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SHELL
EDUCATION

PRACTICE - ASSESS - DIAGNOSE

Level

5

180 Days of

PROBLEM SOLVING

for Fifth Grade

- Think
- Plan
- Solve
- Explain

0.2 - 0.02

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INTRODUCTION

The Need for Practice

To be successful in today’s mathematics classrooms, students must deeply understand both concepts and procedures so that they can discuss and demonstrate their understanding during the problem-solving process. Demonstrating understanding is a process that must be continually practiced for students to be successful. Practice is especially important to help students apply their concrete, conceptual understanding during each step of the problem-solving process.

Understanding Assessment

In addition to providing opportunities for frequent practice, teachers must be able to assess students’ problem-solving skills. This is important so that teachers can adequately address students’ misconceptions, build on their current understandings, and challenge them appropriately. Assessment is a long-term process that involves careful analysis of student responses from discussions, projects, practice pages, or tests. When analyzing the data, it is important for teachers to reflect on how their teaching practices may have influenced students’ responses and to identify those areas where additional instruction may be required. In short, the data gathered from assessments should be used to inform instruction: slow down, speed up, or reteach. This type of assessment is called *formative assessment*.

HOW TO USE THIS BOOK *(cont.)*

College-and-Career Readiness Standards

Below is a list of mathematical standards that are addressed throughout this book. Each week, students solve problems related to the same mathematical topic.

Week	Standard
1	Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
2	Use parentheses, brackets, or braces in numerical expressions, and evaluate expressions with these symbols.
3	Write simple expressions that record calculations with numbers, and interpret numerical expressions without evaluating them.
4	Fluently multiply multi-digit whole numbers using the standard algorithm.
5	Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.
6	Recognize volume as an attribute of solid figures and understand concepts of volume measurement.
7	Measure volumes by counting unit cubes, using cubic cm, cubic in., cubic ft., and improvised units.
8	Relate volume to the operations of multiplication and addition and solve real world and mathematical problems involving volume.
9	Add fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.
10	Subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.
11	Solve word problems involving addition and subtraction of fractions referring to the same whole, including cases of unlike denominators (e.g., by using visual fraction models or equations to represent the problem).
12	Interpret a fraction as division of the numerator by the denominator ($\frac{a}{b} = a \div b$). Solve word problems involving division of whole numbers leading to answers in the form of fractions or mixed numbers (e.g., by using visual fraction models or equations to represent the problem).

HOW TO USE THIS BOOK *(cont.)*

13	Apply and extend previous understandings of multiplication to multiply a whole number by a fraction.
14	Apply and extend previous understandings of multiplication to multiply a fraction by a fraction.
15	Compare the size of a product to the size of one factor on the basis of the size of the other factor, without performing the indicated multiplication.
16	Solve real world problems involving multiplication of fractions and mixed numbers (e.g., by using visual fraction models or equations to represent the problem).
17	Apply and extend previous understandings of division to divide whole numbers by unit fractions.
18	Apply and extend previous understandings of division to divide unit fractions by whole numbers.
19	Solve real-world problems involving division of unit fractions by non-zero whole numbers and division of whole numbers by unit fractions (e.g., by using visual fraction models and equations to represent the problem).
20	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real-world problems.
21	Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Use operations on fractions for this grade to solve problems involving information presented in line plots.
22	Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left.
23	Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.
24	Read and write decimals to thousandths using base-ten numerals, number names, and expanded form.
25	Compare two decimals to thousandths based on meanings of the digits in each place, using $>$, $=$, and $<$ symbols to record the results of comparisons.
26	Use place value understanding to round decimals to any place.
27	Add decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

HOW TO USE THIS BOOK *(cont.)*

28	Subtract decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
29	Multiply decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
30	Divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.
31	Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real-world problems.
32	Understand that attributes belonging to a category of two-dimensional figures also belong to all subcategories of that category.
33	Classify two-dimensional figures in a hierarchy based on properties.
34	Generate two numerical patterns using two given rules. Identify apparent relationships between corresponding terms. Form ordered pairs consisting of corresponding terms from the two patterns, and graph the ordered pairs on a coordinate plane.
35	Use a pair of perpendicular number lines, called axes, to define a coordinate system, with the intersection of the lines (the origin) arranged to coincide with the 0 on each line and a given point in the plane located by using an ordered pair of numbers, called its coordinates. Understand that the first number indicates how far to travel from the origin in the direction of one axis, and the second number indicates how far to travel in the direction of the second axis, with the convention that the names of the two axes and the coordinates correspond (e.g., x -axis and x -coordinate, y -axis and y -coordinate).
36	Represent real world and mathematical problems by graphing points in the first quadrant of the coordinate plane, and interpret coordinate values of points in the context of the situation.

NAME: _____ DATE: _____



Think about the problem, and answer the questions.

Jamila has a gift box that is 8 centimeters long, 8 centimeters wide, and 2 centimeters high. It has a volume of 128 cubic centimeters. She has a second gift box that is the same width but is twice the length and three times the height. What is the volume of the second gift box?



Think About It!

1. What information is given?

2. What is the question asking you to find?

3. Can the answer be 128 cubic centimeters? Why or why not?

NAME: _____ DATE: _____

DIRECTIONS:

Read and solve each problem.

Solve It!

Problem 1: Jamila has a gift box that is 8 centimeters long, 8 centimeters wide, and 2 centimeters high. It has a volume of 128 cubic centimeters. She has a second gift box that is the same width but is twice the length and three times the height. What is the volume of the second gift box?

**What Do You Know?****What Is Your Plan?****Solve the Problem!****Look Back and Explain!**

Problem 2: Tonya has a tool chest that is 5 feet long, 3 feet wide, and 4 feet high. It has a volume of 60 cubic feet. She has a second tool chest that has the same width, twice the length, and half the height. What is the volume of the second tool chest?

**What Do You Know?****What Is Your Plan?****Solve the Problem!****Look Back and Explain!**

NAME: _____ DATE: _____



Look at the example. Then, solve the problem.



Visualize It!

Example: Sketch the figure and find the volume.

Sketch	Dimensions length × width × height	Volume
	$4 \times 2 \times 3$	24 cubic units

1. Sketch each figure and find the volume.

Sketch	Dimensions length × width × height	Volume
	$2 \times 3 \times 4$	
	$3 \times 4 \times 2$	

2. Does the order of the dimensions change the volume? Why or why not?

NAME: _____ DATE: _____

DIRECTIONS: Show two ways to solve the problem.



1. Mrs. Clark is sending a care package to her daughter who is away at college. She needs a box that holds 36 cubic inches. Sketch two different boxes that Mrs. Clark can use to send her package. Write an equation for each sketch to justify your reasoning.

Strategy 1

Strategy 2

2. Do you think there are more than two solutions to this problem? Why or why not?

NAME: _____ **DATE:** _____



Read and solve the problem.

Alex has a bird feeder that has a height of 30 centimeters, length of 10 centimeters, and width of 8 centimeters. His friend has a bird feeder that has twice the volume. What could be the possible height, length, and width of his friend's bird feeder?



Challenge Yourself!

1. Write an equation to find the volume of Alex's bird feeder.

2. Sketch Alex's friend's bird feeder and label the length, width, and height. Show how you found your solution.

3. Can you think of a different way to sketch his friend's bird feeder? Explain your thinking.

PROBLEM-SOLVING FRAMEWORK

Use the following problem-solving steps to help you:

1. understand the problem
2. make a plan
3. solve the problem
4. check your answer and explain your thinking



What Do You Know?

- read/reread the problem
- restate the problem in your own words
- visualize the problem
- find the important information in the problem
- understand what the question is asking

What Is Your Plan?

- draw a picture or model
- decide which strategy to use
- choose an operation (+, −, ×, ÷)
- determine if there is one step or multiple steps



Solve the Problem!

- carry out your plan
- check your steps as you are solving the problem
- decide if your strategy is working or choose a new strategy
- find the solution to the problem

Look Back and Explain!

- check that your solution makes sense and is reasonable
- determine if there are other possible solutions
- use words to explain your solution

