CONTENTS

TO THE TEACHER

Basic Occupational Math is an introduction to basic mathematical operations required in a broad range of occupations. Among the jobs mentioned in the book are catering, clerical work, cooking, construction work, auto mechanics, electronic repair, medical and laboratory technical work, stockroom work, clerical work, typesetting, interior decorating, drafting, carpentry, painting, masonry, roofing, truck driving, nursery management, tool-and-die work, dressmaking, and farming.

Basic Occupational Math illustrates mathematical operations performed both manually and with a calculator. Practice problems are arranged in order of difficulty. Not all students are expected to solve all problems.

The teacher's guide provides suggestions for teaching and a complete answer key. A diagnostic pretest and a posttest for each chapter are included in handy reproducible form.

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Chapter 4: Powers, Roots, and Geometric Figures

Roots and Powers

1. Point out to students the difference between a square root sign (radical) ($\sqrt{\ }$) and a division sign ($\overline{)}$).
2. You may wish to demonstrate how to use tables of powers and roots featured in many textbooks.
3. Help students learn to calculate roots and powers on their own calculators.

Geometric Figures

1. Students will benefit from making a sketch of most of the problems in this section.
2. The technical name for a six-faced rectangular solid is a parallepiped.

Linear, Angular, and Circular Measurement

1. Students should either memorize the formulas on pages 81–82 or have copies available.
2. As an enrichment exercise, you might ask students to read about the discovery of pi and about efforts to calculate its precise value.
3. Review with students the various mathematical symbols for multiplication. (See page 18).
4. In some occupations, angles must be measured precisely in minutes and seconds. You may wish to discuss in some detail this level of precision in angle measurement.
5. A value of 3.14 for π is usually adequate in problems involving decimals; use $\frac{22}{7}$ in problems with fractions.

Area

1. Students should memorize the formulas on pages 85–86 or have copies available.
2. Solving for linear dimensions where the area of a figure is known is discussed on pages 122–125.
3. Be sure that students understand all possible abbreviations for square units, such as sq in and in^2.

Volume

1. Students should memorize the formulas on page 92 or have copies available.

2. You may want to review with students how to use calculator memory buttons (M+, M–, and M) to solve problems that have more than one step.

Chapter 5: Measuring Systems and Devices

Introduction

1. Measurement is a skill with which most students are familiar. The advantage of that familiarity is that you probably do not have to spend much time on the basics of weighing, finding lengths, and measuring volumes. The disadvantage is that students may be unaware of some fundamental aspects of measurement. For example, measurement is often regarded as the first step in collecting true, accurate, and precise information. It may come as a surprise to students that *all* measurements, inherently and unavoidably, contain some degree of uncertainty or error. Awareness of that error, specifically its magnitude, is crucial in understanding error terms and tolerance in measurement.

2. Discuss with students possible sources of error in measurement and what can be done to reduce its effect.

3. Point out that the symbol ± is read "plus or minus."

4. The only common liquid with a negative (convex) meniscus is mercury. Reading the meniscus on a mercury thermometer requires particular attention and skill.

5. Collect a variety of measuring devices—balances, graduated cylinders and beakers, pipettes and burettes, meter- and yardsticks—for students to examine. You may be able to borrow these devices from your school science laboratory or a local workplace.

6. Invite a representative from the local water or power company to visit your class to describe the meters and measuring devices used at his or her company.

7. Notice that most water meters are calibrated in *cubic feet,* but water charges may be translated into the number of *gallons* used. The conversion factor is 1 cubic foot = 7.48 gallons.

8. Precisely speaking, the kilogram (kg) is a unit of mass, not weight. In everyday life, however, we use the word to mean both an object's mass and the force that gravity exerts on that mass. Earth's gravity pulls on a kilogram of mass with a force of 2.2 pounds.

Measuring Systems

1. You may want to allow some class time for a discussion about the advantages and disadvantages of the British (customary) and metric systems of measurement. Many industries are finding it necessary to convert to metric measurements in order to compete in international markets.

2. The factor-label method for conversions provides a quick and foolproof way of making any conversion of measurement units.

Name _____ Date _____

Chapter 6: Pretest

1. Solve each of the following formulas for the underlined letter.

   a. $C = 2\pi\underline{r}$ b. $A = \frac{1}{2}\, b\underline{h}$

2. Find the diameter of a circle whose circumference is 14 feet.

3. The longer side of Van's rectangular field is 1,240 feet in length. How long is the shorter side if a fence 3,540 feet just encloses the field?

4. The wire Nadia is testing in her laboratory stretches when weights are placed on it according to the formula

   $$l = l_0 + 0.000865\, m$$

   where l is the length (in centimeters) of the wire with a weight on it, l_0 is the length without the weight (in centimeters), and m is the weight (in grams) placed on the wire. What weight must be placed on a wire that is originally 186.5 cm long to make it stretch to a length of 186.9 cm?

5. Express each of the following pairs of numbers as a ratio, the first number to the second number. Reduce each ratio to its lowest terms. Also express the ratio in the format $a : 1$.

   a. 8 : 4 b. $\frac{1}{6}$ foot : 6 inches c. 17.5 cm : 4.2 cm

6. Calculate the value of x in each of the following proportions.

   a. $\frac{3}{7} = \frac{4}{x}$ b. $\frac{1.5}{2.7} = \frac{x}{6.3}$ c. $\frac{21.5}{x} = \frac{4.8}{9.3}$

7. Roseanne operates a piledriver. The machine sinks a steel post 0.15 cm each time a force of 2,500 pounds is applied. What force is needed to sink the same post a distance of 0.25 cm in a single blow?

8. Juan bakes a cake for six people. The recipe calls for 15 g of baking soda. How much baking soda should he add to a larger cake intended for 75 people?

Name _____ Date _____

Chapter 6: Posttest

1. Solve each of the following formulas for the underlined letter.

   a. $p = k\underline{d}h$ b. $A = 6\underline{s}^2$

2. What is the height of a cylinder whose base is 6 inches in diameter and whose volume is 1,639 cubic inches?

3. Olive places one drop of adhesive between two plastic sheets, each 25 cm by 35 cm in size. The drop contains 1.500 cubic centimeters of adhesive. The adhesive spreads out and completely covers the space between the two sheets. What is the thickness of the layer of adhesive?

4. Jamie's test car accelerates from 35 miles per hour to 60 miles per hour in 4.2 seconds. To calculate the car's acceleration, Jamie uses the formula $v = v_0 + at$, where v_0 is the original speed (in miles per hour), v is the final velocity (in miles per hour), a is the acceleration (in miles per hour per second), and t is the time (in seconds). What is the car's acceleration?

5. Express each of the following pairs of numbers as a ratio of the first number to the second number. Reduce each ratio to its lowest terms. Also express the ratio in the format $a : 1$.

   a. 72 : 18 b. $\frac{1}{16}$ mile : 440 feet c. 252 mm : 72 mm

6. Calculate the value of x in each of the following proportions.

   a. $\frac{7}{11} = \frac{x}{5}$ b. $\frac{4.7}{13.6} = \frac{21.3}{x}$ c. $\frac{x}{22.7} = \frac{9.04}{5.16}$

7. Orlando's paint crew normally uses 2.5 gallons of primer to cover 350 square feet of new siding. How many gallons of primer should he buy to paint a house that has 2,000 square feet of new siding?

8. Pho's monthly budget for the salaries of 13 people who work for him is $15,585. What should he budget for salaries if he adds 5 new employees at the same rate of pay?