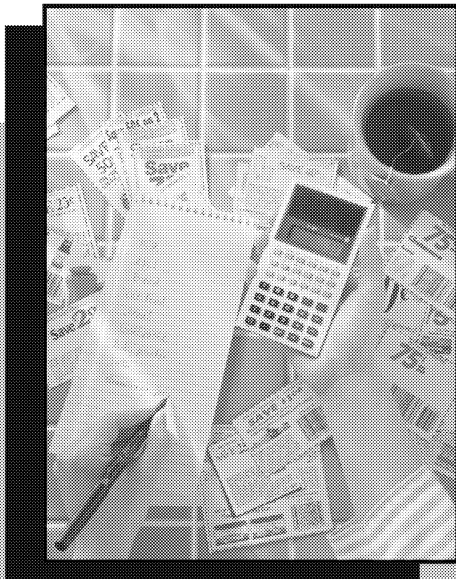


TEACHER GUIDE

MATH

in Everyday Life

Third Edition



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Preface to the Third Edition

Math students throughout the United States and Canada have been helping a typical American family solve its financial problems for 25 years. We are pleased that teachers have found these exercises helpful in introducing students to the kinds of mathematical problems that most people encounter in their everyday lives.

These problems have changed considerably since the first edition of this book appeared in 1976. Today most people make use of hand calculators, computers, and the Internet to think about and solve the mathematical problems they come across in their daily lives. This book has been modified to reflect those changes.

The National Council of Teachers of Mathematics has developed a comprehensive set of standards, *Principles and Standards for School Mathematics*, the *NCTM Standards 2000*, which outlines the skills expected of mathematics students at every grade level from pre-kindergarten through grade 12. Many school systems and most developers of mathematics curriculum turn to this important document for guidelines on grade-level content and for suggestions on how to teach that content.

This revision of *Math in Everyday Life* has been conducted with these *NCTM Standards 2000* in mind.

Number and Operations Standard for Grades 6–8

- Understand numbers, ways of representing numbers, relationships among numbers, and number systems
 - work flexibly with fractions, decimals, and percents to solve problems;
 - understand and use ratios and proportions to represent quantitative relationships;
- Understand meanings of operations and how they related to one another
 - understand the meaning and effects of arithmetic operations with fractions, decimals, and integers;
- Compute fluently and make reasonable estimates
 - select appropriate methods and tools for computing with fractions and decimals from among mental computation, estimation, calculators or computers, and paper and pencil, depending on the situation, and apply the selected methods;
 - develop and analyze algorithms for computing with fractions, decimals, and integers and develop fluency in their use.

Measurement Standard for Grades 6–8

- Understand measurable attributes of objects and the units, systems, and processes of measurement

- understand both metric and customary systems of measurement;
- understand relationships among units and convert from one unit to another within the same system;
- understand, select, and use units of appropriate size and type to measure angles, perimeter, area, surface area, and volume.

Problem Solving Standard for Grades 6–8

Instructional programs from pre-kindergarten through grade 12 should enable all students to—

- build new mathematical knowledge through problem solving;
- solve problems that arise in mathematics and in other contexts;
- apply and adapt a variety of appropriate strategies to solve problems.

Connections Standards for Grades 6–8

Instructional programs from pre-kindergarten through grade 12 should enable all students to—

- recognize and use connections among mathematical ideas;
- recognize and apply mathematics in contexts outside of mathematics.

To the Teacher

This is a *workbook* in consumer mathematics. It is intended to be just that, a collection of exercises on the kinds of mathematical problems that people run into every week of their lives. This is not a textbook in the traditional sense, but instead provides an array and variety of specific, practical problems.

One important objective of this workbook is to make the subject of consumer math relevant to students' lives. To the author, that means using problems and information from students' own lives. In many instances, we suggest that students visit local stores, read local newspapers, collect information from local sources—all in order to do the problems in the workbook. Students use the Internet to widen the search and enrich the experience of using math in everyday life. We think this emphasis will not only improve students' motivation, but will also improve the rate at which they learn.

The problems in the workbook are chosen from the everyday life of a fictitious “average” family, the Van Dusens. We recognize the risk that some of the activities in this book may not be typical of all families. We feel the risk is outweighed by the opportunity of getting to know the Van Dusen family and of feeling that the problems in the workbook are real problems of everyday life.

The workbook is set up to allow teachers to use as much or as little imagination as they wish. Each activity is independent but it is possible to carry over information and data from one chapter to another: The wages reported in Chapter 1, for example, can be used to develop budgets in Chapter 2 and to figure income taxes in Chapter 12. The check-writing exercise can be directed toward paying specific bills found in other sections, and so on. Each teacher can balance the advantages of this realistic approach to learning about home finances with the time available.

You will find multiple copies of some forms. The book contains six copies of Mr. Van Dusen's pay record, for example.

The teacher pages provide answers to nearly every exercise. Sometimes the answer is unique, that is, the only one possible; for example, there is one correct answer for the net pay earned by Mr. and Mrs. Van Dusen and Craig. In other cases, the answers given are only examples of those your students might obtain. Exercises in which students have to visit stores, read advertisements, or make decisions will have many possible correct answers, depending upon prices of the items students find.

SAVINGS ACCOUNTS

Teaching Notes

Answers to Text Questions, page 68

1. The money received by a bank from an investor is used by the bank for making other investments. For example, the bank might purchase government bonds or lend money to people for mortgages. The income received by the bank is greater than the interest the bank pays the investor. For example, banks currently earn anywhere from 9% to 14% on the money that they lend to individuals and businesses. They pay about 1% to 3% on regular savings accounts. Thus, banks commonly earn a net profit of approximately 10% on these financial transactions.

2. The decision on how to invest money involves many factors. A regular savings account often has a low minimum-deposit requirement, such as \$100. The bank pays interest on that account, as long as a minimum balance is maintained. The investor is allowed to withdraw money at any time. The interest rate on such accounts is usually very low.

Money invested in insurance, on the other hand, is regarded as a long-term investment that pays relatively low interest because it provides death benefits as well as savings interest.

Stocks are usually regarded as more risky investments because the return they provide may vary over time. Usually, no specific return is guaranteed on stocks and, as a result, one can realize significant gains or losses. Bonds are generally safer investments, with a certain standard return guaranteed to the bondholder by a governmental body or a corporation. Bond market values fluctuate, as do stock values, but usually over a narrower

range. Bonds mature, as do insurance policies, although often in somewhat less time.

3. Saving money is almost a necessity in our society. Most families are confronted from time to time with fairly large expenses, such as the purchase of a new house or new car, or the cost of a college education, for which money should be set aside. Unexpected events, such as a major illness, may require large sums of money for which savings would be very important.

4. One purpose of a life-insurance policy is to provide financial protection to the family and friends of a policyholder in the event of his or her death. The insurance policy can also be thought of as a savings account, however. The insurance company pays interest to the policyholder on all the money that he or she has paid in premiums over the years. The amount of interest paid on an insurance policy, however, is usually less than that on a regular savings account since, in the former case, the policyholder is also receiving the benefits of life-insurance protection in case of death.

5. Suppose that a bank pays a certain amount of interest on money in a savings account. If that interest is then added to the account and included in the principal the next time interest is figured, we say that the interest is being *compounded*. If, on the other hand, that interest is not added to the account (it might be paid out directly, for example), then the interest paid is *simple* interest.

6. Credit unions are financial institutions organized to make loans to those who might not otherwise be eligible at a commercial bank. A credit union is a “democratic” organization in the sense that everyone who conducts business at the credit union must become a

member and then has a vote in its operation. This system does not operate in commercial banks. Many credit unions are established by companies, unions, or other groups of people who are in some way connected as, for example, a teachers' credit union.

7. A *certificate of deposit*, or CD, is a financial instrument that allows a person to deposit a sum of money at a savings institution for a period of time at a rate of interest that

is usually higher than the rate for a regular savings account. Certificates of deposit may be issued for any period of time from a month to five years or more. In general, the longer the period of time for which the CD is issued, the higher the rate of interest it carries. A disadvantage of CDs is that the investor cannot withdraw the money without penalty before a specified period of time.

Comments on Internet Activities, pages 75–76

1. The balance at the end of one week in the account described in this question would be \$500.50. Interest earned during the week would be \$0.50.

Some web sites explain the mathematical formula for calculating compound interest. That formula may be too complex for students using this book. Many web sites provide an automatic compound-interest calculator that can be used simply by inputting principal, interest rate, and time of investment. Students can use these calculators quite easily. Some web sites that students might find include the following:

Compound-Interest Calculations
http://www.warwick.ac.uk/fac/cross_fac/nflc/cal2.html

Compound-Interest Calculator
<http://www.1728.com/compint.htm>

Future Value JavaScript Calculator
http://www.webwinder.com/wwhtmbin/java_fv1.html

The values of a \$500 investment kept for one year at the interest rates given are as follows:

$5\frac{1}{4}\%$: \$526.89

$5\frac{1}{2}\%$: \$528.20

$5\frac{3}{4}\%$: \$529.52

2. Many Internet sites provide information on the Social Security system, but probably the

best place to begin is the Social Security Administration's own web site at <http://www.ssa.gov/>. The retirement questions asked of students can be answered on the site's Quick Calculator page. The monthly benefits for each individual at ages 62, 66, and 70 as of publication are as follows:

(a) \$1,149; \$1,535; \$2,030

(b) \$957; \$1,280; \$1,695

(c) \$1,282; \$1,837; \$2,282

3. The most common retirement plans are traditional IRAs; Roth IRAs, Education IRAs; Simplified Employee Pensions (SEPs); Savings Incentive Match Plans for Employees (SIMPLE); and Keough plans. The details and provisions of each of these plans are complex. The best sources for information on the plans are IRS publications dealing with them, specifically, Publications 560 (Retirement Plans for Small Business) and 590 (Individual Retirement Plans). Both publications can be obtained by contacting the IRS on-line at the IRS web site, http://www.irs.gov/forms_pubs/.

Information about a variety of retirement plans is available on-line from banks, financial advisors, retirement planners, and similar sources. Students may find other articles and publications that deal with this subject. One of the most useful sources is the Money Central web site at <http://moneycentral.msn.com/>, which has a variety of articles on various kinds of retirement plans.

GROCERY SHOPPING

Teaching Notes

You may want to discuss with students the many factors that can affect the price of groceries to explain why the sample prices provided here may be very different from those obtained by your students.

Some of the factors that account for differences in food prices include: (1) variations found at different types of stores (discount, specialty, chain or convenience stores, for example); (2) variations found within one chain, depending on geographical location (urban, suburban or rural, for example); (3) variations among brands (national, regional or generic brands, for example); (4) variations owing to special sales; and (5) seasonal variations (for fresh fruits and vegetables at various times of the year).

You may also want to discuss the difficulties comparing prices when package sizes differ. For example, some foods are packaged in one-pound or one-quart containers. Others may be packaged in fractional weight or liquid measures. Canned vegetables might be available in $14\frac{1}{2}$ -ounce sizes. The size of such containers is largely a matter of tradition and competition.

Because of the variation in package sizes, there are a number of options on how to complete the charts provided in the Activity Text. Some students may round off fractional weights and volumes to the next nearest whole number before making calculations. Thus, a $14\frac{1}{2}$ -ounce package could be called 14 or 15 ounces for the purpose of calculations of unit price. Others may do calculations using the exact weight or volume of a package. In that way, you can give students practice in mathematical operations that involve fractions and decimals. The unit price for a can of green beans that weighs $14\frac{1}{2}$ ounces and costs \$1.39, for example, is found by dividing a decimal (\$1.39) by a mixed number ($14\frac{1}{2}$ oz.) transformed into a decimal (14.5).

Answers to Text Questions, page 78

1. Similar items sold by different food producers are often available in various and odd sizes. For example, tuna fish is sold in $3\frac{1}{2}$ -ounce, $7\frac{1}{4}$ -ounce, and 14-ounce sizes. *Unit pricing* tells a shopper how much each item costs in some standard measurement, such as price per ounce, price per pound, or price per gallon. This practice allows the shopper to compare the price of a product in any size package.
2. Stores sometimes use sales to lure customers into a store. However, there may be only a limited amount of the sale item on hand, or items may not be in good condition. And the price of items not on sale may be so high that the customer actually spends more at the store, rather than saving money. Still another factor to consider is the original price of the sale item. It could be that the original price was so high that, even on sale, the customer realizes no savings in comparison with prices at other stores.
3. *Convenience foods* are packaged foods that may be partially cooked so that minimum preparation time is needed. Canned vegetables and frozen dinners are examples of convenience foods. Although convenience foods can save time and effort in preparing a meal, they have certain drawbacks. They are usually more expensive than the price of raw materials. They generally contain food additives that may not be nutritious and, in some cases, may actually be harmful. Finally, they are seldom as enjoyable to eat as a meal prepared from scratch.

4. Stores can make extensive use of advertising on television and radio and in newspapers to attract buyers. They can also construct attractive displays in the store to catch the buyer's eye. Special sales and the offer of coupons for free or reduced-price items are also available. Some stores and chains now have food clubs that consumers can join. Club members receive special discounts on items available in the store or from the chain. It should be noted that stores often emphasize luxury or impulse items not necessary to a healthy diet but that a customer may be talked into buying. The placement of such items at the front of the store, at the end of an aisle, or in some other conspicuous location may increase the chance that a consumer will buy the items.
5. During some seasons of the year, packaged items may be less expensive than unprocessed foods because of the difficulty and expense of obtaining such raw foods. For example, during the winter, canned pineapple is likely to be less expensive than fresh pineapple.

Comments on Internet Activities, page 79

1. The Food Stamp Program is an activity funded by federal or state governments by which certain individuals can receive food stamps. These can be used to buy food at most groceries. The Food Stamp Program is designed for low-income individuals and families. Eligibility for food stamps is based on a number of factors, primarily household income.
The Electronic Benefit Transfer program allows the transfer of the dollar value of food stamps directly to a specific retailer. For example, rather than sending \$100 worth of food stamps to a person or family, the government sends a voucher worth \$100 to a store of the recipient's choice.
The best source of detailed information about the Food Stamp Program is the U.S.

Department of Agriculture's web site at <http://www.fns.usda.gov/fsp/>. The Electronic Benefit Transfer program is described in a separate section of that site at <http://www.fns.usda.gov/fsp/menu/admin/ebt/ebt.htm>.

2. Information about smart shopping skills can be found on a number of web sites devoted to consumer information. Some sites focus specifically on how to teach children to become intelligent shoppers. Two articles of this type can be found at the respective sites listed below:

eHow to Take Children Grocery Shopping

<http://www.ehow.com/>

Grocery Shopping Skills for Kids

<http://financialfinesse.com/>

3. The U.S. Department of Agriculture has an extensive list of publications on meal planning. Similar information is available from many state and public-interest agencies. These publications are usually available in hard copy as well as on the Internet. Examples of some Internet sources that may be of value in meal planning include the following:

Guide to Menu Planning

<http://www.cdasantiego.com/Menu.htm>

Meal Planning (a collection of related web sites)

<http://www.busycooks.about.com/>

Meal Planning and Make-Ahead Cooking—The Kitchen Link

<http://www.kitchenlink.com/rcpmenus.html>

4. Internet grocery shopping is largely a regional activity because of the problem of making deliveries from a store to nearby customers. Such programs have become popular in some parts of the country but less so in other regions. One criterion for success is a population density that would offset delivery costs.

Some stores and chains that currently provide Internet grocery-shopping sites are the following:

Groceries to Go

<http://www.grocerywagon.com/>

Peapod

<http://www.peapod.com/>