Grade 8 Mathematics
Number and Number Relations: Lesson 12

Read aloud to the students the material that is printed in **boldface type** inside the boxes. Information in regular type inside the boxes and all information outside the boxes should **not** be read to students. Possible student responses are included in parentheses after the questions.

NOTE: The directions read to students may depend on the available materials. Read only those parts of the lesson that apply to the materials you are using.

Any directions that ask you to do something, such as to turn to a page or to hand out materials to students, will have an arrow symbol ( ) by them.

Purpose of Lesson 12:

- In this lesson, the tutor and the students will
  - ✓ analyze multi-step word problems.

Equipment/Materials Needed:

- Copies of Student Sheet 85
- Paper and pencils
- Chalkboard

Preparations before beginning Lesson 12:

- Run one copy of Student Sheet 85 for each student.
- Have paper and pencils available.

Lesson 12: Number and Number Relations

This lesson, as did Lessons 7, 8, and 11 in Number Relations, will focus on analyzing word problems. In this lesson, the emphasis will be on multi-step word problems. A multi-step word problem is one that requires more than one operation or process to solve the problem.

Say:

Today, we will focus on multi-step word problems. *Multi-step problems* are problems that require more than one step or operation to solve them. Sometimes when solving multi-step problems, you have to answer questions that are not written down. Writing the missing questions can help you understand how to solve these multi-step problems.

Give students Student Sheet 85. You may want to cut the problems apart so that students focus on one problem at a time.

Say:

I am going to give you a problem and either one or two students' solutions to the problems. You need to decide what unwritten questions are being asked.

1. a. How many days are in one week?
   b. How much does it cost to board Jake for one week?
   c. How much is Mr. Daigle's total bill?

2. a. How much does one flag cost at regular price?
   b. How would you write 98¢ as a decimal?
   c. How much would you save when buying one flag on sale?
   d. How much would you save when buying 18 flags on sale?
   e. How much would 18 flags cost on sale?
   f. If six flags cost $6.72, how much would 18 flags cost at regular price?
   g. How much would you save when buying 18 flags on sale?
   h. The final solutions are the same. You can solve word problems in different ways.

3. a. What time did Ronlynn start playing soccer?
   b. How long did Ronlynn play soccer?
   c. How much time passed between the time Ronlynn got home and the time her father called her to dinner?
   d. How many minutes are in ½ hour?
   e. How long did Ronlynn play soccer?
   f. The final answers are the same.

Answers will vary:

4. 300 sq. ft.; What was the width of the pool?
5. 50 hours ; How many hours does Leah baby-sit in one week? Or How many days does she baby-sit in four weeks?
6. 11:44 p.m. ; How long was the flight delayed?
7. $19.00; How much would two adult tickets cost? How much would three children's tickets cost?
8. $14.94; How many 5's are in 15?

 Have one student summarize today's lesson. Multi-step word problems are often difficult for students because they do not *see* the unwritten questions.

Student Sheet 85 (Number Relations: Lesson 12)

The following are problems and solutions to the problems. What written or unwritten questions are being answered in the steps of the solutions?

1. Mr. Daigle boards his dog, Jake, at the kennel when he travels. It costs him $4.50 a day. On the last day, Mr. Daigle has Jake groomed for a cost of $12.95. What is the total cost if Mr. Daigle boards Jake for one week?

   Stan's solution:

   $4.50 × 7 days = 31.50 $31.50
   +12.95
   $44.45

   A. What question does using "7" answer?
   B. What question does "$4.50 × 7 days = $31.50" answer?
   C. What question does "$31.50 + $12.95 = $44.45" answer?

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2. Sandra is having a Fourth of July party. She wants to have American flags displayed all around. Normally, she can buy them at a price of six for $6.72. Right now, they are on sale for 98¢ each. How much will she save if she buys 18 flags at the sale price?

   Lynn's solution:

   $6.72 ÷ 6 flags = $1.12 $1.12 – .98 = $0.14
   $0.14 × 18 flags = $2.52

   A. What question does "$6.72 ÷ 6 flags = $1.12" answer?
   B. What question does using ".98" answer?
   C. What question does "$1.12 – .98 = $0.14" answer?
   D. What question does "$0.14 × 18 flags = $2.52" answer?

   Michelle's solution:

   18 flags × $.98 = $17.64 3 flags × $6.72 = $20.16
   $20.16 – $17.64 = $2.52

   E. What question does "18 flags × $.98 = $17.64" answer?
   F. What question does "3 flags × $6.72 = $20.16" answer?
   G. What question does "$20.16 – $17.64 = $2.52" answer?
   H. What do you notice about Lynn's and Michelle's final solutions? What do their answers tell you about solving word problems?

Student Sheet 85 (Number Relations: Lesson 12) continued

3. Ronlynn arrived home from school at 3:15 p.m. She worked on her homework for 1½ hours and then played soccer until her dad called her to eat dinner at 7:00 p.m. How long did she play soccer with her friends?

   Steven's solution:
   3:15 p.m. and 1½ hours is 4:45 p.m.
   7:00 p.m. – 4:45 p.m. is 2 hours 15 minutes

   A. What question does "3:15 p.m. and 1½ hours is 4:45 p.m." answer?
   B. What question does "7:00 p.m. – 4:45 p.m. is 2 hrs 15 min" answer?

   Margie's solution:
   7:00 p.m. – 3:15 p.m. is 3 hours 45 minutes
   3 hours 45 minutes – 1 hour 30 minutes is 2 hours 15 minutes

   C. What question does "7:00 p.m. – 3:15 p.m. is 3 hrs 45 min" answer?
   D. What question does using "30 minutes" answer?
   E. What question does "3 hours 45 minutes – 1 hour 30 minutes is 2 hours 15 minutes" answer?
   F. What do you notice about Steven and Margie's solutions?

Solve the following multi-step problems. Write down any questions that are answered as you work the problems.

4. A brochure said that a swimming pool had a perimeter of 74 feet. The length is 25 ft., but the width dimension has been torn off the brochure. How much space will the pool take up?

5. Leah baby-sits for her little brother, James, for 2½ hours each afternoon, five days a week. How many hours will she baby-sit in four weeks?

6. William's flight was scheduled to leave at 8:59 p.m. It was delayed 45 minutes due to weather and two hours due to mechanical problems. What time did the flight leave?

7. Adult tickets for the movie are $6.50 each and children's tickets are $2 each. How much would it cost Mr. and Ms. Shoop and their three children to go to the movie?

8. A sign says "Buy four plants at $4.98 and get one free." How much would 15 plants cost?