

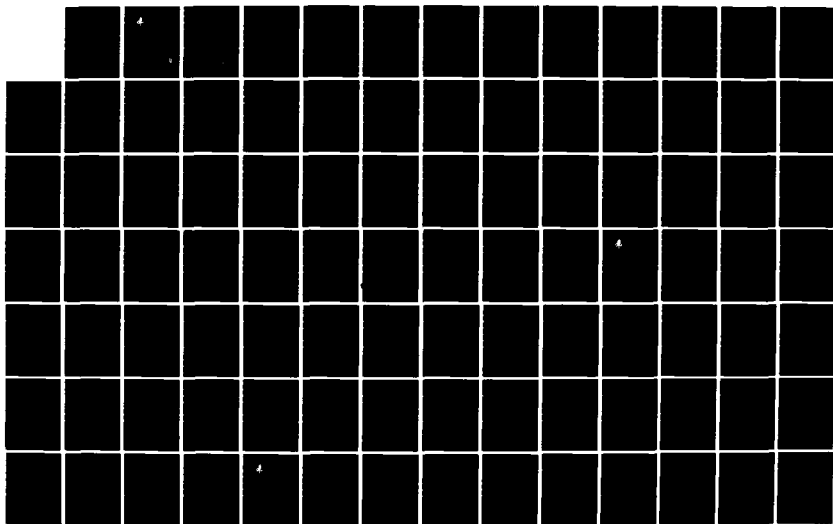
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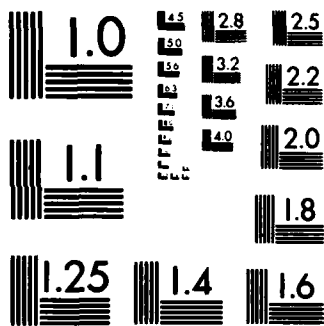
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# RADIO TELETYPE OPERATOR

MOS 05C10

STUDENT GUIDE

05C FBSEP LESSON D-01

CHANGING CIVILIAN TIME TO MILITARY TIME

DABT60-81-C-0027

per Form 50

PREREQUISITE: None

MATERIALS REQUIRED: None

TYPE OF LESSON: Self paced

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## STUDENT GUIDE

05C FBSEP LESSON D-01

### CHANGING CIVILIAN TIME TO MILITARY TIME

#### INTRODUCTION

Military procedures are uniform. They are the same for everyone everywhere. This applies to the way time is expressed. In civilian life, someone might say "a quarter to three"; someone else may use "15 minutes to three"; another person, "two forty-five." All of these mean the same thing but each is stated differently. To avoid confusion, the military uses one, and only one, method for expressing time. You'll see it used constantly on everyday items such as bulletin boards and work schedules. More importantly, as a radio operator you'll need to use it every time you send or receive a message.

This lesson is the first of four lessons dealing with military time. In this lesson you will learn how to convert civilian time to military time. The arrow on the annex map on the next page shows you where this lesson fits in.

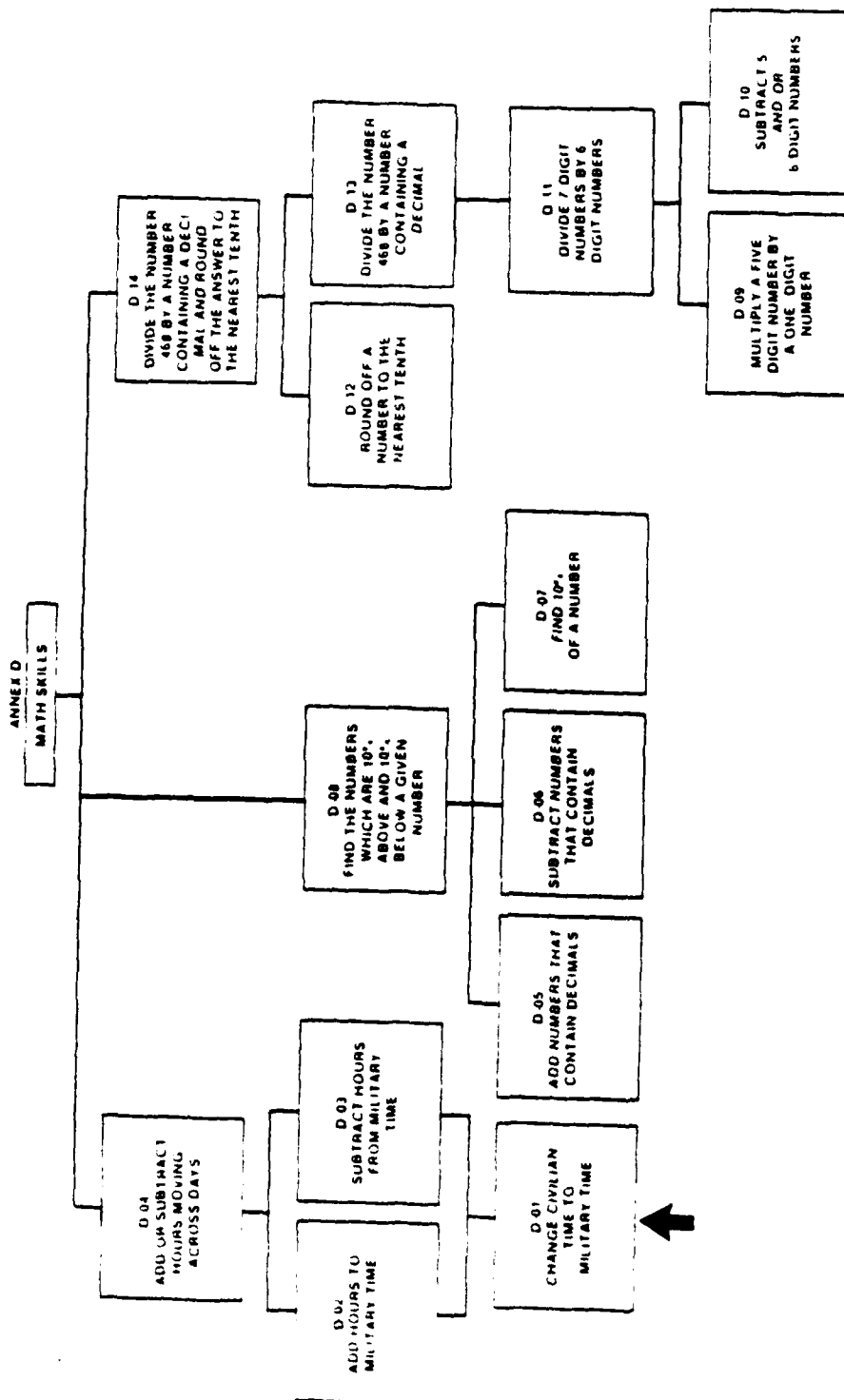
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OBJECTIVE: When you finish this lesson, you will be able to change civilian time to military time format.

To change civilian time to military time, you should:

1. Write civilian time using a colon between hours and minutes past the hour.
  - a. Use two zeros if there are no minutes.
  - b. Use a zero in front of minutes less than 10.
2. Label as either AM or PM.
  - a. Label as AM if the time is between midnight and noon.
  - b. Label as PM if the time is between noon and midnight.
3. Change the number of hours to the number of hours past midnight.
  - a. If the time is AM:
    - (1) Use two zeros if it is after midnight but before 1:00 AM.
    - (2) Use a zero in front of hours less than 10.
  - b. If the time is 1:00 PM or later add 12.
  - c. Drop the colon and the AM/PM label.
  - d. Label as hours.

## PRESENTATION

Before putting all the steps together, let's take a look at each of them separately to be sure you understand what is meant.

STEP 1: Write civilian time using a colon between hours and minutes past the hour.

- a. Use two zeros if there are no minutes.
- b. Use a zero in front of minutes less than 10.

The way you say or hear time expressed is not always the way you want to write it. Take a look at a few examples comparing how you might say or hear time and the way you would write it with a colon and two digits to show minutes past the hour. For those of you familiar with digital clocks, think of the way time is displayed on that type of clock.

## SPOKEN TIME

## WRITTEN TIME

|                                            |       |
|--------------------------------------------|-------|
| ten o'clock                                | 10:00 |
| three o'clock                              | 3:00  |
| twenty after four                          | 4:20  |
| twenty past four                           | 4:20  |
| twenty minutes after four                  | 4:20  |
| four twenty                                | 4:20  |
| five after two                             | 2:05  |
| five past two                              | 2:05  |
| two o five                                 | 2:05  |
| half past seven (half = 30 minutes)        | 7:30  |
| seven thirty                               | 7:30  |
| quarter past eleven (quarter = 15 minutes) | 11:15 |
| eleven fifteen                             | 11:15 |
| ten to ten                                 | 9:50  |
| ten of ten                                 | 9:50  |
| ten till ten                               | 9:50  |
| ten minutes before ten                     | 9:50  |
| nine fifty                                 | 9:50  |
| quarter to six                             | 5:45  |
| fifteen minutes to six                     | 5:45  |
| five forty-five                            | 5:45  |

STEP 2: Label as either AM or PM.

- a. Label as AM if the time is between  
midnight and noon.
- b. Label as PM if the time is between  
noon and midnight.

Labeling as AM or PM accomplishes two things. First, in civilian time it's a "short-cut." It allows you to replace words by an abbreviation. The words "in the morning" may be replaced by the letters AM; the words "in the afternoon," "in the evening," and "at night" may all be replaced by PM. Secondly, it's very helpful when converting civilian time to military time. As you go through the steps that are to follow, you'll see how it's easier. Take a look at how using AM or PM is a "short-cut."

|                                                                                                                                                     |          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|----------|
| 10:00 in the morning                                                                                                                                | 10:00 AM |
| 10:00 at night                                                                                                                                      | 10:00 PM |
| 4:20 in the morning                                                                                                                                 | 4:20 AM  |
| 4:20 in the afternoon                                                                                                                               | 4:20 PM  |
| 11:15 in the morning                                                                                                                                | 11:15 AM |
| 11:15 at night                                                                                                                                      | 11:15 PM |
| 9:50 in the morning                                                                                                                                 | 9:50 AM  |
| 9:50 at night                                                                                                                                       | 9:50 PM  |
| 12:06 (midnight)                                                                                                                                    | 12:06 AM |
| (part a: <u>Label as AM if the time is between</u><br><u>midnight and noon. Six minutes past midnight</u><br><u>is between midnight and noon.</u> ) |          |
| 12:06 (noon)                                                                                                                                        | 12:06 PM |
| (part b: <u>Label as PM if the time is between</u><br><u>noon and midnight. This represents 6 minutes</u><br><u>past noon.</u> )                    |          |

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STEP 3: Change the number of hours to the number of hours past midnight.

a. If the time is AM:

(1) Use two zeros if it is after midnight but before 1:00 AM.

(2) Use a zero in front of hours less than 10.

b. If the time is 1:00 PM or later, add 12.

c. Drop the colon and the AM/PM label.

d. Label as hours.

The key to Step 3 is that military time is always expressed as the number of hours past midnight! Another way of looking at it is to remember that you're always dealing with a 24 hour period of time or with a 24 hour clock.

You need to remember that military time does not use the colon between hours and minutes. It also does not need the label AM or PM since all time will be expressed as hours after midnight.

Now study these examples:



CIVILIAN TIME

MILITARY TIME

10:00 AM

1000 hours

part c: Drop colon and AM label.

part d: Label as hours.

10:00 PM

2200 hours

part b: If time is 1:00 PM or later, add 12.

It might be helpful to remember that

12 noon is 12 hours past midnight;

1:00 PM is 12 noon + 1 more hour past

midnight or  $12+1=13$  hours past midnight;

2:00 PM is  $12+2=14$  hours past midnight;

10:00 PM is  $12+10=22$  hours after midnight,

etc.

4:20 AM

0420 hours

part a (2): Use a zero in front of hours less than 10.

part c: Drop colon and AM label.

part d: Label as hours.

4:20 PM

1620 hours

part b: If time is 1:00 PM or later, add 12.

$$12+4=16$$

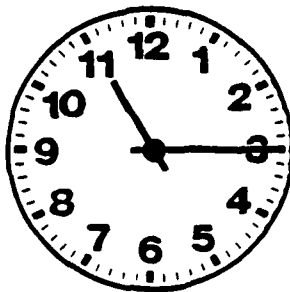
part c: Drop colon and PM label.

part d: Label as hours.

Whether it's day or night the setting on a regular clock is the same. A digital clock will usually display an AM or PM symbol to show the difference. Military time uses the idea of hours past midnight.

11:15 AM

11:15 PM



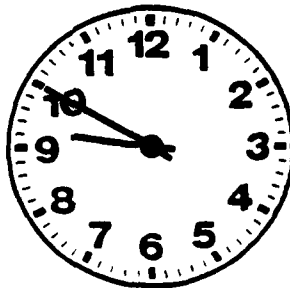
1115 hours

2315 hour

$$(12+11=23)$$

9:50 AM

9:50 PM



0950 hours

2150 hours

$$(12+9=21)$$

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The following problems are very difficult. Study them carefully.

12:06 AM

0006 hours

Remember this means 6 minutes past midnight, namely no hours past midnight. Part a (1): Use two zeros if it is after midnight but before 1:00 AM. In other words, use two zeros if there are no hours past midnight.

12:06 PM

1206 hours

Remember this means 6 minutes past noon, and noon is 12 hours after midnight.

12:28 AM

0028 hours

(28 minutes past midnight; no hours past midnight)

12:28 PM

1228 hours

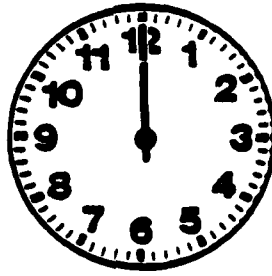
(noon = 12 hours past midnight)

12:49 AM

0049 hours

12:49 PM

1249 hours



12:00 PM

1200 hours

(12 noon = 12 hours past midnight)

12 midnight

2400 hours

(The end of the 24 hour clock or 12 noon + 12 =

12+12=24.)

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D-01 SG  
05C FBSEP

Each of the following examples will start with the civilian time and change it to the correct military time. The work will appear to the right of the part of the procedure that is used. Study each example carefully.

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EXAMPLE 1: Write "five minutes past midnight" as military time.

STEPS

5 minutes  
past midnight

1. Write civilian time using a colon between hours and minutes past the hour.

- a. Use two zeros if there are no minutes.
- b. Use a zero in front of minutes less than 10.

12:05 midnight

2. Label as either AM or PM.

- a. Label as AM if the time is between midnight and noon.
- b. Label as PM if the time is between noon and midnight.

12:05 AM

3. Change the number of hours to the number of hours past midnight.

- a. If the time is AM:
  - (1) Use two zeros if it is after midnight but before 1:00 AM.
  - (2) Use a zero in front of hours less than 10.

0005 hours

- b. If the time is 1:00 PM or later, add 12.
- c. Drop the colon and the AM/PM label.
- d. Label as hours.

ANSWER: 0005 hours

EXAMPLE 2: Write "quarter past two in the morning" as military time. ( $\frac{1}{4}$  hour = 15 minutes). Another way to say this is 15 minutes past 2 in the morning.

STEPS

15 minutes past  
2 in the morning

1. Write civilian time using a colon between hours and minutes past the hour.

2:15 in morning

- a. Use two zeros if there are no minutes.
- b. Use a zero in front of minutes less than 10.

2. Label as either AM or PM.

- a. Label as AM if the time is between midnight and noon.
- b. Label as PM if the time is between noon and midnight.

2:15 AM

3. Change the number of hours to the number of hours past midnight.

- a. If the time is AM:

- (1) Use two zeros if it is after midnight but before 1:00 AM.
- (2) Use a zero in front of hours less than 10.

0215 hours

- b. If the time is 1:00 PM or later, add 12.
- c. Drop the colon and the AM/PM label.
- d. Label as hours.

ANSWER: 0215 hours



EXAMPLE 3: Write "seven minutes past noon" as military time.

STEPS

7 minutes  
past noon

1. Write civilian time using a colon between hours and minutes past the hour.

- a. Use two zeros if there are no minutes.
- b. Use a zero in front of minutes less than 10.

12:07 noon

2. Label as either AM or PM.

- a. Label as AM if the time is between midnight and noon.
- b. Label as PM if the time is between noon and midnight.

12:07 PM

3. Change the number of hours to the number of hours past midnight.

12:07 hours

- a. If the time is AM:
  - (1) Use two zeros if it is after midnight but before 1:00 AM.
  - (2) Use a zero in front of hours less than 10.
- b. If the time is 1:00 PM or later, add 12.
- c. Drop the colon and the AM/PM label.
- d. Label as hours.

ANSWER: 1207 hours

EXAMPLE 4: Write "eighteen to one in the afternoon" as military time. Another way to say this is 42 minutes past 12 noon. ( $60-18=42$ )

STEPS

18 minutes to 1  
in the afternoon

1. Write civilian time using a colon between hours and minutes past the hour.

12:42 noon

- a. Use two zeros if there are no minutes.
- b. Use a zero in front of minutes less than 10.

2. Label as either AM or PM.

- a. Label as AM if the time is between midnight and noon.
- b. Label as PM if the time is between noon and midnight.

12:42 PM

3. Change the number of hours to the number of hours past midnight.

1242 hours

- a. If the time is AM:

- (1) Use two zeros if it is after midnight but before 1:00 AM.
- (2) Use a zero in front of hours less than 10.

- b. If the time is 1:00 PM or later, add 12.
- c. Drop the colon and the AM/PM label.
- d. Label as hours.

ANSWER: 1242 hours

EXAMPLE 5: Write "half past five in the evening" as military time. (1/2 hour = 30 minutes) Another way to say this is 30 minutes past 5 in the evening.

STEPS

30 minutes past  
5 in the evening

1. Write civilian time using a colon between hours and minutes past the hour.

5:30 in the  
evening

- a. Use two zeros if there are no minutes.
- b. Use a zero in front of minutes less than 10.

2. Label as either AM or PM.

- a. Label as AM if the time is between midnight and noon.
- b. Label as PM if the time is between noon and midnight.

5:30 PM

3. Change the number of hours to the number of hours past midnight.

- a. If the time is AM:
  - (1) Use two zeros if it is after midnight but before 1:00 AM.
  - (2) Use a zero in front of hours less than 10.

- b. If the time is 1:00 PM or later, add 12.
- c. Drop the colon and the AM/PM label.
- d. Label as hours.

1730 hours

ANSWER: 1730 hours

EXAMPLE 6: Write "eleven o'clock at night" as military time.

STEPS

11 o'clock  
at night

1. Write civilian time using a colon between hours and minutes past the hour.

- a. Use two zeros if there are no minutes.
- b. Use a zero in front of minutes less than 10.

11:00 at night

2. Label as either AM or PM.

- a. Label as AM if the time is between midnight and noon.
- b. Label as PM if the time is between noon and midnight.

11:00 PM

3. Change the number of hours to the number of hours past midnight.

- a. If the time is AM:
  - (1) Use two zeros if it is after midnight but before 1:00 AM.
  - (2) Use a zero in front of hours less than 10.

- b. If the time is 1:00 PM or later, add 12.
- c. Drop the colon and the AM/PM label.
- d. Label as hours.

2300 hours

ANSWER: 2300 hours

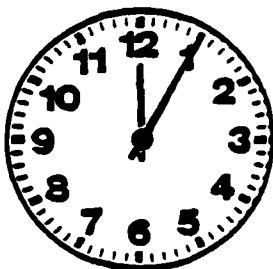
Take a second look at these six examples. Compare the setting on a regular clock, the civilian time, and the corresponding military time.

CIVILIAN TIME

MILITARY TIME

1. Five minutes  
past midnight

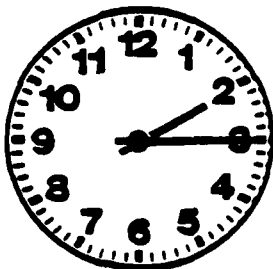
12:05 AM



0005 hours

2. Quarter past two  
in the morning

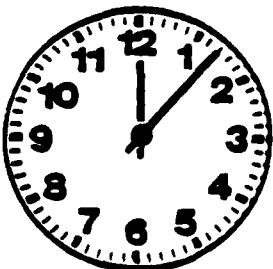
2:15 AM



0215 hours

3. Seven minutes  
past noon

12:07 PM



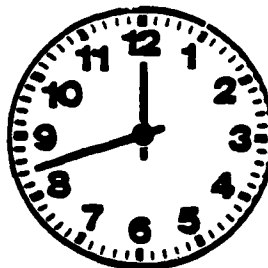
1207 hours

CIVILIAN TIME

MILITARY TIME

4. Eighteen to one  
in the afternoon

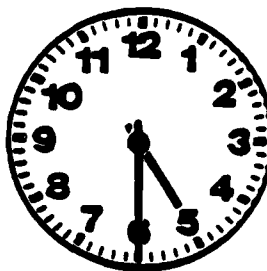
12:42 PM



1242 hours

5. Half past five  
in the evening

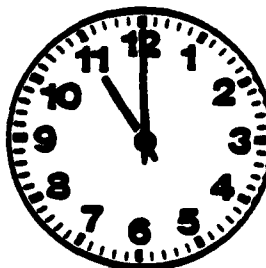
5:30 PM



1730 hours

6. Eleven o'clock  
at night

11:00 PM



2300 hours

## SUMMARY AND PRACTICE

On the next page you will find a Practice Exercise that you are to do on your own. When you've completed it, compare your answers with the ones given. If you have any difficulty, study the detailed Explanations for the Practice Exercise. Ask the learning supervisor about any explanation that is unclear. When you feel you understand how to do the problems, ask the learning supervisor for the Lesson Test.

Before starting the Practice Exercise, review the steps necessary to change civilian time to military time:

1. Write civilian time using a colon between hours and minutes past the hour.
  - a. Use two zeros if there are no minutes.
  - b. Use a zero in front of minutes less than 10.
2. Label as either AM or PM.
  - a. Label as AM if the time is between midnight and noon.
  - b. Label as PM if the time is between noon and midnight.
3. Change the number of hours to the number of hours past midnight.
  - a. If the time is AM:
    - 1) Use two zeros if it is after midnight but before 1:00 AM.
    - 2) Use a zero in front of hours less than 10.
  - b. If the time is 1:00 PM or later, add 12.
  - c. Drop the colon and the AM/PM label.
  - d. Label as hours.

PRACTICE EXERCISE

Write each of the following as military time:

1. Twenty-five minutes past midnight.
2. Quarter to five in the afternoon.
3. Ten o'clock in the morning.
4. Eight minutes past nine at night.
5. Five minutes before nine in the morning.
6. Half past noon.



ANSWERS TO PRACTICE EXERCISE

1. 0025 hours
2. 1645 hours
3. 1000 hours
4. 2108 hours
5. 0855 hours
6. 1230 hours

EXPLANATIONS FOR PRACTICE EXERCISE

1. Write "twenty-five past midnight" as military time.

STEPS

25 minutes  
past midnight

1. Write civilian time using a colon between hours and minutes past the hour.

12:25 midnight

- a. Use two zeros if there are no minutes.  
b. Use a zero in front of minutes less than 10.

2. Label as either AM or PM.

- a. Label as AM if the time is between midnight and noon.  
b. Label as PM if the time is between noon and midnight.

12:25 AM

3. Change the number of hours to the number of hours past midnight.

- a. If the time is AM:

- (1) Use two zeros if it is after midnight but before 1:00 AM.  
(2) Use a zero in front of hours less than 10.

0025 hours

- b. If the time is 1:00 PM or later, add 12.  
c. Drop the colon and the AM/PM label.  
d. Label as hours.

ANSWER: 0025 hours

2. Write "quarter to five in the afternoon" as military time. (1/4 hour = 15 minutes). Another way to say this is 45 minutes past 4 in the afternoon.

STEPS

45 minutes past  
4 in the afternoon

1. Write civilian time using a colon between hours and minutes past the hour.

4:45 in the  
afternoon

- a. Use two zeros if there are no minutes.
- b. Use a zero in front of minutes less than 10.

2. Label as either AM or PM.

- a. Label as AM if the time is between midnight and noon.
- b. Label as PM if the time is between noon and midnight.

4:45 PM

3. Change the number of hours to the number of hours past midnight.

- a. If the time is AM:
  - (1) Use two zeros if it is after midnight but before 1:00 AM.
  - (2) Use a zero in front of hours less than 10.
- b. If the time is 1:00 PM or later, add 12.
- c. Drop the colon and the AM/PM label.
- d. Label as hours.

1645 hours

ANSWER: 1645 hours

3. Write "ten o'clock in the morning" as military time.

STEPS

10 o'clock  
in the morning

1. Write civilian time using a colon between hours and minutes past the hour.
  - a. Use two zeros if there are no minutes.
  - b. Use a zero in front of minutes less than 10.
2. Label as either AM or PM.
  - a. Label as AM if the time is between midnight and noon.
  - b. Label as PM if the time is between noon and midnight.
3. Change the number of hours to the number of hours past midnight.
  - a. If the time is AM :
    - (1) Use two zeros if it is after midnight but before 1:00 AM.
    - (2) Use a zero in front of hours less than 10.
  - b. If the time is 1:00 PM or later, add 12.
  - c. Drop the colon and the AM/PM label.
  - d. Label as hours.

10:00 in the  
morning

10:00 AM

1000 hours

ANSWER: 1000 hours

4. Write "eight minutes past nine at night" as military time.

#### STEPS

8 minutes past  
9 at night

1. Write civilian time using a colon between hours and minutes past the hour.

- a. Use two zeros if there are no minutes.
- b. Use a zero in front of minutes less than 10.

9:08 at night

2. Label as either AM or PM.

- a. Label as AM if the time is between midnight and noon.
- b. Label as PM if the time is between noon and midnight.

9:08 PM

3. Change the number of hours to the number of hours past midnight.

- a. If the time is AM:
  - (1) Use two zeros if it is after midnight but before 1:00 AM.
  - (2) Use a zero in front of hours less than 10.

- b. If the time is 1:00 PM or later, add 12.
- c. Drop the colon and the AM/PM label.
- d. Label as hours.

2108 hours

ANSWER: 2108 hours

5. Write "five minutes before nine in the morning" as military time. Another way to say this is 55 minutes past 8 in the morning. ( $60-5=55$ )

#### STEPS

55 minutes past  
8 in the morning

1. Write civilian time using a colon between hours and minutes past the hour.

8:55 in the  
morning

- a. Use two zeros if there are no minutes.
- b. Use a zero in front of minutes less than 10.

2. Label as either AM or PM.

- a. Label as AM if the time is between midnight and noon.
- b. Label as PM if the time is between noon and midnight.

8:55 AM

3. Change the number of hours to the number of hours past midnight.

- a. If the time is AM;
  - (1) Use two zeros if it is after midnight but before 1:00 A.M.
  - (2) Use a zero in front of hours less than 10.

0855 hours

- b. If the time is 1:00 PM or later, add 12.
- c. Drop the colon and the AM/PM label.
- d. Label as hours.

ANSWER: 0855 hours

6. Write "half past noon" as military time. (1/2 hours = 30 minutes). Another way to say this is 30 minutes past noon.

STEPS

30 minutes  
past noon

1. Write civilian time using a colon between hours and minutes past the hour.

12:30 noon

- a. Use two zeros if there are no minutes.
- b. Use a zero in front of minutes less than 10.

2. Label as either AM or PM.

- a. Label as AM if the time is between midnight and noon.
- b. Label as PM if the time is between noon and midnight.

12:30 PM

3. Change the number of hours to the number of hours past midnight.

1230 hours

- a. If the time is AM:
  - (1) Use two zeros if it is after midnight but before 1:00 AM.
  - (2) Use a zero in front of hours less than 10.
- b. If the time is 1:00 PM or later, add 12.
- c. Drop the colon and the AM/PM label.
- d. Label as hours.

ANSWER: 1230 hours

OBTAIN LESSON TEST FROM LEARNING SUPERVISOR

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### REMEDIATION

This section of the Student Guide contains an extra practice exercise for you to try. It is called a Remediation Exercise. The answers, as well as detailed explanations, are also included. Be sure to study them carefully.

You must do well on the retest for this FBSEP lesson before you can go on to another FBSEP lesson or to an 05C AIT lesson. So, before taking the retest, be sure you understand all the examples that you've seen, or done, in this lesson and ask the learning supervisor to explain anything you don't understand.

Once more, review the rules necessary to change civilian time to military time and then try the Remediation Exercise. Good Luck!

1. Write civilian time using a colon between hours and minutes past the hour.
  - a. Use two zeros if there are no minutes.
  - b. Use a zero in front of minutes less than 10.
2. Label as either AM or PM.
  - a. Label as AM if the time is between midnight and noon.
  - b. Label as PM if the time is between noon and midnight.
3. Change the number of hours to the number of hours past midnight.
  - a. If the time is AM:
    - (1) Use two zeros if it is after midnight but before 1:00 AM.
    - (2) Use a zero in front of hours less than 10.
  - b. If the time is 1:00 PM or later, add 12.
  - c. Drop the colon and the AM/PM label.
  - d. Label as hours.

D-01 SG  
05C FBSEP

REMEDIATION EXERCISE

Write each of the following as military time:

1. Twenty-three minutes past six in the morning.
2. Seven minutes after eleven at night.
3. Eleven minutes before one in the afternoon.
4. Two o'clock in the morning.
5. Half past midnight.
6. Quarter past seven in the evening.

ANSWERS TO REMEDIATION EXERCISE

1. 0623 hours
2. 2307 hours
3. 1249 hours
4. 0200 hours
5. 0030 hours
6. 1915 hours

EXPLANATIONS FOR REMEDIATION EXERCISE

1. Write "twenty-three minutes past six in the morning" as military time.

STEPS

23 minutes past 6  
in the morning

1. Write civilian time using a colon between hours and minutes past the hour.
  - a. Use two zeros if there are no minutes.
  - b. Use a zero in front of minutes less than 10.

6:23 in the  
morning

2. Label as either AM or PM.
  - a. Label as AM if the time is between midnight and noon.
  - b. Label as PM if the time is between noon and midnight.

6:23 AM

3. Change the number of hours to the number of hours past midnight.
  - a. If the time is AM:
    - (1) Use two zeros if it is after midnight but before 1:00 AM.
    - (2) Use a zero in front of hours less than 10.
  - b. If the time is 1:00 PM or later, add 12.
  - c. Drop the colon and the AM/PM label.
  - d. Label as hours.

0623 hours

ANSWER: 0623 hours

2. Write "seven minutes after eleven at night" as military time.

STEPS

7 minutes after  
11 at night

1. Write civilian time using a colon between hours and minutes past the hour.

- a. Use two zeros if there are no minutes.
- b. Use a zero in front of minutes less than 10.

11:07 at night

2. Label as either AM or PM.

- a. Label as AM if the time is between midnight and noon.
- b. Label as PM if the time is between noon and midnight.

11:07 PM

3. Change the number of hours to the number of hours past midnight.

- a. If the time is AM:
  - (1) Use two zeros if it is after midnight but before 1:00 AM.
  - (2) Use a zero in front of hours less than 10.
- b. If the time is 1:00 PM or later, add 12.
- c. Drop the colon and the AM/PM label.
- d. Label as hours.

2307 hours

ANSWER: 2307 hours

3. Write "eleven minutes before one in the afternoon" as military time. Another way to say this is 49 minutes after 12 in the afternoon. (60-11=49)

#### STEPS

49 minutes after  
12 in the afternoon

1. Write civilian time using a colon between hours and minutes past the hour.
  - a. Use two zeros if there are no minutes.
  - b. Use a zero in front of minutes less than 10.
2. Label as either AM or PM.
  - a. Label as AM if the time is between midnight and noon.
  - b. Label as PM if the time is between noon and midnight.
3. Change the number of hours to the number of hours past midnight.
  - a. If the time is AM:
    - (1) Use two zeros if it is after midnight but before 1:00 AM.
    - (2) Use a zero in front of hours less than 10.
  - b. If the time is 1:00 PM or later, add 12.
  - c. Drop the colon and the AM/PM label.
  - d. Label as hours.

12:49 in the  
afternoon

12:49 PM

1249 hours

ANSWER: 1249 hours



4. Write "two o'clock in the morning" as military time.

STEPS

2 o'clock in  
the morning

1. Write civilian time using a colon between hours and minutes past the hour.

- a. Use two zeros if there are no minutes.
- b. Use a zero in front of minutes less than 10.

2:00 in the  
morning

2. Label as either AM or PM.

- a. Label as AM if the time is between midnight and noon.
- b. Label as PM if the time is between noon and midnight.

2:00 AM

3. Change the number of hours to the number of hours past midnight.

- a. If the time is AM:
  - (1) Use two zeros if it is after midnight but before 1:00 AM.
  - (2) Use a zero in front of hours less than 10.
- b. If the time is 1:00 PM or later, add 12.
- c. Drop the colon and the AM/PM label.
- d. Label as hours.

0200 hours

ANSWER: 0200 hours

5. Write "half past midnight" as military time.  
(1/2 hours = 30 minutes). Another way to say this is  
30 minutes past midnight.

#### STEPS

30 minutes  
past midnight

1. Write civilian time using a colon between hours and minutes past the hour.

12:30 midnight

- a. Use two zeros if there are no minutes.
- b. Use a zero in front of minutes less than 10.

2. Label as either AM or PM.

- a. Label as AM if the time is between midnight and noon.
- b. Label as PM if the time is between noon and midnight.

12:30 AM

3. Change the number of hours to the number of hours past midnight.

- a. If the time is AM:

- (1) Use two zeros if it is after midnight but before 1:00 AM.
- (2) Use a zero in front of hours less than 10.

0030 hours

- b. If the time is 1:00 PM or later, add 12.
- c. Drop the colon and the AM/PM label.
- d. Label as hours.

ANSWER: 0030 hours

6. Write "quarter past seven in the evening" as military time. (1/4 hours = 15 minutes). Another way to say this is 15 minutes past 7 in the evening.

STEPS

15 minutes past 7  
in the evening

1. Write civilian time using a colon between hours and minutes past the hour.

a. Use two zeros if there are no minutes.  
b. Use a zero in front of minutes less than 10.
2. Label as either AM or PM.

a. Label as AM if the time is between midnight and noon.  
b. Label as PM if the time is between noon and midnight.
3. Change the number of hours to the number of hours past midnight.

a. If the time is AM:  
(1) Use two zeros if it is after midnight but before 1:00 AM.  
(2) Use a zero in front of hours less than 10.

b. If the time is 1:00 PM or later, add 12.

c. Drop the colon and the AM/PM label.

d. Label as hours.

7:15 in the  
evening

7:15 PM

1915 hours

ANSWER: 1915 hours

OBTAIN REMEDIATION TEST FROM LEARNING SUPERVISOR

D-01 SG  
05C FBSEP

# ANSWER KEY FOR LESSON TEST D-01

This answer key contains the correct responses for Lesson Test D-01. Each problem is worth one point. Students must get 5 out of 6 total points to pass this test.

1. 1730 hours
2. 2100 hours
3. 0052 hours
4. 0945 hours
5. 1210 hours
6. 0809 hours

ANSWER KEY FOR REMEDIATION TEST D-01

This answer key contains the correct responses for Remediation Test D-01. Each problem is worth one point. Students must get 5 out of 6 total points to pass this test.

1. 0503 hours
2. 1218 hours
3. 1115 hours
4. 1500 hours
5. 0050 hours
6. 2245 hours

# LESSON TEST FOR D-01

You will need some paper and a pencil to do this Lesson Test. It contains six problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 5 out of 6 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

Write each of the following as military time:

1. Half past five in the evening.
2. Nine o'clock at night.
3. Eight minutes before one in the morning.
4. Quarter to ten in the morning.
5. Ten minutes past noon.
6. Nine minutes after eight in the morning.

# REMEDICATION TEST FOR D-01

You will need some paper and a pencil to do this Remediation Test. It contains six problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 5 out of 6 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

Write each of the following as military time:

1. Three minutes past five in the morning.
2. Eighteen minutes past noon.
3. Quarter past eleven in the morning.
4. Three o'clock in the afternoon.
5. Ten minutes before one in the morning.
6. Quarter to eleven at night.





**FBSEP**

# **RADIO TELETYPE OPERATOR**

**MOS 05C10**

**STUDENT GUIDE**

**05C FBSEP LESSON D-02**

**ADDING HOURS TO MILITARY TIME**

**PREREQUISITE: None**

**MATERIALS REQUIRED: None**

**TYPE OF LESSON: Self paced**

## STUDENT GUIDE

### 05C FBSEP LESSON D-02

#### ADDING HOURS TO MILITARY TIME

##### INTRODUCTION

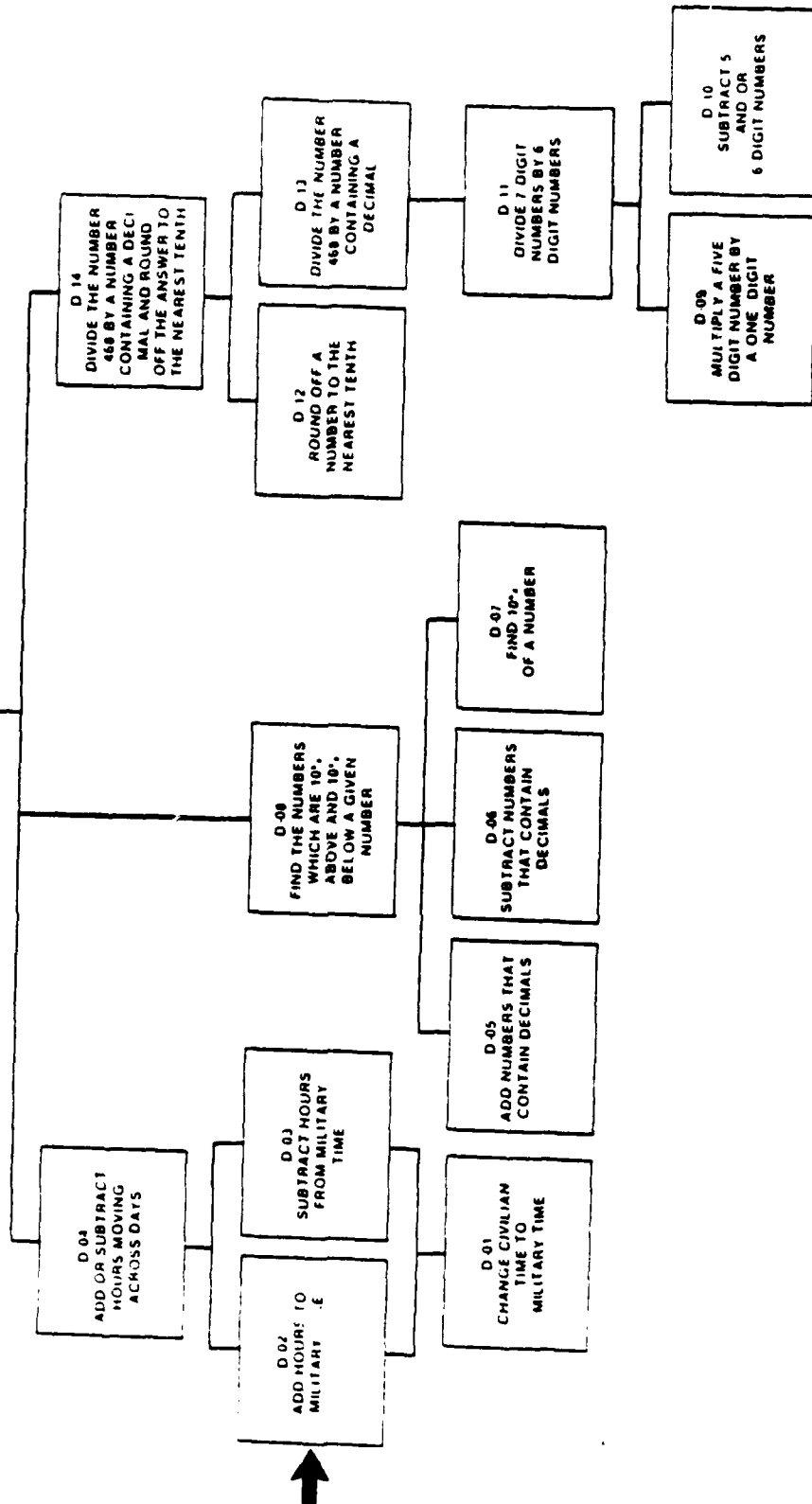
In this lesson you are going to learn how to add hours to military time. If you do not understand how military time is written, ask the learning supervisor for Lesson D-01, Converting Civilian Time to Military Time. You have to understand how military time is written before you do this lesson.

You may very well ask when you will have to add hours to military time. Let's say you're stationed on the West Coast and it is 0430 hours and you need to send a message to a station on the East Coast. You also know there's a 3-hour difference between the West and East Coasts. To find out the East Coast time, you have to add 3 hours to your West Coast time. In other words, you want to add 3 hours to 0430 hours. The purpose of this lesson is to show you how to do this.

In the AIT 05C Course you'll learn about the differences in time between West and East Coast, between the United States and Europe, and between various other time zones. You'll also learn when to add and when to subtract hours. This lesson will teach you how to add hours to military time so that you'll be ready for the AIT 05C Course.

This lesson is the second of four lessons dealing with military time. The arrow on the Annex Map on the next page shows you where this lesson fits in.

ANNEX D  
MATH SKILLS



OBJECTIVE: When you finish this lesson, you will be able to add hours to military time. The answer will never be more than 2400.

To add hours to military time, you should:

1. Multiply the number of hours by 100.
2. Add this new number to the military time.

## PRESENTATION

Take a closer look at the arithmetic that you will use in each step.

STEP 1: To multiply any number by 100 is simple once you know how. Just add two zeros to the number.

For example:

|                   |      |                          |
|-------------------|------|--------------------------|
| $7 \times 100 =$  | 700  | 7 followed by two zeros  |
| $12 \times 100 =$ | 1200 | 12 followed by two zeros |
| $1 \times 100 =$  | 100  | 1 followed by two zeros  |
| $11 \times 100 =$ | 1100 | 11 followed by two zeros |
| $10 \times 100 =$ | 1000 | 10 followed by two zeros |

STEP 2: Step two of the process is adding. Adding large groups of numbers can sometimes be a chore. Here, however, you'll be adding only two numbers together. One of the numbers will be like those in Step 1. It will contain at least two zeros. Having zeros in the numbers makes adding easier. Step two looks like this:

|       |        |        |
|-------|--------|--------|
| 1620  | 0346   | 1013   |
| + 300 | + 1200 | + 1100 |
| 1920  | 1546   | 2113   |

Putting together these two steps is what's required to add hours to military time. Here are a few examples:

EXAMPLE 1: Add 3 hours to 0430 hours.

In this example, 3 is the number of hours to be added to the military time of 0430 hours.

STEP 1: Multiply the number of hours by 100.

Multiply 3 by 100.

$$3 \times 100 = 300$$

STEP 2: Add this new number to the military time. In this example that means adding 300 to 0430 hours:

$$\begin{array}{r} 0430 \text{ hours} \\ + \quad 300 \\ \hline 0730 \text{ hours} \end{array}$$

The answer is 0730 hours. Remember to write the word "hours" after the sum. Notice you write (or bring down) the 0 in front of the 7, writing 0730 hours and not just 730 hours. Your sum must be in military time.

EXAMPLE 2: Add 4 hours to 1525 hours.

In this example, 4 is the number of hours to be added to the military time of 1525 hours.

STEP 1: Multiply the number of hours by 100.

Here multiply 4 by 100.

$$4 \times 100 = 400$$

STEP 2: Add this new number to the military time.

Here add 400 to 1525 hours:

$$\begin{array}{r} 1525 \text{ hours} \\ + \quad 400 \\ \hline 1925 \text{ hours} \end{array}$$

ANSWER: 1925 hours



EXAMPLE 3: Add 7 hours to 0030 hours.

STEP 1: Multiply 7 by 100.

$$7 \times 100 = 700$$

STEP 2: Add 700 to 0030 hours.

0030 hours  
+ 700  

---

0730 hours  
    ↖ 0 for military time format

ANSWER: 0730 hours

EXAMPLE 4: Add 10 hours to 1250 hours.

STEP 1: Multiply 10 by 100.

$$10 \times 100 = 1000$$

STEP 2: Add 1000 to 1250 hours.

$$\begin{array}{r} 1250 \text{ hours} \\ + 1000 \\ \hline 2250 \text{ hours} \end{array}$$

ANSWER: 2250 hours

EXAMPLE 5: Add 12 hours to 0716 hours.

STEP 1: Multiply 12 by 100.

$$12 \times 100 = 1200$$

STEP 2: Add 1200 to 0716 hours.

$$\begin{array}{r} 0716 \text{ hours} \\ + 1200 \\ \hline 1916 \text{ hours} \end{array}$$

ANSWER: 1916 hours

EXAMPLE 6: Add 11 hours to 0012 hours.

STEP 1: Multiply 11 by 100.

$$11 \times 100 = 1100$$

STEP 2: Add 1100 to 0012 hours.

$$\begin{array}{r} 0012 \text{ hours} \\ + 1100 \\ \hline 1112 \text{ hours} \end{array}$$

ANSWER: 1112 hours

### SUMMARY AND PRACTICE

Review the two steps necessary to add hours to military time:

1. Multiply the number of hours by 100.
2. Add this new number to the military time.

Now you should be ready to try the Practice Exercise. Use scratch paper to work out the problems. Write your answers on another sheet of paper. DO NOT WRITE ON THIS LESSON. After completing the problems, check your answers with those listed in the Answers to Practice Exercise. If any of your answers are wrong, look at the Explanations for the Practice Exercise. If you still have problems with the solutions that are given, ask the learning supervisor for help. When you feel certain about these solutions, ask the learning supervisor for the Lesson Test. Good Luck!

PRACTICE EXERCISE

1. Add 5 hours to 1415 hours.
2. Add 12 hours to 0045 hours.
3. Add 2 hours to 0748 hours.
4. Add 11 hours to 0509 hours.
5. Add 1 hour to 0027 hours.
6. Add 10 hours to 1315 hours.

ANSWERS TO PRACTICE EXERCISE

1. 1915 hours
2. 1245 hours
3. 0948 hours
4. 1609 hours
5. 0127 hours
6. 2315 hours

EXPLANATIONS FOR PRACTICE EXERCISE

1. Add 5 hours to 1415 hours.

5 is the number of hours to be added to the military time of 1415 hours.

STEP 1: Multiply the number of hours by 100.

Multiply 5 by 100.

$$5 \times 100 = 500$$

STEP 2: Add this new number to the military time.

Add 500 to 1415 hours

$$\begin{array}{r} 1415 \text{ hours} \\ + 500 \\ \hline 1915 \text{ hours} \end{array}$$

ANSWER: 1915 hours



2. Add 12 hours to 0045 hours.

12 is the number of hours to be added to the military time of 0045 hours.

STEP 1: Multiply the number of hours by 100.

Multiply 12 by 100.

$$12 \times 100 = 1200$$

STEP 2: Add this new number to the military time.

Add 1200 to 0045 hours

$$\begin{array}{r} 0045 \text{ hours} \\ + 1200 \\ \hline 1245 \text{ hours} \end{array}$$

ANSWER: 1245 hours

3. Add 2 hours to 0748 hours.

2 is the number of hours to be added to the military time of 0748 hours.

STEP 1: Multiply the number of hours by 100.

Multiply 2 by 100.

$$2 \times 100 = 200$$

STEP 2: Add this new number to the military time.

Add 200 to 0748 hours.

|            |
|------------|
| 0748 hours |
| + 200      |
| <hr/>      |
| 0948 hours |

0 for military time format

ANSWER: 0948 hours

4. Add 11 hours to 0509 hours.

11 is the number of hours to be added to the military time of 0509 hours.

STEP 1: Multiply the number of hours by 100.

Multiply 11 by 100.

$$11 \times 100 = 1100$$

STEP 2: Add this new number to the military time.

Add 1100 to 0509 hours.

$$\begin{array}{r} 0509 \text{ hours} \\ + 1100 \\ \hline 1609 \text{ hours} \end{array}$$

ANSWER: 1609 hours

5. Add 1 hour to 0027 hours.

1 is the number of hours to be added to the military time of 0027 hours.

STEP 1: Multiply the number of hours by 100.

Multiply 1 by 100.

$$1 \times 100 = 100$$

STEP 2: Add this new number to the military time.

Add 100 to 0027 hours.

|            |
|------------|
| 0027 hours |
| + 100      |
| <hr/>      |
| 0127 hours |

↖ 0 for military time format

ANSWER: 0127 hours

6. Add 10 hours to 1315 hours.

10 is the number of hours to be added to the military time of 1315 hours.

STEP 1: Multiply the number of hours by 100.

Multiply 10 by 100.

$$10 \times 100 = 1000$$

STEP 2: Add this new number to the military time.

Add 1000 to 1315 hours.

$$\begin{array}{r} 1315 \text{ hours} \\ + 1000 \\ \hline 2315 \text{ hours} \end{array}$$

ANSWER: 2315 hours

OBTAIN LESSON TEST FROM LEARNING SUPERVISOR

D-02 SG  
05C FBSEP

### REMEDIATION

This section of the lesson contains another practice exercise for you to try; it is called a Remediation Exercise. Check your answers against the Answers to Remediation Exercise.

Next, you should read the Explanations for Remediation Exercise which contains a detailed solution for each problem. If after studying these explanations you still have questions, ask the learning supervisor to assist you. It is important that you do well on the test scheduled at the end of this section.

Before you begin, take a minute to review the steps necessary for adding hours to military time:

1. Multiply the number of hours by 100.
2. Add this new number to the military time.

REMEDIATION EXERCISE

1. Add 4 hours to 1608 hours.
2. Add 5 hours to 0030 hours.
3. Add 3 hours to 0621 hours.
4. Add 10 hours to 0849 hours.
5. Add 12 hours to 0056 hours.
6. Add 11 hours to 1135 hours.



ANSWERS TO REMEDIATION EXERCISE

1. 2008 hours
2. 0530 hours
3. 0921 hours
4. 1849 hours
5. 1256 hours
6. 2235 hours

EXPLANATIONS FOR REMEDIATION EXERCISE

1. Add 4 hours to 1608 hours.

4 is the number of hours to be added to the military time of 1608 hours.

STEP 1: Multiply the number of hours by 100.

Multiply 4 by 100.

$$4 \times 100 = 400$$

STEP 2: Add this new number to the military time.

Add 400 to 1608 hours.

$$\begin{array}{r} 1608 \text{ hours} \\ + \quad 400 \\ \hline 2008 \text{ hours} \end{array}$$

ANSWER: 2008 hours

2. Add 5 hours to 0030 hours.

5 is the number of hours to be added to the military time of 0030 hours.

STEP 1: Multiply the number of hours by 100.

Multiply 5 by 100.

$$5 \times 100 = 500$$

STEP 2: Add this new number to the military time.

Add 500 to 0030 hours.

$$\begin{array}{r} 0030 \text{ hours} \\ + \quad 500 \\ \hline 0530 \text{ hours} \end{array}$$

ANSWER: 0530 hours

3. Add 3 hours to 0621 hours.

3 is the number of hours to be added to the military time of 0621 hours.

STEP 1: Multiply the number of hours by 100.

Multiply 3 by 100.

$$3 \times 100 = 300$$

STEP 2: Add this new number to the military time.

Add 300 to 0621 hours.

$$\begin{array}{r} 0621 \text{ hours} \\ + \quad 300 \\ \hline 0921 \text{ hours} \end{array}$$

ANSWER: 0921 hours

4. Add 10 hours to 0849 hours.

10 is the number of hours to be added to the military time of 0849 hours.

STEP 1: Multiply the number of hours by 100.

Multiply 10 by 100.

$$10 \times 100 = 1000$$

STEP 2: Add this new number to the military time.

Add 1000 to 0849 hours.

$$\begin{array}{r} 0849 \text{ hours} \\ + 1000 \\ \hline 1849 \text{ hours} \end{array}$$

ANSWER: 1849 hours

5. Add 12 hours to 0056 hours.

12 is the number of hours to be added to the military time 0056 hours.

STEP 1: Multiply the number of hours by 100.

Multiply 12 by 100.

$$12 \times 100 = 1200$$

STEP 2: Add this new number to the military time.

Add 1200 to 0056 hours.

$$\begin{array}{r} 0056 \text{ hours} \\ + 1200 \\ \hline 1256 \text{ hours} \end{array}$$

ANSWER: 1256 hours

6. Add 11 hours to 1135 hours.

11 is the number of hours to be added to the military time of 1135 hours.

STEP 1: Multiply the number of hours by 100.

Multiply 11 by 100.

$$11 \times 100 = 1100$$

STEP 2: Add this new number to the military time.

Add 1100 to 1135 hours.

$$\begin{array}{r} 1135 \text{ hours} \\ + 1100 \\ \hline 2235 \text{ hours} \end{array}$$

ANSWER: 2235 hours

OBTAIN REMEDIATION TEST FROM LEARNING SUPERVISOR

D-02 SG  
05C FBSEP



## LESSON TEST FOR D-02

You will need some paper and a pencil to do this Lesson Test. It contains five problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 4 out of 5 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

1. Add 6 hours to 0036 hours.
2. Add 10 hours to 1259 hours.
3. Add 8 hours to 0105 hours.
4. Add 3 hours to 2013 hours.
5. Add 11 hours to 0015 hours.

## REMEDIATION TEST FOR D-02

You will need some paper and a pencil to do this Remediation Test. It contains five problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 4 out of 5 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

1. Add 4 hours to 0930 hours.
2. Add 12 hours to 0025 hours.
3. Add 5 hours to 1647 hours.
4. Add 9 hours to 0052 hours.
5. Add 1 hour to 2110 hours.

ANSWER KEY FOR LESSON TEST D-02

This answer key contains the correct responses for Lesson Test D-02. Each problem is worth one point. Students must get 4 out of 5 total points to pass this test.

1. 0636 hours.
2. 2259 hours.
3. 0905 hours.
4. 2313 hours.
5. 1115 hours.

ANSWER KEY FOR REMEDIATION TEST D-02

This answer key contains the correct responses for Remediation Test D-02. Each problem is worth one point. Students must get 4 out of 5 total points to pass this test.

1. 1330

2. 1225

3. 2147

4. 0952

5. 2210



**FBSEP**

# **RADIO TELETYPE OPERATOR**

**MOS 05C10**

**STUDENT GUIDE**

**05C FBSEP LESSON D-03**

**SUBTRACTING HOURS FROM MILITARY TIME**

**PREREQUISITE: None**

**MATERIALS REQUIRED: None**

**TYPE OF LESSON: Self paced**

## STUDENT GUIDE

### 05C FBSEP LESSON D-03

#### SUBTRACTING HOURS FROM MILITARY TIME

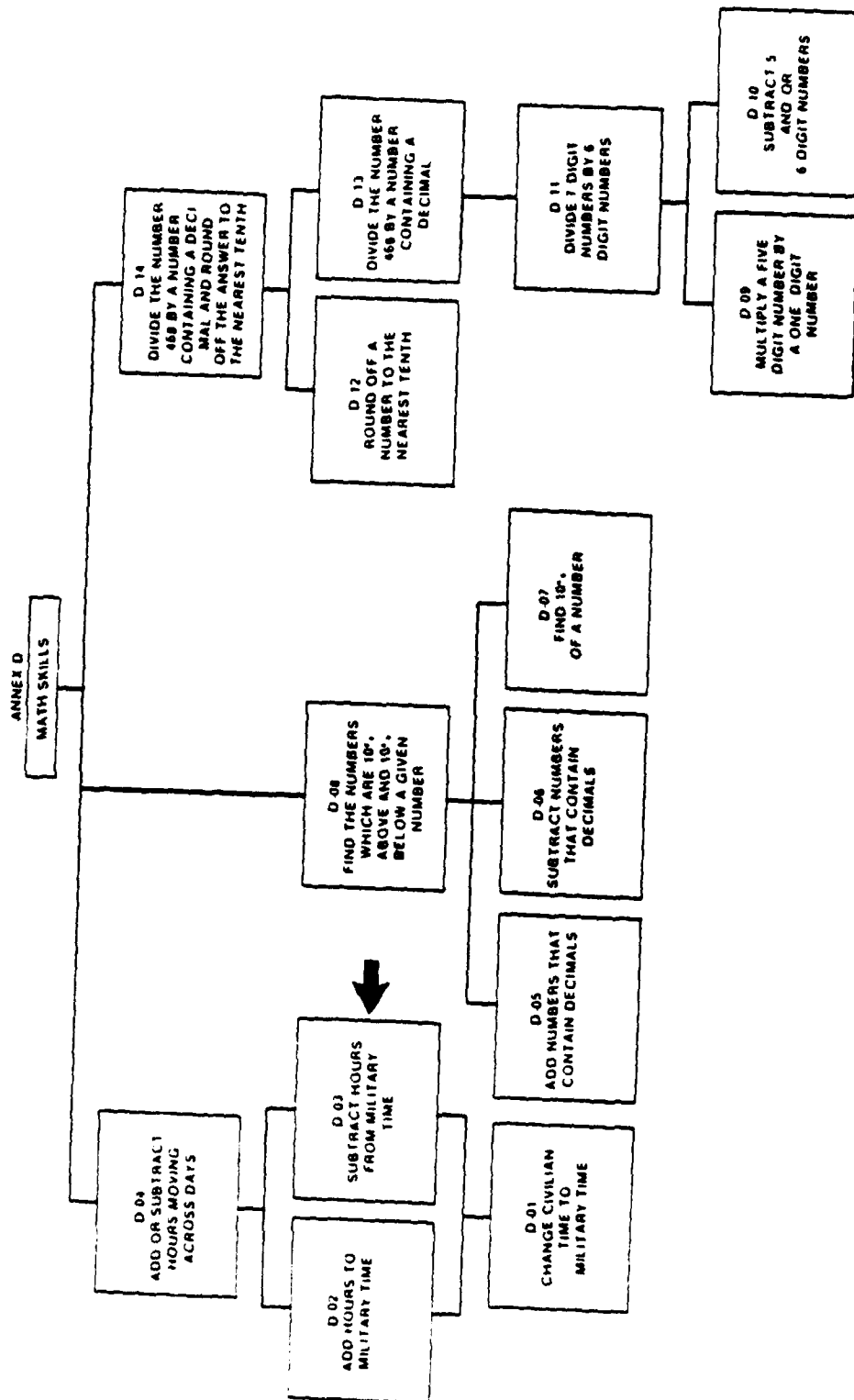
##### INTRODUCTION

In this lesson you are going to learn how to subtract hours from military time. If you do not understand how military time is written, ask your learning supervisor for the lesson D-01, Converting Civilian Time to Military Time. Understanding military time is important to this lesson.

As a radio operator, you may very well need to send messages from one time zone to another. Two different areas sometimes have different times. For example, the East and West coasts of this country are in different time zones. In the 05C AIT Course you'll learn about the various time zones and what the difference in time between them is. This FBSEP lesson will show you how to do the arithmetic involved.

This lesson is very similar to FBSEP Lesson D-02, Add Hours to Military Time. The procedures are identical except in D-02 the operation is addition and here, in D-03, subtraction is involved.

The arrow on the Annex Map on the next page shows you where this lesson fits in.





OBJECTIVE: When you finish this lesson, you will be able to subtract hours from military time. The difference will always be greater than zero.

To subtract hours from military time you should:

1. Multiply the number of hours by 100.
2. Subtract this new number from the military time.

### PRESENTATION

Before going on, examine each of these steps separately.

STEP 1: To multiply any number by 100 is easy once you know how. It means adding on two zeros following that number. For example:

|          |   |      |                          |
|----------|---|------|--------------------------|
| 5 x 100  | = | 500  | 5 followed by two zeros  |
| 12 x 100 | = | 1200 | 12 followed by two zeros |
| 1 x 100  | = | 100  | 1 followed by two zeros  |
| 11 x 100 | = | 1100 | 11 followed by two zeros |
| 10 x 100 | = | 1000 | 10 followed by two zeros |

STEP 2: Subtracting two numbers can sometimes be a bit tricky. However, here the number to be subtracted has at least two zeros in it. This makes the subtraction easier. Look at these samples:

$$\begin{array}{r} 1. \quad 859 \\ - \quad 300 \\ \hline 559 \end{array}$$

$$\begin{array}{r} 2. \quad 1200 \\ - \quad 1000 \\ \hline 200 \end{array}$$

$$\begin{array}{r} 3. \quad 1837 \\ - \quad 1600 \\ \hline 237 \end{array}$$

$$\begin{array}{r} 4. \quad 2315 \\ - \quad 500 \\ \hline 1815 \end{array}$$

For the problems in this lesson, you'll need to put together these two steps, multiplying by 100 and subtracting. You'll be given problems like this: Subtract 3 hours from 1930 hours.

EXAMPLE 1: Subtract 3 hours from 1930 hours.

In this example, 3 is the number of hours to be subtracted from the military time of 1930 hours.

STEP 1: Multiply the number of hours by 100.

Here, you multiply by 100.

$$3 \times 100 = 300$$

STEP 2: Subtract this new number from the military time.

In this example you need to subtract 300 from 1930 hours.

$$\begin{array}{r} 1930 \text{ hours} \\ - \quad 300 \\ \hline 1630 \end{array}$$

Be sure to put the new number, namely the answer from Step 1, on the bottom of the subtraction problem. Look at it again.

$$\begin{array}{r} 1930 \\ - \quad 300 \\ \hline \end{array} \qquad \text{NOT} \qquad \begin{array}{r} 300 \\ - 1930 \\ \hline \end{array}$$

300 is the answer from Step 1 and goes on the bottom of the subtraction problem.

Therefore:

$$\begin{array}{r} 1930 \text{ hours} \\ - \quad 300 \\ \hline 1630 \text{ hours} \end{array}$$

ANSWER: 1630 hours

EXAMPLE 2: Subtract 11 hours from 2355 hours.

The number of hours to be subtracted from  
the military time of 2355 hours is 11.

STEP 1: Multiply the number of hours by 100.

So you multiply 11 by 100.

$$11 \times 100 = 1100$$

STEP 2: Subtract this new number from the military time.

Here, subtract 100 from 2355 hours.

|            |   |
|------------|---|
| 2355 hours |   |
| - 1100     | ← |
| 1255 hours |   |

Remember the  
answer from  
Step 1 goes on  
the bottom!

ANSWER: 1255 hours

EXAMPLE 3: Subtract 6 hours from 0914 hours.

STEP 1: Multiply 6 by 100.

$$6 \times 100 = 600$$

STEP 2: Subtract 600 from 0914 hours.

$$\begin{array}{r} 0914 \text{ hours} \\ - \quad 600 \\ \hline 0314 \text{ hours} \end{array}$$

Notice 0314 was written and not just 314! In most arithmetic problems, you'd write 314 as the answer because the zero in front doesn't change the value of the number. In other words, it wouldn't make any difference if you wrote 314, 0314, 00314 or for that matter 00000314; they mean the same thing. So you would write the simplest form 314. Here, however, you must remember that you're dealing, not with plain numbers, but with military time. Military time always has four digits in it. That means not writing 314 hours but 0314 hours.

If writing military time such as 0314 is a problem for you, ask the learning supervisor for the FBSEP Lesson on Military Time Format.

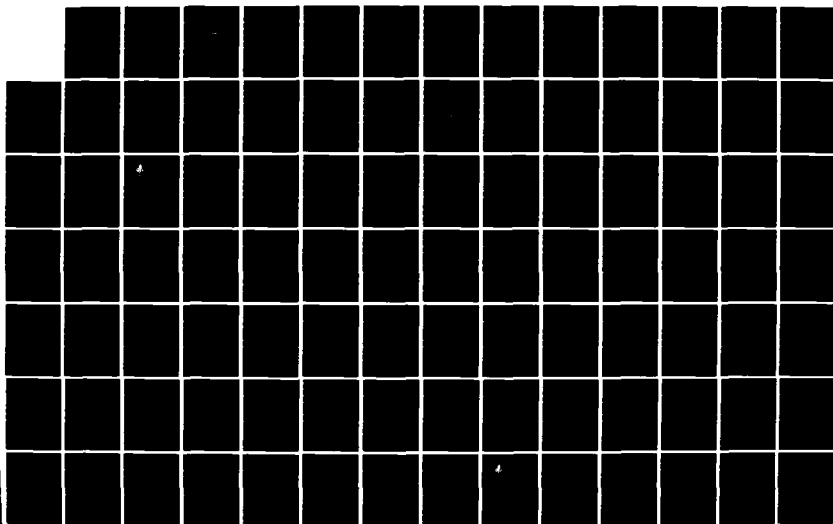
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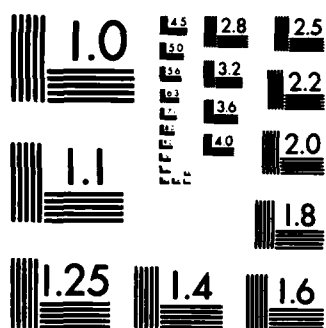
FBSEP (FUNCTIONAL BASIC SKILLS EDUCATION PROGRAM) RADIO 2/8  
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To summarize, the answer to this particular problem is  
0314 hours.

ANSWER: 0314 hours

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EXAMPLE 4: Subtract 10 hours from 1045 hours.

STEP 1: Multiply 10 by 100.

$$10 \times 100 = 1000$$

STEP 2: Subtract 100 from 1045 hours.

1045 hours  
- 1000  
0045 hours

[Notice the answer  
is written as 0045  
(with four digits)  
not 45.]

ANSWER: 0045

EXAMPLE 5: Subtract 7 hours from 2000 hours.

STEP 1: Multiply 7 by 100.

$$7 \times 100 = 700$$

STEP 2: Subtract 700 from 2000 hours.

$$\begin{array}{r} 2000 \text{ hours} \\ - \quad 700 \\ \hline 1300 \text{ hours} \end{array}$$

ANSWER: 1300 hours

## SUMMARY AND PRACTICE

You've seen a number of examples worked out for you; now it's your turn to give it a try. First take a minute to review the steps necessary to subtract hours from military time:

1. Multiply the number of hours by 100.
2. Subtract this new number from the military time.

If you want, take some additional time to go back and take another look at the examples. Then go on and do the following Practice Exercise. When you've completed it, check your answers with the Answers to Practice Exercise. If your answers are wrong, study the detailed Explanations for Practice Exercise and, if you want additional explanation, ask the learning supervisor. He or she is more willing to help. Once all your questions are answered, you are ready for the Lesson Test. Good Luck!

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PRACTICE EXERCISE

1. Subtract 6 hours from 2025 hours.
2. Subtract 9 hours from 1549 hours.
3. Subtract 3 hours from 0330 hours.
4. Subtract 12 hours from 2207 hours.
5. Subtract 2 hours from 0900 hours.

ANSWERS TO PRACTICE EXERCISE

1. 1425 hours
2. 0649 hours
3. 0030 hours
4. 1007 hours
5. 0700 hours

EXPLANATIONS FOR PRACTICE EXERCISE

1. Subtract 6 hours from 2025 hours.

The number of hours to be subtracted from  
the military time of 2025 hours is 6.

STEP 1: Multiply the number of hours by 100.

Multiply 6 by 100.

$$6 \times 100 = 600$$

STEP 2: Subtract this new number from the military time.

Subtract 600 from 2025 hours.

|            |   |             |
|------------|---|-------------|
| 2025 hours |   | Answer from |
| - 600      | ← | Step 1.     |
| 1425 hours |   |             |

ANSWER: 1425 hours



2. Subtract 9 hours from 1549 hours.

The number of hours to be subtracted from  
1549 hours is 9.

STEP 1: Multiply the number of hours by 100.

Multiply 9 by 100.

$$9 \times 100 = 900$$

STEP 2: Subtract this new number from the military time.

Subtract 900 from 1549 hours.

|            |                                                                                      |                |
|------------|--------------------------------------------------------------------------------------|----------------|
| 1549 hours |                                                                                      | Answer from    |
| - 900      |  | Step 1.        |
| 0649 hours |                                                                                      |                |
|            |   | 0 for military |
|            |                                                                                      | time format.   |

ANSWER: 0649 hours

3. Subtract 3 hours from 0330 hours.

The number of hours to be subtracted from  
0330 hours is 3.

STEP 1: Multiply the number of hours by 100.

Multiply 3 by 100.

$$3 \times 100 = 300$$

STEP 2: Subtract this new number from the military time.

Subtract 300 from 0330 hours.

|            |   |                  |
|------------|---|------------------|
| 0330 hours |   | Answer from      |
| - 300      | ← | Step 1.          |
| 0030 hours |   |                  |
|            | ↙ | 0's for military |
|            |   | time format.     |

ANSWER: 0030 hours

4. Subtract 12 hours from 2207 hours.

The number of hours to be subtracted from  
2207 hours is 12.

STEP 1: Multiply the number of hours by 100.

Multiply 12 by 100.

$$12 \times 100 = 1200$$

STEP 2: Subtract this new number from the military time.

Subtract 1200 from 2207 hours.

$$\begin{array}{r} 2207 \text{ hours} \\ - 1200 \\ \hline 1007 \text{ hours} \end{array}$$

Answer from  
Step 1.



ANSWER: 1007 hours

5. Subtract 2 hours from 0900 hours.

The number of hours to be subtracted from  
the military time of 0900 hours is 2.

STEP 1: Multiply the number of hours by 100.

Multiply 2 by 100.

$$2 \times 100 = 200$$

STEP 2: Subtract the new number from the military time.

Subtract 200 from 0900 hours.

|            |   |                |
|------------|---|----------------|
| 0900 hours |   | Answer from    |
| - 200      | ← | Step 1         |
| 0700 hours |   |                |
|            | ↙ | 0 for military |
|            |   | time format.   |

ANSWER: 0700 hours

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OBTAIN LESSON TEST FROM LEARNING SUPERVISOR

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### REMEDIATION

This part of the lesson contains an additional exercise. Try it on your own and then check your answers with the ones in Answers to Remediation Exercise. For any you get wrong, compare the Explanations for Remediation Exercise with your work. Ask the learning supervisor to explain anything you still don't understand because you will be retested at the end of this section.

Before going on, review the steps necessary to subtract hours from military time:

1. Multiply the number of hours by 100.
2. Subtract this new number from the military time.

REMEDIATION EXERCISE

1. Subtract 3 hours from 1515 hours.
2. Subtract 7 hours from 1240 hours.
3. Subtract 8 hours from 0824 hours.
4. Subtract 10 hours from 2138 hours.
5. Subtract 1 hour from 0700 hours.



ANSWERS TO REMEDIATION EXERCISE

1. 1215 hours
2. 0540 hours
3. 0024 hours
4. 1138 hours
5. 0600 hours

EXPLANATIONS FOR REMEDIATION EXERCISE

1. Subtract 3 hours from 1515 hours.

The number of hours to be subtracted from  
the military time of 1515 hours is 3.

STEP 1: Multiply the number of hours by 100.  
Multiply 3 by 100.

$$3 \times 100 = 300$$

STEP 2: Subtract this new number from the military time.  
Subtract 300 from 1515 hours.

$$\begin{array}{r} 1515 \text{ hours} \\ - 300 \\ \hline 1215 \text{ hours} \end{array}$$

← Answer from  
Step 1.

ANSWER: 1215 hours

2. Subtract 7 hours from 1240 hours.

The number of hours to be subtracted from  
the military time of 1240 hours is 7.

STEP 1: Multiply the number of hours by 100.

Multiply 7 by 100.

$$7 \times 100 = 700$$

STEP 2: Subtract this new number from the military time.

Subtract 700 from 1240 hours.

$$\begin{array}{r} 1240 \text{ hours} \\ - 700 \\ \hline 0540 \text{ hours} \end{array}$$

← Answer from Step 1.

ANSWER: 0540 hours

3. Subtract 8 hours from 0824 hours.

The number of hours to be subtracted from  
the military time of 0824 hours is 8.

STEP 1: Multiply the number of hours by 100.

Multiply 8 by 100.

$$8 \times 100 = 800$$

STEP 2: Subtract this new number from the military time.

Subtract 800 from 0824 hours.

$$\begin{array}{r} 0824 \text{ hours} \\ - 800 \\ \hline 0024 \text{ hours} \end{array}$$

← Answer from Step 1.

ANSWER: 0024 hours

4. Subtract 10 hours from 2138 hours.

The number of hours to be subtracted from  
the military time of 2138 hours is 10.

STEP 1: Multiply the number of hours by 100.

Multiply 10 by 100.

$$10 \times 100 = 1000$$

STEP 2: Subtract this new number from the military time.

Subtract 1000 from 2138 hours.

$$\begin{array}{r} 2138 \text{ hours} \\ - 1000 \\ \hline 1138 \text{ hours} \end{array}$$

← Answer from Step 1.

ANSWER: 1138 hours

5. Subtract 1 hour from 0700 hours.

The number of hours to be subtracted from  
the military time of 0700 hours is 1.

STEP 1: Multiply the number of hours by 100.

Multiply 1 by 100.

$$1 \times 100 = 100$$

STEP 2: Subtract this new number from the military time.

Subtract 100 from 0700 hours.

$$\begin{array}{r} 0700 \text{ hours} \\ - 100 \\ \hline 0600 \text{ hours} \end{array}$$

← Answer from Step 1.

ANSWER: 0600 hours

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OBTAIN REMEDIATION TEST FROM LEARNING SUPERVISOR

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05C FBSEP



### LESSON TEST FOR D-03

You will need some paper and a pencil to do this Lesson Test. It contains five problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 4 out of 5 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

1. Subtract 12 hours from 1228 hours.
2. Subtract 5 hours from 1935 hours.
3. Subtract 6 hours from 1446 hours.
4. Subtract 7 hours from 2005 hours
5. Subtract 4 hours from 0750 hours.

### REMEDIATION TEST FOR D-03

You will need some paper and a pencil to do this Remediation Test. It contains five problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 4 out of 5 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

1. Subtract 2 hours from 0810 hours.
2. Subtract 11 hours from 2345 hours.
3. Subtract 9 hours from 1736 hours.
4. Subtract 3 hours from 1505 hours.
5. Subtract 10 hours from 1052 hours.

ANSWER KEY FOR REMEDIATION TEST D-03

This answer key contains the correct responses for Remediation Test D-03. Each problem is worth one point. Students must get 4 out of 5 total points to pass this test.

1. 0610
2. 1245
3. 0836
4. 1205
5. 0052

# ANSWER KEY FOR LESSON TEST D-03

This answer key contains the correct responses for Lesson Test D-03. Each problem is worth one point. Students must get 4 out of 5 total points to pass this test.

1. 0028 hours
2. 1435 hours
3. 0846 hours
4. 1305 hours
5. 0350 hours



**FBSEP**

# **RADIO TELETYPE OPERATOR**

**MOS 05C10**

**STUDENT GUIDE**

**05C FBSEP LESSON D-04**

**ADDING OR SUBTRACTING HOURS MOVING ACROSS DAYS**

**PREREQUISITE: None**

**MATERIALS REQUIRED: None**

**TYPE OF LESSON: Self paced**

## STUDENT GUIDE

### 05C FBSEP LESSON D-04

#### ADDING OR SUBTRACTING HOURS MOVING ACROSS DAYS

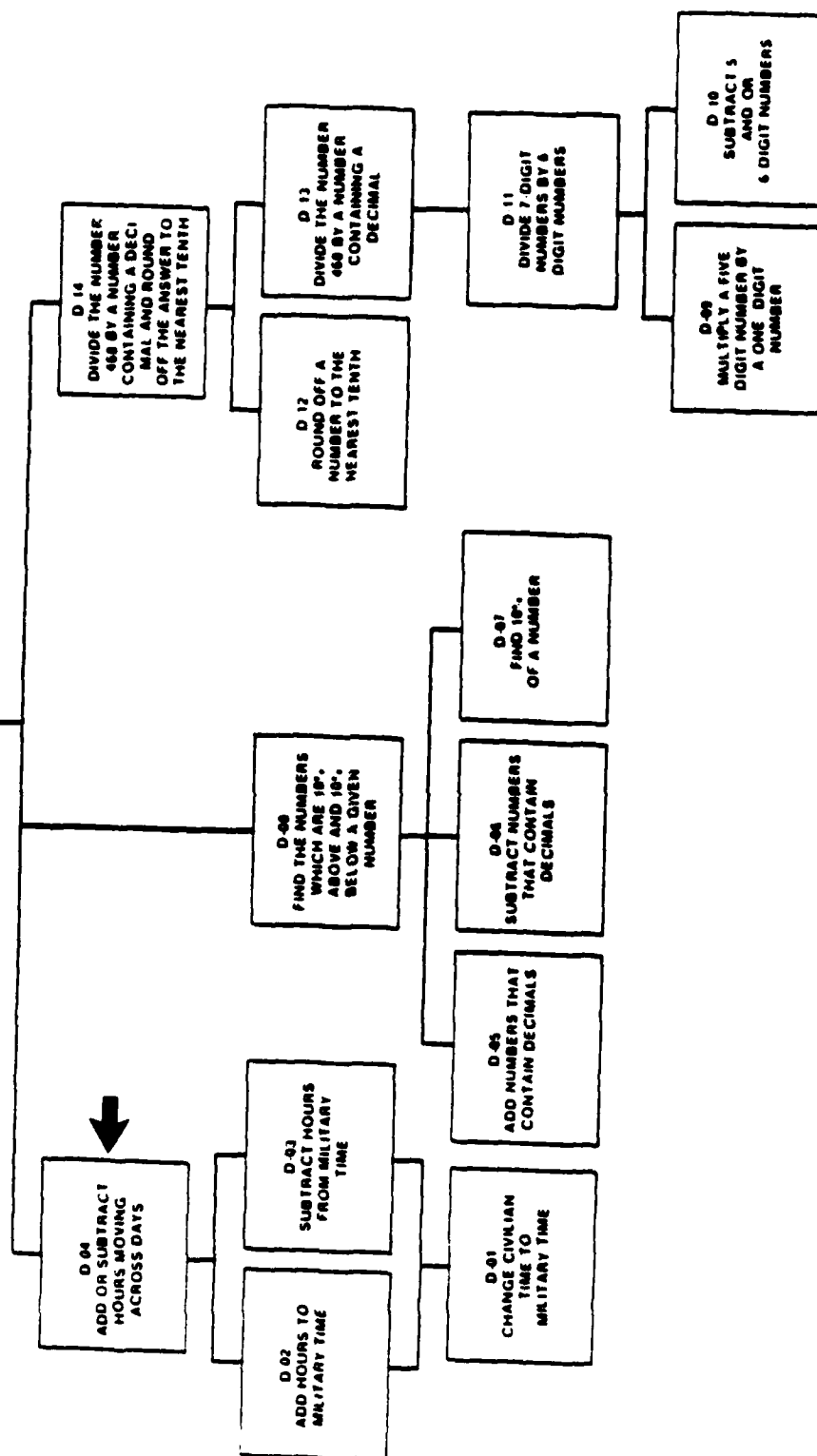
##### INTRODUCTION

As a radio operator, you might have to send messages from one section of the country to another section, or from one country to another country. A large distance between areas usually means a difference in their times. For example, when it's 1700 hours in Atlanta, it's only 1400 hours in San Diego because there's a 3-hour difference between these two cities. An interesting situation arises when it's 0200 hours in Atlanta and you want to figure out what time it is in San Diego. The purpose of this lesson is to show you how to handle this situation. What areas of the world fall into what time zones is a topic that will be discussed in the 05C AIT Course. In this FBSEP lesson you will learn how to deal with the numbers or the math that's involved in figuring out time differences.

There are four FBSEP lessons dealing with military time. This lesson, D-04, is marked with an arrow on the annex map which follows.

D-04 SG  
05C FBSEP

ANNEX D  
MATH SKILLS





OBJECTIVE: When you finish this lesson, you will be able to add hours to or subtract hours from military time, even if it involves moving across days.

To add hours to military time:

- (1) Add hours.
- (2) Decide if the sum is greater than 2400 hours.
  - (a) If the sum is not greater than 2400 hours, the sum is the time, and the date remains the same.
  - (b) If the sum is greater than 2400 hours, subtract 2400 hours, and the remainder is the time. Add 1 day to the date.

To subtract hours from military time:

- (1) Set-up the problem to subtract hours.
- (2) Before subtracting, decide if the difference will fall below zero.
  - (a) If the difference will not fall below zero, subtract; the difference is the time and the date remains the same.
  - (b) If the difference will fall below zero, add 2400 hours to the time before subtracting, and the remainder is the time. Subtract 1 day from the date.

D-04 SG  
05C FBSEP

### PRESENTATION

The plan in this lesson is to begin by showing you a few problems involving addition, then a few involving subtraction. Each will be clearly labeled as to what type they are so that if you need to go back and review, you can easily find the type you want. Then there will be addition and subtraction problems mixed together so that you can compare the two procedures.

- ADDITION -

EXAMPLE 1: (SUM NOT MORE THAN 2400 HOURS)

Add 3 hours to 1145 hours, August 21.

STEP 1: Add hours.

(a)  $3 \times 100 = 300$

(b) 1145 hours

+ 300

1445 hours

You should already be familiar with this part of the procedure. If not, ask the learning supervisor for the FBSEP lesson on Adding Hours to Military Time.

STEP 2: Decide if the sum is greater than 2400 hours.

Here you must decide if 1445 hours is greater than 2400 hours. It's NOT.

Step 2 gives us two alternatives: What happens if it's NOT greater [Part (a)] and what happens if it IS greater [Part (b)]. Since 1445 hours is not greater than 2400 hours, you must use Part (a): If the sum is not greater than 2400 hours, the sum is the time, and the date remains the same.

The sum was found in Step 1. The date given in this problem is August 21, and it is to remain the same. Therefore, the final answer is the combination of the time from Step 1 (1445 hours) and the given date (August 21).

ANSWER: 1445 hours, August 21

EXAMPLE 2: (SUM GREATER THAN 2400 HOURS)

Add 5 hours to 2230 hours, February 3.

STEP 1: Add hours.

(a) 5 x 100 = 500  
(b) 2230 hours  
+ 500  
2730 hours

Once again, you should already know how to do this much of the procedure.

STEP 2: Decide if the sum is greater than 2400 hours. In other words, is 2730 hours greater than 2400 hours? Yes, it is greater.

Again there are two choices with Step 2:

Part (a): If the sum is not greater than 2400 hours ..., or

Part (b): If the sum is greater than 2400 hours...

Since 2730 hours is greater than 2400 hours, you need to use Part (b): If the sum is greater than 2400 hours, subtract 2400 hours, and the remainder will be the time. Add 1 day to the date. Here the sum is 2730 hours and you now want to subtract 2400 hours from it.

2730 hours ← answer from Step 1  
- 2400 hours  
0330 hours ← This is the new time.

The rule says that you must also add 1 day to the date.  
The given date is February 3.

February 3 ← given date  
+ 1 day  
February 4 ← This is the new date.

ANSWER: 0330 hours, February 4



Now that you've seen the "rule" applied, see if you can understand why the rule works.

You see the first step actually does all that the problem itself tells you to do. The problem tells you to add 5 hours to 2230 hours and you accomplish this with Step 1.

Add Hours: (a)  $5 \times 100 = 500$

(b) 2230 hours

+ 500

2730 hours

The difficulty is with the answer you get, 2730 hours.

Operating with a 2400 hour clock makes an answer like 2730 hours unacceptable — at least in the form it's in. What you have to do with 2730 hours is to keep the value the same but change the form. Look at an example you're more familiar with to illustrate what's meant by "form:"

18 inches

1 foot 6 inches

1½ feet

All of these are different "forms" of the same value; in other words, they all mean the same thing. They're just different ways of writing it.

It's Part (b) of Step 2 that changes the form of 2730 hours; Part (b) indicates you should subtract 2400 hours from the number of hours and add 1 day to the date. One day equals 2400 hours, so by subtracting 2400 hours and adding one day you have not changed the value of what you started with. Again, look at a more obvious example that shows what's meant: If you start with a number like 35 and subtract 5 and then add 5, you get back the original number 35.

$$\begin{array}{r} 35 \\ - 5 \\ \hline 30 \\ + 5 \\ \hline 35 \end{array} \quad \left. \vphantom{\begin{array}{r} 35 \\ - 5 \\ \hline 30 \\ + 5 \\ \hline 35 \end{array}} \right\} \text{ same value}$$

If you were to start with 35 and subtract 17 and then add 17, you'd get back to 35. It doesn't matter what amount is subtracted and added as long as it's the same amount. Subtracting 2400 hours and then adding 1 day to the date has the same effect since 2400 hours and 1 day are the same amount.

See what happens:

|                                            |   |     |                   |
|--------------------------------------------|---|-----|-------------------|
| subtract<br>and<br>add<br>equal<br>amounts | } |     | 2730 hours        |
|                                            |   | → - | <u>2400 hours</u> |
|                                            |   |     | 0330 hours        |
|                                            |   |     |                   |
|                                            |   |     | February 3        |
|                                            |   | → + | <u>1 day</u>      |
|                                            |   |     | February 4        |

Therefore, the value you started with and the value you ended with are also the same; the form is different:

|               |   |                        |                     |
|---------------|---|------------------------|---------------------|
| same<br>value | } | 2730 hours, February 3 | ← unacceptable form |
|               |   | 0330 hours, February 4 | ← acceptable form   |

As a result, the final answer is 0330 hours, February 4.

- SUBTRACTION -

Before actually looking at problems involving subtracting hours and before going through the whole procedure, examine the first step - the step that states "set up the problem to subtract hours." Then examine the second step - "before subtracting, decide if the difference will fall below zero." Look at a few subtraction problems and see if you can decide if the difference will fall below zero.

$$\begin{array}{r} 1736 \\ - 400 \\ \hline \end{array}$$

$$\begin{array}{r} 1547 \\ - 900 \\ \hline \end{array}$$

$$\begin{array}{r} 0821 \\ - 300 \\ \hline \end{array}$$

$$\begin{array}{r} 1047 \\ - 1200 \\ \hline \end{array}$$

$$\begin{array}{r} 0945 \\ - 1000 \\ \hline \end{array}$$

$$\begin{array}{r} 0326 \\ - 700 \\ \hline \end{array}$$

If you were to try to carry through the subtraction, the first three problems would have these results.

$$\begin{array}{r} 1736 \\ - 400 \\ \hline 1336 \end{array}$$

$$\begin{array}{r} 1547 \\ - 900 \\ \hline 647 \end{array}$$

$$\begin{array}{r} 0821 \\ - 300 \\ \hline 521 \end{array}$$

or 0647

or 0521

All of these differences are well above zero.

On the other hand, the second three are a different story.

$$\begin{array}{r} 1047 \\ - 1200 \end{array}$$

$$\begin{array}{r} 0945 \\ - 1000 \end{array}$$

$$\begin{array}{r} 0326 \\ - 700 \end{array}$$

This subtraction presents a problem! The reason is that the number to be subtracted, or the bottom number, is larger than the top number. You know before you begin that the difference between the numbers will be below zero.

1200 is larger than 1047.

1000 is larger than 0945 or 945.

700 is larger than 0326 or 326.

Remember the 0's at the beginning of a number have no value.

There's no need to go through the subtraction; all you need do is decide if the difference will fall below zero.

To review: (a) The difference will not fall below zero if the bottom number IS NOT larger than the top number.

(b) The difference will fall below zero if the bottom number IS larger than the top number.

Now look at how all this applies to subtracting hours from military time:

EXAMPLE 1: (DIFFERENCE NOT BELOW ZERO)

Subtract 2 hours from 0916 hours, May 26.

STEP 1: Set up the problem to subtract hours.

(a)  $2 \times 100 = 200$

(b) 0916 hours

- 200

(You should already be familiar with this part of the procedure. If not, ask the learning supervisor for the FBSEP lesson on Subtracting Hours from Military Time.)

Notice the problem has been set up for subtraction but the subtraction itself has not been done. Look ahead to Step 2. You don't want to subtract just yet. You want to go on to Step 2 first.

STEP 2:     Before subtracting, decide if the difference will  
fall below zero.

Look again at the set-up you have in Step 1:

$$\begin{array}{r} 0916 \text{ hours} \\ - \underline{200} \end{array}$$

The bottom number, 200, is NOT larger than the top number, 0916. Therefore, the difference will not fall below zero! Now Step 2 gives you two choices:

Part (a) If the difference will not fall below zero. . . .

Part (b) If the difference will fall below zero. . . .

Since in this case the difference will not fall below zero, you must use Part (a): If the difference will not fall below zero, subtract; the difference is the time and the date remains the same. So continue with the subtraction.

$$\begin{array}{r} 0916 \text{ hours} \\ - \underline{200} \\ 0716 \text{ hours} \end{array} \leftarrow \text{This is the new time.}$$

The date that was given is May 26, and that's to remain the same.

ANSWER: 0716 hours, May 26



EXAMPLE 2: (DIFFERENCE BELOW ZERO)

Subtract 7 hours from 0420 hours, June 22.

STEP 1: Set up the problem to subtract hours.

(a)  $7 \times 100 = 700$

(b) 0420 hours

- 700

Notice, you set up the problem, but you do not subtract yet.

STEP 2: Before subtracting, decide if the difference will fall below zero.

Look at the set-up.

0420 hours

- 700

To decide if the difference will fall below zero, decide if the bottom number is larger than the top number. Is 700 larger than 0420? The answer is yes. Therefore, the difference will fall below zero.

You must use Part (b) of Step 2. Part (b): If the difference will fall below zero, add 2400 hours to the time before subtracting, and the remainder is the time. Subtract 1 day from the date.

|              |   |                                    |
|--------------|---|------------------------------------|
| 0420 hours   | ← | given time                         |
| + 2400 hours |   |                                    |
| 2820 hours   |   |                                    |
| - 700        | ← | given number of hours to subtract. |
| 2120 hours   | ← | This is the new time!              |

Remember, earlier in this lesson you added and subtracted equal amounts (2400 hours and 1 day) to change the form of an answer but not the value. Well, here you're doing the same thing. When you add 2400 hours and then subtract 1 day, you're keeping the value the same but changing the form.

|         |   |            |
|---------|---|------------|
| June 22 | ← | given date |
| - 1 day |   |            |
| June 21 | ← | new date   |

ANSWER: 2120 hours, June 21

- ADDITION/SUBTRACTION -

EXAMPLE 1: Add 11 hours to 1821 hours, July 8.

STEP 1: Add hours.

$$11 \times 100 = 1100$$

1821 hours

+ 1100

2921 hours

STEP 2: Decide if the sum is greater than 2400 hours.

Is 2921 hours greater than 2400 hours? Yes!

Therefore, use Part (b): If the sum is greater than 2400 hours, subtract 2400 hours, and the remainder will be the time. Add 1 day to the date.

|         |   |            |                      |
|---------|---|------------|----------------------|
|         |   | 2921 hours | ← answer from Step 1 |
| -       | } | -          | <u>2400 hours</u>    |
| and     |   |            | 0521 hours           |
| +       |   |            |                      |
| equal   |   | July 8     | ← given date         |
| amounts | → | +          | <u>1 day</u>         |
|         |   |            | July 9               |

ANSWER: 0521 hours, July 9

EXAMPLE 2: Subtract 12 hours from 1017 hours, July 3.

STEP 1: Set up the problem to subtract hours.

$$12 \times 100 = 1200$$

$$\begin{array}{r} 1017 \text{ hours} \\ - \underline{1200} \end{array}$$

Just set up the problem; do not subtract yet.

STEP 2: Before subtracting, decide if the difference will fall below zero.

$$\begin{array}{r} 1017 \text{ hours} \\ - \underline{1200} \end{array}$$

Is 1200 greater than  
1017? Yes!

Therefore, use Part (b): If the difference will fall below zero, add 2400 hours to the time before subtracting and the remainder is the time. Subtract 1 day from the date.

|         |     |                   |            |
|---------|-----|-------------------|------------|
|         |     | 1017 hours        |            |
|         | → + | <u>2400 hours</u> |            |
| +       |     | 3417 hours        |            |
| and     | -   | <u>1200</u>       |            |
| minus   |     | 2217 hours        | ← new time |
| equal   |     |                   |            |
| amounts |     | July 3            |            |
|         | → - | <u>1 day</u>      |            |
|         |     | July 2            | ← new date |

ANSWER: 2217, July 2

EXAMPLE 3: Add 8 hours to 1000 hours, August 11.

STEP 1: Add hours.

8 x 100 = 800  
2000 hours  
+ 800  
2800 hours

STEP 2: Decide if the sum is greater than 2400 hours.

Is 2800 hours greater than 2400 hours? Yes, therefore use Part (b): If the sum is greater than 2400 hours, subtract 2400 hours, and the remainder is the time. Add 1 day to the date.

2800 hours ← answer from Step 1  
- 2400  
and 0400 hours  
+  
equal August 11  
amounts → + 1 day  
August 12

ANSWER: 0400 hours, August 12

EXAMPLE 4: Subtract 9 hours from 0752 hours, December 9.

STEP 1: Set up the problem to subtract hours.

$$9 \times 100 = 900$$

0752 hours

$$\begin{array}{r} 0752 \text{ hours} \\ - 900 \\ \hline \end{array}$$

STEP 2: Before subtracting, decide if the difference will fall below zero.

$$\begin{array}{r} 0752 \text{ hours} \\ - 900 \\ \hline \end{array}$$

Is 900 greater than  
0752? Yes.

Therefore, use Part (b): If the difference will fall below zero, add 2400 hours to the time before subtracting, and the remainder is the time. Subtract 1 day from the date.

|              |   |         |   |            |
|--------------|---|---------|---|------------|
| 0752 hours   |   | +       |   | December 9 |
| + 2400 hours | ← | and     | → | - 1 day    |
| 3152 hours   |   | -       |   | December 8 |
| - 900        |   | equal   |   |            |
| 2252 hours   |   | amounts |   |            |

ANSWER: 2252 hours, December 8



EXAMPLE 5: Add 6 hours to 0918 hours, October 27.

STEP 1: Add hours.

$$6 \times 100 = 600$$

0918 hours

$$+ \quad 600 \quad \underline{\hspace{1cm}}$$

1518 hours

STEP 2: Decide if the sum is greater than 2400 hours.

Is 1518 hours greater than 2400 hours? No, therefore use Part (a): If the sum is not greater than 2400 hours, the sum is the time, and the date remains the same.

ANSWER: 1518 hours, October 27

EXAMPLE 6: Subtract 4 hours from 1705 hours, April 1.

STEP 1: Set up the problem to subtract hours.

$$4 \times 100 = 400$$

$$\begin{array}{r} 1705 \text{ hours} \\ - 400 \\ \hline \end{array}$$

STEP 2: Before subtracting, decide if the difference will fall below zero.

$$\begin{array}{r} 1705 \text{ hours} \\ - 400 \\ \hline \end{array}$$

Is 400 greater than  
1705? No!

Therefore use Part (a): If the difference will not fall below zero, subtract; the difference is the time, and the date remains the same.

$$\begin{array}{r} 1705 \text{ hours} \\ - 400 \\ \hline 1305 \text{ hours} \end{array}$$

ANSWER: 1305 hours, April 1

### SUMMARY AND PRACTICE

In the next section there is a Practice Exercise for you to try on your own. Before you do it, take a few minutes to be sure you thoroughly understand the procedure involved. Study this summary carefully.

ADDITION: To add hours to military time.

- (1) Add hours.
- (2) Decide if the sum is greater than 2400 hours.
  - (a) not greater than 2400—  
sum = time; same date
  - (b) greater than 2400—  
subtract 2400; date + 1

SUBTRACTION: To subtract hours from military time.

- (1) Set-up to subtract.
- (2) Decide if the difference will fall below zero.
  - (a) not below zero (bottom number not greater than top number) —  
difference = time; same date
  - (b) below zero (bottom number greater than top number) —  
+2400, then subtract; date - 1

Go back and review the Examples, then do the Practice Exercise. Compare your answers with the Answers to the Practice Exercise and go over the Explanations for Practice Exercise to be sure there are no questions. If there are, ask the learning supervisor for help. When you feel you're ready, ask for the Lesson Test.

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PRACTICE EXERCISE

1. Add 10 hours to 1800 hours, March 8.
2. Subtract 8 hours from 0630 hours, November 29.
3. Add 4 hours to 2125 hours, February 14.
4. Subtract 5 hours from 0249 hours, September 4.
5. Subtract 5 hours from 1508 hours, September 4.
6. Add 7 hours to 1936 hours, January 15.
7. Add 7 hours to 0815 hours, January 15.
8. Subtract 11 hours from 0953 hours, December 25.

ANSWERS TO PRACTICE EXERCISE

1. 0400 hours, March 9.
2. 2230 hours, November 28.
3. 0125 hours, February 15.
4. 2149 hours, September 3.
5. 1008 hours, September 4.
6. 0236 hours, January 16.
7. 1515 hours, January 15.
8. 2253 hours, December 24.

EXPLANATIONS FOR PRACTICE EXERCISE

1. Add 10 hours to 1800 hours, March 8.

STEP 1: Add hours

$$10 \times 100 = 1000$$

$$\begin{array}{r} 1800 \text{ hours} \\ + 1000 \\ \hline 2800 \text{ hours} \end{array}$$

STEP 2: Decide if the sum is greater than 2400 hours.

Is 2800 hours greater than 2400 hours? Yes!

Therefore, use Part (b).

Part (b): If the sum is greater than 2400 hours,  
subtract 2400 hours, and the remainder is the time.

Add 1 day to the date.

|         |   |              |
|---------|---|--------------|
|         |   | 2800 hours   |
| +       | } | - 2400 hours |
| and     |   | 0400 hours   |
| -       |   |              |
| equal   |   | March 8      |
| amounts | → | + 1 day      |
|         |   | March 9      |

ANSWER: 0400 hours, March 9



2. Subtract 8 hours from 0630 hours, November 29.

STEP 1: Set-up the problem to subtract hours.

$$8 \times 100 = 800$$

$$\begin{array}{r} 0630 \text{ hours} \\ - 800 \\ \hline \end{array}$$

Set-up the problem, but do not subtract yet.

STEP 2: Before subtracting, decide if the difference will fall below zero. Is 800 greater than 0630? Yes! Therefore, use Part (b).

Part (b): If the difference will fall below zero, add 2400 hours to the time before subtracting, and the remainder is the time. Subtract 1 day from the date.

|         |     |             |
|---------|-----|-------------|
|         |     | 0630 hours  |
|         | → + | 2400        |
| +       |     | <hr/>       |
|         |     | 3030 hours  |
| and     |     | - 800       |
|         |     | <hr/>       |
| -       |     | 2230 hours  |
|         |     |             |
| equal   |     |             |
|         |     | November 29 |
| amounts | → - | 1 day       |
|         |     | <hr/>       |
|         |     | November 28 |

ANSWER: 2230 hours, November 28

3. Add 4 hours to 2125 hours, February 14.

STEP 1: Add hours.

$$4 \times 100 = 400$$

2125 hours  
+ 400  

---

2525 hours

STEP 2: Decide if the sum is greater than 2400 hours. Is

2525 hours greater than 2400 hours? Yes!

Therefore, use Part (b).

Part (b): If the sum is greater than 2400 hours,  
subtract 2400 hours, and the remainder is the time.

Add 1 day to the date.

|         |              |
|---------|--------------|
|         | 2525 hours   |
| +       | - 2400 hours |
| and     | 0125 hours   |
| -       |              |
| equal   | February 14  |
| amounts | + 1 day      |
|         | February 15  |

ANSWER: 0125 hours, February 15

4. Subtract 5 hours from 0249 hours, September 4.

STEP 1: Set-up the problem to subtract hours.

$$5 \times 100 = 500$$

$$\begin{array}{r} 0249 \text{ hours} \\ - 500 \\ \hline \end{array}$$

Set-up the problem, but do not subtract yet.

STEP 2: Before subtracting decide if the difference will fall below zero. Is 500 greater than 0249? Yes! Therefore, use Part (b).

Part (b): If the difference will fall below zero, add 2400 hours to the time before subtracting, and the remainder is the time. Subtract 1 day from the date.

|         |   |              |
|---------|---|--------------|
|         |   | 0249 hours   |
| +       | → | + 2400 hours |
|         |   | 2649 hours   |
| and     |   | - 500        |
| -       |   | 2149 hours   |
| equal   |   | September 4  |
| amounts | → | - 1 day      |
|         |   | September 3  |

ANSWER: 2149 hours, September 3

5. Subtract 5 hours from 1508 hours, September 4.

STEP 1: Set-up the problem to subtract hours.

$$5 \times 100 = 500$$

$$\begin{array}{r} 1508 \text{ hours} \\ - 500 \\ \hline \end{array}$$

Set-up the problem, but do not subtract yet.

STEP 2: Before subtracting, decide if the difference will

fall below zero. Is 500 greater than 1508? No!

Therefore, use Part (a).

Part (a): If the difference will not fall below zero, subtract; the difference is the time, and the date remains the same.

$$\begin{array}{r} 1508 \text{ hours} \\ - 500 \\ \hline 1008 \text{ hours} \end{array}$$

ANSWER: 1008 hours, September 4

6. Add 7 hours to 1936 hours, January 15.

STEP 1: Add hours.

$$7 \times 100 = 700$$

1936 hours  
+ 700  

---

2636 hours

STEP 2: Decide if the sum is greater than 2400 hours. Is

2636 hours greater than 2400 hours? Yes!

Therefore, use Part (b).

Part (b): If the sum is greater than 2400 hours,  
subtract 2400 hours, and the remainder is the time.

Add 1 day to the date.

|         |                  |
|---------|------------------|
|         | 2636 hours       |
| +       | - 2400 hours     |
| and     | <hr/> 0236 hours |
| -       |                  |
| equal   | January 15       |
| amounts | + <hr/> 1 day    |
|         | January 16       |

ANSWER: 0236 hours, January 16

7. Add 7 hours to 0815 hours, January 15.

STEP 1: Add hours.

$$7 \times 100 = 700$$

0815 hours

+ 700

1515 hours

STEP 2: Decide if the sum is greater than 2400 hours.

Is 1515 hours greater than 2400 hours? No!

Therefore, use Part (a).

Part (a): If the sum is not greater than 2400 hours, the sum is the time, and the date remains the same.

ANSWER: 1515 hours, January 15

8. Subtract 11 hours from 0953 hours, December 25.

STEP 1: Set-up the problem to subtract hours.

$$11 \times 100 = 1100$$

0953 hours  
-1100

Set-up the problem, but do not subtract yet.

STEP 2: Before subtracting, decide if the difference will fall below zero. Is 1100 greater than 0953? Yes! Therefore, use Part (b).

Part (b): If the difference will fall below zero, add 2400 hours to the time before subtracting, and the remainder is the time. Subtract 1 day from the date.

0953 hours  
+ 2400 hours  
3353 hours  
- 1100  
2253 hours

December 25  
- 1 day  
December 24

ANSWER: 2253 hours, December 24

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### REMEDIATION

Here's a second look at adding and subtracting hours.

Whenever the sum or difference falls within the 2400 hour clock, in other words, between 0 and 2400 hours, there's no problem. You just do the addition or subtraction as you normally would. (This is covered in the two Part a's of the procedure.)

The special cases are those where the sum or difference falls outside of the 2400 hour clock, in other words, when the sum is greater than 2400 or when the difference falls below zero. These types of problems involve adding/ subtracting 2400 hours so that the time will fall within the acceptable range. But whenever you add/subtract 2400 hours, you must also add/subtract 1 day so that you do not change the value of the answer but only its form. Consequently, the date will also change in these problems. (This is all covered in the two Part b's of the procedure).

Once again study the procedure listed on the following page.

To add hours to military time:

1. Add hours.
2. Decide if the sum is greater than 2400 hours.
  - (a) If the sum is not greater than 2400 hours, the sum is the time, and the date remains the same.
  - (b) If the sum is greater than 2400 hours, subtract 2400 hours, and the remainder is the time. Add 1 day to the date.

To subtract hours from military time:

1. Set-up the problem to subtract hours.
2. Before subtracting, decide if the difference will fall below zero.
  - (a) If the difference will not fall below zero, subtract; the difference is the time, and the date remains the same.
  - (b) If the difference will fall below zero, add 2400 hours to the time before subtracting, and the remainder is the time. Subtract 1 day from the date.

If you still feel uncertain, go back over the Examples and the Explanations for the Practice Exercise presented earlier in this lesson. Then give the Remediation Exercise a try. When you finish it, compare your answers with the Answers to Remediation Exercise and, if you get any incorrect, study the Explanations for Remediation Exercise. The learning supervisor will be glad to help you with any questions you may have. When all your questions have been answered, you're ready for the retest for this lesson. Good Luck!

REMEDATION EXERCISE

1. Add 5 hours to 2305 hours, May 3.
2. Subtract 6 hours from 0430 hours, January 5.
3. Add 7 hours to 1023 hours, February 10.
4. Subtract 10 hours from 1815 hours, June 6.
5. Subtract 4 hours from 0158 hours, March 15.
6. Add 8 hours to 1941 hours, July 9.
7. Subtract 10 hours from 0939, April 20.
8. Add 12 hours to 1800, August 12.

ANSWERS TO REMEDIATION EXERCISE

1. 0405 hours, May 4
2. 2230 hours, January 4
3. 1723 hours, February 10
4. 0815 hours, June 6
5. 2158 hours, March 14
6. 0341 hours, July 10
7. 2339 hours, April 19
8. 0600 hours, August 13

EXPLANATIONS FOR REMEDIATION EXERCISE

1. Add 5 hours to 2305 hours, May 3.

STEP 1: Add hours.

$$5 \times 100 = 500$$

2305 hours  
+ 500  
-----  
2805 hours

STEP 2: Decide if the sum is greater than 2400 hours. Is

2805 hours greater than 2400 hours? Yes!

Therefore, use Part (b).

Part (b): If the sum is greater than 2400 hours,  
subtract 2400 hours, and the remainder is the time.

Add 1 day to the date.

|         |   |              |
|---------|---|--------------|
|         |   | 2805 hours   |
| +       | } | - 2400 hours |
| and     |   | 0405 hours   |
| -       |   |              |
| equal   |   | May 3        |
| amounts |   | + 1 day      |
|         |   | May 4        |

ANSWER: 0405 hours, May 4

2. Subtract 6 hours from 0430 hours, January 5.

STEP 1: Set-up the problem to subtract hours.

$$6 \times 100 = 600$$

$$\begin{array}{r} 0430 \text{ hours} \\ - 600 \\ \hline \end{array}$$

Set-up the problem, but do not subtract yet.

STEP 2: Before subtracting, decide if the difference will fall below zero. Is 600 greater than 0430? Yes! Therefore, use Part (b).

Part (b): If the difference will fall below zero, add 2400 hours to the time before subtracting, and the remainder is the time. Subtract 1 day from the date.

|         |   |              |
|---------|---|--------------|
|         |   | 0430 hours   |
| +       | } | + 2400 hours |
|         |   | 2830 hours   |
| and     |   | - 600        |
| -       |   | 2230 hours   |
|         |   |              |
| equal   |   | January 5    |
| amounts |   | - 1          |
|         |   | January 4    |

ANSWER: 2230 hours, January 4

3. Add 7 hours to 1023 hours, February 10.

STEP 1: Add hours.

$$7 \times 100 = 700$$

1023 hours  
+ 700  
1723 hours

STEP 2: Decide if the sum is greater than 2400 hours. Is

1723 hours greater than 2400 hours? No!

Therefore, use Part (a).

Part (a): If the sum is not greater than 2400 hours, the sum is the time, and the date remains the same.

ANSWER: 1723 hours, February 10



4. Subtract 10 hours from 1815 hours, June 6.

STEP 1: Set-up the problem to subtract hours.

$$10 \times 100 = 1000$$

1815 hours

$$\begin{array}{r} 1815 \text{ hours} \\ - 1000 \\ \hline \end{array}$$

Set-up the problem, but do not subtract yet.

STEP 2: Before subtracting, decide if the difference will fall below zero. Is 1000 greater than 1815? No! Therefore, use Part (a).

Part (a): If the difference will not fall below zero, subtract; the difference is the time, and the date remains the same.

1815 hours

$$\begin{array}{r} 1815 \text{ hours} \\ - 1000 \\ \hline \end{array}$$

0815 hours

ANSWER: 0815 hours, June 6

5. Subtract 4 hours from 0158 hours, March 15.

STEP 1: Set-up the problem to subtract hours.

$$4 \times 100 = 400$$

$$\begin{array}{r} 0158 \text{ hours} \\ - 400 \\ \hline \end{array}$$

Set-up the problem, but do not subtract yet.

STEP 2: Before subtracting, decide if the difference will fall below zero. Is 400 greater than 0158? Yes! Therefore, use Part (b).

Part (b): If the difference will fall below zero, add 2400 hours to the time before subtracting, and the remainder is the time. Subtract 1 day from the date.

|         |   |              |
|---------|---|--------------|
|         |   | 0158 hours   |
| +       | } | + 2400 hours |
|         |   | 2558 hours   |
| and     |   | - 400        |
| -       |   | 2158 hours   |
| equal   |   |              |
| amounts | } | March 15     |
|         |   | - 1 day      |
|         |   | March 14     |

ANSWER: 2158 hours, March 14

6. Add 8 hours to 1941 hours, July 9.

STEP 1: Add hours.

$$8 \times 100 = 800$$

$$\begin{array}{r} 1941 \text{ hours} \\ + 800 \\ \hline 2741 \text{ hours} \end{array}$$

STEP 2: Decide if the sum is greater than 2400 hours. Is

2741 hours greater than 2400 hours? Yes!

Therefore, use Part (b).

Part (b): If the sum is greater than 2400 hours, subtract 2400 hours, and the remainder will be the time. Add 1 day to the date.

$$\begin{array}{rcl} & & 2741 \text{ hours} \\ + & \left[ \begin{array}{l} + \\ \text{and} \\ - \\ \text{equal} \\ \text{amounts} \end{array} \right] & \rightarrow - \underline{2400 \text{ hours}} \\ & & 0341 \text{ hours} \\ & & \\ & & \text{July 9} \\ & & \rightarrow - \underline{1 \text{ day}} \\ & & \text{July 10} \end{array}$$

ANSWER: 0341 hours, July 10

7. Subtract 10 hours from 0939 hours, April 20.

STEP 1: Set-up the problem to subtract hours.

$$10 \times 100 = 1000$$

$$\begin{array}{r} 0939 \text{ hours} \\ - 1000 \\ \hline \end{array}$$

Set-up the problem, but do not subtract yet.

STEP 2: Before subtracting, decide if the difference will fall below zero. Is 1000 greater than 0939? Yes! Therefore, use Part (b).

Part (b): If the difference will fall below zero, add 2400 hours to the time before subtracting, and the remainder is the time. Subtract 1 day from the date.

|         |   |            |
|---------|---|------------|
|         |   | 0939 hours |
| +       | → | + 2400     |
|         |   | 3339 hours |
| and     |   | - 1000     |
| -       |   | 2339 hours |
| equal   |   |            |
| amounts | → | April 20   |
|         |   | - 1 day    |
|         |   | April 19   |

ANSWER: 2339 hours, April 19

8. Add 12 hours to 1800 hours, August 12.

STEP 1: Add hours.

$$12 \times 100 = 1200$$

$$\begin{array}{r} 1800 \text{ hours} \\ + 1200 \\ \hline 3000 \text{ hours} \end{array}$$

STEP 2: Decide if the sum is greater than 2400 hours. Is

3000 hours greater than 2400 hours? Yes!

Therefore, use Part (b).

Part (b): If the sum is greater than 2400 hours,  
subtract 2400 hours, and the remainder will be the  
time. Add 1 day to the date.

$$\begin{array}{rcl} & & 3000 \text{ hours} \\ + & \left[ \begin{array}{l} \text{and} \\ - \\ \text{equal} \\ \text{amounts} \end{array} \right. & \rightarrow - \underline{2400 \text{ hours}} \\ & & 0600 \text{ hours} \\ & & \text{August 12} \\ & & + \underline{1 \text{ day}} \\ & & \text{August 13} \end{array}$$

ANSWER: 0600 hours, August 13

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# ANSWER KEY FOR REMEDIATION TEST D-04

This answer key contains the correct responses for Remediation Test D-04. Each problem is worth one point. Students must get 8 out of 10 total points to pass this test.

1. 1820 hours, September 4
2. 2317 hours, February 11
3. 0334 hours, November 21
4. 2206 hours, May 27
5. 2000 hours, June 6
6. 0713 hours, October 6
7. 0845 hours, August 3
8. 0636 hours, December 25
9. 0228 hours, October 17
10. 1952 hours, July 7

ANSWER KEY FOR LESSON TEST D-04

This answer key contains the correct responses for Lesson Test D-04. Each problem is worth one point. Students must get 8 out of 10 total points to pass this test.

1. 0232 hours, December 9
2. 2249 hours, June 1
3. 0310 hours, November 14
4. 0105 hours, August 11
5. 2100 hours, March 23
6. 0210 hours, April 13
7. 0026 hours, July 7
8. 1858 hours, February 17
9. 2150 hours, May 4
10. 2045 hours, January 15



# REMEDIATION TEST FOR D-04

You will need some paper and a pencil to do this Remediation Test. It contains 10 problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 8 out of 10 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

1. Add 6 hours to 1220 hours, September 4.
2. Subtract 3 hours from 0217 hours, February 12.
3. Add 10 hours to 1734 hours, November 20.
4. Subtract 8 hours from 0606 hours, May 28.
5. Subtract 9 hours from 0500 hours, June 7.
6. Add 12 hours to 1913 hours, October 5.
7. Subtract 10 hours from 1845 hours, August 3.
8. Add 7 hours to 2336 hours, December 24.
9. Add 5 hours to 2128 hours, October 16.
10. Subtract 6 hours from 0152 hours, July 8.

# LESSON TEST FOR D-04

You will need some paper and a pencil to do this Lesson Test. It contains 10 problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 8 out of 10 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

1. Add 3 hours to 2332 hours, December 8.
2. Subtract 5 hours from 0349 hours, June 2.
3. Subtract 6 hours from 0910 hours, November 14.
4. Add 8 hours to 1705 hours, August 10.
5. Subtract 10 hours from 0700 hours, March 24.
6. Add 6 hours to 2010 hours, April 12.
7. Add 9 hours to 1526 hours, July 6.
8. Subtract 7 hours from 0158 hours, February 18.
9. Add 10 hours to 1150 hours, May 4.
10. Subtract 12 hours from 0845 hours, January 16.



**FBSEP**

# **RADIO TELETYPE OPERATOR**

**MOS 05C10**

**STUDENT GUIDE**

**05C FBSEP LESSON D-05**

**ADDING TWO NUMBERS WHICH CONTAIN DECIMALS**

**PREREQUISITES:** None

**MATERIALS REQUIRED:** None

**TYPE OF LESSON:** Self paced

## STUDENT GUIDE

### 05C FBSEP LESSON D-05

#### ADDING TWO NUMBERS WHICH CONTAIN DECIMALS

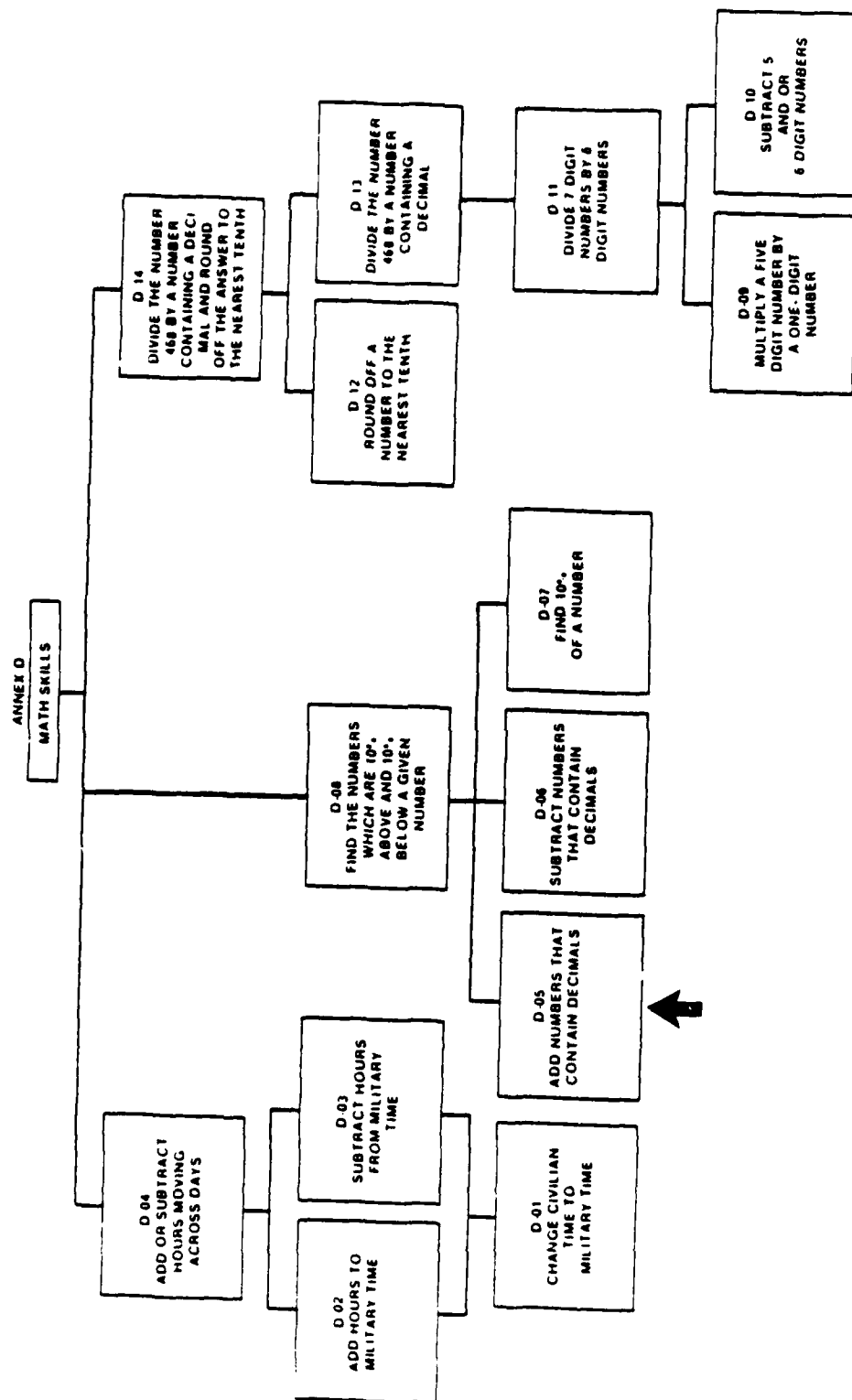
##### INTRODUCTION

In the course of your work, there will be times when you will have to set the frequency of two separate receiver-transmitters. You will have to make sure that the second frequency is at least 10% higher or lower than the first frequency.

In order to do that, you will have to figure out how much 10% of the first frequency is. Then you will have to add or subtract the 10% to the first frequency.

These frequency numbers contain decimals. In this lesson you will learn how to add numbers that contain decimals. In Lesson D-06, you will learn how to subtract numbers that contain decimals.

Lesson D-05 is marked with an arrow on the Annex D Map on the next page.



OBJECTIVE: When you finish this lesson, you will be able to add two numbers that contain decimals.

To add two numbers that contain decimals:

1. Write the two numbers so that the decimal points are lined up one below the other.
2. Put the decimal point in the answer directly below the other decimal points.
3. Add in the same way you add whole numbers.

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05C FBSEP

### PRESENTATION

Here are some examples to show you how to add numbers that have decimals.

EXAMPLE 1: Add 32.354 and 3.235

STEP 1: Write the two numbers so that the decimal points are lined up one below the other.

↓

|              |  |
|--------------|--|
| 32.354       |  |
| <u>3.235</u> |  |

Notice the position of the decimal points.

STEP 2: Put the decimal point in the answer directly below the other decimal points.

|              |
|--------------|
| 32.354       |
| <u>3.235</u> |
| .            |

STEP 3: Add in the same way you add whole numbers.

|                |
|----------------|
| 32.354         |
| + <u>3.235</u> |
| 35.589         |

ANSWER: 35.589

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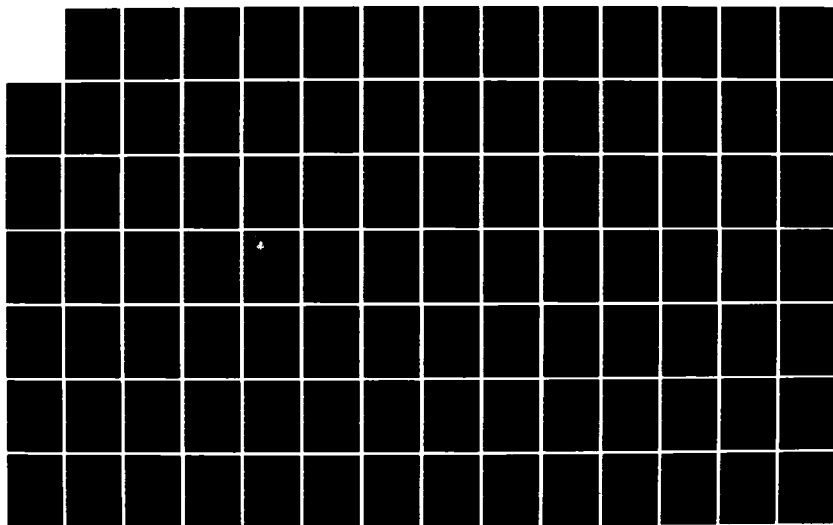
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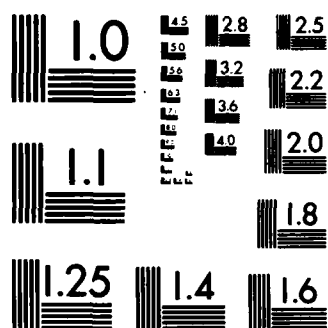
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EXAMPLE 2: Add 26.8123 and 2.6812

STEP 1: Write the two numbers so that the decimal points are lined up one below the other.

↓  
26.8123  
2.6812

Notice the position  
of the decimal  
points.

It is very important to make sure that all the columns of numbers are lined up correctly. Otherwise, you will make mistakes when you have to add them.

STEP 2: Put the decimal point in the answer directly below the other two points.

26.8123  
2.6812  
.

STEP 3:     Add in the same way you add whole numbers.

$$\begin{array}{r} 26.8123 \\ + \underline{2.6812} \\ 29.4935 \end{array}$$

ANSWER:     29.4935

EXAMPLE 3: Add 31.928 and 1.39

STEP 1: Write the two numbers so that the decimal points are lined up one below the other.

$$\begin{array}{r} 31.928 \\ 1.39 \\ \hline \end{array}$$

In this example, the first number has three numbers after the decimal point. The second number has two. But line up the numbers according to the decimal point.

Check to make sure that all the columns are straight.

STEP 2: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 31.928 \\ 1.39 \\ \hline \end{array}$$

STEP 3: Add in the same way you add whole numbers.

$$\begin{array}{r} 31.928 \\ + 1.39 \\ \hline 33.318 \end{array}$$

ANSWER: 33.318

Notice that there is no number directly under the eight. If you want to, you may fill in this place with a zero. Adding a zero after a decimal does not change the value of the number. However, it is not necessary to write the zero in.

$$\begin{array}{r} 31.928 \\ + 1.390 \\ \hline 33.318 \end{array}$$

← You may fill in this place with a zero.

EXAMPLE 4: Add 1.7305 and .17305

STEP 1: Write the two numbers so that the decimal points are lined up one below the other.

$$\begin{array}{r} 1.7305 \\ \underline{.17305} \end{array}$$

Check to make sure that the decimal points are lined up correctly. Then make sure that each column of numbers is lined up correctly.

STEP 2: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 1.7305 \\ \underline{.17305} \\ . \end{array}$$

STEP 3: Add in the same way you add whole numbers.

$$\begin{array}{r} 1.7305 \\ + .17305 \\ \hline 1.90355 \end{array}$$

ANSWER: 1.90355

Again, notice that there is no number above the five in the first column that you add. If you want to, you may fill in this place with a zero. It will not change the value of the number. Remember that it is not necessary to write the zero in.

$$\begin{array}{r} 1.73050 \\ + .17305 \\ \hline 1.90355 \end{array}$$

← You may fill in this place with a zero.



EXAMPLE 5: Add 9.78 and .9780

STEP 1: Write the two numbers so that the decimal points are lined up one below the other.

$$\begin{array}{r} 9.78 \\ \underline{.9780} \end{array}$$

Check to make sure the decimal points are in a line. Then make sure that all the columns of numbers are straight.

STEP 2: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 9.78 \\ \underline{.9780} \\ . \end{array}$$

STEP 3: Add in the same way you add whole numbers.

$$\begin{array}{r} 9.78 \\ + \underline{.9780} \\ 10.7580 \end{array}$$

ANSWER: 10.7580

D-05 SG  
05C FBSEP

### SUMMARY AND PRACTICE

Here again are the steps you need to follow in order to add two numbers that contain decimals.

1. Write the two numbers so that the decimal points are lined up one below the other.
2. Put the decimal point in the answer directly below the other decimal points.
3. Add in the same way you add whole numbers.

Now you will be given the Practice Exercise to try on your own. Use the steps you have learned to figure out the answer. When you have finished, check your answers with the Answers to Practice Exercise. If you get any wrong, read the Explanations for Practice Exercise to find where you made a mistake. If you do not understand the explanations, ask your learning supervisor for help. When you feel that you understand the Practice Exercise, ask your learning supervisor for the Lesson Test.

D-05 SG  
05C FBSEP

PRACTICE EXERCISE

1. Add 13.66 and 1.36
2. Add 21.4981 and 2.1498
3. Add 7.355 and .73
4. Add 26.53 and 2.653
5. Add 19.156 and 1.91563

D-05 SG  
05C FBSEP

ANSWERS TO PRACTICE EXERCISE

1. 15.02
2. 23.6479
3. 8.085
4. 29.183
5. 21.07163

EXPLANATIONS FOR PRACTICE EXERCISE

1. Add 13.66 and 1.36

STEP 1: Write the two numbers so that the decimal points are lined up one below the other.

$$\begin{array}{r} 13.66 \\ \underline{1.36} \end{array}$$

Did you put the decimal points in a line?  
Was each column of numbers straight?  
Remember that if the columns are not  
straight, you may make a mistake when you  
add.

STEP 2: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 13.66 \\ \underline{1.36} \\ . \end{array}$$

Did you remember to put the decimal point  
in the answer? Did you put it in the right  
place?

STEP 3: Add in the same way you add whole numbers.

$$\begin{array}{r} 13.66 \\ + \quad 1.36 \\ \hline 15.02 \end{array}$$

ANSWER: 15.02



2. Add 21.4981 and 2.1498

STEP 1: Write the two numbers so that the decimal points are lined up one below the other.

$$\begin{array}{r} 21.4981 \\ \underline{2.1498} \end{array}$$

Did you put the decimal point in the right place? Were the columns of numbers straight? Remember that if the columns of numbers are not straight, you may make a mistake when you add.

STEP 2: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 21.4981 \\ \underline{2.1498} \\ . \end{array}$$

Did you remember to put the decimal point in the answer? Did you put it in the right place?

STEP 3: Add in the same way you add whole numbers.

$$\begin{array}{r} 21.4981 \\ + 2.1498 \\ \hline 23.6479 \end{array}$$

ANSWER: 23.6479

3. Add 7.355 and .73

STEP 1: Write the two numbers so that the decimal points are lined up one below the other.

$$\begin{array}{r} 7.355 \\ .73 \\ \hline \end{array}$$

Did you put the decimal point in the right place? Are the columns of numbers straight?

STEP 2: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 7.355 \\ .73 \\ \hline . \end{array}$$

Did you put the decimal point in the answer?  
Did you put it in the right place?

STEP 3: Add in the same way you add whole numbers.

$$\begin{array}{r} 7.355 \\ + \quad .73 \\ \hline 8.085 \end{array}$$

ANSWER: 8.085

4. Add 26.53 and 2.653

STEP 1: Write the two numbers so that the decimal points are lined up one below the other.

$$\begin{array}{r} 26.53 \\ \underline{2.653} \end{array}$$

Did you put the decimal point in the right place? Are all the columns of numbers straight?

STEP 2: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 26.53 \\ \underline{2.653} \\ . \end{array}$$

Did you remember to put the decimal point in the answer? Did you put it in the right place?

STEP 3: Add in the same way you add whole numbers.

$$\begin{array}{r} 26.53 \\ + \quad 2.653 \\ \hline 29.183 \end{array}$$

ANSWER: 29.183

5. Add 19.156 and 1.91563

STEP 1: Write two numbers so that the decimal points are lined up one below the other.

$$\begin{array}{r} 19.156 \\ \underline{1.91563} \end{array}$$

Did you put the decimal in the right place?

Did you check to see the columns were straight?

STEP 2: Put the the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 19.156 \\ \underline{1.91563} \\ . \end{array}$$

Did you remember to put the decimal point in the answer? Did you put it in the right place?

STEP 3: Add in the same way you add whole numbers.

$$\begin{array}{r} 19.156 \\ + \underline{1.91563} \\ 21.07163 \end{array}$$

ANSWER: 21.07163



D-05 SG  
05C FBSEP

OBTAIN LESSON TEST FROM LEARNING SUPERVISOR

D-05 SG  
05C FBSEP

### REMEDIATION

Read carefully the steps you need to follow in order to add two numbers that have decimals.

1. Write the two numbers so that the decimal points are lined up one below the other.
2. Put the decimal point in the answer directly below the other decimal points.
3. Add in the same way you add whole numbers.

Now you will have another exercise to practice on your own. If you don't remember how to do the problems, review the steps that are listed above. Follow these steps carefully when you are working on the exercise. When you have finished, check your answer with the Answers to Remediation Exercise. If you have made any mistakes, read the Explanations For Remediation Exercise to find where you made a mistake. If you do not understand the explanations, ask your learning supervisor for help. When you feel that you understand the Remediation Exercise, ask your learning supervisor for the Remediation Test.

REMEDIATION EXERCISE

1. Add 24.91 and 2.49
2. Add 13.6982 and 1.3698
3. Add 14.516 and 1.45
4. Add 8.54 and .854
5. Add 21.346 and 2.13463

D-05 SG  
05C FBSEP

ANSWERS TO REMEDIATION EXERCISE

1. 27.40
2. 15.0680
3. 15.966
4. 9.394
5. 23.48063

EXPLANATIONS FOR REMEDIATION EXERCISE

1. Add 24.91 and 2.49

STEP 1: Write the two numbers so that the decimal points are lined up one below the other.

$$\begin{array}{r} 24.91 \\ 2.49 \\ \hline \end{array}$$

Did you put the decimal point in the right place? Are the columns of numbers straight?

STEP 2: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 24.91 \\ 2.49 \\ \hline . \end{array}$$

Did you remember to put the decimal point in the answer? Did you put it in the right place?

STEP 3: Add the numbers in the same way you add whole numbers.

$$\begin{array}{r} 24.91 \\ + \underline{2.49} \\ 27.40 \end{array}$$

ANSWER: 27.40



2. Add 13.6982 and 1.3698

STEP 1: Write the two numbers so that the decimal points are lined up one below the other.

$$\begin{array}{r} 13.6982 \\ \underline{1.3698} \end{array}$$

Did you put the decimal point in the right place? Are the columns of numbers straight?

STEP 2: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 13.6982 \\ \underline{1.3698} \\ . \end{array}$$

Did you remember to put the decimal point in the answer? Did you put it in the right place?

STEP 3: Add the numbers in the same way you add the whole numbers.

$$\begin{array}{r} 13.6982 \\ + \underline{1.3698} \\ 15.0680 \end{array}$$

ANSWER: 15.0680

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3. Add 14.516 and 1.45

STEP 1: Write the two numbers so that the decimal points are lined up one below the other.

$$\begin{array}{r} 14.516 \\ \underline{1.45} \end{array}$$

Did you put the decimal point in the right place? Are the columns of numbers straight?

STEP 2: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 14.516 \\ \underline{1.45} \\ . \end{array}$$

Did you remember to put the decimal point in the answer? Did you put it in the right place?

STEP 3: Add the numbers in the same way you add whole numbers.

$$\begin{array}{r} 14.516 \\ + \underline{1.45} \\ 15.966 \end{array}$$

ANSWER: 15.966

4. Add 8.54 and .854

STEP 1: Write the two numbers so that the decimal points lined up one below the other.

$$\begin{array}{r} 8.54 \\ \underline{.854} \end{array}$$

Did you put the decimal point in the right place?  
Are the columns of numbers straight?

STEP 2: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 8.54 \\ \underline{.854} \\ . \end{array}$$

Did you remember to put the decimal point in the answer? Did you put it in the right place?

STEP 3: Add the numbers in the same way you add whole numbers.

$$\begin{array}{r} 8.54 \\ + \ .854 \\ \hline 9.394 \end{array}$$

ANSWER: 9.394

5. Add 21.346 and 2.13463

STEP 1: Write the two numbers so that the decimal points are lined up one below the other.

$$\begin{array}{r} 21.346 \\ \underline{2.13463} \end{array}$$

Did you put the decimal point in the right place?  
Are the columns of numbers straight?

STEP 2: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 21.346 \\ \underline{2.13463} \\ . \end{array}$$

Did you remember to put the decimal point in the answer? Did you put it in the right place?

STEP 3: Add the numbers in the same way you add whole numbers.

$$\begin{array}{r} 21.346 \\ + \quad 2.13463 \\ \hline 23.48063 \end{array}$$

ANSWER: 23.48063



D-05 SG  
05C FBSEP

OBTAIN REMEDIATION TEST FROM LEARNING SUPERVISOR

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# ANSWER KEY FOR REMEDIATION TEST D-05

This answer key contains the correct responses for Remediation Test D-05. Each problem is worth one point. Students must get 4 out of 5 total points to pass this test.

1. 27.31
2. 15.7070
3. 4.355
4. 34.4916
5. 25.1353

ANSWER KEY FOR LESSON TEST D-05

This answer key contains the correct responses for Lesson Test D-05. Each problem is worth one point. Students must get 4 out of 5 total points to pass this test.

1. 29.16
2. 17.8180
3. 7.093
4. 16.7596
5. 19.7123

## REMEDIATION TEST FOR D-05

You will need some paper and a pencil to do this Remediation Test. It contains five problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 4 out of 5 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

1. Add 24.83 and 2.48
2. Add 14.2791 and 1.4279
3. Add 3.965 and .39
4. Add 31.356 and 3.1356
5. Add 22.85 and 2.2853

# LESSON TEST FOR D-05

You will need some paper and a pencil to do this Lesson Test. It contains five problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 4 out of 5 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

1. Add 26.52 and 2.65
2. Add 16.1982 and 1.6198
3. Add 6.453 and .64
4. Add 15.236 and 1.5236
5. Add 17.92 and 1.7923



**FBSEP**

# **RADIO TELETYPE OPERATOR**

**MOS 05C10**

**STUDENT GUIDE**

**05C FBSEP LESSON D-06**

**SUBTRACTING TWO NUMBERS WHICH CONTAIN DECIMALS**

**PREREQUISITE(S):** None

**MATERIALS REQUIRED:** None

**TYPE OF LESSON:** Self paced

## STUDENT GUIDE

### 05C FBSEP LESSON D-06

#### SUBTRACTING TWO NUMBERS WHICH CONTAIN DECIMALS

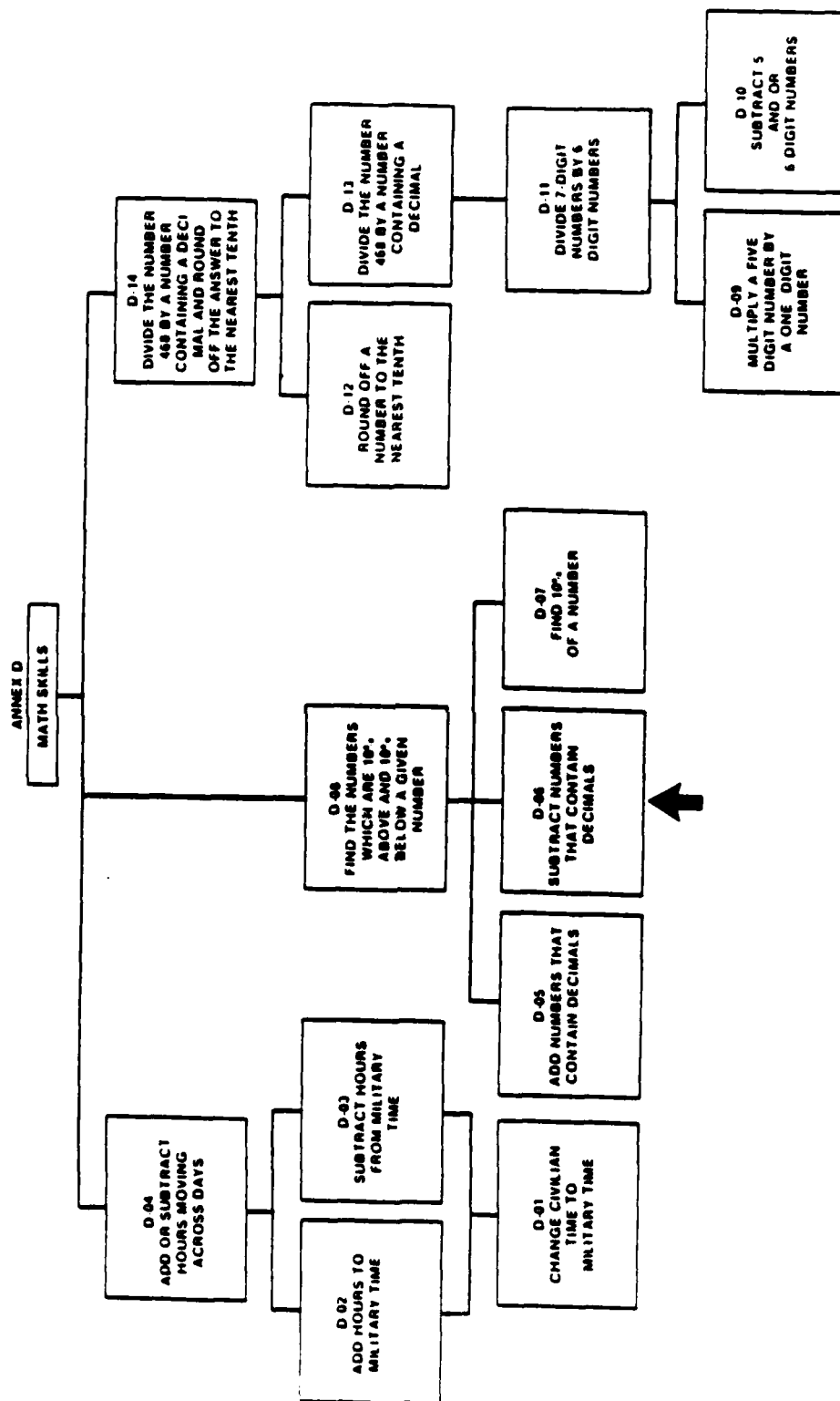
##### INTRODUCTION

If you had Lesson D-05, you learned to add numbers that contain decimals. This lesson will teach you how to subtract numbers that contain decimals.

Knowing how to add and subtract decimals will help you in your work. When you need to set the frequency of two receiver transmitters, you will have to make sure that the second frequency is at least 10% higher or lower than the first frequency. In order to figure that out, you will have to know how to add and subtract numbers that contain decimals.

Lesson D-06 is marked with an arrow on the Annex D Map on the next page.





## OBJECTIVE

When you finish this lesson, you will be able to subtract numbers that contain decimals.

To subtract numbers that contain decimals:

1. Decide which of the two numbers is the smaller one.
2. Write the smaller number below the larger one so that the decimal points are lined up one below the other.
3. If the numbers do not have the same number of decimal places, fill these places with zeros.
4. Put the decimal point in the answer directly below the other decimal points.
5. Subtract in the same way you subtract whole numbers.

## PRESENTATION

Here are some examples to show you how to subtract numbers that have decimals.

EXAMPLE 1: Subtract 2.283 from 22.834

STEP 1: Decide which of the two numbers is the smaller one.

Look at the number 22.834. It has a decimal point in it. What does that mean?

The number to the left of the decimal point is a whole number (22). The number to the right of the decimal point is not a whole number. It is a part of a number or a fraction of a number. It is less than one.

whole number ←  $\boxed{22}.\boxed{834}$  → fraction of number (less than 1)

Therefore, the number 22.834 stands for 22 plus a fraction of 1. It is more than the number 22 and less than the number 23.

Now look at the other number in this example:

whole number ←  $\boxed{2}.\boxed{283}$  → fraction of a number

The number to the left of the decimal point is a whole number (2). The number to the right of the decimal point is a fraction or less than one. So the number 2.283 is more than 2 and less than 3.

The smaller number →  $22.834 = 22$  and a fraction  
→  $2.283 = 2$  and a fraction

Therefore, the number 2.283 is smaller than the number 22.834.

STEP 2: Write the smaller number below the larger one so that the decimal points are lined up one below the other.

$$\begin{array}{r} 22.834 \\ \underline{2.283} \end{array}$$

STEP 3: If the numbers do not have the same number of decimal places, fill these places with zeros.

The decimal places are the places that are to the right of the decimal point. The number 22.834 has three numbers (or digits) after the decimal point. Therefore, it has three decimal places. The number 2.283 also has three numbers after the decimal point. It also has three decimal places.

$$\begin{array}{r} 22.834 \\ \underline{2.283} \end{array}$$
three decimal places

Since both numbers have the same number of decimal places, you do not need to fill in any places with zeros.

STEP 4: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 22.834 \\ \underline{2.283} \\ \hline \end{array}$$

STEP 5: Subtract in the same way you subtract whole numbers.

$$\begin{array}{r} 22.834 \\ - 2.283 \\ \hline 20.551 \end{array}$$

ANSWER: 20.551

EXAMPLE 2: Subtract 1.853 from 18.534

STEP 1: Decide which of the two numbers is the smaller one.

Remember that the numbers to the left of the decimal point are whole numbers and the numbers to the right of the decimal point are a fraction, or less than one. Therefore, 1.853 is equal to 1 and a fraction and 18.534 is equal to 18 and a fraction.

The  $\longrightarrow$  1.853 = 1 and a fraction  
smaller 18.534 = 18 and a fraction  
number

STEP 2: Write the smaller number below the larger one so that the decimal points are lined up one below the other.

18.534  
1.853

STEP 3: If the numbers do not have the same number of decimal places, fill these places with zeros.

$$\begin{array}{r} 18.534 \\ \underline{1.853} \end{array}$$
three  
decimal  
places

In this case, they both have three decimal places so you do not need to add any zeros.

STEP 4: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 18.534 \\ \underline{1.853} \end{array}$$

STEP 5: Subtract in the same way you subtract whole numbers.

$$\begin{array}{r} 18.534 \\ - 1.853 \\ \hline 16.681 \end{array}$$

ANSWER: 16.681



EXAMPLE 3: Subtract .456 from 4.56

STEP 1: Decide which of the two numbers is the smaller one.

The  $\longrightarrow$  .456 = less than 1  
smaller number 4.56 = 4 and a fraction

Notice that the number .456 has no digits to the left of the decimal point. This means that it has no whole numbers. So the value of the number .456 is less than 1. Therefore, the number .456 is the smaller number.

STEP 2: Write the smaller number below the larger one so that the decimal points are lined up one below the other.

$$\begin{array}{r} 4.56 \\ \underline{.456} \end{array}$$

Make sure that you line up the decimal points correctly so that one is directly below the other. Also, it is very important to make sure that all the columns of digits are straight. Otherwise, you will make a mistake when you subtract.

STEP 3: If the numbers do not have the same number of decimal places, fill these places with zeros.

4.56 ← empty decimal place  
.456

Here you see the upper number has only two decimal places and the lower number has three. Therefore, you must fill this place with a zero.

4.560 ← Put a zero here.  
.456

In the lesson on adding decimals (D-05), you were told that you could fill in these decimal places with a zero if you wanted to. However, here, we are going to subtract, not add. Therefore, you must fill in the empty decimal places with zeros. You need a digit to subtract from.

Note: Adding a zero after a decimal does not change the value of the number.

STEP 4: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 4.560 \\ \underline{.456} \\ . \end{array}$$

Make sure the decimal point is in the right place.

STEP 5: Subtract in the same way you subtract whole numbers.

$$\begin{array}{r} 4.560 \\ - .456 \\ \hline 4.104 \end{array}$$

ANSWER: 4.104

EXAMPLE 4: Subtract 2.9645 from 29.645

STEP 1: Decide which of the two numbers is the smaller one.

The  $\longrightarrow$  2.9645 = 2 and a fraction  
smaller 29.645 = 29 and a fraction  
number

STEP 2: Write the smaller number below the larger one so that the decimal points are lined up one below the other.

29.645  
2.9645

Make sure the decimal points are in a straight line. Make sure the columns of digits are also straight.

STEP 3: If the numbers do not have the same number of decimal places, fill these places with zeros.

29.645 ← empty decimal place  
2.9645

Since these numbers do not have the same number of decimal places, you must fill in the places with a zero.

29.6450 ← Put a zero here.  
2.9645

Remember that when you are subtracting, you must fill in empty decimal places with zeros.

STEP 4: Put the decimal point in the answer directly below the other decimal points.

29.6450  
2.9645  
.

STEP 5: Subtract in the same way you subtract whole numbers.

$$\begin{array}{r} 29.6450 \\ - 2.9645 \\ \hline 26.6805 \end{array}$$

ANSWER: 26.6805

EXAMPLE 5: Subtract 1.6824 from 16.82

STEP 1: Decide which of the two numbers is the smaller one.

The  $\longrightarrow$  1.6824 = 1 and a fraction  
smaller 16.82 = 16 and a fraction  
number

STEP 2: Write the smaller number below the larger one so that the decimal points are lined up one below the other.

$$\begin{array}{r} 16.82 \\ \underline{1.6824} \end{array}$$

STEP 3: If the numbers do not have the same number of decimal places, fill these places with zeros.

$$\begin{array}{r} 16.82 \quad \longleftarrow \text{empty decimal places} \\ \underline{1.6824} \end{array}$$

Since there are two empty decimal places, you must insert two zeros.

$$\begin{array}{r} 16.8200 \quad \longleftarrow \text{Put zeros here.} \\ \underline{1.6824} \end{array}$$

STEP 4: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 16.8200 \\ \underline{1.6824} \\ . \end{array}$$

STEP 5: Subtract in the same way you subtract whole numbers.

$$\begin{array}{r} 16.8200 \\ - \underline{1.6824} \\ 15.1376 \end{array}$$

ANSWER: 15.1376



### SUMMARY AND PRACTICE

Here is a review of the steps you need to follow in order to subtract two numbers that contain decimals.

1. Decide which of the two numbers is the smaller one.
2. Write the smaller number below the larger one so that the decimal points are lined up one below the other.
3. If the numbers do not have the same number of decimal places, fill these places with zeros.
4. Put a decimal point in the answer directly below the other decimal points.
5. Subtract in the same way you subtract whole numbers.

Now you will be given the Practice Exercise to try on your own. Use the steps you have learned to figure out the answers. When you have finished, check your answers with the Answers to Practice Exercise. If you have gotten any wrong, read the Explanations to Practice Exercise to find where you made a mistake. If you do not understand the explanations, ask your learning supervisor for help. When you feel that you understand the Practice Exercise, ask your learning supervisor for the Lesson Test.

PRACTICE EXERCISE

1. Subtract 1.96 from 19.64
2. Subtract 2.8349 from 28.3487
3. Subtract 1.534 from 15.34
4. Subtract .8175 from 8.175
5. Subtract 3.1162 from 31.16

ANSWERS TO PRACTICE EXERCISE

1. 17.68
2. 25.5138
3. 13.806
4. 7.3575
5. 28.0438

EXPLANATIONS FOR PRACTICE EXERCISE

1. Subtract 1.96 from 19.64

STEP 1: Decide which of the two numbers is the smaller one.

Remember that the digits to the left of the decimal point are whole numbers and the digits to the right of the decimal are a fraction of a number or are less than one. Therefore, 1.96 is equal to 1 and a fraction. It is more than 1 and less than 2. The number 19.64 is equal to 19 and a fraction. It is more than 19 and less than 20.

|         |        |       |   |                   |
|---------|--------|-------|---|-------------------|
| The     | —————→ | 1.96  | = | 1 and a fraction  |
| smaller |        |       |   |                   |
| number  |        | 19.64 | = | 19 and a fraction |

Therefore, 1.96 is the smaller number.

STEP 2: Write the smaller number below the larger one so that the decimal points are lined up one below the other.

$$\begin{array}{r} 19.64 \\ \underline{1.96} \end{array}$$

Did you make sure to put the decimal points in a straight line? Did you make sure all the digits were in straight columns?

STEP 3: If the numbers do not have the same number of decimal places, fill these places with zeros.

$$\begin{array}{r} 19.64 \\ \underline{1.96} \end{array}$$

two decimal places

Since both numbers have two decimal places, you do not have to add any zeros.

STEP 4: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 19.64 \\ \underline{1.96} \\ . \end{array}$$

Did you remember to put the decimal point in the answer? Did you put it in the right place?

STEP 5: Subtract in the same way you subtract whole numbers.

$$\begin{array}{r} 19.64 \\ - \underline{1.96} \\ 17.68 \end{array}$$

ANSWER: 17.68

Do you understand how to get the correct answer?

2. Subtract 2.8349 from 28.3487

STEP 1: Decide which of the two numbers is the smaller one.

The  $\longrightarrow$  2.8349 = 2 and a fraction  
smaller 28.3487 = 28 and a fraction  
number

STEP 2: Write the smaller number below the larger one so that the decimal points are lined up one below the other.

$$\begin{array}{r} 28.3487 \\ \underline{2.8347} \end{array}$$

Did you make sure the decimal points were in a straight line? Did you make sure the digits were in straight columns? Remember that when the digits are not in straight columns, you may make a mistake when you subtract.

STEP 3: If the numbers do not have the same number of decimal places, fill these places with zeros.

$$\begin{array}{r} 28.3487 \\ \underline{2.8349} \end{array}$$

In this case, both numbers have four decimal places. Therefore, it is not necessary to add any zeros. Remember that we are talking about decimal places or places to the right of the decimal point.

STEP 4: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 28.3487 \\ \underline{2.8349} \end{array}$$

Did you remember to put the decimal point in the answer? Did you put it in the right place?



STEP 5: Subtract in the same way you subtract whole numbers.

$$\begin{array}{r} 28.3487 \\ - 2.8349 \\ \hline 25.5138 \end{array}$$

ANSWER: 25.5138

3. Subtract 1.534 from 15.34

STEP 1: Decide which of the two numbers is the smaller one.

The  $\longrightarrow$  1.534 = 1 and a fraction  
smaller number 15.34 = 15 and a fraction

If you do not understand this, look at the explanation for number 1.

STEP 2: Write the smaller number below the larger one so that the decimal points are lined up one below the other.

15.34  
1.534

Remember that these numbers are lined up according to the decimal point. Did you make sure all the columns were straight?

STEP 3: If the numbers do not have the same number of decimal places, fill these places with zeros.

15.34 ← empty decimal place  
1.534

Since there are two decimal places in the upper number and three in the lower number, fill in the space with a zero.

15.340 ← Put a zero here.  
1.534

Remember that when you are subtracting, you must put zeros in the empty decimal places.

STEP 4: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 15.340 \\ \underline{1.534} \\ . \end{array}$$

Did you remember to put the decimal point in the answer? Did you put it in the right place?

STEP 5: Subtract in the same way you subtract whole numbers.

$$\begin{array}{r} 15.340 \\ - \underline{1.534} \\ 13.806 \end{array}$$

ANSWER: 13.806

4. Subtract .8175 from 8.175

STEP 1: Decide which of the two numbers is the smaller one.

The  $\longrightarrow$  .8175 = less than 1  
smaller number      8.175 = 8 plus a fraction

The number .8175 has no digits to the left of the decimal point. This means that there are no whole numbers. Therefore, the value of the number .8175 is less than 1.

STEP 2: Write the smaller number below the larger one so that the decimal points are lined up one below the other.

$$\begin{array}{r} 8.175 \\ \underline{.8175} \end{array}$$

Make sure you put all the decimal points and numbers in straight columns.

STEP 3: If the numbers do not have the same number of decimal places, fill these places with zeros.

8.175 ← empty decimal place  
.8175

There is an empty decimal place. Fill it in with a zero.

8.1750 ← Put a zero here.  
.8175

STEP 4: Put the decimal point in the answer directly below the other decimal points.

8.1750  
.8175  
.

Did you remember to include the decimal point in the answer?

STEP 5: Subtract in the same way you subtract whole numbers.

$$\begin{array}{r} 8.1750 \\ - \quad .8175 \\ \hline 7.3575 \end{array}$$

ANSWER: 7.3575

5. Subtract 3.1162 from 31.16

STEP 1: Decide which of the two numbers is the smaller one.

The  $\longrightarrow$  3.1162 = 3 and a fraction  
smaller number 31.16 = 31 and a fraction

If you do not understand this, see the explanation for number 1.

STEP 2: Write the smaller number below the larger one so that the decimal points are lined up one below the other.

$$\begin{array}{r} 31.16 \\ \underline{3.1162} \end{array}$$

Did you make sure that all the columns were straight?



STEP 3: If the numbers do not have the same number of decimal places, fill these places with zeros.

31.16   ← empty decimal places  
3.1162

In this case, there are two empty decimal places.  
Fill them in with zeros.

31.1600 ← Put zeros here.  
3.1162

STEP 4: Put the decimal point in the answer directly below the other decimal points.

31.1600  
3.1162  
.

STEP 5: Subtract in the same way you subtract whole numbers.

$$\begin{array}{r} 31.1600 \\ - 3.1162 \\ \hline 28.0438 \end{array}$$

ANSWER: 28.0438

Check to see if you have subtracted correctly.

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### REMEDIATION

Here is a review of the steps you need to follow in order to subtract two numbers that contain decimals.

1. Decide which of the two numbers is the smaller one.
2. Write the smaller number below the larger one so that the decimal points are lined up one below the other.
3. If the numbers do not have the same number of decimal places, fill these places with zeros.
4. Put a decimal point in the answer directly below the other decimal points.
5. Subtract in the same way you subtract whole numbers.

Now you will be given the Remediation Exercise to try on your own. Use the steps you have learned to figure out the answers. When you have finished, check your answers with the Answers to Remediation Exercise. If you have made any mistakes, read the Explanations For Remediation Exercise to find where you made a mistake. If you do not understand the explanations, ask your learning supervisor for help. When you feel that you understand the Remediation Exercise, ask your learning supervisor for the Remediation Test.

REMEDATION EXERCISE

1. Subtract 1.463 from 14.632
2. Subtract 2.0762 from 20.7625
3. Subtract 3.128 from 31.28
4. Subtract .6459 from 6.459
5. Subtract 1.9623 from 19.62

ANSWERS TO REMEDIATION EXERCISE

1. 13.169
2. 18.6863
3. 28.152
4. 5.8131
5. 17.6577

EXPLANATIONS FOR REMEDIATION EXERCISE

1. Subtract 1.463 from 14.632

STEP 1: Decide which of the two numbers is the smaller one.

Remember that the digits to the left of the decimal point are whole numbers and the digits to the right of the decimal are a fraction of a number or are less than one. Therefore, 1.463 is equal to 1 and a fraction. It is more than 1 and less than 2. The number 14.632 is equal to 14 and a fraction. It is more than 14 and less than 15.

1.463 = 1 and a fraction

14.632 = 14 and a fraction

Therefore, 1.463 is the smaller number.



STEP 2: Write the smaller number below the larger one so that the decimal points are lined up one below the other.

$$\begin{array}{r} 14.632 \\ \underline{1.463} \end{array}$$

Did you make sure to put the decimal points in a straight line? Did you make sure all the digits were in straight columns?

STEP 3: If the numbers do not have the same number of decimal places, fill these places with zeros.

$$\begin{array}{r} 14.632 \\ \underline{1.463} \end{array}$$

three decimal places

Since both numbers have three decimal places, you do not have to add any zeros.

STEP 4: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 14.632 \\ \underline{1.463} \\ . \end{array}$$

Did you remember to put the decimal point in the answer? Did you put it in the right place?

STEP 5: Subtract in the same way you subtract whole numbers.

$$\begin{array}{r} 14.632 \\ - \underline{1.463} \\ 13.169 \end{array}$$

ANSWER: 13.169

Do you understand how to subtract correctly?

2. Subtract 2.0762 from 20.7625

STEP 1: Decide which of the two numbers is the smaller one.

The  $\longrightarrow$  2.0762 = 2 and a fraction  
smaller 20.7625 = 20 and a fraction  
number

STEP 2: Write the smaller number below the larger one so that the decimal points are lined up one below the other.

20.7625  
2.6762

Did you make sure the decimal points were in a straight line? Did you make sure the digits were in straight columns? Remember that when the digits are not in straight columns, you may make a mistake when you subtract.

STEP 3: If the numbers do not have the same number of decimal places, fill these places with zeros.

  
20.7625      four decimal places  
2.0762

In this case, both numbers have four decimal places. Therefore, it is not necessary to add any zeros. Remember that we are talking about decimal places or places to the right of the decimal point.

STEP 4: Put the decimal point in the answer directly below the other decimal points.

20.7625  
2.0762  
.

Did you remember to put the decimal point in the answer? Did you put it in the right place?

STEP 5: Subtract in the same way you subtract whole numbers.

$$\begin{array}{r} 20.7625 \\ - \quad 2.0762 \\ \hline 18.6863 \end{array}$$

ANSWER: 18.6863

3. Subtract 3.128 from 31.28

STEP 1: Decide which of the two numbers is the smaller one.

The  $\longrightarrow$  3.128 = 3 and a fraction  
smaller number 31.28 = 31 and a fraction

If you do not understand this, look at the explanation for number 1.

STEP 2: Write the smaller number below the larger one so that the decimal points are lined up one below the other.

$$\begin{array}{r} 31.28 \\ \underline{3.128} \end{array}$$

Remember that these numbers are lined up according to the decimal point. Did you make sure all the columns were straight?

STEP 3: If the numbers do not have the same number of decimal places, fill these places with zeros.

31.28 ← empty decimal place  
3.128

Since there are two decimal places in the upper number and three in the lower number, fill in the space with a zero.

31.280 ← Put a zero here.  
3.128

Remember that when you are subtracting, you must put zeros in the empty decimal places.

STEP 4: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 31.280 \\ \underline{3.128} \end{array}$$

Did you remember to put the decimal point in the answer? Did you put it in the right place?

STEP 5: Subtract in the same way you subtract whole numbers.

$$\begin{array}{r} 31.280 \\ - \underline{3.128} \\ 28.152 \end{array}$$

ANSWER: 28.152



4. Subtract .6459 from 6.459

STEP 1: Decide which of the two numbers is the smaller one.

The  $\longrightarrow$  .6459 = less than 1  
smaller number      6.459 = 6 plus a fraction

The number .8175 has no digits to the left of the decimal point. This means that there are no whole numbers. Therefore, the value of the number .8175 is less than 1.

STEP 2: Write the smaller number below the larger one so that the decimal points are lined up one below the other.

$$\begin{array}{r} 6.459 \\ \underline{.6459} \end{array}$$

Make sure you put all the decimal points and numbers in straight columns.

STEP 3: If the numbers do not have the same number of decimal places, fill these places with zeros.

6.459 ← empty decimal place  
.6459

There is an empty decimal place. Fill it in with a zero.

6.4590 ← Put a zero here.  
.6459

STEP 4: Put the decimal point in the answer directly below the other decimal points.

6.4590  
.6459  
.

Did you remember to include the decimal point in the answer?

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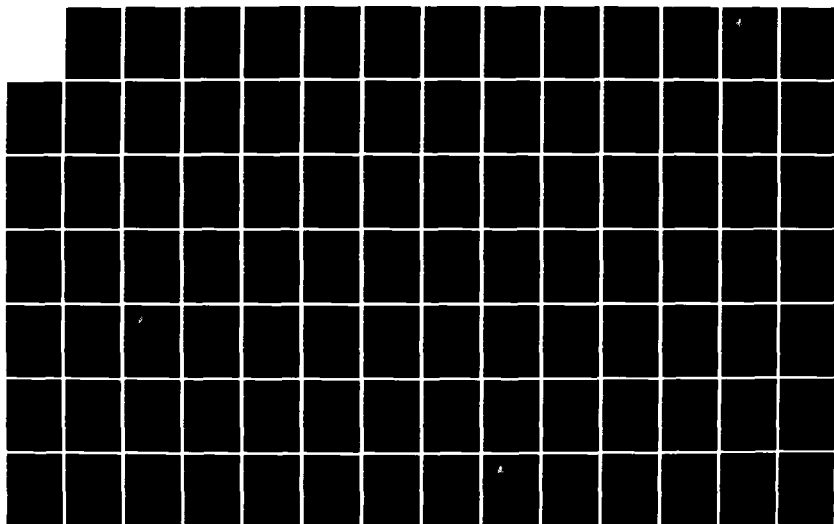
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TELETYPE OPERATOR..(U) PERSPECTIVE INSTRUCTIONAL  
COMMUNICATIONS INC SAN DIEGO CA 1983 DABT60-81-C-0027

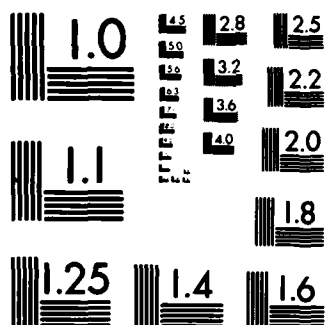
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STEP 5: Subtract in the same way you subtract whole numbers.

$$\begin{array}{r} 6.4590 \\ - .6459 \\ \hline 5.8131 \end{array}$$

ANSWER: 5.8131

5. Subtract 1.9623 from 19.62

STEP 1: Decide which of the two numbers is the smaller one.

|         |   |        |   |                   |
|---------|---|--------|---|-------------------|
| The     | → | 1.9623 | = | 1 and a fraction  |
| smaller |   | 19.62  | = | 19 and a fraction |
| number  |   |        |   |                   |

If you do not understand this, see the explanation for number 1.

STEP 2: Write the smaller number below the larger one so that the decimal points are lined up one below the other.

|               |
|---------------|
| 19.62         |
| <u>1.9623</u> |

Did you make sure that all the columns were straight?

STEP 3: If the numbers do not have the same number of decimal places, fill these places with zeros.

$$\begin{array}{r} 19.62 \quad \leftarrow \text{empty decimal places} \\ \underline{1.9623} \end{array}$$

In this case, there are two empty decimal places.  
Fill them in with zeros.

$$\begin{array}{r} 19.6200 \quad \leftarrow \text{Put zeros here.} \\ \underline{1.9623} \end{array}$$

STEP 4: Put the decimal point in the answer directly below the other decimal points.

$$\begin{array}{r} 19.6200 \\ \underline{1.9623} \\ . \end{array}$$

STEP 5: Subtract in the same way you subtract whole numbers.

$$\begin{array}{r} 19.6200 \\ \underline{1.9623} \\ 17.6577 \end{array}$$

ANSWER: 17.6577

Check to see if you have subtracted correctly.



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LESSON TEST FOR D-06

You will need some paper and a pencil to do this Lesson Test. It contains five problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 4 out of 5 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

1. Subtract 2.436 from 24.364
2. Subtract 3.0192 from 30.1923
3. Subtract 1.284 from 12.84
4. Subtract .7139 from 7.139
5. Subtract 2.8163 from 28.16

# REMEDATION TEST FOR D-06

You will need some paper and a pencil to do this Remediation Test. It contains five problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 4 out of 5 total points to pass this test. Write your answers on a separate sheet of paper.  
DO NOT WRITE ON THIS TEST.

1. Subtract 1.75 from 17.46
2. Subtract 3.1428 from 31.4286
3. Subtract 1.476 from 14.76
4. Subtract .7635 from 7.635
5. Subtract 2.8541 from 28.54

# ANSWER KEY FOR REMEDIATION TEST D-06

This answer key contains the correct responses for Remediation Test D-06. Each problem is worth one point. Students must get 4 out of 5 total points to pass this test.

1. 15.71
2. 28.2858
3. 13.284
4. 6.8715
5. 25.6859

ANSWER KEY FOR LESSON TEST D-06

This answer key contains the correct responses for Lesson Test D-06. Each problem is worth one point. Students must get 4 out of 5 total points to pass this test.

1. 21.928
2. 27.1731
3. 11.556
4. 6.4251
5. 25.3437



**FBSEP**

# **RADIO TELETYPE OPERATOR**

**MOS 05C10**

**STUDENT GUIDE**

**05C FBSEP LESSON D-07**

**FINDING 10% OF A NUMBER**

**PREREQUISITE: None**

**MATERIALS REQUIRED: None**

**TYPE OF LESSON: Self paced**

## STUDENT GUIDE

### 05C FBSEP LESSON D-07

#### FINDING 10% OF A NUMBER

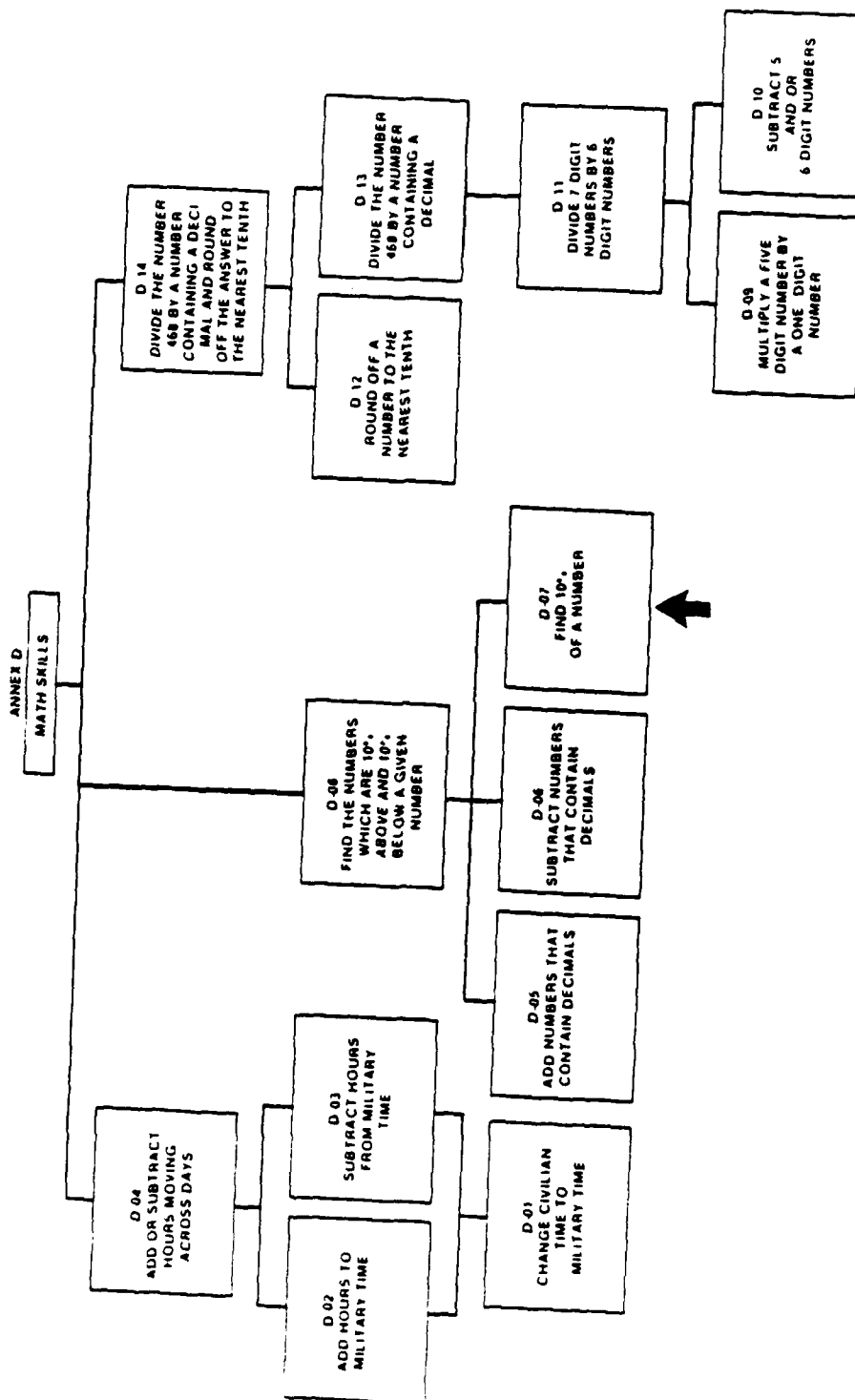
##### INTRODUCTION

While you're working as a radio operator, it may be necessary to use two receiver-transmitters at the same time. It is important that their signals do not overlap. There is a method that will be explained in the 05C AIT Course that will make sure that this does not happen. Part of that procedure involves finding 10% of a number. It is the purpose of this FBSEP lesson to show you how to do this calculation.

Note the lesson map on the following page. Lessons D-05, D-06, D-07 and D-08 all deal with the math necessary for setting the frequency on the second receiver-transmitter.

This lesson, D-07, is indicated by an arrow.





D-07 SG  
05C FBSEP

OBJECTIVE: When you finish this lesson, you will be able to find 10% of a number.

To find 10% of a number, you should:

1. Copy the digits exactly as they appear in the original number but do not include the decimal point.
2. Write the decimal point one place to the left of where it appears in the original number.

PRESENTATION

Take a look at a few examples.

EXAMPLE 1: Find 10% of 17.95

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

"Digits" are the numbers 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. It is the combination of these "digits" which make up all other numbers in our number system. In this example, the digits are 1, 7, 9, and 5. Copy the digits exactly as they appear in the given number but leave out the decimal point:

1795

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

In the original number the decimal point is after the 7:

17.95

Move the decimal point one place to the left:

17.95

In other words, write it after the 1:

1.795

Therefore  $10\%$  of 17.95 = 1.795

ANSWER: 1.795

EXAMPLE 2: Find 10% of 1.489

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

The digits are 1, 4, 8, and 9. Therefore you copy:

1489

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

Move the decimal point one place to the left.

1,489 or .1489

ANSWER: .1489

EXAMPLE 3: Find 10% of 8.3375

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

83375

STEP 2: Write the decimal point one place to the left or where it appears in the original number.

8.3375 or .83375

ANSWER: .83375

EXAMPLE 4: Find 10% of 26.086

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

26086

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

26.086 or 2.6086

ANSWER: 2.6086

Take a minute to examine the example on the previous page more carefully. In reality the steps you have been given to follow are a "shortcut". When you're asked to find 10% of any number, in this case 10% of 26.086, you're really being asked to multiply 26.086 by 10%. But, if you check back at what was done, no multiplication actually took place. You merely copied the given number and then moved the decimal point.

Look at what the multiplication would look like. To multiply by a percent, you must use its decimal (or fraction) value. 10% is the same as .10. You would, therefore, need to multiply 26.086 by .10. To begin:

$$\begin{array}{r} 26.086 \\ \times \quad .10 \\ \hline 00000 \\ 26086 \\ \hline 260860 \end{array}$$



To position the decimal point, you count the decimal places after the decimal points in the two numbers that were multiplied together:

$$\begin{array}{r}
 26.\cancel{0}\cancel{0}\cancel{0} \\
 \times \quad \cancel{.}\cancel{2}\cancel{0} \\
 \hline
 00000 \\
 26086 \\
 \hline
 260860
 \end{array}
 \left. \vphantom{\begin{array}{r} 26.\cancel{0}\cancel{0}\cancel{0} \\ \times \quad \cancel{.}\cancel{2}\cancel{0} \end{array}} \right\} \begin{array}{l} \text{a total of 5 places} \\ \text{after the decimal points} \end{array}$$

You then count off 5 places (from right to left) in the answer and place the decimal point there:

$$\begin{array}{r}
 26.086 \\
 \times \quad \cancel{.}\cancel{1}\cancel{0} \\
 \hline
 00000 \\
 26086 \\
 \hline
 2\cancel{6}\cancel{0}\cancel{8}\cancel{6}\cancel{0} \leftarrow \begin{array}{l} \text{5 places counted off} \\ \text{right to left} \end{array}
 \end{array}$$

Then you put in the decimal point and the answer is:

$$\begin{array}{r} 26.086 \\ \times \quad .10 \\ \hline 00000 \\ 26086 \\ \hline 2.60860 \end{array} \leftarrow \text{answer by multiplication}$$

Check this answer with the one found earlier by the "shortcut", 2.6086. A zero at the end of decimal does not change its value so the two answers are the same. The "shortcut" is recommended in this lesson only because it is just that — a short, quick way to find the answer.

Look at one more example, using this "shortcut".

EXAMPLE 5: Find 10% of 30.4

STEP 1: 304

STEP 2: 30.4 or 3.04

ANSWER: 3.04

### SUMMARY AND PRACTICE

Try the following Practice Exercise on your own; then check your answers with the ones given in this Student Guide. If you get any wrong, study the Explanations for the Practice Exercise and ask the learning supervisor to help you. When you feel you understand the Practice Exercise, ask the learning supervisor for the Lesson Test.

Before doing the exercise, take a minute to review the steps necessary to find 10% of a number:

1. Copy the digits exactly as they appear in the original number but do not include the decimal point.
2. Write the decimal point one place to the left of where it appears in the original number.

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PRACTICE EXERCISE

Find 10% of each of the following numbers:

1. 6.42
2. 29.746
3. 7.837
4. 13.2
5. 16.0243
6. 2.1215
7. 11.6964
8. 42.75
9. 8.337
10. 37.1

ANSWERS TO PRACTICE EXERCISE

1. .642
2. 2.9746
3. .7837
4. 1.32
5. 1.60243
6. .21215
7. 1.16964
8. 4.275
9. .8387
10. 3.71

EXPLANATIONS FOR PRACTICE EXERCISE

1. Find 10% of 6.42

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

642

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

6.42 or .642

ANSWER: .642



2. Find 10% of 29.746

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

29746

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

29.746 or 2.9746

ANSWER: 2.9746

3. Find 10% of 7.837

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

7837

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

7.837 or .7837

ANSWER: .7837

4. Find 10% of 13.2

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

132

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

13.2 or 1.32

ANSWER: 1.32

5. Find 10% of 16.0243

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

160243

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

16.0243 or 1.60243

ANSWER; 1.60243

6. Find 10% of 2.1215

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

21215

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

2.1215 or .21215

ANSWER: .21215

7. Find 10% of 11.6964

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

116964

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

11.6964 or 1.16964

ANSWER: 1.16964

8. Find 10% of 42.75

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

4275

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

42.75 or 4.275

ANSWER: 4.275

9. Find 10% of 8.387

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

8387

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

8.387 or .8387

ANSWER: .8387



10. Find 10% of 37.1

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

371

STEP 2: Write the decimal point place to the left of where it appears in the original number.

37.1 or 3.71

ANSWER: 3.71

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### REMEDIATION

Go back and review the Examples and the Explanations for the Practice Exercise. If there are still questions, ask the learning supervisor to help you. Once you feel certain about these, try the Remediation Exercise and then correct your answers. If you get any wrong, ask the learning supervisor to go over the Explanations for Remediation Exercise with you. When ready, ask for the Remediation Test.

Before beginning, study the steps necessary to find 10% of a number:

- STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.
- 2: Write the decimal point one place to the left of where it appears in the original number.

REMEDATION EXERCISE

Find 10% of each of the following numbers:

1. 7.59
2. 30.47
3. 2.026
4. 17.935
5. 21.2
6. 6.4085
7. 3.74
8. 40.0055
9. 37.40
10. 5.500

ANSWERS TO REMEDIATION EXERCISE

1. .759
2. 3.047
3. .2026
4. 1.7935
5. 2.12
6. .64085
7. .374
8. 4.00055
9. 3.740
10. .5500

EXPLANATIONS FOR REMEDIATION EXERCISE

1. Find 10% of 7.59

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

759

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

7.59 or .759

ANSWER: .759

2. Find 10% of 30.47

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

3047

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

30.47 or 3.047

ANSWER: 3.047

3. Find 10% of 2.026

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

2026

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

2.026 or .2026

ANSWER: .2026



4. Find 10% of 17.935

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

17935

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

17.935 or 1.7935

ANSWER: 1.7935

5. Find 10% of 21.2

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

212

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

21.1 or 2.12

ANSWER: 2.12

6. Find 10% of 6.4085

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

64085

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

6.4085 or .64085

ANSWER: .64085

7. Find 10% of 3.74

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

374

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

3.74 or .374

ANSWER: .374

8. Find 10% of 40.0055

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

400055

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

40.0055 or 4.00055

ANSWER: 4.00055

9. Find 10% of 37.40

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

3740

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

37.40 or 3.740

ANSWER: 3.740

10. Find 10% of 5.500

STEP 1: Copy the digits exactly as they appear in the original number but do not include the decimal point.

5500

STEP 2: Write the decimal point one place to the left of where it appears in the original number.

5,500 or .5500

ANSWER: .5500

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# REMEDATION TEST FOR D-07

You will need some paper and a pencil to do this Remediation Test. It contains 10 problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 8 out of 10 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

- |           |            |
|-----------|------------|
| 1. 15.503 | 6. 4.78    |
| 2. 14.6   | 7. 47.84   |
| 3. 8.24   | 8. 35.999  |
| 4. 1.639  | 9. 2.053   |
| 5. 24.75  | 10. 1.8040 |

LESSON TEST FOR D-07

You will need some paper and a pencil to do this Lesson Test. It contains 10 problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 8 out of 10 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

Find 10% of each of the following numbers:

- |           |            |
|-----------|------------|
| 1. 31.42  | 6. 53.28   |
| 2. 1.536  | 7. 3.56    |
| 3. 9.98   | 8. 1.4080  |
| 4. 27.3   | 9. 4.016   |
| 5. 18.401 | 10. 62.235 |

# ANSWER KEY FOR LESSON TEST D-07

This answer key contains the correct responses for Lesson Test D-07. Each problem is worth one point. Students must get 8 out of 10 total points to pass this test.

1. 3.142
2. .1536
3. .998
4. 2.73
5. 1.8401
6. 5.328
7. .356
8. .14080
9. .4016
10. 6.2235

# ANSWER KEY FOR REMEDIATION TEST D-07

This answer key contains the correct responses for Remediation Test D-07. Each problem is worth one point. Students must get 8 out of 10 total points to pass this test.

1. 1.5503
2. 1.46
3. .824
4. .1639
5. 2.475
6. .478
7. 4.784
8. 3.5999
9. .2053
10. .18040



FBSEP

# RADIO TELETYPE OPERATOR

MOS 05C10

STUDENT GUIDE

05C FBSEP LESSON D-08

FINDING NUMBERS WHICH ARE 10% ABOVE

AND 10% BELOW A GIVEN NUMBER

PREREQUISITE: None

MATERIALS REQUIRED: None

TYPE OF LESSON: Self paced

## STUDENT GUIDE

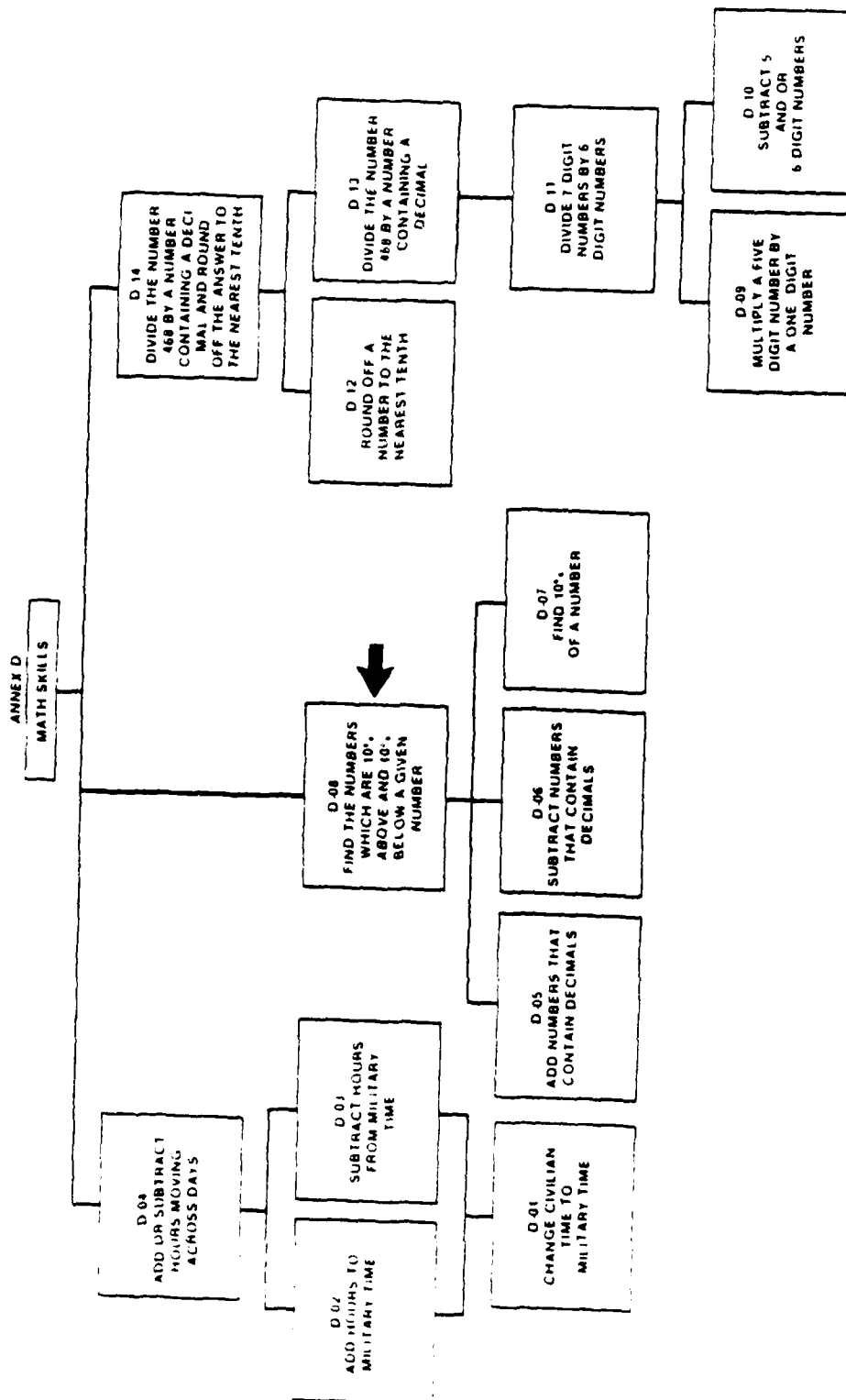
05C FBSEP LESSON D-08

FINDING NUMBERS WHICH ARE 10% ABOVE  
AND 10% BELOW A GIVEN NUMBER

### INTRODUCTION

As a radio operator you may often be required to use one receiver/transmitter to transmit messages and, at the same time, have a second receiver/transmitter ready to receive messages. Each receiver/transmitter will need to be set to an appropriate frequency. It's important, however, that the two signals do not overlap or interfere with each other. To avoid this there must be a minimum separation between the two frequencies used. The 05C AIT course will show you the proper way to do this. It is the purpose of this FBSEP lesson to be sure you know some of the math that will be required to accomplish this task.

Look at the lesson map on the next page. There are four lessons, D-05 through D-08, which deal with the math necessary for setting the frequency on the second receiver/transmitter. This lesson, D-08, is one of the four and is marked on the map by an arrow.



OBJECTIVE: When you finish this lesson, you will be able to find the two numbers, each of which is 10% above and 10% below a given number.

---

To find the numbers which are 10% above and 10% below a given number, you should:

1. Find 10% of the given number.
  2. Add the answer to Step 1 to the given number.
  3. Subtract the answer to Step 1 from the given number.
-



### PRESENTATION

When using two receiver/transmitters at the same time, it is necessary to be sure the two frequencies you assign are at the very least  $1\text{MHz}$  apart. Part of making sure they are at least  $1\text{MHz}$  apart includes comparing a number containing a decimal with the number 1. For example, can you tell which of the following numbers are greater than 1 and which are less than 1?

|        |       |
|--------|-------|
| .3     | .4285 |
| 17.567 | 1.007 |
| 1.76   | 1.2   |
| .906   | .07   |
| 3.42   | 25.0  |

You should have decided these numbers are greater than 1:

|        |       |
|--------|-------|
| 17.567 | 1.007 |
| 1.76   | 1.2   |
| 3.42   | 25.0  |

and these numbers are less than 1:

|      |       |
|------|-------|
| .3   | .4285 |
| .906 | .07   |

If you had difficulty with this, ask your learning supervisor to assist you.

D-08 SG  
05C FBSEP

Another part of the task of operating two receiver/transmitters at the same time is to be sure the frequency of the second receiver/transmitter falls outside of a particular range of frequencies. In other words, you will need to check whether or not that frequency falls between two other frequencies. That means deciding if one number containing a decimal falls between two other numbers containing decimals. For example, you should see that:

18.4 is between 14.7 and 21.3

15.06 is between 9.36 and 31.248

22.0 is not between 11.783 and 21.61

7.391 is not between 10.75 and 18.02

8.65 is between 8.91 and 7.29

30.2 is not between 28.322 and 21.46

If you have difficulty understanding any of these, you should ask your learning supervisor for help.

The range of frequencies referred to earlier is 10% above to 10% below the frequency of the first receiver/transmitter. It is the purpose of this lesson to help you with this part of the procedure. The following examples will show you how to find the numbers which are 10% above and 10% below a given number. Study them carefully.

EXAMPLE 1: Find the numbers which are 10% above and 10% below  
26.39

STEP 1: Find 10% of the given number. Copy the digits  
and move the decimal point one place to the left.

$$26.39 = 2.639$$

If this procedure is not clear to you, ask the  
learning supervisor for FBSEP Lesson D-07, Finding  
10% of a Number.

STEP 2: Add the answer to Step 1 to the given number.

$$\begin{array}{rcl} 26.39 & \longleftarrow & \text{the given number} \\ + \quad 2.639 & \longleftarrow & \text{the answer to Step 1} \\ \hline 29.029 & \longleftarrow & \text{the number which is 10\% above} \\ & & \text{the given number} \end{array}$$

If you have a problem adding numbers which con-  
tain decimals, ask the learning supervisor for  
FBSEP Lesson D-05.

STEP 3:     Subtract the answer to Step 1 from the given number.

|         |   |                                                          |
|---------|---|----------------------------------------------------------|
| 26.390  | ← | the given number                                         |
| - 2.639 | ← | the answer to Step 1                                     |
| 23.751  | ← | the number which is 10% <u>below</u><br>the given number |

If you have difficulty subtracting numbers which contain decimals, ask the learning supervisor for FBSEP Lesson D-06.

TO SUMMARIZE:

- The given number is 26.39
- 10% of this number is 2.639
- The number which is 10% above 26.39 is 29.029  
or  $(26.39 + 2.639)$
- The number which is 10% below 26.39 is 23.751  
or  $(26.39 - 2.639)$

ANSWER:     29.029 and 23.751

EXAMPLE 2: Find the numbers which are 10% above and 10% below 8.475

STEP 1: Find 10% of the given number.

8.475

STEP 2: Add the answer to Step 1 to the given number.

|         |   |                                                      |
|---------|---|------------------------------------------------------|
| 8.475   | ← | the given number                                     |
| + .8475 | ← | the answer to Step 1                                 |
| 9.3225  | ← | the number that is 10% <u>above</u> the given number |

STEP 3: Subtract the answer to Step 1 from the given number.

|         |   |                                                       |
|---------|---|-------------------------------------------------------|
| 8.4750  | ← | the given number                                      |
| - .8475 | ← | the answer to Step 1                                  |
| 7.6275  | ← | the number which is 10% <u>below</u> the given number |

TO SUMMARIZE:

The given number = 8.475

10% of 8.475 = .8475

the number 10% above 8.475 = 8.475 + .8475  
= 9.3225

the number 10% below 8.475 = 8.475 - .8475  
= 7.6275

ANSWER: 9.3225 and 7.6275



EXAMPLE 3: Find the numbers which are 10% above and 10% below 11.292

STEP 1: Find 10% of the given number.

$$11.292 = 1.1292$$

STEP 2: Add the answer to Step 1 to the given number.

$$\begin{array}{r} 11.292 \\ + 1.1292 \\ \hline 12.4212 \end{array} \leftarrow \text{the number 10\% above the given number}$$

STEP 3: Subtract the answer to Step 1 from the given number.

$$\begin{array}{r} 11.2920 \\ - 1.1292 \\ \hline 10.1628 \end{array} \leftarrow \text{the number 10\% below the given number}$$

ANSWER: 12.4212 and 10.1628

EXAMPLE 4: Find the numbers which are 10% above and 10% below 7.56

STEP 1: 10% of 7.56 = .756

STEP 2: The number 10% above 7.56 =

$$\begin{array}{r} 7.56 \\ + .756 \\ \hline 8.316 \end{array}$$

STEP 3: The number 10% below 7.56 =

$$\begin{array}{r} 7.560 \\ - .756 \\ \hline 6.804 \end{array}$$

ANSWER: 8.316 and 6.804

## SUMMARY AND PRACTICE

Review the steps necessary to find the numbers which are 10% above and 10% below a given number:

1. Find 10% of the given number.
2. Add the answer to Step 1 to the given number.
3. Subtract the answer to Step 1 from the given number.

Now you are ready to try the Practice Exercise. When you finish it, correct your own answers. If you need to, go over the step-by-step Explanations for Practice Exercise. Ask the learning supervisor to help you with any you don't understand. When you are ready, ask for the test for this lesson.

PRACTICE EXERCISE

Find the numbers which are 10% above and 10% below each of the following:

1. 16.042
2. 30.19
3. 2.578

ANSWERS TO PRACTICE EXERCISE

1. 17.6462 and 14.4378
2. 33.209 and 27.171
3. 2.8358 and 2.3202

EXPLANATIONS FOR PRACTICE EXERCISE

1. Find the numbers which are 10% above and 10% below  
16.042

STEP 1: Find 10% of the given number.

$$16.042 = 1.6042$$

STEP 2: Add the answer to Step 1 to the given number.

|          |   |                                                 |
|----------|---|-------------------------------------------------|
| 16.042   | ← | the given number                                |
| + 1.6042 | ← | the answer to Step 1                            |
| 17.6462  | ← | the number 10% <u>above</u> the given<br>number |

STEP 3: Subtract the answer to Step 1 from the given  
number.

|          |   |                                                 |
|----------|---|-------------------------------------------------|
| 16.0420  | ← | the given number                                |
| - 1.6042 | ← | the answer to Step 1                            |
| 14.4378  | ← | the number 10% <u>below</u> the given<br>number |

ANSWER: 17.6462 and 14.4378

2. Find the numbers which are 10% above and 10% below  
30.19

STEP 1: Find 10% of the given number.

$$30.19 = 3.019$$

STEP 2: Add the answer to Step 1 to the given number.

|         |   |                                                 |
|---------|---|-------------------------------------------------|
| 30.19   | ← | the given number                                |
| + 3.019 | ← | the answer to Step 1                            |
| 33.209  | ← | the number 10% <u>above</u> the given<br>number |

STEP 3: Subtract the answer to Step 1 from the given  
number.

|         |   |                                                 |
|---------|---|-------------------------------------------------|
| 30.190  | ← | the given number                                |
| - 3.019 | ← | the answer to Step 1                            |
| 27.171  | ← | the number 10% <u>below</u> the given<br>number |

ANSWER: 33.209 and 27.171

3. Find the numbers which are 10% above and 10% below

2.578

STEP 1: Find 10% of the given number.

$$2.578 = .2578$$

STEP 2: Add the answer to Step 1 to the given number.

|         |   |                                              |
|---------|---|----------------------------------------------|
| 2.578   | ← | the given number                             |
| + .2578 | ← | the answer to Step 1                         |
| 2.8358  | ← | the number 10% <u>above</u> the given number |

STEP 3: Subtract the answer to Step 1 from the given number.

|         |   |                                              |
|---------|---|----------------------------------------------|
| 2.5780  | ← | the given number                             |
| - .2578 | ← | the answer to Step 1                         |
| 2.3202  | ← | the number 10% <u>below</u> the given number |

ANSWER: 2.8358 and 2.3202



D-08 SG  
05C FBSEP

OBTAIN LESSON TEST FROM THE LEARNING SUPERVISOR

D-08 SG  
05C FBSEP

### REMEDIATION

This section of the lesson gives you some extra practice. Do the Remediation Exercise, correct your own work, and then study the Explanations. Be sure to ask the learning supervisor to help you with any problems before you take the retest for this lesson.

Before beginning, review the steps required to find the numbers 10% above and 10% below a given number:

1. Find 10% of the given number.
2. Add the answer to Step 1 to the given number.
3. Subtract the answer to Step 1 from the given number.

REMEDIATION EXERCISE

Find the numbers which are 10% above and 10% below each of the following:

1. 22.48
2. 10.357
3. 6.913

ANSWERS TO REMEDIATION EXERCISE

1. 24.728 and 20.232
2. 11.3927 and 9.3213
3. 7.6043 and 6.2217

EXPLANATIONS FOR REMEDIATION EXERCISE

1. Find the numbers 10% above and 10% below 22.48

STEP 1: Find 10% of the given number.

$$22.48 = 2.248$$

STEP 2: Add the answer to Step 1 to the given number.

|         |   |                                              |
|---------|---|----------------------------------------------|
| 22.48   | ← | the given number                             |
| + 2.248 | ← | the answer to Step 1                         |
| 24.728  | ← | the number 10% <u>above</u> the given number |

STEP 3: Subtract the answer to Step 1 from the given number.

|         |   |                                              |
|---------|---|----------------------------------------------|
| 22.480  | ← | the given number                             |
| - 2.248 | ← | the answer to Step 1                         |
| 20.232  | ← | the number 10% <u>below</u> the given number |

ANSWER: 24.728 and 20.232

2. Find the numbers 10% above and 10% below 10.357

STEP 1: Find 10% of the given number.

$$10.357 = 1.0357$$

STEP 2: Add the answer to Step 1 to the given number.

|          |   |                                              |
|----------|---|----------------------------------------------|
| 10.357   | ← | the given number                             |
| + 1.0357 | ← | the answer to Step 1                         |
| 11.3927  | ← | the number 10% <u>above</u> the given number |

STEP 3: Subtract the answer to Step 1 from the given number.

|          |   |                                              |
|----------|---|----------------------------------------------|
| 10.3570  | ← | the given number                             |
| - 1.0357 | ← | the answer to Step 1                         |
| 9.3213   | ← | the number 10% <u>below</u> the given number |

ANSWER: 11.3927 and 9.3213

3. Find the numbers 10% above and 10% below 6.913

STEP 1: Find 10% of the given number.

$$6.913 = .6913$$

STEP 2: Add the answer to Step 1 to the given number.

|         |   |                                                 |
|---------|---|-------------------------------------------------|
| 6.913   | ← | the given number                                |
| + .6913 | ← | the answer to Step 1                            |
| 7.6043  | ← | the number 10% <u>above</u> the given<br>number |

STEP 3: Subtract the answer to Step 1 from the given  
number.

|         |   |                                                 |
|---------|---|-------------------------------------------------|
| 6.9130  | ← | the given number                                |
| - .6913 | ← | the answer to Step 1                            |
| 6.2217  | ← | the number 10% <u>below</u> the given<br>number |

ANSWER: 7.6043 and 6.2217



D-08 SG  
05C FBSEP

OBTAIN REMEDIATION TEST FROM LEARNING SUPERVISOR

D-08 SG  
05C FBSEP

## REMEDIATION TEST FOR D-08

You will need some paper and a pencil to do this Remediation Test. It contains five problems. Each problem tests the objective that you learned in this lesson. There are two parts to each problem. Each problem is worth two points. You must get 8 out of 10 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

Find the numbers which are 10% above and 10% below each of the following:

1. 27.62
2. 5.049
3. 18.217
4. 4.53
5. 30.6

# LESSON TEST FOR D-08

You will need some paper and a pencil to do this Lesson Test. It contains five problems. Each problem tests the objective that you learned in this lesson. There are two parts to each problem. Each problem is worth two points. You must get 8 out of 10 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

Find the numbers which are 10% above and 10% below each of the following:

1. 9.49
2. 18.651
3. 1.027
4. 25.3004
5. 31.5

# ANSWER KEY FOR REMEDIATION TEST D-08

This answer key contains the correct responses for Remediation Test D-08. Each problem is worth two points. Students must get 8 out of 10 total points to pass this test.

1. 30.382 and 24.858
2. 5.5539 and 4.5441
3. 20.0387 and 16.3953
4. 4.983 and 4.077
5. 33.66 and 27.54

# ANSWER KEY FOR LESSON TEST D-08

This answer key contains the correct responses for Lesson Test D-08. Each problem is worth two points. Students must get 8 out of 10 total points to pass this test.

1. 10.439 and 8.541
2. 20.5161 and 16.7859
3. 1.1297 and .9243
4. 27.83044 and 22.77036
5. 34.65 and 28.35



**FBSEP**

# **RADIO TELETYPE OPERATOR**

**MOS 05C10**

**STUDENT GUIDE**

**05C FBSEP LESSON D-09**

**MULTIPLYING A 5-DIGIT NUMBER BY A 1-DIGIT NUMBER**

**PREREQUISITE: None**

**MATERIALS REQUIRED: None**

**TYPE OF LESSON: Self paced**

## STUDENT GUIDE

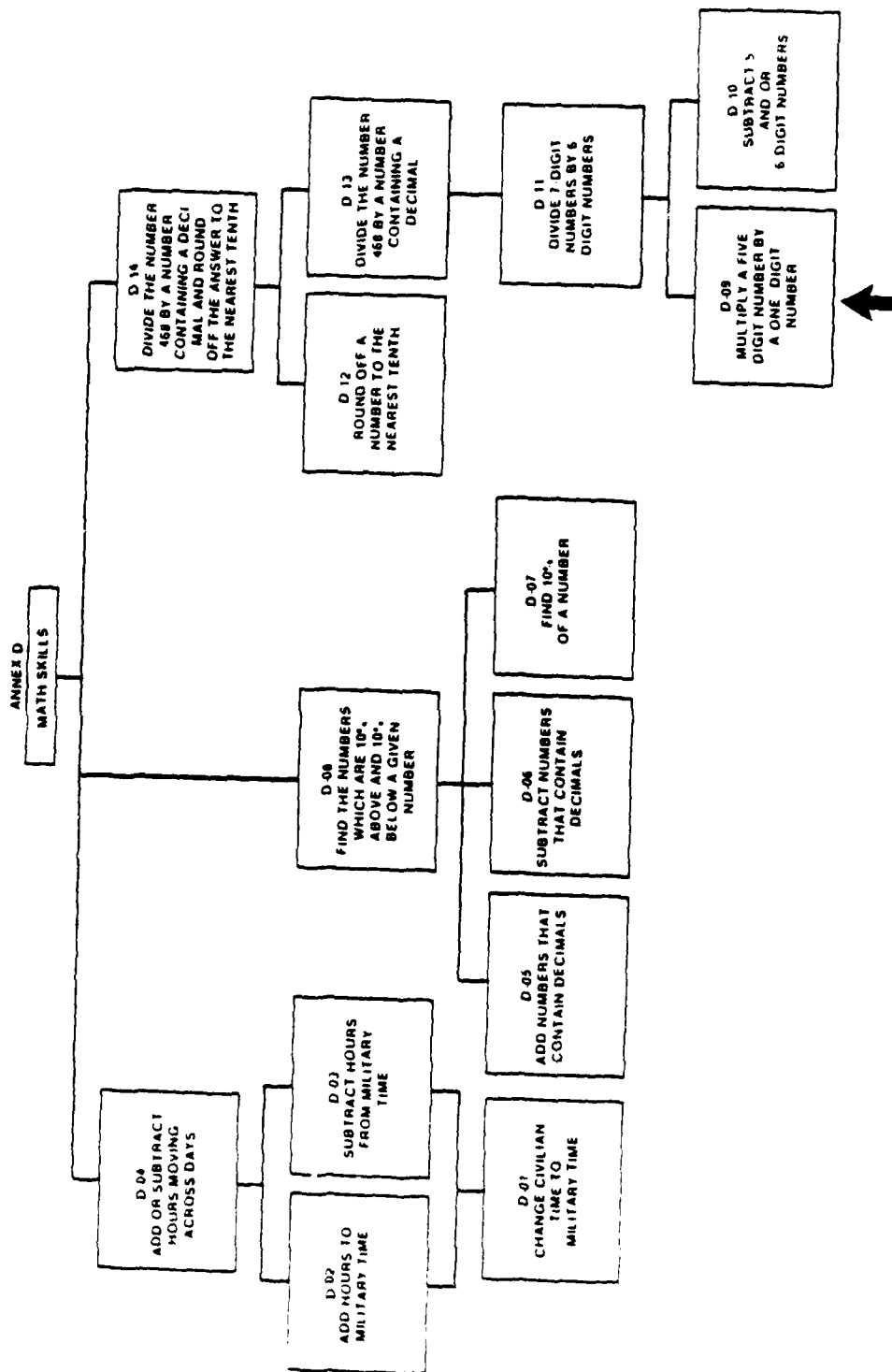
### 05C FBSEP LESSON D-09

#### MULTIPLYING A 5-DIGIT NUMBER BY A 1-DIGIT NUMBER

##### INTRODUCTION

A radio operator often has to assemble an antenna for his radio. To do this the radio operator must know how long to make the antenna wire. There are three ways to decide how long the antenna wire should be. One way is by long-division. This lesson is the first of six lessons that will teach you how to do long-division. Look at the lesson map which follows. The six lessons on long-division are D-09, D-10, D-11, D-12, D-13, and D-14. The lesson you are reading now, D-09, is marked with an arrow.





Objective: When you finish this lesson, you will be able to multiply a 5-digit number by a 1-digit number.

To multiply a 5-digit number by a 1-digit number:

1. Write the two numbers with the 1-digit number directly below the right-most digit of the 5-digit number and draw a line.
2. Multiply the 1-digit number by the last (right-most) digit in the 5-digit number.
  - a. If the product is a 1-digit number, write the number in the answer space.
  - b. If the product is a 2-digit number, write the units digit in the answer space and carry the tens-digit.
3. Multiply the 1-digit number by the next digit in the 5-digit number.
  - a. If the product is a 1-digit number and there is nothing to carry, write the number in the answer space.
  - b. If the product is a 1-digit number and there is a number to carry, add the two numbers together. Write the units digit in the answer space and carry the tens digit.
  - c. If the product is a 2-digit number and there is nothing to carry, write the units digit in the answer space and carry the tens digit.
  - d. If the product is a 2-digit number and there is a number to carry, add the two numbers together. Write the units digit in the answer space and carry the tens digit.

## PRESENTATION

EXAMPLE 1: Let's try an easy example first. Assume that you want to multiply  $3 \times 34102$ . Here is how you would do it.

STEP 1: Write the two numbers with the 1-digit number directly below the right-most digit of the 5-digit number and draw a line.

In this example, you write the 3 directly below the right-most digit in the 5-digit number, the 2, and then draw a line.

$$\begin{array}{r} 34102 \\ \times \quad 3 \\ \hline \end{array}$$

STEP 2: Multiply the 1-digit number by the last (right-most) digit in the 5-digit number. When you multiply  $3 \times 2$  you get 6, a 1-digit number. Since the product is a 1-digit number, do step 2a.

NOTE: When you multiply one number by another, the answer is called the product.

STEP 2a: If the product is a 1-digit number, write the number in the answer space.

$$\begin{array}{r} 34102 \\ \times \quad 3 \\ \hline 6 \end{array}$$

STEP 3: Multiply the 1-digit number by the next digit in the 5-digit number. When you multiply  $3 \times 0$ , you get 0, a 1-digit number. Since the product is a 1-digit number and there is nothing to carry, do step 3a.

NOTE: You repeat step 3, moving from right to left, until you have multiplied each number.

STEP 3a: If the product is a 1-digit number and there is nothing to carry, write the number in the answer space.

$$\begin{array}{r} 34102 \\ \times \quad 3 \\ \hline 06 \end{array}$$

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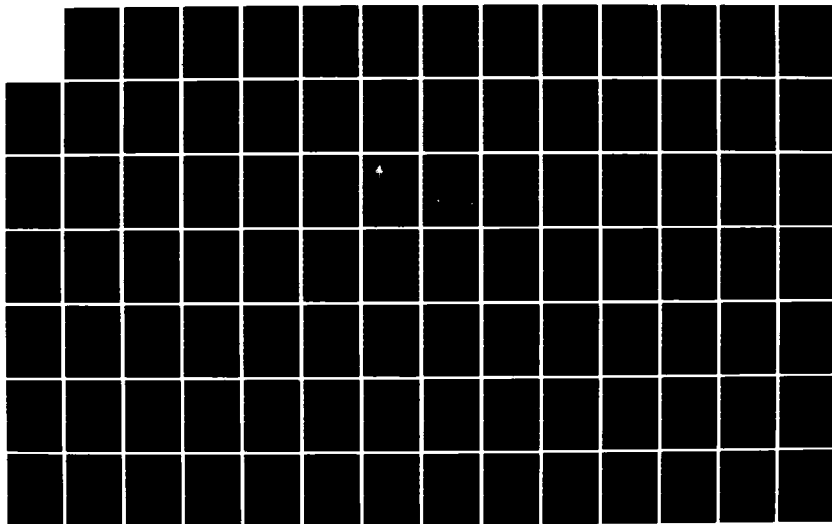
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TELETYPE OPERATOR. (U) PERSPECTIVE INSTRUCTIONAL  
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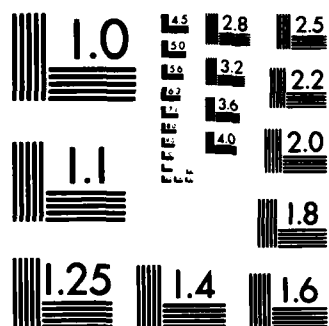
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STEP 3: Multiply the 1-digit number by the next digit in the 5-digit number. When you multiply  $3 \times 1$ , you get 3, a 1-digit number. Since the product is a 1-digit number and there is nothing to carry, repeat step 3a.

STEP 3a: If the product is a 1-digit number and there is nothing to carry, write the number in the answer space.

$$\begin{array}{r} 34102 \\ \times \quad 3 \\ \hline 306 \end{array}$$

STEP 3: Multiply the 1-digit number by the next digit in the 5-digit number. When you multiply  $3 \times 4$  you get 12, a 2-digit number. Since the product is a 2-digit number and there is nothing to carry, do step 3c.

STEP 3c: If the product is a 2-digit number and there is nothing to carry, write the units digit in the answer space and carry the tens digit.

In the number 12, 1 is the tens digit and 2 is the units digit.

$$\begin{array}{r} 1 \\ 34102 \\ \times \quad 3 \\ \hline 2306 \end{array}$$

It's a good idea to write the number you carry on top of the next digit in the 5-digit number.



STEP 3: Multiply the 1-digit number by the next digit in the 5-digit number. When you multiply  $3 \times 3$  you get 9, a 1-digit number. But now you have a number to carry, 1. Since you have a 1-digit number and a number to carry (1), do step 3b.

STEP 3b: If the product is a one digit number and there is a number to carry, add the two numbers together, write the units digit in the answer space and carry the tens digit.

NOTE: When you are multiplying the first (left-most) digit in the 5-digit number, you add the two numbers together and write them both in the answer space.

$$\begin{array}{r} 34102 \\ \times \quad 3 \\ \hline 102306 \end{array}$$

$9 + 1 = 10$



ANSWER: 102,306

EXAMPLE 2: Let's try a harder example now. Assume that you want to multiply 4 x 71658. Here is how you would do it.

STEP 1: Write the two numbers with the 1-digit number directly below the right most digit of the 5-digit number and draw a line.

$$\begin{array}{r} 71658 \\ \times \quad 4 \\ \hline \end{array}$$

STEP 2: Multiply the 1-digit number by last (right-most) digit in the 5-digit number.

When you multiply 4 x 8 you get 32, a 2-digit number. Since the product is a 2-digit number do step 2b.

STEP 2b: If the product is a 2-digit number, write the units digit in the answer space and carry the tens digit.

In the number 32, 3 is the tens-digit and 2 is the units-digit.

$$\begin{array}{r} 3 \\ 71658 \\ \times \quad 4 \\ \hline 2 \end{array}$$

Remember to write the number you carry (3) on top of the 5.

STEP 3: Multiply the 1-digit number by the next digit in the 5-digit number.

When you multiply  $4 \times 5$ , you get 20, a 2-digit number. Since the product is a 2-digit number and you have something to carry (3), do step 3d.

STEP 3d: If the product is a 2-digit number and there is a number to carry, add the two numbers together, write the units digit in the answer space and carry the tens digit.

$$20 + 3 = 23$$

2 is the tens digit.

3 is the units digit.

$$\begin{array}{r} 23 \\ 71658 \\ \times \quad 4 \\ \hline 32 \end{array}$$

STEP 3: Multiply the 1-digit number by the next digit in the 5-digit number.

When you multiply  $4 \times 6$ , you get 24, a 2-digit number. Since the product is a 2-digit number and you have something to carry (2), do step 3d.

STEP 3d: If the product is a 2-digit number and there is a number to carry, add the two numbers together, write the units digit in the answer space and carry the tens digit.

$$24 + 2 = 26$$

2 is the tens digit.

6 is the units digit.

$$\begin{array}{r} 223 \\ 71658 \\ \times \quad 4 \\ \hline 632 \end{array}$$

STEP 3: Multiply the 1-digit number by the next digit in the 5-digit number.

When you multiply  $4 \times 1$ , you get 4, a 1-digit number. Since the product is a 1-digit number and you have something to carry (2), do step 3b.

STEP 3b: If the product is a 1-digit number and there is a number to carry, add the two numbers together, write the units digit in the answer space and carry the tens digit.

$$4 + 2 = 6$$

NOTE: When the sum of the two numbers is a 1-digit number, it is a units digit number.

$$\begin{array}{r} 223 \\ 71658 \\ \times \quad 4 \\ \hline 6632 \end{array}$$

STEP 3: Multiply the 1-digit number by the next digit of the 5-digit number.

When you multiply  $4 \times 7$ , you get 28, a 2-digit number. In this case you have nothing to carry. When you have a 2-digit number and nothing to carry, do step 3c.

STEP 3c: If the product is a 2-digit number and there is nothing to carry, write the units digit in the answer space and carry the tens digit.

NOTE: When you are working with the first (left-most) digit of the 5-digit number, put both numbers in the answer space.

$$\begin{array}{r} 223 \\ 71658 \\ \times \quad 4 \\ \hline 286632 \end{array}$$

ANSWER: 286,632

EXAMPLE 3: Let's try another example. Assume that you want to multiply 7 x 60592. Here is how you would do it.

STEP 1: Write the two numbers with the 1-digit number directly below the right-most digit of the 5-digit number and draw a line.

$$\begin{array}{r} 60592 \\ \times \quad 7 \\ \hline \end{array}$$



STEP 2: Multiply the 1-digit number by the last  
(right-most) digit in the 5-digit number.

$$7 \times 2 = 14$$

STEP 2b: If the product is a 2-digit number, write the  
units digit in the answer space and carry the  
tens digit.

In the number 14, 1 is the tens digit and 4 is  
the units digit.

$$\begin{array}{r} 1 \\ 60592 \\ \times \quad 7 \\ \hline 4 \end{array}$$

STEP 3 : Multiply the 1-digit number by the next digit  
in the 5-digit number.

$$7 \times 9 = 63$$

STEP 3d: If the product is a 2-digit number and there is  
a number to carry, add the two numbers together,  
write the units digit in the answer space and  
carry the tens digit.

$$63 + 1 = 64$$

6 is the tens digit

4 is the units digit

$$\begin{array}{r} 61 \\ 60592 \\ \times \quad 7 \\ \hline 44 \end{array}$$

STEP 3 : Multiply the 1-digit number by the next digit  
in the 5-digit number.

$$7 \times 5 = 35$$

STEP 3d: If the product is a 2-digit number and there is a  
number to carry, add the two numbers together,  
write the units digit in the answer space and  
carry the tens digit.

$$35 + 6 = 41$$

4 is the tens digit

1 is the units digit

$$\begin{array}{r} 461 \\ 60592 \\ \times \quad 7 \\ \hline 144 \end{array}$$

STEP 3 : Multiply the 1-digit number by the next digit in the 5-digit number.

$$7 \times 0 = 0$$

STEP 3b: If the product is a 1-digit number and there is a number to carry, add the two numbers together, write the units digit in the answer space and carry the tens digit.

$$0 + 4 = 4$$

4 is a tens digit

$$\begin{array}{r} 461 \\ 60592 \\ \times \quad 7 \\ \hline 4144 \end{array}$$

STEP 3: Multiply the next digit of the 5-digit number by the 1-digit number.

$$7 \times 6 = 42$$

STEP 3c: If the product is a 2-digit number and there is nothing to carry, write the units digit in the answer space and carry the tens digit.

NOTE: When you are working with the first (left-most) digit in the 5-digit number, you write both numbers in the answer space.

$$\begin{array}{r} 461 \\ 60592 \\ \times \quad 7 \\ \hline 424144 \end{array}$$

ANSWER: 424,144

### SUMMARY AND PRACTICE

Here again are the steps to follow when you want to multiply a 5-digit number by a 1-digit number. Read them again to review what you learned earlier.

#### To multiply a 5-digit number by a 1-digit number:

1. Write the two numbers with the 1-digit number directly below the right-most digit of the 5-digit number and draw a line.
2. Multiply the 1-digit number by the last (right-most) digit in the 5-digit number.
  - a. If the product is a 1-digit number, write the number in the answer space.
  - b. If the product is a 2-digit number, write the units-digit number in the answer space and carry the tens-digit number.
3. Multiply the 1-digit number by the next digit in the 5-digit number.
  - a. If the product is a 1-digit number and there is nothing to carry, write the number in the answer space.
  - b. If the product is a 1-digit number and there is a number to carry, add the two numbers together, write the units digit in the answer space and carry the tens digit.
  - c. If the product is a 2-digit number and there is nothing to carry, write the units digit in the answer space and carry the tens digit.
  - d. If the product is a 2-digit number and there is a number to carry, add the two numbers together, write the units digit in the answer space and carry the tens digit.

Now you should be ready for the Practice Exercise which is on the next page. In the Practice Exercise you will have a chance to multiply 5-digit numbers by 1-digit numbers. Try to solve the problems without looking back at the steps in the lesson.

When you finish the Practice Exercise, compare your answers with those listed under Answers to Practice Exercise. If your answers don't match, read the Explanations for Practice Exercise. If you still don't understand, ask your learning supervisor for help. He/She will be glad to help you.

When you feel you know how to multiply 5-digit numbers by 1-digit numbers, ask the learning supervisor for the Lesson Test. Good Luck!

PRACTICE EXERCISE

Below are three multiplication problems. Solve the problems.

1.  $7 \times 64938$

2.  $5 \times 24815$

3.  $6 \times 81507$



ANSWERS TO PRACTICE EXERCISE

1. 454566
2. 124075
3. 489042

# EXPLANATIONS FOR PRACTICE EXERCISE

|          | Multiply   | Add         | Digit in<br>Answer<br>Space | Digit to<br>Carry |
|----------|------------|-------------|-----------------------------|-------------------|
| 1. 64938 | 7 x 8 = 56 |             | 6                           | 5                 |
| x     7  | 7 x 3 = 21 | 21 + 5 = 26 | 6                           | 2                 |
| 454566   | 7 x 9 = 63 | 63 + 2 = 65 | 5                           | 6                 |
|          | 7 x 4 = 28 | 28 + 6 = 34 | 4                           | 3                 |
|          | 7 x 6 = 42 | 42 + 3 = 45 | 45                          | -                 |
| 2. 24815 |            |             |                             |                   |
| x     5  | 5 x 5 = 25 |             | 5                           | 2                 |
| 124075   | 5 x 1 = 5  | 5 + 2 = 7   | 7                           | 0                 |
|          | 5 x 8 = 40 | 40 + 0 = 40 | 0                           | 4                 |
|          | 5 x 4 = 20 | 20 + 4 = 24 | 4                           | 2                 |
|          | 5 x 2 = 10 | 10 + 2 = 12 | 12                          | -                 |
| 3. 81507 |            |             |                             |                   |
| x     6  | 6 x 7 = 42 |             | 2                           | 4                 |
| 489042   | 6 x 0 = 0  | 0 + 4 = 4   | 4                           | 0                 |
|          | 6 x 5 = 30 | 30 + 0 = 30 | 0                           | 3                 |
|          | 6 x 1 = 6  | 6 + 3 = 9   | 9                           | 0                 |
|          | 6 x 8 = 48 | 48 + 0 = 48 | 48                          | -                 |

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### REMEDIATION

This remediation section gives you a second chance to learn the lesson. You will pass the Remediation Test if you review what is in this Student Guide.

Go back and carefully read the explanation of how to multiply and then review the Explanations for the Practice Exercise.

When you feel that you are ready, do the Remediation Exercise. Try to solve the problems without looking back at the steps. Then compare your answers with those found in Answers to Remediation Exercise. If your answers don't match, carefully read the Explanations for Remediation Exercise. If you still don't understand, ask the learning supervisor for help.

When you think you can multiply 5-digit numbers by 1-digit numbers, ask the learning supervisor for the Remediation Test.

REMEDIATION EXERCISE

Below are three multiplication problems. Solve the problems.

1.  $9 \times 38157$

2.  $4 \times 26318$

3.  $8 \times 40513$

ANSWERS TO REMEDIATION EXERCISE

1. 343413
2. 105272
3. 324104

# EXPLANATIONS FOR REMEDIATION EXERCICE

|          | Multiply   | Add         | Digit in<br>Answer<br>Space | Digit to<br>Carry |
|----------|------------|-------------|-----------------------------|-------------------|
| 1. 38157 |            |             |                             |                   |
| x     9  | 9 x 7 = 63 |             | 3                           | 6                 |
| 343413   | 9 x 5 = 45 | 45 + 6 = 51 | 1                           | 5                 |
|          | 9 x 1 = 9  | 9 + 5 = 14  | 4                           | 1                 |
|          | 9 x 8 = 72 | 72 + 1 = 73 | 3                           | 7                 |
|          | 9 x 3 = 27 | 27 + 7 = 34 | 34                          | -                 |
| 2. 26318 |            |             |                             |                   |
| x     4  | 4 x 8 = 32 |             | 2                           | 3                 |
| 105272   | 4 x 1 = 4  | 4 + 3 = 7   | 7                           | 0                 |
|          | 4 x 3 = 12 | 12 + 0 = 12 | 2                           | 1                 |
|          | 4 x 6 = 24 | 24 + 1 = 25 | 5                           | 2                 |
|          | 4 x 2 = 8  | 8 + 2 = 10  | 10                          | -                 |
| 3. 40513 |            |             |                             |                   |
| x     8  | 8 x 3 = 24 |             | 4                           | 2                 |
| 324104   | 8 x 1 = 8  | 8 + 2 = 10  | 0                           | 1                 |
|          | 8 x 5 = 40 | 40 + 1 = 41 | 1                           | 4                 |
|          | 8 x 0 = 0  | 0 + 4 = 4   | 4                           | 0                 |
|          | 8 x 4 = 32 | 32 + 0 = 32 | 32                          | -                 |



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ANSWER KEY FOR REMEDIATION TEST D-09

This answer key contains the correct responses for  
Remediation Test D-09. Each problem is worth one point.  
Students must get 4 out of 5 total points to pass this test.

1. 126818
2. 310344
3. 262278
4. 343875
5. 212823

ANSWER KEY FOR LESSON TEST D-09

This answer key contains the correct responses for Lesson Test D-09. Each problem is worth one point. Students must get 4 out of 5 total points to pass this test.

1. 228064
2. 417135
3. 457233
4. 82962
5. 315400

# LESSON TEST FOR D-09

You will need some paper and a pencil to do this Lesson Test. It contains five problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 4 out of 5 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

Solve the following multiplication problems.

1.  $4 \times 57016$
2.  $5 \times 83427$
3.  $7 \times 65319$
4.  $3 \times 27654$
5.  $8 \times 39425$

# REMEDIATION TEST FOR D-09

You will need some paper and a pencil to do this Remediation Test. It contains five problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 4 out of 5 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

Solve the following multiplication problems.

1.  $2 \times 63409$
2.  $6 \times 51724$
3.  $3 \times 87426$
4.  $7 \times 49125$
5.  $9 \times 23647$



**FBSEP**

# **RADIO TELETYPE OPERATOR**

**MOS 05C10**

**STUDENT GUIDE**

**05C FBSEP LESSON D-10**

**SUBTRACTING 5 OR 6 DIGIT NUMBERS**

**PREREQUISITE: None**

**MATERIALS REQUIRED: None**

**TYPE OF LESSON: Self paced**

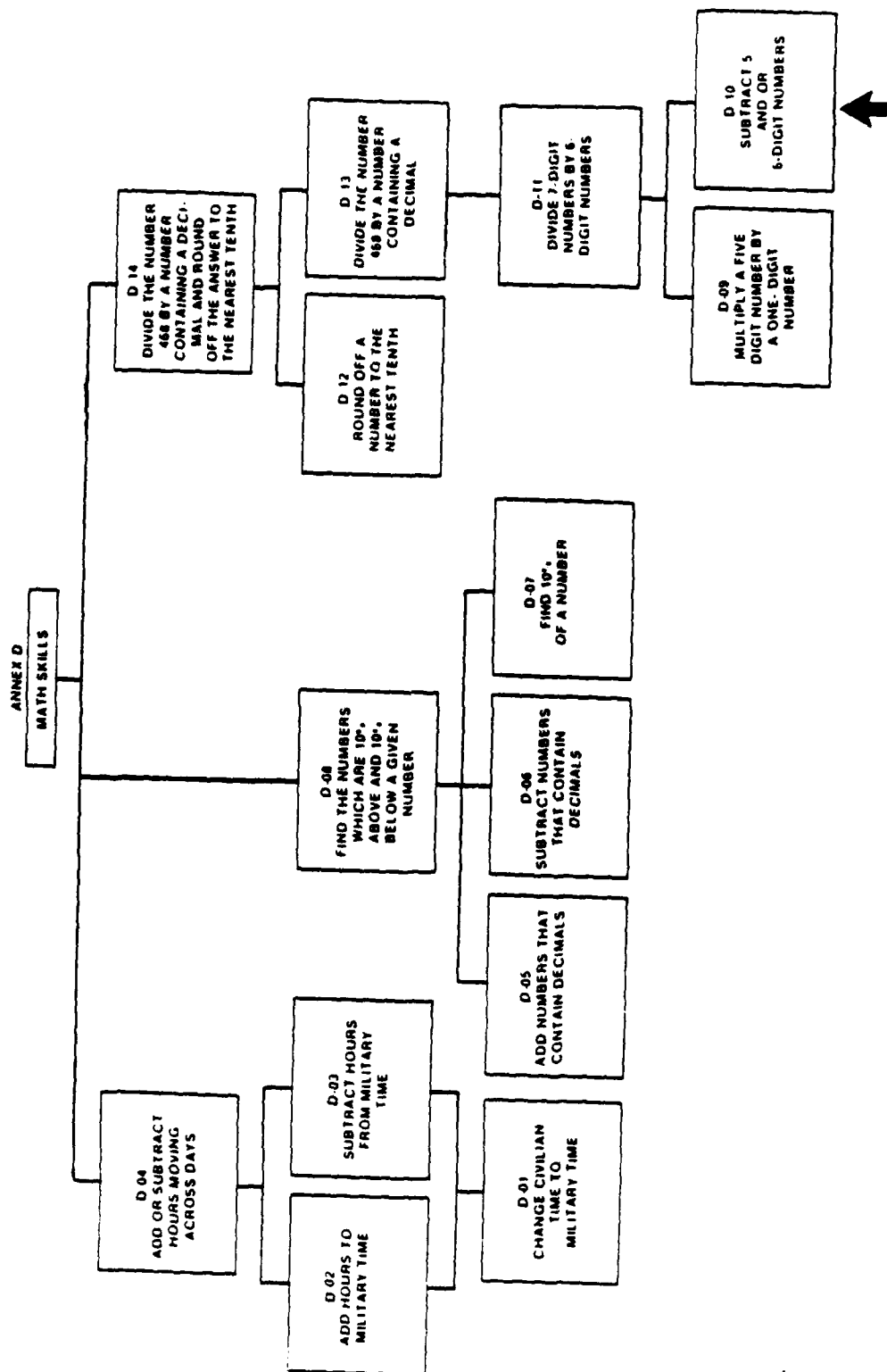
STUDENT GUIDE  
05C FBSEP LESSON D-10  
SUBTRACTING 5 OR 6 DIGIT NUMBERS

INTRODUCTION

During the course of your work, you will need to determine the length of an antenna. In order to do this, you will have to divide 5 and 6 digit numbers. The process of division includes multiplying and subtracting. This lesson will teach you how to subtract 5 and 6 digit numbers in order to prepare you for the lesson on dividing 7 digit numbers by 6 digit numbers.

Look at the Annex D map which follows. The lesson you are now taking is marked with an arrow.





OBJECTIVE: When you finish this lesson you will be able to subtract numbers that have 5 or 6 digits.

To subtract 5 or 6 digit numbers:

1. Write the smaller number below the larger number so that the last digits of both numbers line up.
2. Begin with the column of digits on the right and subtract the bottom digit from the top digit. If the top digit is smaller than the bottom digit, regroup and then subtract. Write the result in the same column below the line.
3. Move left to the next column. Subtract the digits in the second column. Again, if the top digit is smaller than the bottom digit, regroup and then subtract. Write the result in that column below the line.
4. Move left to the next column and subtract. Continue this process until all the digits are used.

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## PRESENTATION

Here are some examples to show you how to subtract these numbers.

EXAMPLE 1: Subtract 23486 from 138799.

STEP 1: Write the smaller number below the larger  
so that the last digits of both numbers line  
up.

$$\begin{array}{r} 138799 \\ - 23486 \\ \hline \end{array}$$

The last digits  
must be in a  
line.

STEP 2: Begin with the column of digits on the right  
and subtract the bottom digit from the top  
digit. If the top digit is smaller than the  
bottom digit, regroup and then subtract. Write  
the result in the same column below the line.

$$\begin{array}{r} 138799 \leftarrow \text{top digits} \\ - 23486 \leftarrow \text{bottom digits} \\ \hline 3 \end{array}$$

Since the top digit is larger, you can subtract without regrouping.

STEP 3: Move left to the next column. Subtract the digits in the second column. Again, if the top digit is smaller than the bottom digit, regroup and then subtract. Write the result in the same column below the line.

$$\begin{array}{r} 138799 \\ - \quad 23486 \\ \hline 13 \end{array}$$

STEP 4: Move left to the next column and subtract. Continue this process until all the digits are used.

$$\begin{array}{r} 138799 \\ - \quad 23486 \\ \hline 313 \end{array}$$

Move left to the next column and subtract.

$$\begin{array}{r} 138799 \\ - \quad 23486 \\ \hline 5313 \end{array}$$

Move left to the next column and subtract.

$$\begin{array}{r} 138799 \\ - \quad 23486 \\ \hline 15313 \end{array}$$

Move left to the next column and subtract.

$$\begin{array}{r} 138799 \\ - \quad 23486 \\ \hline 115313 \end{array}$$

ANSWER: 115313

EXAMPLE 2: Subtract 43185 from 67430.

STEP 1: Write the smaller number below the larger number so that the last digits of both numbers line up.

$$\begin{array}{r} 67430 \\ - 43185 \end{array}$$

STEP 2: Begin with the column of digits on the right and subtract the bottom digit from the top digit. If the top digit is smaller than the bottom digit, regroup and then subtract. Write the result in the same column below the line.

$$\begin{array}{r} 67430 \longleftarrow \text{top digits} \\ - 43185 \longleftarrow \text{bottom digits} \end{array}$$

Since the top digit is smaller than the bottom digit, you must regroup the top digits before you can subtract.

To regroup the numbers you need to go to the next column to the left and decrease the top digit by 1. Then add 10 to the number you are working with.

$$\begin{array}{r}
 \text{Decrease} \\
 \text{by 1.} \\
 \downarrow \\
 674\overset{2}{\cancel{3}}0 \longleftarrow \text{Increase} \\
 \text{by 10.} \\
 - \underline{43185}
 \end{array}$$

Look again at the column of digits on the right. Now the top digit is larger than the bottom digit so you can subtract.  $(10 - 5 = 5)$

$$\begin{array}{r}
 674\overset{2}{\cancel{3}}0 \\
 - \underline{43185} \\
 5
 \end{array}$$



STEP 3: Move left to the next column. Subtract the digits in the second column. Again, if the top digit is smaller than the bottom digit, regroup and then subtract. Write the result in the same column below the line.

$$\begin{array}{r} 674\overset{2}{\cancel{7}}0 \leftarrow \text{top digits} \\ - 43185 \leftarrow \text{bottom digits} \\ \hline 5 \end{array}$$

Look at the next column. Again, you cannot subtract it because the top digit (2) is smaller than the bottom digit (8). You will have to regroup again.

To regroup, go to the next column to the left and decrease the top digit by 1. Then add 10 to the number you are working with.

Decrease  
by 1.

$$\begin{array}{r}
 \text{312} \\
 67\overline{A}30 \\
 - 43185 \\
 \hline
 5
 \end{array}$$

Increase  
by 10.

Now the top digit is larger than the bottom digit so you can subtract. (12 - 8 = 4)

$$\begin{array}{r}
 \text{312} \\
 67\overline{A}30 \\
 - 43185 \\
 \hline
 45
 \end{array}$$

STEP 4: Move left to the next column and subtract.  
Continue this process until all the digits are  
used.

In the next column, the top digit is larger  
than the bottom digit. Therefore, you do not  
need to regroup. You can subtract the way it is.

$$\begin{array}{r} \phantom{0}312 \\ 67\cancel{4}30 \\ - 43185 \\ \hline 245 \end{array}$$

Move to the next column and continue the process.

$$\begin{array}{r} \phantom{0}312 \\ 67\cancel{4}30 \\ - 43185 \\ \hline 4245 \end{array}$$

Since the top digit is larger, you do not need to  
regroup.

Move to the next column and continue.

$$\begin{array}{r} \phantom{0}312 \\ 67\cancel{4}20 \\ - \quad 43185 \\ \hline 24245 \end{array}$$

Since the top digit is larger, you do not need to regroup.  
You have completed the example.

ANSWER: 24245

EXAMPLE 3: Subtract 28538 from 58820.

STEP 1: Write the smaller number below the larger number so that the last digits of both numbers line up.

$$\begin{array}{r} 56820 \\ - 28538 \\ \hline \end{array}$$

It is very important that all the digits be in straight columns. Otherwise, you may make a mistake when you begin to subtract.

STEP 2:

Begin with the column of digits on the right  
and subtract the bottom digit from the top  
digit. If the top digit is smaller than the  
bottom digit, regroup and then subtract. Write  
the result in the same column below the line.

$$\begin{array}{r} 56820 \leftarrow \text{top digit} \\ - \underline{28538} \leftarrow \text{bottom digit} \end{array}$$

Since the top digit is smaller than the bottom digit, you will have to regroup before you can subtract

Decrease  
by 1.

↓

$$\begin{array}{r} 568\overset{1}{2}0 \leftarrow \text{Increase by 10.} \\ - \underline{28538} \end{array}$$

Now you can subtract the column on the right.

$$\begin{array}{r} 568\overset{1}{2}0 \\ - \underline{28538} \\ 2 \end{array}$$

STEP 3: Move left to the next column. Subtract the digits in the second column. Again, if the top digit is smaller than the bottom digit, regroup and then subtract. Write the result in the same column below the line.

$$\begin{array}{r} 568\overset{1}{2}0 \\ - 28538 \\ \hline 2 \end{array}$$

Again the top digit is smaller than the bottom digit so you have to regroup. Remember, to regroup, you go to the next column to the left.

$$\begin{array}{r} \text{Decrease} \\ \text{by 1.} \\ \downarrow \\ 7\overset{11}{11} \text{ --- } \text{Increase} \\ 56\overset{11}{8}20 \text{ by 10.} \\ - 28538 \\ \hline 2 \end{array}$$

Now the top digit is larger and you can subtract.

$$\begin{array}{r} 7\overset{11}{11} \\ 56\overset{11}{8}20 \\ - 28538 \\ \hline 82 \end{array}$$

STEP 4:

Move left to the next column and subtract.

Continue this process until all the digits  
are used.

$$\begin{array}{r} 56\overset{11}{\cancel{8}}20 \\ - 28538 \\ \hline 282 \end{array}$$

Here the top digit is larger so you do not  
need to regroup. Just subtract.

Move to the next column.

$$\begin{array}{r} 56\overset{11}{\cancel{8}}20 \\ - 28538 \\ \hline 282 \end{array}$$

Here the top digit is smaller than the bottom  
digit so you must regroup before you subtract.  
Go to the next column to the left.

Decrease  
by 1.

$$\begin{array}{r} 4\overset{11}{\cancel{5}}6\overset{11}{\cancel{8}}20 \\ - 28538 \\ \hline 282 \end{array}$$

Increase  
by 10.



Now subtract.

$$\begin{array}{r} 4 \text{ } 711 \\ 56820 \\ - 28538 \\ \hline 28282 \end{array}$$

Move on to the next column.

$$\begin{array}{r} 4 \text{ } 711 \\ 56820 \\ - 28538 \\ \hline 28282 \end{array}$$

Here the top digit is larger than the bottom digit so you do not need to regroup.  
You have completed the example.

ANSWER: 28282

EXAMPLE 4: Subtract 43155 from 87600.

STEP 1: Write the smaller number below the larger  
number so that the last digits of both numbers  
line up.

$$\begin{array}{r} 87600 \\ - \underline{43155} \end{array}$$

Always make sure that all the columns are  
straight.

STEP 2: Begin with the column of digits on the right  
and subtract the bottom digit from the top  
digit. If the top digit is smaller than the  
bottom digit, regroup and then subtract. Write  
the result in the same column below the line.

$$\begin{array}{r} 87600 \\ - 43155 \\ \hline \end{array}$$

Since the top digit is smaller, you will have to regroup. However, if you go to the next column on the left, you see that you cannot decrease it by 1 because the number is 0. Therefore, you must move another column to the left and regroup that first.

$$\begin{array}{r} \text{Decrease} \\ \text{by 1.} \\ \downarrow \\ \begin{array}{r} 87\overset{5}{\cancel{6}}00 \\ - 43155 \\ \hline \end{array} \quad \begin{array}{l} \text{Increase} \\ \text{by 10.} \end{array} \end{array}$$

Then you can regroup the numbers that you need.

$$\begin{array}{r}
 \text{Decrease} \\
 \text{by 1.} \\
 \downarrow \\
 \begin{array}{r}
 59 \\
 87\cancel{0}0 \\
 - 43155 \\
 \hline
 \end{array}
 \begin{array}{l}
 \leftarrow \text{Increase} \\
 \text{by 10.}
 \end{array}
 \end{array}$$

Now you can subtract.

$$\begin{array}{r}
 59 \\
 87\cancel{0}0 \\
 - 43155 \\
 \hline
 5
 \end{array}$$

STEP 3: Move left to the next column. Subtract the  
digits in the second column. Again, if the  
top digit is smaller than the bottom digit,  
regroup and then subtract. Write the result  
in the same column below the line.

You have already regrouped, so the top digit  
is already larger than the bottom digit and  
you can subtract.

$$\begin{array}{r} 59 \\ 87\cancel{6}00 \\ - 43155 \\ \hline 45 \end{array}$$

STEP 4: Move left to the next column and subtract.  
Continue this process until all the digits  
are used.

$$\begin{array}{r} 87\overset{59}{\cancel{000}} \\ - \underline{43155} \\ 445 \end{array}$$

You don't need to regroup. Move to the next column.

$$\begin{array}{r} 87\overset{59}{\cancel{000}} \\ - \underline{43155} \\ 4445 \end{array}$$

You don't need to regroup. Move to the next column.

$$\begin{array}{r} 87\overset{59}{\cancel{000}} \\ - \underline{43155} \\ 44445 \end{array}$$

You have completed the example.

ANSWER: 44445

EXAMPLE 5: Subtract 29246 from 81000.

STEP 1: Write the smaller number below the larger number so that the last digits of both numbers line up.

$$\begin{array}{r} 81000 \\ - 29246 \\ \hline \end{array}$$

STEP 2: Begin with the column of digits on the right and subtract the bottom digit from the top digit. If the top digit is smaller than the bottom digit, regroup and then subtract.  
Write the result in the same column below the line.

$$\begin{array}{r} 81000 \\ - 29246 \\ \hline \end{array}$$

Since the top digit is smaller than the bottom digit, you must regroup. However, if you look at the next column to the left, the top digit is a 0. Since you cannot decrease 0 by 1, you must go to the next column. In this case, the next column also has a zero so you must go over one more column to start regrouping.

$$\begin{array}{r}
 \text{Decrease} \quad \text{Increase by} \\
 \text{by 1.} \quad \quad \quad 10. \\
 \swarrow \quad \searrow \\
 \begin{array}{r}
 0 \\
 81000 \\
 - \underline{29246}
 \end{array}
 \end{array}$$

Then, regroup again.

$$\begin{array}{r}
 \text{Decrease} \quad \text{Increase by} \\
 \text{by 1.} \quad \quad \quad 10. \\
 \swarrow \quad \searrow \\
 \begin{array}{r}
 09 \\
 81000 \\
 - \underline{29246}
 \end{array}
 \end{array}$$

Then, regroup again.

$$\begin{array}{r}
 \text{Decrease} \quad \text{Increase by} \\
 \text{by 1.} \quad \quad \quad 10. \\
 \swarrow \quad \searrow \\
 \begin{array}{r}
 099 \\
 81000 \\
 - \underline{29246}
 \end{array}
 \end{array}$$

Now you can begin to subtract.

$$\begin{array}{r}
 099 \\
 81000 \\
 - \underline{29246} \\
 4
 \end{array}$$



STEP 3: Move left to the next column. Subtract the digits in the second column. Again, if the top digit is smaller than the bottom digit, regroup and then subtract. Write the result in the same column below the line.

$$\begin{array}{r} \phantom{0}99 \\ 81\cancel{0}00 \\ - 29246 \\ \hline 54 \end{array}$$

STEP 4: Move left to the next column and subtract. Continue this process until all the digits are used.

$$\begin{array}{r} \phantom{0}99 \\ 81\cancel{0}00 \\ - 29246 \\ \hline 754 \end{array}$$

Move to the next column and subtract.

$$\begin{array}{r} \phantom{0}99 \\ 81\cancel{0}00 \\ - 29246 \\ \hline 754 \end{array}$$

Here the top digit is smaller than the bottom digit so you must regroup.

Decrease by 1.      Increase by 10.

$$\begin{array}{r}
 \overset{\text{Decrease by 1.}}{\cancel{7}1099} \quad \overset{\text{Increase by 10.}}{\cancel{8}1000} \\
 - 29246 \\
 \hline
 754
 \end{array}$$

Now subtract.

$$\begin{array}{r}
 \cancel{7}1099 \\
 \cancel{8}1000 \\
 - 29246 \\
 \hline
 1754
 \end{array}$$

Move to the next column and subtract.

$$\begin{array}{r}
 \cancel{7}1099 \\
 \cancel{8}1000 \\
 - 29246 \\
 \hline
 51754
 \end{array}$$

You have completed the example.

ANSWER: 51754

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### SUMMARY AND PRACTICE

Here again are the steps you need to follow in order to subtract 5 or 6 digit numbers.

1. Write the smaller number below the larger number so that the last digits of both numbers line up.
2. Begin with the column of digits on the right and subtract the bottom digit from the top digit. If the top digit is smaller than the bottom digit, regroup and then subtract. Write the result in the same column below the line.
3. Move left to the next column. Subtract the digits in the second column. Again, if the top digit is smaller than the bottom digit, regroup and then subtract. Write the result in that column below the line.
4. Move left to the next column and subtract. Continue this process until all the digits are used.

Now you will be given a practice exercise to try on your own. Follow the steps you have learned to figure out the answers. When you are finished, check your answers with the Answers to Practice Exercise. If you have made any mistakes, read the Explanations for the Practice Exercise to find out where you made a mistake. If you do not understand the explanations, ask your leaning supervisor to help you. When you feel confident that you understand the Practice Exercise, ask your learning supervisor for the Lesson Test.

PRACTICE EXERCISE

1. Subtract 41321 from 783652.
2. Subtract 17415 from 58630.
3. Subtract 16384 from 458920.
4. Subtract 46152 from 92300.
5. Subtract 34358 from 186000.

ANSWERS TO PRACTICE EXERCISE

1. 742331
2. 41215
3. 442536
4. 46148
5. 151642

EXPLANATIONS FOR PRACTICE EXERCISE

1. Subtract 41321 from 783652.

STEP 1: Write the smaller number below the larger number so that the last digits of both numbers line up.

$$\begin{array}{r} 783652 \\ - 41321 \\ \hline \end{array}$$

Did you make sure the columns of digits were straight?

STEP 2: Begin with the column of digits on the right and subtract the bottom digit from the top digit. If the top digit is smaller than the bottom digit, regroup and then subtract. Write the result in the same column below the line.

$$\begin{array}{r} 783652 \\ - 41321 \\ \hline 1 \end{array}$$

Since the top digit is larger than the bottom digit, you do not need to regroup.



STEP 3: Move left to the next column. Subtract the  
digits in the second column. Again, if the top  
digit is smaller than the bottom digit, regroup  
and then subtract. Write the result in the same  
column below the line.

$$\begin{array}{r} 783652 \\ - \quad 41321 \\ \hline 31 \end{array}$$

Here, also, the top digit is larger than the  
bottom digit, so you do not need to regroup.

STEP 4: Move left to the next column and subtract.  
Continue this process until all the digits  
are used.

$$\begin{array}{r} 783652 \\ - 41321 \\ \hline 331 \end{array}$$

Again, you don't have to regroup. Just subtract and continue moving left to the next column.

$$\begin{array}{r} 783652 \\ - 41321 \\ \hline 2331 \end{array}$$

$$\begin{array}{r} 783652 \\ - 41321 \\ \hline 42331 \end{array}$$

$$\begin{array}{r} 783652 \\ - 41321 \\ \hline 742331 \end{array}$$

If you cannot find any mistake in the steps that you followed, check to make sure you did not make a mistake in subtraction.

ANSWER: 742331

2. Subtract 17415 from 58630.

STEP 1:     Write the smaller number below the larger  
             number so that the last digits of both numbers  
             line up.

$$\begin{array}{r} 58630 \\ - 17415 \\ \hline \end{array}$$

STEP 2: Begin with the column of digits on the right and subtract the bottom digit from the top digit.  
If the top digit is smaller than the bottom digit, regroup and then subtract. Write the result in the same column below the line.

$$\begin{array}{r}
 \text{Decrease} \\
 \text{by 1.} \\
 \downarrow \\
 586\overset{7}{\underset{0}{7}}0 \leftarrow \text{Increase} \\
 - 17415 \quad \text{by 10.} \\
 \hline
 5
 \end{array}$$

Since the top digit is smaller than the bottom digit, you must regroup in order to subtract. In order to regroup, you go to the next column on the left, decrease the top digit by 1 and increase the number you are working with by 10. Then you can subtract.

STEP 3: Move left to the next column. Subtract the  
digits in the second column. Again, if the  
top digit is smaller than the bottom digit,  
regroup and then subtract. Write the result  
in the same column below the line.

$$\begin{array}{r} 586\overset{2}{\cancel{7}}0 \\ - 17415 \\ \hline 15 \end{array}$$

Here the top digit is larger than the bottom  
digit so you don't need to regroup.

STEP 4: Move left to the next column and subtract.  
Continue this process until all the digits are  
used.

$$\begin{array}{r} \overset{2}{586}\cancel{7}0 \\ - 17415 \\ \hline 215 \end{array}$$

$$\begin{array}{r} \overset{2}{586}\cancel{7}0 \\ - 17415 \\ \hline 1215 \end{array}$$

$$\begin{array}{r} \overset{2}{586}\cancel{7}0 \\ - 17415 \\ \hline 41215 \end{array}$$

ANSWER: 41215

3. Subtract 16384 from 458920.

STEP 1: Write the smaller number below the larger  
number so that the last digits of both numbers  
line up.

$$\begin{array}{r} 458920 \\ - \underline{16384} \end{array}$$

Did you write the numbers in the correct place?  
Did you make sure all the columns were straight?

STEP 2: Begin with the column of digits on the right and subtract the bottom digit from the top digit.  
If the top digit is smaller than the bottom digit, regroup and then subtract. Write the result in the same column below the line.

$$\begin{array}{r}
 \text{Decrease} \\
 \text{by 1.} \\
 \downarrow \\
 4589\cancel{2}0 \leftarrow \text{Increase} \\
 - 16384 \quad \text{by 10.} \\
 \hline
 6
 \end{array}$$

Since the top digit is smaller than the bottom digit, you must regroup. Remember that to regroup you go left to the next column, decrease the top digit by 1 and increase the number you are working with by 10. Then you can subtract.



STEP 3. Move left to the next column. Subtract the  
digits in the second column. Again, if the top  
digit is smaller than the bottom digit, regroup  
and then subtract. Write the result in the same  
column below the line.

$$\begin{array}{r}
 \text{Decrease} \\
 \text{by 1.} \\
 \downarrow \\
 \begin{array}{r}
 458\overset{81}{9}20 \\
 - 16384 \\
 \hline
 36
 \end{array}
 \end{array}
 \begin{array}{l}
 \leftarrow \text{Increase} \\
 \text{by 10.}
 \end{array}$$

Again, the top digit is smaller than the bottom digit so you have to regroup before you can subtract.

STEP 4: Move left to the next column and subtract.  
Continue this process until all the digits are  
used.

$$\begin{array}{r} 458\overset{8}{\cancel{9}}\overset{11}{2}0 \\ - 16384 \\ \hline 536 \end{array}$$

Here, you don't have to regroup. Move left to the next column and continue to subtract.

$$\begin{array}{r} 458\overset{8}{\cancel{9}}\overset{11}{2}0 \\ - 16384 \\ \hline 2536 \end{array}$$

$$\begin{array}{r} 458\overset{8}{\cancel{9}}\overset{11}{2}0 \\ - 16384 \\ \hline 42536 \end{array}$$

$$\begin{array}{r} 458\overset{8}{\cancel{9}}\overset{11}{2}0 \\ - 16384 \\ \hline 442536 \end{array}$$

ANSWER: 442536

4. Subtract 46152 from 92300.

STEP 1:     Write the smaller number below the larger  
              number so that the last digits of both numbers  
              line up.

$$\begin{array}{r} 92300 \\ - 46152 \\ \hline \end{array}$$

STEP 2: Begin with the column of digits on the right and subtract the bottom digit from the top digit. If the top digit is smaller than the bottom digit, regroup and then subtract. Write the result in the same column below the line.

Since the top digit is smaller than the bottom digit, you must regroup. However, if you go left to the next column, the top digit is a zero. You cannot decrease a zero by 1. Therefore, you must go left again to the next column where the top digit is a 3. Regroup those members and then regroup again. Then you can subtract.

$$\begin{array}{r}
 \text{Decrease} \\
 \text{by 1.} \\
 \downarrow \\
 \begin{array}{r}
 92\overset{2}{\cancel{3}}00 \\
 - 46152 \\
 \hline
 \end{array}
 \begin{array}{l}
 \text{Increase} \\
 \text{by 10.}
 \end{array}
 \end{array}$$

$$\begin{array}{r}
 \text{Decrease} \\
 \text{by 1.} \\
 \downarrow \\
 \begin{array}{r}
 92\overset{27}{\cancel{3}}00 \\
 - 46152 \\
 \hline
 8
 \end{array}
 \begin{array}{l}
 \text{Increase} \\
 \text{by 10.}
 \end{array}
 \end{array}$$

STEP 3: Move left to the next column. Subtract the  
digits in the second column. Again, if the top  
digit is smaller than the bottom digit, regroup  
and then subtract. Write the result in the same  
column below the line.

Since you have already regrouped these numbers,  
you can go ahead and subtract.

$$\begin{array}{r} 29 \\ 92300 \\ - 46152 \\ \hline 48 \end{array}$$

STEP 4: Move left to the next column and subtract.  
Continue this process until all the digits are  
used.

$$\begin{array}{r} 92\overset{29}{\cancel{3}}00 \\ - 46152 \\ \hline 148 \end{array}$$

Move left again and subtract.

Decrease by 1.      Increase by 10.

$$\begin{array}{r} \swarrow \quad \searrow \\ 92\overset{29}{\cancel{3}}00 \\ - 46152 \\ \hline 6148 \end{array}$$

Here you have to regroup again. Continue moving left and finish the exercise.

$$\begin{array}{r} 8\overset{29}{\cancel{9}}2\overset{19}{\cancel{3}}00 \\ - 46152 \\ \hline 46148 \end{array}$$

ANSWER: 46148

5. Subtract 34358 from 186000.

STEP 1:      Write the smaller number below the larger number  
              so that the last digits of both numbers line up.

$$\begin{array}{r} 186000 \\ - \quad 34358 \\ \hline \end{array}$$

STEP 2: Begin the column of digits on the right and subtract the bottom digit from the top digit.  
If the top digit is smaller than the bottom digit, regroup and then subtract. Write the result in the same column below the line.

Here the top digit is smaller than the bottom digit, so you must regroup. However, you have to keep moving to the left until you come to the 6 to find a number you can decrease by 1. You continue to regroup each column until you get back to the numbers you are working with. Then you will be ready to subtract.

|                     |                    |                     |                    |
|---------------------|--------------------|---------------------|--------------------|
| Decrease<br>by 1.   | Increase<br>by 10. | Decrease<br>by 1.   | Increase<br>by 10. |
| ↓                   | ↘                  | ↓                   | ↘                  |
| 5                   |                    | 59                  |                    |
| 18 <del>6</del> 000 |                    | 18 <del>6</del> 000 |                    |
| - 34358             |                    | - 34358             |                    |

|                     |                    |
|---------------------|--------------------|
| Decrease<br>by 1.   | Increase<br>by 10. |
| ↓                   | ↘                  |
| 599                 |                    |
| 18 <del>6</del> 000 |                    |
| - 34358             |                    |
| 2                   |                    |



STEP 3: Move left to the next column. Subtract the  
digits in the second column. Again, if the  
top digit is smaller than the bottom digit,  
regroup and then subtract. Write the result  
in the same column below the line.

$$\begin{array}{r} \phantom{0}599 \\ 18\cancel{6}\cancel{0}\cancel{0} \\ - \phantom{0}34358 \\ \hline \phantom{0}42 \end{array}$$

You have already regrouped, so you can go ahead  
and subtract.

STEP 4: Move left to the next column and subtract.  
Continue this process until all the digits are  
used.

$$\begin{array}{r} \overset{599}{18000} \\ - 34358 \\ \hline 642 \end{array}$$

$$\begin{array}{r} \overset{599}{18000} \\ - 34358 \\ \hline 1642 \end{array}$$

$$\begin{array}{r} \overset{599}{18000} \\ - 34358 \\ \hline 151642 \end{array}$$

ANSWER: 1 51642

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## REMEDIATION

Here again are the steps you need to follow in order to subtract 5 or 6 digit numbers.

1. Write the smaller number below the larger number so that the last digits of both numbers line up.
2. Begin with the column of digits on the right and subtract the bottom digit from the top digit. If the top digit is smaller than the bottom digit, regroup and then subtract. Write the result in the same column below the line.
3. Move left to the next column. Subtract the digits in the second column. Again, if the top digit is smaller than the bottom digit, regroup and then subtract. Write the result in that column below the line.
4. Move left to the next column and subtract. Continue this process until all the digits are used.

Now you will be given another exercise to try on your own. Follow the same steps you have learned to figure out the answers. When you are finished, check your answers with the answers to Practice Exercise. If you have made any mistakes, read the Explanations for the Remediation Exercise to find out where you made a mistake. If you do not understand the explanations, ask the learning supervisor to help you. When you feel confident that you understand this exercise, ask your learning supervisor for the Remediation Test.

REMEDIATION EXERCISE

1. Subtract 73280 from 387691.
2. Subtract 13228 from 68540.
3. Subtract 11357 from 723410.
4. Subtract 25346 from 81600.
5. Subtract 32392 from 289000.



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ANSWERS TO REMEDIATION EXERCISE

1. 314411
2. 55312
3. 712053
4. 56254
5. 256608

EXPLANATIONS FOR REMEDIATION EXERCISE

1. Subtract 73280 from 387691.

STEP 1: Write the smaller number below the larger number  
so that the last digits of both numbers line up.

$$\begin{array}{r} 387691 \\ - \quad 73280 \\ \hline \end{array}$$

Did you make sure the columns of digits were  
straight?

STEP 2: Begin with the column of digits on the right and  
subtract the bottom digit from the top digit. If  
the top digit is smaller than the bottom digit,  
regroup and then subtract. Write the result in  
the same column below the line.

$$\begin{array}{r} 387691 \\ - \quad 73280 \\ \hline 1 \end{array}$$

Since the top digit is larger than the bottom digit,  
you do not need to regroup.

STEP 3: Move left to the next column. Subtract the digits  
in the second column. Again, if the top digit is  
smaller than the bottom digit, regroup and then  
subtract. Write the result in the same column  
below the line.

$$\begin{array}{r} 387691 \\ - 73280 \\ \hline 11 \end{array}$$

Here, also, the top digit is larger than the  
bottom digit, so you do not need to regroup.

STEP 4: Move left to the next column and subtract.

Continue this process until all the digits are  
used.

$$\begin{array}{r} 387691 \\ - 73280 \\ \hline 411 \end{array}$$

Again, you don't have to regroup. Just subtract  
and continue moving left to the next column.

$$\begin{array}{r} 387691 \\ - 73280 \\ \hline 4411 \end{array}$$

$$\begin{array}{r} 387691 \\ - 73280 \\ \hline 14411 \end{array}$$

$$\begin{array}{r} 387691 \\ - 73280 \\ \hline 314411 \end{array}$$

ANSWER: 314411

If you cannot find any mistakes in the steps that you followed,  
check to make sure you did not make a mistake in subtraction.

2. Subtract 13228 from 68540

STEP 1: Write the smaller number below the larger number  
so that the last digits of both numbers line up.

$$\begin{array}{r} 68540 \\ - 13228 \\ \hline \end{array}$$

STEP 2: Begin with the column of digits on the right and  
subtract the bottom digit from the top digit.  
If the top digit is smaller than the bottom  
digit, regroup and then subtract. Write the  
result in the same column below the line.

$$\begin{array}{r} \text{Decrease} \\ \text{by 1.} \quad \swarrow \\ 685\cancel{4}0 \\ - 13228 \\ \hline 2 \end{array}$$

Increase  
by 10.  $\swarrow$

Since the top digit is smaller than the bottom digit, you must regroup in order to subtract. In order to regroup, you go to the next column on the left, decrease the top digit by 1 and increase the number you are working with by 10. Then you can subtract.

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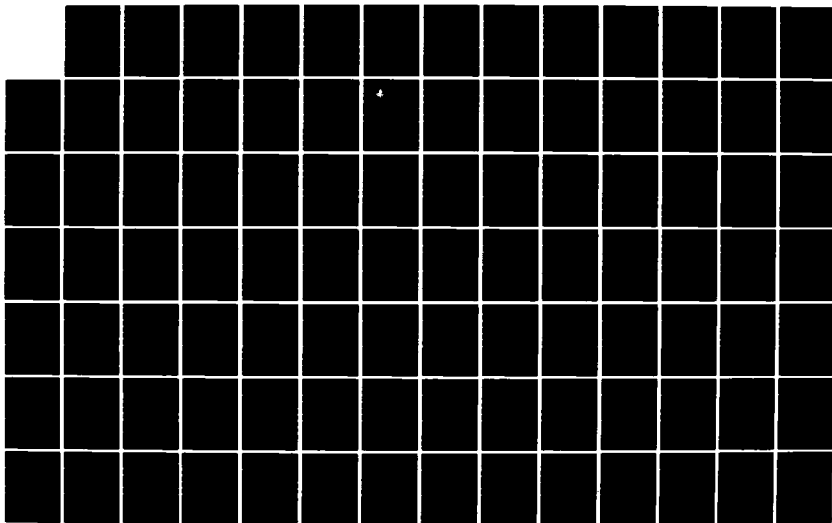
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COMMUNICATIONS INC SAN DIEGO CA 1983 DABT60-81-C-0027

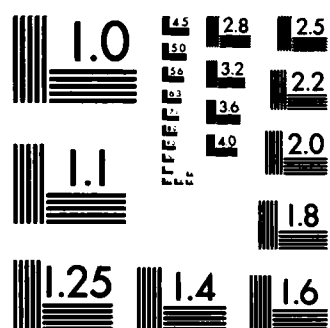
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STEP 3: Move left to the next column. Subtract the digits  
in the second column. Again, if the top digit is  
smaller than the bottom digit, regroup and then  
subtract. Write the result in the column below  
the line.

$$\begin{array}{r} 685\overset{3}{\cancel{0}} \\ - 13228 \\ \hline 12 \end{array}$$

Here the top digit is larger then the bottom  
digit so you don't need to regroup.

STEP 4: Move left to the next column and subtract. Continue  
this process until all the digits are used.

$$\begin{array}{r} 685\overset{3}{\cancel{4}}0 \\ - 13228 \\ \hline 312 \end{array}$$

$$\begin{array}{r} 685\overset{3}{\cancel{4}}0 \\ - 13228 \\ \hline 5312 \end{array}$$

$$\begin{array}{r} 685\overset{3}{\cancel{4}}0 \\ - 13228 \\ \hline 55312 \end{array}$$

ANSWER: 55312

3. Subtract 11357 from 723410.

STEP 1: Write the smaller number below the larger number  
so that the last digits of both numbers line up.

$$\begin{array}{r} 723410 \\ - \quad 11357 \\ \hline \end{array}$$

Did you write the numbers in the correct place?

Did you make sure all the columns were straight?

STEP 2: Begin with the column of digits on the right and subtract the bottom digit from the top digit. If the top digit is smaller than the bottom digit, regroup and then subtract. Write the result in the same column below the line.

$$\begin{array}{r}
 \text{Decrease} \quad \text{Increase} \\
 \text{by 1.} \quad \quad \text{by 10.} \\
 \begin{array}{r}
 7234\overset{0}{\underset{\cdot}{1}}0 \\
 - \quad 11357 \\
 \hline
 3
 \end{array}
 \end{array}$$

Since the top digit is smaller than the bottom digit, you must regroup. Remember that to regroup, you go left to the next column, decrease the top digit by 1 and increase the number you are working with by 10. Then you can subtract.

STEP 3: Move left to the next column. Subtract the digits  
in the second column. Again, if the top digit is  
smaller than the bottom digit, regroup and then  
subtract. Write the result in the same column  
below the line.

$$\begin{array}{r}
 \text{Decrease} \quad \text{Increase} \\
 \text{by 1.} \quad \quad \text{by 10.} \\
 \quad \quad \quad \swarrow \quad \searrow \\
 \quad \quad \quad 310 \\
 723\cancel{4}0 \\
 - 11357 \\
 \hline
 53
 \end{array}$$

Again, the top digit is smaller than the bottom digit so you have to regroup before you can subtract.

STEP 4: Move left to the next column and subtract. Continue this process until all the digits are used.

$$\begin{array}{r} 310 \\ 723\cancel{4}0 \\ - 11357 \\ \hline 053 \end{array}$$

Here, you don't have to regroup. Move left to the next column and continue to subtract.

$$\begin{array}{r} 310 \\ 723\cancel{4}0 \\ - 11357 \\ \hline 2053 \end{array}$$

$$\begin{array}{r} 310 \\ 723\cancel{4}0 \\ - 11357 \\ \hline 12053 \end{array}$$

$$\begin{array}{r} 310 \\ 723\cancel{4}0 \\ - 11357 \\ \hline 712053 \end{array}$$

ANSWER: 712053

4. Subtract 25346 from 81600.

STEP 1: Write the smaller number below the larger number  
so that the last digits of both numbers line up.

$$\begin{array}{r} 81600 \\ - 25346 \\ \hline \end{array}$$

STEP 2: Begin with the column of digits on the right and  
subtract the bottom digit from the top digit.  
If the top digit is smaller than the bottom digit,  
regroup and then subtract. Write the result in the  
same column below the line.

Since the top digit is smaller than the bottom digit, you must regroup. However, if you go left to the next column, the top digit is a zero. You cannot decrease a zero by 1. Therefore, you must go left again to the next column where the top digit is a 6. Regroup those numbers and then regroup again. Then you can subtract.

Decrease by 1.      Increase by 10.

$$\begin{array}{r} 81\overset{5}{\cancel{8}}00 \\ - 25346 \\ \hline \end{array}$$

Decrease by 1.      Increase by 10.

$$\begin{array}{r} 81\overset{59}{\cancel{8}}00 \\ - 25346 \\ \hline 4 \end{array}$$

STEP 3: Move left to the next column. Subtract the digits in the second column. Again, if the top digit is smaller than the bottom digit, regroup and then subtract. Write the result in the same column below the line.

Since you have already regrouped these numbers, you can go ahead and subtract.

$$\begin{array}{r} 81\overset{59}{\cancel{8}}00 \\ - 25346 \\ \hline 54 \end{array}$$



STEP 4: Move left to the next column and subtract. Continue this process until all the digits are used.

$$\begin{array}{r} \phantom{0}59 \\ 81\cancel{0}0 \\ - 25346 \\ \hline 254 \end{array}$$

Move left again and subtract.

$$\begin{array}{r} \text{Decrease} \quad \text{Increase} \\ \text{by 1.} \quad \swarrow \quad \searrow \text{by 10,} \\ \phantom{0}7\phantom{0}59 \\ 81\cancel{0}0 \\ - 25346 \\ \hline 6254 \end{array}$$

Here you have to regroup again. Continue moving left and finish the exercise.

$$\begin{array}{r} \phantom{0}7\phantom{0}59 \\ 81\cancel{0}0 \\ - 25346 \\ \hline 56254 \end{array}$$

ANSWER: 56254

5. Subtract 32392 from 289000.

STEP 1. Write the smaller number below the larger number  
so that the last digits of both numbers line up.

$$\begin{array}{r} 289000 \\ - \quad 32392 \\ \hline \end{array}$$

STEP 2: Begin with the column of digits on the right and  
subtract the bottom digit from the top digit. If  
the top digit is smaller than the bottom digit,  
regroup and then subtract. Write the result in  
the same column below the line.

Here the top digit is smaller than the bottom digit, so you must regroup. However, you have to keep moving to the left until you come to the 9 to find a number you can decrease by 1. You continue to regroup each column until you get back to the numbers you are working with. Then you will be ready to subtract.

Decrease by 1.      Increase by 10.

$$\begin{array}{r} 28\overset{8}{9}000 \\ - \quad 32392 \\ \hline \end{array}$$

Decrease by 1.      Increase by 10.

$$\begin{array}{r} 28\overset{8}{9}000 \\ - \quad 32392 \\ \hline \end{array}$$

Decrease by 1.      Increase by 10.

$$\begin{array}{r} 28\overset{8}{9}\overset{8}{9}000 \\ - \quad 32392 \\ \hline 8 \end{array}$$

STEP 3: Move left to the next column. Subtract the digit in the second column. Again, if the top digit is smaller than the bottom digit, regroup and then subtract. Write the result in the same column below the line.

$$\begin{array}{r} 28\overset{8}{9}\overset{8}{9}000 \\ - \quad 32392 \\ \hline 08 \end{array}$$

You have already regrouped, so you can go ahead and subtract.

STEP 4: Move left to the next column and subtract. Continue  
this process until all the digits are used.

$$\begin{array}{r} 899 \\ 289000 \\ - 32392 \\ \hline 608 \end{array}$$

$$\begin{array}{r} 899 \\ 289000 \\ - 32392 \\ \hline 6608 \end{array}$$

$$\begin{array}{r} 899 \\ 289000 \\ - 32392 \\ \hline 56608 \end{array}$$

$$\begin{array}{r} 899 \\ 289000 \\ - 32392 \\ \hline 256608 \end{array}$$

ANSWER: 256608

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05C FBSEP

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05C FBSEP

# REMEDIATION TEST FOR D-10

You will need some paper and a pencil to do this Remediation Test. It contains five problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 4 out of 5 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

1. Subtract 31801 from 852906.
2. Subtract 21659 from 135970.
3. Subtract 14587 from 36830.
4. Subtract 29158 from 32500.
5. Subtract 12486 from 39000.

LESSON TEST FOR D-10

You will need some paper and a pencil to do this Lesson Test. It contains five problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 4 out of 5 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

1. Subtract 41502 from 98360.
2. Subtract 21423 from 186570.
3. Subtract 14386 from 89720.
4. Subtract 35247 from 82600.
5. Subtract 32154 from 75000.



# ANSWER KEY FOR REMEDIATION TEST D-10

This answer key contains the correct responses for Remediation Test D-10. Each problem is worth one point. Students must get 4 out of 5 total points to pass this test.

1. 821105
2. 114311
3. 22243
4. 3342
5. 26514

ANSWER KEY FOR LESSON TEST D-10

This answer key contains the correct responses for Lesson Test D-10. Each problem is worth one point. Students must get 4 out of 5 total points to pass this test.

1. 56858
2. 165147
3. 75334
4. 47353
5. 42846



**FBSEP**

# **RADIO TELETYPE OPERATOR**

**MOS 05C10**

**STUDENT GUIDE**

**05C FBSEP LESSON D-11**

**DIVIDING 7 DIGIT NUMBERS BY 6 DIGIT NUMBERS**

**PREREQUISITE: None**

**MATERIALS REQUIRED: None**

**TYPE OF LESSON: Self paced**

## STUDENT GUIDE

### 05C FBSEP LESSON D-11

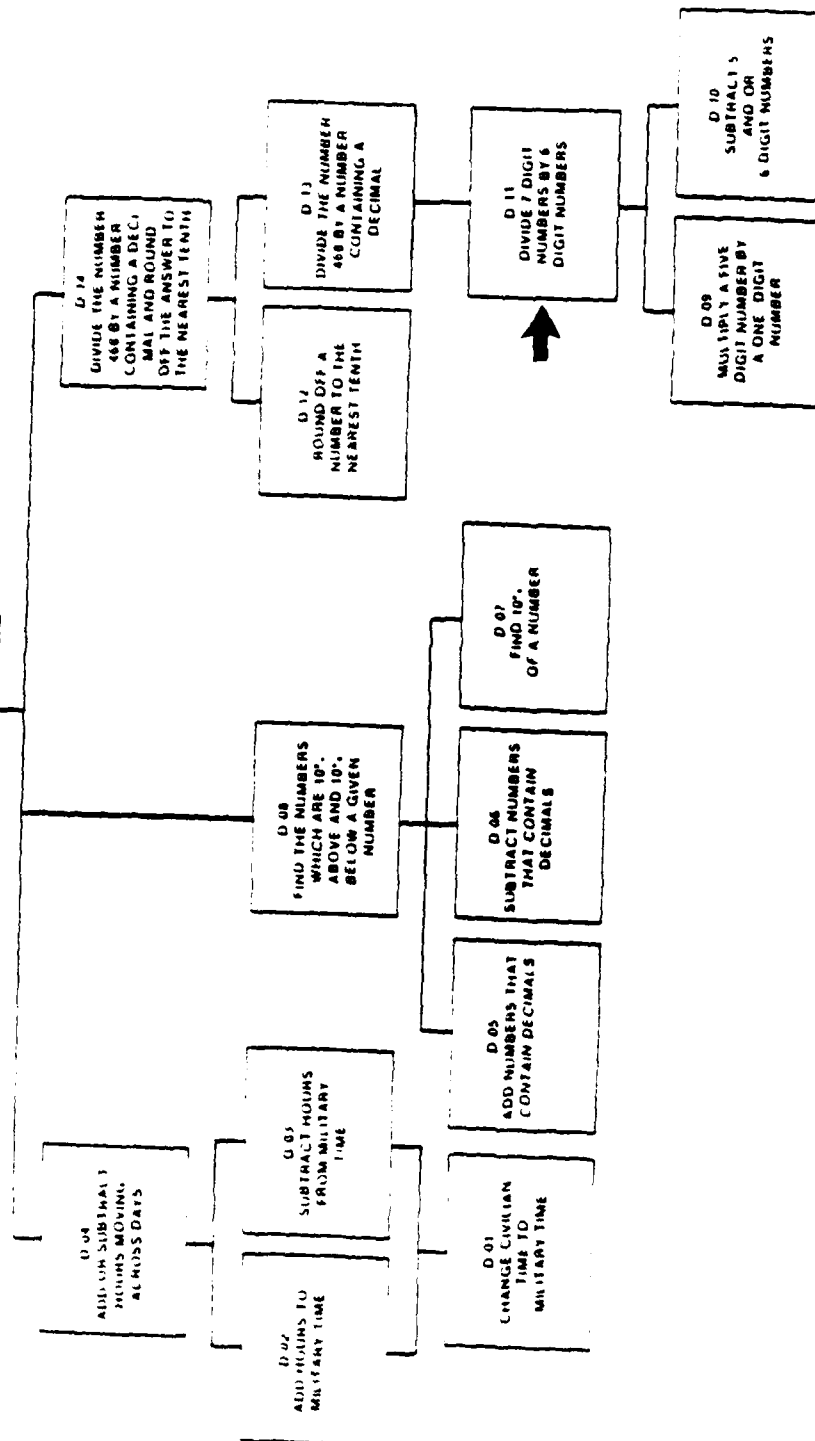
#### DIVIDING 7 DIGIT NUMBERS BY 6 DIGIT NUMBERS

##### INTRODUCTION

As a radio operator, you will need to be able to find the length of an antenna. Sometimes, you will have to be able to figure it out by yourself without the use of a chart or a tape measure. In order to do this, you will have to divide the number 468 by a frequency. Frequencies contain decimals. Therefore, you will have to know how to divide the number 468 by a number that contains a decimal. This lesson will show you how to divide with whole numbers that contain up to 6 digits. The next lesson will teach you how to divide with numbers containing decimals.

Look at the lesson map on the following page and note the arrow pointing to this lesson.

ANNEX D  
MATH SKILLS



OBJECTIVE: When you finish this lesson, you will be able to divide 7 digit numbers by 6 digit numbers.

To divide you should:

1. Set up the problem for division.
  2. Divide the first digits of the dividend by the first digit of the divisor.
  3. Multiply your estimate by the divisor.
  4. Draw a line and subtract.
  5. Bring down the next digit from the dividend.
  6. Repeat steps 2, 3, 4 and 5.
- Continue until you have filled all the places in the answer space.

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### PRESENTATION

Here are some examples to show you how to divide. The first example has only two digits in the divisor. The method is the same no matter how many digits there are.

EXAMPLE 1: Divide 5687 by 42.

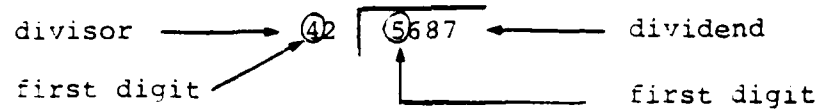
STEP 1: Set up the problem for division.

Draw a division sign. Write the number you are dividing inside the sign. This is called the dividend. Write the number you are dividing by outside the sign. This is called the divisor. (The divisor is always the number following the word "by.")

divisor → 42  $\overline{) 5687}$  ← dividend



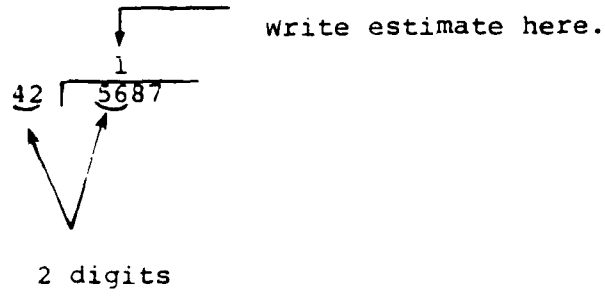
STEP 2: Divide the first digits of the dividend by the first digit of the divisor.



How much is 5 divided by 4 or how many 4's are there in 5? Suppose you guess or estimate that the answer is 1. Where will you write the 1?

Count off the number of digits in the divisor.

(There are two.) Then count off the same number of digits in the dividend and write your estimate above that digit in the answer space.



STEP 3: Multiply your estimate by the divisor.

$$1 \times 42 = 42$$

Write the result below the dividend so that the last digit is lined up with your estimate.

$$\begin{array}{r} 42 \overline{) 5687} \\ \underline{42} \phantom{00} \end{array}$$

Line these up.

STEP 4: Draw a line and subtract.

$$\begin{array}{r} 42 \overline{) 5687} \\ \underline{- 42} \phantom{00} \\ 14 \phantom{00} \end{array}$$

STEP 5: Bring down the next digit from the dividend.

$$\begin{array}{r} 42 \overline{) 5687} \\ \underline{- 42} \phantom{00} \\ 148 \end{array}$$

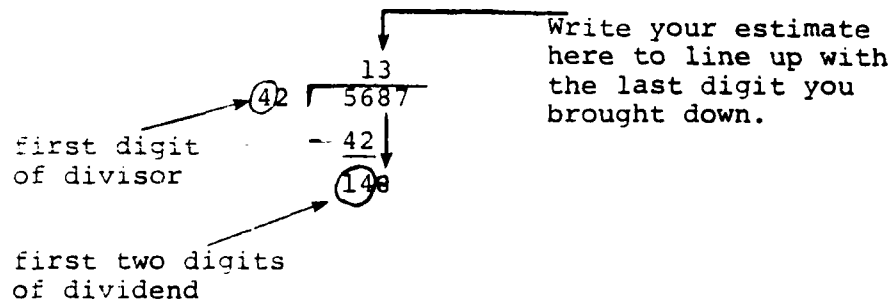
← new dividend

Notice that you have a new dividend.

STEP 6: Repeat steps 2, 3, 4 and 5. Continue until you have filled all the places in the answer space.

STEP 2: Divide the first digits of the dividend by the  
(repeat) first digit of the divisor.

Since 1 is smaller than 4, you cannot divide 1 by 4. When this happens, use the first two digits of the dividend. What is 14 divided by 4? Suppose you guess or estimate that the answer is 3. Write your estimate in the next place in the answer space.



STEP 3: Multiply your estimate by the divisor.

(repeat)

$$3 \times 42 = 126$$

$$\begin{array}{r} 13 \\ 42 \overline{) 5687} \\ - 42 \phantom{00} \\ \hline 148 \phantom{0} \\ - 126 \phantom{0} \\ \hline 22 \phantom{0} \end{array}$$

← Write the result here.

STEP 4: Draw a line and subtract.

(repeat)

$$\begin{array}{r} 13 \\ 42 \overline{) 5687} \\ - 42 \phantom{00} \\ \hline 148 \phantom{0} \\ - 126 \phantom{0} \\ \hline 22 \phantom{0} \end{array}$$

STEP 5: Bring down the next digit from the dividend.

(repeat)

$$\begin{array}{r} 13 \\ 42 \overline{) 5687} \\ - 42 \phantom{00} \\ \hline 148 \phantom{0} \\ - 126 \phantom{0} \\ \hline 22 \phantom{0} \end{array}$$

← new dividend

STEP 6: Repeat steps 2, 3, 4 and 5. Continue until you have filled all the places in the answer space.

STEP 2: Divide the first digits of the dividend by the first (repeat) digit of the divisor.

Since 2 is smaller than 4, you cannot divide 2 by 4. Therefore, you must use the first two digits of the dividend. How much is 22 divided by 4? Suppose you estimate that it is 5. Write your estimate in the next place in the answer space.

Write your estimate here to line up with the last digit you brought down.

$$\begin{array}{r}
 135 \\
 42 \overline{) 5687} \\
 \underline{- 42} \phantom{00} \\
 148 \phantom{00} \\
 \underline{- 126} \phantom{00} \\
 227
 \end{array}$$

first digit of divisor

first digits of dividend

STEP 3: Multiply your estimate by the divisor.

(repeat)

$$5 \times 42 = 210$$

$$\begin{array}{r} 135 \\ 42 \overline{) 5687} \\ \underline{- 42} \phantom{00} \\ 148 \\ \underline{- 126} \phantom{00} \\ 227 \\ \underline{- 210} \phantom{00} \\ 210 \end{array}$$

← Write result here.

STEP 4: Draw a line and subtract.

(repeat)

$$\begin{array}{r} 135 \\ 42 \overline{) 5687} \\ \underline{- 42} \phantom{00} \\ 148 \\ \underline{- 126} \phantom{00} \\ 227 \\ \underline{- 210} \phantom{00} \\ 17 \end{array}$$

Since you have filled all the places above the dividend in the answer space, you have completed the example.

ANSWER: 135 (There is a remainder of 17 but in this lesson you do not need to include it in your answer.)

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EXAMPLE 2: Divide 46800 by 512.

STEP 1: Set up the problem for division.

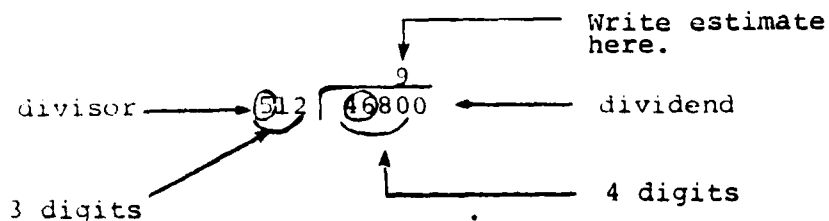
Remember to write the number you are dividing  
inside the division sign and the number you are  
dividing by outside the sign.

divisor → 512  $\overline{) 46800}$  ← dividend



STEP 2: Divide the first digits of the dividend by the first digit of the divisor.

In this case, since 4 is smaller than 5, you cannot divide 4 by 5. You must use the first two digits of the dividend. How much is 46 divided by 5? Suppose you estimate that the answer is 9. Where should you write the 9? Remember that you have to count off the digits in the divisor. Then count off the same number of digits in the dividend, and write your estimate above that digit in the answer space. There are three digits in the divisor (512). However, in this case, you used two digits of the dividend to divide with (46). When you do that, you must count off an extra digit. Instead of counting off three digits, you must count off four digits of the dividend. Then write your estimate above that.



STEP 3: Multiply your estimate by the divisor.

$$9 \times 512 = 4608$$

$$\begin{array}{r} 9 \\ 512 \overline{) 46800} \\ \underline{4608} \end{array}$$

STEP 4: Draw a line and subtract.

$$\begin{array}{r} 9 \\ 512 \overline{) 46800} \\ \underline{- 4608} \\ 72 \end{array}$$

STEP 5: Bring down the next digit from the dividend.

$$\begin{array}{r} 9 \\ 512 \overline{) 46800} \\ \underline{- 4608} \\ 720 \end{array} \quad \leftarrow \text{new dividend}$$

STEP 6: Repeat steps 2, 3, 4 and 5. Continue until you have filled all the places in the answer space.

STEP 2: Divide the first digits of the dividend by the  
(repeat) first digit of the divisor.

How much is 7 divided by 5? Suppose your estimate is 1. Write your estimate in the next place in the answer space.

$$\begin{array}{r}
 91 \\
 512 \overline{) 46800} \\
 - 4608 \\
 \hline
 720
 \end{array}$$

Write estimate here to line up with the last digit you brought down.

STEP 3: Multiply your estimate by the divisor.  
(repeat)

$$1 \times 512 = 512$$

$$\begin{array}{r}
 91 \\
 512 \overline{) 46800} \\
 - 4608 \\
 \hline
 720 \\
 512
 \end{array}$$

Write the result here.

STEP 4: Draw a line and subtract.

(repeat)

$$\begin{array}{r} 91 \\ 512 \overline{) 46800} \\ \underline{- 4608} \phantom{00} \\ 720 \\ \underline{- 512} \\ 208 \end{array}$$

Since you have filled all the places above the dividend in the answer space, you have completed the example. Remember that in this lesson you can ignore the remainder.

ANSWER: 91

EXAMPLE 3: Divide 468000 by 5632.

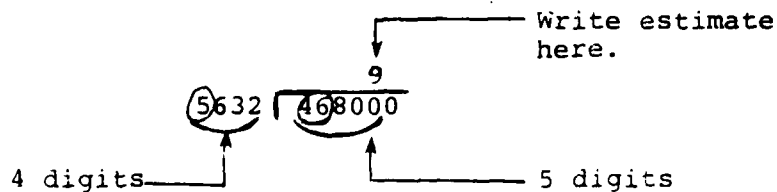
STEP 1: Set up the problem for division.

Remember to write the number you are dividing  
under the division sign and the number you are  
dividing by outside the sign.

divisor → 5632 | 468000 ← dividend

STEP 2: Divide the first digits of the dividend by the first digit of the divisor.

Since 4 is smaller than 5, you cannot divide 4 by 5. Therefore, you must use the first two digits of the dividend. How much is 46 divided by 5? Suppose you estimate that the answer is 9. Where will you write the 9? Remember that the rule is to count the number of digits in the divisor (four). Then count off the same number of digits in the dividend. However, when you use two digits of the dividend to divide with (46), you must count off an extra digit. So, you must write your estimate over the fifth digit of the dividend.



STEP 3: Multiply your estimate by the divisor.

$$9 \times 5632 = 50688$$

$$\begin{array}{r} 9 \\ 5632 \overline{) 468000} \\ \underline{50688} \end{array}$$

STEP 4: Draw a line and subtract.

$$\begin{array}{r} 9 \\ 5632 \overline{) 468000} \\ - \underline{50688} \end{array}$$

In this case, if you try to subtract, you will find that you cannot because the bottom number is larger than the top number. When this happens, you must reduce your estimate by 1 and multiply again.

Note of explanation: The reason this happens is that you are not really dividing 46 by 5. You are dividing 468000 by 5632. Therefore, your response is only a guess or an estimate of the correct answer.

Reduce your estimate to 3 and multiply again.

$$8 \times 5632 = 45056$$

$$\begin{array}{r} 8 \\ 5632 \overline{) 468000} \\ \underline{45056} \end{array}$$

Now draw a line and subtract.

$$\begin{array}{r} 8 \\ 5632 \overline{) 468000} \\ - \underline{45056} \\ 1744 \end{array}$$

STEP 5: Bring down the next digit from the dividend.

$$\begin{array}{r} 8 \\ 5632 \overline{) 468000} \\ - \underline{45056} \downarrow \\ 17440 \end{array} \leftarrow \text{new dividend}$$



STEP 6: Repeat steps 2, 3, 4 and 5. Continue until you have filled all the places in the answer space.

STEP 2: Divide the first digits of the dividend by the  
(repeat) first digit of the divisor.

Since 1 is smaller than 5, use the first two digits of the dividend. How much is 17 divided by 5?

$$\begin{array}{r}
 83 \\
 5632 \overline{) 468000} \\
 \underline{- 45056} \\
 17440
 \end{array}$$

Write your estimate here to line up with the last digit you brought down.

STEP 3: Multiply your estimate by the divisor.  
(repeat)

$$3 \times 5632 = 16896$$

$$\begin{array}{r}
 83 \\
 5632 \overline{) 468000} \\
 \underline{- 45056} \\
 17440 \\
 16896
 \end{array}$$

STEP 4: Draw a line and subtract.

(repeat)

$$\begin{array}{r} 83 \\ 5632 \overline{) 468000} \\ - 45056 \\ \hline 17440 \\ - 16896 \\ \hline 544 \end{array}$$

Since you have filled all the places above the dividend in the answer space, you have completed the example; you can ignore the remainder.

ANSWER: 83

EXAMPLE 4: Divide 468000 by 771.

STEP 1: Set up the problem for division.

Remember to write the number you are dividing under the division sign and the number you are dividing by outside the sign.

divisor  $\longrightarrow$  771  $\overline{) 468000}$   $\longleftarrow$  dividend

STEP 2: Divide the first digits of the dividend by the first digit of the divisor.

Since 4 is smaller than 7, you cannot divide 4 by 7. Therefore, you must use the first two digits of the dividend. How much is 46 divided by 7? Suppose you estimate that the answer is 6. Where will you write the 6? Remember that when you use two digits of the dividend to divide with (46), you must count off an extra digit. So, you must write your estimate over the fourth digit of the dividend.

Write estimate here.

6

771  $\overline{) 468000}$

3 digits  $\longrightarrow$   $\longleftarrow$  4 digits

STEP 3: Multiply your estimate by the divisor.

$$6 \times 771 = 4626$$

$$\begin{array}{r} 6 \\ 771 \overline{) 468000} \\ \underline{4626} \end{array}$$

STEP 4: Draw a line and subtract.

$$\begin{array}{r} 6 \\ 771 \overline{) 468000} \\ - \underline{4626} \\ 54 \end{array}$$

STEP 5: Bring down the next digit from the dividend.

$$\begin{array}{r} 6 \\ 771 \overline{) 468000} \\ - \underline{4626} \downarrow \\ 540 \end{array} \quad \leftarrow \text{new dividend}$$

STEP 6: Repeat steps 2, 3, 4 and 5. Continue until you have filled all the places in the answer spece.

STEP 2: Divide the first digits of the dividend by the  
(repeat) first digit of the divisor.

The new dividend (540) is smaller than the divisor (771). When this happens, write a zero in the answer space. Remember, for each digit you bring down, you must put a digit (or estimate) in the answer space to line up with the digit you brought down.

$$\begin{array}{r}
 60 \\
 771 \overline{) 468000} \\
 \underline{- 4626} \phantom{0} \\
 540
 \end{array}$$

Write a zero here to line up the last digit you brought down.

Then bring down the next digit from the dividend.

$$\begin{array}{r}
 60 \\
 771 \overline{) 468000} \\
 \underline{- 4626} \phantom{0} \\
 5400
 \end{array}$$

new dividend

Since 5 is smaller than 7, use the first two digits of the new dividend. How much is 54 divided by 7? It is about 7.

$$\begin{array}{r} 607 \\ 771 \overline{) 468000} \\ - 4626 \\ \hline 5400 \end{array}$$

Write the estimate here to line up with the last digit you brought down.

STEP 3: Multiply your estimate by the divisor.  
(repeat)

$$7 \times 771 = 5397$$

$$\begin{array}{r} 607 \\ 771 \overline{) 468000} \\ - 4626 \\ \hline 5400 \\ - 5397 \\ \hline \end{array}$$

STEP 4: Draw a line and subtract.  
(repeat)

$$\begin{array}{r} 607 \\ 771 \overline{) 468000} \\ - 4626 \\ \hline 5400 \\ - 5397 \\ \hline 3 \end{array}$$

Since you have filled all the spaces above the dividend in the answer space, you can stop dividing. There is no need to write the remainder as part of the answer.

ANSWER: 607

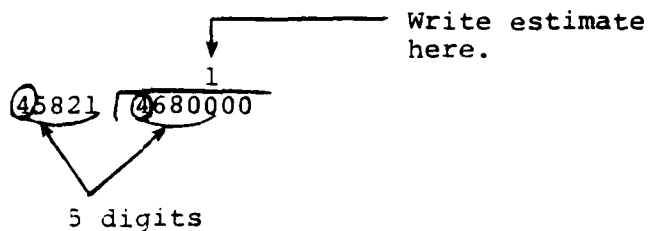
EXAMPLE 5: Divide 4680000 by 45821.

STEP 1: Set up the problem for division.

divisor  $\longrightarrow$  45821  $\overline{) 4680000}$   $\longleftarrow$  dividend

STEP 2: Divide the first digits of the dividend by the first digit of the divisor.

How much is 4 divided by 4? Write your estimate above the fifth digit of the dividend because there are five digits in the divisor.

  
45821  $\overline{) 4680000}$   
1  
5 digits  
Write estimate here.

STEP 3: Multiply your estimate by the divisor.

$$1 \times 45821 = 45821$$

$$\begin{array}{r} 1 \\ 45821 \overline{) 4680000} \\ \underline{45821} \end{array}$$

STEP 4: Draw a line and subtract.

$$\begin{array}{r} 1 \\ 45821 \overline{) 4680000} \\ - 45821 \\ \hline 979 \end{array}$$

STEP 5: Bring down the next digit from the dividend.

$$\begin{array}{r} 1 \\ 45821 \overline{) 4680000} \\ - 45821 \\ \hline 9790 \end{array} \quad \leftarrow \text{new dividend}$$



STEP 6: Repeat steps 2, 3, 4 and 5. Continue until you have filled all the places in the answer space.

STEP 2: Divide the first digits of the dividend by the (repeat) first digit of the divisor.

Look at the new dividend (9790). It is smaller than the divisor (45821). You cannot divide a smaller number by a larger number. When this happens, write a zero in the answer space. Once again, remember that for each digit you bring down, you must put a digit in the answer space.

$$\begin{array}{r}
 \phantom{0}10 \\
 45821 \overline{) 4680000} \\
 \underline{- 45821} \phantom{0} \\
 9790
 \end{array}$$

Write a zero here to line up with the last digit you brought down.

Then bring down the next digit from the dividend.

$$\begin{array}{r}
 \phantom{0}10 \\
 45821 \overline{) 4680000} \\
 \underline{- 45821} \phantom{0} \\
 97900
 \end{array}$$

new dividend

The new dividend (97900) is larger than the divisor. Therefore, you can continue dividing. How much is 9 divided by 4? Write your estimate in the answer space.

$$\begin{array}{r}
 102 \\
 45821 \overline{) 4680000} \\
 - 45821 \\
 \hline
 97900
 \end{array}$$

Write the estimate here to line up with the last digit you brought down.

STEP 3: Multiply your estimate by the divisor.

(repeat)

$$2 \times 45821 = 91642$$

$$\begin{array}{r}
 102 \\
 45821 \overline{) 4680000} \\
 - 45821 \\
 \hline
 97900 \\
 91642
 \end{array}$$

STEP 4: Draw a line and subtract.

(repeat)

$$\begin{array}{r}
 102 \\
 45821 \overline{) 4680000} \\
 - 45821 \\
 \hline
 97900 \\
 - 91642 \\
 \hline
 6258
 \end{array}$$

ANSWER: 102

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EXAMPLE 6: Divide 4680000 by 55103.

STEP 1: Set up the problem for division.

divisor → 55103 | 4680000 ← dividend

STEP 2: Divide the first digits of the dividend by the first digit of the divisor.

Since 4 is smaller than 5, you cannot divide 4 by 5. You must use the first two digits of the dividend. How much is 46 divided by 5? Suppose your estimate is 9. Where will you write it? Remember to count the number of digits in the divisor (5). Then count off the same number of digits in the dividend but count off one extra digit because you used two digits of the dividend to divide with. Write your estimate above the sixth digit of the dividend.

Write estimate here.

9

55103 | 4680000

5 digits      6 digits

STEP 3: Multiply your estimate by the divisor.

$$9 \times 55103 = 495927$$

$$\begin{array}{r} 55103 \overline{) 4680000} \\ 495927 \end{array}$$

Now draw a line and subtract.

$$\begin{array}{r} 9 \\ 55103 \overline{) 4680000} \\ - 495927 \\ \hline \end{array}$$

You can see that you cannot subtract because the bottom number is larger than the top number. Remember that when this happens, you should reduce your estimate by 1 and multiply again.

$$8 \times 55103 = 440824$$

$$\begin{array}{r} 8 \\ 55103 \overline{) 4680000} \\ 440824 \\ \hline \end{array}$$

Now you can subtract.

$$\begin{array}{r} 8 \\ 55103 \overline{) 4680000} \\ - 440824 \\ \hline 27176 \end{array}$$

Later: If you reduce your estimate and multiply and the bottom number is still larger than the top number, reduce your estimate again. Continue to reduce it until you find the correct number.

STEP 5: Bring down the next digit from the dividend.

$$\begin{array}{r} 8 \\ 55103 \overline{) 4680000} \\ - 440824 \\ \hline 271760 \end{array} \leftarrow \text{new dividend}$$

STEP 6: Repeat steps 2, 3, 4 and 5. Continue until you have filled all the places in the answer space.

STEP 2: Divide the first digits of the dividend by the  
(repeat) first digit of the divisor.

Since the first digit of the dividend (2) is smaller than the first digit of the divisor, you must use the first two digits of the dividend.

How much is 27 divided by 5?

$$\begin{array}{r}
 \text{Write your estimate here.} \rightarrow 85 \\
 \textcircled{5}5103 \overline{) 4680000} \\
 \underline{- 440824} \\
 \textcircled{2}71760
 \end{array}$$

STEP 3: Multiply your estimate by the divisor.  
(repeat)

$$5 \times 55103 = 275515$$

$$\begin{array}{r}
 85 \\
 55103 \overline{) 4680000} \\
 \underline{- 440824} \\
 271760 \\
 275515
 \end{array}$$

STEP 4: Draw a line and subtract.

(repeat) Since the bottom number is larger than the top number, you cannot subtract. You must reduce your estimate by 1 and multiply again.

$$4 \times 55103 = 220412$$

$$\begin{array}{r} 84 \\ 55103 \overline{) 4680000} \\ - 440824 \\ \hline 271760 \\ 220412 \end{array}$$

Now you can subtract.

$$\begin{array}{r} 84 \\ 55103 \overline{) 4680000} \\ - 440824 \\ \hline 271760 \\ - 220412 \\ \hline 51348 \end{array}$$

ANSWER: 84

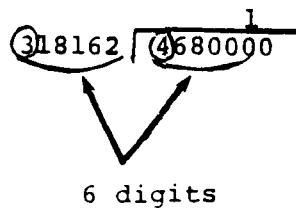


EXAMPLE 7: Divide 4680000 by 318162.

STEP 1: Set up the problem for division.

divisor → 318162 | 4680000 ← dividend

STEP 2: Divide the first digits of the dividend by the first digit of the divisor.

  
6 digits

STEP 3: Multiply your estimate by the divisor.

$$\begin{array}{r} 1 \\ 318162 \overline{) 4680000} \\ \underline{318162} \end{array} \leftarrow 1 \times 318162 = 318162$$

STEP 4: Draw a line and subtract.

$$\begin{array}{r} 1 \\ 318162 \overline{) 4680000} \\ \underline{- 318162} \\ 149838 \end{array}$$

STEP 5: Bring down the next digit from the dividend.

$$\begin{array}{r} 1 \\ 318162 \overline{) 4680000} \\ \underline{- 318162} \\ 1498380 \end{array}$$

STEP 6: Repeat steps 2, 3, 4 and 5. Continue until you have filled all the places in the answer space.

STEP 2: Divide the first digits of the dividend by the first  
(repeat) digit of the divisor.

$$\begin{array}{r}
 \textcircled{3}18162 \overline{)4680000} \\
 \underline{- 318162} \\
 \textcircled{1}498380
 \end{array}$$

$14 \div 3 = 4$   
 (estimate)

STEP 3: Multiply your estimate by the divisor.  
(repeat)

$$\begin{array}{r}
 318162 \overline{)4680000} \\
 \underline{- 318162} \\
 1498380 \\
 1272648 \leftarrow 4 \times 318162 = 1272648
 \end{array}$$

STEP 4: Draw a line and subtract.

(repeat)

$$\begin{array}{r} \phantom{318162} \overline{14} \\ 318162 \overline{) 4680000} \\ \underline{- 318162} \phantom{00} \\ 1498380 \\ \underline{- 1272648} \\ 225632 \end{array}$$

ANSWER: 14

### SUMMARY AND PRACTICE

Here is a review of the steps you need to follow to work out division problems.

1. Set up the problem for division.
2. Divide the first digits of the dividend by the first digit of the divisor.
3. Multiply your estimate by the divisor.
4. Draw a line and subtract.
5. Bring down the next digit from the dividend.
6. Repeat steps 2, 3, 4 and 5. Continue until you have filled all the places in the answer space.

Now you will have some problems to try on your own. Use the steps you have learned to find the answers. Remember that since there are several steps involving subtraction, multiplication, and division, there are also several places where you might make an error. Do your work carefully; go back and check your work for careless errors. On the test for this lesson, each problem will be marked either right or wrong; even a careless error may cause you to fail the test. So learn to do your work carefully.

When you finish the Practice Exercise, check your answers with the answer key. If you get any wrong, study the Explanations for the Practice Exercise. If you don't understand the explanations, ask your learning supervisor to help you. When you feel that you are ready, ask your learning supervisor for the Lesson Test.

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PRACTICE EXERCISE

For each of the following, stop the division when all the digits of the dividend have been used. You do not need to write the remainder as part of the answer.

1. Divide 4680 by 32.
2. Divide 46800 by 502.
3. Divide 468000 by 5621.
4. Divide 4680000 by 44621.
5. Divide 4680000 by 220341.



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ANSWERS TO PRACTICE EXERCISE

1. 146
2. 93
3. 83
4. 104
5. 21

EXPLANATIONS FOR PRACTICE EXERCISE

1. Divide 4680 by 32.

STEP 1: Set up the problem for division.

divisor  $\longrightarrow$  32  $\overline{) 4680}$   $\longleftarrow$  dividend

STEP 2: Divide the first digits of the dividend by the first digit of the divisor.

$4 \div 3 = 1$   
(estimate)

$\begin{array}{r} 1 \\ 32 \overline{) 4680} \end{array}$

2 digits

STEP 3: Multiply your estimate by the divisor.

$\begin{array}{r} 1 \\ 32 \overline{) 4680} \end{array}$

32  $\longleftarrow 1 \times 32 = 32$

STEP 4: Draw a line and subtract.

$$\begin{array}{r} 1 \\ 32 \overline{) 4680} \\ - 32 \\ \hline 14 \end{array}$$

STEP 5: Bring down the next digit from the dividend.

$$\begin{array}{r} 1 \\ 32 \overline{) 4680} \\ - 32 \\ \hline 148 \end{array} \quad \longleftarrow \text{new dividend}$$

STEP 6: Repeat steps 2, 3, 4 and 5. Continue until you have filled all the places in the answer space.

STEP 2. Divide the first digits of the dividend by the  
(repeat) first digit of the divisor.

$$\begin{array}{r} 14 \\ 32 \overline{) 4680} \\ \underline{- 32} \phantom{0} \\ 148 \end{array}$$

$14 \div 3 = 4$   
(estimate)

You cannot use  
 $1 \div 3$

STEP 3: Multiply your estimate by the divisor.  
(repeat)

$$\begin{array}{r} 14 \\ 32 \overline{) 4680} \\ \underline{- 32} \phantom{0} \\ 148 \\ 128 \end{array}$$

$\longleftarrow 4 \times 32 = 128$

STEP 4: Draw a line and subtract.

(repeat)

$$\begin{array}{r} 14 \\ 32 \overline{) 4680} \\ - 32 \\ \hline 148 \\ - 128 \\ \hline 20 \end{array}$$

STEP 5: Bring down the next digit from the dividend.

(repeat)

$$\begin{array}{r} 14 \\ 32 \overline{) 4680} \\ - 32 \\ \hline 148 \\ - 128 \\ \hline 200 \end{array} \quad \leftarrow \text{new dividend}$$

STEP 6: Repeat steps 2, 3, 4 and 5. Continue until you have  
 (repeat) filled all the places in the answer space.

STEP 2: Divide the first digits of the dividend by the first  
 (repeat) digit of the divisor.

$$\begin{array}{r}
 \text{20} \div 3 = 6 \\
 \text{(estimate)} \\
 \begin{array}{r}
 \textcircled{3}2 \overline{) 4680} \\
 \underline{- 32} \phantom{0} \\
 148 \phantom{0} \\
 \underline{- 128} \\
 \textcircled{2}00
 \end{array}
 \end{array}$$

You cannot use  
 $2 \div 3$

STEP 3: Multiply your estimate by the divisor.  
 (repeat)

$$\begin{array}{r}
 \phantom{0}146 \\
 32 \overline{) 4680} \\
 \underline{- 32} \phantom{0} \\
 148 \phantom{0} \\
 \underline{- 128} \\
 200 \\
 192 \longleftarrow 6 \times 32 = 192
 \end{array}$$

STEP 4: Draw a line and subtract.

(repeat)

$$\begin{array}{r} 146 \\ 32 \overline{) 4680} \\ \underline{- 32} \phantom{0} \\ 148 \\ \underline{- 128} \\ 200 \\ \underline{- 192} \\ 8 \end{array}$$

ANSWER: 146

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2. Divide 46800 by 502.

STEP 1: Set up the problem for division.

divisor  $\longrightarrow$  502  $\overline{) 46800}$   $\longleftarrow$  dividend

STEP 2: Divide the first digits of the dividend by the first digit of the divisor.

$\textcircled{502} \overline{) 46800}$

3 digits  $\longleftarrow$   $\uparrow$   $\uparrow$  4 digits

$46 \div 5 = 9$   
(estimate)

You cannot use  
 $4 \div 5$

STEP 3: Multiply your estimate by the divisor.

$$\begin{array}{r} 9 \\ 502 \overline{) 46800} \\ \underline{4518} \end{array} \quad \leftarrow 9 \times 502 = 4518$$

STEP 4: Draw a line and subtract.

$$\begin{array}{r} 9 \\ 502 \overline{) 46800} \\ \underline{- 4518} \\ 162 \end{array}$$

STEP 5: Bring down the next digit in the dividend.

$$\begin{array}{r} 9 \\ 502 \overline{) 46800} \\ \underline{- 4518} \\ 1620 \end{array} \quad \leftarrow \text{new dividend}$$

STEP 6: Repeat steps 2, 3, 4 and 5. Continue until you have filled all the places in the answer space.

STEP 2: Divide the first digits of the dividend by the first (repeat) digit of the divisor.

$$\begin{array}{r} 93 \\ 502 \overline{) 46800} \\ \underline{- 4518} \\ 1620 \end{array}$$

$16 \div 5 = 3$   
(estimate)

You cannot use  
 $1 \div 3$

STEP 3: Multiply your estimate by the divisor.  
(repeat)

$$\begin{array}{r} 93 \\ 502 \overline{) 46800} \\ \underline{- 4518} \\ 1620 \\ 1506 \end{array}$$

$\longleftarrow 3 \times 502 = 1506$

STEP 4: Draw a line and subtract.

(repeat)

$$\begin{array}{r} 93 \\ 502 \overline{) 46800} \\ - 4518 \\ \hline 1620 \\ - 1506 \\ \hline 114 \end{array}$$

ANSWER: 93

3. Divide 468000 by 5621.

STEP 1: Set up the problem for division.

divisor → 5621  $\overline{) 468000}$  ← dividend

STEP 2: Divide the first digits of the dividend by the first digit of the divisor.

5621  $\overline{) 468000}^8$

Did you write your estimate in the correct place?  
(Remember to count off an extra digit when you use two digits of the dividend to divide.)

Was your estimate 9? If it was, you should have reduced it because when you multiply 9 by the divisor, you get a number that is too large to subtract.

STEP 3: Multiply your estimate by the divisor.

$$\begin{array}{r} 8 \\ 5621 \overline{) 468000} \\ \underline{44968} \end{array} \quad \leftarrow 8 \times 5621 = 44968$$

STEP 4: Draw a line and subtract.

$$\begin{array}{r} 8 \\ 5621 \overline{) 468000} \\ \underline{- 44968} \\ 1832 \end{array}$$

STEP 5: Bring down the next digit from the dividend.

$$\begin{array}{r} 8 \\ 5621 \overline{) 468000} \\ \underline{44968} \\ 18320 \end{array} \quad \leftarrow \text{new dividend}$$

STEP 6: Repeat steps 2,3,4, and 5. Continue until you have filled all the places in the answer space.

STEP 2: Divide the first digits of the dividend by the  
 (repeat) first digit of the divisor.

$$\begin{array}{r} 83 \\ 5621 \overline{) 468000} \\ \underline{44968} \\ 18320 \end{array}$$

$18 \div 3 = 5$   
(estimate)

You cannot use  
 $1 \div 5$

STEP 3: Multiply your estimate by the divisor.  
 (repeat)

$$\begin{array}{r} 83 \\ 5621 \overline{) 468000} \\ \underline{44968} \\ 18320 \\ \underline{16863} \end{array} \quad \longleftarrow 3 \times 5621 = 16863$$

STEP 4: Draw a line and subtract.  
 (repeat)

$$\begin{array}{r} 83 \\ 5621 \overline{) 468000} \\ \underline{44968} \\ 18320 \\ \underline{16863} \\ 1457 \end{array}$$

ANSWER: 83

4. Divide 4680000 by 44621.

STEP 1: Set up the problem for division.

divisor  $\rightarrow$  44621  $\overline{) 4680000}$   $\leftarrow$  dividend

STEP 2: Divide the first digits of the dividend by the first digit of the divisor.

$4 \div 4 = 1$   
(estimate)

$\downarrow$   
1  
44621  $\overline{) 4680000}$   
5 digits

STEP 3: Multiply your estimate by the divisor.

1  
44621  $\overline{) 4680000}$   
44621  $\leftarrow 1 \times 44621 = 44621$



STEP 4: Draw a line and subtract.

$$\begin{array}{r} 1 \\ 44621 \overline{) 4680000} \\ \underline{- 44621} \phantom{00} \\ 2179 \phantom{00} \end{array}$$

STEP 5: Bring down the next digit from the dividend.

$$\begin{array}{r} 1 \\ 44621 \overline{) 4680000} \\ \underline{44621} \downarrow \\ 21790 \leftarrow \text{new dividend} \end{array}$$

Here, the new dividend is smaller than the divisor.  
Remember that when this happens, you must put a  
zero in the answer place and bring down the next  
digit from the dividend.

$$\begin{array}{r} 10 \\ 44621 \overline{) 4680000} \\ \underline{44621} \downarrow \\ 217900 \leftarrow \text{new dividend} \end{array}$$

STEP 6: Repeat steps 2, 3, 4, and 5. Continue until you  
have filled all the places in the answer space.

STEP 2: Divide the first digits of the dividend by the  
 (repeat) first digit of the divisor.

$$\begin{array}{r} 104 \\ 44621 \overline{) 4680000} \\ \underline{44621} \phantom{0} \\ 217900 \end{array}$$

You cannot use the estimate 5 when you multiply 5  
 by 44621 because you get too large a number to  
 subtract.

STEP 3: Multiply your estimate by the divisor.  
 (repeat)

$$\begin{array}{r} 104 \\ 44621 \overline{) 4680000} \\ \underline{44621} \phantom{0} \\ 217900 \\ \underline{178484} \leftarrow 4 \times 44621 = 178484 \end{array}$$

STEP 4: Draw a line and subtract.  
 (repeat)

$$\begin{array}{r} 104 \\ 44621 \overline{) 4680000} \\ \underline{- 44621} \phantom{0} \\ 217900 \\ \underline{- 178484} \\ 39416 \end{array}$$

ANSWER: 104

5. Divide 4680000 by 220341.

STEP 1: Set up the problem for division.

divisor  $\rightarrow$  220341  $\overline{) 4680000}$   $\leftarrow$  dividend

STEP 2: Divide the first digits of the dividend by the first digit of the divisor.

$4 \div 2 = 2$   
(estimate)

$\begin{array}{r} 2 \\ 220341 \overline{) 4680000} \end{array}$

6 digits

STEP 3: Multiply your estimate by the divisor.

$\begin{array}{r} 2 \\ 220341 \overline{) 4680000} \\ 440682 \end{array}$   $\leftarrow 2 \times 220341 = 440682$

STEP 4: Draw a line and subtract.

$\begin{array}{r} 2 \\ 220341 \overline{) 4680000} \\ - 440682 \\ \hline 27318 \end{array}$

STEP 5: Bring down the next digit from the dividend.

$$\begin{array}{r}
 2 \\
 220341 \overline{) 4680000} \\
 \underline{440682} \downarrow \\
 273180 \leftarrow \text{new dividend}
 \end{array}$$

STEP 6: Repeat steps 2, 3, 4, and 5. Continue until you have filled all the places in the answer space.

STEP 2: Divide the first digits of the dividend by the (repeat) first digit of the divisor.

$$\begin{array}{r}
 2 \div 2 = 1 \\
 \text{(estimate)} \\
 \downarrow \\
 \textcircled{2}20341 \overline{) 4680000} \\
 \underline{440682} \downarrow \\
 \textcircled{2}73180
 \end{array}$$

STEP 3: Multiply your estimate by the divisor.  
(repeat)

$$\begin{array}{r}
 21 \\
 220341 \overline{) 4680000} \\
 \underline{440682} \\
 273180 \\
 \underline{220341} \leftarrow 1 \times 220341 = 220341
 \end{array}$$

STEP 4: Draw a line and subtract.

(repeat)

$$\begin{array}{r} 21 \\ 220341 \overline{) 4680000} \\ \underline{- 440682} \phantom{0} \\ 273180 \\ \underline{- 220341} \\ 52839 \end{array}$$

ANSWER: 21

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### REMEDIATION

This part of the lesson contains some additional examples for you to work on. Before you begin, review the steps you need to follow to solve division problems.

1. Set up the problem for division.
2. Divide the first digits of the dividend by the first digit of the divisor.
3. Multiply your estimate by the divisor.
4. Draw a line and subtract.
5. Bring down the next digit from the dividend.
6. Repeat steps 2, 3, 4, and 5. Continue until you have filled all the places in the answer space.

Now try the Remediation Exercise. It is important for you to work carefully; even a careless error in your work will make the final answer to the problem wrong. Check your answers with the answer key. If you get any wrong, read the Explanations for Remediation Exercise carefully to find the specific mistakes you made. If there is something you do not understand, ask your learning supervisor to help you.

At the end of this section you will be retested. On the test, do your work carefully and take the time to go back and recheck your work. Remember only the final answer will count; it will be marked either right or wrong.



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REMEDIATION EXERCISE

For each of the following, stop the division when all the digits of the dividend have been used. You do not need to write the remainder as part of the answer.

1. Divide 46800 by 534.
2. Divide 4680 by 21.
3. Divide 468000 by 3685.
4. Divide 4680000 by 483196.
5. Divide 468000 by 665.

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ANSWERS TO REMEDIATION EXERCISE

1. 87
2. 222
3. 127
4. 9
5. 703

# EXPLANATIONS FOR REMEDIATION EXERCISE

1. Divide 46800 by 534.

STEP 1: Set up the problem for division.

divisor  $\longrightarrow$  534  $\overline{) 46800}$   $\longleftarrow$  dividend

STEP 2: Divide the first digits of the dividend by the first digit of the divisor.

534  $\overline{) 46800}$   
8

Since 4 is smaller than 5, you cannot divide 4 by 5. Instead, use the first two digits of the dividend and divide 46 by 5. Did you write your estimate in the correct place? (Remember that when you use two digits of the dividend to divide, you must count off an extra digit in the dividend to find the place to write your estimate.)

Was your estimate 9? If it was, you should have reduced it by 1 because when you multiply 9 by 534, you get a number too large to subtract.

STEP 3: Multiply your estimate by the divisor.

$$\begin{array}{r} 8 \\ 534 \overline{) 46800} \\ \underline{4272} \end{array} \leftarrow 8 \times 534 = 4272$$

STEP 4: Draw a line and subtract.

$$\begin{array}{r} 8 \\ 534 \overline{) 46800} \\ \underline{- 4272} \\ 408 \end{array}$$

STEP 5: Bring down the next digit in the dividend.

$$\begin{array}{r} 8 \\ 534 \overline{) 46800} \\ \underline{- 4272} \\ 4080 \end{array} \leftarrow \text{new dividend}$$

STEP 6: Repeat steps 2, 3, 4 and 5. Continue until you have filled all the places in the answer space.

STEP 2: Divide the first digits of the dividend by the first  
(repeat) digit of the divisor.

$$\begin{array}{r} 87 \\ 524 \overline{) 46800} \\ - 4272 \\ \hline 4080 \end{array}$$

Since you cannot divide 4 by 5, you must use the first two digits of the dividend and divide 40 by 5. You cannot use the estimate 8 because when you multiply by 524, you get too large a number to subtract.

STEP 3: Multiply your estimate by the divisor.  
(repeat)

$$\begin{array}{r} 87 \\ 534 \overline{) 46800} \\ - 4272 \\ \hline 4080 \\ 3738 \end{array} \quad \leftarrow 7 \times 534 = 3738$$

STEP 4: Draw a line and subtract.

(repeat)

$$\begin{array}{r} 87 \\ 534 \overline{) 46800} \\ - 4272 \\ \hline 4080 \\ - 3738 \\ \hline 342 \end{array}$$

ANSWER: 87



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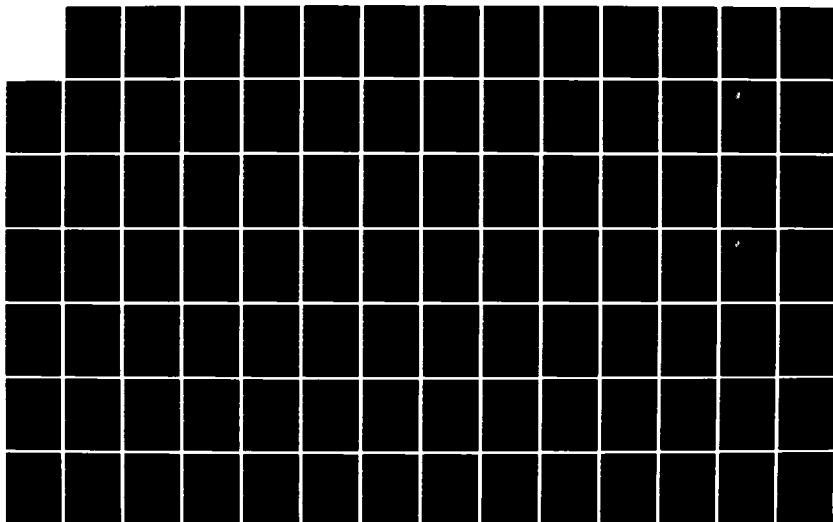
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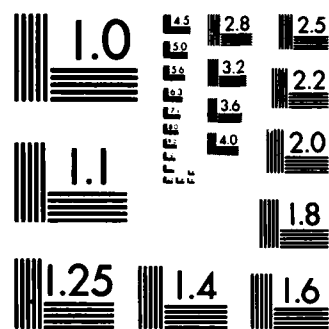
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2. Divide 4680 by 21.

STEP 1: Set up the problem for division.

divisor  $\longrightarrow$  21  $\overline{)4680}$   $\longleftarrow$  dividend

STEP 2: Divide the first digits of the dividend by the first digit of the divisor.

$4 \div 2 = 2$   
(estimate)

$\begin{array}{r} 2 \\ 21 \overline{)4680} \end{array}$

2 digits

STEP 3: Multiply your estimate by the divisor.

$\begin{array}{r} 2 \\ 21 \overline{)4680} \\ 42 \end{array}$   $\longleftarrow 2 \times 21 = 42$

STEP 4: Draw a line and subtract.

$$\begin{array}{r} 21 \overline{) 4680} \\ - 42 \phantom{0} \\ \hline 4 \phantom{0} \end{array}$$

STEP 5: Bring down the next digit from the dividend.

$$\begin{array}{r} 21 \overline{) 4680} \\ - 42 \phantom{0} \\ \hline 48 \end{array} \quad \longleftarrow \text{new dividend}$$

STEP 6: Repeat steps 2, 3, 4 and 5. Continue until you have filled all the places in the answer space.

STEP 2. Divide the first digits of the dividend by the (repeat) first digit of the divisor.

$$\begin{array}{r}
 22 \\
 21 \overline{) 4680} \\
 \underline{- 42} \phantom{0} \\
 48
 \end{array}$$

$4 \div 2 = 2$   
(estimate)

STEP 3: Multiply your estimate by the divisor.  
(repeat)

$$\begin{array}{r}
 22 \\
 21 \overline{) 4680} \\
 \underline{- 42} \phantom{0} \\
 48
 \end{array}$$

$2 \times 21 = 42$

STEP 4: Draw a line and subtract.

(repeat)

$$\begin{array}{r} 22 \\ 21 \overline{) 4680} \\ - 42 \\ \hline 48 \\ - 42 \\ \hline 6 \end{array}$$

STEP 5: Bring down the next digit from the dividend.

(repeat)

$$\begin{array}{r} 22 \\ 21 \overline{) 4680} \\ - 42 \\ \hline 48 \\ - 42 \\ \hline 60 \end{array} \quad \leftarrow \text{new dividend}$$

STEP 6: Repeat steps 2, 3, 4 and 5. Continue until you  
 (repeat) have filled all the places in the answer space.

STEP 2: Divide the first digits of the dividend by the first  
 (repeat) digit of the divisor.

$$\begin{array}{r} 222 \\ 21 \overline{) 4680} \\ \underline{- 42} \phantom{0} \\ 48 \phantom{0} \\ \underline{- 42} \phantom{0} \\ 60 \end{array}$$

You cannot use the estimate 3 because, when you multiply 3 by 21, you get a number too large to subtract.

STEP 3: Multiply your estimate by the divisor.  
 (repeat)

$$\begin{array}{r} 222 \\ 21 \overline{) 4680} \\ \underline{- 42} \phantom{0} \\ 48 \phantom{0} \\ \underline{- 42} \phantom{0} \\ 60 \phantom{0} \\ 42 \end{array} \quad \longleftarrow \quad 2 \times 21 = 42$$

STEP 4: Draw a line and subtract.

(repeat)

$$\begin{array}{r} 222 \\ 21 \overline{) 4680} \\ \underline{- 42} \phantom{0} \\ 48 \phantom{0} \\ \underline{- 42} \phantom{0} \\ 60 \phantom{0} \\ \underline{- 42} \\ 18 \end{array}$$

ANSWER: 222



3. Divide 468000 by 3685.

STEP 1: Set up the problem for division.

divisor    3685  $\overline{) 468000}$  ← dividend

STEP 2: Divide the first digits of the dividend by the first digit of the divisor.

$4 \div 3 = 1$   
(estimate)

$\begin{array}{r} 1 \\ 3685 \overline{) 468000} \end{array}$

4 digits

STEP 3: Multiply your estimate by the divisor.

$$\begin{array}{r} 1 \\ 3685 \overline{) 468000} \\ \underline{3685} \end{array} \quad \longleftarrow 1 \times 3685 = 3685$$

STEP 4: Draw a line and subtract.

$$\begin{array}{r} 1 \\ 3685 \overline{) 468000} \\ \underline{- 3685} \\ 995 \end{array}$$

STEP 5: Bring down the next digit from the dividend.

$$\begin{array}{r} 1 \\ 3685 \overline{) 468000} \\ \underline{- 3685} \\ 9950 \end{array} \quad \longleftarrow \text{new dividend}$$

STEP 6: Repeat steps 2,3,4, and 5. Continue until you have filled all the places in the answer space.

STEP 2: Divide the first digits of the dividend by the (repeat) first digit of the divisor.

$$\begin{array}{r} 1 \\ 3685 \overline{) 468000} \\ \underline{- 3685} \phantom{0} \\ 9950 \end{array}$$

You cannot use the estimate 3 because when you multiply 3 by 3685, you get a number too large to subtract.

STEP 3: Multiply your estimate by the divisor.  
(repeat)

$$\begin{array}{r} 12 \\ 3685 \overline{) 468000} \\ \underline{- 3685} \phantom{0} \\ 9950 \\ \underline{- 7370} \phantom{0} \end{array} \quad \leftarrow 2 \times 3685 = 7370$$

STEP 4: Draw a line and subtract.

(repeat)

$$\begin{array}{r} 12 \\ 3685 \overline{) 468000} \\ - 3685 \phantom{00} \\ \hline 9950 \phantom{0} \\ - 7370 \phantom{0} \\ \hline 2580 \end{array}$$

STEP 5: Bring down the next digit from the dividend.

(repeat)

$$\begin{array}{r} 12 \\ 3685 \overline{) 468000} \\ \underline{3685} \phantom{00} \\ 9950 \phantom{0} \\ \underline{7370} \phantom{0} \\ 25800 \end{array} \quad \begin{array}{l} | \\ | \\ | \\ \downarrow \end{array} \quad \begin{array}{l} \\ \\ \\ \text{new dividend} \end{array}$$

STEP 6: Repeat steps 2, 3, 4 and 5. Continue until you have filled all the places in the answer space.

STEP 2: Divide the first digits of the dividend by the first (repeat) digit of the divisor.

$$\begin{array}{r}
 127 \\
 3685 \overline{) 468000} \\
 \underline{- 3685} \phantom{00} \\
 9950 \\
 \underline{- 7370} \\
 25800
 \end{array}$$

Since you cannot divide 2 by 3, you have to use the first two digits of the dividend and divide 25 by 3. You cannot use the estimate 8 because when you multiply 8 by 3685, you get a number too large to subtract.

STEP 3: Multiply your estimate by the divisor.  
(repeat)

$$\begin{array}{r}
 127 \\
 3685 \overline{) 468000} \\
 \underline{3685} \phantom{00} \\
 9950 \\
 \underline{7370} \\
 25800 \\
 25795 \longleftarrow 7 \times 3685 = 25795
 \end{array}$$

STEP 4: Draw a line and subtract.

(repeat)

$$\begin{array}{r} 127 \\ 3685 \overline{) 468000} \\ - 3685 \phantom{00} \\ \hline 9950 \phantom{00} \\ - 7370 \phantom{00} \\ \hline 25800 \phantom{00} \\ - 25795 \phantom{00} \\ \hline 5 \end{array}$$

ANSWER: 127

4. Divide 4680000 by 483196.

STEP 1: Set up the problem for division.

divisor  $\rightarrow$  483196  $\overline{) 4680000}$   $\leftarrow$  dividend

STEP 2: Divide the first digits of the dividend by the first digit of the divisor.

$$\textcircled{4}83196 \overline{) \textcircled{4}680000}^9$$

If you used  $4 \div 4$  and tried the estimate 1, you found that when you multiplied 1 by 483196, you got a number too large to subtract from the first 6 digits of the dividend. You, therefore, had to use  $46 \div 4$ . The largest (1-digit) estimate you can use is 9.

STEP 3: Multiply your estimate by the divisor.

$$\begin{array}{r} 483196 \overline{) 4680000}^9 \\ 4348764 \leftarrow 9 \times 483196 = 4348764 \end{array}$$

STEP 4: Draw a line and subtract.

$$\begin{array}{r} 483196 \overline{) 4680000} \\ \underline{- 4348764} \\ 331236 \end{array}$$

ANSWER: 9



5. Divide 468000 by 665.

STEP 1: Set up the problem for division.

divisor  $\longrightarrow$  665  $\overline{)468000}$   $\longleftarrow$  dividend

STEP 2: Divide the first digits of the dividend by the first digit of the divisor.

$46 \div 6 = 7$   
(estimate)

$\begin{array}{r} 7 \\ 665 \overline{)468000} \end{array}$

3 digits  $\longleftarrow$   $\begin{array}{c} \textcircled{665} \\ \uparrow \end{array}$   $\begin{array}{c} \textcircled{468000} \\ \uparrow \end{array}$  4 digits

You cannot use  
 $4 \div 6$

STEP 3: Multiply your estimate by the divisor.

$\begin{array}{r} 7 \\ 665 \overline{)468000} \end{array}$

4655  $\longleftarrow$   $7 \times 665 = 4655$

STEP 4: Draw a line and subtract.

$$\begin{array}{r} 665 \overline{) 468000} \\ - 4655 \\ \hline 25 \end{array}$$

STEP 5: Bring down the next digit from the dividend.

$$\begin{array}{r} 665 \overline{) 468000} \\ - 4655 \\ \hline 250 \end{array} \quad \leftarrow \text{new dividend}$$

Here the new dividend is smaller than the divisor.  
Remember that for each digit you bring down, you must  
put a digit in the answer space above the digit  
you brought down. Therefore, here you must put a  
zero in the answer space.

Then bring down the next digit from the dividend.

$$\begin{array}{r} 665 \overline{) 468000} \\ - 4655 \\ \hline 2500 \end{array} \quad \leftarrow \text{new dividend}$$

STEP 6: Repeat steps 2, 3, 4 and 5. Continue until you have filled all the places in the answer space.

STEP 2: Divide the first digits of the dividend by the (repeat) first digit of the divisor.

$$\begin{array}{r} 703 \\ 665 \overline{) 468000} \\ - 4655 \\ \hline 2500 \end{array}$$

You cannot use the estimate 4 because when you multiply 4 by 665, you get a number too large to subtract.

STEP 3: Multiply your estimate by the divisor.  
(repeat)

$$\begin{array}{r} 703 \\ 665 \overline{) 468000} \\ - 4655 \\ \hline 2500 \\ 1995 \longleftarrow 3 \times 665 = 1995 \end{array}$$

STEP 4: Draw a line and subtract.

(repeat)

$$\begin{array}{r} 703 \\ 665 \overline{) 469000} \\ - 4655 \\ \hline 2500 \\ - 1995 \\ \hline 505 \end{array}$$

ANSWER: 703

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# ANSWER KEY FOR REMEDIATION TEST D-11

This answer key contains the correct responses for Remediation Test D-11. Each problem is worth one point. Students must get 4 out of 5 total points to pass this test.

1. 234
2. 137
3. 80
4. 107
5. 15

ANSWER KEY FOR LESSON TEST D-11

This answer key contains the correct responses for Lesson Test D-11. Each problem is worth one point. Students must get 4 out of 5 total points to pass this test.

1. 156
2. 88
3. 82
4. 107
5. 14



## REMEDIATION TEST FOR D-11

You will need some paper and a pencil to do this Remediation Test. It contains five problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 4 out of 5 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

For each of the following, stop the division when all the digits of the dividend have been used. You do not need to write the remainder as part of the answer.

1. Divide 4680 by 20.
2. Divide 46800 by 341.
3. Divide 468000 by 5802.
4. Divide 4680000 by 43345.
5. Divide 4680000 by 302311.

# LESSON TEST FOR D-11

You will need some paper and a pencil to do this Lesson Test. It contains five problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 4 out of 5 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

For each of the following, stop the division when all the digits of the dividend have been used. You do not need to write the remainder as part of the answer.

1. Divide 4680 by 30.
2. Divide 46800 by 531.
3. Divide 468000 by 5701.
4. Divide 4680000 by 43345.
5. Divide 4680000 by 320423.



**FBSEP**

# **RADIO TELETYPE OPERATOR**

**MOS 05C10**

**STUDENT GUIDE**

**05C FBSEP LESSON D-12**

**ROUNDING-OFF A NUMBER CONTAINING  
TWO DECIMAL PLACES TO THE NEAREST TENTH**

**PREREQUISITE: None**

**MATERIALS REQUIRED: None**

**TYPE OF LESSON: Self paced**

## STUDENT GUIDE

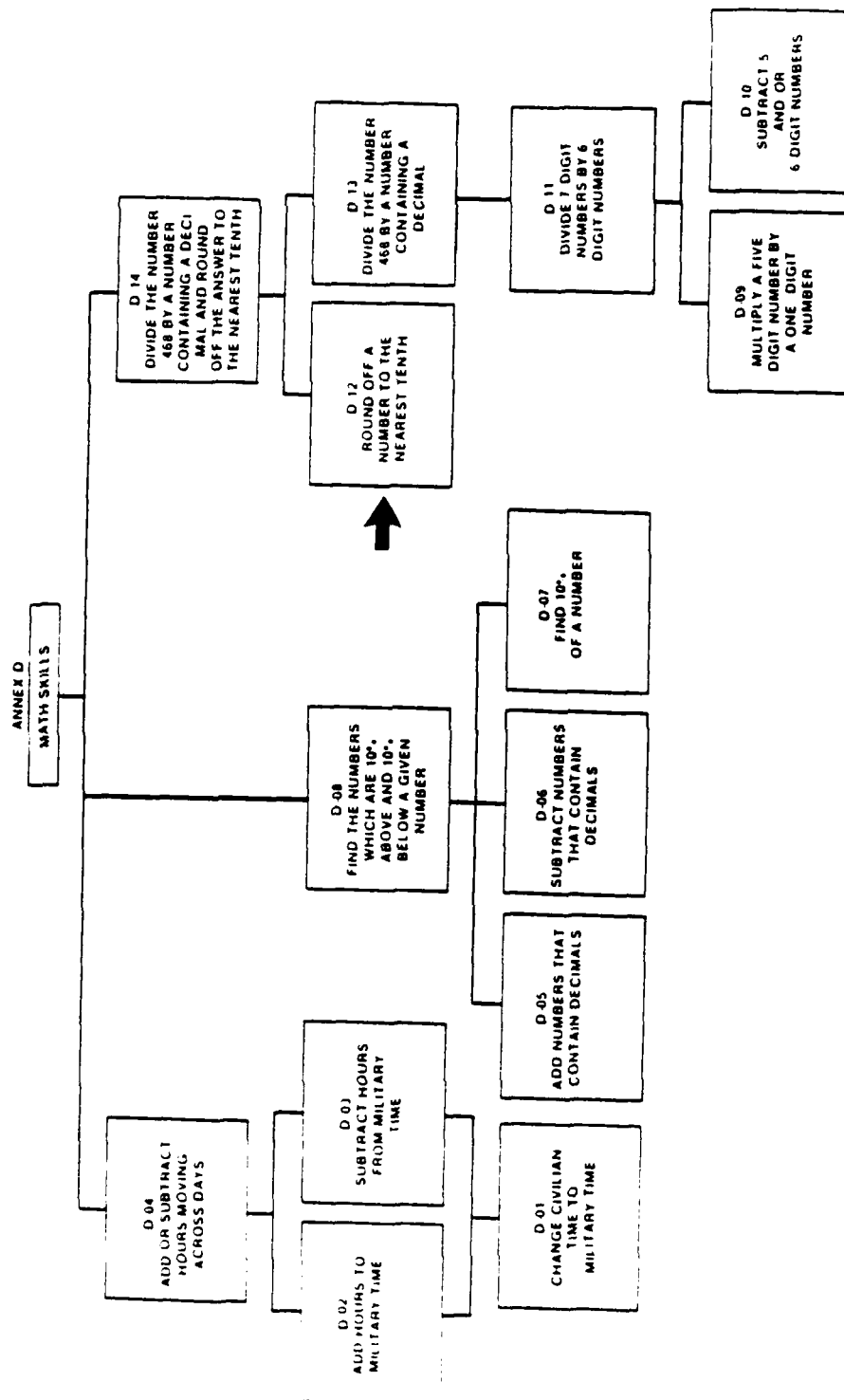
05C FBSEP LESSON D-12

### ROUNDING-OFF A NUMBER CONTAINING TWO DECIMAL PLACES TO THE NEAREST TENTH

#### INTRODUCTION

In this lesson you will learn to round-off numbers that contain two digits to the right of the decimal point to the nearest tenth. Look at the lesson map on the following page and note the arrow pointing to this lesson. As you can see, this lesson is necessary before you do Lesson D-14.

This Student Guide includes a presentation of the steps to achieve the objective of the lesson, Practice and Remediation Exercises, Answers and Explanations.



OBJECTIVE: When you finish this lesson, you will be able to round-off a number to the nearest tenth.

To round-off a number that has two digits to the right of the decimal point to the nearest tenth, you should:

1. Locate the tenth's place after the decimal point.
2. Decide if the digit to the right of the tenth's place digit is less than 5, equal to 5, or greater than 5.
3. Follow these rules:
  - a. If the digit is less than 5, drop the digit to the right of the tenth's place.
  - b. If the digit is equal to 5, drop the digit to the right of the tenth's place, and add 1 to the digit in the tenth's place.
  - c. If the digit is greater than 5, drop the digit to the right of the tenth's place, and add 1 to the digit in the tenth's place.

### PRESENTATION

Follow the steps of the three examples which show you how to round-off a number containing two decimal places, to the nearest tenth.

EXAMPLE 1: Round-off .23 to the nearest tenth.

STEP 1: Locate the tenth's place after the decimal point.

The first digit after the decimal point is in the tenth's place.

The digit 2 is in the tenth's place.

STEP 2: Decide if the digit to the right of the tenth's place is less than 5, equal to 5, or greater than 5.

The digit 3 to the right of tenth's place is less than 5. Look at STEP 3a.

STEP 3a: If the digit is less than 5, drop the digit to the right of the tenth's place.

Drop the digit 3 because it is less than 5.

$$.2\cancel{3} = .2$$



EXAMPLE 2: Round-off 1.75 to the nearest tenth.

STEP 1: Locate the tenth's place after the decimal point.

The tenth's place is the first digit after the decimal point.

The digit 7 is in the tenth's place.

STEP 2: Decide if the digit to the right of the tenth's place is less than 5, equal to 5, or greater than 5.

The digit 5 is equal to 5, so follow STEP 3b.

STEP 3b: If the digit is equal to 5, drop the digit to the right of the tenth's place and add 1 to the digit in the tenth's place.

The digit 5 is equal to 5, so drop 5 and add 1 to 7.

$$1.75 = 1.8$$

Note that the digits before the decimal point did not change.

EXAMPLE 3: Round-off .87 to the nearest tenth.

STEP 1: Locate the tenth's place after the decimal point.

The tenth's place is the first digit after the decimal point.

The digit 8 is in the tenth's place.

STEP 2: Decide if the digit to the right of the tenth's place is less than 5, equal to 5, or greater than 5.

The digit 7 to the right of the tenth's place is greater than 5. Go to STEP 3c.

STEP 3c: If the digit is greater than 5, drop the digit to the right of the tenth's place and add 1 to the digit in the tenth's place.

The digit 7 is greater than 5, so drop 7, and add 1 to 8.

$$.87 = .9$$

### SUMMARY AND PRACTICE

To round-off a number containing two digits to the right of the decimal point to the nearest tenth, you should;

1. Locate the tenth's place after the decimal point.
2. Decide if the digit to the right of the tenth's place digit is less than 5, equal to 5 or greater than 5.
3. Follow these rules:
  - a. If the digit is less than 5, drop the digit to the right of the tenth's place.
  - b. If the digit is equal to 5, drop the digit to the right of the tenth's place and add 1 to the digit in the tenth's place.
  - c. If the digit is greater than 5, drop the digit to the right of the tenth's place and add 1 to the digit in the tenth's place.

There is a Practice Exercise on the following page along with Answers and Explanations.

When you have finished the Practice Exercise ask your learning supervisor for the Lesson Test.

PRACTICE EXERCISE

Round-off the following numbers to the nearest tenth.

1. 1.06
2. 3.33
3. .25
4. 8.15
5. .68
6. 9.42
7. 5.34
8. 2.17

ANSWERS TO PRACTICE EXERCISE

1. 1.1
2. 3.3
3. .3
4. 8.2
5. .7
6. 9.4
7. 5.3
8. 2.2

EXPLANATIONS FOR PRACTICE EXERCISE

1. Round-off 1.06 to the nearest tenth.

STEP 1: 0 is in the tenth's place.

STEP 2: 6 is greater than 5

STEP 3c: Drop 6, add 1 to 0

ANSWER: 1.1

2. Round-off 3.33 to the nearest tenth.

STEP 1: 3 is in the tenth's place.

STEP 2: 3 is less than 5

STEP 3a: Drop 3

ANSWER: 3.3

3. Round-off .25 to the nearest tenth.

STEP 1: 2 is in the tenth's place.

STEP 2: 5 is equal to 5

STEP 3b: Drop 5, add 1 to 2

ANSWER: .3

4. Round-off 8.15 to the nearest tenth.

STEP 1: 1 is in the tenth's place.

STEP 2: 5 is equal to 5

STEP 3b: Drop 5, add 1 to 1

ANSWER: 8.2

5. Round-off .68 to the nearest tenth.

STEP 1: 6 is in the tenth's place.

STEP 2: 8 is greater than 5

STEP 3c: Drop 8, add 1 to 6

ANSWER: .7

6. Round-off 9.42 to the nearest tenth.

STEP 1: 4 is in the tenth's place.

STEP 2: 2 is less than 5

STEP 3a: Drop 2

ANSWER: 9.4

7. Round-off 5.34 to the nearest tenth.

STEP 1: 3 is in the tenth's place.

STEP 2: 4 is less than 5

STEP 3a: Drop 4

ANSWER: 5.3

8. Round-off 2.17 to the nearest tenth.

STEP 1: 1 is in the tenth's place.

STEP 2: 7 is greater than 5

STEP 3c: Drop 7, add 1 to 1

ANSWER: 2.2



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### REMEDIATION

Before doing the Remediation Exercise, go over the steps for rounding-off a number with two decimal places to the nearest tenth.

STEP 1: Locate the tenth's place after the decimal point.

STEP 2: Decide if the digit to the right of the tenth's place digit is less than 5, equal to 5, or greater than 5.

STEP 3: Follow these rules:

- a. If the digit is less than 5, drop the digit to the right of the tenth's place.
- b. If the digit is equal to 5, drop the digit to the right of the tenth's place, and add 1 to the digit in the tenth's place.
- c. If the digit is greater than 5, drop the digit to the right of the tenth's place, and add 1 to the digit in the tenth's place.

Answers and Explanations for the Remediation Exercise  
follow the exercise.

For additional help, see your learning supervisor before  
obtaining the Remediation Test.

REMEDIATION EXERCISE

Round-off to the nearest tenth.

1. .47
2. .85
3. .89
4. 4.21
5. 1.65
6. .80

ANSWERS TO REMEDIATION EXERCISE

1. .5
2. .9
3. .9
4. 4.2
5. 1.7
6. .8

EXPLANATIONS FOR REMEDIATION EXERCISE

1. Round-off .47 to the nearest tenth.

STEP 1: 4 is in the tenth's place.

STEP 2: 7 is greater than 5

STEP 3c: Drop 7, add 1 to 4

ANSWER: .5

2. Round-off .85 to the nearest tenth.

STEP 1: 8 is in the tenth's place.

STEP 2: 5 is equal to 5

STEP 3b: Drop 5, add 1 to 8

ANSWER: .9

3. Round-off .89 to the nearest tenth.

STEP 1: 8 is in the tenth's place.

STEP 2: 9 is greater than 5

STEP 3c: Drop 9, add 1 to 8

ANSWER: .9



4. Round-off 4.21 to the nearest tenth.

STEP 1: 2 is in the tenth's place.

STEP 2: 1 is less than 5

STEP 3a: Drop 1

ANSWER: 4.2

5. Round-off 1.65 to the nearest tenth.

STEP 1: 6 is in the tenth's place.

STEP 2: 5 is equal to 5

STEP 3b: Drop 5, add 1 to 6

ANSWER: 1.7

6. Round-off .80 to the nearest tenth.

STEP 1: 8 is in the tenth's place.

STEP 2: 0 is less than 5

STEP 3a: Drop 0

ANSWER: .8

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# ANSWER KEY FOR REMEDIATION TEST D-12

This answer key contains the correct responses for Remediation Test D-12. Each problem is worth one point. Students must get 5 out of 6 total points to pass this test.

1. .1
2. .9
3. 1.8
4. 2.1
5. 1.8
6. .7

# ANSWER KEY FOR LESSON TEST D-12

This answer key contains the correct responses for Lesson Test D-12. Each problem is worth one point. Students must get 5 out of 6 total points to pass this test.

1. 3.1
2. 1.3
3. .6
4. 2.2
5. .2
6. 7.7

## REMEDIATION TEST FOR D-12

You will need some paper and a pencil to do this Remediation Test. It contains six problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 5 out of 6 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST. Round-off the following numbers to the nearest tenth.

1. .07
2. .92
3. 1.75
4. 2.05
5. 1.81
6. .68

## LESSON TEST FOR D-12

You will need some paper and a pencil to do this Lesson Test. It contains six problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 5 out of 6 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST. Round-off the following numbers to the nearest tenth.

1. 3.06
2. 1.25
3. .63
4. 2.22
5. .15
6. 7.67



FBSEP

# RADIO TELETYPE OPERATOR

MOS 05C10

STUDENT GUIDE

05C FBSEP LESSON D-13

DIVIDING 468 BY A NUMBER CONTAINING A DECIMAL

PREREQUISITE: None

MATERIALS REQUIRED: None

TYPE OF LESSON: Self paced

STUDENT GUIDE

O5C FBSEP LESSON D-13

DIVIDING 468 BY A NUMBER CONTAINING A DECIMAL

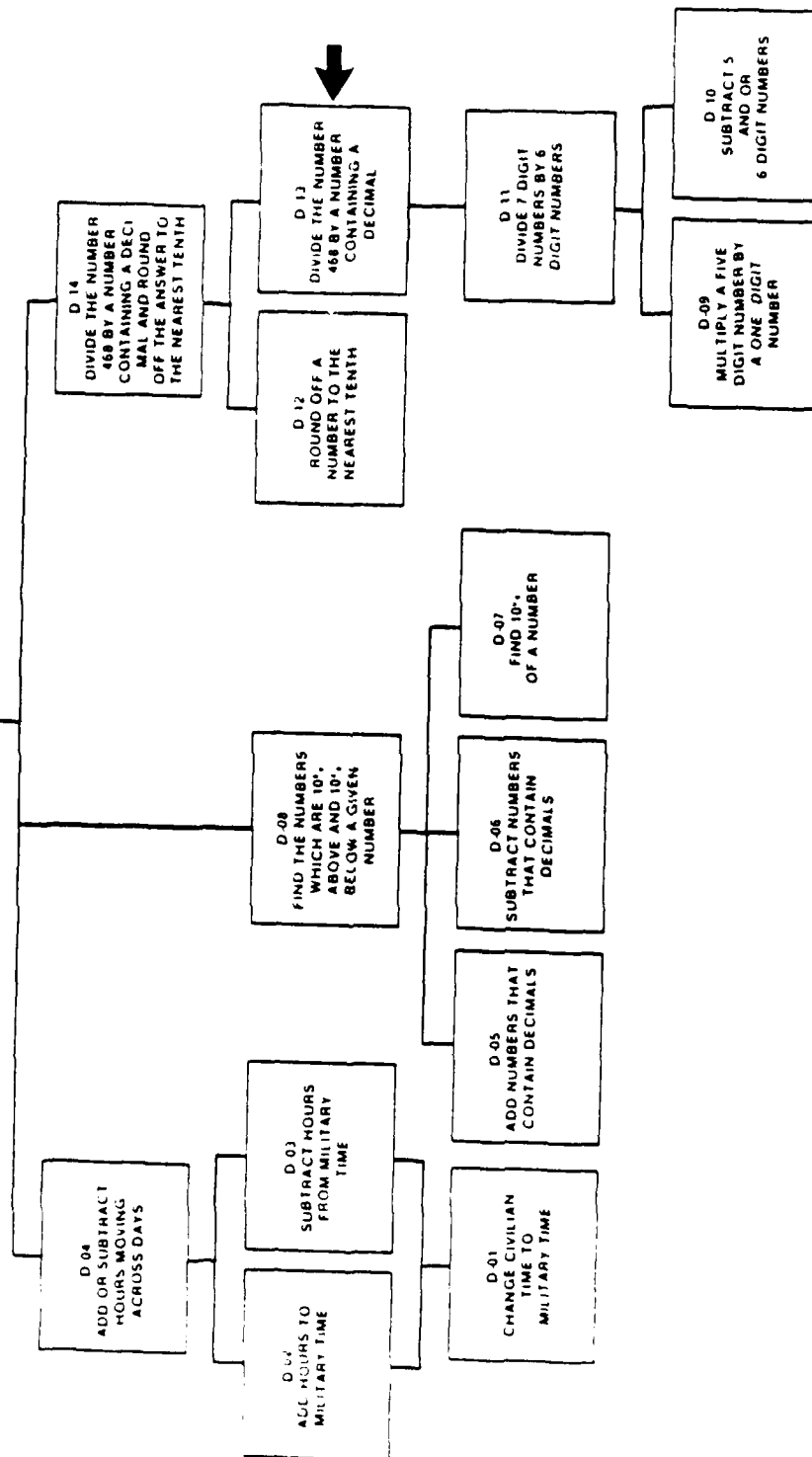
INTRODUCTION

When you are on the job, you will be working with frequencies. Frequencies contain decimals. This lesson will explain how to divide the number 468 by a number containing a decimal. It will be necessary to know this when you have to determine the length of an antenna.

Look at the Annex D map which follows. The lesson you are now taking is marked with an arrow.



ANNEX D  
MATH SKILLS



OBJECTIVE: When you finish this lesson, you will be able to divide the number 468 by a number that contains a decimal.

To divide 468 by a number that contains a decimal, you should:

1. Set up the problem for division.
2. Move the decimal point to the end of the divisor.
3. Put a decimal point after 468 and move it the same number of places.
4. Put a decimal point in the answer space directly above the decimal point in the dividend.
5. Divide in the same way you would divide whole numbers.

### PRESENTATION

Suppose you were working with a frequency of 3.58. In order to figure out the length of the antenna, you have to divide 468 by 3.58. Example 1 will show you what steps you need to follow to get the right answer.

EXAMPLE 1: Divide 468 by 3.58

STEP 1: Set up the problem for division.

Write the number you are dividing (468) under the division sign. This is called the dividend. Write the number you are dividing by (the number containing the decimal) outside the division sign. This is called the divisor.

divisor  $\longrightarrow$  3.58  $\overline{)468}$   $\longleftarrow$  dividend

STEP 2: Move the decimal point to the end of the divisor.

3x58.  $\overline{)468}$

STEP 3: Put a decimal point after 468 and move it the same number of places.

moved two places  $\longrightarrow$   $3 \overline{) 28.468}$   $\longleftarrow$  put decimal point here

Note: Putting a decimal point after a whole number does not change the value of a number.

Now count the number of places you moved the decimal point in the divisor. Since you moved it two places, move the decimal point in the dividend two places. You do this by adding zeros.

$3 \overline{) 28.46800}$

STEP 4: Put a decimal point in the answer space directly above the decimal point in the dividend.

$$328.\overline{)46800.}$$

STEP 5: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 142. \\ 328.\overline{)46800.} \\ \underline{328} \phantom{00} \\ 1400 \phantom{0} \\ \underline{1312} \phantom{0} \\ 880 \phantom{0} \\ \underline{656} \phantom{0} \\ 224 \end{array}$$

Note: If you do not know how to do Step 5, ask your learning supervisor for Lesson D-11, dividing 7-digit Numbers by 6-digit Numbers.

ANSWER: 142

You have a remainder of 224, but in this lesson you don't need to include the remainders in your answers.

Notice that the decimal point after 142 is not written in the answer. If there are any digits after the decimal point, you must include the decimal point. However, if there are no digits after the decimal point, the decimal point is usually not written. It means the number 142 is a whole number.

EXAMPLE 2: Divide 468 by 2.267

STEP 1: Set up the problem for division.

divisor  $\rightarrow$  2.267  $\overline{)468}$   $\leftarrow$  dividend

STEP 2: Move the decimal point to the end of the divisor.

$2\cancel{x}267.\overline{)468}$

STEP 3: Put a decimal point after 468 and move it the same number of places.

Since you moved the decimal point in the divisor three places, move the decimal point in the dividend three places.

$2\cancel{x}267.\overline{)468\cancel{x}000.}$

STEP 4: Put a decimal point in the answer space directly above the decimal point in the dividend.

$$2267 \overline{) 468000.}$$

STEP 5: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 206. \\ 2267 \overline{) 468000.} \\ \underline{4534} \phantom{00} \\ 14600 \\ \underline{13602} \\ 998 \end{array}$$

ANSWER: 206



EXAMPLE 3: Divide 468 by 19.1

STEP 1: Set up the problem for division.

divisor  $\rightarrow$  19.1  $\overline{)468}$   $\leftarrow$  dividend

STEP 2: Move the decimal point to the end of the divisor.

19x1.  $\overline{)468}$

STEP 3: Put a decimal point after 468 and move it the same number of places.

Since you moved the decimal point in the divisor one place, move the decimal point in the dividend one place.

19x1.  $\overline{)468x0.}$

STEP 4: Put a decimal point in the answer space directly above the decimal point in the dividend.

$$191 \overline{) 4680.}$$

STEP 5: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 24. \\ 191 \overline{) 4680.} \\ \underline{382} \phantom{0} \\ 860 \\ \underline{764} \\ 96 \end{array}$$

ANSWER: 24

EXAMPLE 4: Divide 468 by 21.4163

STEP 1: Set up the problem for division.

divisor  $\rightarrow$  21.4163  $\overline{)468}$   $\leftarrow$  dividend

STEP 2: Move the decimal point to the end of the divisor.

21~~x~~4163.  $\overline{)468}$

STEP 3: Put a decimal point after 468 and move it the same number of places.

Since you moved the decimal point in the divisor four places, move the decimal point in the dividend four places.

21~~x~~4163.  $\overline{)468~~x~~0000.}$

STEP 4: Put a decimal point in the answer space directly above the decimal point in the dividend.

$$214163 \overline{) 4680000.}$$

STEP 5: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 21. \\ 214163 \overline{) 4680000.} \\ \underline{428326} \phantom{0} \\ 396740 \\ \underline{214163} \phantom{0} \\ 182577 \end{array}$$

ANSWER: 21

### SUMMARY AND PRACTICE

You will be given some examples to work out on your own. Before you begin, review the steps you need to follow in order to divide 468 by a number that contains a decimal.

1. Set the problem up for division.
2. Move the decimal point to the end of the divisor.
3. Put a decimal point after 468 and move it the same number of places.
4. Put a decimal point in the answer space directly above the decimal point in the dividend.
5. Divide in the same way you would divide whole numbers.

Now try the Practice Exercise. Check your answers with the Answers to Practice Exercise. If you get any wrong, read the Explanations for the Practice Exercise. If you don't understand the explanations, ask your Learning supervisor for help. When you feel that you are ready, ask for the Lesson Test.

PRACTICE EXERCISE

1. Divide 468 by 1.95
2. Divide 468 by 31.9
3. Divide 468 by 14.345
4. Divide 468 by 21.2054

ANSWERS TO PRACTICE EXERCISE

1. 240
2. 14
3. 32
4. 22

EXPLANATIONS FOR PRACTICE EXERCISE

1. Divide 468 by 1.95

STEP 1: Set up the problem for division.

divisor  $\rightarrow$  1.95  $\overline{)468}$   $\leftarrow$  dividend

Did you remember to write the number you are dividing under the division sign, and the number you are dividing by outside the sign?

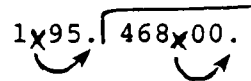
Note. It is not necessary to write the words dividend and divisor. They are written in these examples as a reminder to you.

STEP 2: Move the decimal point to the end of the divisor.

1x95.  $\overline{)468}$



STEP 3: Put a decimal point after 468 and move it the same number of places.

$$1\cancel{x}95.\overline{)468\cancel{x}00.}$$


Since you moved the decimal point two places in the divisor, you must move it two places in the dividend. You can do this by adding zeros.

STEP 4: Put a decimal point in the answer space directly above the decimal point in the dividend.

$$195.\overline{)4680.}$$

Did you put the decimal point in the right place?

STEP 5: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 240. \\ 195 \overline{) 46800.} \\ \underline{390} \phantom{00} \\ 780 \phantom{00} \\ \underline{780} \phantom{00} \\ 00 \end{array}$$

ANSWER: 240

(Remember that it is not necessary to include the decimal point in the answer when there are no digits after the decimal point. The numbers before the decimal point are whole numbers.)

2. Divide 468 by 31.9

STEP 1: Set up the problem for division.

divisor  $\longrightarrow$  31.9  $\overline{)468}$   $\longleftarrow$  dividend

STEP 2: Move the decimal point to the end of the divisor.

31~~x~~9. $\overline{)468}$

STEP 3: Put a decimal point after 468 and move it the same number of places.

31~~x~~9. $\overline{)468}$ ~~x~~0.

Since you moved the decimal one place in the divisor, you must move it one place in the dividend.

STEP 4: Put a decimal point in the answer space directly above the decimal point in the dividend.

$$319.\overline{)4680.}$$

STEP 5: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 14. \\ 319.\overline{)4680.} \\ \underline{319} \phantom{00} \\ 1490 \\ \underline{1276} \\ 214 \end{array}$$

ANSWER: 14

(There is a remainder of 214, but in this lesson you do not need to include the remainders in your answers.)

3. Divide 468 by 14.345

STEP 1: Set up the problem for division.

divisor  $\rightarrow$  14.345  $\overline{)468}$   $\leftarrow$  dividend

STEP 2: Move the decimal point to the end of the divisor.

14~~x~~345. $\overline{)468}$

STEP 3: Put a decimal point after 468 and move it the same number of places.

14~~x~~345. $\overline{)468\del{x}000.}$

Since you moved the decimal three places in the divisor, you must move it three places in the dividend.

STEP 4: Put a decimal point in the answer space directly above the decimal point in the dividend.

$$14345 \overline{) 468000.}$$

Did you put the decimal point in the right place?

STEP 5: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 32. \\ 14345 \overline{) 468000.} \\ \underline{43035} \phantom{0} \\ 37650 \\ \underline{28690} \\ 8960 \end{array}$$

ANSWER: 32

4. Divide 468 by 21.2054

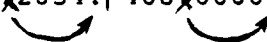
STEP 1: Set up the problem for division.

divisor  $\longrightarrow$  21.2054  $\overline{)468}$   $\longleftarrow$  dividend

STEP 2: Move the decimal point to the end of the divisor.

21~~x~~2054. $\overline{)468}$   


STEP 3: Put a decimal point after 468 and move it the same number of places.

21~~x~~2054. $\overline{)468~~x~~0000.}$   


Since you moved the decimal point four places in the divisor, you must move it four places in the dividend. Remember that you do this by adding four zeros.

STEP 4: Put a decimal point in the answer space directly above the decimal point in the dividend.

$$212054 \overline{) 4680000.}$$

STEP 5: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 22. \\ 212054 \overline{) 4680000.} \\ \underline{424108} \phantom{.} \\ 438920 \\ \underline{424108} \\ 14812 \end{array}$$

ANSWER: 22



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### REMEDIATION

You will be given some additional examples to work on. Before you begin, take time to review the steps you need to follow in order to divide 468 by a number containing a decimal.

1. Set up the problem for division.
2. Move the decimal point to the end of the divisor.
3. Put a decimal point after 468 and move it the same number of places.
4. Put a decimal point in the answer space directly above the decimal point in the dividend.
5. Divide in the same way you would divide whole numbers.

Now begin to work on the Remediation Exercise. When you have finished, check your answers with the Answers to Remediation Exercise. If you get any wrong, read the Explanations for Remediation Exercise carefully and try to find your mistake. If you don't understand the explanations, ask your learning supervisor to help you. After the exercise, you will be retested.

REMEDIATION EXERCISE

1. Divide 468 by 1.95
2. Divide 468 by 31.9
3. Divide 468 by 21.2054
4. Divide 468 by 14.345

ANSWERS TO REMEDIATION EXERCISE

1. 240
2. 14
3. 22
4. 32

EXPLANATIONS FOR REMEDIATION EXERCISE

1. Divide 468 by 1.95

STEP 1: Set up the problem for division.

divisor  $\longrightarrow$  1.95  $\overline{) 468}$   $\longleftarrow$  dividend

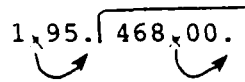
Did you remember to write the number you are dividing under the division sign and the number you are dividing by outside the sign?

Note: It is not necessary to write the words dividend and divisor. They are written in these examples as a reminder to you.

STEP 2: Move the decimal point to the end of the divisor.

1x95.  $\overline{) 468}$

STEP 3: Put a decimal point after 468 and move it the same number of places.

$$1 \overline{) 95.46800.}$$


Since you moved the decimal point two places in the divisor, you must move it two places in the dividend. You can do this by adding zeros.

STEP 4: Put a decimal point in the answer space directly above the decimal point in the dividend.

$$195 \overline{) 4680.}$$

Did you put the decimal point in the right place?

STEP 5. Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 240. \\ 195 \overline{) 46800.} \\ \underline{390} \phantom{00} \\ 780 \phantom{00} \\ \underline{780} \phantom{00} \\ 00 \end{array}$$

ANSWER: 240

(Remember that it is not necessary to include the decimal point in the answer when there are no digits after the decimal point. The numbers before the decimal point are whole numbers.)



2. Divide 468 by 31.9

STEP 1: Set up the problem for division.

divisor  $\rightarrow$  31.9  $\overline{)468}$   $\leftarrow$  dividend

STEP 2: Move the decimal point to the end of the divisor.

31~~x~~9. $\overline{)468}$

STEP 3: Put a decimal point after 468 and move it the same number of places.

31~~x~~9. $\overline{)468\del{x}0.}$

Since you moved the decimal one place in the divisor, you must move it one place in the dividend.

STEP 4: Put a decimal point in the answer space directly above the decimal point in the dividend.

$$319 \overline{) 4680.}$$

STEP 5: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 14. \\ 319 \overline{) 4680.} \\ \underline{319} \phantom{0} \\ 1490 \\ \underline{1276} \\ 214 \end{array}$$

ANSWER: 14

(There is a remainder of 214 but in this lesson you do not need to include the remainders in your answers.)

3. Divide 468 by 21.2054

STEP 1: Set up the problem for division.

divisor  $\rightarrow$  21.2054  $\overline{)468}$   $\leftarrow$  dividend

STEP 2: Move the decimal point to the end of the divisor.

21~~x~~2054. $\overline{)468}$

STEP 3: Put a decimal point after 468 and move it the same number of places.

21~~x~~2054. $\overline{)468~~x~~0000.}$

Since you moved the decimal point four places in the divisor, you must move it four places in the dividend. Remember that you do this by adding four zeros.

STEP 4: Put a decimal point in the answer space directly above the decimal point in the dividend.

$$212054 \overline{) 4680000.}$$

STEP 5: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 22. \\ 212054 \overline{) 4680000.} \\ \underline{424108} \phantom{0} \\ 438920 \\ \underline{424108} \\ 14812 \end{array}$$

ANSWER: 22

4. Divide 468 by 14.345

STEP 1: Set up the problem for division.

divisor  $\longrightarrow$  14.345  $\overline{)468}$   $\longleftarrow$  dividend

STEP 2: Move the decimal point to the end of the divisor.

14 $\times$ 345. $\overline{)468}$

STEP 3: Put a decimal point after 468 and move it the same number of places.

14 $\times$ 345. $\overline{)468\times000.}$

Since you moved the decimal three places in the divisor, you must move it three places in the dividend.

STEP 4: Put a decimal point in the answer space directly above the decimal point in the dividend.

$$14345 \overline{) 468000.}$$

Did you put the decimal point in the right place?

STEP 5: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 32. \\ 14345 \overline{) 468000.} \\ \underline{43035} \phantom{0} \\ 37650 \\ \underline{28690} \\ 8960 \end{array}$$

ANSWER: 32

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ANSWER KEY FOR LESSON TEST D-13

This answer key contains the correct responses for Lesson Test D-13. Each problem is worth one point. Students must get 4 out of 5 total points to pass this test.

1. 374
2. 21
3. 21
4. 34
5. 13

ANSWER KEY FOR REMEDIATION TEST D-13

This answer key contains the correct responses for Remediation Test D-13. Each problem is worth one point. Students must get 4 out of 5 total points to pass this test.

1. 346
2. 15
3. 21
4. 21
5. 28

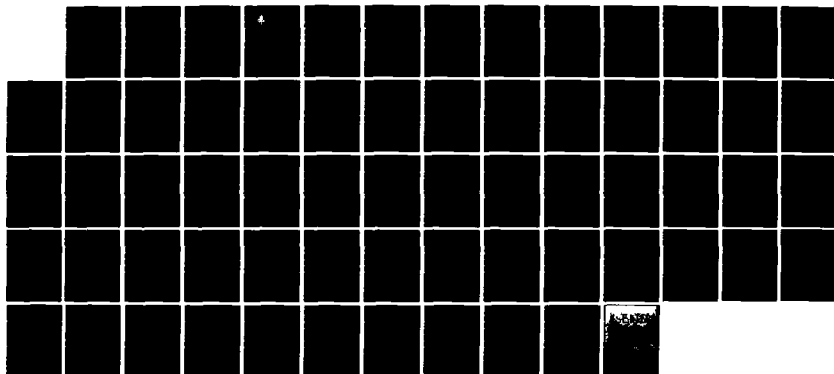
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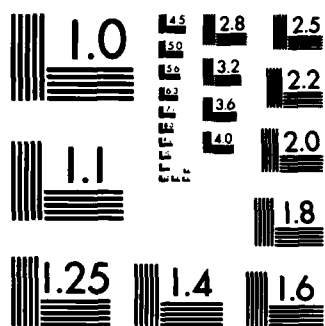
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NATIONAL BUREAU OF STANDARDS-1963-A

# REMEDIATION TEST FOR D-13

You will need some paper and a pencil to do this Remediation Test. It contains five problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 4 out of 5 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

1. Divide 468 by 1.35
2. Divide 468 by 31.16
3. Divide 468 by 21.395
4. Divide 468 by 21.8865
5. Divide 468 by 16.439

# LESSON TEST FOR D-13

You will need some paper and a pencil to do this Lesson Test. It contains five problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 4 out of 5 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

1. Divide 468 by 1.25
2. Divide 468 by 22.14
3. Divide 468 by 21.328
4. Divide 468 by 13.5021
5. Divide 468 by 34.265



**FBSEP**

# **RADIO TELETYPE OPERATOR**

**MOS 05C10**

**STUDENT GUIDE**

**05C FBSEP LESSON D-14**

**DIVIDING 468 BY A NUMBER**

**CONTAINING A DECIMAL AND ROUNDING-OFF**

**THE ANSWER TO THE NEAREST TENTH**

**PREREQUISITE: None**

**MATERIALS REQUIRED: None**

**TYPE OF LESSON: Self paced**

STUDENT GUIDE  
05C FBSEP LESSON D-14  
DIVIDING 468 BY A NUMBER  
CONTAINING A DECIMAL AND ROUNDING-OFF  
THE ANSWER TO THE NEAREST TENTH

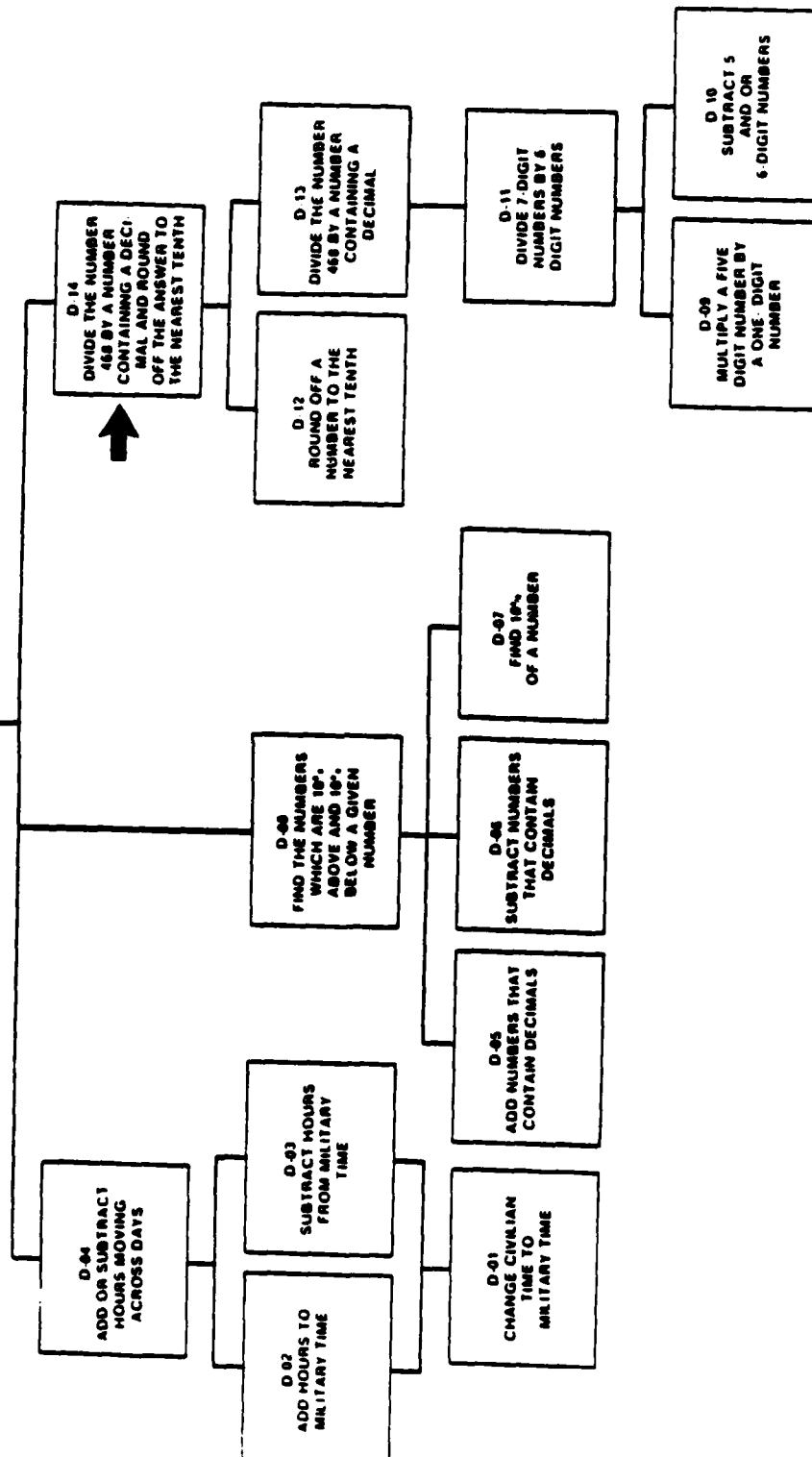
INTRODUCTION

This is the last lesson in the math module. In this lesson you will use all the multiplication, subtraction, and division skills you have learned in the other math lessons. This lesson will teach you how to divide 468 by a frequency. You will use this process in your training to determine the length of an antenna.

Look at the Annex D Map which follows. The lesson you are now taking is marked with an arrow.



ANNEX D  
MATH SKILLS



OBJECTIVE: When you finish this lesson, you will be able to divide 468 by a number containing a decimal and round-off the answer to the nearest tenth.

To divide by a number containing a decimal and round-off to the nearest tenth, you should:

1. Set up the problem for division.
2. Put the decimal points in the proper places.
3. Add two zeros after the decimal point in the dividend.
4. Divide in the same way you would divide whole numbers.
5. Round-off the answer to the nearest tenth.

## PRESENTATION

Look at the first example. It will show you the steps you need to follow to solve the problem.

EXAMPLE 1: Divide 468 by 2.1 and round-off the answer to the nearest tenth.

STEP 1: Set up the problem for division. Write the number you are dividing (468) under the division sign. This is called the dividend. Write the number you are dividing by (the number containing the decimal) outside the division sign. This is called the divisor.

divisor → 2.1  $\overline{) 468}$  ← dividend

STEP 2: Put the decimal points in the proper places. First move the decimal point in the divisor to the end of the number.

$$2.1. \overline{) 468}$$


Next put a decimal point after 468 and move it the same number of places you moved the decimal point in the divisor. Do this by adding zeros.

$$2 \times 1. \overline{) 468 \times 0.}$$


Next put a decimal point in the answer space directly above the decimal point in the dividend.

$$2 \times 1. \overline{) 468 \times 0.}$$

STEP 3: Add two zeros after the decimal point in the dividend. You are asked to round off the answer to to the nearest tenth. In order to do that, you must carry the division to one place beyond the tenths place. Therefore, you must add two zeros after the decimal point. Adding zeros after a decimal point does not change the value of a number.

$$21. \overline{) 4680.00}$$

STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r}
 222.85 \\
 21. \overline{) 4680.00} \\
 \underline{42} \phantom{00} \\
 48 \phantom{00} \\
 \underline{42} \phantom{00} \\
 60 \phantom{00} \\
 \underline{42} \phantom{00} \\
 180 \phantom{00} \\
 \underline{168} \phantom{00} \\
 120 \phantom{00} \\
 \underline{105} \phantom{00} \\
 15
 \end{array}$$

STEP 5: Round-off the answer to the nearest tenth. Since the digit to the right of the tenths place is equal to 5, drop that digit and add 1 to the digit in the tenths place.

222.85  $\longrightarrow$  222.9

ANSWER: 222.9

EXAMPLE 2: Divide 468 by 3.23 and round-off the answer to the nearest tenth.

STEP 1: Set up the problem for division.

divisor  $\rightarrow$  3.23  $\overline{) 468}$   $\leftarrow$  dividend

STEP 2: Put the decimal points in the proper places.

Since you have to move the decimal point in the divisor two places, move the decimal point in the dividend two places also. Don't forget to put a decimal point in the answer space!

$3.23. \overline{) 468.00.}$

STEP 3: Add two zeros after the decimal point in the dividend.

$323. \overline{) 46800.00}$

STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 144.89 \\ 323 \overline{) 46800.00} \\ \underline{323} \phantom{00} \\ 1450 \phantom{00} \\ \underline{1292} \phantom{00} \\ 1580 \phantom{00} \\ \underline{1292} \phantom{00} \\ 2880 \phantom{00} \\ \underline{2584} \phantom{00} \\ 2960 \phantom{00} \\ \underline{2907} \phantom{00} \\ 53 \end{array}$$

STEP 5: Round-off the answer to the nearest tenth. Since the digit to the right of the tenths place is more than 5, drop that digit and add 1 to the digit in the tenths place.

$$144.89 \longrightarrow 144.9$$

ANSWER: 144.9



EXAMPLE 3: Divide 468 by 25.980 and round-off the answer to the nearest tenth.

STEP 1: Set up the problem for division.

divisor → 25.980 | 468 ← dividend

STEP 2: Put the decimal points in the proper places.

Since you must move the decimal point in the divisor three places, move the decimal point in the dividend three places, also. Remember to put a decimal point in the answer space!

25,980. | 468.000.

STEP 3: Add two zeros after the decimal point in the dividend.

25980. | 468000.00

STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 18.01 \\ 25980 \overline{) 468000.00} \\ \underline{25980} \phantom{00} \\ 208200 \phantom{00} \\ \underline{207840} \phantom{00} \\ 36000 \phantom{00} \\ \underline{25980} \phantom{00} \\ 10020 \phantom{00} \end{array}$$

STEP 5: Round-off the answer to the nearest tenth. Since the digit to the right of the tenths place is less than 5, drop that digit.

$$18.01 \longrightarrow 18.0$$

ANSWER: 18.0

EXAMPLE 4: Divide 468 by 4.4544 and round-off the answer to the nearest tenth.

STEP 1: Set up the problem for division.

divisor  $\rightarrow$  4.4544  $\overline{) 468}$   $\leftarrow$  dividend

STEP 2: Put the decimal points in the proper places.

4.4544.  $\overline{) 468.0000.}$

STEP 3: Add two zeros after the decimal point in the dividend.

44544.  $\overline{) 4680000.00}$

STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 105.06 \\ 44544 \overline{) 4680000.00} \\ \underline{44544} \phantom{00} \\ 225600 \\ \underline{222720} \phantom{00} \\ 288000 \\ \underline{267264} \phantom{00} \\ 20736 \end{array}$$

STEP 5: Round-off the answer to the nearest tenth. Since the digit to the right of the tenths place is more than 5, drop that digit and add 1 to the digit in the tenths place.

$$105.06 \longrightarrow 105.1$$

ANSWER: 105.1

### SUMMARY AND PRACTICE

Here, again, are the steps you need to follow in order to divide 468 by a number containing a decimal and round-off to the nearest tenth.

1. Set up the problem for division.
2. Put the decimal points in the proper places.
3. Add two zeros after the decimal point in the dividend.
4. Divide in the same way you would whole numbers.
5. Round-off the answer to the nearest tenth.

Now you will be given a Practice Exercise to work out on your own. Use the steps you have learned to find the answers. Use the Answers To Practice Exercise to check your answers. If you get any wrong, read the Explanations for the Practice Exercise to see where you made a mistake. If you don't understand the explanations, ask the learning supervisor to help you. When you feel that you are ready, as for the Lesson Test.

PRACTICE EXERCISE

In each of these problems, round-off the answer to the nearest tenth.

1. Divide 468 by 2.5
2. Divide 468 by 4.4
3. Divide 468 by 21.8
4. Divide 468 by 1.62
5. Divide 468 by 8.09
6. Divide 468 by 16.45
7. Divide 468 by 25.92
8. Divide 468 by 31.06
9. Divide 468 by 5.291

ANSWERS TO PRACTICE EXERCISE

1. 187.2
2. 106.4
3. 21.5
4. 288.9
5. 57.8
6. 28.4
7. 18.1
8. 15.1
9. 88.5

EXPLANATIONS FOR PRACTICE EXERCISE

1. Divide 468 by 2.5 and round-off the answer to the nearest tenth.

STEP 1: Set up the problem for division.

$$\text{divisor} \longrightarrow 2.5 \overline{) 468} \longleftarrow \text{dividend}$$

STEP 2: Put the decimal points in the proper places.

$$2.5 \overline{) 468.0}$$

STEP 3: Add two zeros after the decimal point in the dividend.

$$25 \overline{) 4680.00}$$



STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 187.20 \\ 25 \overline{) 4680.00} \\ \underline{25} \phantom{00} \\ 218 \phantom{00} \\ \underline{200} \phantom{00} \\ 180 \phantom{00} \\ \underline{175} \phantom{00} \\ 50 \phantom{00} \\ \underline{50} \phantom{00} \\ 0 \end{array}$$

STEP 5: Round-off the answer to the nearest tenth.

$$187.20 \longrightarrow 187.2$$

ANSWER: 187.2

2. Divide 468 by 4.4 and round-off the answer to the nearest tenth.

STEP 1: Set up the problem for division.

$$4.4 \overline{) 468}$$

STEP 2: Put the decimal points in the proper places.

$$4.4 \overline{) 468.0}$$

STEP 3: Add two zeros after the decimal point in the dividend.

$$4.4 \overline{) 4680.00}$$

STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 106.36 \\ 44 \overline{) 4680.00} \\ \underline{44} \phantom{00} \\ 280 \\ \underline{264} \phantom{00} \\ 160 \\ \underline{132} \phantom{00} \\ 280 \\ \underline{264} \phantom{00} \\ 14 \end{array}$$

STEP 5: Round-off the answer to the nearest tenth.

$$106.36 \rightarrow 106.4$$

ANSWER: 106.4

3. Divide 468 by 21.8 and round-off the answer to the nearest tenth.

STEP 1: Set up the problem for division.

divisor  $\longrightarrow$  21.8  $\overline{) 468}$   $\longleftarrow$  dividend

STEP 2: Put the decimal points in the proper places.

21.8.  $\overline{) 4680.}$

STEP 3: Add two zeros after the decimal point in the dividend.

218.  $\overline{) 4680.00}$

STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 21.46 \\ 218 \overline{) 4680.00} \\ \underline{436} \phantom{00} \\ 320 \phantom{00} \\ \underline{218} \phantom{00} \\ 1020 \phantom{00} \\ \underline{872} \phantom{00} \\ 1480 \phantom{00} \\ \underline{1308} \phantom{00} \\ 172 \end{array}$$

STEP 5: Round-off the answer to the nearest tenth.

$$21.46 \rightarrow 21.5$$

ANSWER: 21.5

4. Divide 468 by 1.62 and round-off the answer to the nearest tenth.

STEP 1: Set up the problem for division.

divisor  $\longrightarrow$  1.62  $\overline{) 468}$   $\longleftarrow$  dividend

STEP 2: Put the decimal points in the proper places.

1.62  $\overline{) 468.00}$

STEP 3: Add two zeros after the decimal point in the dividend.

162.  $\overline{) 46800.00}$

STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 288.88 \\ 162 \overline{) 46800.00} \\ \underline{324} \phantom{00} \\ 1440 \phantom{00} \\ \underline{1296} \phantom{00} \\ 1440 \phantom{00} \\ \underline{1296} \phantom{00} \\ 1440 \phantom{00} \\ \underline{1296} \phantom{00} \\ 144 \phantom{00} \end{array}$$

STEP 5: Round-off the answer to the nearest tenth.

$$288.88 \longrightarrow 288.9$$

ANSWER: 288.9

5. Divide 468 by 8.09 and round-off the answer to the nearest tenth.

STEP 1: Set up the problem for division.

divisor  $\longrightarrow$  8.09  $\overline{) 468}$   $\longleftarrow$  dividend

STEP 2: Put the decimal points in the proper places.

8.09.  $\overline{) 468.00.}$   
     $\swarrow$          $\searrow$

STEP 3: Add two zeros after the decimal point in the dividend

809.  $\overline{) 46800.00}$



STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 57.84 \\ 809 \overline{) 46800.00} \\ \underline{4045} \phantom{00} \\ 6350 \phantom{00} \\ \underline{5663} \phantom{00} \\ 6870 \phantom{00} \\ \underline{6472} \phantom{00} \\ 3980 \phantom{00} \\ \underline{3236} \phantom{00} \\ 744 \end{array}$$

STEP 5: Round-off the answer to the nearest tenth.

$$57.84 \longrightarrow 57.8$$

ANSWER: 57.8

6. Divide 468 by 16.45 and round-off the answer to the nearest tenth

STEP 1: Set up the problem for division.

$$16.45 \overline{) 468}$$

STEP 2: Put the decimal points in the proper places.

$$16.45. \overline{) 468.00.}$$

STEP 3: Add two zeros after the decimal point in the dividend.

$$1645. \overline{) 46800.00}$$

STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 28.44 \\ 1645 \overline{) 46800.00} \\ \underline{3290} \phantom{00} \\ 13900 \\ \underline{13160} \phantom{00} \\ 7400 \\ \underline{6580} \phantom{00} \\ 8200 \\ \underline{6580} \phantom{00} \\ 1620 \end{array}$$

STEP 5: Round-off the answer to the nearest tenth.

$$28.44 \longrightarrow 28.4$$

ANSWER: 28.4

7. Divide 468 by 25.92 and round-off to the nearest tenth.

STEP 1: Set up the problem for division.

$$25.92 \overline{) 468}$$

STEP 2: Put the decimal points in the proper places.

$$25.92 \overline{) 468.00}$$

STEP 3: Add two zeros after the decimal point in the dividend.

$$2592 \overline{) 46800.00}$$

STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 18.05 \\ 2592 \overline{) 46800.00} \\ \underline{2592} \phantom{00} \\ 20880 \phantom{00} \\ \underline{20736} \phantom{00} \\ 14400 \phantom{00} \\ \underline{12960} \phantom{00} \\ 1440 \phantom{00} \end{array}$$

STEP 5: Round-off the answer to the nearest tenth.

$$18.05 \longrightarrow 18.1$$

ANSWER: 18.1

8. Divide 468 by 31.06 and round-off the answer to the nearest tenth.

STEP 1: Set up the problem for division.

divisor  $\longrightarrow$  31.06  $\overline{) 468}$   $\longleftarrow$  dividend

STEP 2: Put the decimal points in the proper places.

31.06.  $\overline{) 468.00.}$

STEP 3: Add two zeros after the decimal point in the dividend.

3106.  $\overline{) 46800.00}$

STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 15.06 \\ 3106 \overline{) 46800.00} \\ \underline{3106} \phantom{00} \\ 15740 \phantom{00} \\ \underline{15530} \phantom{00} \\ 21000 \phantom{00} \\ \underline{18636} \phantom{00} \\ 2364 \end{array}$$

STEP 5: Round-off the answer to the nearest tenth.

$$15.06 \longrightarrow 15.1$$

ANSWER: 15.1

9. Divide 468 by 5.291 and round-off the answer to the nearest tenth.

STEP 1: Set up the problem for division.

divisor  $\longrightarrow$  5.291  $\overline{) 468}$   $\longleftarrow$  dividend

STEP 2: Put the decimal points in the proper places.

5.291.  $\overline{) 468.000.}$

STEP 3: Add two zeros after the decimal point in the dividend.

5291.  $\overline{) 468000.00}$



STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 88.45 \\ 5291 \overline{) 468000.00} \\ \underline{42328} \phantom{00} \\ 44720 \phantom{00} \\ \underline{42328} \phantom{00} \\ 23920 \phantom{00} \\ \underline{21164} \phantom{00} \\ 27560 \phantom{00} \\ \underline{26455} \phantom{00} \\ 1105 \end{array}$$

STEP 5: Round-off the answer to the nearest tenth.

$$88.45 \longrightarrow 88.5$$

ANSWER: 88.5

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### REMEDIATION

This part of the lesson contains an additional exercise for you to work on. Before you begin, review the steps you need to follow to divide by a number containing a decimal and round-off the answer to the nearest tenth.

1. Set up the problem for division.
2. Put the decimal points in the proper places.
3. Add two zeros after the decimal point in the dividend.
4. Divide in the same way you would divide whole numbers.
5. Round-off the answer to the nearest tenth.

Now try to do the exercise. Check your answers with those in Answers To Remediation Exercise. If you get any wrong, study the Explanations for Remediation Exercise. If you don't understand the explanations, ask the learning supervisor to help you. After the Remediation Exercise, you will be retested.

REMEDIATION EXERCISE

In each of these problems, round-off the answer to the nearest tenth.

1. Divide 468 by 2.4
2. Divide 468 by 1.8
3. Divide 468 by 13.8
4. Divide 468 by 14.3
5. Divide 468 by 3.01
6. Divide 468 by 21.60
7. Divide 468 by 15.91
8. Divide 468 by 21.56
9. Divide 468 by 1.352

ANSWERS TO REMEDIATION EXERCISE

1. 195.0
2. 260.0
3. 33.9
4. 32.7
5. 155.5
6. 21.7
7. 29.4
8. 21.7
9. 346.2

EXPLANATIONS FOR REMEDIATION EXERCISE

1. Divide 468 by 2.4 and round-off the answer to the nearest tenth.

STEP 1: Set up the problem for division.

$$\begin{array}{c} \text{divisor} \longrightarrow 2.4 \overline{) 468} \longleftarrow \text{dividend} \end{array}$$

STEP 2: Put the decimal points in the proper places.

$$\begin{array}{c} 2.4. \overline{) 468.0.} \\ \uparrow \qquad \qquad \uparrow \end{array}$$

STEP 3: Add two zeros after the decimal point in the dividend.

$$24. \overline{) 4680.00}$$

STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 195.00 \\ 24 \overline{) 4680.00} \\ \underline{24} \phantom{00} \\ 228 \phantom{00} \\ \underline{216} \phantom{00} \\ 120 \phantom{00} \\ \underline{120} \phantom{00} \\ 0 \end{array}$$

STEP 5: Round-off the answer to the nearest tenth.

$$195.00 \longrightarrow 195.0$$

ANSWER: 195.0

2. Divide 468 by 1.8 and round-off the answer to the nearest tenth.

STEP 1: Set up the problem for division.

$$1.8 \overline{) 468}$$

STEP 2: Put the decimal points in the proper places.

$$1.8 \overline{) 468.0}$$

STEP 3: Add two zeros after the decimal point in the dividend.

$$18 \overline{) 4680.00}$$



STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 260.00 \\ 18 \overline{) 4680.00} \\ \underline{36} \phantom{00} \\ 108 \phantom{00} \\ \underline{108} \phantom{00} \\ 0 \end{array}$$

STEP 5: Round-off the answer to the nearest tenth.

$$260.00 \longrightarrow 260.0$$

ANSWER: 260.0

3. Divide 468 by 13.8 and round-off the answer to the nearest tenth.

STEP 1: Set up the problem for division.

$$\begin{array}{ccc} \text{divisor} & \longrightarrow & 13.8 \overline{) 468} \longleftarrow \text{dividend} \end{array}$$

STEP 2: Put the decimal points in the proper places.

$$\begin{array}{ccc} 13\cancel{x}8. & \overline{) 468\cancel{x}0.} & \\ \text{↪} & & \text{↪} \end{array}$$

STEP 3: Add two zeros after the decimal point in the dividend.

$$138. \overline{) 4680.00}$$

STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 33.91 \\ 138 \overline{) 4680.00} \\ \underline{414} \phantom{00} \\ 540 \phantom{00} \\ \underline{414} \phantom{00} \\ 1260 \phantom{00} \\ \underline{1242} \phantom{00} \\ 180 \phantom{00} \\ \underline{138} \phantom{00} \\ 42 \end{array}$$

STEP 5: Round-off the answer to the nearest tenth.

$$33.91 \rightarrow 33.9$$

ANSWER: 33.9

4. Divide 468 by 14.3 and round-off the answer to the nearest tenth.

STEP 1: Set up the problem for division.

divisor  $\longrightarrow$  14.3  $\overline{) 468}$   $\longleftarrow$  dividend

STEP 2: Put the decimal points in the proper places.

14.3.  $\overline{) 468.0.}$

STEP 3: Add two zeros after the decimal point in the dividend.

143.  $\overline{) 4680.00}$

STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 32.72 \\ 143 \overline{) 4680.00} \\ \underline{429} \phantom{00} \\ 390 \phantom{00} \\ \underline{286} \phantom{00} \\ 1040 \phantom{00} \\ \underline{1001} \phantom{00} \\ 390 \phantom{00} \\ \underline{286} \phantom{00} \\ 104 \phantom{00} \end{array}$$

STEP 5: Round-off the answer to the nearest tenth.

$$32.72 \longrightarrow 32.7$$

ANSWER: 32.7

5. Divide 468 by 3.01 and round-off the answer to the nearest tenth.

STEP 1: Set up the problem for division.

$$3.01 \overline{) 468}$$

STEP 2: Put the decimal points in the proper places.

$$3.01 \overline{) 468.00}$$

STEP 3: Add two zeros after the decimal point in the dividend.

$$301 \overline{) 46800.00}$$

STEP 4: Divide in the same way you divide whole numbers.

$$\begin{array}{r} 155.48 \\ 301 \overline{) 46800.00} \\ \underline{301} \phantom{00} \\ 1670 \phantom{00} \\ \underline{1505} \phantom{00} \\ 1450 \phantom{00} \\ \underline{1204} \phantom{00} \\ 2460 \phantom{00} \\ \underline{2408} \phantom{00} \\ 52 \end{array}$$

STEP 5: Round-off the answer to the nearest tenth.

$$155.48 \longrightarrow 155.5$$

ANSWER: 155.5

6. Divide 468 by 21.60 and round-off the answer to the nearest tenth.

STEP 1: Set up the problem for division.

divisor  $\longrightarrow$  21.60  $\overline{) 468}$   $\longleftarrow$  dividend

STEP 2: Put the decimal points in the proper places.

21~~x~~60.  $\overline{) 468~~x~~00.}$



STEP 3: Add two zeros after the decimal point in the dividend.

$$2160. \overline{) 46800.00}$$

STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 21.66 \\ 2160 \overline{) 46800.00} \\ \underline{4320} \phantom{00} \\ 3600 \phantom{00} \\ \underline{2160} \phantom{00} \\ 14400 \phantom{00} \\ \underline{12960} \phantom{00} \\ 14400 \phantom{00} \\ \underline{12960} \phantom{00} \\ 1440 \phantom{00} \end{array}$$

STEP 5: Round-off the answer to the nearest tenth.

$$21.66 \longrightarrow 21.7$$

ANSWER: 21.7

7. Divide 468 by 15.91 and round-off the answer to the nearest tenth.

STEP 1: Set up the problem for division.

$$15.91 \overline{) 468}$$

STEP 2: Put the decimal points in the proper places.

$$15.91 \overline{) 468.00}$$

STEP 3: Add two zeros after the decimal point in the dividend.

$$1591 \overline{) 46800.00}$$

STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 29.41 \\ 1591 \overline{) 46800.00} \\ \underline{3182} \phantom{00} \\ 14980 \phantom{00} \\ \underline{14319} \phantom{00} \\ 6610 \phantom{00} \\ \underline{6364} \phantom{00} \\ 2460 \phantom{00} \\ \underline{1591} \phantom{00} \\ 969 \end{array}$$

STEP 5: Round-off the answer to the nearest tenth.

$$29.41 \longrightarrow 29.4$$

ANSWER: 29.4

8. Divide 468 by 21.56 and round-off the answer to the nearest tenth.

STEP 1: Set up the problem for division.

divisor  $\longrightarrow$  21.56  $\overline{) 468}$   $\longleftarrow$  dividend

STEP 2: Put the decimal points in the proper places.

21.56.  $\overline{) 468.00.}$

STEP 3: Add two zeros after the decimal point in the dividend.

2156.  $\overline{) 46800.00}$

STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 21.70 \\ 2156 \overline{) 46800.00} \\ \underline{4312} \phantom{00} \\ 3680 \phantom{00} \\ \underline{2156} \phantom{00} \\ 15240 \phantom{00} \\ \underline{15092} \phantom{00} \\ 1480 \phantom{00} \\ \underline{0} \phantom{00} \end{array}$$

STEP 5: Round-off the answer to the nearest tenth.

$$21.70 \longrightarrow 21.7$$

ANSWER: 21.7

9. Divide 468 by 1.352 and round-off the answer to the nearest tenth.

STEP 1: Set up the problem for division.

divisor  $\longrightarrow$  1.352  $\overline{) 468}$   $\longleftarrow$  dividend

STEP 2: Put the decimal points in the proper places.

1.352.  $\overline{) 468.000.}$

STEP 3: Add two zeros after the decimal point in the dividend.

1352  $\overline{) 468000.00}$

STEP 4: Divide in the same way you would divide whole numbers.

$$\begin{array}{r} 346.15 \\ 1352 \overline{) 468000.00} \\ \underline{4056} \phantom{00} \\ 6240 \phantom{00} \\ \underline{5408} \phantom{00} \\ 8320 \phantom{00} \\ \underline{8112} \phantom{00} \\ 2080 \phantom{00} \\ \underline{1352} \phantom{00} \\ 7280 \phantom{00} \\ \underline{6760} \phantom{00} \\ 520 \end{array}$$

STEP 5: Round-off the answers to the nearest tenth.

$$346.15 \longrightarrow 346.2$$

ANSWER 346.2

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D-14 SG  
05C FBSEP



## LESSON TEST FOR D-14

You will need some paper and a pencil to do this Lesson Test. It contains five problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 4 out of 5 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

In each of these problems round-off the answer to the nearest tenth. It is very important to work carefully and check your work. A small mistake in arithmetic will make the entire answer wrong.

1. Divide 468 by 1.3
2. Divide 468 by 12.8
3. Divide 468 by 3.16
4. Divide 468 by 14.33
5. Divide 468 by 6.319

# REMEDATION TEST FOR D-14

You will need some paper and a pencil to do this Remediation Test. It contains five problems. Each problem tests the objective that you learned in this lesson. Each problem is worth one point. You must get 4 out of 5 total points to pass this test. Write your answers on a separate sheet of paper. DO NOT WRITE ON THIS TEST.

In each of these problems, round-off the answer to the nearest tenth. It is very important to work carefully and check your work. A small mistake in arithmetic will make the entire answer wrong.

1. Divide 468 by 3.5
2. Divide 468 by 13.4
3. Divide 468 by 6.88
4. Divide 468 by 14.87
5. Divide 468 by 5.471

# ANSWER KEY FOR LESSON TEST D-14

This answer key contains the correct responses for Lesson Test D-14. Each problem is worth one point. Students must get 4 out of 5 total points to pass this test.

1. 360.0
2. 36.6
3. 148.1
4. 32.7
5. 74.1

# ANSWER KEY FOR REMEDIATION TEST D-14

This answer key contains the correct responses for Remediation Test D-14. Each problem is worth one point. Students must get 4 out of 5 total points to pass this test.

1. 133.7
2. 34.9
3. 68.0
4. 31.5
5. 85.5

**END**

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