

Applications

1. Jared and Pedro walk 1 mile in about 15 minutes. They can keep up this pace for several hours.
 - a. About how far do they walk in 90 minutes?
 - b. About how far do they walk in 65 minutes?
2. Swimming $\frac{1}{4}$ of a mile uses about the same number of Calories as running 1 mile.
 - a. Gilda ran a 26-mile marathon. About how far would her sister have to swim to use the same number of Calories Gilda used during the marathon?
 - b. Juan swims 5 miles a day. About how many miles would he have to run to use the same number of Calories used during his swim?



3. After testing many samples, an electric company determined that approximately 2 of every 1,000 light bulbs on the market are defective. Americans buy more than 1 billion light bulbs every year. Estimate how many of these bulbs are defective.
4. The organizers of an environmental conference order buttons for the participants. They pay \$18 for 12 dozen buttons. Write and solve proportions to answer each question. Assume that price is proportional to the size of the order.
 - a. How much do 4 dozen buttons cost?
 - b. How much do 50 dozen buttons cost?
 - c. How many dozens can the organizers buy for \$27?
 - d. How many dozens can the organizers buy for \$63?

5. Denzel makes 10 of his first 15 shots in a basketball free-throw contest. His success rate stays about the same for his next 100 free throws. Write and solve a proportion to answer each part. Round to the nearest whole number. Start each part with the original 10 of 15 free throws.
- About how many free throws does Denzel make in his next 60 attempts?
 - About how many free throws does he make in his next 80 attempts?
 - About how many attempts does Denzel take to make 30 free throws?
 - About how many attempts does he take to make 45 free throws?

For Exercises 6–13, solve each equation.

6. $12.5 = 0.8x$ 7. $\frac{x}{15} = \frac{20}{50}$ 8. $\frac{x}{18} = 4.5$ 9. $\frac{15.8}{x} = 0.7$
 10. $\frac{5}{9} = \frac{12}{x}$ 11. $245 = 0.25x$ 12. $\frac{18}{x} = \frac{4.5}{1}$ 13. $\frac{0.1}{48} = \frac{x}{960}$

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 For: Multiple-Choice Skills
 Practice
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14. **Multiple Choice** Middletown sponsors a two-day conference for selected middle-school students to study government. There are three middle schools in Middletown.

Suppose 20 student delegates will attend the conference. Each school should be represented fairly in relation to its population. How many should be selected from each school?



- North: 10 delegates, Central: 8 delegates, South: 2 delegates
- North: 11 delegates, Central: 7 delegates, South: 2 delegates
- North: 6 delegates, Central: 3 delegates, South: 2 delegates
- North: 10 delegates, Central: 6 delegates, South: 4 delegates

Connections

For Exercises 15–17, use ratios, percents, fractions, or rates.

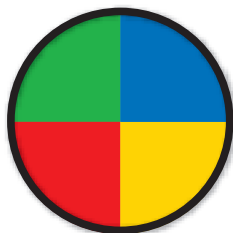
- 15. Multiple Choice** Which cereal is the best buy?
- F.** a 14-ounce box for \$1.98 **G.** a 36-ounce box for \$2.59
H. a 1-ounce box for \$0.15 **J.** a 72-ounce box for \$5.25
- 16.** Which is the better average: 10 of 15 free throws, or 8 of 10 free throws?
- 17.** Which is the better home-run rate: two home runs per 60 times at bat, or five home runs per 120 times at bat?
- 18.** A jar contains 150 marked beans. Scott takes several samples from the jar and gets the results shown.

Bean Samples

Number of Beans	25	50	75	100	150	200	250
Number of Marked Beans	3	12	13	17	27	38	52
Percent of Marked Beans	12%	■	■	■	■	■	■

- a.** Copy and complete the table.
- b.** Graph the data using (*number of beans, marked beans*) as data points. Describe the pattern of data points in your graph. What does the pattern tell you about the relationship between the number of beans in a sample and the number of marked beans you can expect to find?
- 19. Multiple Choice** Ayanna is making a circular spinner to be used at the school carnival. She wants the spinner to be divided so that 30% of the area is blue, 20% is red, 15% is green, and 35% is yellow. Choose the spinner that fits the description.

A.



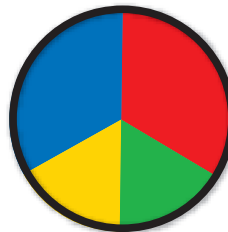
B.



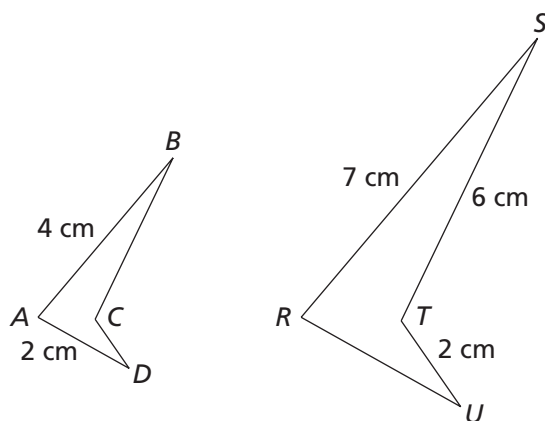
C.



D.

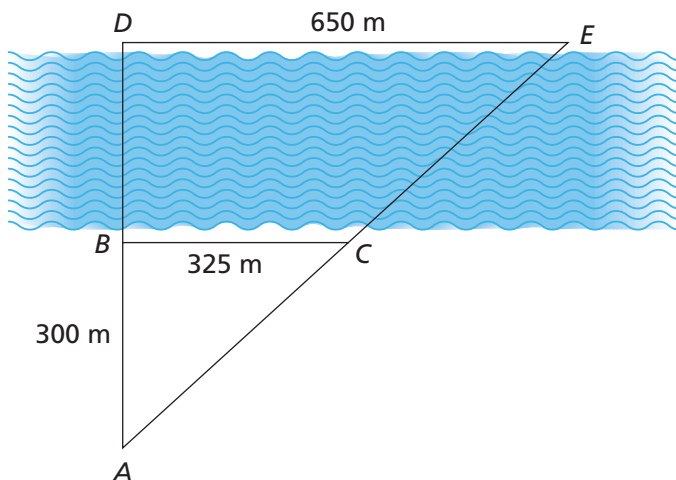


- 20.** Hannah is making her own circular spinner. She makes the ratio of green to yellow 2:1, the ratio of red to yellow 3:1, and the ratio of blue to green 2:1. Make a sketch of her spinner.
- 21. a.** Plot the points (8, 6), (8, 22), and (24, 14) on grid paper. Connect them to form a triangle.
- b.** Draw the triangle you get when you apply the rule $(0.5x, 0.5y)$ to the three points from part (a).
- c.** How are lengths of corresponding sides in the triangles from parts (a) and (b) related?
- d.** The area of the smaller triangle is what percent of the area of the larger triangle?
- e.** The area of the larger triangle is what percent of the area of the smaller triangle?
- 22.** The sketch shows two similar polygons.



- a.** What is the length of side BC ?
- b.** What is the length of side RU ?
- c.** What is the length of side CD ?

- 23.** To earn an Explorer Scout merit badge, Yoshi and Kai have the task of measuring the width of a river. Their report includes a diagram that shows their work.



- How do you think they came up with the lengths of the segments AB , BC , and DE ?
- How can they find the width of the river from segments AB , BC , and DE ?

Extensions

- 24.** Angela, a biologist, spends summers on an island in Alaska. For several summers she studied puffins. Two summers ago, Angela captured, tagged, and released 20 puffins. This past summer, she captured 50 puffins and found that 2 of them were tagged. Using Angela's findings, estimate the number of puffins on the island. Explain.



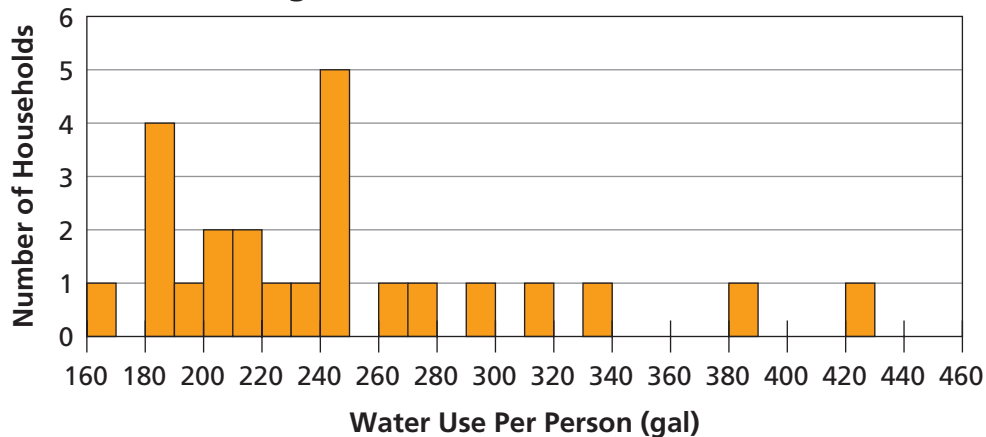
- 25.** Rita wants to estimate the number of beans in a large jar. She takes out 100 beans and marks them. Then she returns them to the jar and mixes them with the unmarked beans. She then gathers some data by taking a sample of beans from the jar. Use her data to predict the number of beans in the jar.

Sample

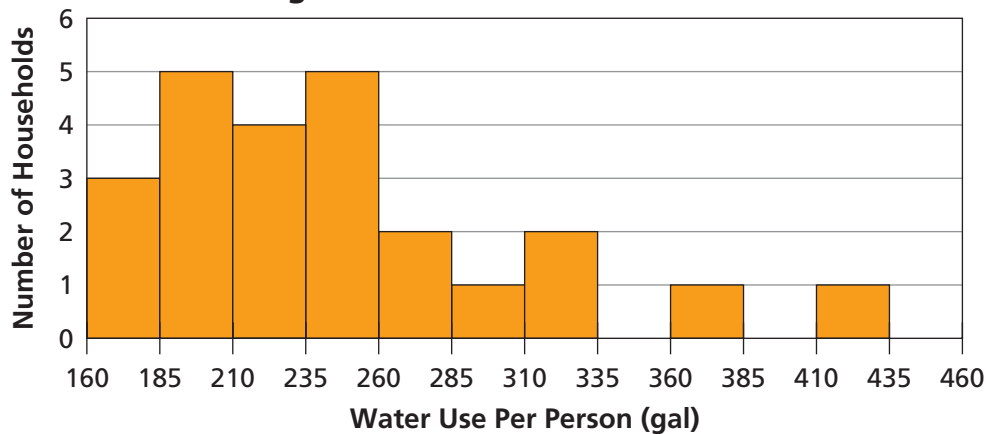
Number of marked beans: 2
Beans in sample: 30

- 26.** The two histograms below display information about gallons of water used per person in 24 households in a week.

Histogram A: Water Use in 24 Households



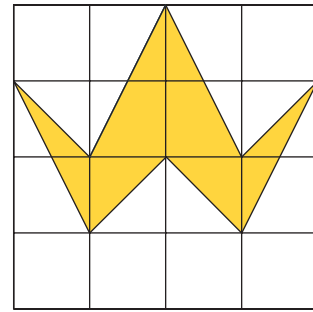
Histogram B: Water Use in 24 Households



- Compare the two histograms and explain how they differ.
- Where do the data seem to clump in Histograms A and B?

27. The picture at the right is drawn on a centimeter grid.

- a.** On a grid made of larger squares than those shown here, draw a figure similar to this figure. What is the scale factor between the original figure and your drawing?
- b.** Draw another figure similar to this one, but use a grid made of smaller squares than those shown here. What is the scale factor between the original and your drawing?
- c.** Compare the perimeters and areas of the original figure and its copies in each case (enlargement and reduction of the figure). Explain how these values relate to the scale factor in each case.



28. The people of the United States are represented in Congress, which is made up of the House of Representatives and the Senate.

- a.** In the House of Representatives, the number of representatives from each state varies. From what you know about Congress, how is the number of representatives from each state determined?
- b.** How is the number of senators from each state determined?
- c.** Compare the two methods of determining representation in Congress. What are the advantages and disadvantages of these two forms of representation for states with large populations? How about for states with small populations?

