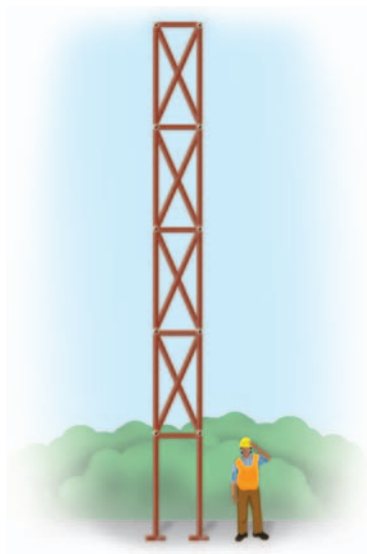


## Applications

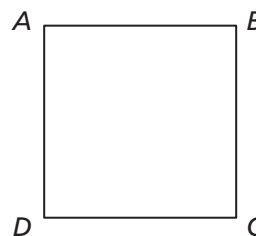
For Exercises 1 and 2, use the drawing at the right, which shows a person standing next to a construction scaffold.

- Find the approximate height of the scaffold if the person is
  - 6 feet tall
  - 5 feet 6 inches tall
- Find the approximate height of the person if the scaffold is
  - 28 feet tall
  - 36 feet tall



- Copy square  $ABCD$  and anchor point  $P$  onto a sheet of paper. Use the rubber-band method to enlarge the figure. Then answer parts (a)–(d) below.

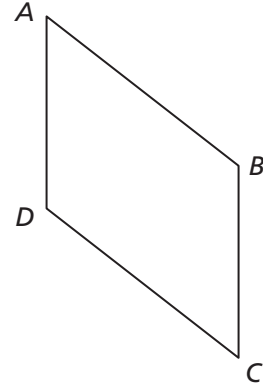
•  
 $P$



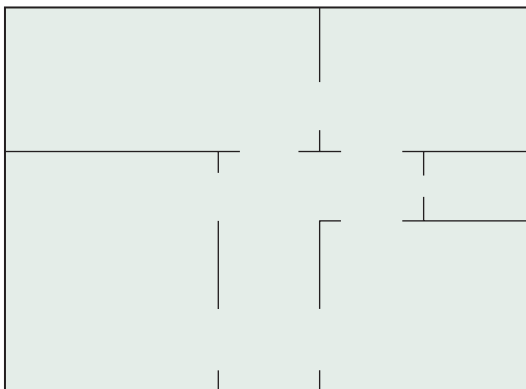
- How do the side lengths of the original figure compare to the side lengths of the image?
- How does the perimeter of the original figure compare to the perimeter of the image?
- How do the angle measures of the original figure compare to the angle measures of the image?
- How does the area of the original figure compare to the area of the image? How many copies of the original figure would it take to cover the image?

4. Copy parallelogram  $ABCD$  and anchor point  $P$  onto a sheet of paper. Use the rubber-band method to enlarge the figure. Then, answer parts (a)–(d) from Exercise 3 for your diagram.

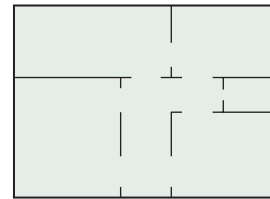
●  
 $P$



5. The diagram below is the original floor plan for a dollhouse. The diagram on the right is the image of the floor plan after you reduce it with a copier.



Original



Reduction Image

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For: Multiple-Choice Skills  
Practice

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- Estimate the copier size factor used. Give your answer as a percent.
- How do the segment lengths in the original plan compare to the corresponding segment lengths in the image?
- Compare the area of the entire original floor plan to the area of the entire image. Then, do the same with one room in both plans. Is the relationship between the areas of the rooms the same as the relationship between the areas of the whole plans?
- The scale on the original plan is 1 inch = 1 foot. This means that 1 inch on the floor plan represents 1 foot on the actual dollhouse. What is the scale on the smaller copy?

6. **Multiple Choice** Suppose you reduce the design below with a copy machine. Which of the following can be the image?



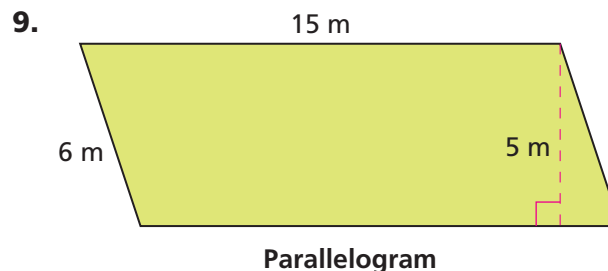
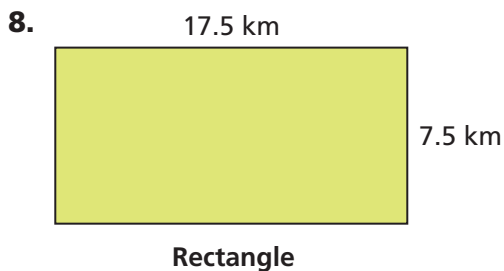
- A.      B.      C.      D.

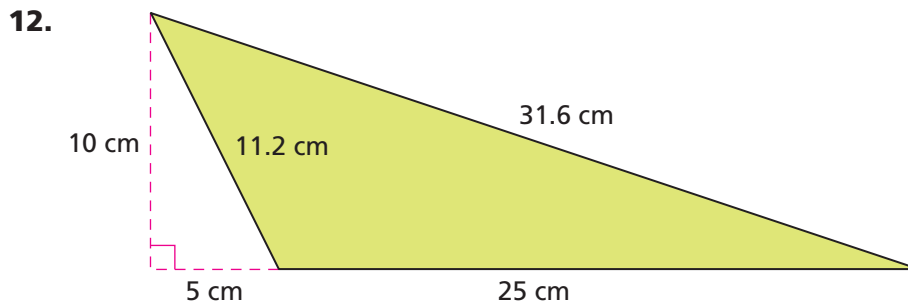
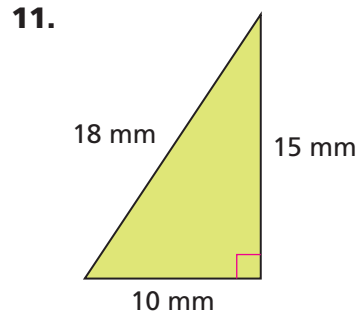
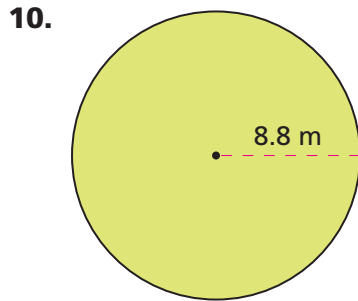
7. Suppose you copy a drawing of a polygon with the given size factor. How will the side lengths, angle measures, and perimeter of the image compare to those of the original?
- a. 200%      b. 150%      c. 50%      d. 75%

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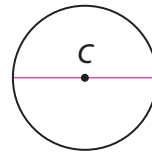
## Connections

For Exercises 8–12, find the perimeter (or circumference) and the area of each figure.





13. Copy the circle and anchor point  $P$  onto a sheet of paper. Make an enlargement of the circle using your two-band stretcher.



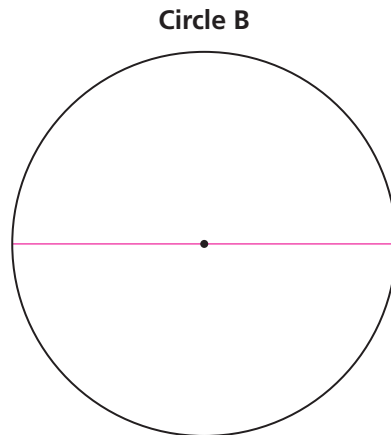
- How do the diameters of the circles compare?
  - How do the areas of the circles compare?
  - How do the circumferences of the circles compare?
14. Find the given percent of each number. Show your work.
- |                |                |
|----------------|----------------|
| a. 25% of 120  | b. 80% of 120  |
| c. 120% of 80  | d. 70% of 150  |
| e. 150% of 200 | f. 200% of 150 |
15. **Multiple Choice** What is the 5% sales tax on a \$14.00 compact disc?  
**A.** \$0.07      **B.** \$0.70      **C.** \$7.00      **D.** \$70.00
16. **Multiple Choice** What is the 15% service tip on a \$25.50 dinner in a restaurant?  
**F.** \$1.70      **G.** \$3.83      **H.** \$5.10      **J.** \$38.25

- 17. Multiple Choice** What is the 28% tax on a \$600,000 cash prize?  
**A.** \$16,800      **B.** \$21,429      **C.** \$168,000      **D.** \$214,290
- 18. Multiple Choice** What is the 7.65% Social Security/Medicare tax on a paycheck of \$430?  
**F.** \$3.29      **G.** \$5.62      **H.** \$32.90      **J.** \$60.13
- 19.** A circle has a radius of 4 centimeters.
- a.** What are the circumference and the area of the circle?
  - b.** Suppose you copy the circle using a size factor of 150%. What will be the radius, diameter, circumference, and area of the image?
  - c.** Suppose you copy the original circle using a size factor of 50%. What will be the radius, diameter, circumference, and area of the image?
- 20.** While shopping for sneakers, Juan finds two pairs he likes. One pair costs \$55 and the other costs \$165. He makes the following statements about the prices.
- “The expensive sneakers cost \$110 more than the cheaper sneakers.”
- “The expensive sneakers cost three times as much as the cheaper sneakers.”
- a.** Are both of his statements accurate?
  - b.** How are the comparison methods Juan uses similar to the methods you use to compare the sizes and shapes of similar figures?
  - c.** Which method is more appropriate for comparing the size and shape of an enlarged or reduced figure to the original? Explain.



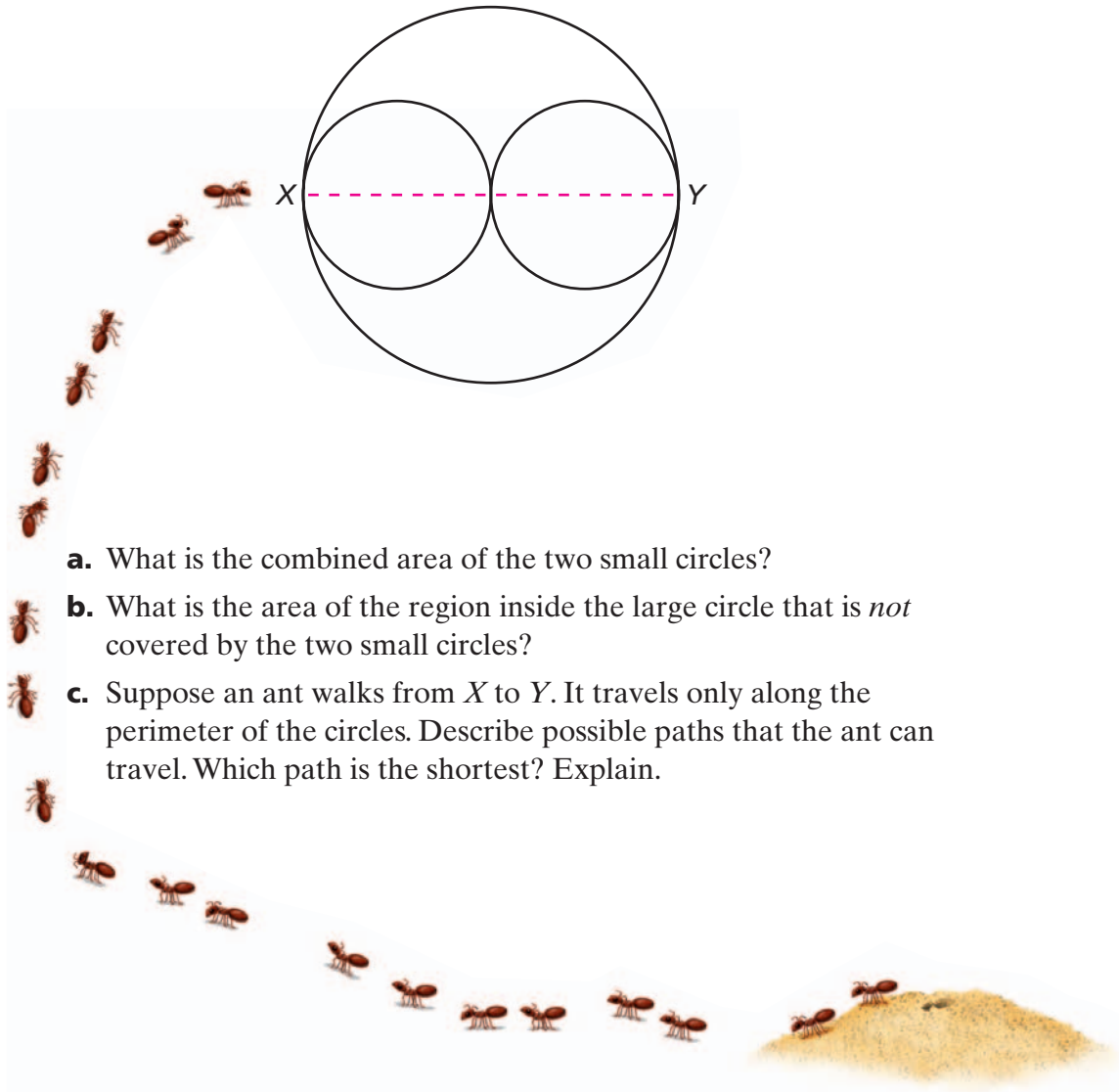
## Extensions

- 21.** A movie projector that is 6 feet away from a large screen shows a rectangular picture that is 3 feet wide and 2 feet high.
- Suppose the projector is moved to a point 12 feet from the screen. What size will the picture be (width, height, and area)?
  - Suppose the projector is moved to a point 9 feet from the screen. What size will the picture be (width, height, and area)?
- 22.** Circle B is an enlargement of a smaller circle A, made with a two-band stretcher. Circle A is not shown.



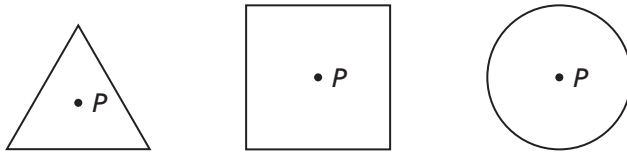
- How does the diameter of circle B compare to the diameter of circle A?
- How does the area of circle B compare to the area of circle A?
- How does the circumference of circle B compare to the circumference of circle A?

- 23.** Make a three-band stretcher by tying three rubber bands together. Use this stretcher to enlarge the “Super Sleuth” drawing from Problem 1.2.
- How does the shape of the image compare to the shape of the original figure?
  - How do the lengths of the segments in the two figures compare?
  - How do the areas of the two figures compare?
- 24.** Two copies of a small circle are shown side by side inside a large circle. The diameter of the large circle is 2 inches.



- What is the combined area of the two small circles?
- What is the area of the region inside the large circle that is *not* covered by the two small circles?
- Suppose an ant walks from  $X$  to  $Y$ . It travels only along the perimeter of the circles. Describe possible paths that the ant can travel. Which path is the shortest? Explain.

- 25.** Suppose you enlarge some triangles, squares, and circles with a two-band stretcher. You use an anchor point inside the original figure, as shown in the sketches below.



- a.** In each case, how does the shape and position of the image compare to the shape and position of the original?
- b.** What relationships do you expect to find between the side lengths, angle measures, perimeters, and areas of the figures?
- c.** Test your ideas with larger copies of the given shapes. Make sure the shortest distance from the anchor point to any side of a shape is at least one band length.
- 26.** Suppose you make a stretcher with two different sizes of rubber band. The band attached to the anchor point is twice as long as the band attached to the pencil.
- a.** If you use the stretcher to enlarge polygons, what relationships do you expect to find between the side lengths, angle measures, perimeters, and areas of the figures?
- b.** Test your ideas with copies of some basic geometric shapes.