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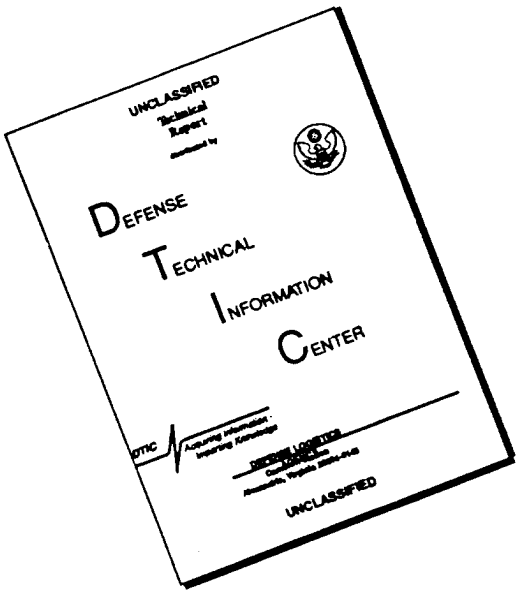

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The Pennsylvania State University

The Graduate School

Department of Nutrition

COMPUTER-ASSISTED FOOD LABELING EDUCATION FOR ADULTS WITH NON-INSULIN-DEPENDENT DIABETES MELLITUS

A Thesis in

Nutrition

by

Deborah Ann Downes

Submitted in Partial Fulfillment
of the Requirements
for the Degree of

Master of Science

May 1996

We approve the thesis of Deborah Ann Downes.

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ABSTRACT

This study was designed to determine the merit of computer-assisted food labeling education for adults with non-insulin-dependent diabetes mellitus. The study included both the development and evaluation of a tutorial computer lesson designed to provide education on the Nutrition Facts food label. The independent variables in this study included gender, age, education, duration of diabetes, computer experience, and characteristics related to food shopping and selection. The dependent variable was knowledge as measured by changes from pretest to posttest. Subjects were recruited from five U.S. Air Force outpatient medical clinics. Fifty one participants completed the study. Each participant was given a written questionnaire designed to collect information about them, their computer experience and characteristics related to food shopping and selection. They also completed a food label knowledge pretest. Once finished with the written portion, each participant completed the "Nutrition Facts" computer lesson, and finally completed a knowledge posttest. Fifty seven percent of the subjects were male. Ages ranged from 25 to 76 with a mean age of 55.5 and a SD of 10.7 years. Forty three percent had a high school education with another 51% having completed further education after high school. Duration of diabetes ranged from one month to 25 years, with a mean duration of 4.5 and a SD of 6.3 years. Approximently half of the participants could be classified as computer users, with 47% using a computer daily or weekly, and 53% rating

themselves as very or moderately experienced with computers. Fifty nine percent reported that they read food labels frequently, with 67% reporting they do all or most of the food shopping. A one-way within-subject analysis of variance indicated the posttest scores were significantly higher than the pretest ($F_{1,50}$= 78.37, $p < .0001$). In addition to successful knowledge improvement, participants were highly positive about this educational experience. Based on the data collected in this study it is concluded that computer-assisted food labeling education is acceptable and effective in this clinical population. Males had the greatest posttest improvement, as well as individuals who reported reading food labels less often, and those who reported feeling less confident about their ability to use food labels. Age, education, duration of diabetes, and computer experience were not related to a successful outcome.

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ACKNOWLEDGMENTS

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Chapter 1

INTRODUCTION

Diabetes mellitus is a chronic condition in which dietary modifications are a primary treatment for control of blood glucose. The food choices individuals with diabetes make have a direct effect on their blood glucose values which, in turn, have a direct effect on their health everyday and over a lifetime. As the fourth leading cause of death by disease in the United States and a direct medical cost of almost 100 billion dollars, diabetes has a serious health and financial impact (American Diabetes Association 1993a). Approximently 16 million Americans have diabetes. Non-insulin-dependent diabetes mellitus (NIDDM) accounts for over 90% of all cases of diabetes. Treatment therapies for NIDDM include nutritional management, exercise or increasing physical activity, and if needed, medications (oral hypoglycemic agents and/or insulin).

In the American Diabetes Association (ADA) Goals for Diabetes Education (1986), Harold Rifkin stated that "It has become increasingly clear that the treatment of diabetes is largely an educational process. Educational goals and objectives are critical elements in the management of diabetes and particularly in the prevention of acute and chronic complications". The Diabetes Control and Complications Trial (DCCT), a landmark study designed to test the effects of intensively controlled blood glucose values, also identified diabetes education as a key treatment factor (DCCT 1993).

It has long been accepted that education on the principles of good nutrition is essential for people with diabetes. Nutrition knowledge is a vital component of successful diabetes management (Franz et al. 1994, ADA 1995). The goals of medical nutrition therapy include maintenance of near-normal blood glucose levels, achievement of optimal lipid levels, provision of adequate calories for maintaining or attaining reasonable weight, prevention, delay, or treatment of nutrition-related risk factors and complications, and improvement of overall health through optimal nutrition. Nutrition labeling offers an educational opportunity for people with diabetes.

On May 8, 1994 revamped nutrition labeling was mandated by the federal government to be on packaged foods sold in supermarkets. The new regulations were a direct result of the Nutrition Labeling and Education Act (NELA) (1990), which sought to achieve uniform labeling on all foods across the states. A nutrient panel titled "Nutrition Facts" replaced "Nutrition Information per Serving". This panel was designed to provide nutritional information to serve consumers with normal as well as those with special dietary requirements.

The ADA recognizes that in order for individuals with diabetes mellitus to make appropriate food choices and select appropriate portion sizes, food labels are the most efficient and practical way to communicate much of the key nutrition information. However, the information provided by food labeling alone is not sufficient. The ADA Position Statement on Food Labeling (1994) states:

Food labels cannot compensate for inadequate nutrition knowledge. To use

> the information provided by food labels appropriately, consumers must be educated about and must be able to apply basic principles of good nutrition. This is particularly true for people with diabetes who must be knowledgeable about foods in relation to their diabetes self-management.

Food label education can be used in helping people with diabetes apply nutrition guidelines to their meal planning. In a technical review of food labeling, Wheeler et al. (1994) identified fifteen examples of how some of the food label information could be applied to assist consumers with diabetes in making actual food choices. Areas identified for nutrition intervention included education on using sugars and other carbohydrate information for determining the nutritional value of a food, identifying serving sizes, using the information provided on grams of fat, grams of saturated fat, and calories from fat, and learning how to integrate food labeling information with other types of food information, such as recipes. There is tremendous potential to enhance consumer knowledge on the nutritional content of foods and aid this large population in selecting foods conducive to their dietary requirements.

Computers are increasingly becoming available in patient education settings providing opportunities to expand methods of health education delivery. Redman (1993) discusses the accomplishments that have been made in patient education, and the developments that are remaining. She states that although computers are being used in the teaching and learning process, there is potential for a virtual explosion in the uses for computers in instruction. Newer and more powerful software and hardware innovations are being developed at a considerable rate. Computer programs which take advantage of this technology are being used to increase patient compliance with medication regimens, to

train patients in self-care preventative skills, and to give patients the information they need to provide informed consent (Kahn 1993).

Computer-assisted education is one instructional tool that can be used by health care professionals. The computer lends itself to several instructional strategies (Billings 1986, Hannafin and Peck 1988) including learner assessment, drill and practice, tutorial, simulation, problem solving, and evaluation. Advantages of computers in patient education include self-paced instruction, active learning, immediate feedback, and standardized instructional delivery.

In the field of diabetes, there are computer programs designed to help patients analyze their diets, to plan meals, and record blood glucose values and insulin doses. There are also comprehensive educational computer programs, containing self-paced modules on a variety of diabetes related topics such as nutrition, medications, acute and chronic complications, and self-monitoring. Currently, there are no educational computer programs available for individuals with diabetes on the topic of the Nutrition Facts food label.

Patient education is a dynamic and ongoing process. This is especially true when new information and concepts are evolving such as food labeling and nutrition recommendations for people with diabetes. Research is needed to evaluate methods of providing food labeling education. Because different learners benefit from different instructional methods, research is also needed to evaluate the type of learner that may benefit from a computer-assisted education method.

The primary goal of this study was to evaluate computer-assisted education as a method for providing education on the Nutrition Facts panel of the food label to adults with NIDDM, and identify the characteristics of this clinical population for whom computer-assisted education is most effective.

Chapter 2

REVIEW OF THE LITERATURE

The purpose of this study was to test the effectiveness of a computer-assisted educational program with consumers with NIDDM. The computer program was designed to provide education on specific content areas of the Nutrition Facts panel of the food label. This review of the literature will describe research in the areas of food labeling, and computer-assisted education in health care and diabetes management and education.

Current Status of Nutrition Labeling

Food labeling regulations which took effect in May 1994 directed the content and format of nutrition information required on packaged food products (58 Fed. Reg. 2079, Jan. 6, 1993). The new label features a nutrition panel titled "Nutrition Facts" which was designed to provide consumers with the information they need to make healthful food selections. With the accumulating knowledge about the relationship between nutrition and chronic disease, the content of the label reflects the nutrients which are considered to have the greatest public health significance for today's consumers. The Nutrition Facts panel is required to identify the amount of total calories, calories from fat, total fat, saturated fat,

cholesterol, sodium, total carbohydrate, dietary fiber, sugars, protein, vitamin A, vitamin C, calcium, and iron in a specified serving of the food.

Since the release of the Nutrition Facts panel of the food label a large number of educational materials have been developed. The National Exchange for Food Labeling Education (NEFLE) was established in 1992 as a joint effort between the United States Department of Health and Human Services, Food and Drug Administration (FDA) and the United States Department of Agriculture (USDA), Food Safety and Inspection Service (FSIS). These organizations have tracked promotional and educational materials, as well as programs developed in response to the new label. They have not, however, collected any evidence of program or material evaluations (personal communication, Gina McNeal, Information Specialist USDA/Food and Nutrition Information Center, October 1995).

The NEFLE database of labeling education resources includes information on handouts, brochures, videos, slide programs, curriculum or teaching kits, and software programs. Development of the various materials comes from sources such as food companies, private vendors, universities, and organizations with an interest in nutrition and health, such as the American Heart Association, the American Dietetic Association, and the American Diabetes Association.

Two resources specifically for diabetes education are available. "Reading Food Labels: A Handbook For People With Diabetes" is a 13 page brochure which was developed jointly by the American Diabetes Association, the American Heart Association, and the American Association of Diabetes Educators (1994). Although it was field tested

with diabetes educators, it has not been tested with the clinical population for which it was designed. The other resource titled "Shop Smart: Reading Food Labels" (1994) is available from the International Diabetes Center as either a videotape or a slide program. No research evaluation of this program has been published.

Having reached their primary goal of ensuring education materials were available, the NEFLE was folded into the USDA Food and Nutrition Information Center in October 1995. Currently the Food and Nutrition Information Center maintains the food labeling educational materials database.

Published literature on the consumer use and understanding of the Nutrition Facts food label is just beginning to emerge. A survey by the Food Marketing Institute (FMI) (1994) indicated that, at the time of their survey, only 38% of shoppers were aware of the newly formatted Nutrition Facts label. Sixty seven percent of those who had seen the new label said the information on it was more clear and understandable than the information presented on the old label. Twenty five percent said clarity and understandability were about the same. No assessment was made of actual consumer comprehension of the label.

Allen (1995) conducted an evaluation of the food label media coverage from December 1, 1992 to August 30, 1993. The purpose of her study was to identify the specific information printed about the Nutrition Facts label in newspapers, magazines, and health newsletters. While this analysis did not evaluate the effectiveness of the reviewed media materials in educating the public, the author reported that several articles

contained errors or misleading statements, and suggested that health professionals need to offer additional guidance to ensure the label is accurately portrayed. Her findings reinforce the issue of the complexity of the label and the potential for misinformation and misunderstanding. Nutrition education is needed for correct understanding and accurate use of the information provided.

Downes et al. (1995) reported that university students correctly interpreted most information given on the Nutrition Facts panel, with some specific exceptions. Areas identified for more intensive educational efforts included individualizing percent daily values, calculating percent calories from fat, and interpreting the recommendation for carbohydrate intake.

Previous Nutrition Labeling

Nutrition labeling was initially implemented in 1975 and experienced little change until the recent reform (National Academy of Sciences 1990). Previous FDA regulations mandated labeling only when a food was fortified or a nutrition claim was made about the product. Labeling was voluntary on all other food packages, although manufacturers were encouraged to make nutrition labeling available. By 1990 only slightly more than half of all packaged foods displayed nutrition labels.

The content of the label titled "Nutrition Information per Serving" was largely focused on the public health concerns of undernourishment and malnutrition and directed

at ensuring consumers had information to select a diet that was adequate in vitamins, minerals, and protein. The focus on micronutrients was much different than the current concern of the population's overconsumption of certain macronutrients such as cholesterol, fat, and saturated fat.

Although little data exists on consumer comprehension of the current nutrition label content, some studies are available on the consumer use and knowledge of the previous nutrition label. Many of these focus, however, on self-reported use and understanding of the label information, and none of the research efforts appear to have been directed to the study of a clinical population.

In a 1989 FMI survey it was reported that 34% of shoppers read labels for nutrition information "pretty much every time" with another 27% responding they read labels "fairly often". The report further notes that shoppers 40 years old and older and those on medically restricted diets are more likely to read the nutrition information on labels (FMI 1989).

Based on the results of FDA conducted telephone interviews, Bender et al. (1992) stated that the number of consumers who say they pay attention to the information on nutrition labels is increasing. Sixty seven percent of consumers reported using nutrition labels in the 1982 FDA survey, while the percentage had increased to 74% in the 1988 survey. She concluded, however, that although the reported use of food labels is high, gaps in nutrition knowledge remain. She recommended targeted education initiatives to help consumers become more effective users of food label information.

This gap in comprehension of nutrition information was reported by FDA food labeling surveys conducted in 1978 and 1982 which revealed that "consumers believed the present system too inflexible, complex, and difficult for the average consumer to understand" (54 Fed. Reg. 32610, Aug. 8, 1989). In a *FDA Consumer* magazine article addressing frequently asked questions about the label, Chris Lecos stated consumers "are mystified by some of the technical terminology and other information that is crammed onto food labels nowadays" (Lecos 1988).

Daly (1976) tested both attitudes toward nutrition labeling and comprehension of the nutrition label. The two main conclusions of her study were that consumer's attitudes toward nutrition labeling appeared to be highly positive, but that consumers lacked the ability to use the information. Likewise, Jacoby et al. (1977) in a series of six studies concluded that consumers neither used nor comprehended nutrition information in arriving at food purchase decisions.

Whether or not consumer comprehension of the Nutrition Facts label will be greater than what was seen with the old format remains to be demonstrated, but there is no doubt that for a great number of consumers the information on the label alone will not be adequate. Educational efforts are a primary component of the 1990 NLEA. Specifically, this public law states that consumers will be educated about the availability of nutrition information in the label and the importance of that information in maintaining healthy dietary practices.

Computer-Assisted Education

Computer-assisted education refers to the process of providing education with a computer. There are a number of other labels given to the use of computers as an educational tool, including computer-assisted instruction, computer-assisted learning, and computer-aided learning (Hannafin and Peck 1988).

Computer-assisted educational lessons are generally categorized as drill and practice, games, simulation, or tutorials. The type of program that is most appropriate for a particular learning situation will depend on the characteristics of the instructional setting, the learning task, and program objectives.

The primary function of drill and practice is to provide practice and feedback on a topic that has already been taught. A common use is in a classroom setting, where similar to the use of flash-cards, the computer lesson emphasizes rote memory.

Like drill and practice, educational games are most often designed to reinforce concepts taught elsewhere, although they can be used to teach new information. Educational computer games provide practice and feedback in a highly motivating and involving format. *Packy & Marlon* (1995) is an example of a diabetes-related video game for children using Super Nintendo systems. Packy and Marlon are two young elephants who go to diabetes summer camp and discover that mice and rats have pillaged the camp. Left without food or diabetes supplies, the friends go out on an adventure to find the lost goods. It is up to the player to check Packy and Marlon's blood glucose levels, give them

insulin, plan their meals, and answer diabetes-related questions for extra points. Although no user evaluation has been published on *Packy & Marlon*, the game is endorsed by the American Academy of Pediatrics.

Simulations present scenarios in which the computer accepts inputs and then responds with the realism of the actual situation, allowing the learner to experience the results of good and bad decisions without risky or expensive consequences. One area where simulations are being developed and used is medical training and practice in invasive patient procedures. An example is abdominal surgical simulations using virtual reality technology (Merril et al. 1994). The surgical instruments are fitted to sensors which track the instruments orientation in space. The program combines video, audio, and graphics and provides both visual and tactile feedback.

Tutorials are useful in teaching factual information. New information and concepts are presented and the learner's understanding is measured. Subsequent instruction is provided based on the learner's response. Effective tutorials include lesson orientation, learner guidance, appropriate feedback and remediation, and strategies for making the lesson meaningful to the learner (Hannafin and Peck 1988).

Computers in Health Care Education

Computer applications are increasingly becoming a factor in the area of patient education. It has been proposed that using computer-assisted education can save

time, effort, and money enabling staff to educate more patients; provide a higher quality of teaching, learning and assessment; and provide the intellectual challenge necessary to force educators to re-examine their teaching objectives, methods, and materials (Juge et al. 1993). Advantages for the patient include self-paced instruction, active learning, and immediate feedback without constant supervision by staff. Study subjects have also reported they felt more comfortable learning from the computer, since, unlike a human educator, the computer is not critical of their progress or mistakes (Luker et al. 1994).

Several studies have been done using computer-based health education in the health promotion and medical care setting. Ellis et al. (1981) developed computer-assisted instruction programs on a variety of health awareness topics which were evaluated by 420 noncomputer-orientated volunteers. The volunteers were recruited at a hospital sponsored health fair. Data were collected on the popularity and helpfulness of the programs. The results demonstrated that having a computer provide health-related material is acceptable to a noncomputer-oriented general public.

In a second study conducted by Ellis et al. (1982), the computer was shown to be a cost-effective method of health education that was acceptable to both patients and staff. In this study, a computer with five health lessons was available for patient use in the waiting area of a health center. Over 70% of the users reported they had received helpful information from the lessons. Health care staff were evaluated at six months and one year about their attitude toward this computerized health education for patients. Eighty seven percent of the staff felt that the computer should continue to be dedicated to patient

education after the conclusion of the study, with staff interest in developing new lessons on other health related topics.

Deardorff (1986) compared computerized health education to both face-to-face and written methods. He randomly assigned college students to one of the three treatment groups or a control group. The treatment groups received education on sexually transmitted diseases. Participants were assessed for self-reported anxiety, feelings about the experience, recall of the information presented, and previous computer experience. Results indicated there were no differences related to the participant's previous computer experience. The computer-based and face-to-face experience were rated more positively than the written method, while recall was better with the computer-based and written methods. The author concluded, therefore, that computer-based education may be the method of choice.

More recently, Reis et al. (1994) evaluated the response of subjects to computer-assisted self-care for colds and flu. Five hundred and forty undergraduate students completed a knowledge questionnaire on colds and the flu. Next they reviewed a computer lesson designed to enhance self-care for colds and flu, and then completed an attitude questionnaire. The authors hypothesized that the subjects who were categorized as computer users would have a more positive attitude toward receiving information from a computer than those categorized as nonusers. In general, they found that users were more willing to rely on the computer for this health care activity. The authors concluded that for a subgroup of young adults computer-assisted self-care may offer a way to

improve primary health care services, and that understanding self-care options for common illnesses such as colds and flu may result in more efficient use of limited health care resources.

Consoli et al. (1995) tested computer-assisted education in a clinical population. Hypertensive patients were randomly assigned to a control or a computer education group. Patients from both groups received traditional education from a physician, nurse, and dietitian. In addition, the computer group was supplemented with a 30-60 minute session on the computer. All patients had a significant improvement in knowledge, but the authors state the improvement was greater in the computer group, although they do not state whether this was significant. The authors concluded that computer-assisted education is beneficial as a complement to traditional education, however, it could also be argued that an additional 30-60 minutes of patient education using traditional education methods may have resulted in the same level of knowledge improvement.

In the field of nutrition and dietetics computer applications are not new, however, they have been used primarily as a management tool, or for nutrient analysis rather than for patient education. Orta (1988) wrote a review of 201 articles which were published between 1958 and 1987 related to the use of computers in nutrition. He classified the articles under the areas of normal, clinical and community nutrition, management, food service operations, and computer-based education (CBE). Of the CBE articles reviewed, 40 programs were designed for teaching students (college or dietetic interns), 10 were continuing education programs for professionals, 5 were nutrient or recipe analysis

programs, 2 were for general public education, and only one for patient education.

As discussed previously, the USDA Food and Nutrition Information Center currently maintains a database of food labeling education materials. Of the six software programs listed, three address the topic of food labeling in detail while the other three discuss food labeling as part of a more comprehensive nutrition education program. The target audiences for these various materials are listed as general consumers and students of various age groups. None of the programs were designed for a clinical audience.

Computers in Diabetes Education

The National Diabetes Information Clearinghouse (1995) compiled a literature search of computer software programs for diabetes management and education. They identified 33 programs for health professionals and 24 programs for people with diabetes. The nutrition programs for professionals are designed for analyzing nutrients, foods, and recipes, customizing meal plans, calculating food exchanges, and continuing education. The majority of the nutrition programs identified for people with diabetes are designed for diet assessment or meal planning verses education. Correspondence with the various program developers failed to identify any research conducted to evaluate the programs listed in the National Diabetes Information Clearinghouse document.

Clinical Studies

Success has been demonstrated with educational computer programs for people with diabetes. Juge et al. (1993) developed a program on hypoglycemia for patients with insulin-dependent diabetes mellitus (IDDM). The goals of the program were to provide a teaching tool that was sufficiently flexible to take into account the specific needs of each patient, and to give the medical team a means for assessing the knowledge and attitudes of patients by providing a printout showing the mistakes that patients make in their day to day lives with diabetes. Recognizing the importance of providing patient education that is relevant to the patient's concerns, the program covered clinical situations that patients face in their daily lives. The program was divided into six content areas, with information tailored to match a particular patient's insulin regimen. Problem solving questions with feedback and explanations were used.

After completing the program, each patient received a printout listing important points and a summary of the mistakes made. The health care team also received a copy of the patient's printout which allowed them to reemphasize any areas that were difficult for the patient.

Patient acceptance of the program indicated that prior to using a computer for learning, only 64% of the patients responded favorably to this educational technique. After using the program, over 85% responded favorably.

In this same article, Juge reports that a comparative study was conducted by

independent researchers. The results indicated that Juge's computer-assisted program was more efficient than conventional group teaching in creating a knowledge improvement. The average increase in knowledge for the computer group was 62% against 13% for the conventional teaching group. However, neither the study methods nor the characteristics of the populations tested were described.

Lefebvre et al. (1981) developed a tutorial for hospitalized patients with IDDM. Tutorial lessons included units on carbohydrate metabolism, pathophysiology of diabetes, exogenous insulin, hypoglycemia, principles of diet, and urine testing. Although this study did not report whether the subjects had received any diabetes education prior to their computer experience, these investigators demonostrated a dramatic improvement in knowledge scores.

Using two computer-based systems, Wise et al. (1986) evaluated their effect on knowledge and metabolic control in patients with IDDM and NIDDM. One system was a knowledge-assessment program with an option for providing learner feedback. The other was an interactive teaching program with text and animated graphics. The participants were assigned to one of four treatment groups: control, knowledge-assessment program without feedback, knowledge-assessment program with feedback, or the interactive computer teaching (ICT). Both knowledge-assessment with feedback and ICT resulted in a significant knowledge increase in both IDDM and NIDDM patients, together with a mean fall in glycosylated hemoglobin levels. The authors stated that the positive metabolic benefits likely resulted from an enhancement of knowledge and motivation.

Kim et al. (1991) designed a computer-based drill and practice lesson on the basic survival skills and concepts needed for the control of diabetes. The investigators were studying the effect of two different forms of corrective feedback. The computer lesson consisted of 40 multiple choice questions, and was used to reinforce principles taught previously by a videotape series. The study results indicated that the feedback which provided a more extensive explanation about the correct response resulted in a more positive attitude toward the program.

Turnin et al. (1992) evaluated a computer-assisted diet education system which was made available through the French public videotex network. Study participants had free program access 24 hours per day in their homes. The program, Diabeto, was designed to help patients with diabetes self-monitor their diets and balance their meals with personalized counseling. Significant improvements were seen on both knowledge tests and dietary habits.

Wheeler et al. (1985) evaluated the merit of computer-based techniques as a supplement to dietitian provided meal planning and diet education. Sixteen individuals with NIDDM were assigned to the traditional education group and 16 to the computer-based group. The authors reported that in the computer-based group there was an improved level of knowledge of the *ADA Exchange Lists for Meal Planning* and a decreased reported fat intake. In addition, obese individuals were able to lose weight at a satisfactory rate during the one month study period. The authors were unable to make comparisons with the two treatment groups as a result of study protocol errors.

Diabetes Educator Survey Results

In response to a growing demand for diabetes education that is both high-quality and cost-effective Funnell et al. (1992) at the Michigan Diabetes Research and Training Center developed a questionnaire for diabetes educators. The educators were asked to rate seven types of educational materials and eight types of educational methods for both cost and educational effectiveness. It is important to note that effectiveness was not measured or defined, but was simply the assessment of the individual completing the questionnaire.

The survey was sent to members of the American Association of Diabetes Educators (n = 325), and included registered nurses (62%), registered dietitians (36%), and others (2%). Respondents indicated videotapes, slide/tape programs, and booklets were generally effective. Computer-assisted education was rated as rarely effective and rarely cost-effective, however, this educational technique was used by only a small number of the sample (14%). The authors concluded that the low rating of computer-assisted education may be due to a lack of access to computers by patients and educators, the quality of computer programs currently available, the perceived lack of computer literacy among adults, or the associated costs. Likewise, it might be concluded that the educational media that were rated as most effective were those that are most familiar and available. Ninety nine percent of those surveyed used booklets, 90% used videotapes, and 67% used slide/tape programs.

Lewis (1994) conducted a study to describe the role of diabetes educators' characteristics, attitudes, and concerns as they relate to the adoption of computers as a teaching strategy. One hundred and sixty-nine diabetes educators completed a survey which was used to profile their concerns and characteristics regarding computer-based patient education. Only 19% of those surveyed reported using computers for patient education. Ninety one percent reported spending less than one percent of their time using the computer for patient education. It was also interesting to note that 81% of the educators characterized themselves as non-computer users. Major barriers listed by those surveyed included: availability of computers for patients (74%), financial constraints (57%), time for patients to learn computers (54%), limited computer training for patients (54%). Other barriers described by the surveyed participants included "lack of knowledge about what's out there", "patients are not computer literate", "clients have low literacy levels", "clients afraid of computers", and "older patients are intimidated by computers".

The general perception expressed by diabetes educators that patients might not be amiable to computer education may be more related to the educator's lack of computer experience than the patient's inability or anxiety about using a computer. Based on the findings from her study, Lewis recommended the need to test patient education software for educational effectiveness and to investigate patient characteristics and concerns regarding computer usage.

Summary

Diabetes mellitus is a chronic illness that requires the individual to undertake daily self-care activities in order to achieve optimal metabolic control. Education about diabetes and self-care management techniques is accepted as an integral part of care for the person with diabetes (ADA 1993b). In addition, it is well accepted that nutrition education is an essential part of diabetes management (Franz et al. 1994, ADA 1995).

Although the use of computers in patient education has been limited, several studies demonstrate success with this method. There is a need to continue investigating alternative methods of patient education and specifically diabetes education. Traditional methods of individual and group counseling are not enough. In a survey of 2,405 individuals with diabetes, only 35.1% reported having received diabetes education in the form of an educational class or program (Coonrod et al. 1994). Computer technology has the ability to supplement education efforts and reach more people who need diabetes education.

Education about the food label is considered an essential part of the 1990 NLEA. Others have also stressed the importance of nutrition label education (ADA 1994, American Dietetic Association 1990, Society for Nutrition Education 1992). Currently there is little information available about the success of various food labeling education efforts. In reviewing the literature for information specific to the Nutrition Facts panel, the lack of information may be due to it's relatively recent appearance on food packages.

Lack of material and program evaluations might also be due to limited funding for those evaluations.

This study demonstrates the use of computer-assisted food labeling education with individuals with NIDDM. The results of this study may provide a model for opportunities to expand methods of providing diabetes and food labeling education.

Chapter 3

METHODOLOGY

The overall objective of this study was to assess a specific method of providing Nutrition Facts food labeling education to adults with NIDDM. The study included the design, development, and evaluation of a computer-assisted educational program. This chapter will describe the process of developing and testing the Nutrition Facts lesson.

Research Questions

The specific research questions were, for the individual with NIDDM:

1. What are the initial levels of knowledge on using the Nutrition Facts label panel?
2. Can computer-assisted education increase knowledge on the Nutrition Facts food label panel?
3. What characteristics of the population with NIDDM can be identified for whom computer-assisted education is most effective?

Hypotheses

The study hypotheses were:

H1: Knowledge test scores will be significantly higher after the participants have completed the Nutrition Facts computer lesson.

H2: Successful posttest outcomes will be associated with the following variables: gender, age, education, duration of diabetes, computer experience, and characteristics related to food shopping and selection.

Study Sample

Study participants consisted of military members, their dependents, and military retirees with the medical diagnosis of NIDDM who were receiving their health care at Air Force medical treatment facilities. These individuals represent diverse ages and educational backgrounds. There was no reason to believe these individuals were clinically different from their civilian counterparts.

Air Force outpatient medical clinic sites were recruited as a convenience sample and a site coordinator was selected at each study locations. Qualifications for the site coordinators included a basic familiarity with computers, patient contact as a routine part of their normal work, and supervisor approval for their work on the study. The five participating sites included Dover AFB (Dover, DE), Keesler AFB (Biloxi, MS), Scott

AFB (Belleville, IL), Andrews AFB (Washington DC), and Maxwell AFB (Montgomery, AL). Although diverse in geographical location, each facility provides the same level of medical services to similar populations of military medical beneficiaries. Each facility also provides comprehensive inpatient and outpatient nutritional services with the exception of Dover, which is limited by staffing and includes diet technicians but no registered dietitians.

Subject recruitment was primarily through medical clinics and diabetes education classes. Participation was voluntary, and the volunteers received no compensation for their participation in the study.

Hardware and Software

Program development was done with Multimedia ToolBook 3.0, a software development program by Asymetrix Corporation. ToolBook is considered relatively easy to use (Poston 1993, Hall 1996). Program designers need not be computer programmers in order to develop their lessons, although ToolBook programming has the ability to become very complex depending on the depth of the program. The Nutrition Facts lesson was relatively small and programming could be accomplished using the prewritten script commands in ToolBook.

The program was developed on a 486-66 megahertz central processing unit, IBM compatible computer. Color, graphic images, and text were used. Graphics were

scanned as tagged image format (tif extension) using a Hewlett Packard ScanJet 11c/ADF. These images were then imported into the ToolBook program.

Multimedia features also include applications such as audio and video which is available in ToolBook, however, a major consideration for using these applications was the capability of the hardware on which the program was installed. This did limit some applications. The computer hardware used in the study did not have the capability for sound, and it was decided not to use video which may have slowed the program for the user.

Another consideration in designing the program was the use of color. Colors can appear different on various computer monitors. The royal blue screen background used in the Nutrition Facts lesson ranged from royal blue, to navy blue, to purple on various monitors. Therefore, limiting the number of colors and attention to the contrast between colors was important in creating the overall design.

Once the lesson was complete, distribution copies were made by setting up runtime files which compressed and copied all the applications onto floppy disks. This allowed the lesson to be installed on the user's hard drive and created a program icon which could be used to start the lesson. The runtime file, including the Nutrition Facts lesson, required two 3.5" disks and 3.33 megabytes. The program was installed in five Air Force medical outpatient clinics.

Program Content

The target audience for the Nutrition Facts lesson was identified as individuals with the medical diagnosis of NIDDM and with an interest in learning about food labels. Three lesson objectives were developed for the learners.

After completing the Nutrition Facts lesson, the participant will be able to:

1. Locate key information listed on the label.
2. Compare nutrient content between labels.
3. Calculate nutrient content when the serving size consumed is different from the serving size listed on the label.

Prior to development of the computer software, the lesson content was selected and planned on paper to illustrate the screen design sequencing. In order to provide a focused lesson that would not overwhelm the learner with the complexity of all the information on the label, three key areas were chosen for the educational program. These included serving size, carbohydrate, and fat. These areas are consistent with the goals for medical nutrition therapy (ADA 1995), and addressed by Wheeler et al. (1994) as areas individuals with diabetes need to understand from the food label.

Understanding the label serving size is a critical element. The serving size establishes the standard for the amount of all the other nutrients listed for a particular food. The Nutrition Facts label serving sizes are standardized and based on the amount likely to be consumed at a single sitting. However, for an individual with diabetes depending on the type of meal plan used, the serving sizes suggested by a particular meal

plan may be different than the serving size listed on the label.

Knowledge of carbohydrate information is also critical for the individual with diabetes. Carbohydrate is the macronutrient having the strongest impact on blood glucose levels. Priority should be given to the total amount of carbohydrate eaten, with the goal of balancing food intake, activity, and medication (if needed) to achieve optimal blood glucose levels (Franz et al. 1994, ADA 1995).

Focusing on the total amount of carbohydrate rather than the source of carbohydrate consumed represents a fairly recent change in the nutrition recommendations for people with diabetes (ADA 1995). The idea that sugar has the greatest glycemic effect, and therefore should be avoided by all individuals with diabetes was based more on an assumption and has not been scientifically supported. These changing nutrition recommendations, along with a changing label format provided an opportunity to focus a section of the lesson on this important area.

The third area, fat, could also be called critical. Fat intake can effect both serum lipids and weight control. Individuals with NIDDM have a two to three times higher incidence of lipid abnormalities (Franz et al. 1994). In addition, the incidence of obesity in individuals with NIDDM has been estimated at over 80% (ADA 1993a). With the most recent publication of the nutrition principles for diabetes, the recommendations for controlling fat intake has also changed (Franz et al. 1994, ADA 1995). A reduction in total fat is recommended, but the major emphasis is a reduction in saturated fats as an important goal for reducing the risk of cardiovascular disease.

Program Design

A linear program design was used, which means all learners proceeded through the instructional material in the same order. A linear approach is limited in that it does not individualize the program content for each learner, however, for the purpose of presenting specific material in an organized manner the linear design was considered appropriate.

The Nutrition Facts lesson was designed to provide new information and practice opportunities for the learner, therefore, it was designed using instructional principles for the development of a tutorial. The content was organized using Gagnè's *Events of Instruction* (Gagnè et al. 1981) (Figure 1). Gagnè relates each event to a cognitive process which is considered important for effective learning. Not all instructional programs will include the entire sequence of steps, however, each step should be evaluated for possible inclusion. The need for including each event will vary based on the learning audience and learning objectives.

1. Gain the learner's attention
2. Inform the learner of the lesson objective
3. Stimulate recall of previously learned concepts
4. Present new information
5. Guide learning
6. Elicit practice response
7. Provide feedback
8. Assess performance
9. Enhance retention

Figure 1. Events of Instruction

Based on the lesson objectives, the learner was introduced to material in each of the three content areas (serving size, carbohydrate, and fat). Education was given using both text and examples. After a teaching sequence, the learner was given the opportunity to practice. All practice was in the form of multiple choice, clicking on the correct response. Immediate feedback was given and the correct response was given when an incorrect answer was selected. If the question was missed, the learner had the opportunity to try again. At the end of the lesson the objectives were reviewed. Prints of the computer screens are shown in Appendix J.

Program Evaluation and Revision

Throughout the process of program design and development ongoing program evaluation was conducted. During the initial formulation of the lesson this included reviewing available materials and consulting with nutrition and diabetes educators.

As the program was being developed on the computer, two stages of evaluation were conducted with the draft form of the program. These were done to determine where any revisions were needed in the instructional materials. The first stage was done by content experts in nutrition and instructional systems to solicit comments about the accuracy and completeness of the information provided, as well as the program design. The instructional content was judged accurate by all reviewers. Suggestions for program improvement included expanding the information presented on carbohydrate, including

additional practice activities, and rewording some of the text to improve the clarity of the information provided. These revisions were made.

The second stage was a one-to-one evaluation done with five individuals with NIDDM, who were not part of the final study. They represented a wide range of computer use experience, with two reporting they had never used a computer before, two reporting some familiarity with using computers at work, and one reporting a high level of computer experience both at work and at home.

During this review, the subjects were asked to think aloud and express any thoughts about the instructions provided, information presented, or graphics. This technique is described by Smith and Ragan (1993) as a useful approach in evaluating computer-based instruction. All subjects reported feeling positive about the information the program provided, and the experience interacting with the computer. The instructions, information, and graphics were all judged good. The content on carbohydrate still caused some confusion. This area was further expanded and reorganized. The word lipid was unfamiliar to three of the subjects. This was revised to include a definition. Other minor changes were made based on these evaluator's comments.

Questionnaire Development and Testing

Both the questionnaire and knowledge tests were developed for this study (Appendix A). They were designed using Dillman's (1978) *Total Design Method.*

The 23-item questionnaire was designed to collect demographic information as well as information about computer experience and characteristics related to food shopping and selection. A knowledge test of 13 items (12 multiple choice and one short answer) was designed to match the learning objective skills and the content areas taught in the Nutrition Facts lesson. The same questions were given for both the pretest and posttest, but the question order was changed to minimize a possible practice effect.

Both the questionnaire and knowledge test were administered as a pilot instrument to 28 individuals with NIDDM not involved in the final study. The alpha coefficient was calculated as an estimate of reliability. The questionnaire had an alpha = .74. The items related to computer experience had an alpha = .81 (5 items), and those related to food shopping and selection had an alpha = .70 (6 items). These reliability estimates were judged to be satisfactory.

The reliability estimate for the knowledge portion was calculated as alpha = .78 with the pilot sample, while in the actual study, reliability was calculated at alpha = .71 for the pretest, and alpha = .75 for the posttest. Two question items were not included in the posttest reliability estimates because they had zero variance (100% scored). The difference in the alphas for the pretest and posttest was not statistically significant. The mean knowledge test score for the pilot sample was 8.2 (68% correct) with a standard deviation of 2.8, indicating an acceptable level of test difficulty.

Study Protocol

Prior to beginning this study, permission was granted for use of human subjects in research from the Office for Regulatory Compliance of The Pennsylvania State University (Appendix B). Approval for use of a survey with Air Force medical beneficiaries was authorized through the Air Force Military Personnel Center (AFMPC) Randolph AFB, TX (Appendix C). The study was conducted between October and December 1995.

The site coordinators were given protocol guidelines (Appendix D) as well as appropriate study materials. Coordination throughout the study included written and telephone correspondence.

Each study participant was scheduled for a one hour clinic appointment. All testing was done on an individual basis. Both the intervention and the testing were scheduled to take place during the same session to avoid the confounding influences that can occur with delayed posttests.

When reporting for the scheduled appointment, the purpose of the study was explained and their informed consent was obtained (Appendix E). Next they were given the written questionnaire and pretest. After completion of the written portion, they began the Nutrition Facts computer lesson. Participant interaction with the computer was done with the computer mouse rather than the keyboard. If needed, prior to beginning the lesson, a demonstration on using the mouse was provided. The site coordinators collected

information on the length of time each participant spent on the computer lesson. The written posttest was conducted after the participant completed the computer program.

Statistical Analyses

Descriptive statistics were computed on all variables. The independent variables in this study included: gender, age, education, duration of diabetes, computer experience, and characteristics related to food shopping and selection. The dependent variable was knowledge about the Nutrition Facts food label as measured by a pretest and posttest. A one-way within-subjects analysis of covariance (ANCOVA) was used to test the significance of the posttest outcome while adjusting for the pretest. ANCOVA was conducted to test the significance of relationships between the posttest results and gender, and characteristics related to food shopping and selection. A semi-partial correlation was conducted between computer experience and posttest outcome. Pearson correlation was used to investigate possible relationships among variables. Mean scores were calculated on each test question to identify areas the participants answered successfully and those they did not. A significance level of $p < .05$ was set for all statistical tests. All of the analyses were completed using the Statistical Package for Social Sciences (SPSS release 4.1).

Chapter 4

RESULTS

Fifty four individuals with NIDDM were recruited to participate in this study. Of those, three were unable to complete the study. One was not feeling well, a second was not able to adapt to the use of the computer mouse, and a third participant reported difficulty understanding the material. English was not her native language. Therefore, the analysis was conducted using the results from 51 subjects.

Participant Characteristics

The questionnaire which was completed prior to taking the pretest, was designed to collect information on participant characteristics, their computer experience, and characteristics related to food shopping and selection. Participant characteristics are summarized in Table 1. Fifty seven percent of the subjects were male. Ages ranged from 25 to 76 with a mean age of 55.5 and a standard deviation (SD) of 10.7 years. Forty three percent had a high school education, with another 51% having further education after high school. Duration of diabetes ranged from one month (newly diagnosed) to 25 years, with a mean duration of 4.5 and a SD of 6.3 years (N = 49). Two individuals reported

Table 1. Participant Characteristics

Characteristics	N	%
Gender		
Male	29	57
Female	22	43
Age (years)		
25 - 55	25	49
56 - 76	26	51
Education level		
Less than 12th grade	3	6
High school or GED	22	43
Post high school	26	51
Duration of diabetes (N = 49)		
≤ 12 months	27	53
> 12 months	22	43
Monitor blood glucose		
Yes	40	78
No	11	22
Frequency of monitoring blood glucose		
Less than once a week	3	6
Several times a week	8	16
Daily	8	16
More than once a day	21	41
Instructed on diabetic meal plan		
Yes	49	96
No	2	4
Type of meal planning used[a]		
None	15	29
ADA exchange lists	20	39
Calorie counting	7	14
Carbohydrate counting	5	10
Other	6	12
Prescribed diet[b]		
Diabetic diet	42	82
Low sodium	13	25
Low cholesterol	8	16
Low fat	15	29
Low protein	2	4
Other	3	6

[a] Two participants selected more than one answer
[b] Participants circled all that applied

not knowing their date of diagnosis. Over half (53%) had been diagnosed within the twelve months prior to their participation in the study. Seventy eight percent reported that they monitor their blood glucose, with the largest percent (41%) reporting they monitor their blood glucose values more than once a day. Almost all the participants (96%) reported they had been instructed on a diabetic diet. The *ADA Exchange Lists for Meal Planning* was reported as the most frequently used meal plan (39%), however, another 29% reported using no meal planning. Write-ins for other types of meal planning included, "common sense", "minimum sugar", and "Weight Watchers".

Computer Experience

Responses related to computer experience are summarized in Table 2. Prior to the intervention, the majority of the participants (73%) responded that they felt using a computer program could be an effective way to learn about nutrition. Approximently half of the subjects could be classified as computer users, with 47% using a computer daily or weekly, and 53% rating themselves as very or moderately experienced with computers. Half (53%) have access to a computer at home. On the other hand, 48% reported very limited or no computer experience, and 27% said they have no access to computers.

There was a significant association between age and computer experience for four of the questionnaire items related to computer experience (Table 3), with younger individuals more likely to be computer users. Education was also correlated with

Table 2. Computer Experience

Questionnaire Items	N	%
Frequency of using a computer		
Daily	22	43
Weekly	2	4
Only occasionally	12	24
Never	15	29
Own a home computer		
Yes	26	51
No	25	49
Experience with computers		
Very experienced	8	16
Moderate	19	37
Very limited	10	20
None	14	28
Nutrition can be learned using computer[a]		
Yes	37	73
Not sure	14	28
Feelings about using a computer		
Very comfortable	14	28
Somewhat comfortable	16	31
No feelings one way or another	9	18
Somewhat or very uncomfortable	12	24
Access to a computer[b]		
None	14	27
At home	27	53
At work	23	45
Other	6	12

[a] The response No was not selected
[b] Participants circled all that applied

Table 3. Correlation (r) of Age and Education with Computer Experience (N = 51)

Questionnaire Items	Age	Education
Frequency of using a computer	-.3806**	.3146*
Own a home computer	-.2804*	.3502*
Experience with computers	-.4332**	.3825**
Nutrition can be learned using computer	-.2222	.0734
Feelings about using a computer	-.4779**	.3908**

* Significance $p < .05$
** Significance $p < .01$

computer experience. Computer users had higher levels of formal education. No correlation was seen between age and education.

Characteristics Related to Food Shopping and Selection

Table 4 summarizes the responses given to those questions related to food shopping and selection. Fifty nine percent of the participants reported that they read food labels frequently, with 67% reporting they do all or most of the food shopping. Sixty nine percent rated food labels as an extremely or very important guide for making food choices. Confidence in using food labels was rated lower, with only 28% rating themselves as extremely or very confident. The importance of the nutrition content of food to

Table 4. Characteristics Related to Food Shopping and Selection

Questionnaire Items	N	%
How often shop for food		
All the food shopping	13	26
Most of the food shopping	21	41
Occasionally or never	17	33
Rating of eating habits		
Very healthy	5	10
Relatively healthy	32	63
Relatively poor or poor	14	27
Frequency of reading food labels		
Never	5	10
Sometimes	16	31
Frequently	30	59
Confidence about using food labels		
Extremely or very confident	14	27
Somewhat confident	23	45
Slightly or not confident	14	27
Importance of nutrition content of food to diabetes		
Extremely important	21	41
Very important	21	41
Somewhat important	7	14
Slightly or not important	2	4
Importance of food labels in food selection		
Extremely important	13	26
Very important	22	43
Somewhat important	12	24
Slightly important	4	8
Has health care provider recommended using food labels as a guide in food selection ?		
Yes	37	73
No	10	20
Not sure	4	8

diabetes management and control was rated as extremely or very important by 82% of the participants, and 73% rated their overall eating habits as healthy.

There was a positive association between duration of diabetes and the frequency of reading food labels ($r = .375$; $p < .01$) (Table 5). A negative association was seen between duration of diabetes and the frequency of food shopping ($r = -.300$; $p < .05$). Neither age nor education were associated with any questionnaire items related to food shopping and selection.

Table 5. Correlation (r) of Age, Education, and Duration of Diabetes with Characteristics of Food Shopping and Selection (N = 51)

Questionnaire Items	Age	Education	Duration of Diabetes[a]
How often shop for food	-.1978	.0439	-.2996*
Rating of eating habits	.1689	.1272	.0963
Frequency of reading food labels	-.0948	.1691	.3747**
Confidence about using food labels	.1988	.1200	-.0282
Importance of nutrition content of food to diabetes	-.1321	.0244	.0691
Importance of food labels in food selection	.1080	-.0790	.1132

[a] N = 49
* Significance $p < .05$
** Significance $p < .01$

Knowledge Test Results

The mean score for the pretest was 9.1 with a SD of 2.2. The pretest scores ranged from 3 to 12. Twelve was the highest possible score. The posttest mean was 11.0 with a SD of 1.5 and a range from 5 to 12 (See Appendix F). A within-subjects ANCOVA indicated this was a significant improvement ($F_{1,50} = 78.37$, $p < .0001$). Age and pretest scores were negatively correlated ($r = -.366$; $p < .01$) (Table 6). Education and pretest scores were positively correlated ($r = .332$; $p < .01$). No other correlational relationships were identified between the independent variables and pretest scores.

As shown in Table 6, correlation analysis was conducted to investigate possible associations between age, education, duration of diabetes, time spent on the computer lesson and the posttest outcome. A difference score was calculated to adjust for the pretest. No relationship was seen for age, education, duration of diabetes, or the length of time spent on the computer lesson. There was a positive correlation between age and computer time ($r = .445$; $p < .01$), with older individuals spending more time on the computer. The average user time on the computer was 23 minutes, with a range from 10 to 46 minutes ($N = 45$). The length of time spent on the computer lesson was not reported for six participants.

A first order semi-partial correlation between a computer experience composite score and the posttest score, partialing out the effects of the pretest, was not significant ($r = .00$), meaning there was no correlation between computer experience and posttest

Table 6. Correlation (r) of Age, Education, Duration of Diabetes, Time Spent on the Computer Lesson, and Test Outcomes (N = 51)

	Age	Education	Duration of diabetes[a]	Time[b]	Pretest	Difference
Age	1.0000					
Education	.0514	1.0000				
Duration of diabetes[a]	-.1416	-.0732	1.0000			
Time[b]	.4453**	-.2334	-.1360	1.0000		
Pretest	-.3657**	.3315*	-.1175*	-.4223**	1.0000	
Difference	.1934	-.1074	.0002	.2212	-.7171**	1.0000

[a] N = 49
[b] N = 45
*Significant $p < .05$
**Significant $p < .01$

improvement.

As shown in Table 7, gender was significantly related to posttest scores with males scoring higher ($p = .032$). Frequency of reading food labels was significant ($p = .014$). The greatest improvement was seen for those reporting that they never or sometimes read food labels. Confidence about using food labels was also significant ($p = .039$) with the greatest test improvement seen for those reporting less confidence in their ability to use the food label as a guide for making food choices. In addition, the possibility of differences was examined between the five study sites. No statistically significant differences were seen.

Table 7. Analysis of Covariance for Posttest Scores

Source of Variation	DF	Mean Squares	F	Sig of F
Gender	1	5.15	4.865	.032*
Frequency of reading food labels	1	6.74	6.570	.014*
Confidence about using food labels	2	3.62	3.484	.039*

* indicates significance $p < .05$

Individual Test Item Responses

Individual pretest and posttest questions were analyzed to assess the more difficult content and skill areas related to label reading. The knowledge test was designed to evaluate the computer lesson learning objectives. Lesson content included serving size, carbohydrate, and fat. The skills included: locating key information listed on the label; comparing the nutrient content between labels; and calculating the nutrient content when the serving size consumed is different from the serving size listed on the label. Appendix I lists each question by both content area and skill.

Mean scores for the individual test questions were calculated and reviewed to determine if any particular content area or skill could be identified as more difficult. Four pretest questions and one posttest question scored < 75% (Table 8). Questions one through three, on Table 8, required carbohydrate knowledge, while question four required knowledge of serving size. Question one required the ability to compare labels, while

Table 8. Frequency of Responses for Most Frequently Missed Questions

Questions	Possible Answers	Responses	
		Pretest (N)	Posttest (N)
1. Would you expect a higher blood glucose after eating one serving from label A or one serving from label B?	1. Label A	24	8
	2. Label B[a]	25	42
	3. No difference	1	1
	4. Can't be figured	1	0
2. What is the most important consideration?	1. Kind of carbohydrate	8	2
	2. Total carbohydrate[a]	19	44
	3. Sugar content	16	3
	4. Fat content	6	2
3. What does sugars represent?	1. Added	13	7
	2. Added and natural[a]	25	33
	3. Naturally present	10	8
	4. Naturally added	2	2
4. How many calories in entire package?	1. 110	1	0
	2. 250	14	5
	3. 500[a]	35	46
	4. Can't be figured	1	0

[a] Correct answer

question four required the ability to calculate.

The scores improved from the pretest to the posttest for each question listed in Table 8. Question one improved from 49% correct to 82%, question two from 37% to 86%, question three from 49% to 65%, and question four from 69% correct to 90%.

As a follow-up to question number one as shown in Table 8, there was a short answer question which asked the subjects to explain why they chose their answer (Pretest question 5 & 6/Posttest 7 & 8. See Appendix A). The short answer response was scored as either correct or incorrect. On the pretest 49% of the participants answered the multiple choice question correctly, however, only 56% of those had the correct reasoning (14 participants). On the posttest, 82% answered the multiple choice correctly, and 88% of those had the correct reasoning (37 participants).

A content analysis of the short answer responses indicated that the predominant misconception was in selecting the label with the highest sugar content as the one which would have the greatest effect on blood glucose. Two other misconceptions included selecting a food label based on a higher caloric content or fat content. The short answer responses are shown in Appendix G.

Results of Hypotheses

H1: The results of this study support the first hypothesis. Knowledge test scores were significantly higher after the participants completed the Nutrition Facts

computer lesson.

H2: The most successful posttest outcomes were related to gender, frequency of reading food labels, and confidence in ability to use food labels. Successful posttest outcomes were not associated with age, education, duration of diabetes, or computer experience.

Other Data Collected

Participant comments about the computer program were solicited using three open ended questions which followed the posttest. Question 16 asked participants if there was any information about food labeling that the computer program did not provide. Ten of the study participants commented about the program content (Appendix H).

Question 17 (Would you recommend this computer program to others?) and question 19 (Are there any additional comments that you would like to make?) solicited numerous positive comments (Appendix H). With two exceptions, all participants reported that they would recommend the computer program to others. Sixty five percent rated themselves as feeling more confident about using a computer after this experience, and the majority (86%) rated themselves as feeling more confident about using food labels after viewing the program.

Chapter 5

DISCUSSION

The individuals in this study demonstrated a statistically significant improvement in their knowledge about the Nutrition Facts label after completing the computer lesson. This finding supports the usefulness of computer-assisted education as a means for providing patient education, and contributes to the expanding body of literature on the successful use of computers in diabetes education (Lefebvre et al. 1981, Wheeler et al. 1985, Wise et al. 1986, Kim et al. 1991, Turnin et al. 1992, Juge et al. 1993).

In the present study, the absolute test improvement was small. This was likely a consequence of the relatively high initial level of knowledge about the Nutrition Facts label seen with these participants. The average pretest score was 76%, which limited the range of improvement which could be achieved. Baseline participant knowledge about labeling information may have been underestimated when developing the evaluation tool, however, this was not detected with the pilot test of a similar population sample. The average score in the pilot sample was lower (68%) with a wider variation in scores.

Although the overall improvement can be considered small, this study identified several misconceptions among people with diabetes. Four test questions were identified as more difficult to answer based on the low percentage of participants who scored them

correctly.

Two of these questions were related to an understanding of the effect of carbohydrate on blood glucose. In one of the questions, the participants were asked to compare two labels and identify which would result in a higher blood glucose if one serving of each was consumed. Only 49% answered the question correctly on the pretest. In addition, the short answer responses indicated only half of those had the correct reasoning for having selected the right answer. The predominant misconception was identifying sugar, rather than total carbohydrate, as the dietary component having the greatest impact on blood glucose. Other misconceptions included selecting a food label because it listed a higher calorie or fat content as contributing to a higher rise in blood glucose.

For individuals with diabetes, the most serious consequence of evaluating foods only for their sugar content is not managing the hyperglycemia which results from consuming other carbohydrate-containing foods. Another problem for individuals with diabetes is related to the long-term difficulty of trying to restrict a diet for sugar content. Sugar-containing foods can be consumed, but should be substituted for other carbohydrate foods from the meal plan (Franz et al. 1994).

The misconception related to carbohydrate was also reflected by the answers to the question which asked what nutrient has the most important effect on blood glucose. Only 37% correctly answered that it is the amount of total carbohydrate consumed. Again, a large percent (31%) incorrectly selected the sugar content of the food.

This confusion about the glycemic effect of sugar is the result of a long-term and widely held belief that the dietary treatment of diabetes was to avoid sugars (Franz et al. 1994). This belief appears to be based on the assumption that sucrose and other sugars are more rapidly digested and absorbed than the starch form of carbohydrate. There is little or no scientific evidence, however, to support this assumption. Focusing on the total amount of carbohydrate consumed rather than the source of carbohydrate represents a fairly recent change in the nutrition recommendations for people with diabetes (ADA 1995).

Another concept that the participants had difficulty with was the definition of the term *sugars* on the Nutrition Facts panel. Half of the participants correctly answered that the value for sugars includes both added and naturally present sugars. Twenty five percent, however, answered the value represents only added sugars. The assumption that sugars represents only added sugars is not surprising. The word sugar is often used to describe the sweeteners which are commonly added to foods either at home or by the food industry. Adding to the confusion, is that sugar in the ingredient list refers to sucrose and not the other sugars (Shapiro 1995). And finally, the listing for sugars was voluntary prior to the Nutrition Facts panel which makes it a relatively new area for education.

Another test question which proved difficult involved a mathematical calculation in addition to understanding the concept of serving size. The participants were required to locate the package serving size, the number of servings per package, and the calories. They also needed to calculate how many calories would be consumed if the contents of the

entire package were consumed. In this case, the subjects were required to multiply the number of calories by two. Sixty nine percent of the participants were able to answer this question correctly on the pretest. Another 27%, however, incorrectly selected the value listed for calories without performing any calculation.

Other studies have been consistent with this finding. Klopp et al. (1981) found consumers had difficulty performing calculations using the label. Like the present study, consumers were asked to determine the content of various nutrients when the serving size was different from that listed on the package. In the calculation questions they tested, they found that the most frequent wrong answer was to select the value given on the label without making any calculations. In research by Jacoby et al. (1977), study participants were asked for the quantity of nutrients in the entire box. This required multiplying the number of servings by the nutrient value. Only half the participants were able to perform this calculation. Likewise, in Food and Drug Administration dietary judgement task studies, performance on calculation using the food label information was lower than for any other type of task tested (58 Fed. Reg. 2118, Jan. 6, 1993).

The results of the current study suggest that consumers have difficulty using the serving size information to make calculations with the food label information prior to education. The serving size establishes the standard for the amount of all the other nutrients listed for a particular food. Not understanding this relationship between serving size and the quantity of nutrients per serving could result in either under or overconsumption, which interferes with the ability to control blood glucose, weight, or

other nutritionally related medical conditions.

The difficulty seen in these areas prior to education adds support to the recommendations for food labeling education made by experts in the area of nutrition education in diabetes. Wheeler et al. (1994) identified serving size and carbohydrate information as two of the areas in which food labeling education could result in making food labels more useful in meal planning. The present study demonstrated that education in these areas was beneficial in increasing knowledge.

It was interesting to note that the majority of the participants in the present study reported they had been previously instructed on a diabetic meal plan, yet some major difficulties were identified prior to completing the Nutrition Facts lesson. Half the study participants reported a relatively recent diagnosis of diabetes; therefore, they should have been exposed to current dietary information. This reinforces the importance of providing not only initial education, but follow-up patient education as well.

Three characteristics of this study population were identified as being related to higher posttest outcomes. These included gender, food label reading, and confidence in using food labels.

In this study, males achieved a greater score on the posttest. Past studies have demonstrated gender differences related to computer anxiety and attitude, with males responding more favorably towards computers. More recent surveys have suggested that this attitude related gender gap is closing (Times Mirror Center 1994). This study looked at computer experience and found no relationship between those items and gender.

Previous research has been identified on gender attitudes and competencies related to computer use, however, no previous studies were identified which compared knowledge achievement based on gender differences in an adult or clinical population.

Individuals who reported "never" or "sometimes" reading food labels achieved a greater posttest improvement. There was no evidence that the individuals who reported frequently reading food labels started with more knowledge on the Nutrition Facts label based on their pretest scores. It is possible that because the Nutrition Facts label was less familiar to those who read labels less often, they were more attentive to the computer lesson than those who reported that they read food labels frequently.

Greater improvements were also seen for those who rated their confidence in using labels as being lower. An advantage of computer-assisted education is the active practice opportunity, and the feedback given to the learner (Billings 1986, Hannafin and Peck 1988). The Nutrition Facts lesson provided practice using the label information, feedback on the responses selected, and the opportunity to repeat practice questions. This strategy may have been particularly effective with those who initially felt less confident in their ability to use labels.

Age is sometimes suggested to be a factor in the acceptance of computer technology, with the assumption that older adults may be less accepting. Dennison et al. (1992) found older adults were receptive to computer-assisted nutrition instruction in a study designed to evaluate satisfaction with various educational methods. Leirer et al. (1988) also found older adults were positive towards computer technology, and that

computer training reduced medication nonadherence. Although older adults are less likely to own and use computers as reported both by a survey of technology in the American household (Times Mirror Center 1994) and as found in this study, age was not related to program learning achievement. Regardless of age, all participants were good candidates for computer-assisted education. This is an important finding for this clinical population since half of all people with NIDDM are over the age of 55 (ADA 1993a).

It was not an unexpected finding that older individuals spent a longer amount of time on the computer lesson. This may be a result of less practice using computers, or may reflect a learning characteristic of older adults. Older adults, reportedly, require a slower pace to learn (Carter et al. 1989). Therefore, self-paced methods such as computer-assisted education may be especially beneficial. For the diabetes educator, this means ensuring adequate time is given to the learner when using computer education, especially for older adults.

Computer experience was also unrelated to a successful outcome in this study, although lack of computer experience is often expressed as a concern by educators. Both Funnell et al. (1992) and Lewis (1994) found that diabetes educators expressed concerns about their patient's abilities to use computers. It was interesting to note that several of the participants in this study made this assumption as well. When asked if they would recommend the program to others, there were comments like "only if they can get over computer aversion" and "provided computer literacy or familiarity". A lack of difference between high and low computer experience has been demonstrated in other studies.

Deardorff (1986) reported similar knowledge gains and attitudes regardless of the level of previous computer experience.

In this study, duration of diabetes was not related to posttest scores. Wise et al. (1986) found a correlation between knowledge improvement and individuals with newly diagnosed diabetes using interactive computer teaching. He suggested that the individuals who have been more recently diagnosed might be more concerned and, therefore, more receptive to education, resulting in higher knowledge achievements. His research, however, differed from the current study in that it tested a comprehensive diabetes education program. It is likely that a one-time instruction on a specific topic such as the Nutrition Facts label would not measure differences based on duration of diabetes.

Program Design

Several features were thought to contribute to the success of the program. The Nutrition Facts lesson was designed using *Events of Instruction* developed by Gagné et al. (1981) which provided a comprehensive system of planning and developing the computer program. This included using the capabilities of the computer to enhance the information provided.

The learner's attention was gained by using rhetorical questions, highlighting key words, and using color and graphics. Lesson objectives were provided to the learners through a simple statement at the beginning of the program. New information was

presented with examples, followed by an opportunity for the learner to practice using the new information. Immediate feedback was given on all practice problems. And finally, at the conclusion of the program the lesson objectives were again reviewed.

The importance of using sound instructional principles was emphasized by the identification of a weakness in the Nutrition Facts lesson. Information on the definition of sugars was presented in only one computer frame. Although an improvement was seen on this particular question from the pretest to the posttest, it was a much smaller improvement than was seen for the other questions. This lack of message repetition was also reflected by several participants commenting on the lack of information about sugars. This finding emphasizes that reinforcement is an important factor for effective learning.

A linear program design was used successfully in this study; however, a branching program design would have provided the capacity to individualize the education. A goal of the Nutrition Facts lesson was to provide focused education that would not overwhelm the learner; therefore, the content was limited to three areas which were considered of primary importance. More complex concepts, such as daily values, were not included as part of the Nutrition Facts lesson. A comprehensive label educational program which included a learner assessment would have allowed the lesson material to be tailored to meet the needs of the individual learner.

Limitations of the Study

There are several limitations to consider when interpreting this study. The results are based on a relatively small sample size and the participants were not randomly selected. The individuals who participated in this study may not represent those who are most apprehensive about using computers, or those with little interest in food labels. In addition, the assumption was made that a military medical population was similar to the civilian population. There may be differences between these populations that were not identified in this study. These results can not, therefore, be generalized to all patients with diabetes. Secondly, the study results are based on a one-time intervention. It could be debated whether the program effectiveness is adequately reflected in a one-time session. A third limitation is that the data collection relied on self-reported information. Another possible limitation is that the Nutrition Facts lesson relies heavily on reading and visual skills, although for a topic such as food label reading this may be appropriate. And finally, this study was not designed to measure the impact of computer-assisted education beyond knowledge.

Implications for Clinical Practice

The findings from this study suggest that efforts should be made to incorporate computer-assisted education as an educational tool in diabetes. The assumption should

not be made that patients are not receptive to computer education. Anderson et al. (1992) found that diabetes educators generally have favorable attitudes towards computers, however, they most often used computers for administrative and clerical tasks. These researchers recommended encouragement and demonstrations of computer efficacy in support of patient education. In the present study, no difference was seen between high and low computer experience. In addition to their success in the knowledge test, the participants overwhelmingly indicated that this had been a positive educational experience. The findings of this study do not support the belief that patients will be resistant to computer education.

Lack of time for teaching has been identified as a major barrier to effective patient education (Giloth 1990). Diabetes educators distribute large amounts of information, and often have large client populations needing education. Coonrod et al. (1994) found that our traditional methods of educating this large population are not sufficient, reporting that a large proportion of patients with diabetes have never received diabetes education. Computer-assisted education has the ability to augment the education provided by educators.

Wheeler et al. (1985) demonstrated that the use of computer programs can release the dietitian's time from repetitive education and suggested this can provide the educator the time to focus on personal counseling and individual patient problem areas. Topics such as food labels, which are a consistent source of nutrition information, may be optimal for computer-assisted educational methods.

A program such as the Nutrition Facts lesson could be used in various clinical settings including as a supplement to other educational methods, as an information source at times and locations where there is no nutrition educator available, or to make use of patient waiting times. Based on findings from this study, it may be especially effective with individuals who express less familiarity with food labels, or less confidence in their ability to use them.

From the results of the current study, these consumers were able to locate information on the label and compare labels. This is consistent with how consumers say they are most likely to use labels (Shapiro 1995). Previous research indicates consumers tend to use labels for simple tasks such as to get a general idea of nutrient content and to compare different types of food items. Making calculations using label information, on the other hand, seemed to be more difficult. This suggests that providing education on performing calculations with the label information may provide the greatest benefit. For the individual with diabetes this is especially important since their meal plan serving sizes can differ from the serving sizes listed on the labels.

There is no doubt that label education is needed for consumers with NIDDM to understand concepts related to carbohydrate and its effect on blood glucose. Prior to education, there were misconceptions identified with the content related to carbohydrate. Education on carbohydrate was successfully provided as a key part of the Nutrition Facts computer lesson.

Conclusion

The goal of this study was to develop a nutrition education program that resulted in knowledge about food labeling. Fifty one participants with non-insulin-dependent diabetes mellitus completed this study. These participants represented a wide range of computer experience and ages, and all demonstrated success with computer-assisted education as measured by knowledge test scores. The study pretest identified lower levels of knowledge related to carbohydrate, and to the relationship between serving size and the nutrients listed on the label. Education targeted in these areas was successful in improving responses on the posttest. A limited number of concepts were tested in this study. A next step would be to test comprehension and the ability to use of other areas of the food label which were not included in this study. This research also suggests that males, individuals who read labels less often, and those who rated their confidence in using labels as being lower were the most successful with the educational computer program. Speculation was made regarding possible explanations for these results, but exploring these outcomes further may be useful. Based on the results of this study, it is concluded that computer-assisted education is effective in increasing knowledge about food labeling with this population.

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Appendix A
Questionnaire and Knowledge Pretest/Posttest

Form A ____

Name:_____

Sponsor's ID number:_____

The following questions ask about you and your nutritional habits. Please circle your answer or fill in the blank as indicated. Please answer all the questions. Your answers will be completely confidential.

1. What is your gender?
   1. Female
   2. Male

2. Your present age:_____Years.

3. Please circle your education level.
   1. Less than 12th grade
   2. High school or GED
   3. Vocational or technical school after high school
   4. Bachelor's degree
   5. Advanced degree

4. Date your diabetes was diagnosed:_____Month and Year.

5. Have you ever been instructed on a diabetic meal plan?
   1. Yes
   2. No
   3. I'm not sure

6. Do you monitor your blood glucose (perform home glucose fingersticks)?
   1. Yes
   2. No

7. If you monitor your blood glucose, how often on average?
   1. Less than once a week
   2. Several times a week
   3. Daily
   4. More than once a day
   5. I don't monitor my blood glucose

8. How often do you shop for food for yourself or your household?
   1. Never
   2. Occasionally
   3. Most of the food shopping is done by me
   4. All of the food shopping is done by me

9. Approximately how often do you use a computer?
   1. Never
   2. Daily
   3. Weekly
   4. Only occasionally

10. Do you own a home computer?
   1. Yes
   2. No

11. Where do you have access to a computer? (circle all that apply)
   1. I don't have access to a computer
   2. At home
   3. At work
   4. At school
   5. Other_____(please describe)

12. How much experience do you feel you have with computers?
   1. None
   2. Very limited
   3. Moderate
   4. Very experienced

13. Do you think using a computer program could be an effective way to learn about nutrition?
   1. Yes
   2. No
   3. I'm not sure

14. How do you feel about using a computer?
   1. Very uncomfortable
   2. Somewhat uncomfortable
   3. No feelings one way or another
   4. Somewhat comfortable
   5. Very comfortable

15. How would you rate your arithmetic skills?
    1. Highly skilled
    2. Relatively skilled
    3. Relatively unskilled
    4. Unskilled

16. What type of meal planning do you use?
    1. None
    2. ADA Exchange Lists
    3. Calorie Counting
    4. Carbohydrate Counting
    5. Other_____(please describe)

17. Have any of the following diets been prescribed for you? (circle all that apply)
    1. Diabetic diet
    2. Low sodium (or low salt)
    3. Low cholesterol
    4. Low fat
    5. Low protein
    6. Other_____(please describe)

18. How would you rate your overall eating habits?
    1. Very healthy
    2. Relatively healthy
    3. Relatively poor
    4. Poor

19. How often do you read food labels?
    1. Never
    2. Sometimes
    3. Frequently

20. How confident are you about your ability to use the food label as a guide for making food choices?
    1. Extremely confident
    2. Very confident
    3. Somewhat confident
    4. Slightly confident
    5. Not confident

21. How important is information on the nutrition content of food to your diabetes management and control? 72
    1. Extremely important
    2. Very important
    3. Somewhat important
    4. Slightly important
    5. Not important

22. How important is the information on food labels in assisting you to select food?
    1. Extremely important
    2. Very important
    3. Somewhat important
    4. Slightly important
    5. Not important

23. Has your health care provider ever recommended that you use the food labels as a guide for selecting foods?
    1. Yes
    2. No
    3. I'm not sure

Please answer the following questions. For some of the questions you will need to use the sheet showing Label A and Label B.

1. What effect does eating have on your blood glucose level?
    1. Lowers it
    2. Raises it
    3. There is no effect
    4. The effect is not known

2. Look at label A. What is the portion size of one serving?
    1. 4
    2. 1 cup
    3. 150 calories
    4. Can't be figured from this label

3. Look at label A. If you ate two servings of this food, how many grams of saturated fat would you be eating?
    1. 35
    2. 24
    3. 5
    4. Can't be figured from this label

4. Compare label A and label B. If you were limiting your sodium intake which food choice would be best?
   1. Label A
   2. Label B
   3. There is no difference
   4. Can't be figured from these labels

5. Compare label A and label B. Would you expect a higher blood glucose after eating one serving from label A or one serving from label B?
   1. Label A
   2. Label B
   3. There is no difference
   4. Can't be figured from these labels

6. Please explain why you chose the answer you did in question number 5.

   _____

   _____

   _____

7. Look at label B. How many grams of total carbohydrate are there in 1 cup?
   1. 10
   2. 250
   3. 31
   4. Can't be figured from this label

8. When considering carbohydrate's effect on your blood glucose, what is the most important consideration?
   1. The kind of carbohydrate you eat
   2. The total amount of carbohydrate you eat
   3. The sugar content of the food
   4. The fat content of the food

9. Look at sugars as listed on either label example. What does the value listed represent?
   1. Added sugars
   2. Added sugars and naturally present sugars
   3. Naturally present sugars
   4. Naturally added sugars

10. Look at label B. If you ate the entire package, how many calories would you be eating?
    1. 110
    2. 250
    3. 500
    4. Can't be figured from this label

11. Eaten together, one serving from label A and one serving from label B provide how many grams of total carbohydrate?
    1. 48
    2. 34
    3. 62
    4. Can't be figured from this label

12. Compare label A and label B. Which food label lists more dietary fiber?
    1. Label A
    2. Label B
    3. There is no difference
    4. Can't be figured from these labels

13. Look at label B. If you ate a ½ cup portion, how many grams of total fat would you be eating?
    1. 12
    2. 18
    3. 6
    4. Can't be figured from this label

Once complete, you are ready to view the educational program.

Form B_____

Name:_____

Sponsor's ID number:_____

This is the last step! Please answer the following questions by circling your answer or filling in the blank as indicated. For some of the questions you will need to use the sheet showing Label A and Label B. Please answer all the questions. Your answers will be completely confidential.

1. Look at label A. If you ate two servings of this food, how many grams of saturated fat would you be eating?
   1. 35
   2. 24
   3. 5
   4. Can't be figured from this label

2. Look at label B. How many grams of total carbohydrate are there in 1 cup?
   1. 10
   2. 250
   3. 31
   4. Can't be figured from this label

3. Look at label B. If you ate the entire package, how many calories would you be eating?
   1. 110
   2. 250
   3. 500
   4. Can't be figured from this label

4. Look at label B. If you ate a ½ cup portion, how many grams of total fat would you be eating?
   1. 12
   2. 18
   3. 6
   4. Can't be figured from this label

5. Compare label A and label B. If you were limiting your sodium intake which food choice would be best?
   1. Label A
   2. Label B
   3. There is no difference
   4. Can't be figured from these labels

6. When considering carbohydrate's effect on your blood glucose, what is the most important consideration?
   1. The kind of carbohydrate you eat
   2. The total amount of carbohydrate you eat
   3. The sugar content of the food
   4. The fat content of the food

7. Compare label A and label B. Would you expect a higher blood glucose after eating one serving from label A or one serving from label B?
   1. Label A
   2. Label B
   3. There is no difference
   4. Can't be figured from these labels

8. Please explain why you chose the answer you did in question number 7.

   _____

   _____

   _____

9. What effect does eating have on your blood glucose level?
   1. Lowers it
   2. Raises it
   3. There is no effect
   4. The effect is not known

10. Eaten together, one serving from label A and one serving from label B provide how many grams of total carbohydrate?
    1. 48
    2. 34
    3. 62
    4. Can't be figured from this label

11. Look at label A. What is the portion size of one serving? 77
    1. 4
    2. 1 cup
    3. 150 calories
    4. Can't be figured from this label

12. Look at sugars as listed on either label example. What does the value listed represent?
    1. Added sugars
    2. Added sugars and naturally present sugars
    3. Naturally present sugars
    4. Naturally added sugars

13. Compare label A and label B. Which food label lists more dietary fiber?
    1. Label A
    2. Label B
    3. There is no difference
    4. Can't be figured from these labels

Please circle your rating for the following statements. Ratings go from 1, which means that you "strongly agree", to 5, which means that you "strongly disagree".

14. Now that I've used this computer program, I feel more confident about using a computer.

Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
1	2	3	4	5

15. After viewing this computer program, I feel more confident about using food labels as a guide to making food choices.

Strongly Agree	Agree	Neither Agree or Disagree	Disagree	Strongly Disagree
1	2	3	4	5

16. Is there any information about food labeling that this computer education program did not provide?
    Please comment:

17. Would you recommend this computer education program to others?
    1. Yes
    2. No

    Please comment:

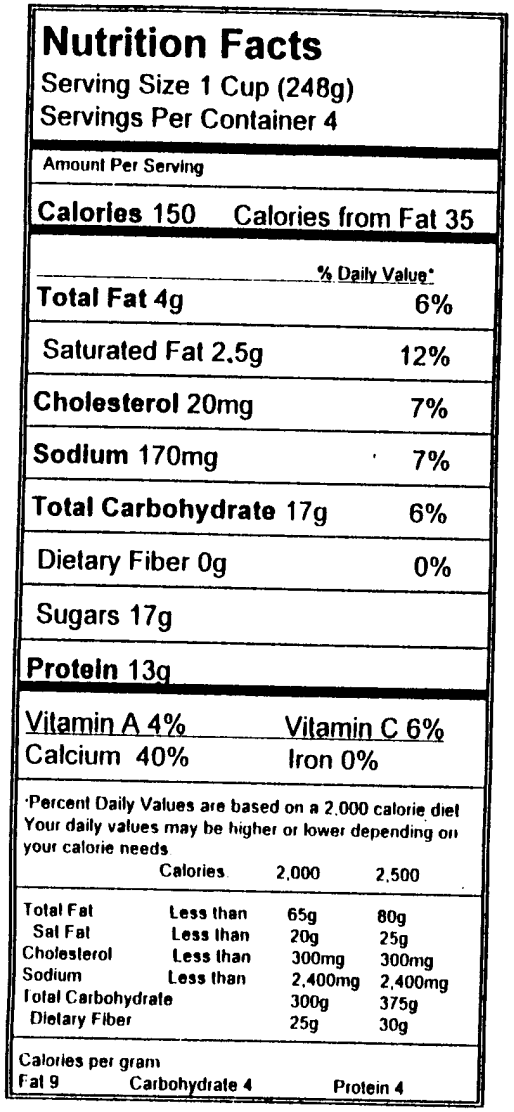
18. Are there other methods of learning food labeling information that you feel would have been more effective?
    1. None
    2. Video tape instruction
    3. Written workbook
    4. One-to-one instruction
    5. Classroom or group instruction
    6. Other_____(please describe)

19. Are there any additional comments that you would like to make?

Thank you for your time.

Sincerely, Deborah Downes, Capt, USAF, BSC
Feel free to contact me if you have further comments or questions.

Label A



Nutrition Facts
Serving Size 1 Cup (248g)
Servings Per Container 4

Amount Per Serving

Calories 150 Calories from Fat 35

	% Daily Value*
Total Fat 4g	6%
Saturated Fat 2.5g	12%
Cholesterol 20mg	7%
Sodium 170mg	7%
Total Carbohydrate 17g	6%
Dietary Fiber 0g	0%
Sugars 17g	
Protein 13g	

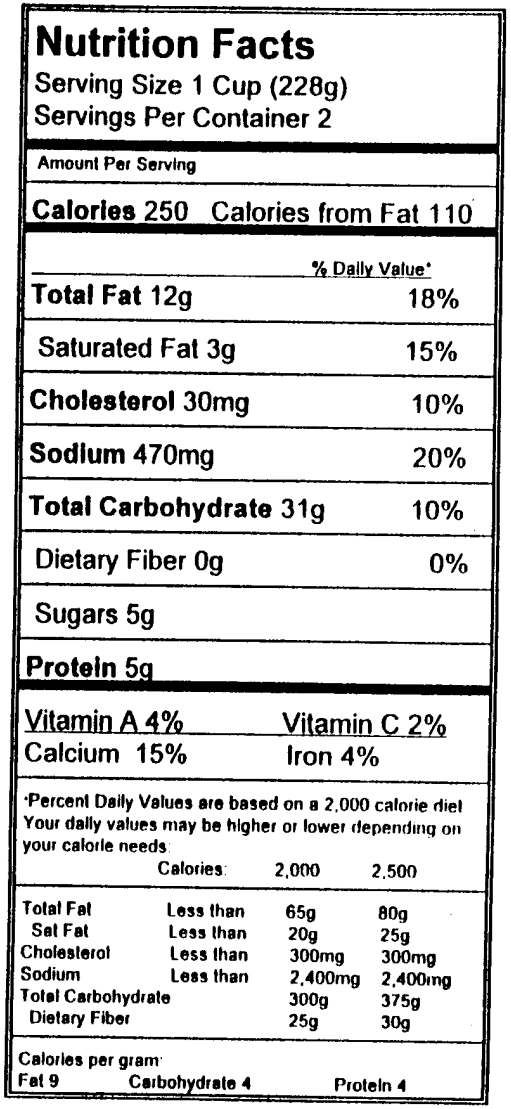
Vitamin A 4% Vitamin C 6%
Calcium 40% Iron 0%

*Percent Daily Values are based on a 2,000 calorie diet Your daily values may be higher or lower depending on your calorie needs

		Calories: 2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram
Fat 9 Carbohydrate 4 Protein 4

Label B



Nutrition Facts
Serving Size 1 Cup (228g)
Servings Per Container 2

Amount Per Serving

Calories 250 Calories from Fat 110

	% Daily Value*
Total Fat 12g	18%
Saturated Fat 3g	15%
Cholesterol 30mg	10%
Sodium 470mg	20%
Total Carbohydrate 31g	10%
Dietary Fiber 0g	0%
Sugars 5g	
Protein 5g	

Vitamin A 4% Vitamin C 2%
Calcium 15% Iron 4%

*Percent Daily Values are based on a 2,000 calorie diet Your daily values may be higher or lower depending on your calorie needs

		Calories: 2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

Calories per gram
Fat 9 Carbohydrate 4 Protein 4

Appendix B
Human Subjects Permission

PENNSTATE

1855

Senior Vice President for Research and
Dean of the Graduate School
Office for Regulatory Compliance

(814) 865-1775
Fax: (814) 863-8698

The Pennsylvania State University
212 Kern Graduate Building
University Park, PA 16802-3301

Date: June 29, 1995

From: Karen J. English, Research Coordinator

To: Deborah A. Downes

Subject: Proposal for Use of Human Subjects in Research - Exemption **(#950975-00)**

"Effectiveness of Computer-Assisted Education for Providing Food Labeling Education to Consumers with Diabetes Mellitus"

Your proposal for use of human subjects in your research has been reviewed and **approved for a one-year period**. Subjects in your research are at minimal risk.

COMMENT: Upon receipt, please forward a copy of the letter from the medical outpatient clinic acknowledging their agreement to participate in your study.

Attached are mailing labels you can use to forward to 212 Kern Building the original, signed informed consent forms obtained from the subjects of your study. Contact this office if you need more labels.

Subjects must receive a copy of the informed consent form and the written explanation of your study that was submitted to this office for review.

By accepting this decision you agree to notify this office of (1) any additions or changes in procedures for your study that modify the subjects' risks in any way and (2) any events that affect the safety or well-being of subjects.

The University appreciates your efforts to conduct research in compliance with the federal regulations that have been established to ensure the protection of human subjects.

KJE/slk

Attachments

cc: C. Probart
J. Milner
H. Lundegren

Appendix C
USAF Survey Approval

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AIR FORCE MILITARY PERSONNEL CENTER
RANDOLPH AIR FORCE BASE TEXAS

19 July 1995

MEMORANDUM FOR AFIT/XO
ATTN: MS HOUTZ

FROM: AFMPC/DPSAS
550 C Street West, Ste 35
Randolph AFB TX 78150-4737

SUBJECT: Survey Approval (Downes)

Captain Downes' proposed survey is approved for use with military dependents and retirees in an Air Force hospital or clinic setting. A survey control number (SCN) of USAF SCN 95-75 is assigned and expires on 31 Dec 95. Questions regarding this action can be addressed to me at DSN 487-5680.

CHARLES H. HAMILTON
Chief, Survey Branch

Appendix D
Study Protocol

29 Sep 1995

MEMORANDUM FOR SITE COORDINATORS

FROM: The Pennsylvania State University
126-S Henderson Bldg
University Park PA 16802

SUBJECT: Computer Education Study Protocol

1. Inside this packet you will find the following:

a. Two computer diskettes labeled Disk 1 and Disk 2
b. Instructions for installing the computer program on your hard drive
c. 30 information pamphlets for the participants (light green)
d. 30 informed consent forms (in duplicate) stapled to the Form A questionnaire (6 pages)
e. 30 one-page sheets showing Label A and Label B
f. 30 Form B questionnaires (4 pages)
g. Instructions for implementing and conducting the study
h. A sample folder with participant checklist
I. Two return mailing envelopes

2. I will call you a few days after you have received the packet. Please read the following instructions carefully, so we can discuss any questions you might have.

Deborah A. Downes

DEBORAH A. DOWNES, Capt, USAF, BSC
AFIT Student

Instructions for Implementing and Conducting the Study

1. If you have not already, you will need to arrange for a computer to be available for the study participants to view the program. Like any other patient education session, the computer should be located where the participant will be comfortable and have privacy.

2. Install the computer education program using the instructions provided. Then run through the program yourself to get familiar with it.

3. Look through the sample folder. This contains an example of each item the participant will need, and some additional notes.

4. Individual appointments should be scheduled for each participant. Allow one hour for each participant.

When a Participant Reports for their Appointment

1. To begin the appointment session, give the participant a copy of the light green pamphlet titled "Food Labeling". That is for them to keep. They should read it over.

2. Next, complete the Informed Consent form. Read it through with them. They should print their name on the first blank and then sign and date the bottom of the form (see sample). You also sign and date. Tear off the top copy (white) and give it to the participant to keep. The yellow copy stays attached to the Form A questionnaire.

3. Now have them complete Form A. They will also need a copy of the sheet with Label A and Label B on it to answer some of the questions. Please **do not** help answer any of the questions for them. If they are unsure, tell them to select the best answer.

4. After they complete Form A, look it over to be sure all the questions have been answered. They are now ready to view the computer program.

5. Ask the participant if they have ever used a computer or a computer mouse before. If they have not, help them feel comfortable by explaining that they will be looking at the monitor or screen, and demonstrate how to move the mouse around on the desk to point to different areas of the computer screen. Also, demonstrate how to click the mouse. A computer mouse can work differently on different computers, so even someone who knows how to use a mouse may need to be shown which button to click. The mouse only needs **one** click to answer questions in the program or move to the next screen.

6. Now let them begin the computer program. Record the time they begin the computer program on the checklist. If they have problems with the computer, you should be available to help, but again **do not** answer any questions for them. If they seem to want to ask questions, it might be helpful to have a paper tablet next to the computer for them to write down their questions or comments.

7. After they have completed the computer program, record the time they ended the program.

8. Next they should complete Form B. They will need the sheet showing Label A and Label B again to answer some of these questions.

9. Before they leave your office, look over Form B to be sure all the questions have been answered.

10. Thank the participant for their time.

Record Keeping and Other Important Information

1. If at any time during the session a participant decides they want to stop, that's okay. Just keep any paperwork they have completed to return to me. Also make a note in the comment section of the checklist that the participant did not complete the study and the reason why.

2. After you have tested the first 10 participants, mail their signed consent forms, Form A, Form B, and the checklist to me. Mail the rest of the participant's paperwork after you have tested the next 15 or more.

3. Once you are done testing the study for me, the computer program is yours to use. There is no copyright, and the program can be installed on any IBM compatible computer.

4. Because this is a research study, it is extremely important to follow the above steps as consistently as possible with all participants. The checklist should help you be sure all parts of the session were completed.

5. Thank you for helping with this project. It would not be possible to evaluate this method of education without your help.

Instructions for Installing the Computer Education Program

1. Once your computer is started and windows is running, insert the 3.5" disk labeled Disk 1. *(Along with these written directions, I've included pictures of the various computer screens that you will see to help you if the written directions are not clear.)*

2. From within the Program Manager, choose "Run" from the File menu.

3. In the Command line type "A:\Setup.exe" (or "B:\Setup.exe" if your computer uses the B drive) and click okay. *(Another way to do this, is to click on "Browse...", then select the drive where Disk 1 is located. Then click on "setup.exe", and click on okay.)*

4. Now click on okay again.

5. When asked to select an option, click on "Full - Install all files."

6. The runtime version of ToolBook, and the food label education program are now being copied onto your hard drive. Follow the instructions when asked to insert disk 2.

7. When asked "Do you want setup to create Program manager groups?", click on "Yes".

8. You double click the "Nutrition Facts" icon to launch the program.

9. Before viewing the program for yourself or a patient, maximize the screen.

10. To Exit, select "Exit" under the File menu.

11. If needed, you can use the Page menu to move around in the program. There shouldn't be any reason for any of the participants to need this option.

Appendix E
Informed Consent

Computer-Assisted Education on Food Labeling for Consumers with Diabetes Mellitus

Deborah Downes, Capt, USAF, BSC
Principal Investigator

Description of Study

The purpose of this project is to determine the effectiveness of computer-assisted instruction for education on food labeling.

If you agree to participate, you will be asked to complete a written pre and post test, and demographics and food label use questionnaire. You will also work through an educational food label computer program. You can stop the computer lesson at any time if necessary. The data from this study will be used to determine the effectiveness of computer education on food label reading and the groups of consumers for whom this is most effective. This is a one-time session, and your participation in this project will take approximently one hour.

If you do not wish to participate, notify the site coordinator.

You are under no risk from participating in this project. The data will be confidential and only group data will be reported. The results of this study may improve food labeling education for consumers with diabetes mellitus. If you have any questions or concerns, please contact Capt Downes at (814) 237-9573.

Informed Consent

This is to certify that I,_____, hereby agree to participate as a volunteer in this study as an authorized part of the Air Force Institute of Technology in cooperation with the education and research program of The Pennsylvania State University under the supervision of Capt Deborah Downes and Dr. Claudia Probart, assistant professor Penn State University.

I understand that my participation is voluntary. I am free to stop participating in the research at any time, or to decline to answer any specific questions without penalty. I am 18 years or older and eligible for health care in a military facility.

_____ _____
Participant's Signature Date

_____ _____
Investigator's Signature - Deborah Downes Date

_____ _____
Site Coordinator's Signature Date

Appendix F
Knowledge Test Data

3-FEB-96 SPSS RELEASE 4.1 FOR IBM VM/CMS

17:39:11 PENNSYLVANIA STATE UNIVERSITY IBM 3090-600S
SPSS 4.1

Subject	Pretest	Posttest
1	7.00	9.00
2	5.00	6.00
3	9.00	11.00
4	12.00	12.00
5	4.00	5.00
6	9.00	11.00
7	10.00	12.00
8	12.00	11.00
9	4.00	10.00
10	10.00	12.00
11	10.00	12.00
12	10.00	11.00
13	9.00	11.00
14	10.00	11.00
15	8.00	11.00
16	5.00	7.00
17	7.00	11.00
18	12.00	12.00
19	9.00	12.00
20	11.00	11.00
21	8.00	11.00
22	10.00	11.00
23	3.00	10.00
24	10.00	12.00
25	10.00	12.00
26	11.00	12.00
27	11.00	12.00
28	9.00	11.00
29	10.00	11.00
30	11.00	11.00
31	8.00	11.00
32	10.00	11.00
33	10.00	11.00
34	10.00	12.00
35	10.00	10.00
36	6.00	8.00
37	8.00	12.00
38	8.00	11.00

(Con't)

Subject	Pretest	Posttest
39	10.00	12.00
40	12.00	12.00
41	12.00	12.00
42	9.00	12.00
43	7.00	11.00
44	10.00	12.00
45	10.00	12.00
46	10.00	11.00
47	12.00	12.00
48	7.00	11.00
49	10.00	12.00
50	10.00	12.00
51	9.00	12.00

VARIABLE	MEAN	STD DEV	MINIMUM	MAXIMUM	N
TIME	23.56	9.93	10	46	45
AGE	55.53	10.70	25	76	51
Pretest					
Q1	.75	.44	0	1	51
Q2	.90	.30	0	1	51
Q3	.78	.42	0	1	51
Q4	.92	.27	0	1	51
Q5	.49	.50	0	1	51
Q6	.86	.35	0	1	51
Q7	.37	.49	0	1	51
Q8	.49	.50	0	1	51
Q9	.69	.47	0	1	51
Q10	.96	.20	0	1	51
Q11	.98	.14	0	1	51
Q12	.90	.30	0	1	51
Posttest					
I1	.90	.30	0	1	51
I2	.96	.20	0	1	51
I3	.94	.24	0	1	51
I4	1.00	.00	1	1	51
I5	.82	.39	0	1	51
I6	.98	.14	0	1	51
I7	.86	.35	0	1	51
I8	.65	.48	0	1	51
I9	.90	.30	0	1	51
I10	1.00	.00	1	1	51
I11	.98	.14	0	1	51
I12	.98	.14	0	1	51
PRE	9.10	2.17	3.00	12.00	51
POST	10.98	1.52	5.00	12.00	51

Appendix G
Short Answer Responses

Short Answer Responses to Pretest Question 6: "Please explain why you chose the answer you did in question number 5".

The number in parenthesis indicates the multiple choice answer selected in question number 5. Answer 2 was the correct answer. To be counted as correct, short answer response needed to address carbohydrate.

(1) Label B is higher in sugar
(2) Calorie content
(1) Try to eat good food and my sugar has been doing good. Lost 15 pounds
(1) Because carbohydrates are nothing but complex sugars, and when added with simple sugar it comes out higher.
(2) Label B has 12g total fat/carb 31g. Label A has 4g total fat/carb 17g.
(2) Carbohydrate
(1) Because label A has more grams of sugar
(2) Label B has more calories than label A
(2) Label B only 5 gram sugar
(1) 17g sugar
(2) Label B has more calories per serving, the sodium contents are high, and more carbohydrate
(2) Fats increase blood glucose
(1) Sugar
(1) The sugar is higher
(1) A has more sugars
(2) Total carbohydrate higher
(1) Label A - 17 g sugar, Label B - 5 g sugar
(2) Because it has more calories than label A
(1) Label A has 17g of sugar. Label B has 5g of sugar.
(1) Lower proteins
(2) I'm not sure, just my instinct
(2) Total calories and calories from fat
(1) Totals from carbohydrates and sugars
(2) The total carbohydrates and fat percentages are higher on Label B thus causing more sugar in the blood
(2) More calories and fat, but I'm guessing
(2) Because of total fat % and amount of calories from fat
(4) Don't know how to read labels for content
(2) Saturated fat is higher with label B. Total carbohydrates is higher with label B.
(1) Label A sugars 17g, Label B sugars 5g
(2) Total carbohydrate content
(1) Label A has 17g of sugar. Label B has 5g of sugar -- but I'm not sure if I should be concerned with sugar content or carbohydrate content -- more carbohydrates in label B.
(2) If I'm correct carbohydrate turns to sugar
(1) Because the sugar levels 17g vs 5g
(2) Calories are higher and so is total carbohydrates

(1) Because of the amount of sugar contained in Label A. It's higher.
(1) One serving has 17g of sugar
(2) Label B because of the 31 grams of carbohydrates
(1) Because it has more grams from sugars
(1) Difference in sugar content
(1) Because it has more grams
(1) A=17g, B=5g
(1) Because of 17g of sugar instead of 5g
(2) Lower sugar per serving
(2) Serving size is the same and carbohydrate is higher in B and calories are higher in B (less influence)
(2) High carbohydrate level
(1) Label B has 5g per serving, Label A has 17g per serving
(2) Real high carbohydrate levels
(1) A = 170 mg and B = 470 mg per serving
(2) B is higher in calories, total fats, sodium is much higher, cholesterol is higher
(2) Higher in calories, fats, carbohydrates, and sodium
(3) Fat, carbohydrate, protein same

Short Answer Responses to Posttest Question 8: "Please explain why you chose the answer you did in question number 7".

This was the same question as pretest question 6. The number in parenthesis indicates the multiple choice answer selected in question number 7. Again, answer 2 was the correct answer. The correct short answer response needed to address carbohydrate.

(1) Higher sugar content
(1) It just looked better
(1) More sugar
(2) Label B when added with carbohydrate the sugar is higher
(2) Higher sodium/total fat/less protein
(2) Total carbohydrate is higher
(2) More total calories and carbohydrate
(2) Label B has more total fat, more cholesterol, more sodium, and more total carbohydrate
(2) Label A - total carbohydrate 17g whereas label B - total carbohydrate 31g
(2) Carb and sugar
(2) Because the total carbohydrates 31 grams.
(2) More calories per serving size and lots more fats
(1) Amount of carbohydrate
(2) The total carbohydrate is higher for B
(2) B has higher carbs
(2) "B" is higher in total carbohydrates
(2) Higher total carbohydrates

(2) More calories
(1) More grams of sugar on label A
(1) Less total carbohydrates
(2) I understand better than before since I used the computer program
(2) "B" has higher carbohydrate factor
(2) Carbohydrate plus sugar
(2) There is a much higher carbohydrate content as well as total fat in label B, both which raise the blood glucose level.
(2) Higher total carbohydrates
(2) Calories from fat is higher
(2) Total carbohydrate
(2) Total carbohydrate is higher
(2) Total carbohydrates A = 17g, total carbohydrates B = 31g
(2) Total carbohydrate content
(2) Carbohydrates raise your blood sugar
(2) Carbohydrate turns to sugar
(2) Carbohydrate level is higher on label B
(2) Higher calories and almost twice as much carbohydrates
(2) Total carbohydrates impact your glucose levels more
(2) One serving has 31g carbohydrate
(2) Total carbohydrates label B = 31 grams therefore the higher glucose will result since label A has only 17 grams total carbohydrates
(2) Because the total amount of carbohydrate is more important than the amount of sugar
(3) Carbohydrate difference. Sugar difference.
(1) More sugar
(2) Hi cal, Hi fat, Hi car
(2) Because total carbohydrates on Label B are higher
(2) Total carbohydrates are higher in label B
(2) Higher total carbohydrate
(2) Higher in carbohydrates
(1) Label A has more sugar
(2) Total carbohydrates
(2) Total carbohydrate 31g on label B and 17g on A
(2) Everything is higher with label B, sat fat, cholesterol, sodium, and carbohydrates.
(2) Higher calories, higher carbos - especially higher carbos, higher fats
(2) More total carbohydrates in B

Appendix H
Participant Comments

Posttest Question 16: Is there any information about food labeling that this computer education program did not provide? (Ten participants commented)

Responses:

1. Daily value
2. Is there any particular carbohydrate that may affect the blood glucose more or are they equal - the dietary fiber and the sugars?
3. What should daily calories be?; Is carbohydrate good or bad?; What is good or bad about sodium?
4. Are added sugars and naturally present sugars listed together?
5. Calories vs fat - which is better to control?
6. It did not cover whether sugars listed on the label are added on or there naturally.
7. Does not compare natural - added sugars
8. Labels - whole labels - that contain certain information that make it possible to answer the questions
9. Confused about sugar amounts
10. I would expand by adding examples of food sizes and groups to fit the patient's particular dietary program.

Following the Posttest Question 17: Would you recommend this computer education program to others? The responses were overwhelmingly positive. Selected comments are listed below:

"I like using the computer"
"This program in conjunction with classroom information completes the circle"
"The computer presented a clear picture on information needed for reading food labeling"
"It was simple and written so that most people could understand"
"The program spells out each fact"
"It is easy to understand and eliminates having to have people teach it"
"Program allowed me to interact; reinforcing my desire to learn"
"Yes, because if you are uncertain the computer helps you to be more sure of yourself"
"It could help the uninformed how to understand nutrition information"
"Only if they can get over computer aversion"
"Recommend individual copies be distributed"
"No, computer aided instruction is good for group show and tell, but I feel that a workbook with problems is better"
"Provided computer literacy or familiarity"
"Program is well done. I feel I learned several things that will be useful in meal planning. Well worth my time."
"It does presume either experience or ability to adapt to the mouse. This is not a problem for me. This is a comment about individuals who may have a fear of computers."
"It is simple and easy to use"

Question 19: Are there any additional comments that you would like to make? Selected comments are listed below:

"This was great. I enjoyed it. Keep up the good work"
"I appreciated the information"
"Thank you and others for your time. I greatly appreciate it."
"Just keep is simple"
"Thank you for your efforts to educate those of us that need it"
"This does help me feel better about reading labels"
"Might add video instruction along with computer info to reinforce what is taught."

Appendix I
Classification of Knowledge Question Items by Content and Skill Areas

Classification of Knowledge Test Questions by Content Areas and Skills

Content:

1) Serving size
   * Look at label A. What is the portion size of one serving?

   * Look at label B. If you ate the entire package, how many calories would you be eating?

2) Carbohydrate (an understanding of serving size is also necessary for several of these questions)
   * When considering carbohydrate's effect on your blood glucose, what is the most important consideration?

   * Look at sugars as listed on either label example. What does the value listed represent?

   * Compare label A and label B. Would you expect a higher blood glucose after eating one serving from label A or one serving from label B?

   * Look at label B. How many grams of total carbohydrate are there in 1 cup?

   * Compare label A and label B. Which food label lists more dietary fiber?

   * Eaten together, one serving from label A and one serving from label B provide how many grams of total carbohydrate?

3) Fat (an understanding of serving size is also necessary)
   * Look at label A. If you ate two servings of this food, how many grams of saturated fat would you be eating?

   * Look at label B. If you ate a ½ cup portion, how many grams of total fat would you be eating?

Skill:

1) Locate

* Look at label B. How many grams of total carbohydrate are there in 1 cup?

* Look at label A. What is the portion size of one serving?

2) Compare (locating the information is also a necessary skill)

* Compare label A and label B. If you were limiting your sodium intake which food choice would be best?

* Compare label A and label B. Would you expect a higher blood glucose after eating one serving from label A or one serving from label B?

* Compare label A and label B. Which food label lists more dietary fiber?

3) Calculate (locating the information is also a necessary skill)

* Look at label A. If you ate two servings of this food, how many grams of saturated fat would you be eating?

* Look at label B. If you ate the entire package, how many calories would you be eating?

* Look at label B. If you ate a ½ cup portion, how many grams of total fat would you be eating?

* Eaten together, one serving from label A and one serving from label B provide how many grams of total carbohydrate?

Appendix J
Nutrition Facts Computer Lesson

Nutrition Facts

File Edit Text Page Help

Food Labels are Talking

Are You Listening?

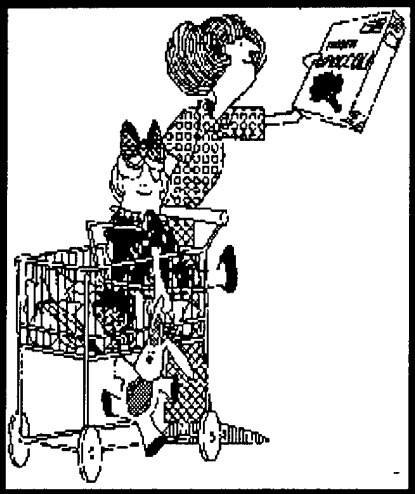
You can exit this program at anytime by clicking on Quit

Now click on Start to begin this program.

Nutrition Facts

File Edit Text Page Help

In this program you will learn to identify and use key information on the Nutrition Facts food label. Food labels give you important information to help you make your best food choices.



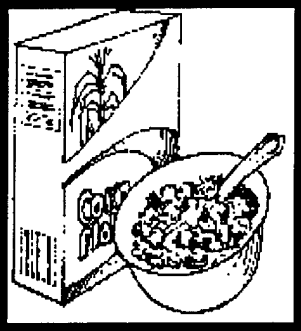
Quit

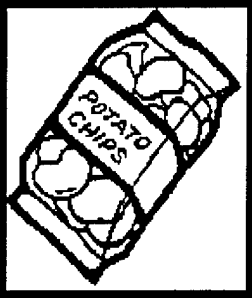
Click here to continue

Nutrition Facts

File Edit Text Page Help

What do cornflakes, chips, and pears have in common?





Quit

Click here to continue

Nutrition Facts

File Edit Text Page Help

Like all packaged foods cornflakes, chips, and pears are labeled with the Nutrition Facts panel.

Nutrition Facts	
Serving Size 1/2 cup	
Servings Per Container 4	
Amount Per Serving	
Calories 90	
	% Daily Value
Total Fat 3g	5%
Saturated fat 0g	0%
Cholesterol 0 mg	

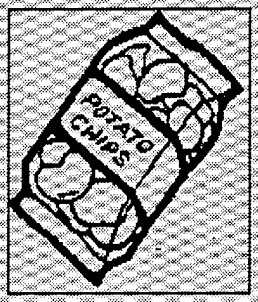
Quit

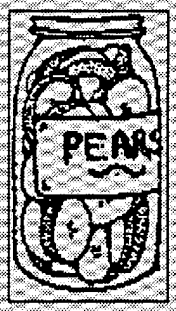
Click here to continue

Nutrition Facts

File Edit Text Page Help

To begin looking at the Nutrition Facts label, click on the cereal package below.





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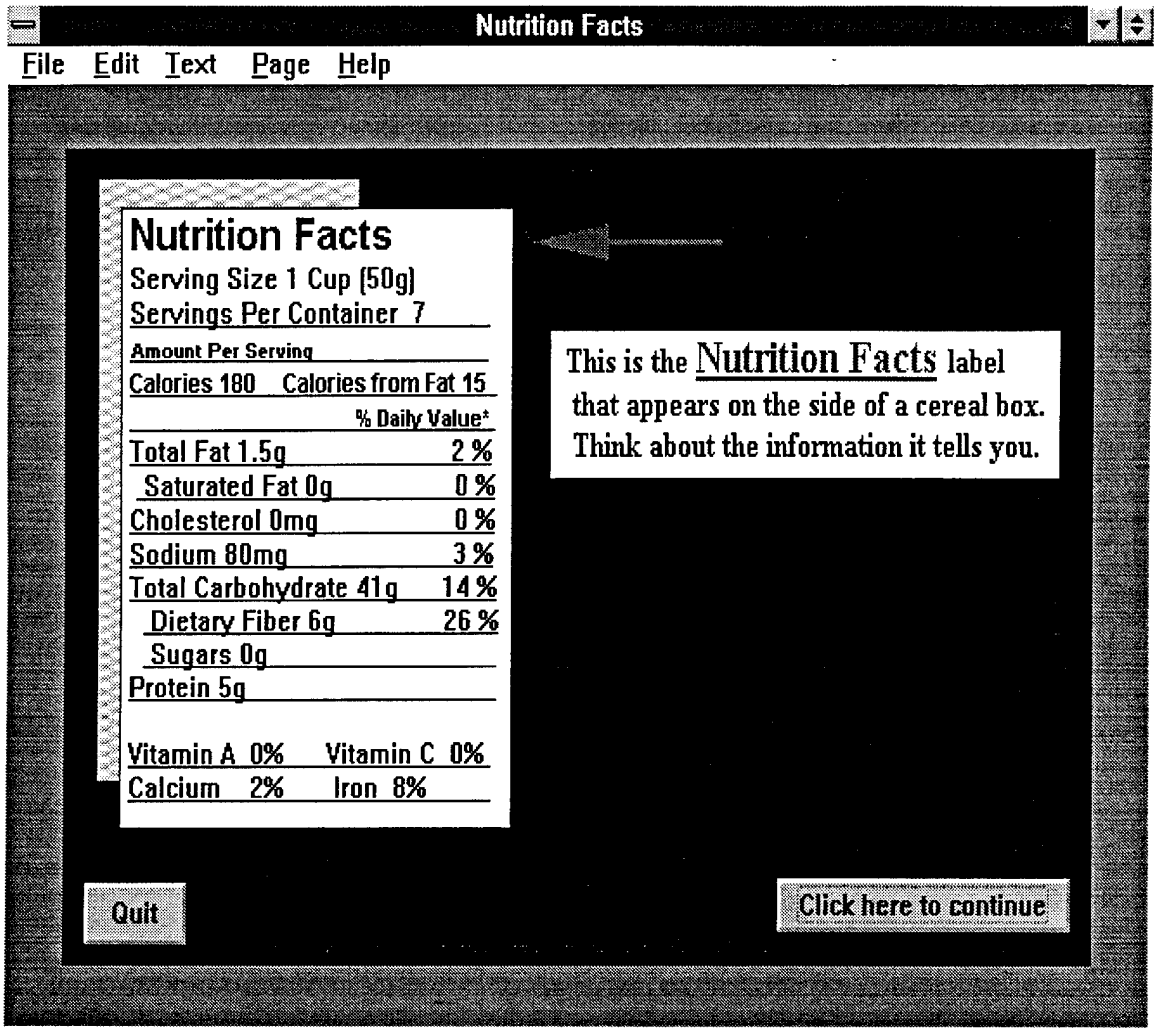

Nutrition Facts
File Edit Text Page Help
Nutrition Facts
Serving Size 1 Cup (50g)
Servings Per Container 7
Amount Per Serving
Calories 180 Calories from Fat 15
% Daily Value*
Total Fat 1.5g 2 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 80mg 3 %
Total Carbohydrate 41g 14 %
Dietary Fiber 6g 26 %
Sugars 0g
Protein 5g
Vitamin A 0% Vitamin C 0%
Calcium 2% Iron 8%
This is the Nutrition Facts label that appears on the side of a cereal box. Think about the information it tells you.
Quit
Click here to continue

Nutrition Facts

File Edit Text Page Help

There are many things this label tells you. Look at serving size.
The serving size is set at an amount that would be reasonable to eat.

Nutrition Facts

Serving Size 1 Cup (50g)
Servings Per Container 7

Amount Per Serving	
Calories 180	Calories from Fat 15
	% Daily Value*
Total Fat 1.5g	2 %
Saturated Fat 0g	0 %
Cholesterol 0mg	0 %
Sodium 80mg	3 %
Total Carbohydrate 41g	14 %
Dietary Fiber 6g	26 %
Sugars 0g	
Protein 5g	
Vitamin A 0%	Vitamin C 0%
Calcium 2%	Iron 8%

Quit

Continue

Nutrition Facts

File Edit Text Page Help

The serving size listed on this label is equal to 1 Cup.

Nutrition Facts

Serving Size 1 Cup (50g)

Servings Per Container 7

Amount Per Serving

Calories 180	Calories from Fat 15
	% Daily Value*
Total Fat 1.5g	2 %
Saturated Fat 0g	0 %
Cholesterol 0mg	0 %
Sodium 80mg	3 %
Total Carbohydrate 41g	14 %
Dietary Fiber 6g	26 %
Sugars 0g	
Protein 5g	
Vitamin A 0%	Vitamin C 0%
Calcium 2%	Iron 8%

Quit

Continue

Nutrition Facts

File Edit Text Page Help

Look at the serving size again. This label tells you that by eating 1 cup of cereal you are eating 180 calories.

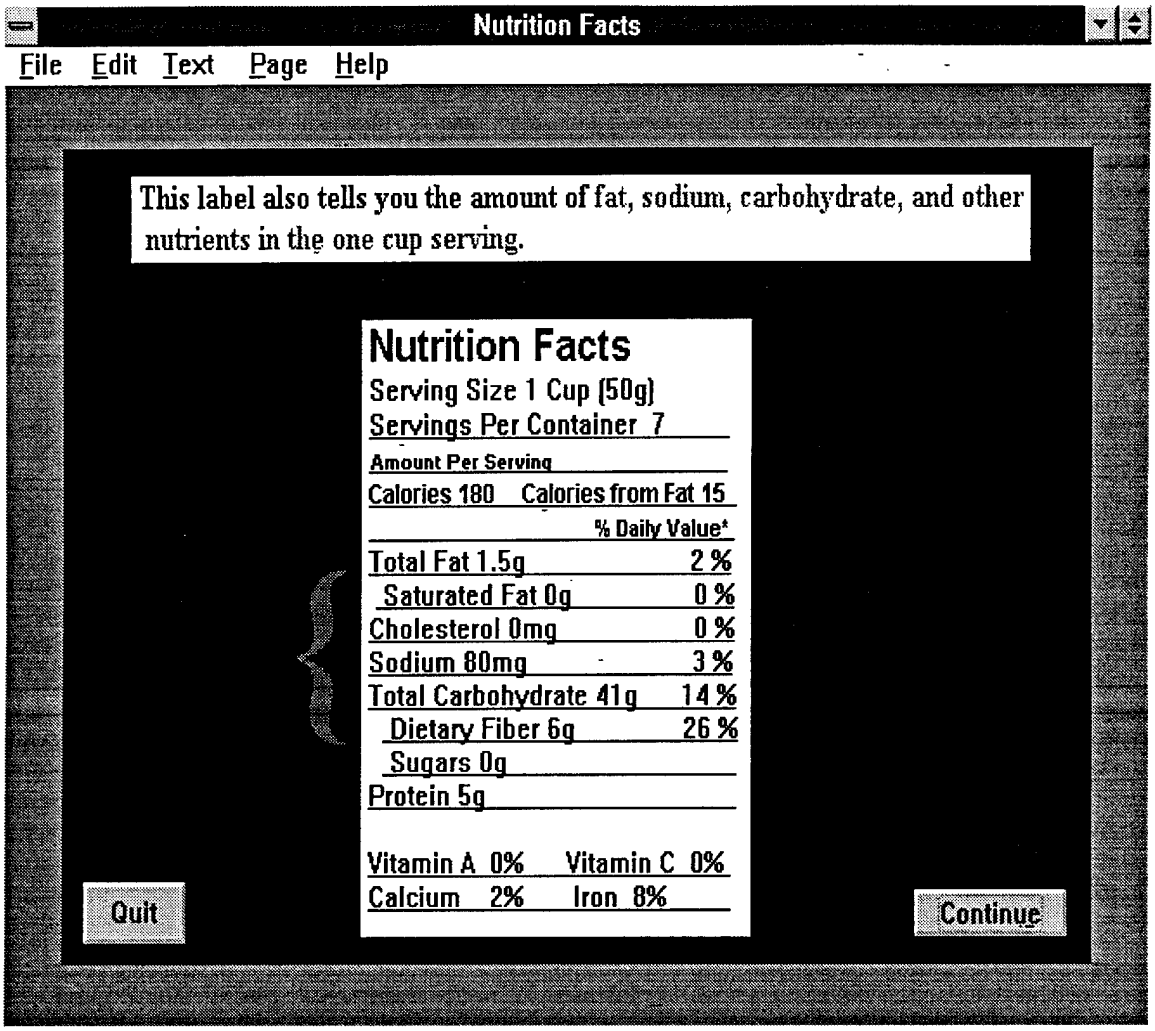
Nutrition Facts

Serving Size 1 Cup (50g)
Servings Per Container 7

Amount Per Serving	
Calories 180	Calories from Fat 15
	% Daily Value*
Total Fat 1.5g	2 %
Saturated Fat 0g	0 %
Cholesterol 0mg	0 %
Sodium 80mg	3 %
Total Carbohydrate 41g	14 %
Dietary Fiber 6g	26 %
Sugars 0g	
Protein 5g	
Vitamin A 0%	Vitamin C 0%
Calcium 2%	Iron 8%

Quit

Continue


Nutrition Facts
File Edit Text Page Help
This label also tells you the amount of fat, sodium, carbohydrate, and other nutrients in the one cup serving.
Nutrition Facts
Serving Size 1 Cup (50g)
Servings Per Container 7
Amount Per Serving
Calories 180 Calories from Fat 15
% Daily Value*
Total Fat 1.5g 2 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 80mg 3 %
Total Carbohydrate 41g 14 %
Dietary Fiber 6g 26 %
Sugars 0g
Protein 5g
Vitamin A 0% Vitamin C 0%
Calcium 2% Iron 8%
Quit
Continue

Nutrition Facts

File Edit Text Page Help

One of your nutrition goals might be to limit the amount of fat you eat. Look for fat on this label.

Nutrition Facts

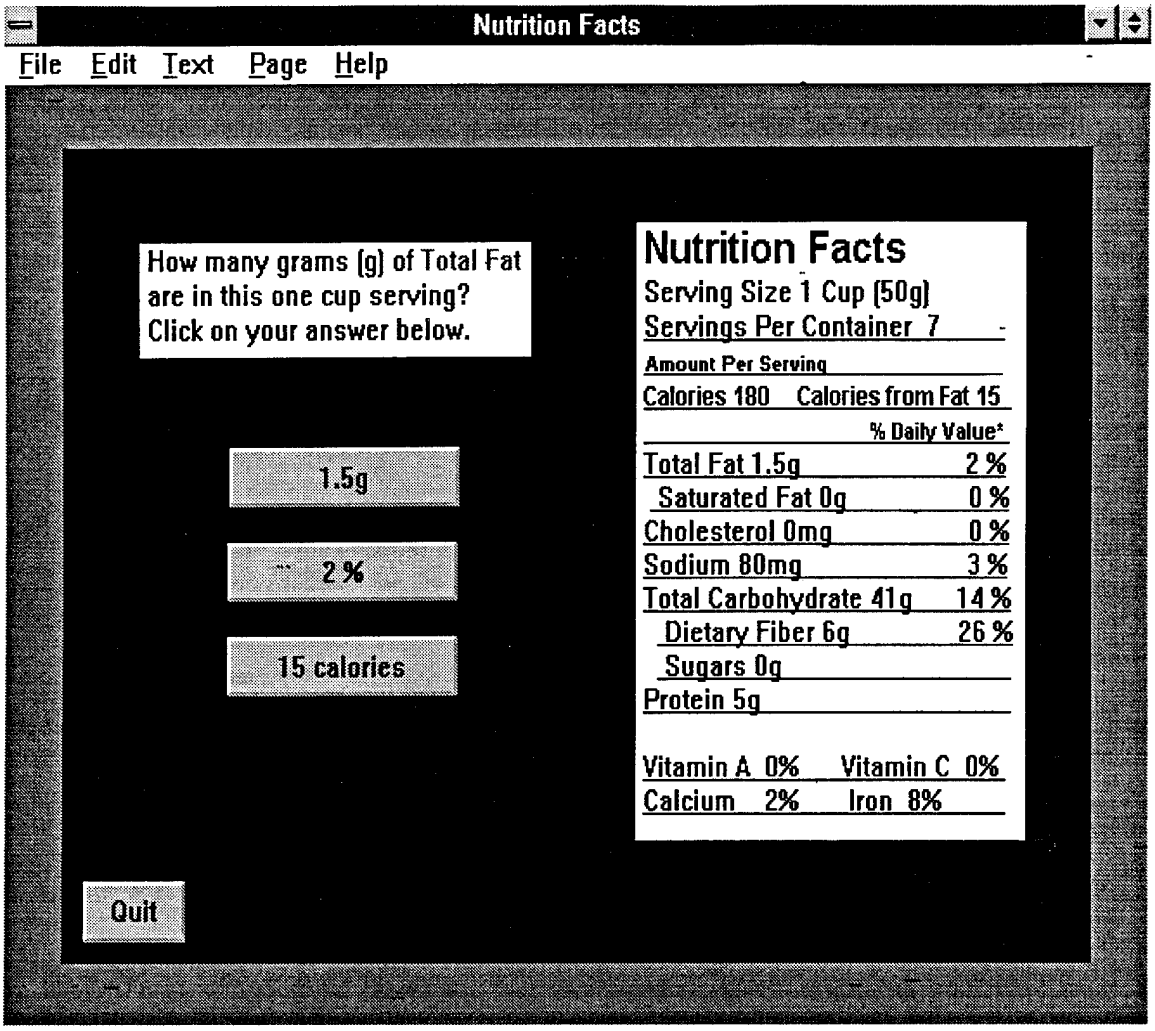
Serving Size 1 Cup (50g)
Servings Per Container 7

Amount Per Serving

Calories 180	Calories from Fat 15
	% Daily Value*
Total Fat 1.5g	2 %
Saturated Fat 0g	0 %
Cholesterol 0mg	0 %
Sodium 80mg	3 %
Total Carbohydrate 41g	14 %
Dietary Fiber 6g	26 %
Sugars 0g	
Protein 5g	
Vitamin A 0%	Vitamin C 0%
Calcium 2%	Iron 8%

Quit

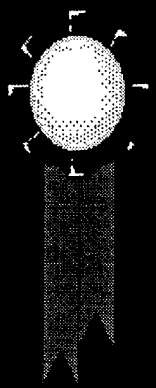
Continue


Nutrition Facts
File Edit Text Page Help
How many grams (g) of Total Fat are in this one cup serving? Click on your answer below.
1.5g
2 %
15 calories
Quit
Nutrition Facts
Serving Size 1 Cup (50g)
Servings Per Container 7
Amount Per Serving
Calories 180 Calories from Fat 15
% Daily Value*
Total Fat 1.5g 2 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 80mg 3 %
Total Carbohydrate 41g 14 %
Dietary Fiber 6g 26 %
Sugars 0g
Protein 5g
Vitamin A 0% Vitamin C 0%
Calcium 2% Iron 8%

Nutrition Facts

File Edit Text Page Help

Yes, you are correct!



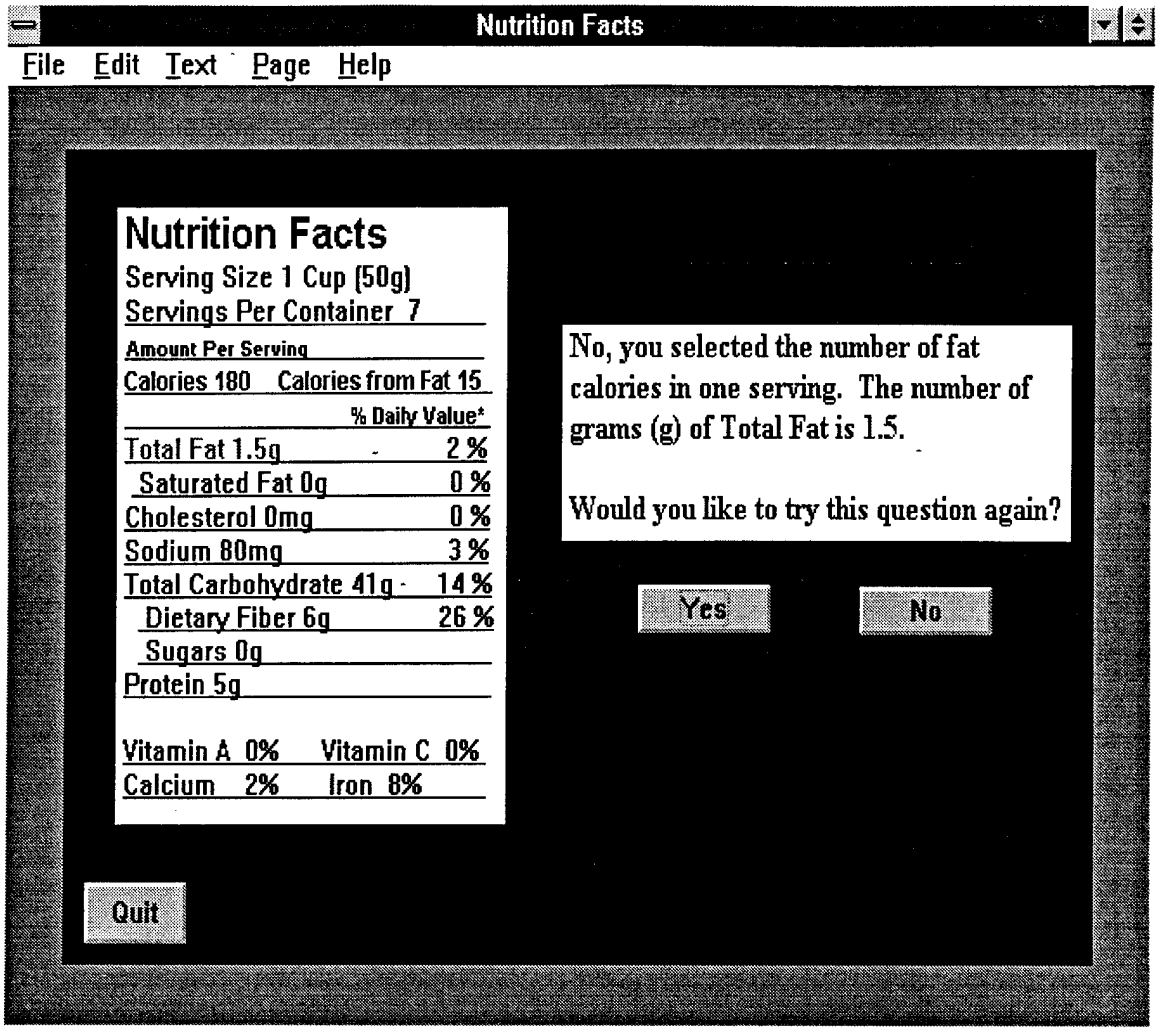
Nutrition Facts

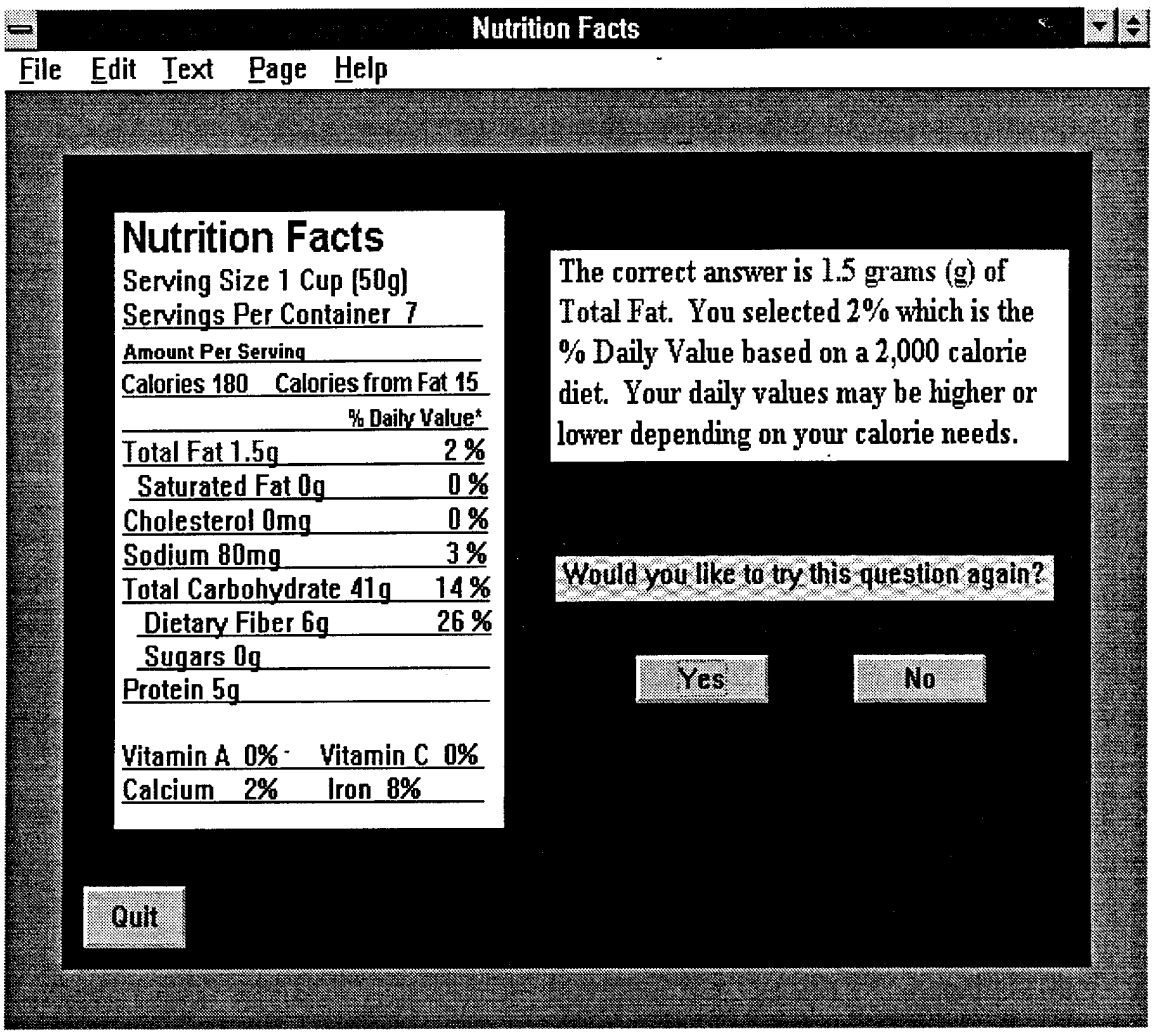
Serving Size 1 Cup (50g)
Servings Per Container 7

Amount Per Serving	
Calories 180	Calories from Fat 15
	% Daily Value*
Total Fat 1.5g	2 %
Saturated Fat 0g	0 %
Cholesterol 0mg	0 %
Sodium 80mg	3 %
Total Carbohydrate 41g	14 %
Dietary Fiber 6g	26 %
Sugars 0g	
Protein 5g	
Vitamin A 0%	Vitamin C 0%
Calcium 2%	Iron 8%

Quit

Continue

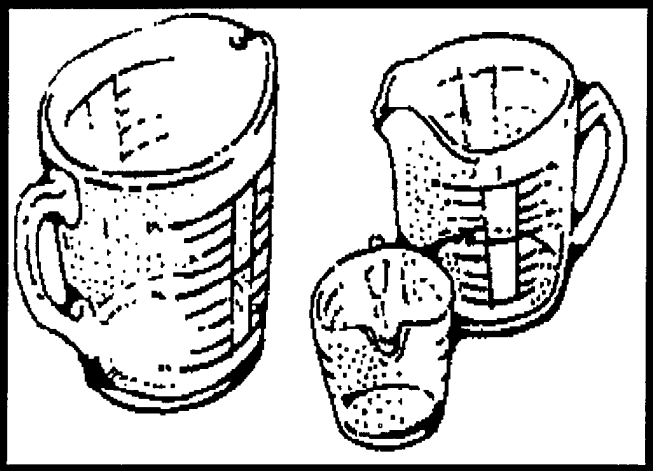

Nutrition Facts
File Edit Text Page Help
Nutrition Facts
Serving Size 1 Cup (50g)
Servings Per Container 7
Amount Per Serving
Calories 180 Calories from Fat 15
% Daily Value*
Total Fat 1.5g 2 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 80mg 3 %
Total Carbohydrate 41g 14 %
Dietary Fiber 6g 26 %
Sugars 0g
Protein 5g
Vitamin A 0% Vitamin C 0%
Calcium 2% Iron 8%
No, you selected the number of fat calories in one serving. The number of grams (g) of Total Fat is 1.5.
Would you like to try this question again?
Yes
No
Quit

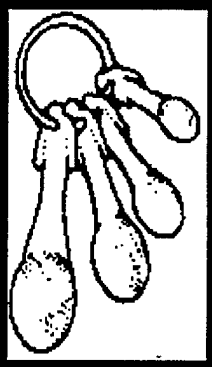

Nutrition Facts
File Edit Text Page Help
Nutrition Facts
Serving Size 1 Cup (50g)
Servings Per Container 7
Amount Per Serving
Calories 180 Calories from Fat 15
% Daily Value*
Total Fat 1.5g 2 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 80mg 3 %
Total Carbohydrate 41g 14 %
Dietary Fiber 6g 26 %
Sugars 0g
Protein 5g
Vitamin A 0% Vitamin C 0%
Calcium 2% Iron 8%
The correct answer is 1.5 grams (g) of Total Fat. You selected 2% which is the % Daily Value based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.
Would you like to try this question again?
Yes
No
Quit

Nutrition Facts

File Edit Text Page Help

What happens when you eat a serving size that is different from the serving size listed on the label?





Quit

Continue

Nutrition Facts

File Edit Text Page Help

When your serving size is different from the amount listed on the label, you can use the label serving size as a guide.

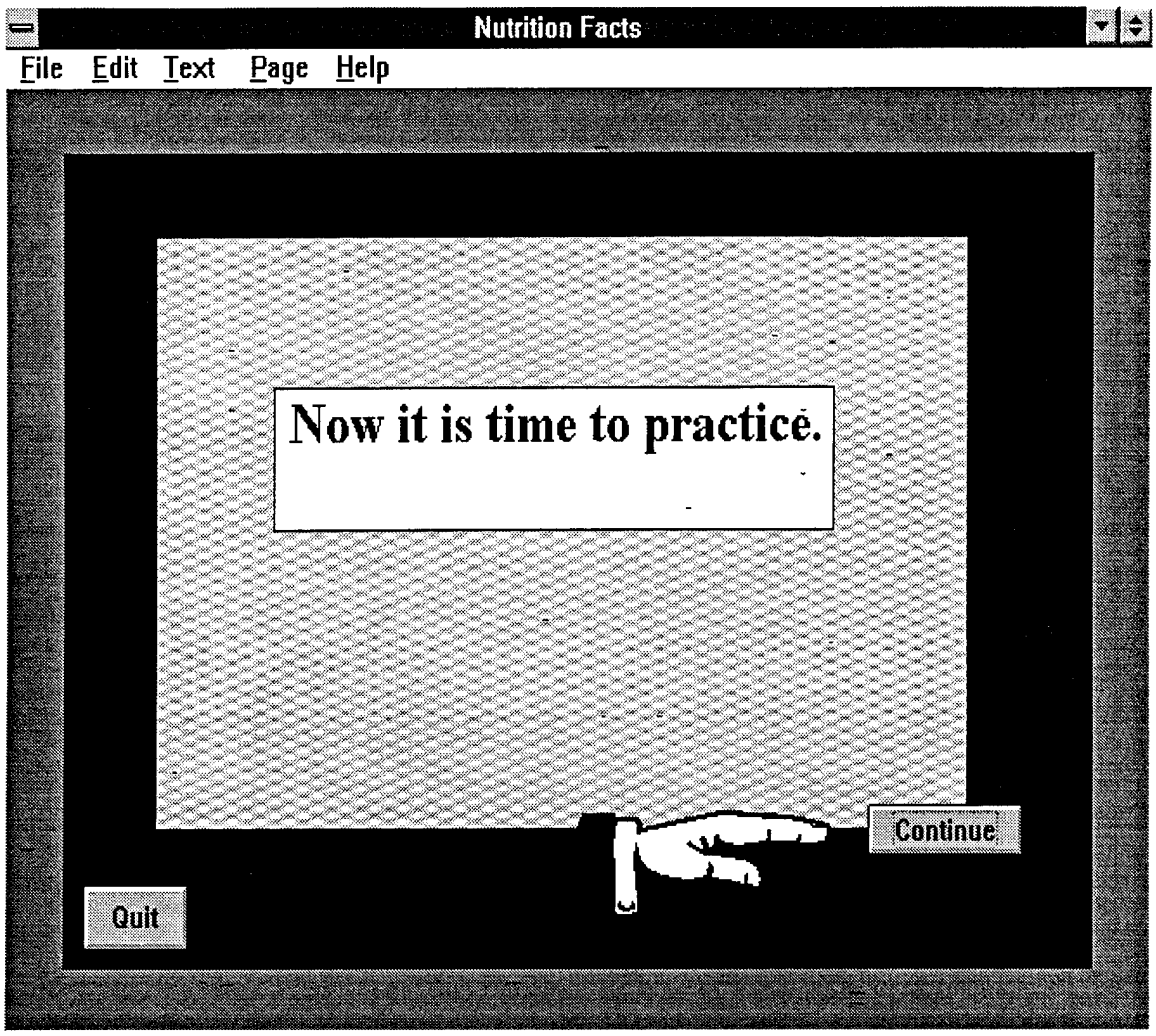
Nutrition Facts
Serving Size 1 Cup (50g)
Servings Per Container 7
Amount Per Serving
Calories 180 Calories from Fat 15

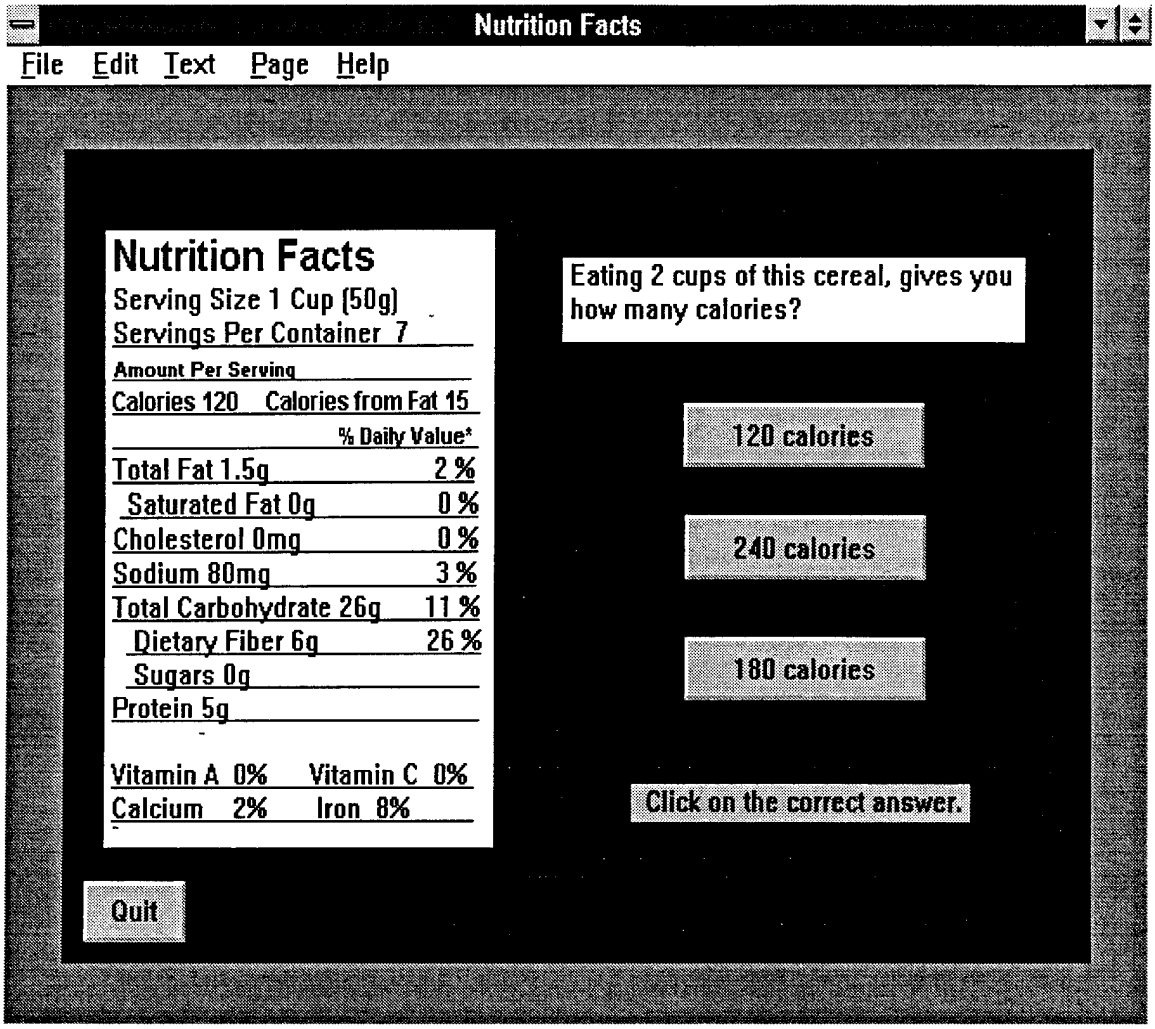
For example,
If a 1 cup serving = 180 calories

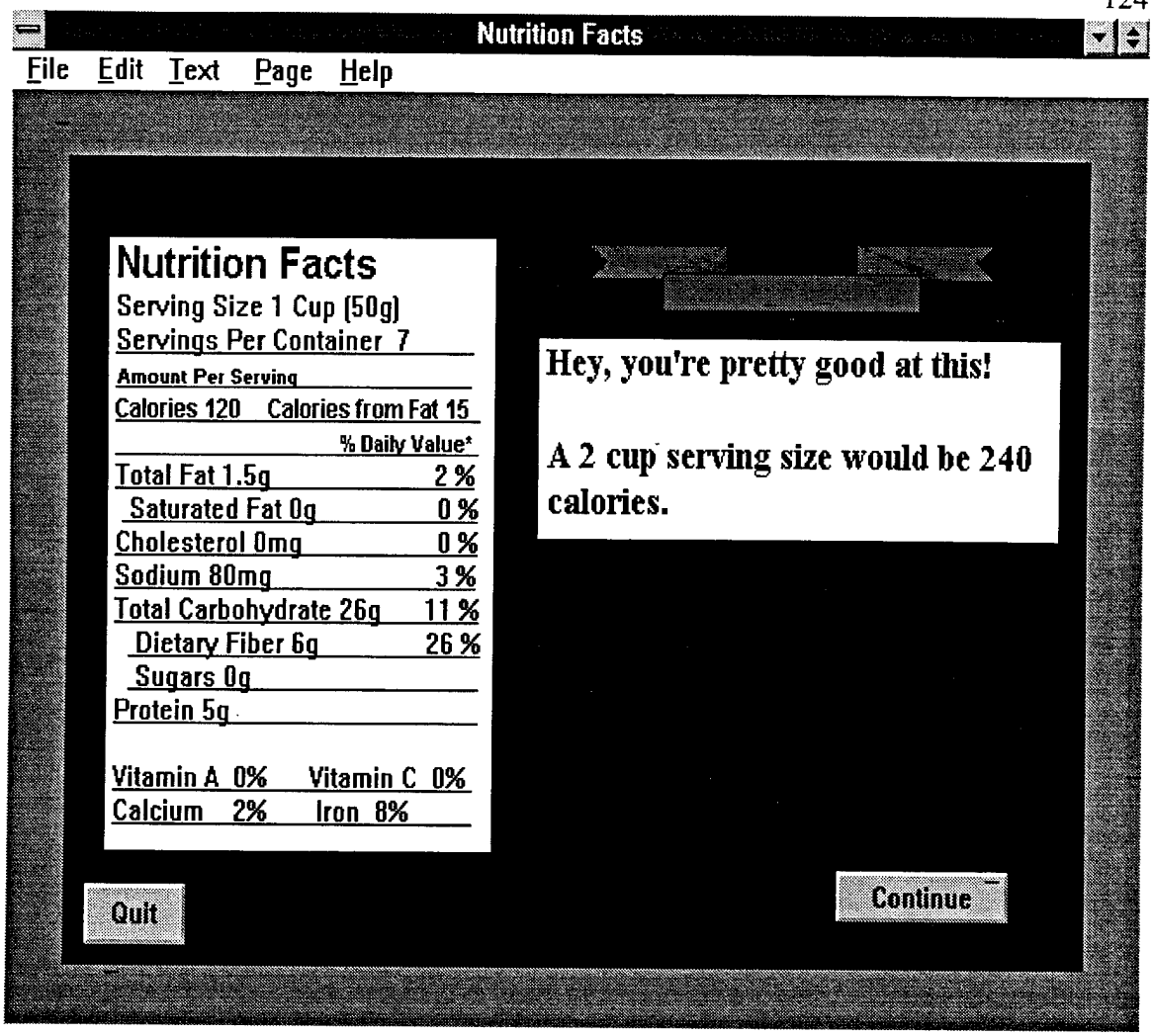
then a 2 cup serving = 360 calories
(2 servings x 180 calories = 360)

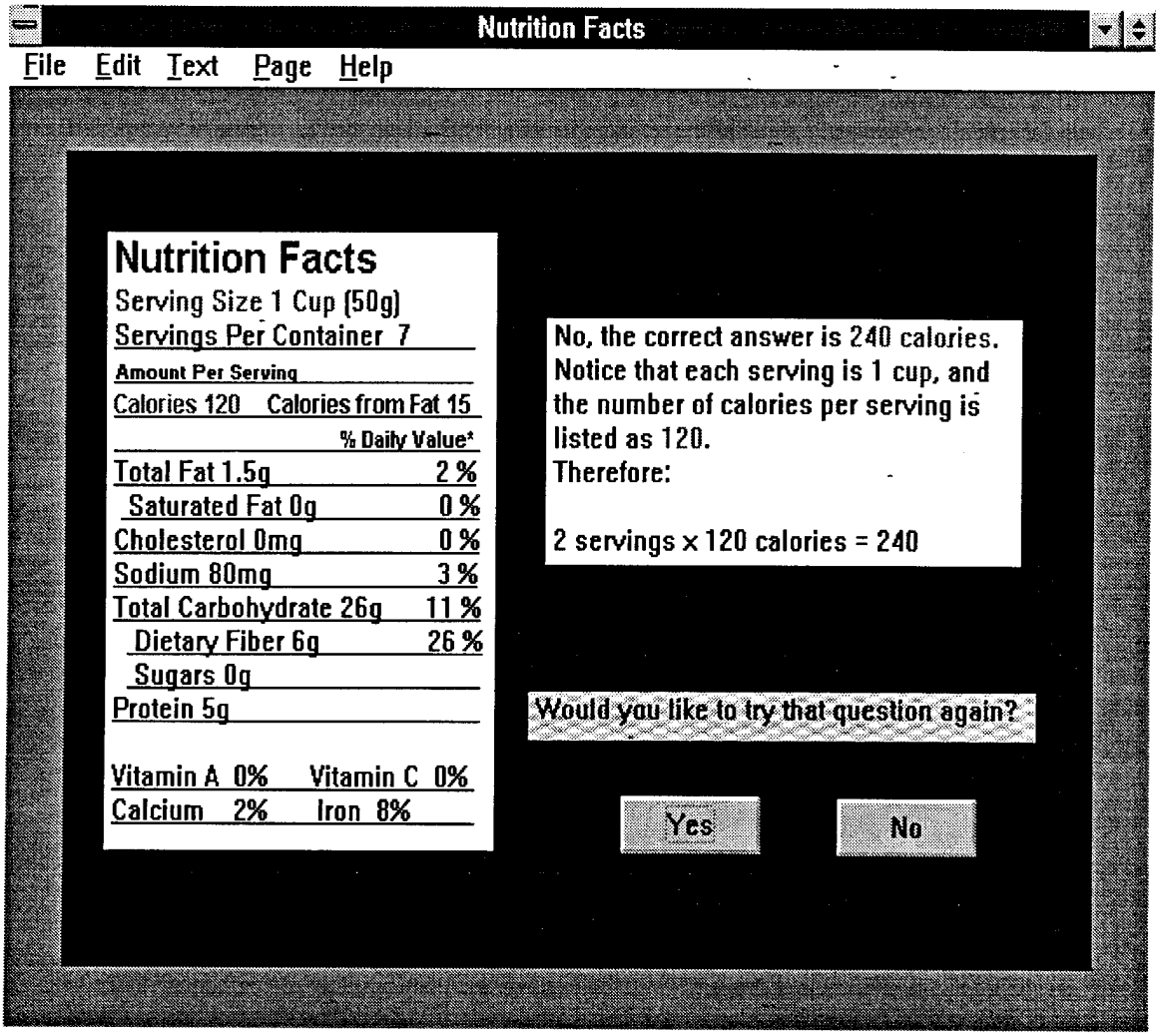
Quit

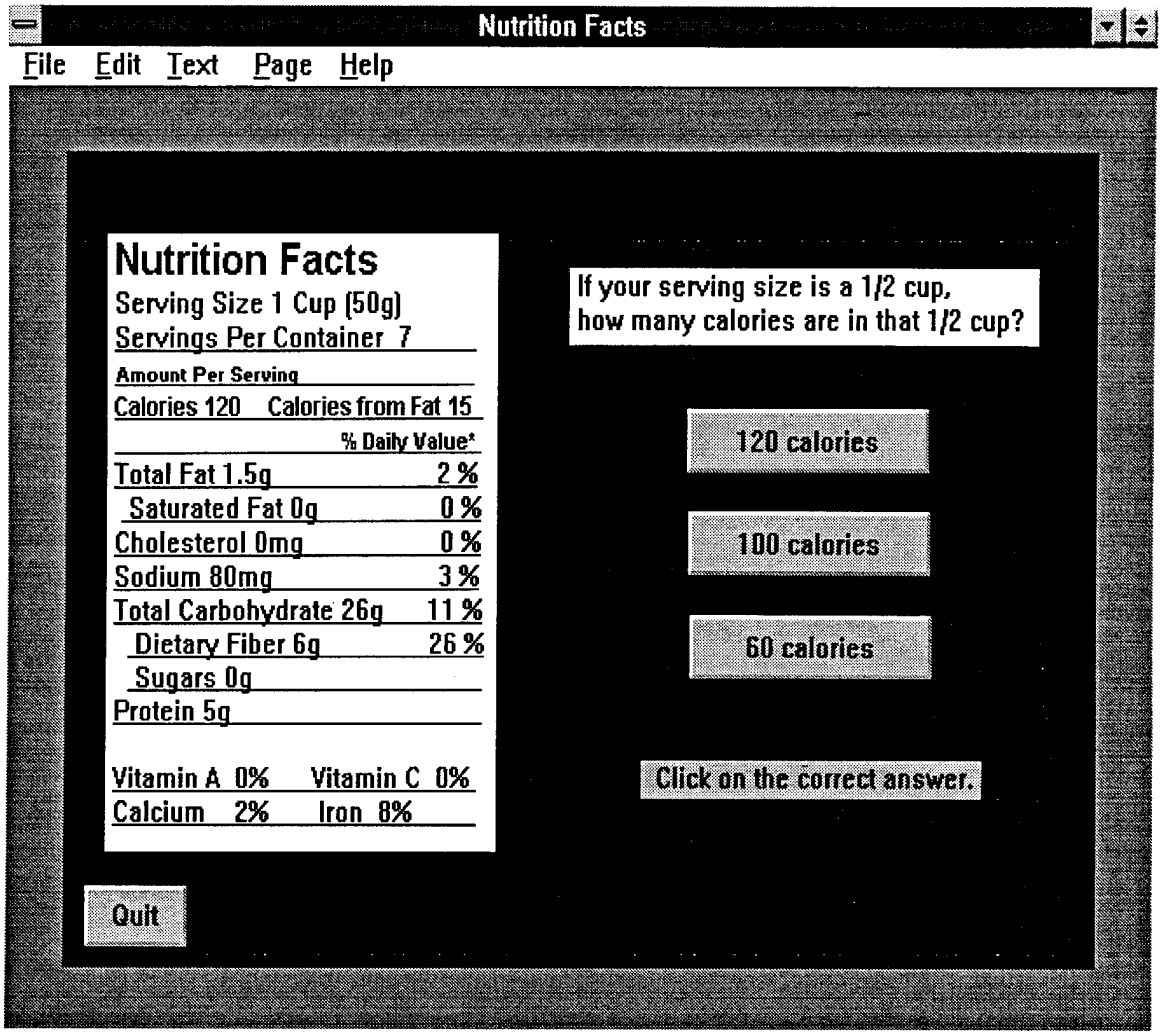
Continue


Nutrition Facts
File Edit Text Page Help
Now it is time to practice.
Continue
Quit


Nutrition Facts
File Edit Text Page Help
Nutrition Facts
Serving Size 1 Cup (50g)
Servings Per Container 7
Amount Per Serving
Calories 120 Calories from Fat 15
% Daily Value*
Total Fat 1.5g 2 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 80mg 3 %
Total Carbohydrate 26g 11 %
Dietary Fiber 6g 26 %
Sugars 0g
Protein 5g
Vitamin A 0% Vitamin C 0%
Calcium 2% Iron 8%
Eating 2 cups of this cereal, gives you how many calories?
120 calories
240 calories
180 calories
Click on the correct answer.
Quit


Nutrition Facts
File Edit Text Page Help
Nutrition Facts
Serving Size 1 Cup (50g)
Servings Per Container 7
Amount Per Serving
Calories 120 Calories from Fat 15
% Daily Value*
Total Fat 1.5g 2 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 80mg 3 %
Total Carbohydrate 26g 11 %
Dietary Fiber 6g 26 %
Sugars 0g
Protein 5g
Vitamin A 0% Vitamin C 0%
Calcium 2% Iron 8%
Hey, you're pretty good at this!
A 2 cup serving size would be 240 calories.
Quit
Continue


Nutrition Facts
File Edit Text Page Help
Nutrition Facts
Serving Size 1 Cup (50g)
Servings Per Container 7
Amount Per Serving
Calories 120 Calories from Fat 15
% Daily Value*
Total Fat 1.5g 2 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 80mg 3 %
Total Carbohydrate 26g 11 %
Dietary Fiber 6g 26 %
Sugars 0g
Protein 5g
Vitamin A 0% Vitamin C 0%
Calcium 2% Iron 8%
No, the correct answer is 240 calories. Notice that each serving is 1 cup, and the number of calories per serving is listed as 120.
Therefore:
2 servings x 120 calories = 240
Would you like to try that question again?
Yes
No


Nutrition Facts
File Edit Text Page Help
Nutrition Facts
Serving Size 1 Cup (50g)
Servings Per Container 7
Amount Per Serving
Calories 120 Calories from Fat 15
% Daily Value*
Total Fat 1.5g 2 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 80mg 3 %
Total Carbohydrate 26g 11 %
Dietary Fiber 6g 26 %
Sugars 0g
Protein 5g
Vitamin A 0% Vitamin C 0%
Calcium 2% Iron 8%
If your serving size is a 1/2 cup, how many calories are in that 1/2 cup?
120 calories
100 calories
60 calories
Click on the correct answer.
Quit

Nutrition Facts

File Edit Text Page Help

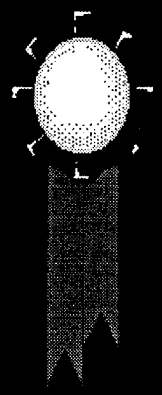
Nutrition Facts

Serving Size 1 Cup (50g)
Servings Per Container 7

Amount Per Serving	
Calories 120	Calories from Fat 15
	% Daily Value*
Total Fat 1.5g	2 %
Saturated Fat 0g	0 %
Cholesterol 0mg	0 %
Sodium 80mg	3 %
Total Carbohydrate 26g	11 %
Dietary Fiber 6g	26 %
Sugars 0g	
Protein 5g	

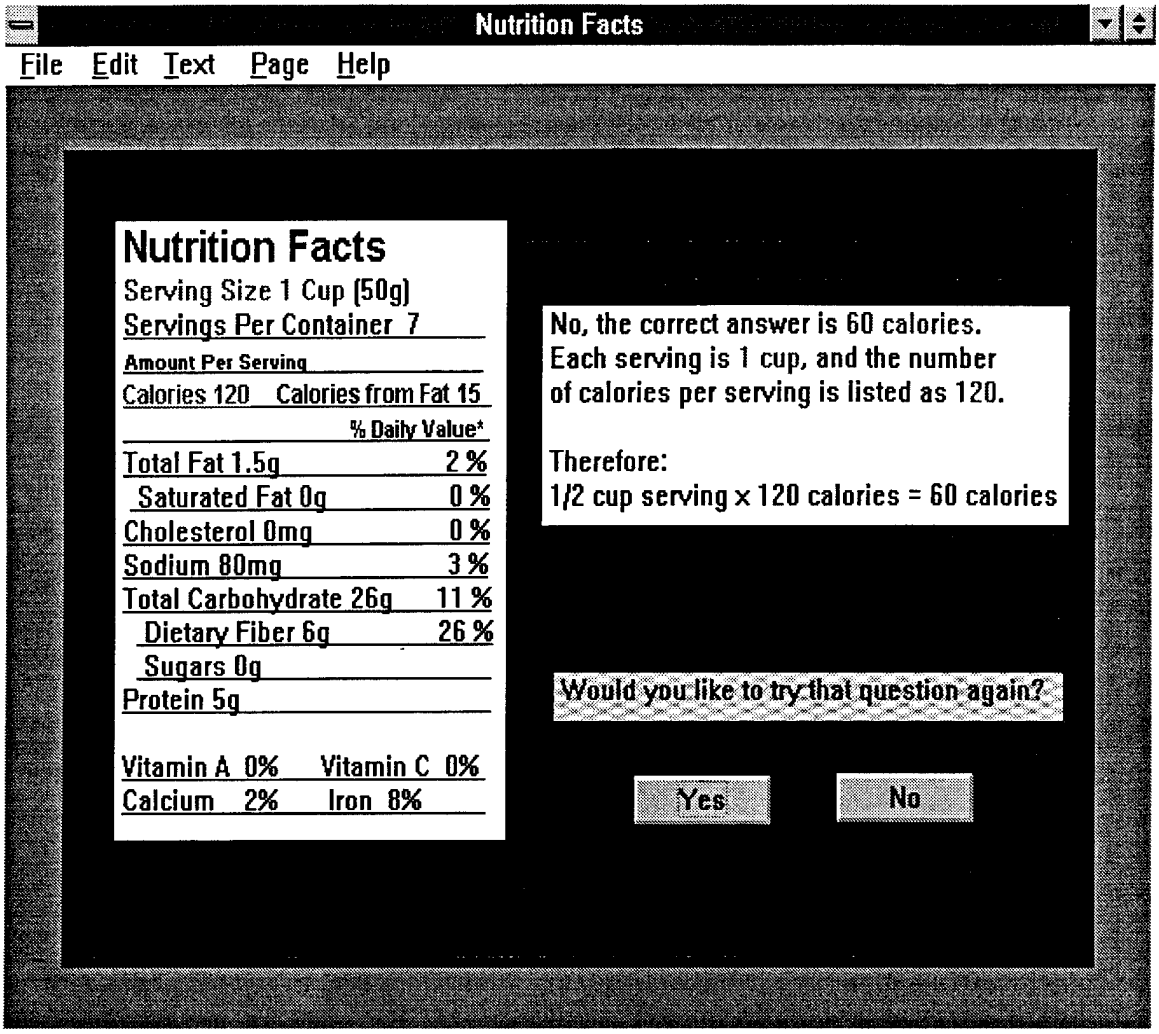
Vitamin A 0%	Vitamin C 0%
Calcium 2%	Iron 8%

Yes, the correct answer is 60 calories in a 1/2 cup serving.



Quit

Continue


Nutrition Facts
File Edit Text Page Help
Nutrition Facts
Serving Size 1 Cup (50g)
Servings Per Container 7
Amount Per Serving
Calories 120 Calories from Fat 15
% Daily Value*
Total Fat 1.5g 2 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 80mg 3 %
Total Carbohydrate 26g 11 %
Dietary Fiber 6g 26 %
Sugars 0g
Protein 5g
Vitamin A 0% Vitamin C 0%
Calcium 2% Iron 8%
No, the correct answer is 60 calories.
Each serving is 1 cup, and the number
of calories per serving is listed as 120.
Therefore:
1/2 cup serving x 120 calories = 60 calories
Would you like to try that question again?
Yes
No

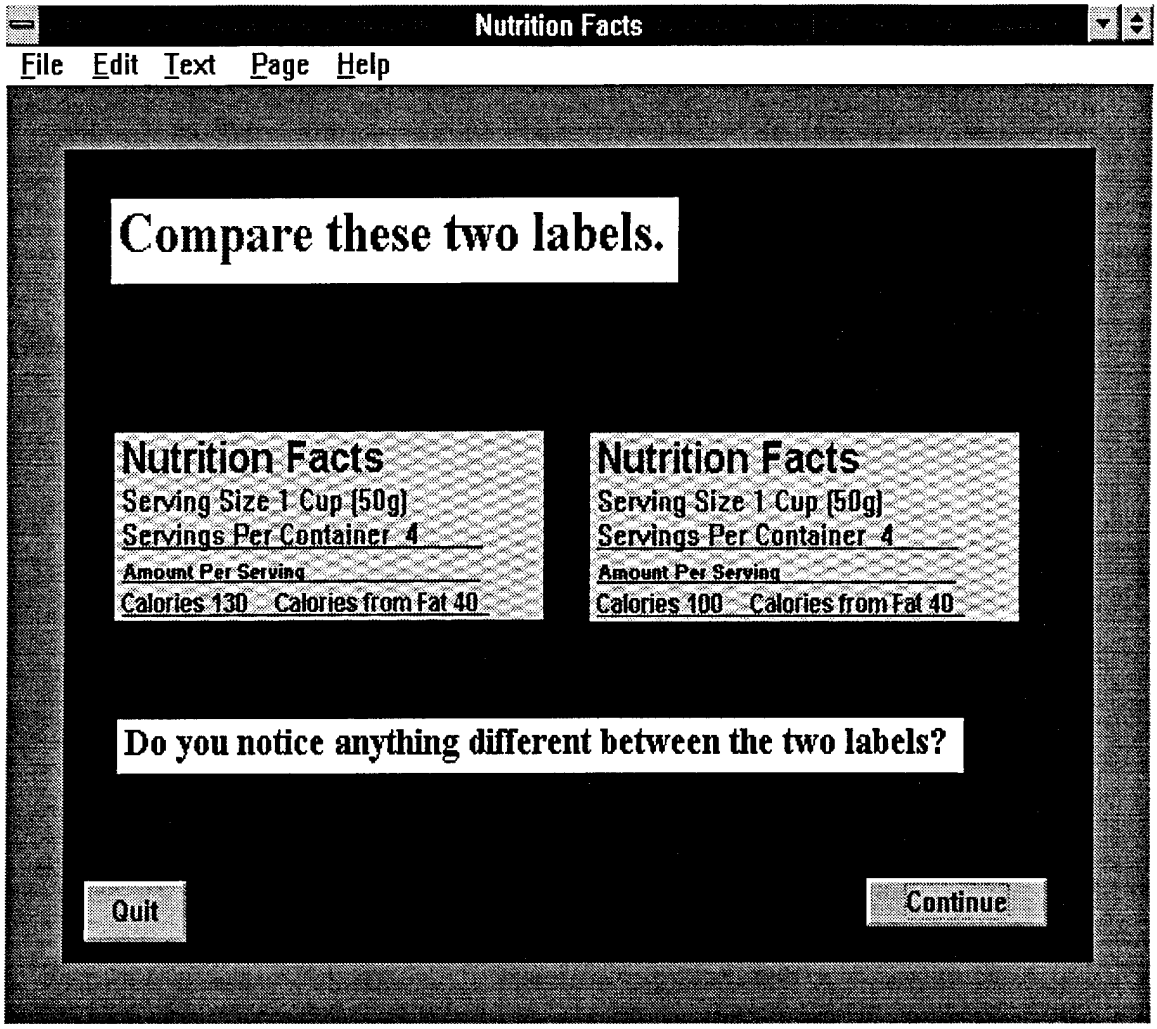
Nutrition Facts

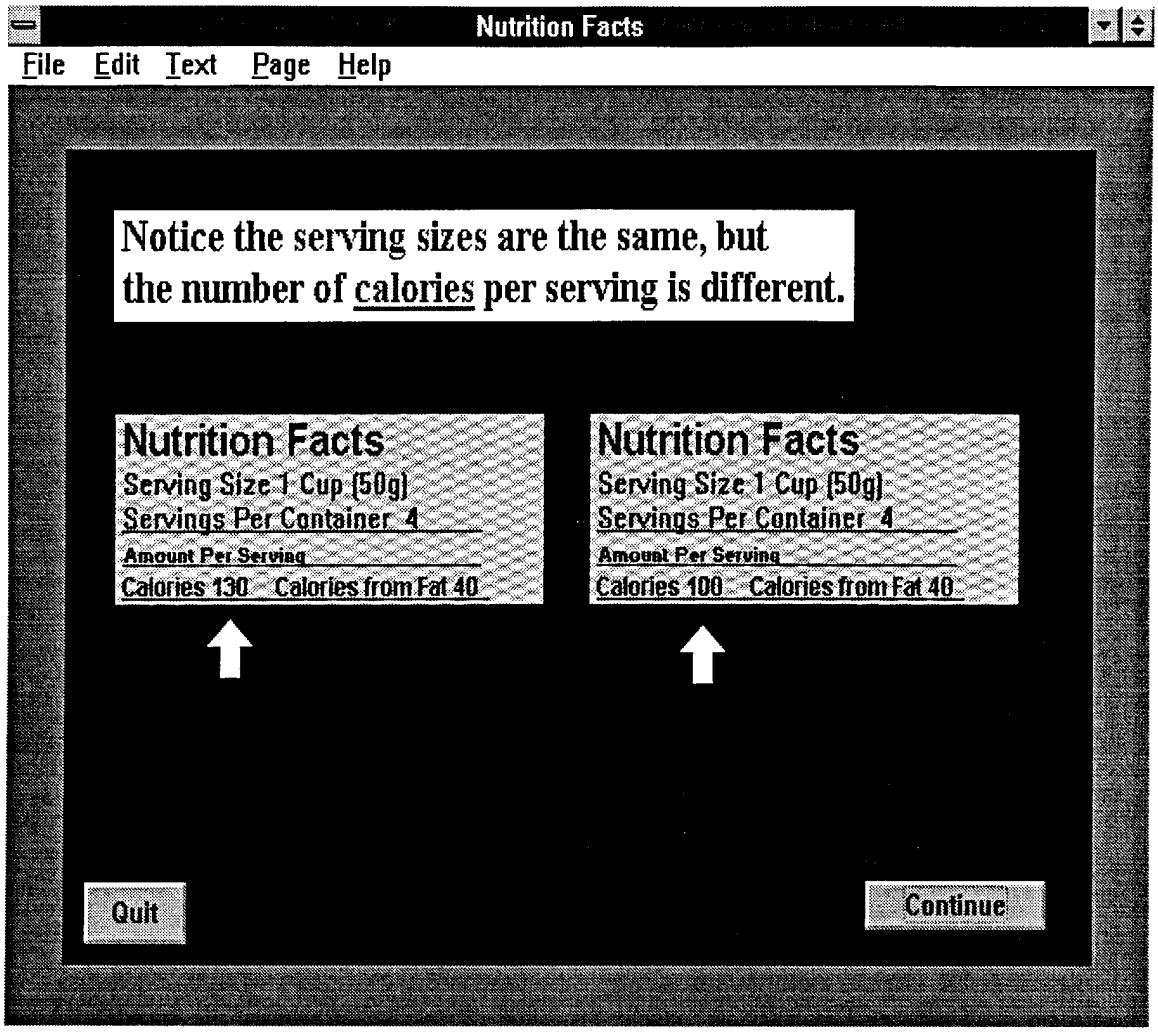
File Edit Text Page Help

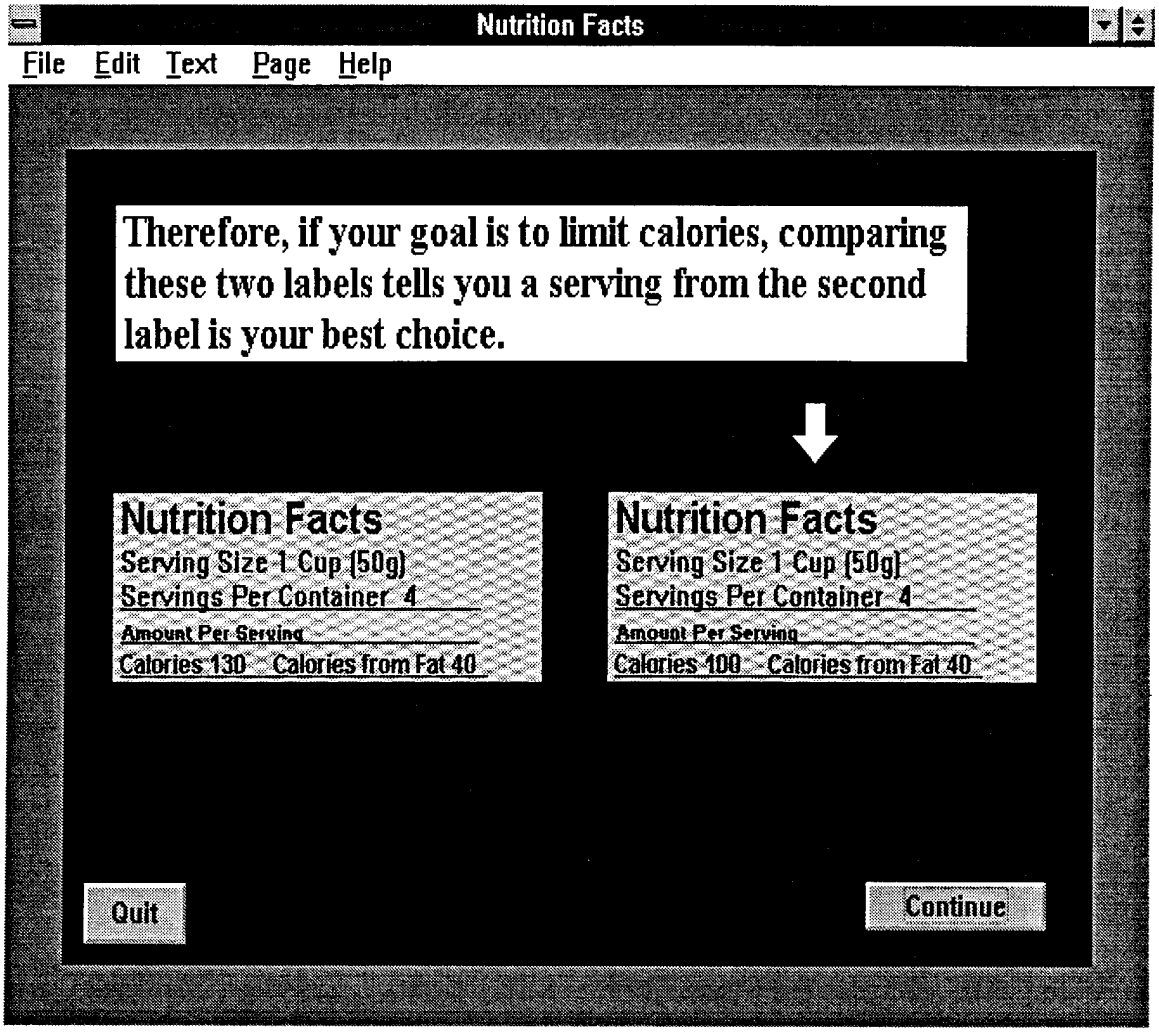
Comparing the serving sizes of similiar foods can assist you in making the best food choice.

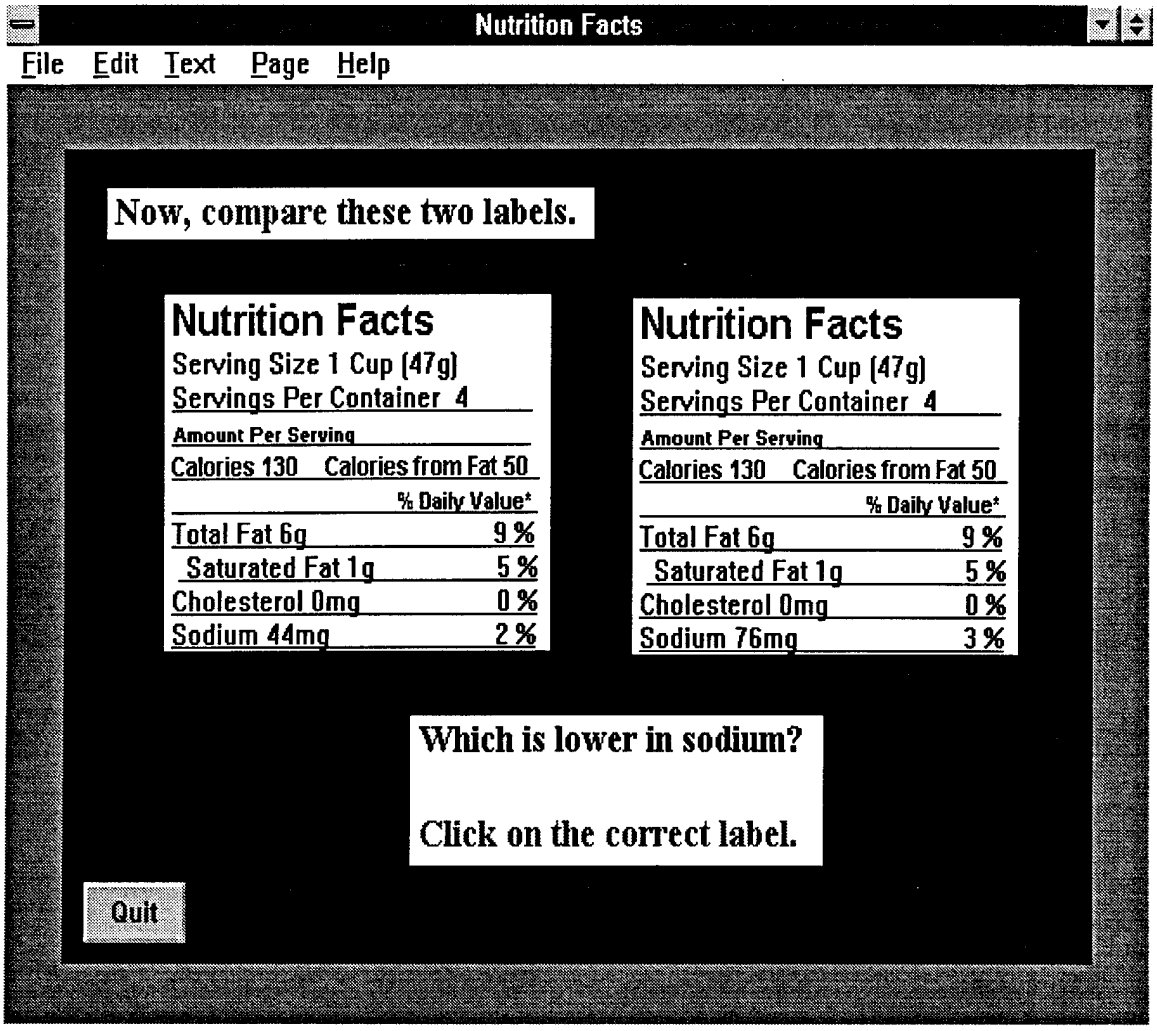
Quit

Continue


Nutrition Facts
File Edit Text Page Help
Compare these two labels.
Nutrition Facts
Serving Size 1 Cup (50g)
Servings Per Container 4
Amount Per Serving
Calories 130 Calories from Fat 40
Nutrition Facts
Serving Size 1 Cup (50g)
Servings Per Container 4
Amount Per Serving
Calories 100 Calories from Fat 40
Do you notice anything different between the two labels?
Quit
Continue


Nutrition Facts
File Edit Text Page Help
Notice the serving sizes are the same, but the number of calories per serving is different.
Nutrition Facts
Serving Size 1 Cup (50g)
Servings Per Container 4
Amount Per Serving
Calories 130 Calories from Fat 40
Nutrition Facts
Serving Size 1 Cup (50g)
Servings Per Container 4
Amount Per Serving
Calories 100 Calories from Fat 40
Quit
Continue


Nutrition Facts
File Edit Text Page Help
Therefore, if your goal is to limit calories, comparing these two labels tells you a serving from the second label is your best choice.
Nutrition Facts
Serving Size 1 Cup (50g)
Servings Per Container 4
Amount Per Serving
Calories 130 Calories from Fat 40
Nutrition Facts
Serving Size 1 Cup (50g)
Servings Per Container 4
Amount Per Serving
Calories 100 Calories from Fat 40
Quit
Continue


Nutrition Facts
File Edit Text Page Help
Now, compare these two labels.
Nutrition Facts
Serving Size 1 Cup (47g)
Servings Per Container 4
Amount Per Serving
Calories 130 Calories from Fat 50
% Daily Value*
Total Fat 6g 9 %
Saturated Fat 1g 5 %
Cholesterol 0mg 0 %
Sodium 44mg 2 %
Nutrition Facts
Serving Size 1 Cup (47g)
Servings Per Container 4
Amount Per Serving
Calories 130 Calories from Fat 50
% Daily Value*
Total Fat 6g 9 %
Saturated Fat 1g 5 %
Cholesterol 0mg 0 %
Sodium 76mg 3 %
Which is lower in sodium?
Click on the correct label.
Quit

Nutrition Facts

File Edit Text Page Help

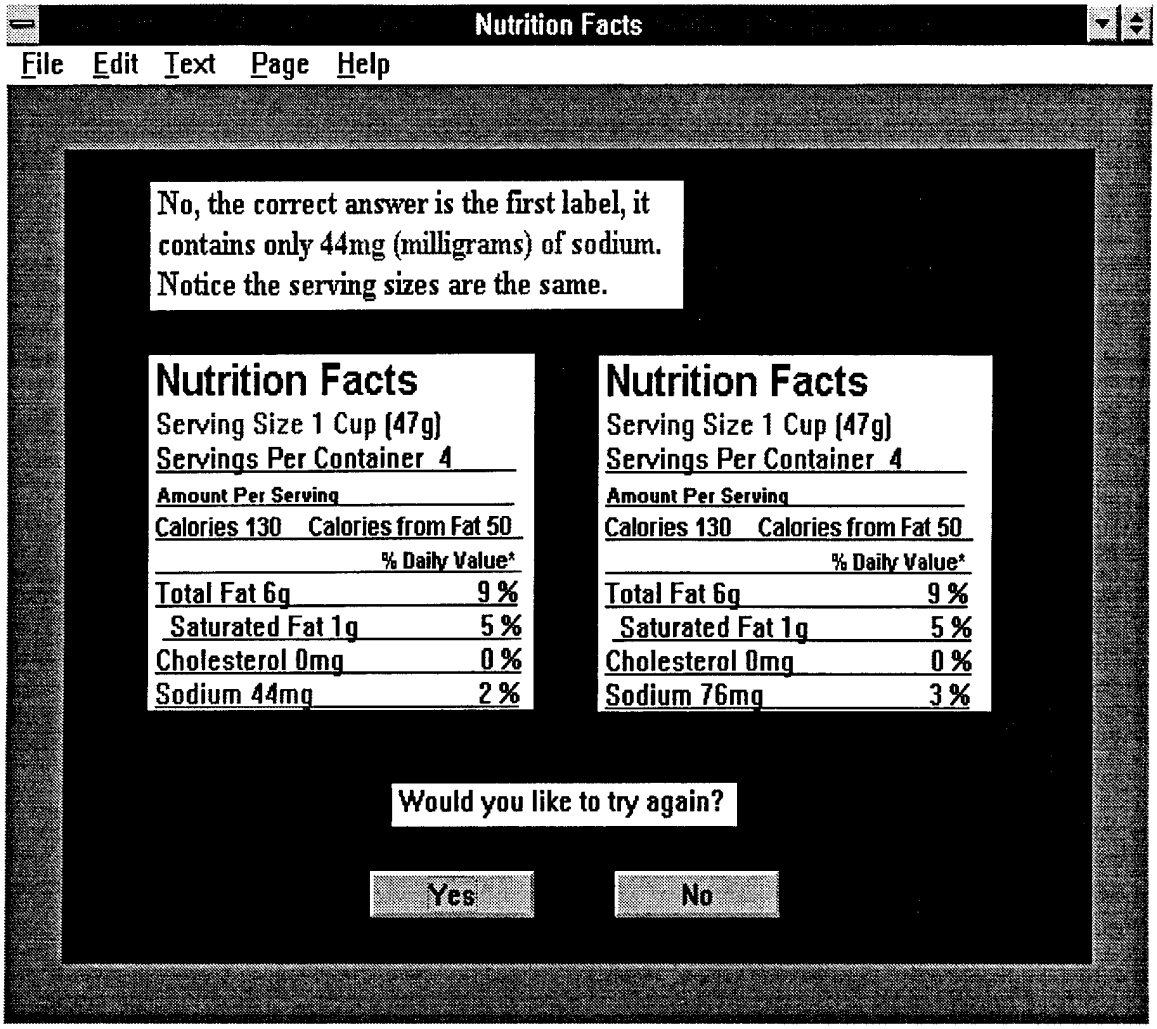
Yes, you are correct. Both labels tell us that the serving size is one cup, but the first label is the lower sodium choice.

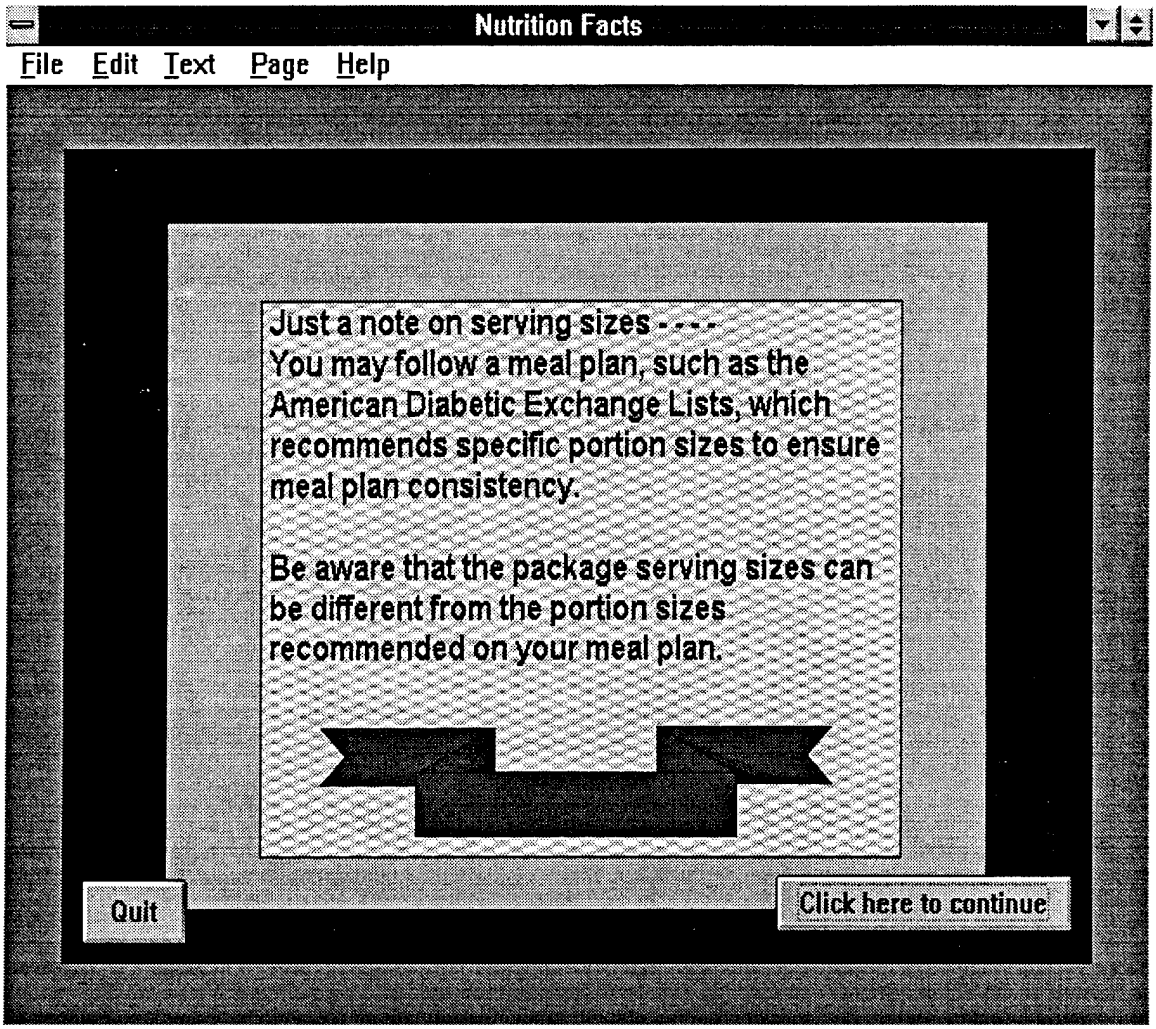
Nutrition Facts	
Serving Size 1 Cup (47g)	
Servings Per Container 4	
Amount Per Serving	
Calories 130	Calories from Fat 50
	% Daily Value*
Total Fat 6g	9 %
Saturated Fat 1g	5 %
Cholesterol 0mg	0 %
Sodium 44mg	2 %

Nutrition Facts	
Serving Size 1 Cup (47g)	
Servings Per Container 4	
Amount Per Serving	
Calories 130	Calories from Fat 50
	% Daily Value*
Total Fat 6g	9 %
Saturated Fat 1g	5 %
Cholesterol 0mg	0 %
Sodium 76mg	3 %

Quit

Continue

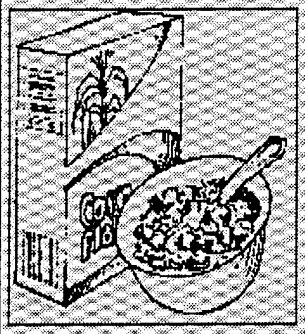

Nutrition Facts
File Edit Text Page Help
No, the correct answer is the first label, it contains only 44mg (milligrams) of sodium. Notice the serving sizes are the same.
Nutrition Facts
Serving Size 1 Cup (47g)
Servings Per Container 4
Amount Per Serving
Calories 130 Calories from Fat 50
% Daily Value*
Total Fat 6g 9 %
Saturated Fat 1g 5 %
Cholesterol 0mg 0 %
Sodium 44mg 2 %
Nutrition Facts
Serving Size 1 Cup (47g)
Servings Per Container 4
Amount Per Serving
Calories 130 Calories from Fat 50
% Daily Value*
Total Fat 6g 9 %
Saturated Fat 1g 5 %
Cholesterol 0mg 0 %
Sodium 76mg 3 %
Would you like to try again?
Yes
No

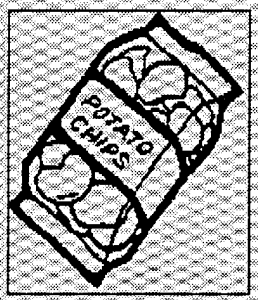

Nutrition Facts
File Edit Text Page Help
Just a note on serving sizes - - - -
You may follow a meal plan, such as the American Diabetic Exchange Lists, which recommends specific portion sizes to ensure meal plan consistency.
Be aware that the package serving sizes can be different from the portion sizes recommended on your meal plan.
Quit
Click here to continue

Nutrition Facts

File Edit Text Page Help

Now look at a different food.





Click on the pears.

Quit

Nutrition Facts

File Edit Text Page Help

Pears, like all fruit, are rich in carbohydrates. Carbohydrates come from a variety of the foods you eat. Starches, sugars, and dietary fiber are all carbohydrates. Along with vitamins and minerals, carbohydrate foods are your body's main source of energy.

Quit

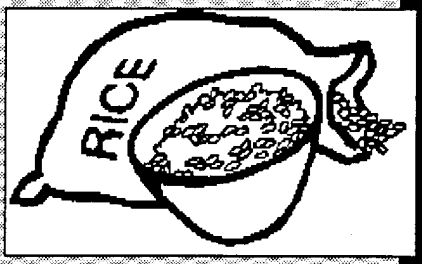
Continue

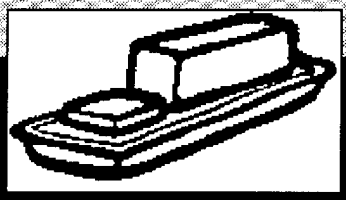
Nutrition Facts

File Edit Text Page Help

Do you know which of these is highest in carbohydrate?

Click on the food which you think is highest in carbohydrate.





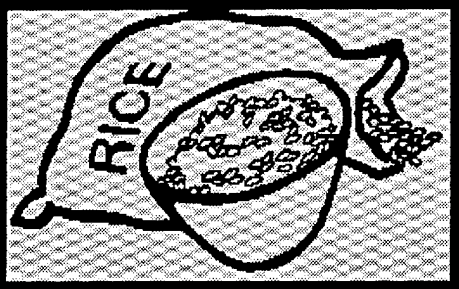
Quit

Nutrition Facts

File Edit Text Page Help

Yes, you are correct!

Other carbohydrates include fruits, vegetables like potatoes and corn, breads, cereals and other grain foods. Carbohydates are also the sweets and sugars you eat.



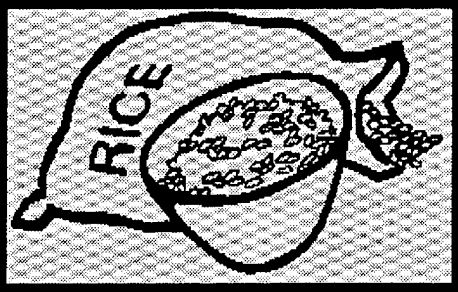
Quit

Continue

Nutrition Facts

File Edit Text Page Help

No, the correct answer is the rice. Other carbohydrates include fruits, vegetables like potatoes and corn, breads, cereals and other grain foods. Carbohydates are also the sweets and sugars you eat.



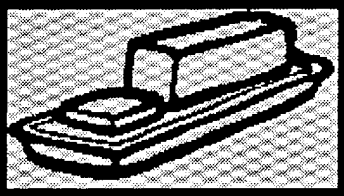
Quit

Continue

Nutrition Facts

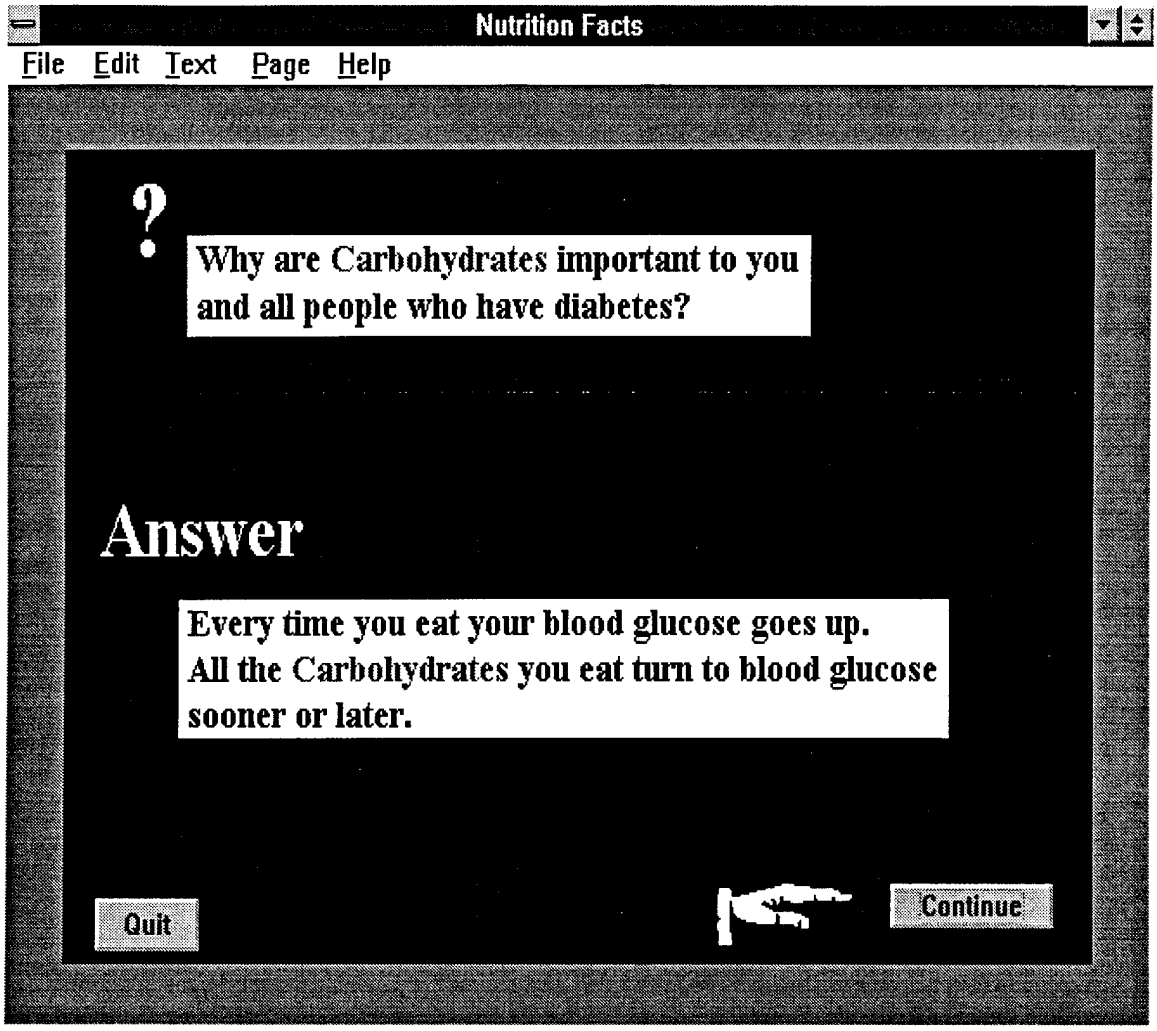
File Edit Text Page Help

Meat contains protein and fat. Spreads like margarine and butter contain fat. Your body gets calories from all three nutritents - carbohydrates, protein, and fat.



Quit

Continue


Nutrition Facts
File Edit Text Page Help
?
Why are Carbohydrates important to you and all people who have diabetes?
Answer
Every time you eat your blood glucose goes up. All the Carbohydrates you eat turn to blood glucose sooner or later.
Quit
Continue

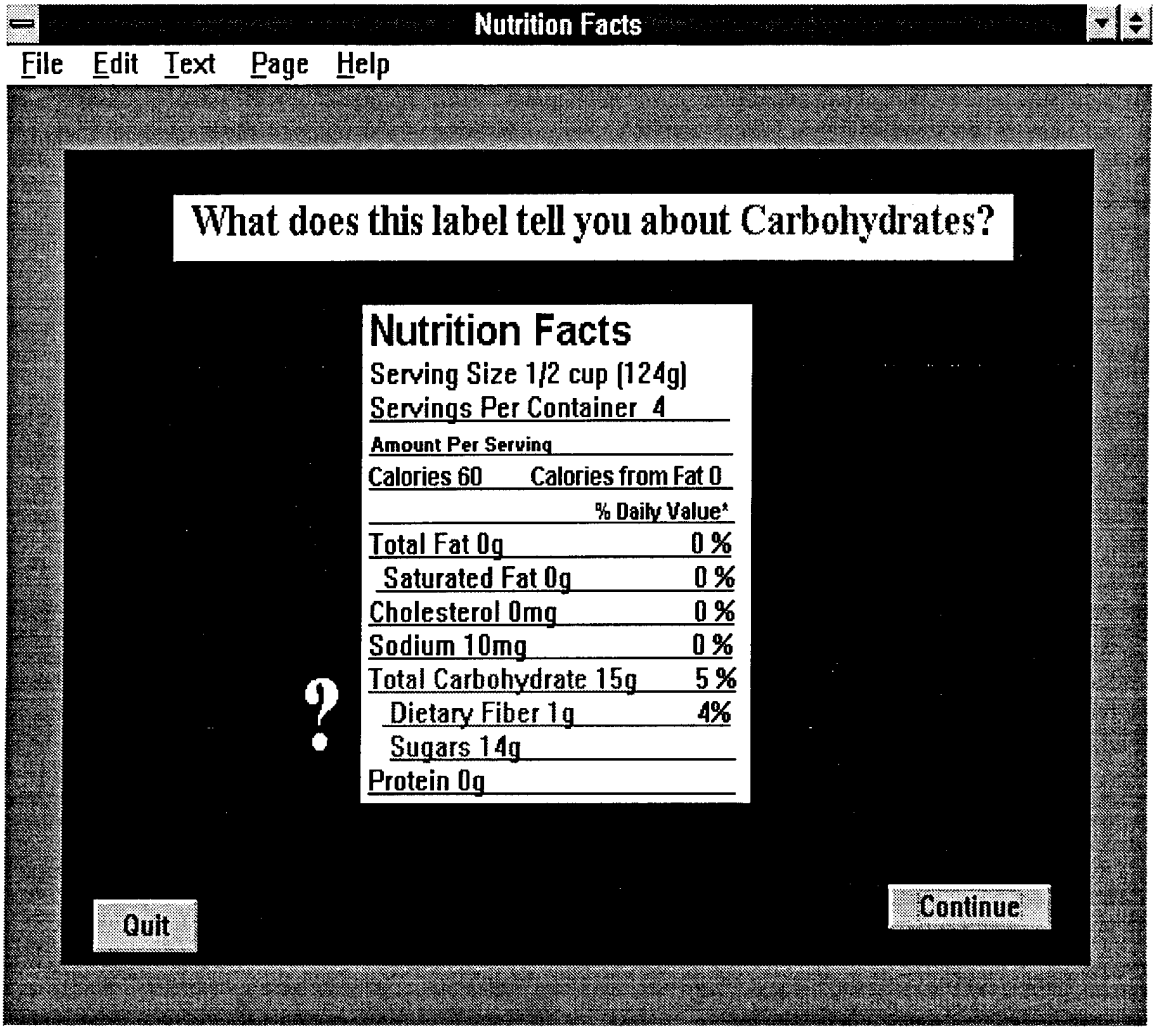
Nutrition Facts

File Edit Text Page Help

Learning to be consistent with the amount of Carbohydrate you eat can give you better blood glucose control. Reading food labels can help you learn which foods are Carbohydrates.

Quit

Continue


Nutrition Facts
File Edit Text Page Help
What does this label tell you about Carbohydrates?
Nutrition Facts
Serving Size 1/2 cup (124g)
Servings Per Container 4
Amount Per Serving
Calories 60 Calories from Fat 0
% Daily Value*
Total Fat 0g 0 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 10mg 0 %
Total Carbohydrate 15g 5 %
Dietary Fiber 1g 4%
Sugars 14g
Protein 0g
?
Quit
Continue

Nutrition Facts

File Edit Text Page Help

Nutrition Facts

Serving Size 1/2 cup (124g)
Servings Per Container 4

Amount Per Serving	
Calories 60	Calories from Fat 0
	% Daily Value*
Total Fat 0g	0 %
Saturated Fat 0g	0 %
Cholesterol 0mg	0 %
Sodium 10mg	0 %
Total Carbohydrate 15g	5 %
Dietary Fiber 1g	4%
Sugars 14g	

This label tells you that eating a 1/2 cup serving of these pears, gives you 15g (grams) of Total Carbohydrate.

Quit

Continue

Nutrition Facts

File Edit Text Page Help

Nutrition Facts

Serving Size 1/2 cup (124g)
Servings Per Container 4

Amount Per Serving

Calories 60	Calories from Fat 0
	% Daily Value*
Total Fat 0g	0 %
Saturated Fat 0g	0 %
Cholesterol 0mg	0 %
Sodium 10mg	0 %
Total Carbohydrate 15g	5 %
Dietary Fiber 1g	4%
Sugars 14g	

It also tells you that a 1/2 cup serving of these pears, provides 1g (gram) of dietary fiber. Dietary fiber is part of the total carbohydrate.

Quit

Continue

Nutrition Facts

File Edit Text Page Help

Nutrition Facts

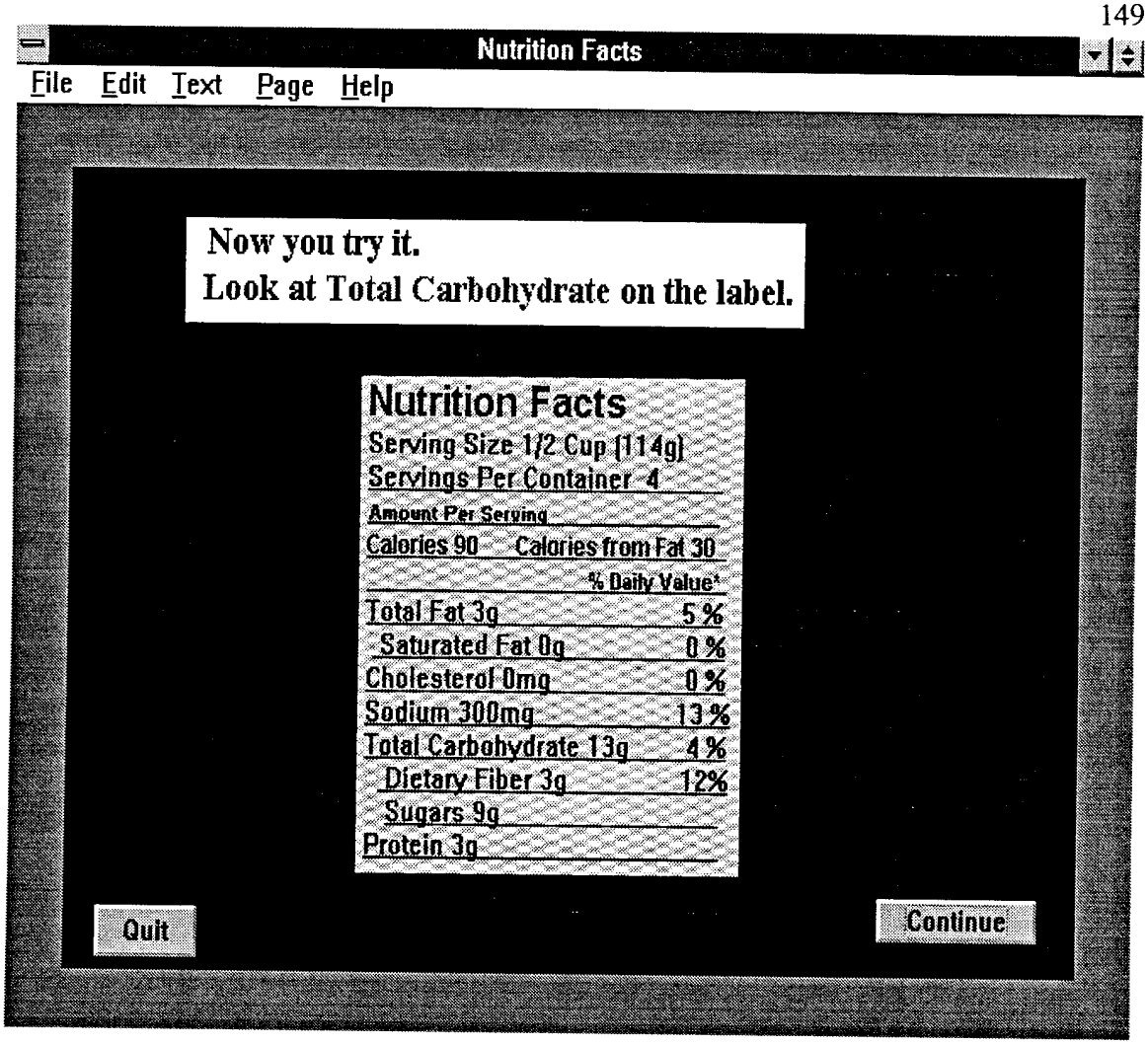
Serving Size 1/2 cup (124g)
Servings Per Container 4

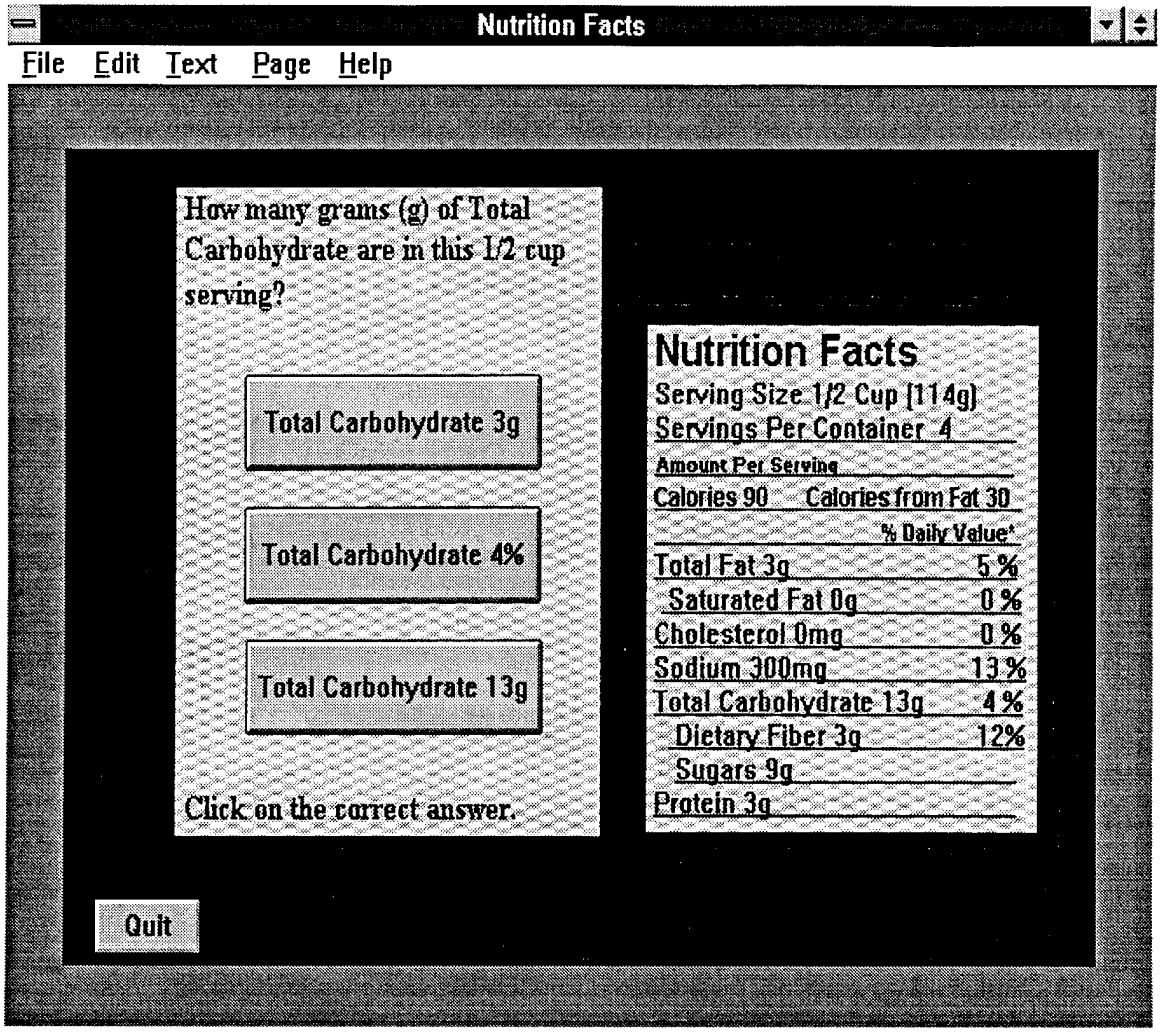
Amount Per Serving	
Calories 60	Calories from Fat 0
	% Daily Value*
Total Fat 0g	0 %
Saturated Fat 0g	0 %
Cholesterol 0mg	0 %
Sodium 10mg	0 %
Total Carbohydrate 15g	5 %
Dietary Fiber 1g	4%
Sugars 14g	

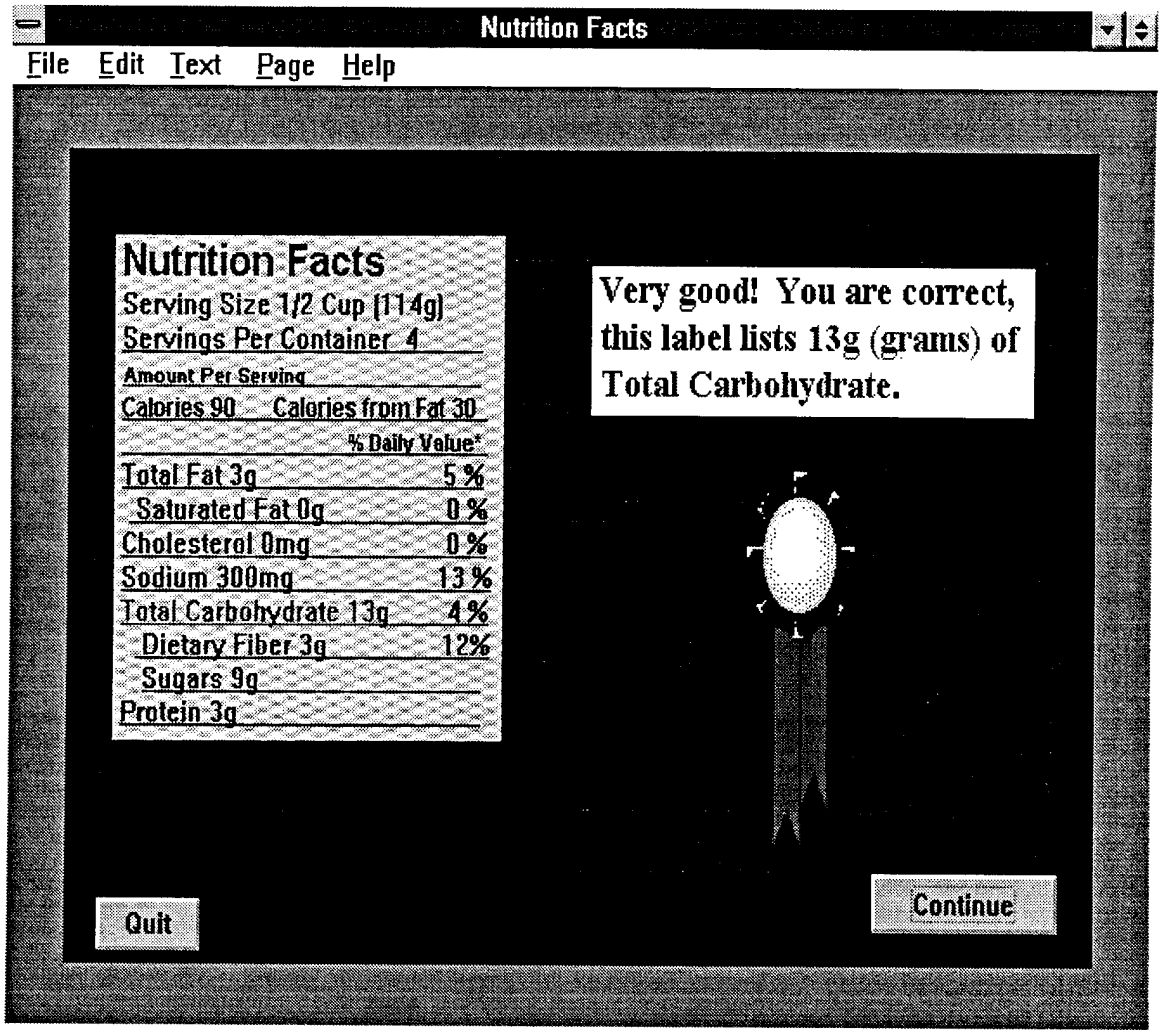
And, if you eat a 1/2 cup serving of these pears, you would be eating 14g (grams) of sugars. Sugars on the label are also part of the total carbohydrate.

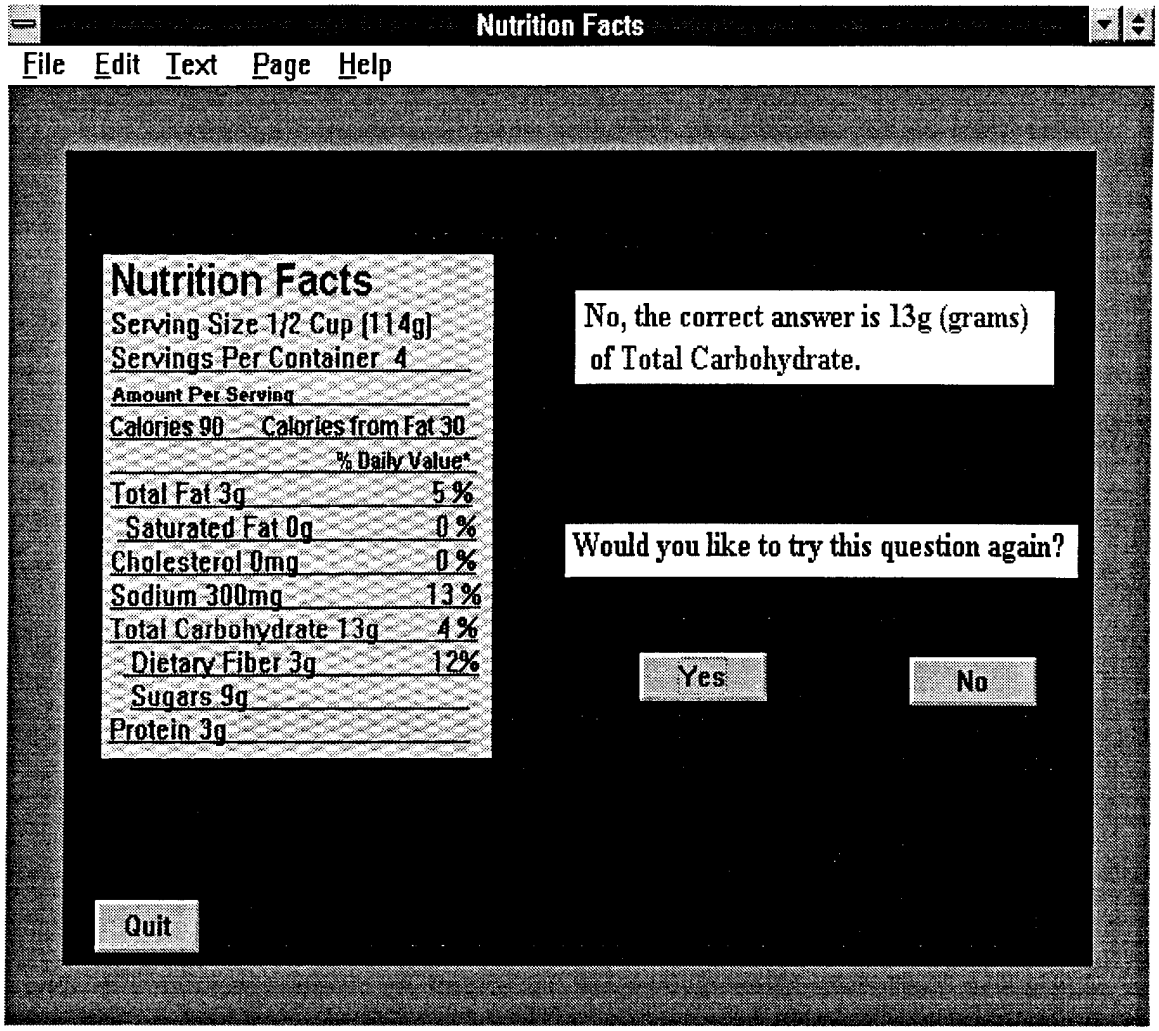
Quit

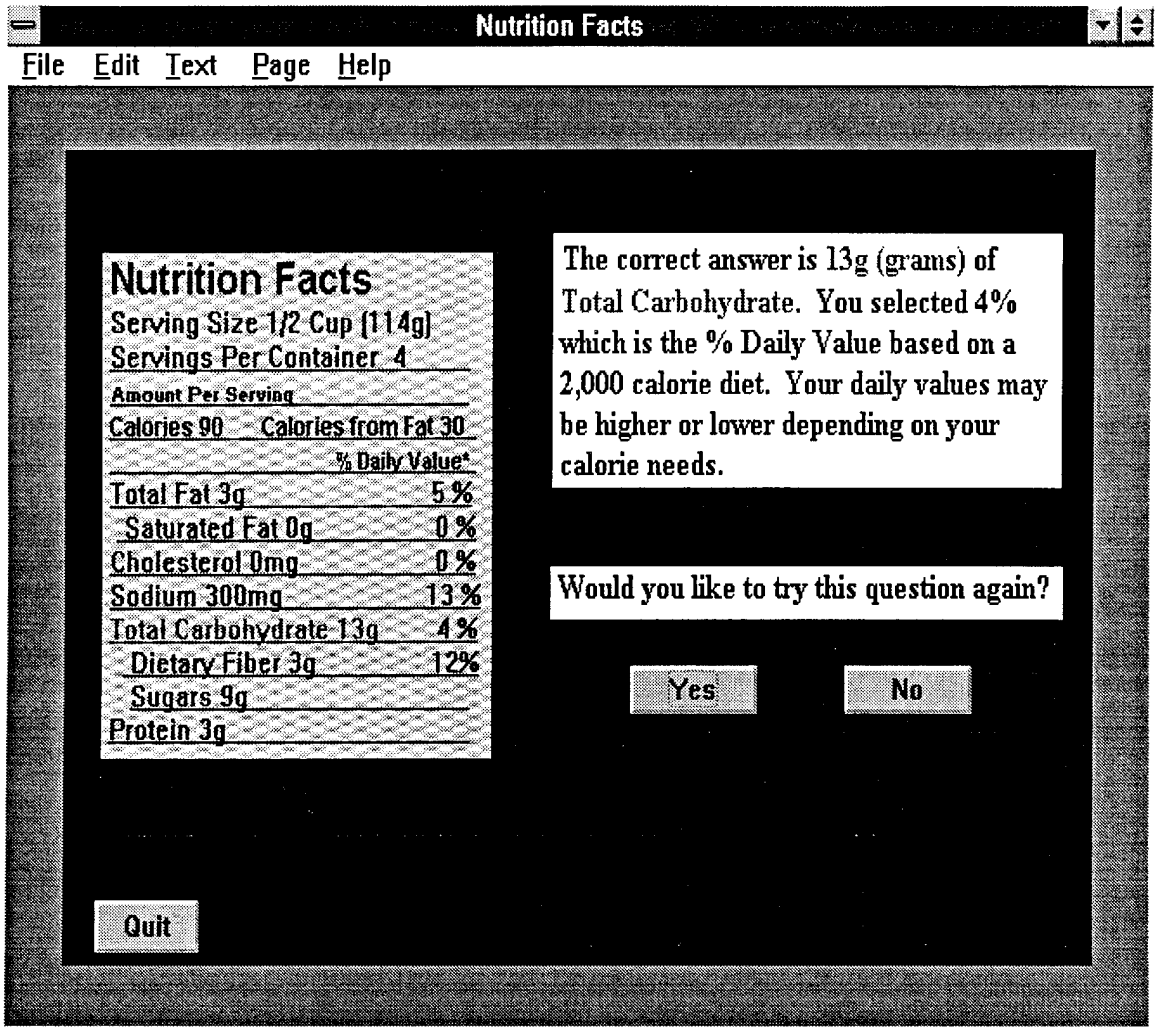
Continue

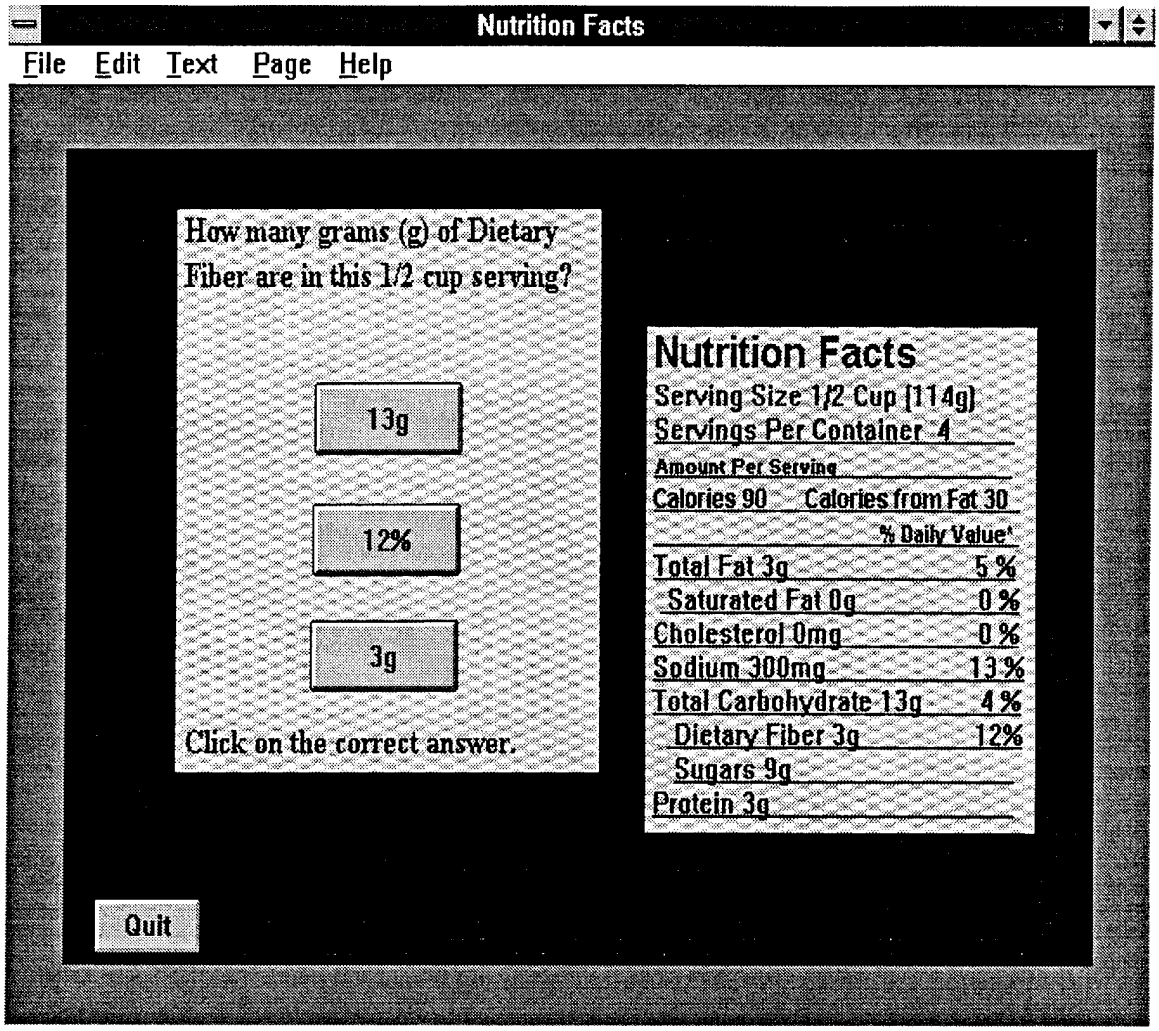

Nutrition Facts
File Edit Text Page Help
Now you try it.
Look at Total Carbohydrate on the label.
Nutrition Facts
Serving Size 1/2 Cup (114g)
Servings Per Container 4
Amount Per Serving
Calories 90 Calories from Fat 30
% Daily Value*
Total Fat 3g 5 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 300mg 13 %
Total Carbohydrate 13g 4 %
Dietary Fiber 3g 12%
Sugars 9g
Protein 3g
Quit
Continue


Nutrition Facts
File Edit Text Page Help
How many grams (g) of Total Carbohydrate are in this 1/2 cup serving?
Total Carbohydrate 3g
Total Carbohydrate 4%
Total Carbohydrate 13g
Click on the correct answer.
Nutrition Facts
Serving Size 1/2 Cup (114g)
Servings Per Container 4
Amount Per Serving
Calories 90 Calories from Fat 30
% Daily Value*
Total Fat 3g 5 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 300mg 13 %
Total Carbohydrate 13g 4 %
Dietary Fiber 3g 12%
Sugars 9g
Protein 3g
Quit


Nutrition Facts
File Edit Text Page Help
Nutrition Facts
Serving Size 1/2 Cup (114g)
Servings Per Container 4
Amount Per Serving
Calories 90 Calories from Fat 30
% Daily Value*
Total Fat 3g 5 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 300mg 13 %
Total Carbohydrate 13g 4 %
Dietary Fiber 3g 12%
Sugars 9g
Protein 3g
Very good! You are correct, this label lists 13g (grams) of Total Carbohydrate.
Quit
Continue


Nutrition Facts
File Edit Text Page Help
Nutrition Facts
Serving Size 1/2 Cup (114g)
Servings Per Container 4
Amount Per Serving
Calories 90 Calories from Fat 30
% Daily Value*
Total Fat 3g 5 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 300mg 13 %
Total Carbohydrate 13g 4 %
Dietary Fiber 3g 12%
Sugars 9g
Protein 3g
No, the correct answer is 13g (grams) of Total Carbohydrate.
Would you like to try this question again?
Yes
No
Quit


Nutrition Facts
File Edit Text Page Help
Nutrition Facts
Serving Size 1/2 Cup (114g)
Servings Per Container 4
Amount Per Serving
Calories 90 Calories from Fat 30
% Daily Value*
Total Fat 3g 5 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 300mg 13 %
Total Carbohydrate 13g 4 %
Dietary Fiber 3g 12%
Sugars 9g
Protein 3g
The correct answer is 13g (grams) of Total Carbohydrate. You selected 4% which is the % Daily Value based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.
Would you like to try this question again?
Yes
No
Quit


Nutrition Facts
File Edit Text Page Help
How many grams (g) of Dietary Fiber are in this 1/2 cup serving?
13g
12%
3g
Click on the correct answer.
Nutrition Facts
Serving Size 1/2 Cup (114g)
Servings Per Container 4
Amount Per Serving
Calories 90 Calories from Fat 30
% Daily Value*
Total Fat 3g 5 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 300mg 13 %
Total Carbohydrate 13g 4 %
Dietary Fiber 3g 12%
Sugars 9g
Protein 3g
Quit

Nutrition Facts

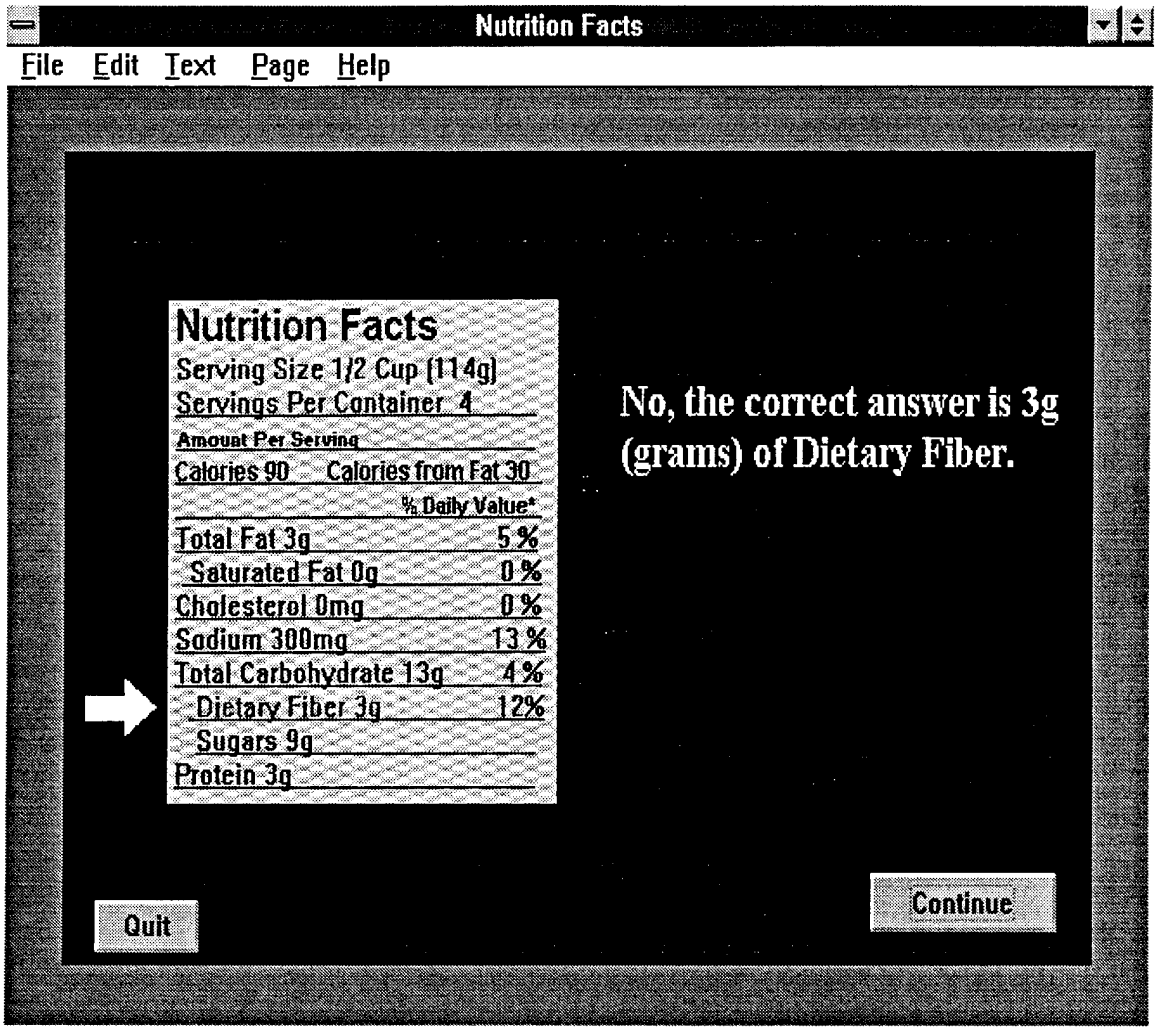
File Edit Text Page Help

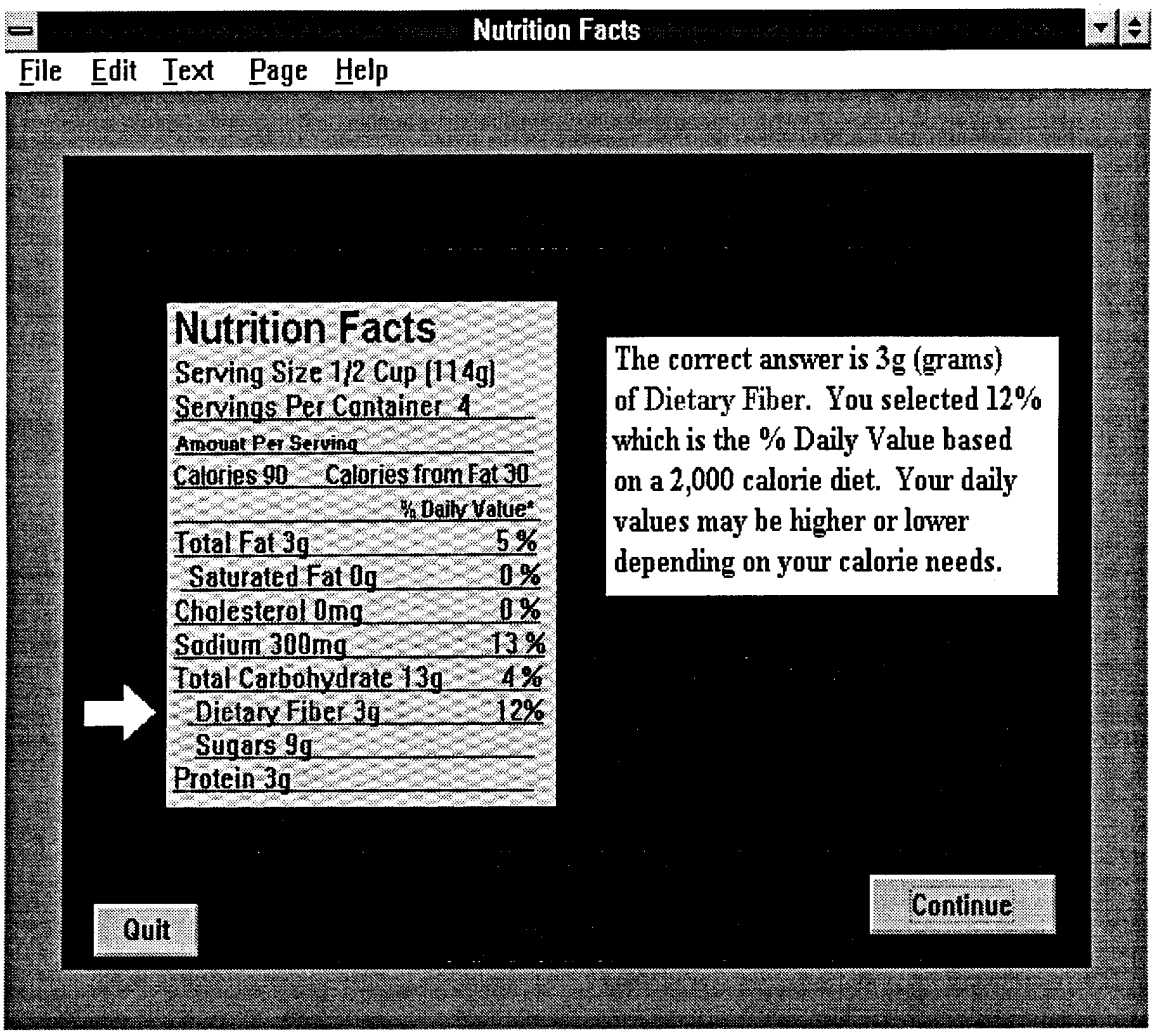
Nutrition Facts
Serving Size 1/2 Cup (114g)
Servings Per Container 4
Amount Per Serving
Calories 90 Calories from Fat 30
% Daily Value*
Total Fat 3g 5%
Saturated Fat 0g 0%
Cholesterol 0mg 0%
Sodium 300mg 13%
Total Carbohydrate 13g 4%
Dietary Fiber 3g 12%
Sugars 9g
Protein 3g

Yes, there are 3g (grams) of Dietary Fiber in a 1/2 cup serving.

Quit

Continue

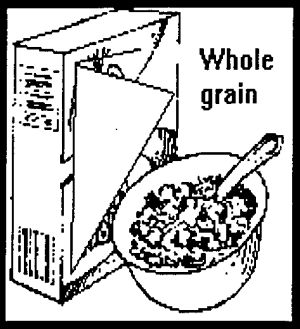

Nutrition Facts
File Edit Text Page Help
Nutrition Facts
Serving Size 1/2 Cup (114g)
Servings Per Container 4
Amount Per Serving
Calories 90 Calories from Fat 30
% Daily Value*
Total Fat 3g 5%
Saturated Fat 0g 0%
Cholesterol 0mg 0%
Sodium 300mg 13%
Total Carbohydrate 13g 4%
Dietary Fiber 3g 12%
Sugars 9g
Protein 3g
No, the correct answer is 3g (grams) of Dietary Fiber.
Quit
Continue

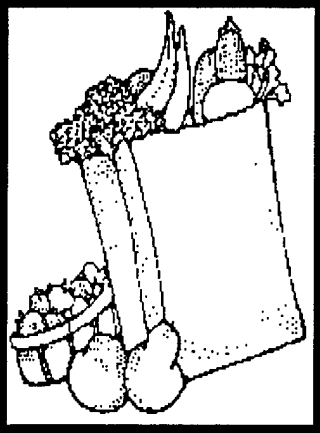

Nutrition Facts
File Edit Text Page Help
Nutrition Facts
Serving Size 1/2 Cup (114g)
Servings Per Container 4
Amount Per Serving
Calories 90 Calories from Fat 30
% Daily Value*
Total Fat 3g 5%
Saturated Fat 0g 0%
Cholesterol 0mg 0%
Sodium 300mg 13%
Total Carbohydrate 13g 4%
Dietary Fiber 3g 12%
Sugars 9g
Protein 3g
The correct answer is 3g (grams) of Dietary Fiber. You selected 12% which is the % Daily Value based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs.
Quit
Continue

Nutrition Facts

File Edit Text Page Help

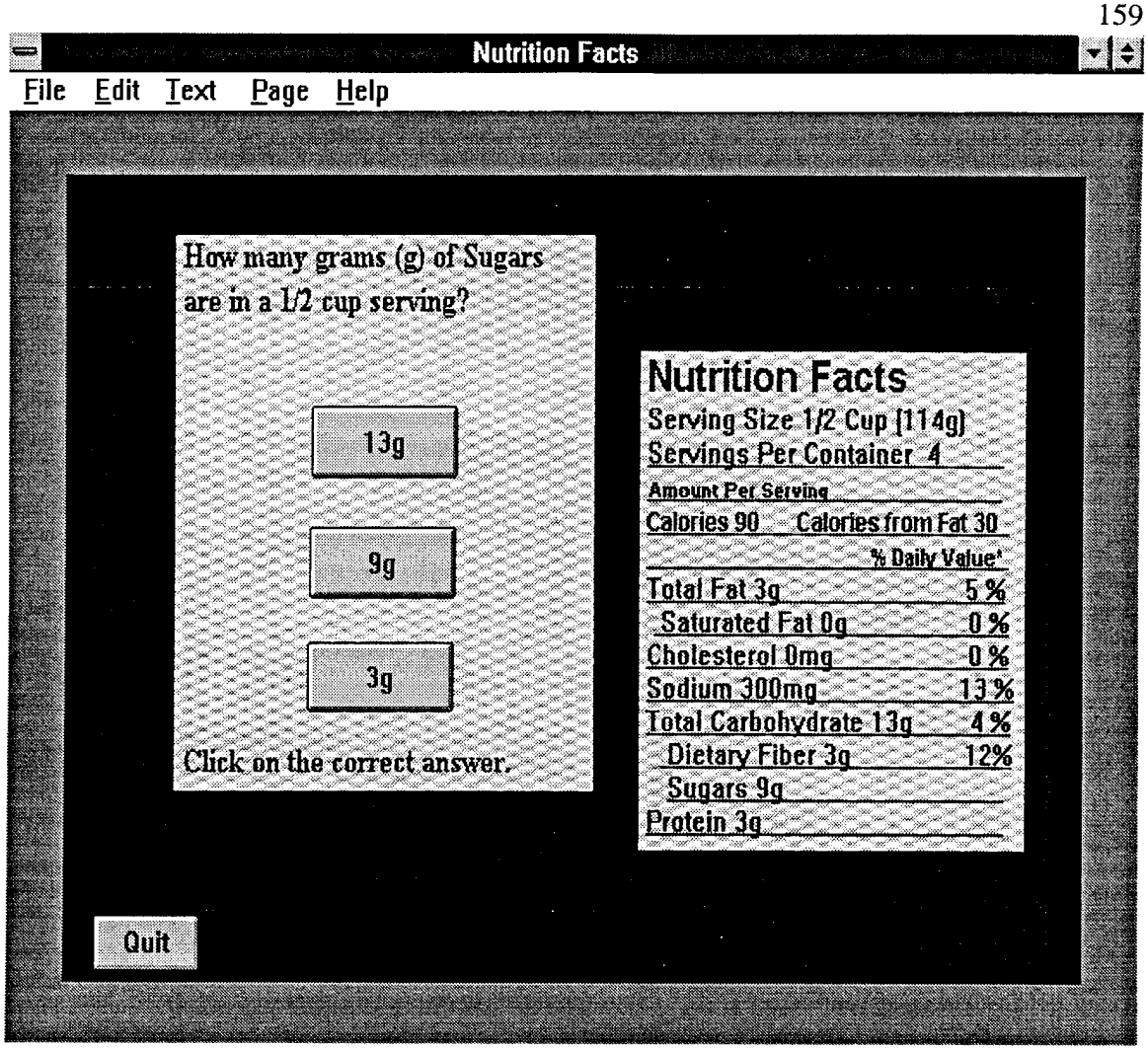
Dietary fiber is the bulk or roughage in your diet. Fruits, vegetables, and foods made from whole grains are good sources of dietary fiber.





Quit

Continue


Nutrition Facts
File Edit Text Page Help
How many grams (g) of Sugars are in a 1/2 cup serving?
13g
9g
3g
Click on the correct answer.
Nutrition Facts
Serving Size 1/2 Cup (114g)
Servings Per Container 4
Amount Per Serving
Calories 90 Calories from Fat 30
% Daily Value*
Total Fat 3g 5 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 300mg 13 %
Total Carbohydrate 13g 4 %
Dietary Fiber 3g 12%
Sugars 9g
Protein 3g
Quit

Nutrition Facts

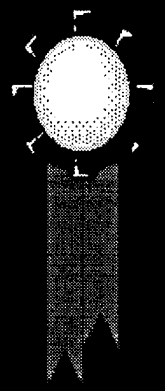
File Edit Text Page Help

Yes, you are right! Locating the information you need is easy when you use the Nutrition Facts panel.

Nutrition Facts

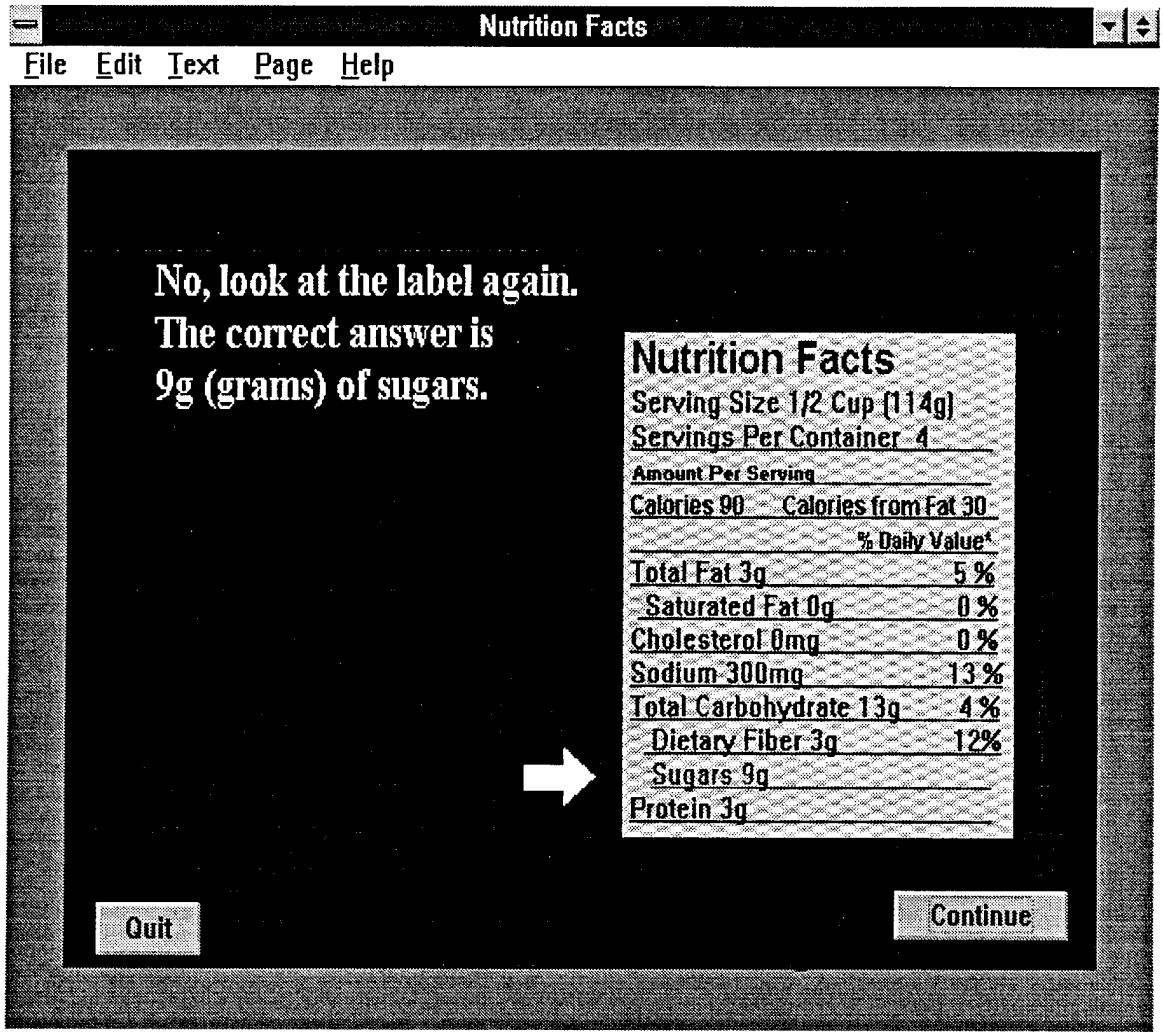
Serving Size 1/2 Cup (114g)
Servings Per Container 4

Amount Per Serving	
Calories 90 — Calories from Fat 30	
	% Daily Value*
Total Fat 3g	5 %
Saturated Fat 0g	0 %
Cholesterol 0mg	0 %
Sodium 300mg	13 %
Total Carbohydrate 13g	4 %
Dietary Fiber 3g	12%
Sugars 9g	
Protein 3g	



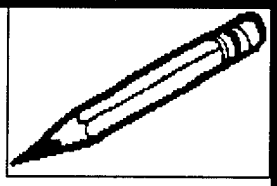
Quit

Continue


Nutrition Facts
File Edit Text Page Help
No, look at the label again.
The correct answer is
9g (grams) of sugars.
Nutrition Facts
Serving Size 1/2 Cup (114g)
Servings Per Container 4
Amount Per Serving
Calories 90 Calories from Fat 30
% Daily Value*
Total Fat 3g 5 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 300mg 13 %
Total Carbohydrate 13g 4 %
Dietary Fiber 3g 12%
Sugars 9g
Protein 3g
Quit
Continue

Nutrition Facts

File Edit Text Page Help



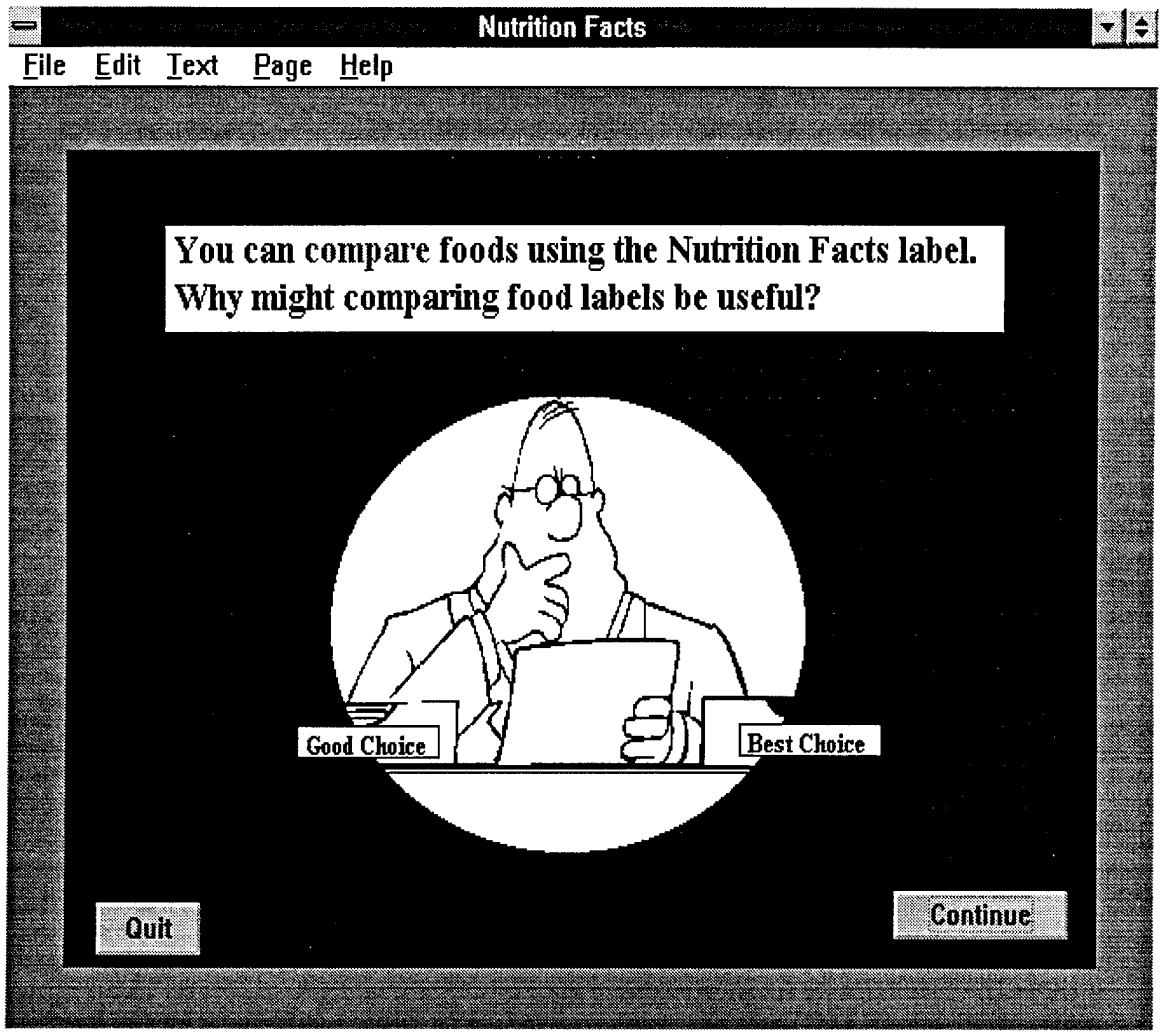
Just a note on sugars - - - -

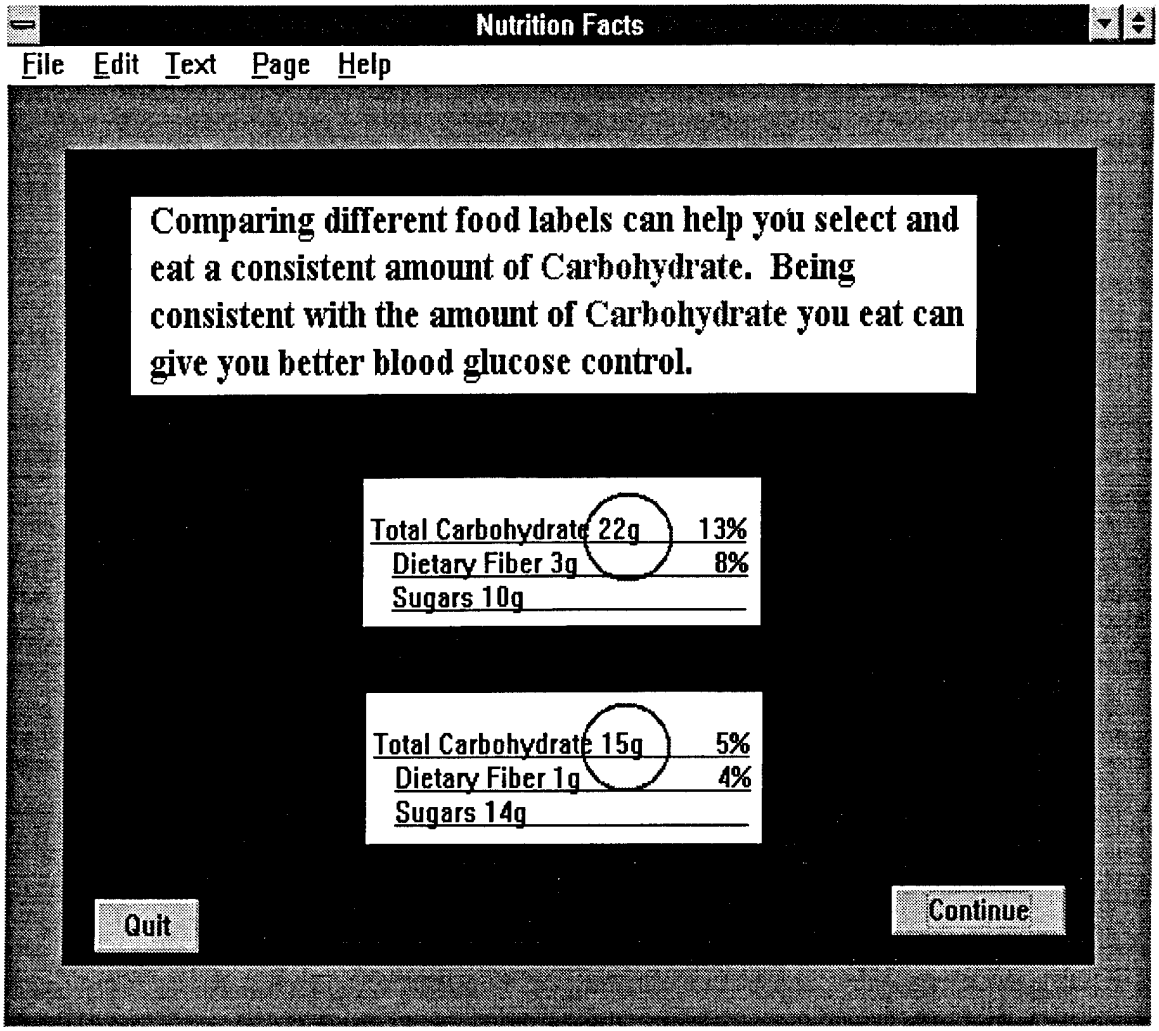
Sugars are part of the Total Carbohydrate. Examples of naturally containing sugars include lactose in milk and fructose in fruit.

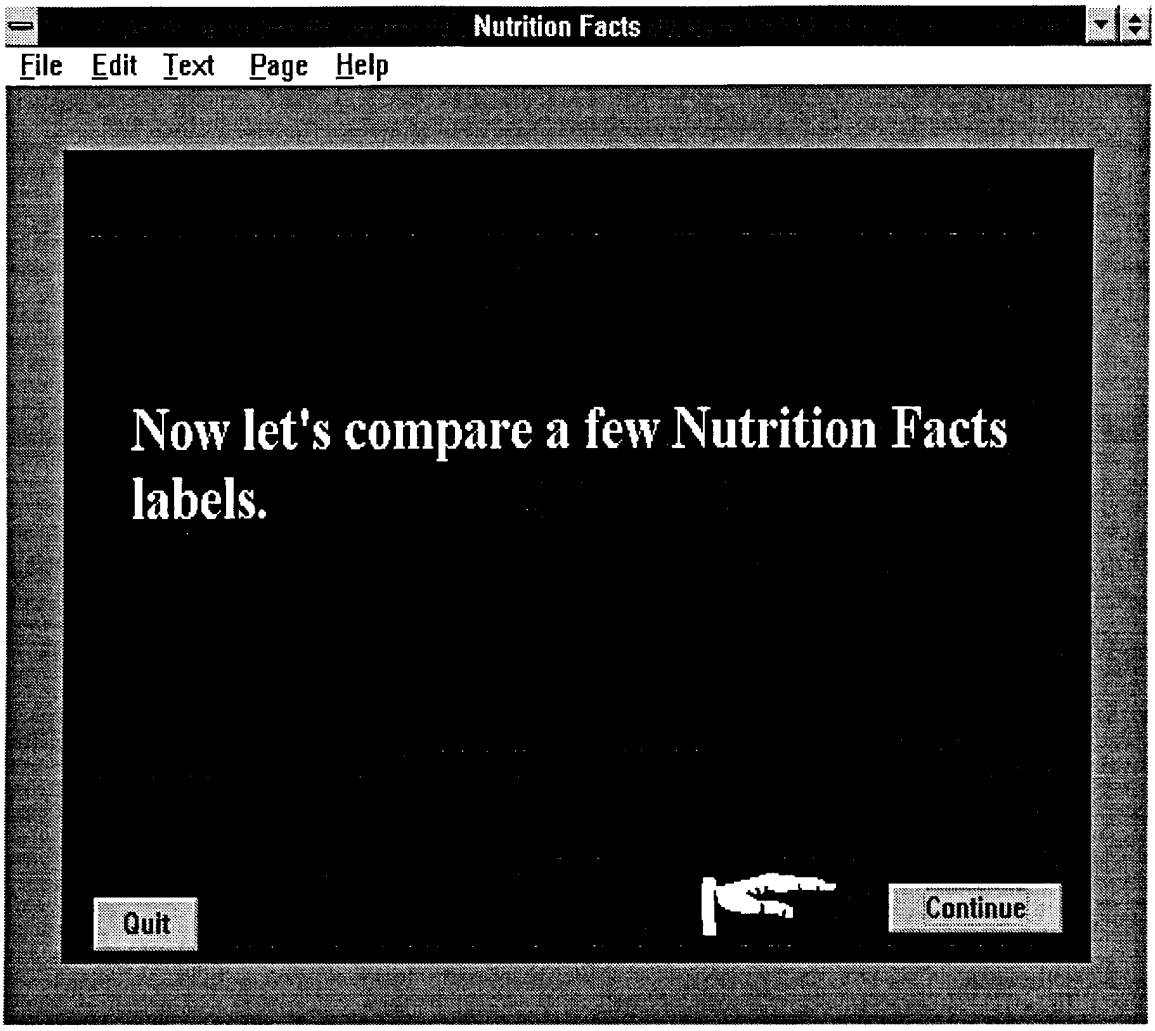
Added sugars include ingredients like sucrose (table sugar), honey, and corn syrup. Contrary to what we used to believe, it is not just the sugar content of a food that effects your blood glucose. It is the total amount of carbohydrate that you eat that will effect how high your blood glucose will go.

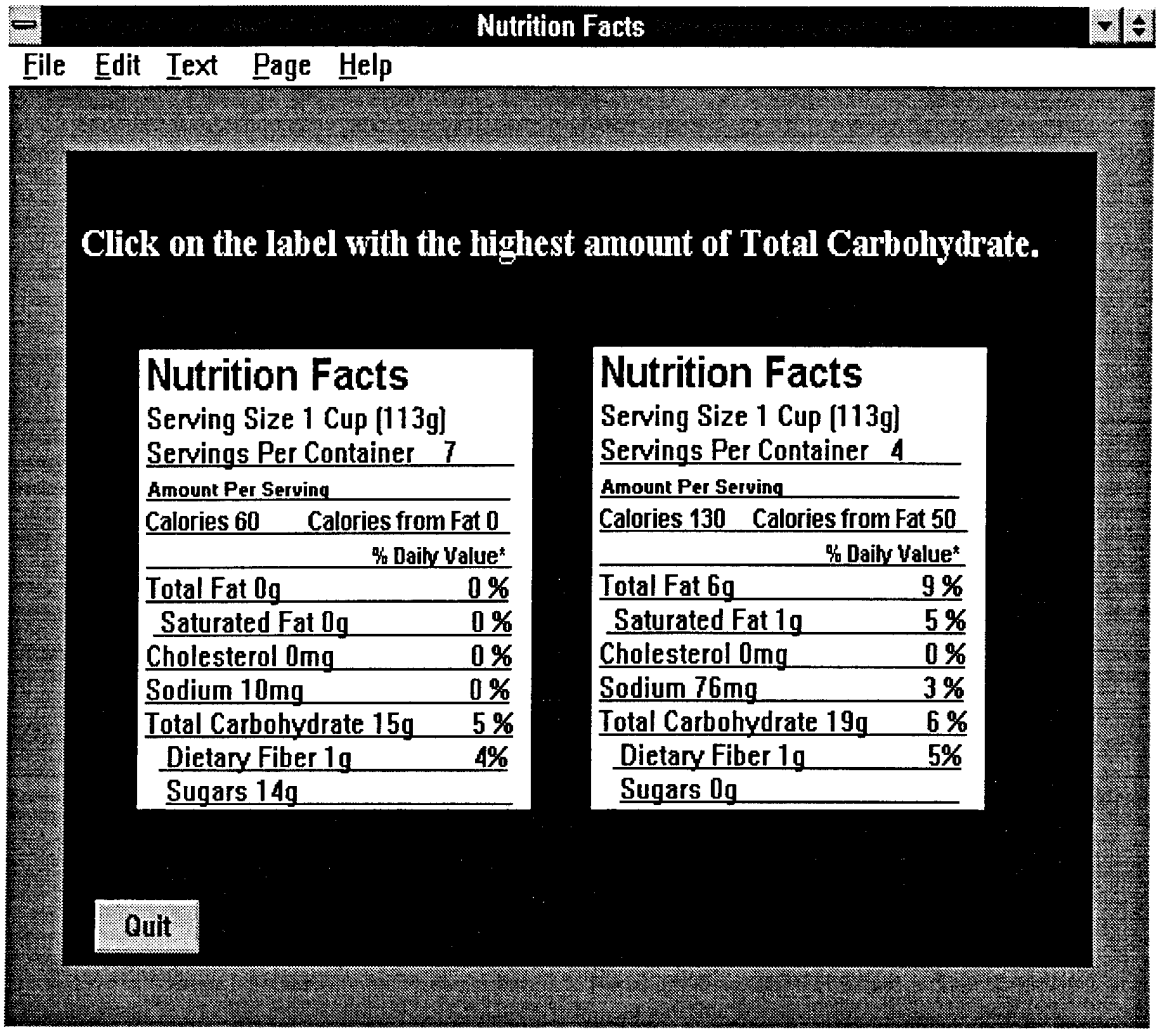
Quit

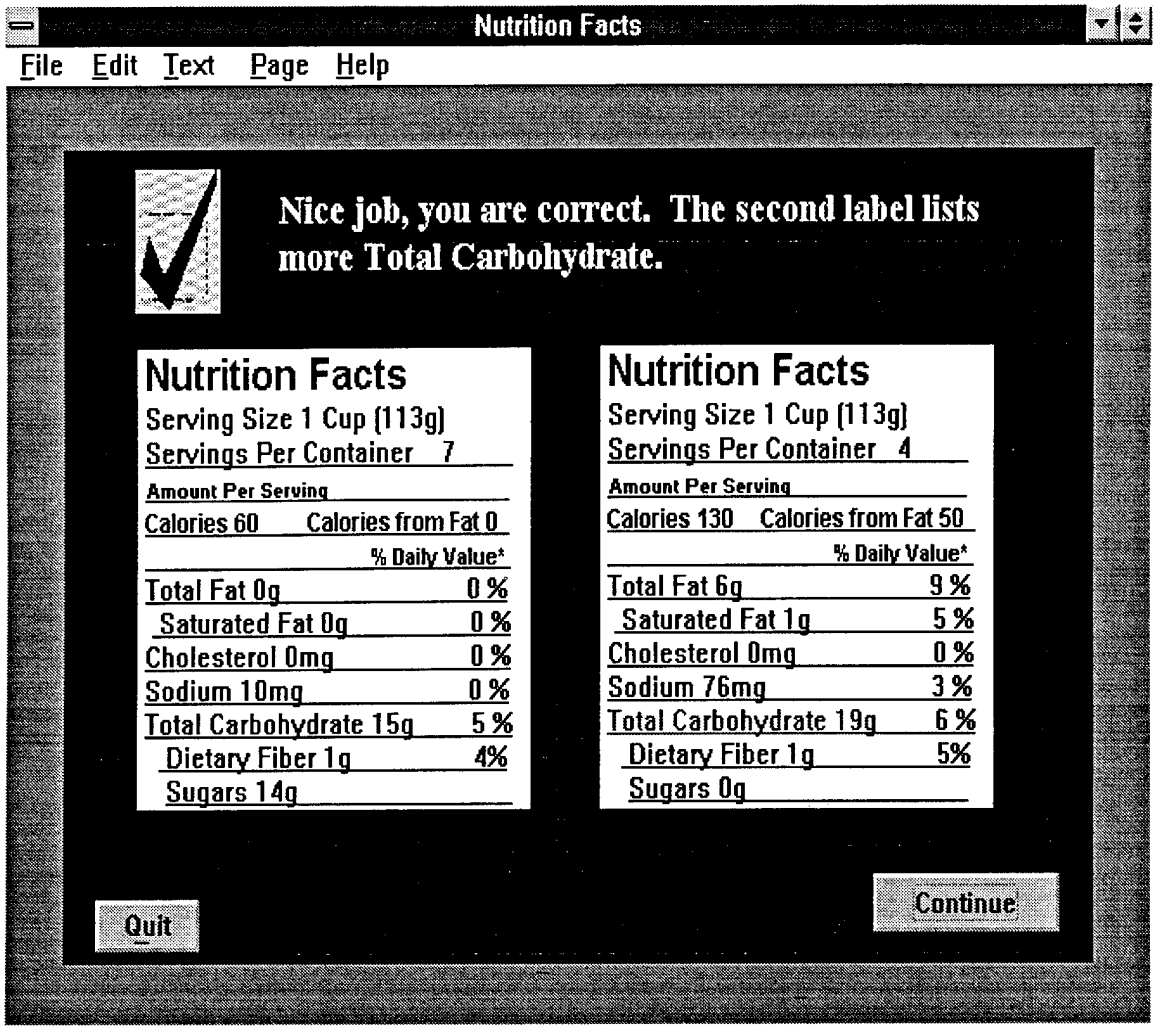
Continue

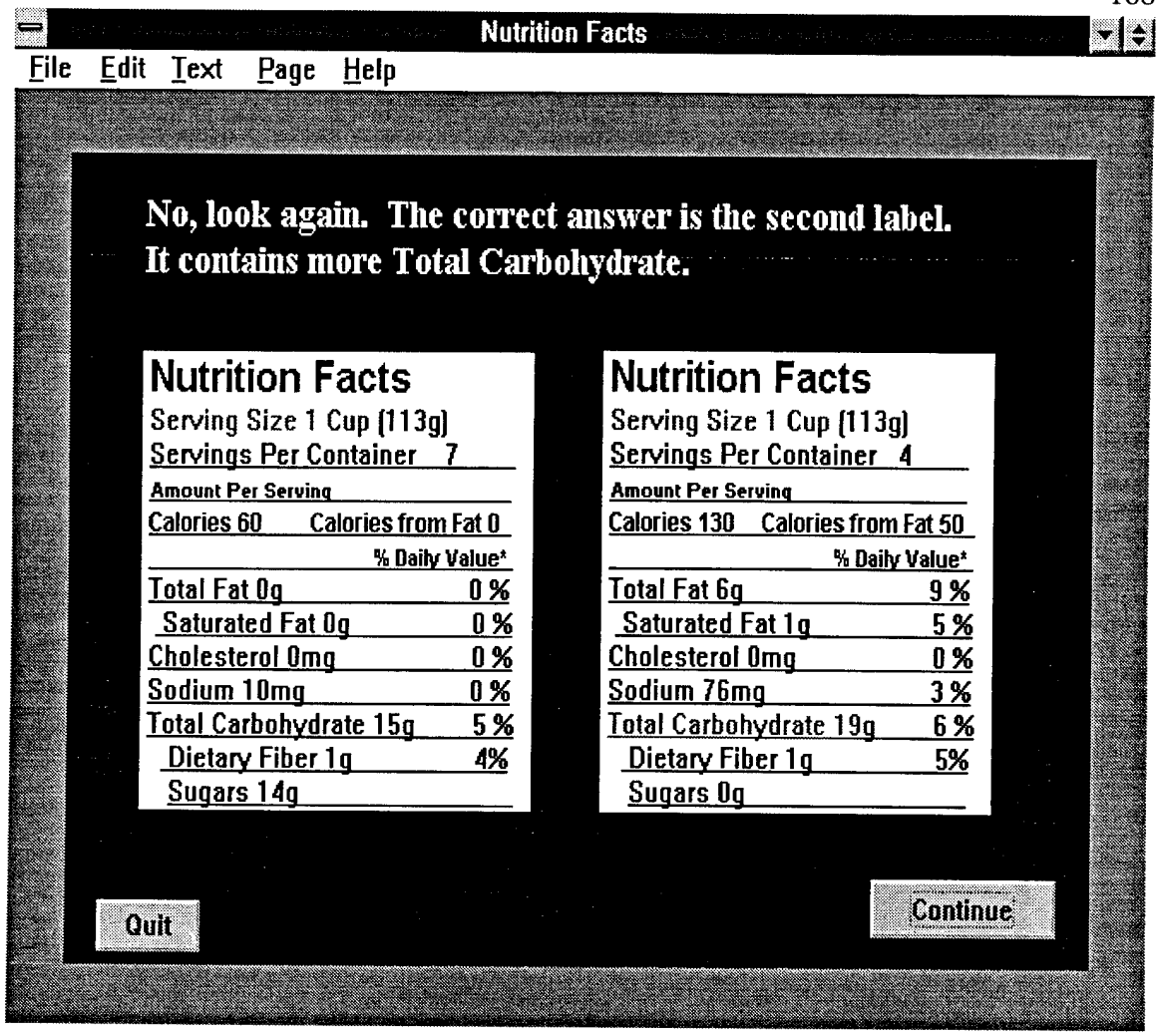

Nutrition Facts
File Edit Text Page Help
You can compare foods using the Nutrition Facts label.
Why might comparing food labels be useful?
Good Choice
Best Choice
Quit
Continue

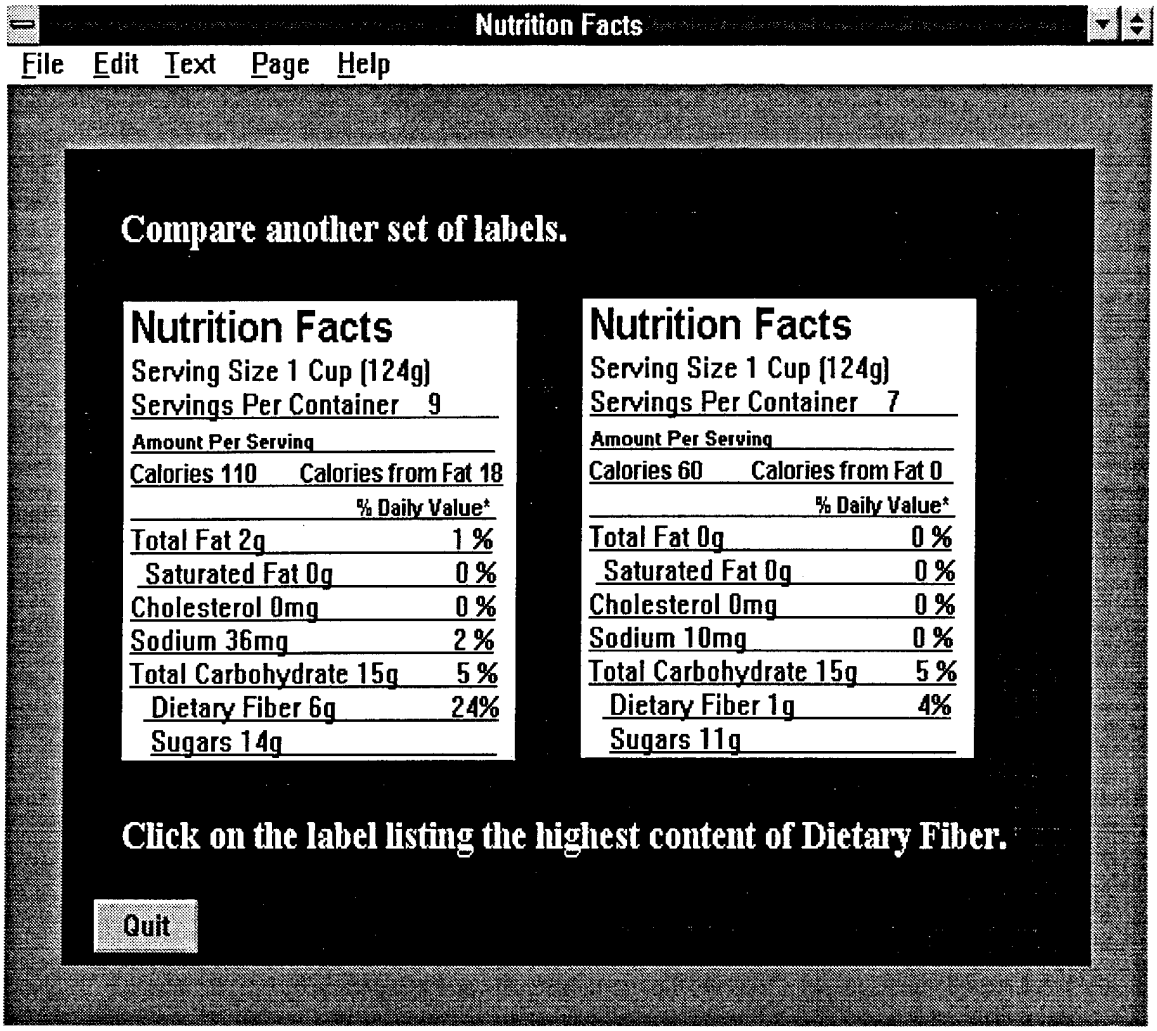

Nutrition Facts
File Edit Text Page Help
Comparing different food labels can help you select and eat a consistent amount of Carbohydrate. Being consistent with the amount of Carbohydrate you eat can give you better blood glucose control.
Total Carbohydrate 22g 13%
Dietary Fiber 3g 8%
Sugars 10g
Total Carbohydrate 15g 5%
Dietary Fiber 1g 4%
Sugars 14g
Quit
Continue

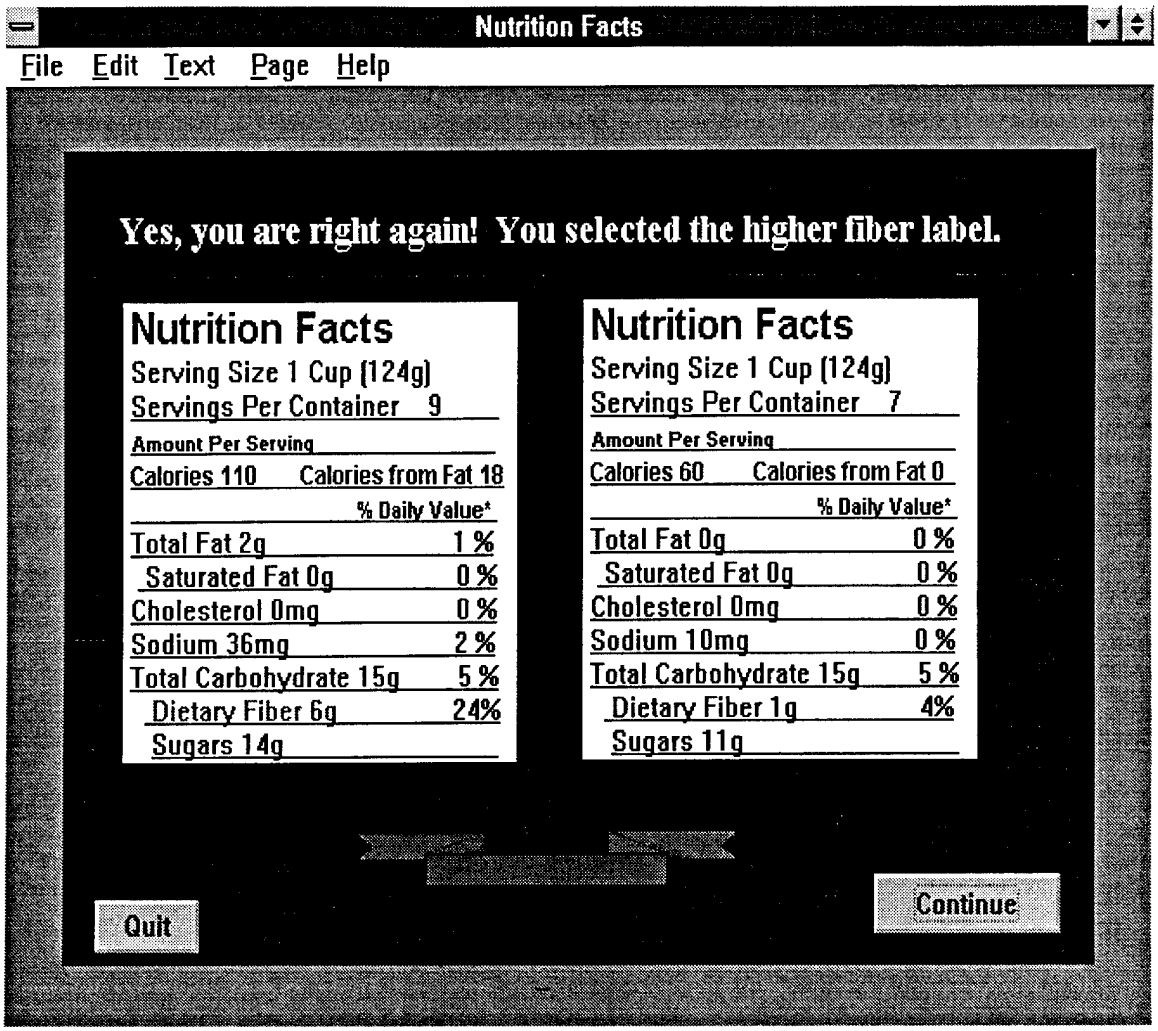

Nutrition Facts
File Edit Text Page Help
Now let's compare a few Nutrition Facts labels.
Quit
Continue

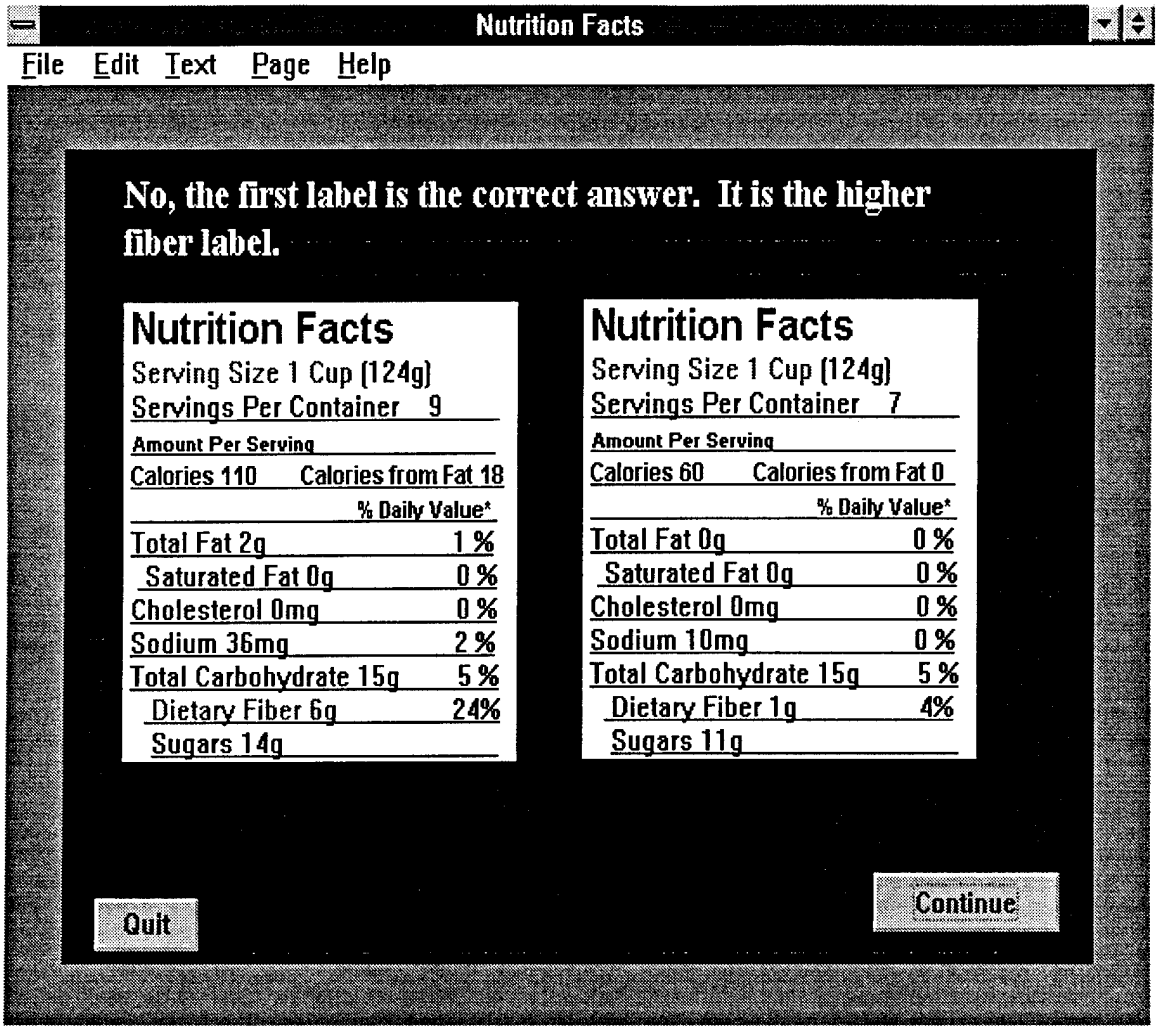

Nutrition Facts
File Edit Text Page Help
Click on the label with the highest amount of Total Carbohydrate.
Nutrition Facts
Serving Size 1 Cup (113g)
Servings Per Container 7
Amount Per Serving
Calories 60 Calories from Fat 0
% Daily Value*
Total Fat 0g 0 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 10mg 0 %
Total Carbohydrate 15g 5 %
Dietary Fiber 1g 4%
Sugars 14g
Nutrition Facts
Serving Size 1 Cup (113g)
Servings Per Container 4
Amount Per Serving
Calories 130 Calories from Fat 50
% Daily Value*
Total Fat 6g 9 %
Saturated Fat 1g 5 %
Cholesterol 0mg 0 %
Sodium 76mg 3 %
Total Carbohydrate 19g 6 %
Dietary Fiber 1g 5%
Sugars 0g
Quit

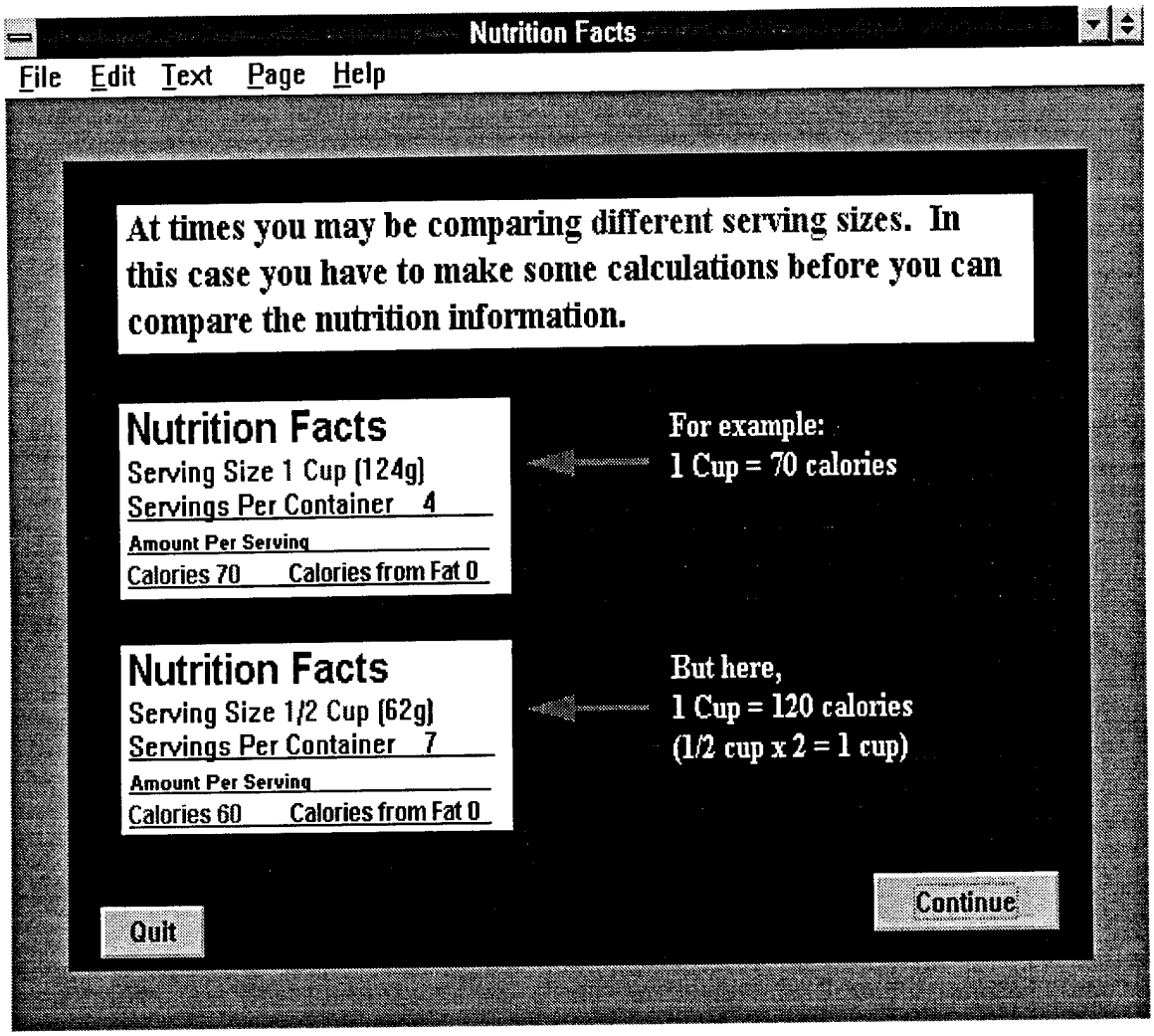

Nutrition Facts
File Edit Text Page Help
Nice job, you are correct. The second label lists more Total Carbohydrate.
Nutrition Facts
Serving Size 1 Cup (113g)
Servings Per Container 7
Amount Per Serving
Calories 60 Calories from Fat 0
% Daily Value*
Total Fat 0g 0 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 10mg 0 %
Total Carbohydrate 15g 5 %
Dietary Fiber 1g 4%
Sugars 14g
Nutrition Facts
Serving Size 1 Cup (113g)
Servings Per Container 4
Amount Per Serving
Calories 130 Calories from Fat 50
% Daily Value*
Total Fat 6g 9 %
Saturated Fat 1g 5 %
Cholesterol 0mg 0 %
Sodium 76mg 3 %
Total Carbohydrate 19g 6 %
Dietary Fiber 1g 5%
Sugars 0g
Quit
Continue

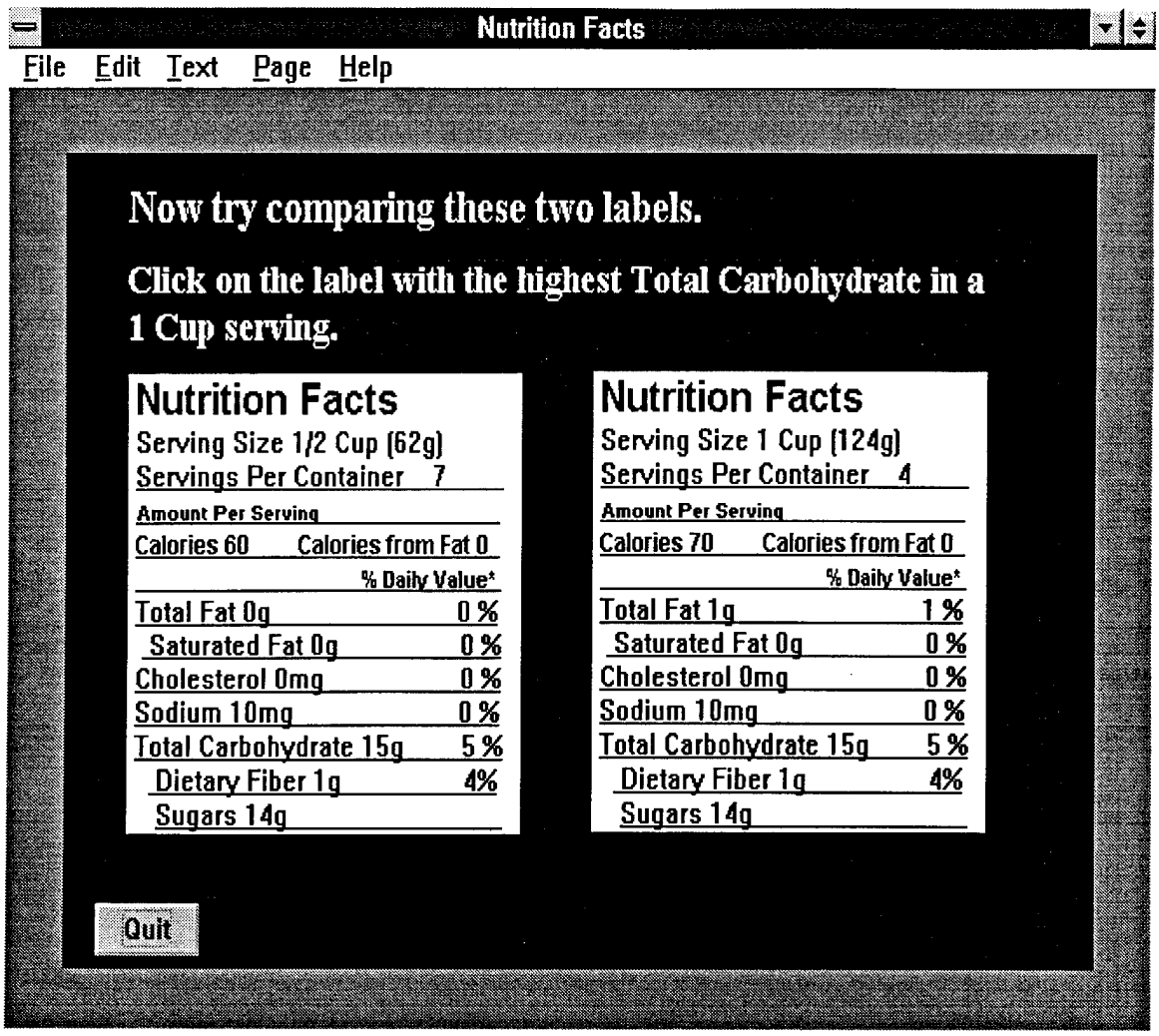

Nutrition Facts
File Edit Text Page Help
No, look again. The correct answer is the second label.
It contains more Total Carbohydrate.
Nutrition Facts
Serving Size 1 Cup (113g)
Servings Per Container 7
Amount Per Serving
Calories 60 Calories from Fat 0
% Daily Value*
Total Fat 0g 0 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 10mg 0 %
Total Carbohydrate 15g 5 %
Dietary Fiber 1g 4%
Sugars 14g
Nutrition Facts
Serving Size 1 Cup (113g)
Servings Per Container 4
Amount Per Serving
Calories 130 Calories from Fat 50
% Daily Value*
Total Fat 6g 9 %
Saturated Fat 1g 5 %
Cholesterol 0mg 0 %
Sodium 76mg 3 %
Total Carbohydrate 19g 6 %
Dietary Fiber 1g 5%
Sugars 0g
Quit
Continue

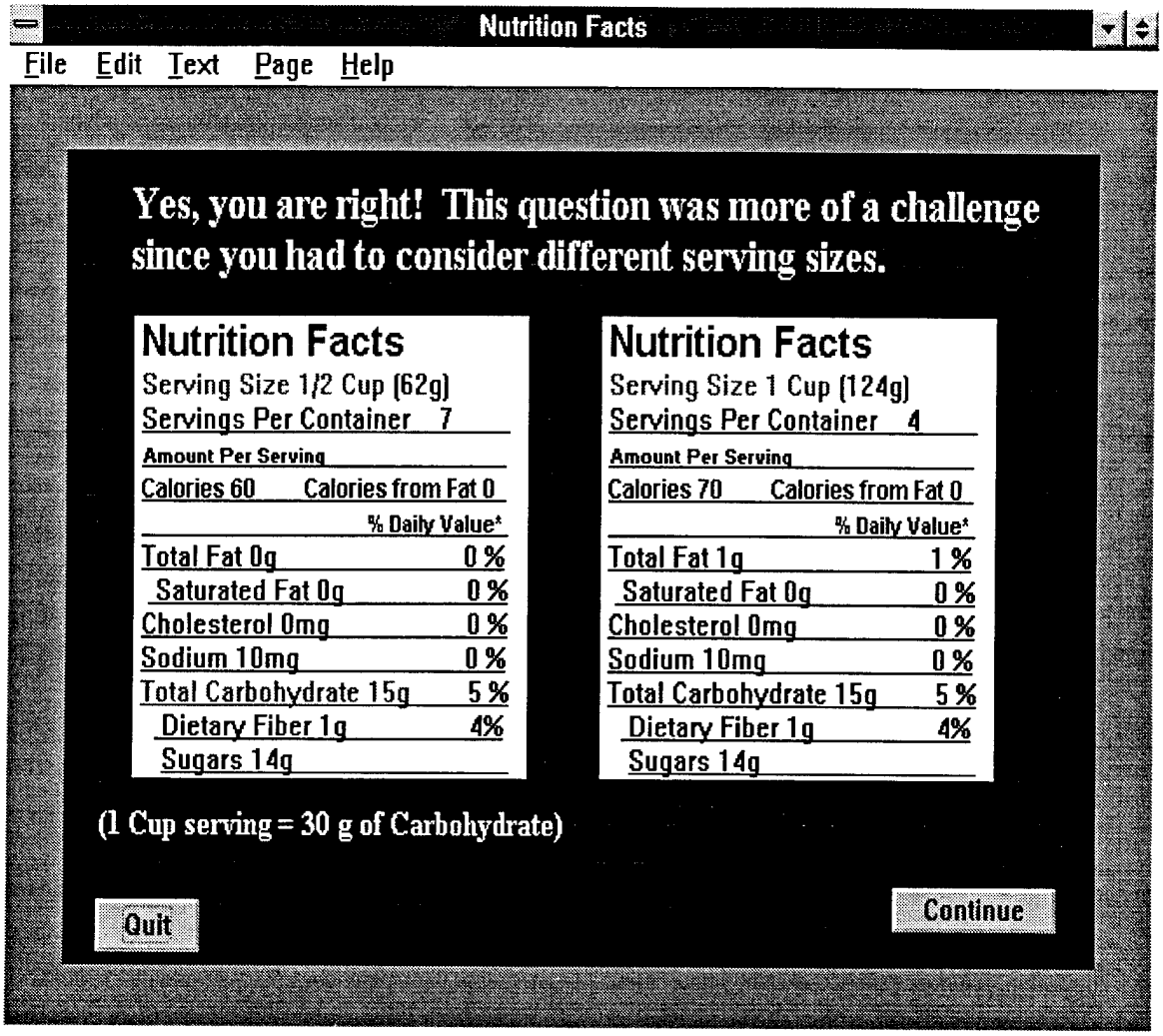

Nutrition Facts
File Edit Text Page Help
Compare another set of labels.
Nutrition Facts
Serving Size 1 Cup (124g)
Servings Per Container 9
Amount Per Serving
Calories 110 Calories from Fat 18
% Daily Value*
Total Fat 2g 1 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 36mg 2 %
Total Carbohydrate 15g 5 %
Dietary Fiber 6g 24%
Sugars 14g
Nutrition Facts
Serving Size 1 Cup (124g)
Servings Per Container 7
Amount Per Serving
Calories 60 Calories from Fat 0
% Daily Value*
Total Fat 0g 0 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 10mg 0 %
Total Carbohydrate 15g 5 %
Dietary Fiber 1g 4%
Sugars 11g
Click on the label listing the highest content of Dietary Fiber.
Quit

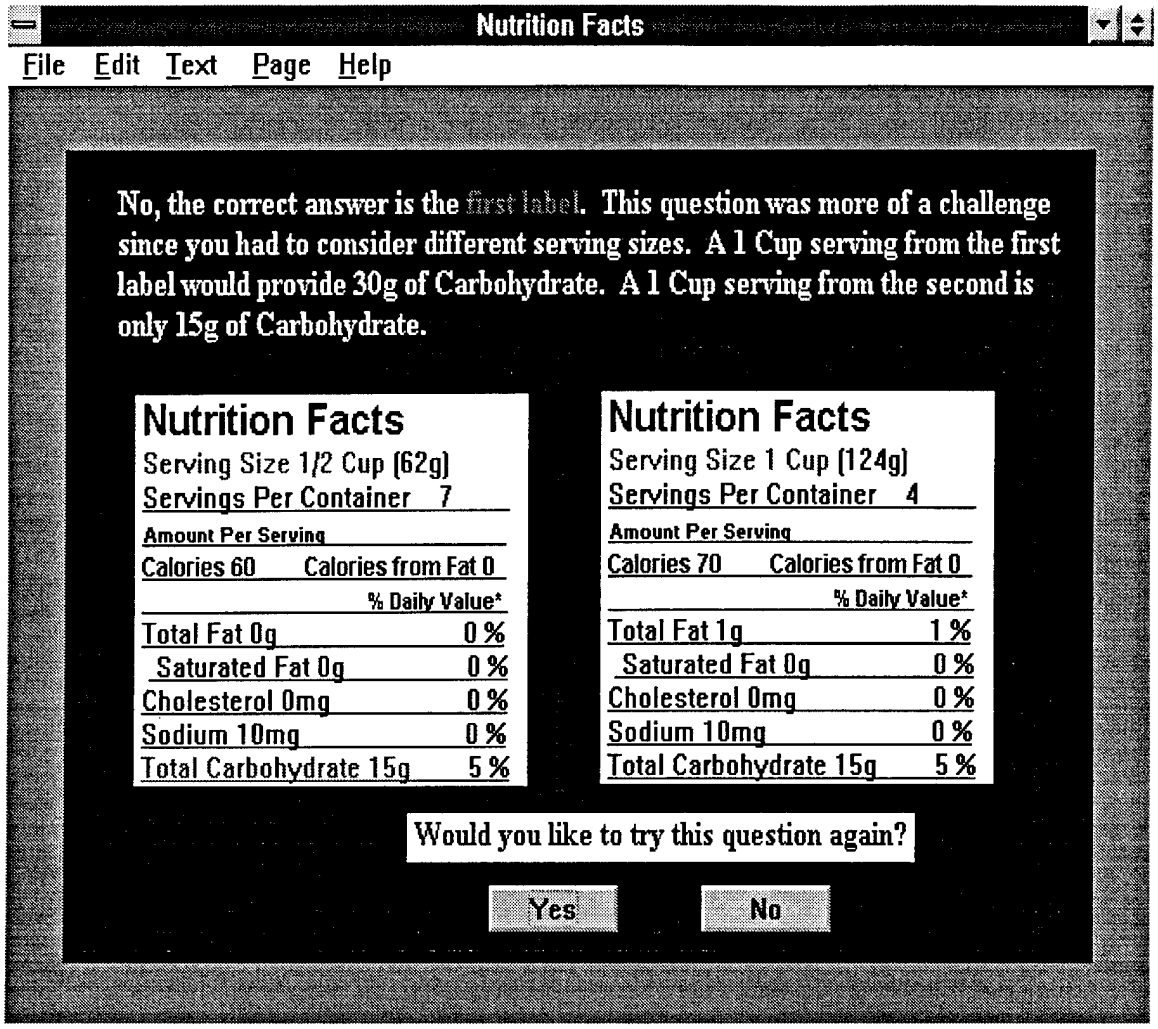

Nutrition Facts
File Edit Text Page Help
Yes, you are right again! You selected the higher fiber label.
Nutrition Facts
Serving Size 1 Cup (124g)
Servings Per Container 9
Amount Per Serving
Calories 110 Calories from Fat 18
% Daily Value*
Total Fat 2g 1 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 36mg 2 %
Total Carbohydrate 15g 5 %
Dietary Fiber 6g 24%
Sugars 14g
Nutrition Facts
Serving Size 1 Cup (124g)
Servings Per Container 7
Amount Per Serving
Calories 60 Calories from Fat 0
% Daily Value*
Total Fat 0g 0 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 10mg 0 %
Total Carbohydrate 15g 5 %
Dietary Fiber 1g 4%
Sugars 11g
Quit
Continue


Nutrition Facts
File Edit Text Page Help
No, the first label is the correct answer. It is the higher fiber label.
Nutrition Facts
Serving Size 1 Cup (124g)
Servings Per Container 9
Amount Per Serving
Calories 110 Calories from Fat 18
% Daily Value*
Total Fat 2g 1 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 36mg 2 %
Total Carbohydrate 15g 5 %
Dietary Fiber 6g 24%
Sugars 14g
Nutrition Facts
Serving Size 1 Cup (124g)
Servings Per Container 7
Amount Per Serving
Calories 60 Calories from Fat 0
% Daily Value*
Total Fat 0g 0 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 10mg 0 %
Total Carbohydrate 15g 5 %
Dietary Fiber 1g 4%
Sugars 11g
Quit
Continue


Nutrition Facts
File Edit Text Page Help
At times you may be comparing different serving sizes. In this case you have to make some calculations before you can compare the nutrition information.
Nutrition Facts
Serving Size 1 Cup (124g)
Servings Per Container 4
Amount Per Serving
Calories 70 Calories from Fat 0
For example:
1 Cup = 70 calories
Nutrition Facts
Serving Size 1/2 Cup (62g)
Servings Per Container 7
Amount Per Serving
Calories 60 Calories from Fat 0
But here,
1 Cup = 120 calories
(1/2 cup x 2 = 1 cup)
Continue
Quit


Nutrition Facts
File Edit Text Page Help
Now try comparing these two labels.
Click on the label with the highest Total Carbohydrate in a 1 Cup serving.
Nutrition Facts
Serving Size 1/2 Cup (62g)
Servings Per Container 7
Amount Per Serving
Calories 60 Calories from Fat 0
% Daily Value*
Total Fat 0g 0 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 10mg 0 %
Total Carbohydrate 15g 5 %
Dietary Fiber 1g 4%
Sugars 14g
Nutrition Facts
Serving Size 1 Cup (124g)
Servings Per Container 4
Amount Per Serving
Calories 70 Calories from Fat 0
% Daily Value*
Total Fat 1g 1 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 10mg 0 %
Total Carbohydrate 15g 5 %
Dietary Fiber 1g 4%
Sugars 14g
Quit

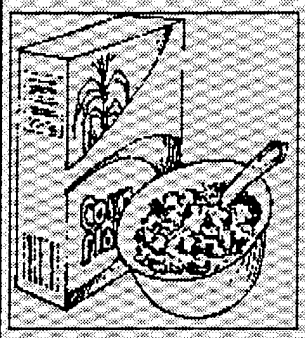

Nutrition Facts
File Edit Text Page Help
Yes, you are right! This question was more of a challenge since you had to consider different serving sizes.
Nutrition Facts
Serving Size 1/2 Cup (62g)
Servings Per Container 7
Amount Per Serving
Calories 60 Calories from Fat 0
% Daily Value*
Total Fat 0g 0 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 10mg 0 %
Total Carbohydrate 15g 5 %
Dietary Fiber 1g 4%
Sugars 14g
Nutrition Facts
Serving Size 1 Cup (124g)
Servings Per Container 4
Amount Per Serving
Calories 70 Calories from Fat 0
% Daily Value*
Total Fat 1g 1 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 10mg 0 %
Total Carbohydrate 15g 5 %
Dietary Fiber 1g 4%
Sugars 14g
(1 Cup serving = 30 g of Carbohydrate)
Quit
Continue


Nutrition Facts
File Edit Text Page Help
No, the correct answer is the first label. This question was more of a challenge since you had to consider different serving sizes. A 1 Cup serving from the first label would provide 30g of Carbohydrate. A 1 Cup serving from the second is only 15g of Carbohydrate.
Nutrition Facts
Serving Size 1/2 Cup (62g)
Servings Per Container 7
Amount Per Serving
Calories 60 Calories from Fat 0
% Daily Value*
Total Fat 0g 0 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 10mg 0 %
Total Carbohydrate 15g 5 %
Nutrition Facts
Serving Size 1 Cup (124g)
Servings Per Container 4
Amount Per Serving
Calories 70 Calories from Fat 0
% Daily Value*
Total Fat 1g 1 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 10mg 0 %
Total Carbohydrate 15g 5 %
Would you like to try this question again?
Yes
No

Nutrition Facts

File Edit Text Page Help

Now make your third food choice by clicking on the potato chip package.

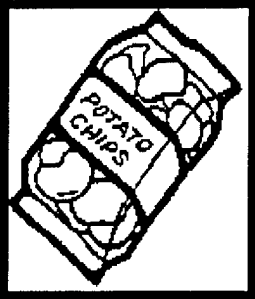


Quit

Nutrition Facts

File Edit Text Page Help

The Nutrition Facts label tells you a few things about fat. Let's see what they are.



Nutrition Facts

Serving Size 1 oz (6 chips)
Servings Per Container 4

Amount Per Serving	
Calories 130	Calories from Fat 54
	% Daily Value*
Total Fat 6g	9 %
Saturated Fat 1g	5 %
Cholesterol 0mg	0 %
Sodium 80mg	3 %
Total Carbohydrate 19g	6 %
Dietary Fiber 1g	5%
Sugars 0g	
Protein 2g	

Vitamin A 0%	Vitamin C 0%
Calcium 4%	Iron 0%

Quit

Continue

Nutrition Facts

File Edit Text Page Help

Nutrition Facts

Serving Size 1 oz (6 chips)

Servings Per Container 4

Amount Per Serving	
Calories 130	Calories from Fat 54
	% Daily Value*
Total Fat 6g	9 %
Saturated Fat 1g	5 %
Cholesterol 0mg	0 %
Sodium 80mg	3 %
Total Carbohydrate 19g	6 %
Dietary Fiber 1g	5%
Sugars 0g	
Protein 2g	

Vitamin A 0%	Vitamin C 0%
Calcium 4%	Iron 0%

The label tells you that eating six of these chips gives you 54 calories from fat.

Quit

Continue

Nutrition Facts

File Edit Text Page Help

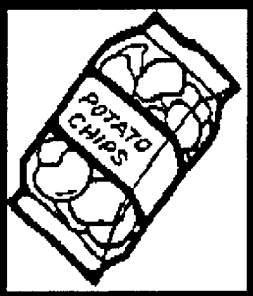
Nutrition Facts

Serving Size 1 oz (6 chips)
Servings Per Container 4

Amount Per Serving	
Calories 130	Calories from Fat 54
	% Daily Value*
Total Fat 6g	9 %
Saturated Fat 1g	5 %
Cholesterol 0mg	0 %
Sodium 80mg	3 %
Total Carbohydrate 19g	6 %
Dietary Fiber 1g	5%
Sugars 0g	
Protein 2g	

Vitamin A 0%	Vitamin C 0%
Calcium 4%	Iron 0%

The label tells you that eating 6 chips gives you 6g (grams) of fat.



Quit

Continue

Nutrition Facts

File Edit Text Page Help

Nutrition Facts

Serving Size 1 oz (6 chips)

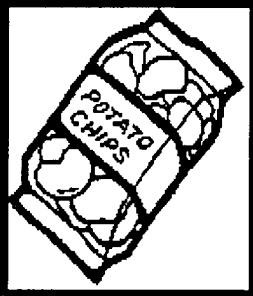
Servings Per Container 4

Amount Per Serving

Calories 130	Calories from Fat 54
	% Daily Value*
Total Fat 6g	9 %
Saturated Fat 1g	5 %
Cholesterol 0mg	0 %
Sodium 80mg	3 %
Total Carbohydrate 19g	6 %
Dietary Fiber 1g	5%
Sugars 0g	
Protein 2g	

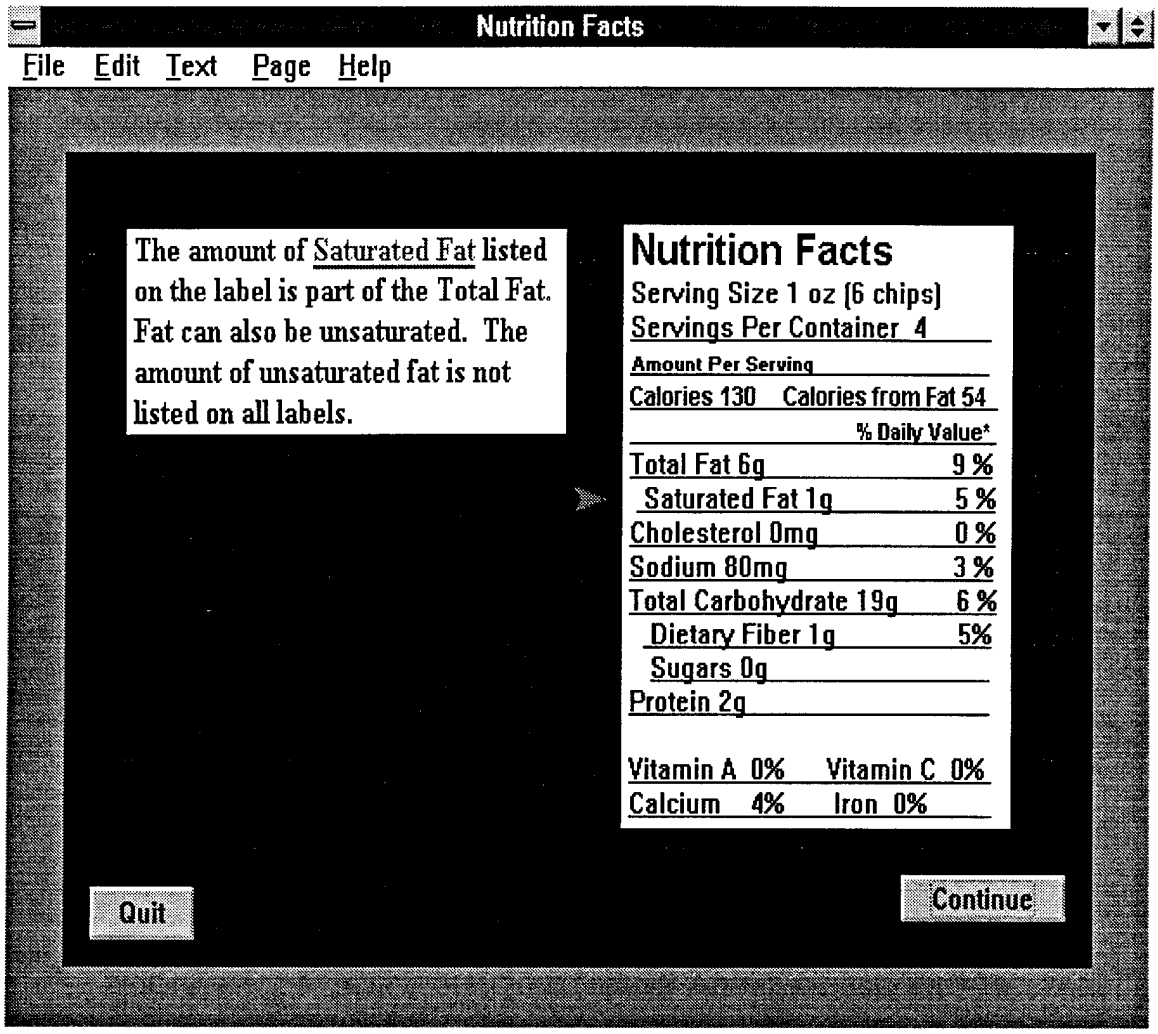
Vitamin A 0%	Vitamin C 0%
Calcium 4%	Iron 0%

And eating 6 chips gives you 1g (gram) of saturated fat.



Quit

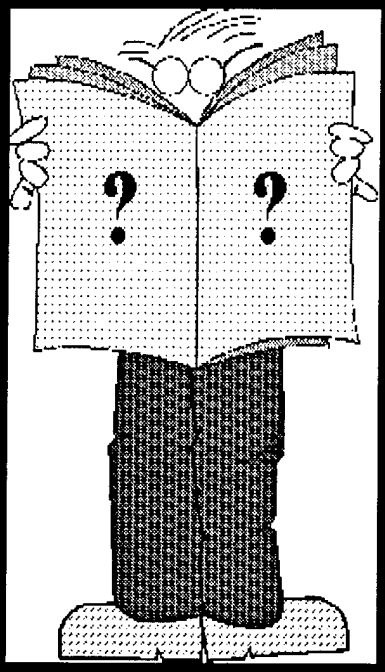
Continue


Nutrition Facts
File Edit Text Page Help
The amount of Saturated Fat listed on the label is part of the Total Fat. Fat can also be unsaturated. The amount of unsaturated fat is not listed on all labels.
Nutrition Facts
Serving Size 1 oz (6 chips)
Servings Per Container 4
Amount Per Serving
Calories 130 Calories from Fat 54
% Daily Value*
Total Fat 6g 9 %
Saturated Fat 1g 5 %
Cholesterol 0mg 0 %
Sodium 80mg 3 %
Total Carbohydrate 19g 6 %
Dietary Fiber 1g 5%
Sugars 0g
Protein 2g
Vitamin A 0% Vitamin C 0%
Calcium 4% Iron 0%
Quit
Continue

Nutrition Facts

File Edit Text Page Help

Why should you read the food labels for fat?



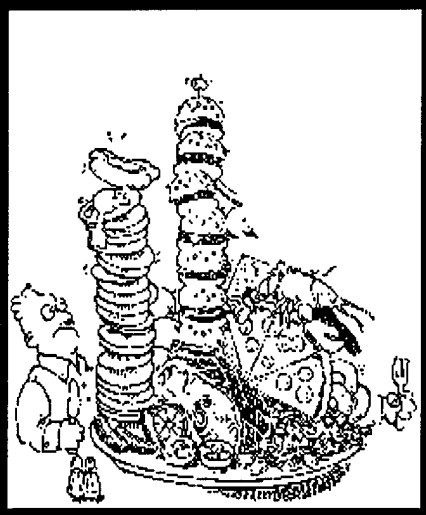
Quit

Continue

Nutrition Facts

File Edit Text Page Help

Because eating too much fat may interfere with your weight, glucose control, and the amount of lipids (such as cholesterol and triglycerides) in your blood.



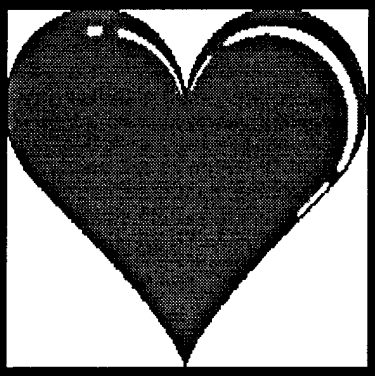
Quit

Continue

Nutrition Facts

File Edit Text Page Help

It's also important to reduce the amount of saturated fat you eat to reduce your risk of heart disease.



Quit

Continue

Nutrition Facts

File Edit Text Page Help

Now look at saturated fat on the label.

Nutrition Facts

Serving Size 1 oz (6 chips)

Servings Per Container 4

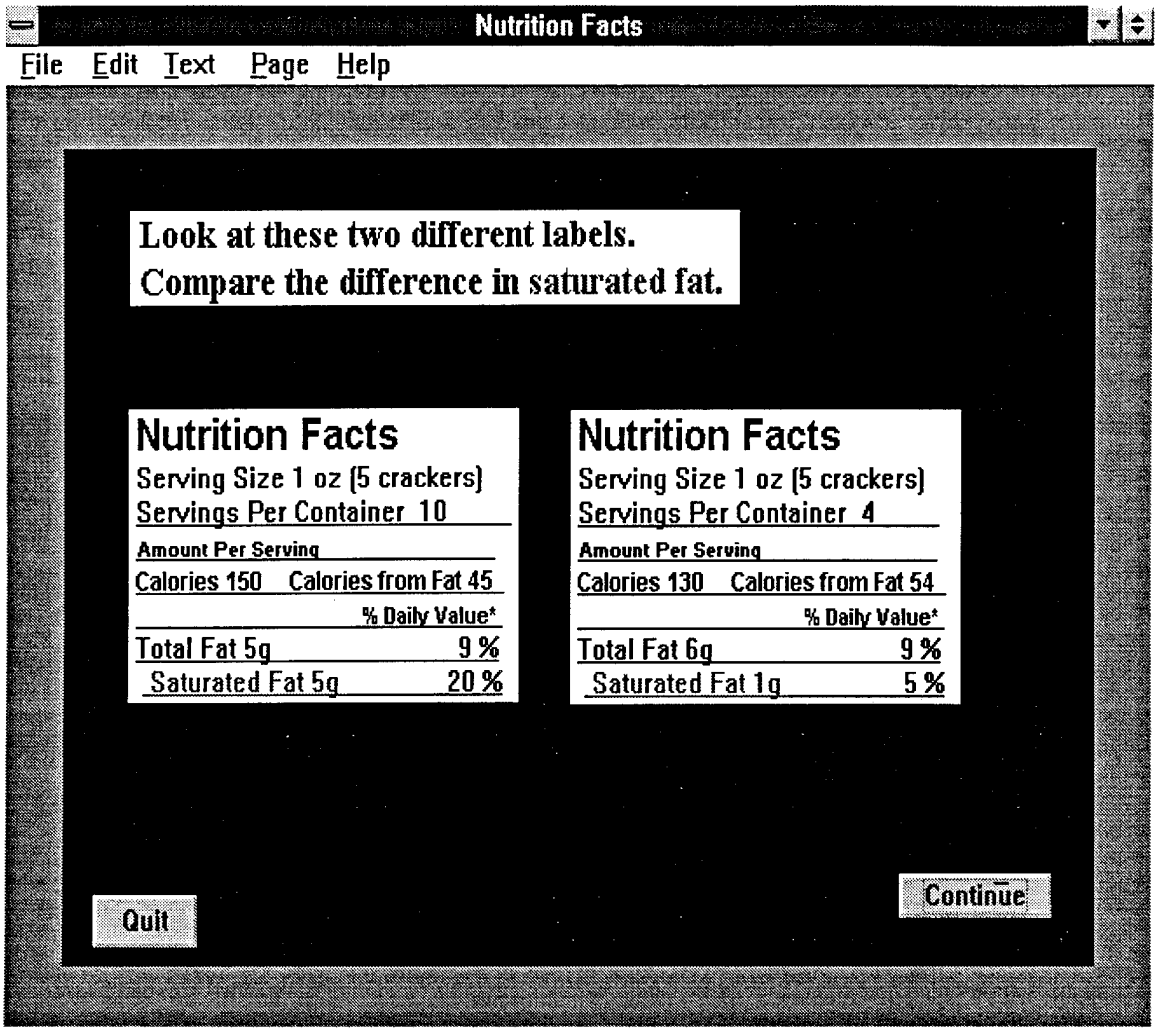
Amount Per Serving

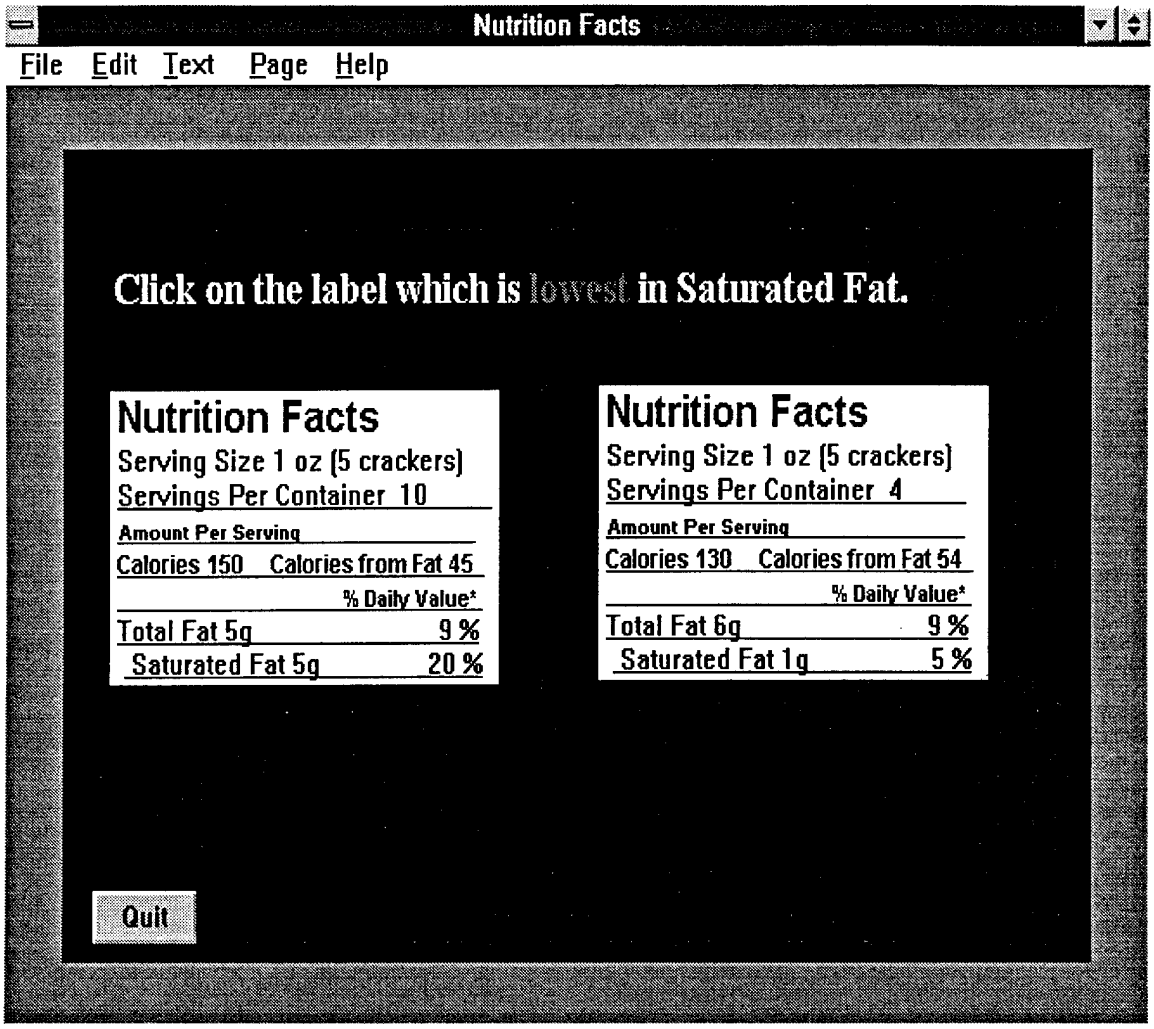
Calories 130 Calories from Fat 54

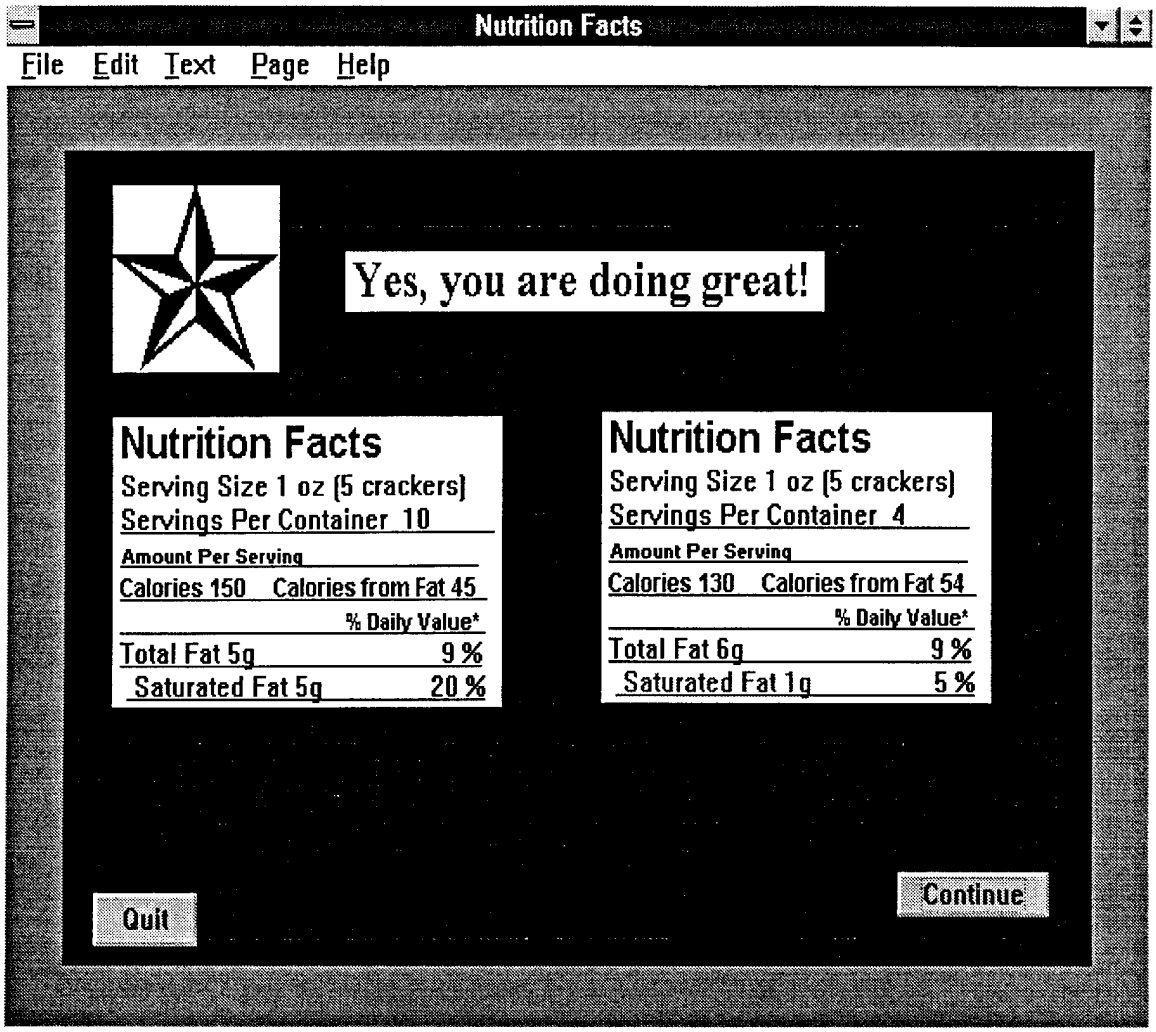
	% Daily Value*
Total Fat 6g	9 %
Saturated Fat 1g	5 %
Cholesterol 0mg	0 %
Sodium 80mg	3 %
Total Carbohydrate 19g	6 %
Dietary Fiber 1g	5%
Sugars 0g	
Protein 2g	

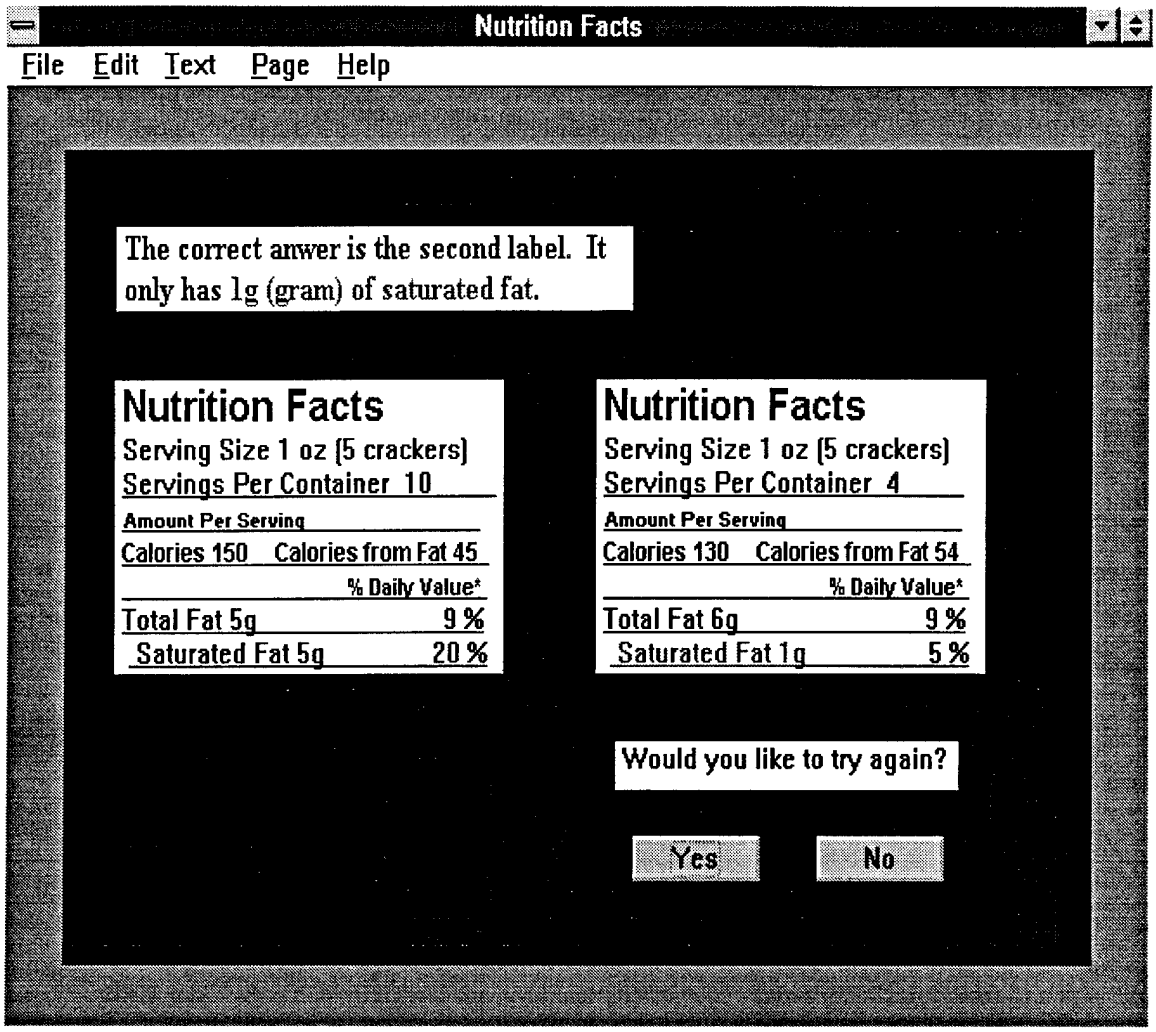
Quit

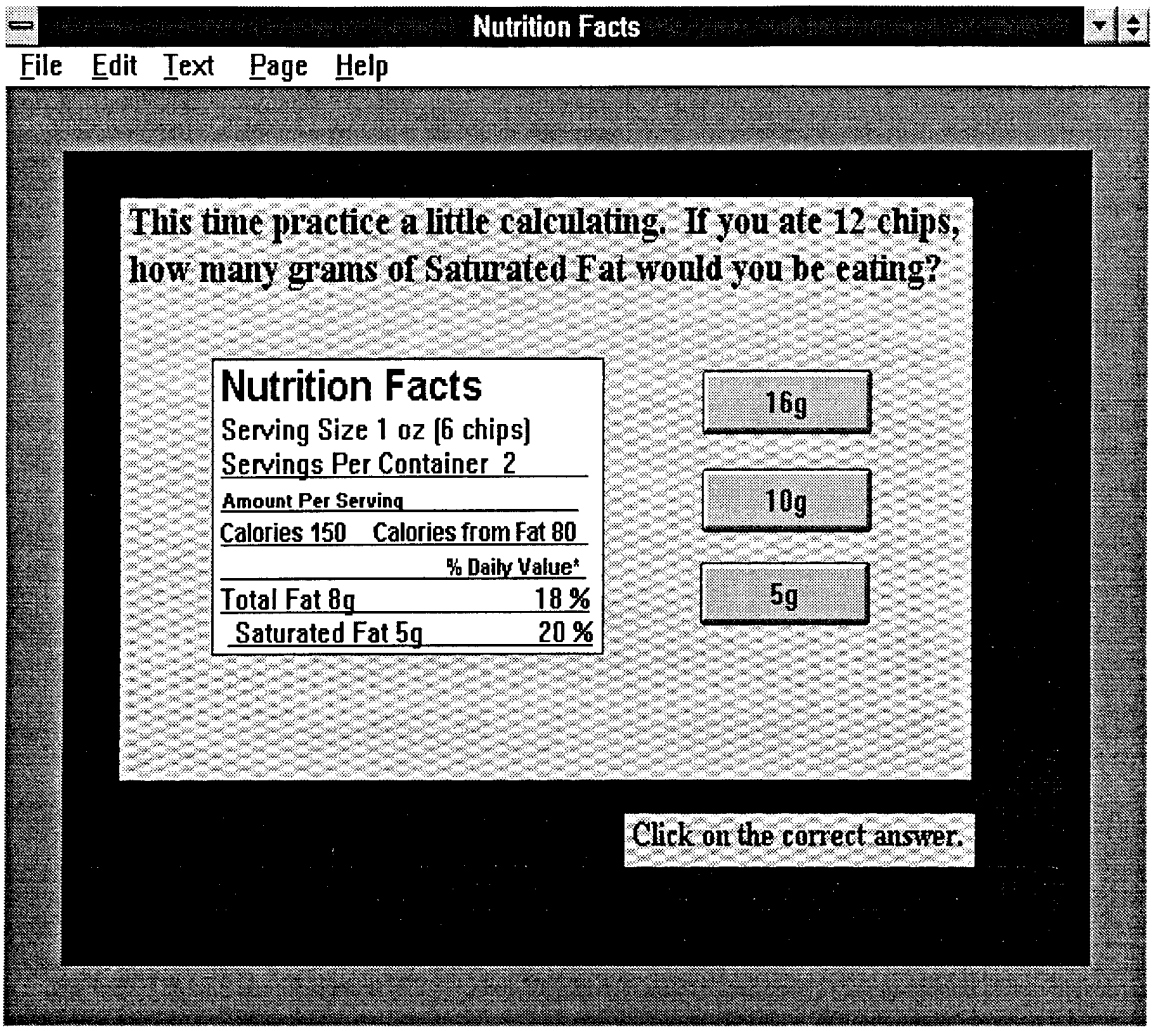
Continue


Nutrition Facts
File Edit Text Page Help
Look at these two different labels.
Compare the difference in saturated fat.
Nutrition Facts
Serving Size 1 oz (5 crackers)
Servings Per Container 10
Amount Per Serving
Calories 150 Calories from Fat 45
% Daily Value*
Total Fat 5g 9 %
Saturated Fat 5g 20 %
Nutrition Facts
Serving Size 1 oz (5 crackers)
Servings Per Container 4
Amount Per Serving
Calories 130 Calories from Fat 54
% Daily Value*
Total Fat 6g 9 %
Saturated Fat 1g 5 %
Quit
Continue


Nutrition Facts
File Edit Text Page Help
Click on the label which is lowest in Saturated Fat.
Nutrition Facts
Serving Size 1 oz (5 crackers)
Servings Per Container 10
Amount Per Serving
Calories 150 Calories from Fat 45
% Daily Value*
Total Fat 5g 9 %
Saturated Fat 5g 20 %
Nutrition Facts
Serving Size 1 oz (5 crackers)
Servings Per Container 4
Amount Per Serving
Calories 130 Calories from Fat 54
% Daily Value*
Total Fat 6g 9 %
Saturated Fat 1g 5 %
Quit


Nutrition Facts
File Edit Text Page Help
Yes, you are doing great!
Nutrition Facts
Serving Size 1 oz (5 crackers)
Servings Per Container 10
Amount Per Serving
Calories 150 Calories from Fat 45
% Daily Value*
Total Fat 5g 9 %
Saturated Fat 5g 20 %
Nutrition Facts
Serving Size 1 oz (5 crackers)
Servings Per Container 4
Amount Per Serving
Calories 130 Calories from Fat 54
% Daily Value*
Total Fat 6g 9 %
Saturated Fat 1g 5 %
Quit
Continue


Nutrition Facts
File Edit Text Page Help
The correct anwer is the second label. It only has 1g (gram) of saturated fat.
Nutrition Facts
Serving Size 1 oz (5 crackers)
Servings Per Container 10
Amount Per Serving
Calories 150 Calories from Fat 45
% Daily Value*
Total Fat 5g 9 %
Saturated Fat 5g 20 %
Nutrition Facts
Serving Size 1 oz (5 crackers)
Servings Per Container 4
Amount Per Serving
Calories 130 Calories from Fat 54
% Daily Value*
Total Fat 6g 9 %
Saturated Fat 1g 5 %
Would you like to try again?
Yes
No


Nutrition Facts
File Edit Text Page Help
This time practice a little calculating. If you ate 12 chips, how many grams of Saturated Fat would you be eating?
Nutrition Facts
Serving Size 1 oz (6 chips)
Servings Per Container 2
Amount Per Serving
Calories 150 Calories from Fat 80
% Daily Value*
Total Fat 8g 18 %
Saturated Fat 5g 20 %
16g
10g
5g
Click on the correct answer.

Nutrition Facts

File Edit Text Page Help

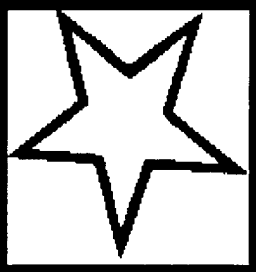
Nutrition Facts

Serving Size 1 oz (6 chips)
Servings Per Container 2

Amount Per Serving	
Calories 150	Calories from Fat 80
	% Daily Value*
Total Fat 8g	18 %
Saturated Fat 5g	20 %
Cholesterol 0mg	0 %
Sodium 80mg	3 %
Total Carbohydrate 19g	6 %
Dietary Fiber 1g	5%
Sugars 0g	
Protein 2g	

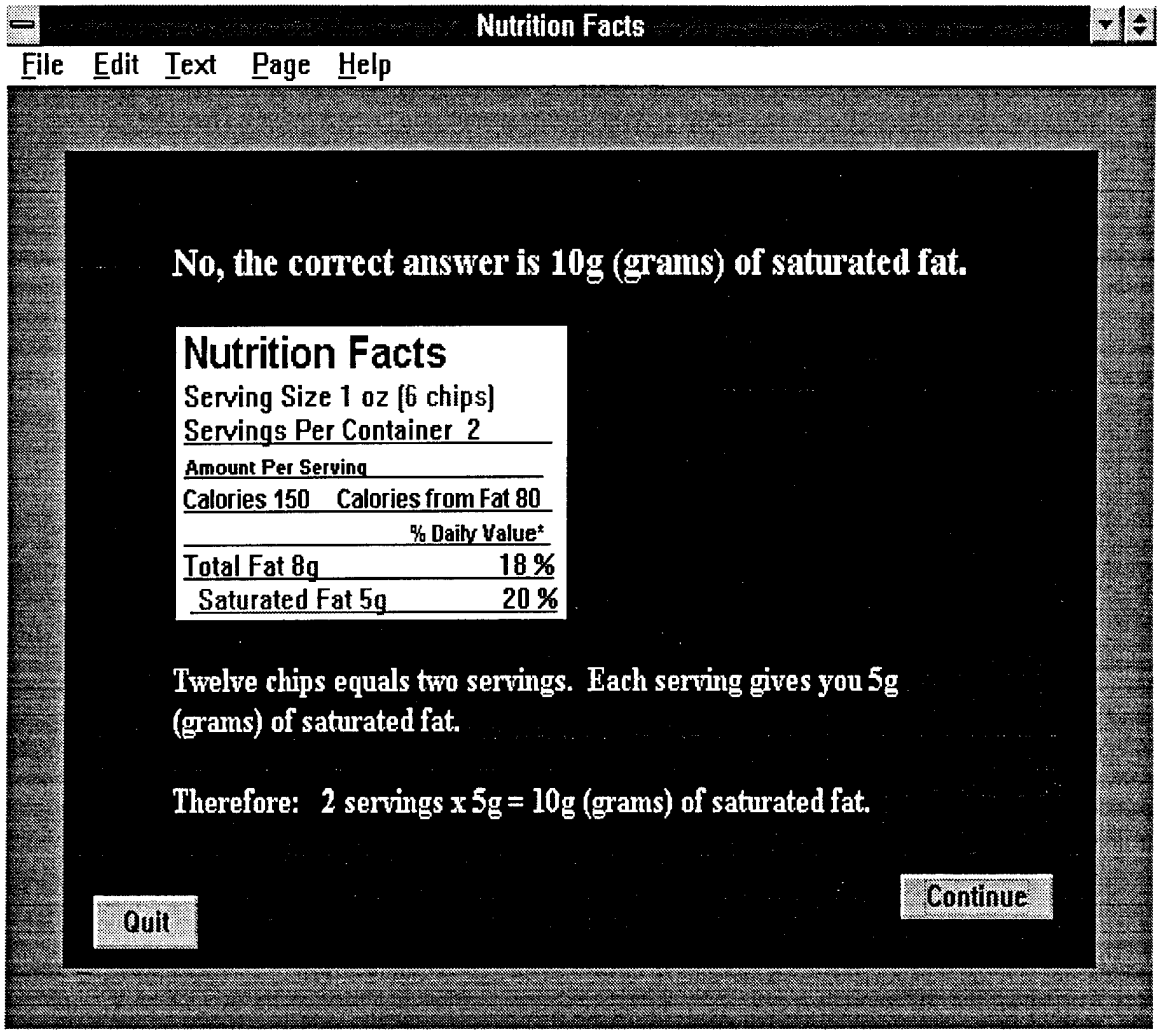
Vitamin A 0%	Vitamin C 0%
Calcium 4%	Iron 0%

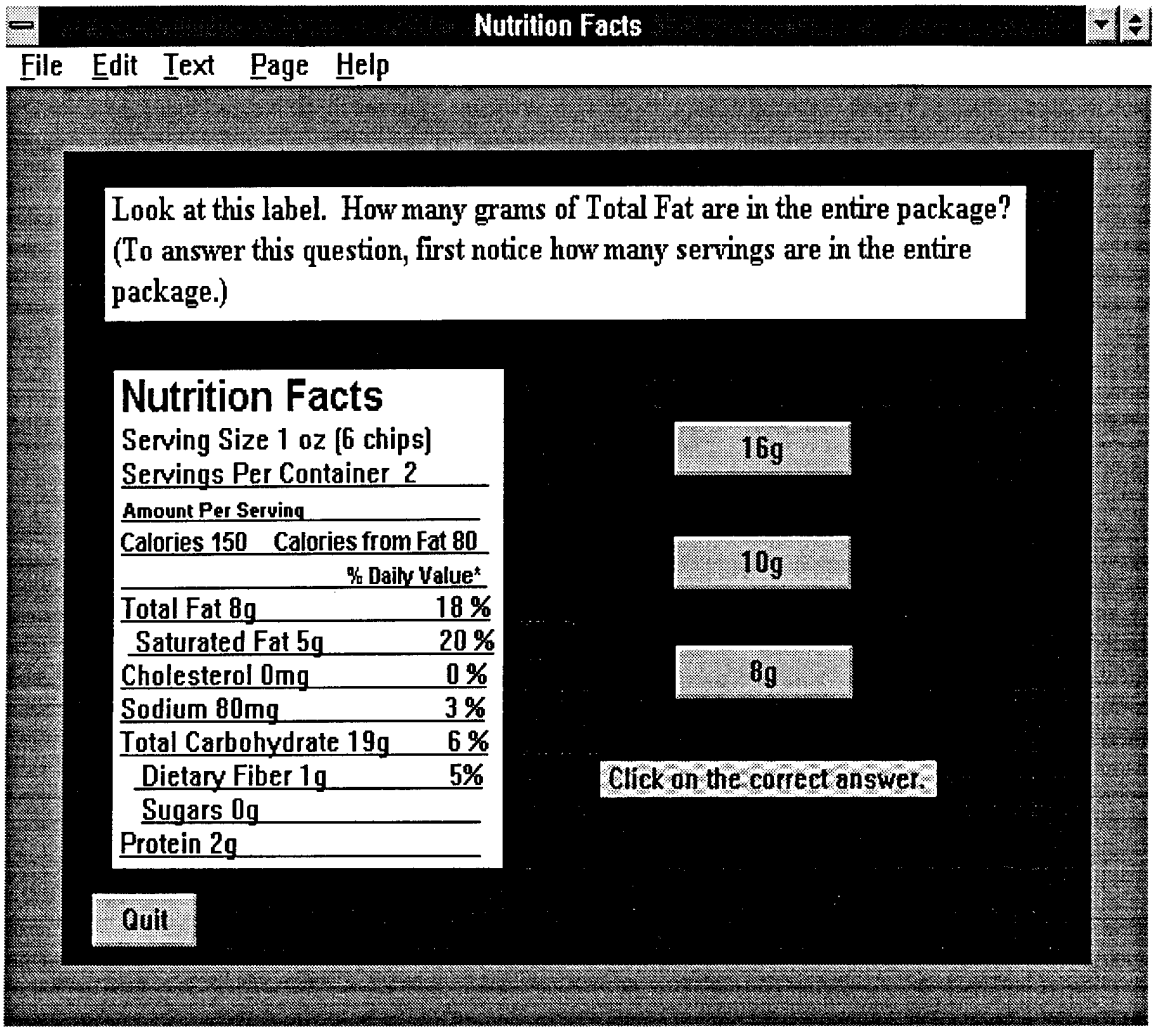
Yes, you are correct!



Quit

Continue


Nutrition Facts
File Edit Text Page Help
No, the correct answer is 10g (grams) of saturated fat.
Nutrition Facts
Serving Size 1 oz (6 chips)
Servings Per Container 2
Amount Per Serving
Calories 150 Calories from Fat 80
% Daily Value*
Total Fat 8g 18 %
Saturated Fat 5g 20 %
Twelve chips equals two servings. Each serving gives you 5g (grams) of saturated fat.
Therefore: 2 servings x 5g = 10g (grams) of saturated fat.
Quit
Continue


Nutrition Facts
File Edit Text Page Help
Look at this label. How many grams of Total Fat are in the entire package? (To answer this question, first notice how many servings are in the entire package.)
Nutrition Facts
Serving Size 1 oz (6 chips)
Servings Per Container 2
Amount Per Serving
Calories 150 Calories from Fat 80
% Daily Value*
Total Fat 8g 18 %
Saturated Fat 5g 20 %
Cholesterol 0mg 0 %
Sodium 80mg 3 %
Total Carbohydrate 19g 6 %
Dietary Fiber 1g 5%
Sugars 0g
Protein 2g
16g
10g
8g
Click on the correct answer.
Quit

Nutrition Facts

File Edit Text Page Help

Nutrition Facts

Serving Size 1 oz (6 chips)

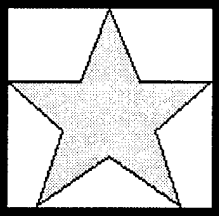
Servings Per Container 2

Amount Per Serving

Calories 150 Calories from Fat 80

% Daily Value*

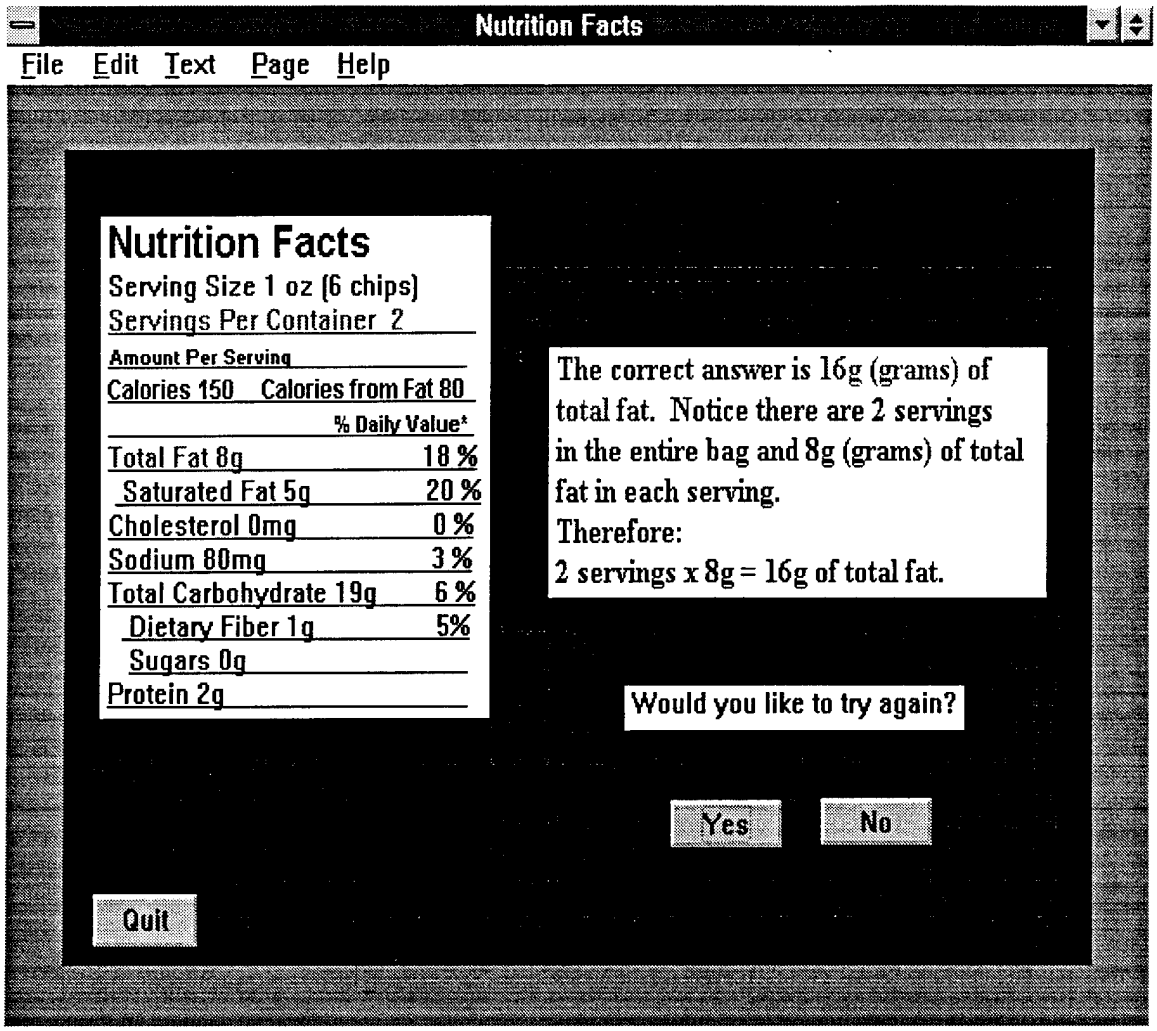
Total Fat 8g	18 %
Saturated Fat 5g	20 %
Cholesterol 0mg	0 %
Sodium 80mg	3 %
Total Carbohydrate 19g	6 %
Dietary Fiber 1g	5%
Sugars 0g	
Protein 2g	

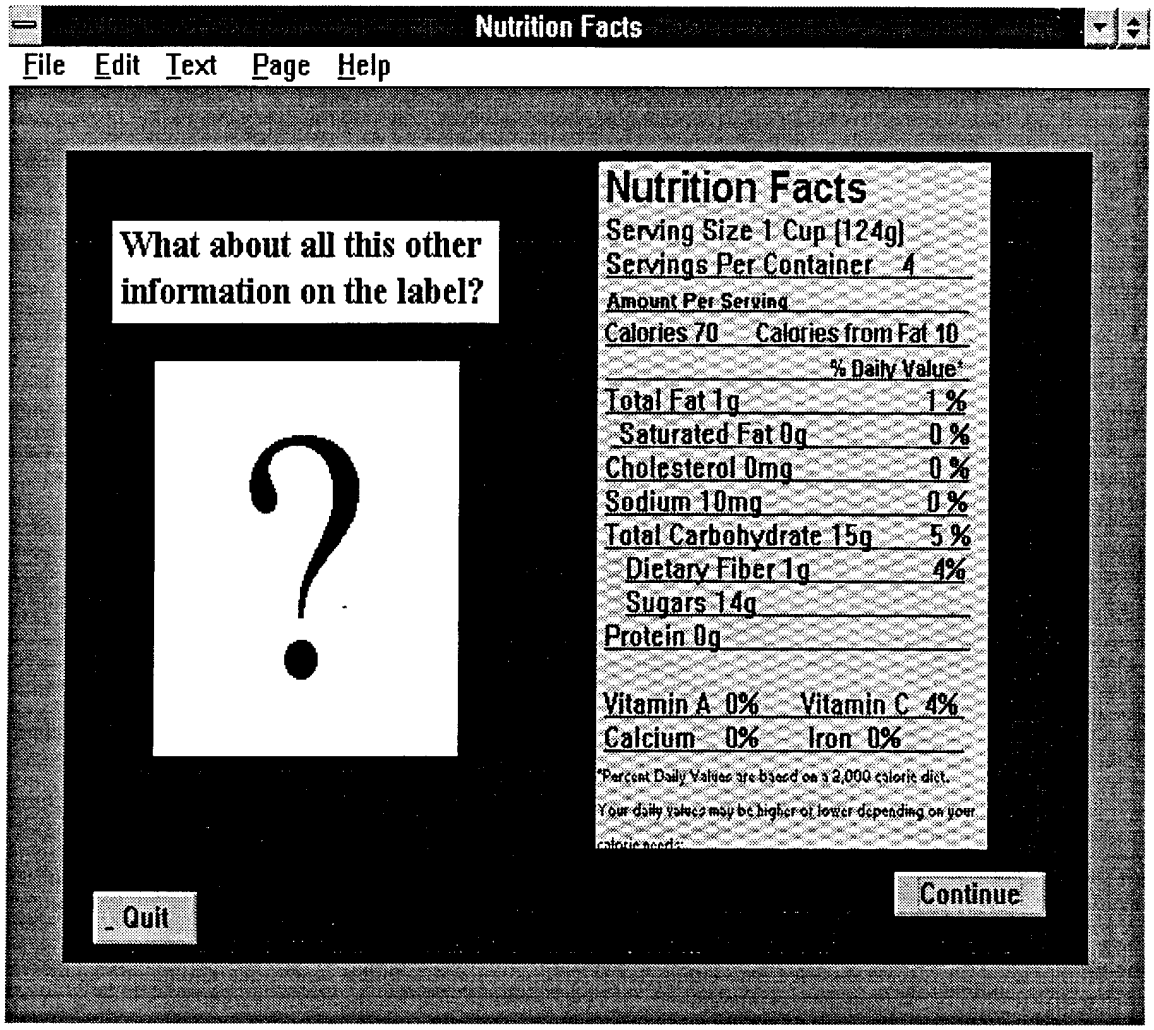


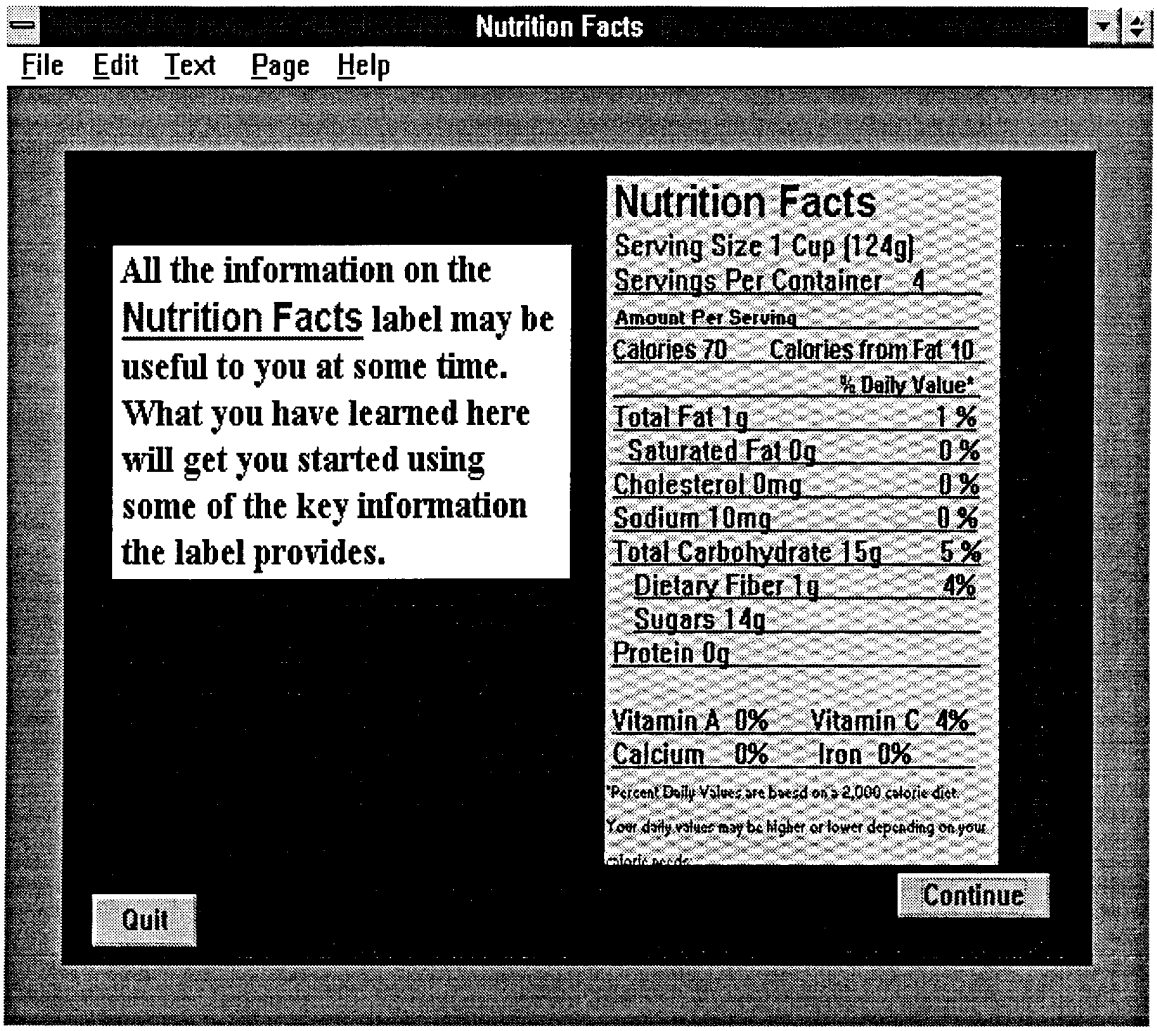
Great! You noticed there are 2 servings in the entire package and 8g (grams) of total fat in each serving.
Therefore:
2 servings x 8g = 16g of total fat.

Quit

Continue


Nutrition Facts
File Edit Text Page Help
Nutrition Facts
Serving Size 1 oz (6 chips)
Servings Per Container 2
Amount Per Serving
Calories 150 Calories from Fat 80
% Daily Value*
Total Fat 8g 18 %
Saturated Fat 5g 20 %
Cholesterol 0mg 0 %
Sodium 80mg 3 %
Total Carbohydrate 19g 6 %
Dietary Fiber 1g 5%
Sugars 0g
Protein 2g
The correct answer is 16g (grams) of total fat. Notice there are 2 servings in the entire bag and 8g (grams) of total fat in each serving.
Therefore:
2 servings x 8g = 16g of total fat.
Would you like to try again?
Yes
No
Quit


Nutrition Facts
File Edit Text Page Help
What about all this other information on the label?
?
Nutrition Facts
Serving Size 1 Cup (124g)
Servings Per Container 4
Amount Per Serving
Calories 70 Calories from Fat 10
% Daily Value*
Total Fat 1g 1 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 10mg 0 %
Total Carbohydrate 15g 5 %
Dietary Fiber 1g 4%
Sugars 14g
Protein 0g
Vitamin A 0% Vitamin C 4%
Calcium 0% Iron 0%
*Percent Daily Values are based on a 2,000 calorie diet.
Your daily values may be higher or lower depending on your
Quit
Continue


Nutrition Facts
File Edit Text Page Help
All the information on the Nutrition Facts label may be useful to you at some time. What you have learned here will get you started using some of the key information the label provides.
Nutrition Facts
Serving Size 1 Cup (124g)
Servings Per Container 4
Amount Per Serving
Calories 70 Calories from Fat 10
% Daily Value*
Total Fat 1g 1 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 10mg 0 %
Total Carbohydrate 15g 5 %
Dietary Fiber 1g 4%
Sugars 14g
Protein 0g
Vitamin A 0% Vitamin C 4%
Calcium 0% Iron 0%
*Percent Daily Values are based on a 2,000 calorie diet.
Your daily values may be higher or lower depending on your
Quit
Continue

Nutrition Facts

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As you become more familiar with using the label, you will learn to use the information you need.

Nutrition Facts

Serving Size 1 Cup (124g)
Servings Per Container 4

Amount Per Serving
Calories 70 Calories from Fat 10

	% Daily Value*
Total Fat 1g	1 %
Saturated Fat 0g	0 %
Cholesterol 0mg	0 %
Sodium 10mg	0 %
Total Carbohydrate 15g	5 %
Dietary Fiber 1g	4%
Sugars 14g	
Protein 0g	

Vitamin A 0% Vitamin C 4%
Calcium 0% Iron 0%

*Percent Daily Values are based on a 2,000 calorie diet.
Your daily values may be higher or lower depending on your calorie needs:

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Nutrition Facts

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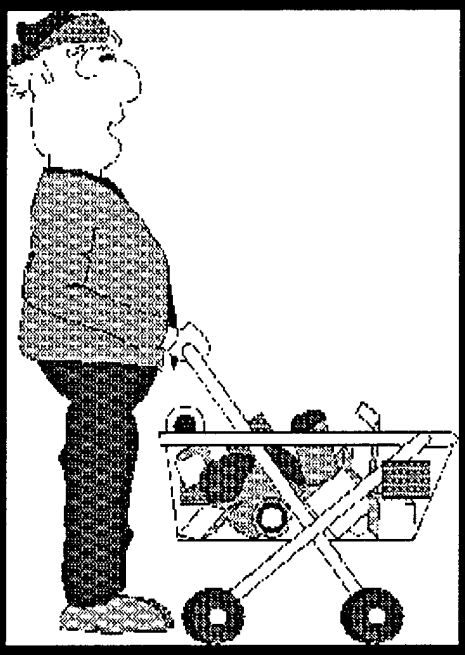
So what have you learned?



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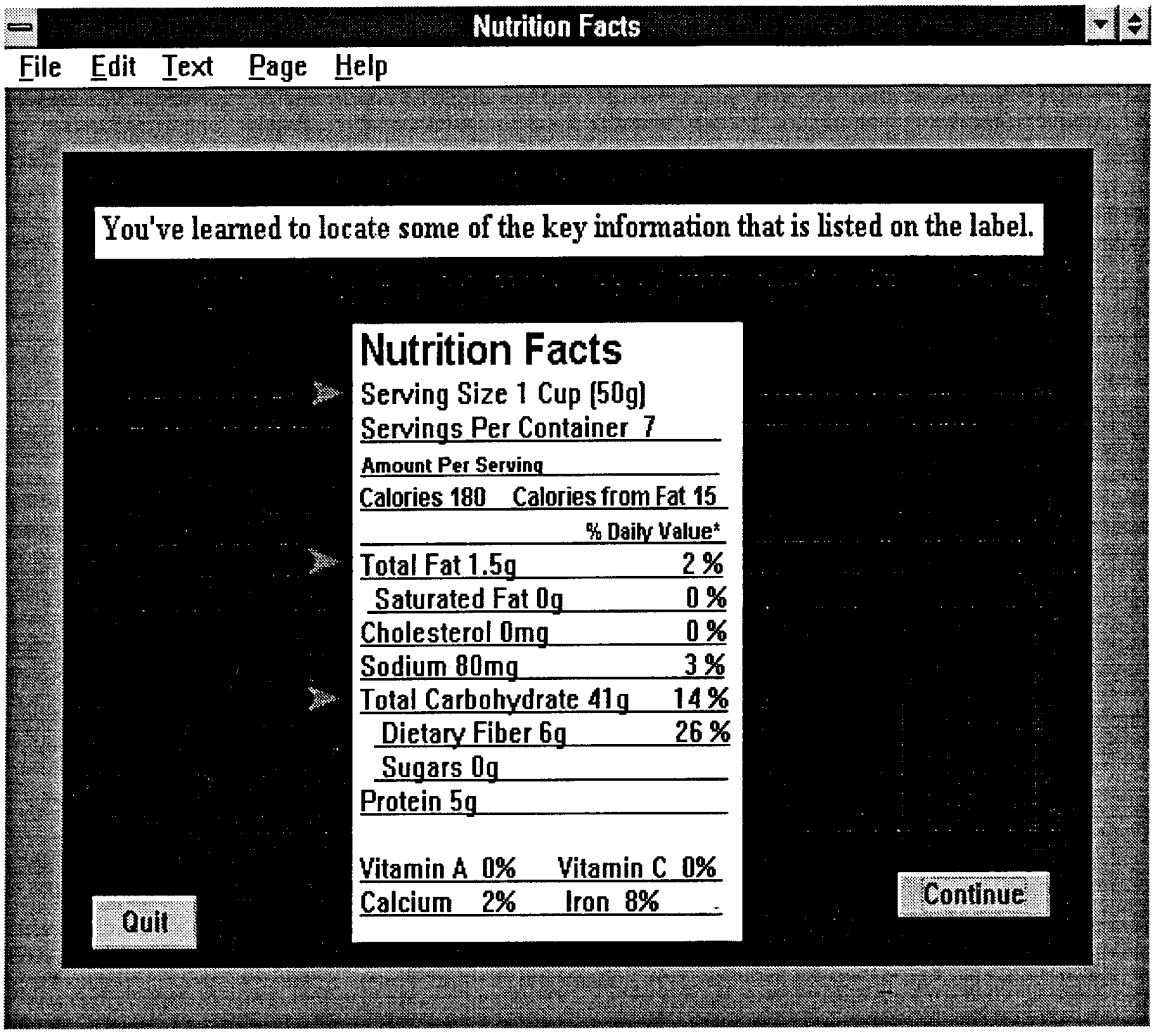
Nutrition Facts
File Edit Text Page Help
You've learned to locate some of the key information that is listed on the label.
Nutrition Facts
Serving Size 1 Cup (50g)
Servings Per Container 7
Amount Per Serving
Calories 180 Calories from Fat 15
% Daily Value*
Total Fat 1.5g 2 %
Saturated Fat 0g 0 %
Cholesterol 0mg 0 %
Sodium 80mg 3 %
Total Carbohydrate 41g 14 %
Dietary Fiber 6g 26 %
Sugars 0g
Protein 5g
Vitamin A 0% Vitamin C 0%
Calcium 2% Iron 8%
Quit
Continue

Nutrition Facts

File Edit Text Page Help

You have also learned to use the Nutrition Facts label to make calculations when your needs are different than what is listed on the label.

Nutrition Facts
Serving Size 1 Cup (50g)
Servings Per Container 7
Amount Per Serving
Calories 180 Calories from Fat 15

For example,
If a 1 cup serving = 180 calories

then a 2 cup serving = 360 calories
(2 servings x 180 calories = 360)

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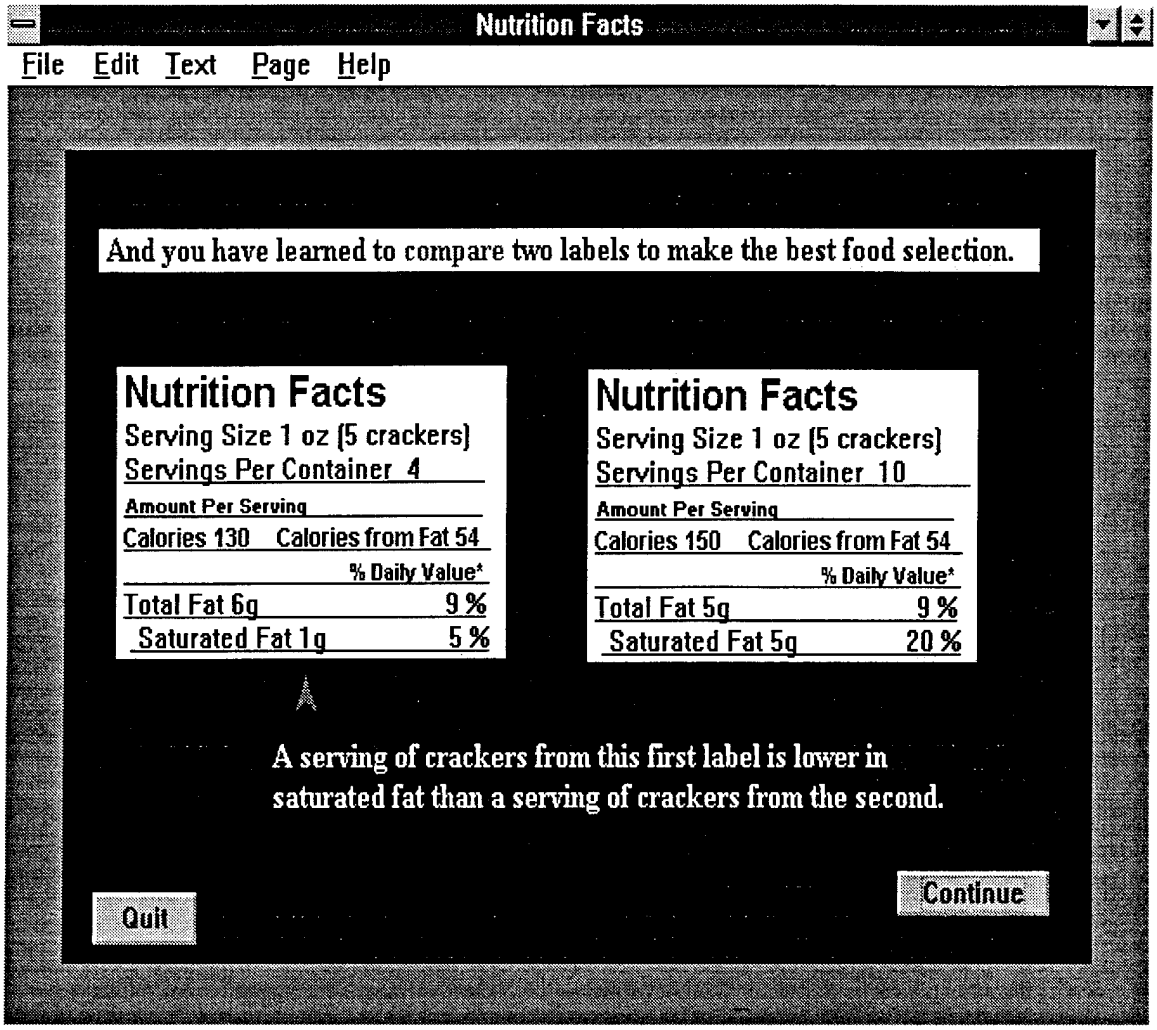
Nutrition Facts
File Edit Text Page Help
And you have learned to compare two labels to make the best food selection.
Nutrition Facts
Serving Size 1 oz (5 crackers)
Servings Per Container 4
Amount Per Serving
Calories 130 Calories from Fat 54
% Daily Value*
Total Fat 6g 9 %
Saturated Fat 1g 5 %
Nutrition Facts
Serving Size 1 oz (5 crackers)
Servings Per Container 10
Amount Per Serving
Calories 150 Calories from Fat 54
% Daily Value*
Total Fat 5g 9 %
Saturated Fat 5g 20 %
A serving of crackers from this first label is lower in saturated fat than a serving of crackers from the second.
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Nutrition Facts

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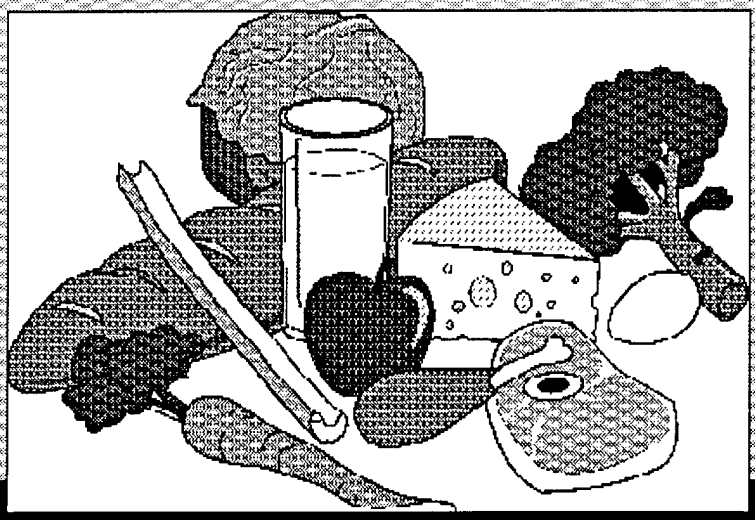
You have been busy investigating some details of the label, but don't forget all foods can contribute in a good way to your daily diet. Your job is to learn how.



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Nutrition Facts

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