Lesson 29: Multi-Step Problems—All Operations

Classwork

Example 1

The school librarian, Mr. Marker, knows the library has $1{,}400$ books but wants to reorganize how the books are displayed on the shelves. Mr. Marker needs to know how many fiction, nonfiction, and resource books are in the library. He knows that the library has four times as many fiction books as resource books and half as many nonfiction books as fiction books. If these are the only types of books in the library, how many of each type of book are in the library?

Draw a tape diagram to represent the total number of books in the library.

Draw two more tape diagrams, one to represent the number of fiction books in the library and one to represent the number of resource books in the library.

- Resource Books:

- Fiction Books:

What variable should we use throughout the problem?

Write the relationship between resource books and fiction books algebraically.

Draw a tape diagram to represent the number of nonfiction books.

How did you decide how many sections this tape diagram would have?

Represent the number of nonfiction books in the library algebraically.

Use the tape diagrams we drew to solve the problem.

Write an equation that represents the tape diagram.

Determine the value of r.

How many fiction books are in the library?

How many nonfiction books are in the library?

Set up a table with four columns and label each column.

How many fiction books are in the library?

How many nonfiction books are in the library?

How many resource books are in the library?

Does the library have four times as many fiction books as resource books?

Does the library have half as many nonfiction books as fiction books?

Does the library have $1{,}400$ books?

Exercises 1–4

Solve each problem below using tables and algebraic methods. Then, check your answer with the word problem.

1. Indiana Ridge Middle School wanted to add a new school sport, so they surveyed the students to determine which sport is most popular. Students were able to choose among soccer, football, lacrosse, or swimming. The same number of students chose lacrosse and swimming. The number of students who chose soccer was double the number of students who chose lacrosse. The number of students who chose football was triple the number of students who chose swimming. If 434 students completed the survey, how many students chose each sport?

2. At Prairie Elementary School, students are asked to pick their lunch ahead of time so the kitchen staff will know what to prepare. On Monday, 6 times as many students chose hamburgers as chose salads. The number of students who chose lasagna was one third the number of students who chose hamburgers. If 225 students ordered lunch, how many students chose each option if hamburger, salad, and lasagna were the only three options?

3. The art teacher, Mr. Gonzalez, is preparing for a project. In order for students to have the correct supplies, Mr. Gonzalez needs 10 times more markers than pieces of construction paper. He needs the same number of bottles of glue as pieces of construction paper. The number of scissors required for the project is half the number of pieces of construction paper. If Mr. Gonzalez collected 400 items for the project, how many of each supply did he collect?

4. The math teacher, Ms. Zentz, is buying appropriate math tools to use throughout the year. She is planning on buying twice as many rulers as protractors. The number of calculators Ms. Zentz is planning on buying is one quarter of the number of protractors. If Ms. Zentz buys 65 items, how many protractors does Ms. Zentz buy?