

Section 1.3 Applications of Addition and Subtraction

Objectives

In this section you will learn to:

- Solve problems using addition.
- Find the perimeter of a geometric figure.
- Solve problems using subtraction.
- Read bar graphs.

INTRODUCTION

Because you are in a prealgebra course, it is assumed that you are skilled in addition and subtraction of whole numbers, and that there is nothing new to review in this regard. However, that doesn't mean we shouldn't practice those skills, especially as they relate to real world situations.

This section introduces you to some ways in which we can apply addition and subtraction. Often, within the written problem, there are key words or phrases that indicate whether addition or subtraction should be used. Later in this course we'll see situations that use both addition and subtraction, but for now, only one of these operations will be used.

In all applications, it is appropriate to answer the question in the form of a sentence. Often, the words used in the question can be rephrased to help us write the answer.

APPLICATIONS INVOLVING ADDITION

In a story problem, or word problem, the last sentence is usually in the form of a question asking us to find an amount of something. In the question, you should look for a word or phrase that indicates which operation is to be used.

In an addition problem, you will likely see words like *total*, *combined*, *sum*, and *in all*. There are many situations to which addition can apply.

Example 1: The South Orange County Community College District has two colleges, Irvine Valley College and Saddleback College. Last summer, Irvine Valley had an enrollment of 5,087 and Saddleback had an enrollment of 9,953, and no one attended both colleges. How many total students were enrolled in the entire district last summer?

Procedure: The key word in the last sentence is *total*. This indicates that we should add the student enrollments at each college:

Answer:

Irvine Valley	5,087
+ Saddleback	+ 9,953
Total	15,040

Sentence: Last summer there was a total of 15,040 students enrolled in the district.

YTI #1

Juan’s monthly salary is \$2,038 and his wife Angelica’s monthly salary is \$1,979. What is their combined monthly salary?

Sentence: _____

YTI #2

Allison often travels out of state for business. On her last trip she flew from Seattle to Houston (1,848 miles), then from Houston to Detroit (1,083 miles), and from Detroit to Seattle (1,927 miles). How many total miles did she travel on that trip?

Sentence: _____

ADDITION IN GEOMETRY: PERIMETER

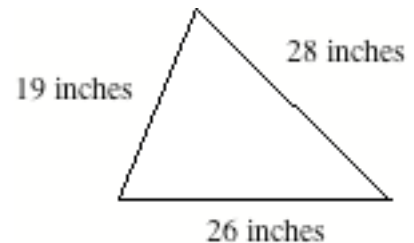
The **perimeter** of a geometric figure—such as a triangle or rectangle—is the total measure around the figure. The perimeter is found by adding the lengths of all of the sides.

For the triangle at right,

$$\text{Perimeter} = 19 \text{ inches} + 28 \text{ inches} + 26 \text{ inches}$$

$$\text{Perimeter} = 73 \text{ inches}$$

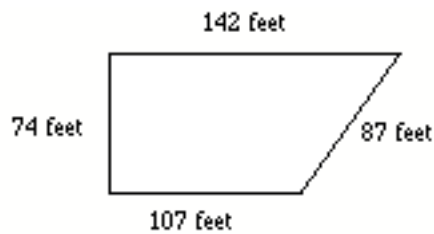
$$\begin{array}{r} 19 \\ 28 \\ + 26 \\ \hline 73 \end{array}$$



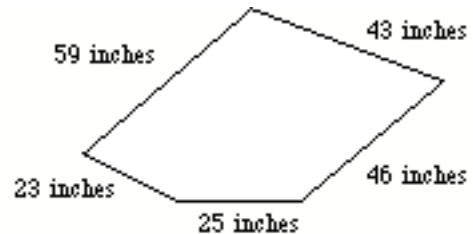
YTI #3

Find the perimeter of each shape.

a)



b)



APPLICATIONS INVOLVING SUBTRACTION

Here are some applications involving subtraction. Generally, subtraction is used when we are asked to compare two numbers. Phrases like, “How much more than...” or “What is the difference between...” or “What was the change in...” almost always indicate subtraction.

For each, write a sentence answering the question.

YTI #4

Marcus traveled 1,385 miles on business last month while Ruben traveled 859 miles. How many more miles did Marcus travel last month than Ruben?

Sentence: _____

YTI #5

Last year Arash’s annual salary was \$25,457. This year he got a raise and is now making \$27,350. What was the amount of Arash’s raise?

Sentence: _____

YTI #6

Two years ago, Sam’s Neighborhood Market had receipts totaling \$1,887,518. Last year, sales were better and the market had receipts totaling \$1,960,710. How much higher were the market receipts last year than the year before?

Sentence: _____

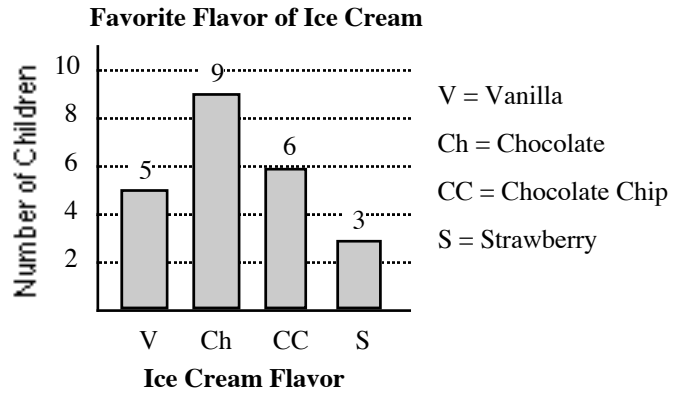
READING A BAR GRAPH

Many addition and subtraction applications can be found a **bar graph**, a visual way to quickly compare numbers of things in a particular category.

For example, if we asked the 23 children in Mrs. Dennison’s first grade class what their favorite flavor of ice cream is (the category), then their answers may be represented by the following bar graph.

From this bar graph, we can quickly see that 9 of the children prefer chocolate and 5 of the children prefer vanilla.

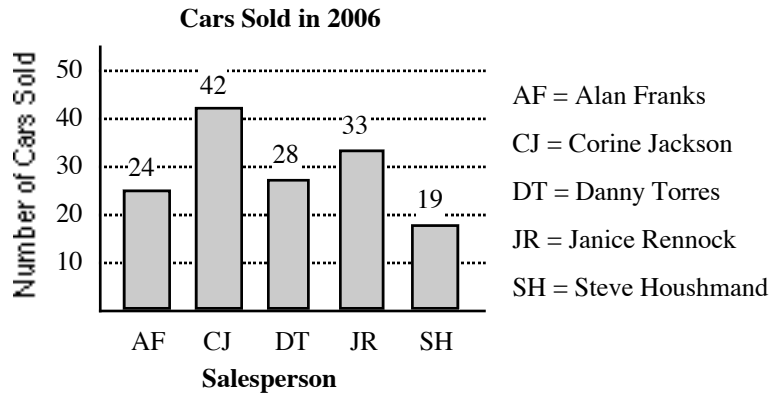
We can see, by simple subtraction, that 4 more children prefer chocolate than vanilla: $9 - 5 = 4$. We can also see the total number of children that were asked: $5 + 9 + 6 + 3 = 23$.



YTI #7

The bar graph at right represents the number of cars sold in 2006 by five different salespersons at Cramer Honda.

Answer the following questions based on this bar graph. Write each answer as a sentence.



a) How many more cars did Corine sell than Steve?

b) Together, how many cars did both Alan and Danny sell?

c) How many cars did all five salespersons sell in 2006?

You Try It Answers: Section 1.3

- YTI #1:** Their combined monthly salary is \$4,017.
- YTI #2:** Allison traveled a total of 4,858 miles.
- YTI #3:** a) Perimeter = 410 feet b) Perimeter = 196 inches
- YTI #4:** Marcus traveled 526 miles more than Ruben.
- YTI #5:** Arash's raise was \$1,893.
- YTI #6:** Last year's receipts were \$73,192 higher than receipts from the year before.
- YTI #7:**
- a) Corine sold 23 more cars than Steve.
 - b) Together, Alan and Danny sold 52 cars.
 - c) All five salespersons sold 146 cars in 2006.

Focus Exercises: Section 1.3

Work each application and answer with a complete sentence.

1. Throughout 2006, Dionne gave monetary donations to two charities, \$1,258 to the Salvation Army and \$875 to the United Way. What was Dionne's total contribution to these two charities?
2. The Detroit office of Globe Realty employs four agents. Mike, the owner, has 21 years of experience in real estate; Ann has 23 years of experience; Uta has 19 years; and Francisco has 17 years. How many combined years of experience in real estate do the four agents have?
3. Eugenia ordered some new furniture for her Portland, Oregon office. The order included an executive desk, \$327; a computer desk, \$133; a swivel chair, \$148; and a client chair, \$92. Along with shipping charges of \$116, what was the total amount of the order? (By the way, there is no sales tax in Oregon!)
4. Enerio is out shopping for a new car for his young family. The Hyundai Elantra has caught his attention. The car has a sticker price of \$14,695. To add a sunroof and an anti-lock braking system is an extra \$1,148. Add to that sales tax, \$1,228, and dealer charges of \$862. What is the total cost of the car?
5. Ron's electric bill for July was \$212 but only \$87 for June. How much more was Ron's electric bill for July than June?
6. Debbie has an adjustable rate mortgage that could change from year to year. In 2005, her monthly mortgage payment was \$1,426. In 2006, her monthly payment was \$1,347. How much less was Debbie's monthly payment in 2006 than in 2005?
7. Throughout their NBA careers, Kareem Abdul Jabbar scored a total of 38,387 points and Michael Jordan scored a total of 32,292 points. How many more points did Kareem Abdul Jabbar score than Michael Jordan? *Source: www.nba.com*
8. South Orange County Community College District has two colleges, Irvine Valley College and Saddleback College. Last summer Irvine Valley had an enrollment of 5,087 and Saddleback had an enrollment of 9,953, and no one attended both colleges. How many more students attended Saddleback than Irvine Valley?

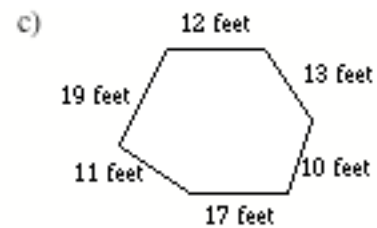
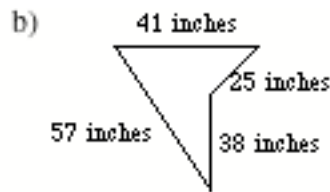
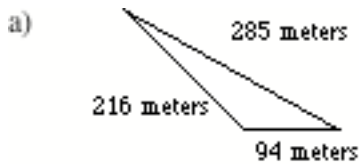
9. Baseball attendance figures for a weekend series between the Houston Astros and the Florida Marlins were 35,403 on Friday, 41,292 on Saturday, and 28,515 on Sunday.

- a) What was the total attendance for the three-game series?
- b) How many more fans were in attendance on Saturday than on Sunday?

10. The elevation of Mount Everest, in Nepal, is 29,035 feet (8,850 meters). The elevation of Mount Kilimanjaro, in Tanzania, is 19,340 feet (5,895 meters). How much higher is Mount Everest than Mount Kilimanjaro...

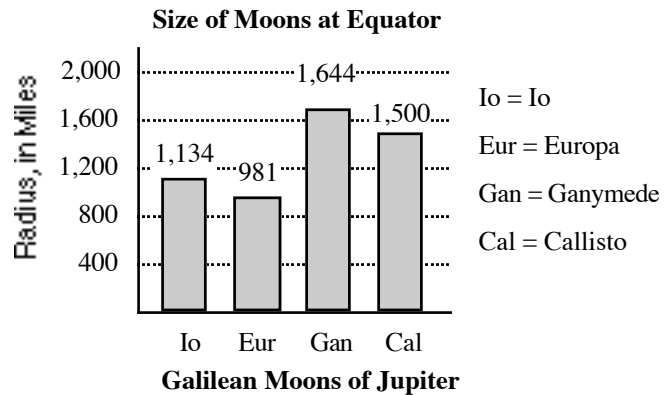
- a) In feet?
- b) In meters?

11. Find the perimeter of each figure.



12. The bar graph at right represents the size of the four Galilean moons of Jupiter, based on each one's radius at the equator. (The Galilean moons were discovered by the famous astronomer Galileo in 1610.)

Answer the following questions based on this bar graph. Write each answer as a sentence.



- a) How much longer is the radius of Callisto than the radius of Io?
- b) How much longer is the radius of the largest moon than the radius of the smallest moon?