Lesson 1-1

A Plan for Problem Solving

ISG **Interactive Study Guide**

See pages 5–6 for:
- Getting Started
- Real-World Link
- Notes

Essential Question

How can you use numbers and symbols to represent mathematical ideas?

CCSS **Common Core State Standards**

Content Standards
7.NS.3, 7.EE.3

Mathematical Practices
1, 3, 4, 5

Vocabulary

four-step plan

What You'll Learn
- Use the four-step plan to solve problems.
- Solve multi-step problems.

Real-World Link

Cell Phones The table shows the results of a survey about how teens use their cell phones. About how many times as great is the number of teens who use their phones to take pictures compared to the number who exchange videos?

I Use My Cell Phone to...	Number of Teens
access social network sites	46
exchange videos	61
play games	92
play music	120
take pictures	177

Key Concept ▶ The Four-Step Plan

Understand
- Read the problem quickly to gain a general understanding of it.
- Ask, "What facts do I know?"
- Ask, "What do I need to find out?"
- Ask, "Is there enough information to solve the problem? Is there extra information?"

Plan
- Reread the problem to identify relevant facts.
- Determine how the facts relate to one another.
- Make a plan and choose a strategy for solving it. There may be several strategies that you can use.
- Estimate what you think the answer should be.

Solve
- Use your plan to solve the problem.
- If your plan does not work, revise it or make a new plan.

Check
- Reread the problem. Is there another solution?
- Examine your answer carefully.
- Ask, "Is my answer reasonable and close to my estimate?"
- Ask, "Does my answer make sense?"
- If your answer is not reasonable, make a new plan and solve the problem another way.
- You may also want to check your answer by solving the problem again in a different way.

It is often helpful to have an organized plan for solving math problems. The **four-step plan** shown above can be used to solve any math problem.

RubberBall Productions

Example 1

Tutor

Refer to the table at the beginning of the lesson. About how many times as great is the number of teens who use their cell phones to take pictures compared to the number who exchange videos? Use the four-step plan.

Watch Out!

The phrase *how many times as great* means you should use division to compare the numbers. The phrase *how many more* means you should use subtraction.

Understand You know that 177 teens use cell phones to take pictures and 61 use them to exchange videos. You need to find *about* how many times as great the first group of teens is than the second group.

Plan Divide the number of teens who take pictures by the number who exchange videos. Since the question asks for *about* how many times as great, you can estimate.

Solve $177 \div 61 \rightarrow 180 \div 60 = 3$ Estimate.

So, the number of teens who use their cell phones to take pictures is about 3 times as great as the number who exchange videos.

Check $61 \times 3 = 183$. Since 183 is close to 177, the answer is reasonable. ✓

Got It? Do this problem to find out.

1. About how many more teens in the survey use cell phones to play games than to access social network sites?

[handwritten: 92 = 90]
[handwritten: 46 = 45] *[handwritten: 90-45=45]* *[handwritten: 90-50=40]*

Solving Multi-Step Problems

In some problems, the *Solve* step may require two or more substeps.

Example 2

Tutor

The tower of a free-fall ride at an amusement park is 251.5 feet tall. The ride begins to free-fall from 18.9 feet below the top of the tower, and the brakes are applied 41.4 feet from the bottom. How long is the free-fall portion of the ride?

Understand You know the tower is 251.5 feet tall, and that the ride starts 18.9 feet from the top and ends 41.4 feet from the bottom. You need to find the length of the free-fall portion of the ride.

Different Methods

There is often more than one way to solve a problem. Using a different method is a good way to check your answer.

Plan Draw a diagram. Subtract the starting height of the ride from the height of the tower. Then subtract the height where the brakes are applied.

Solve $251.5 - 18.9 = 232.6$ feet
$232.6 - 41.4 = 191.2$ feet

So, the free-fall is 191.2 feet.

Check Since $20 + 40 + 190 = 250$, the answer is reasonable. ✓

[diagram labels: 18.9 ft Drop, 251.5 ft, Free-Fall, Brakes, 41.4 ft]

[handwritten: 12 × 9 = 108m² AREA]
[handwritten: 12+12+9+9 = 42]
[handwritten: 42 ÷ 1.5 = 28 SECTIONS]
[handwritten: PERIMETER]

Got It? Do this problem to find out.

2. A rectangular garden is 12 meters long and 9 meters wide. A border is sold in 1.5-meter sections. How many sections are needed to surround the garden?