Practice by Example

Example 1
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The figures in each pair are similar. Identify the corresponding sides and angles.

1.

$\triangle ABC \sim \triangle PQR$

2.

$\triangle DEF \sim \triangle HJK$
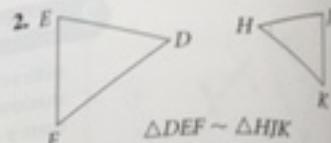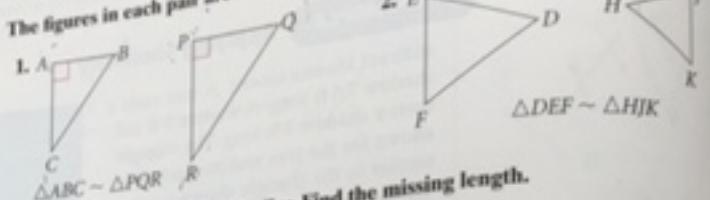
The figures in each pair are similar. Find the missing length.

3.

5 ft, 5 ft, 8 ft, x

4.

20 cm, 18 cm, y, 12 cm

5.

120 in., 18 in., 12 in., x

6.

15 m, k, 21 m, 56 m

7.

x, 24 cm, 27 cm, 32 cm

8.

6 ft, k, 5 ft
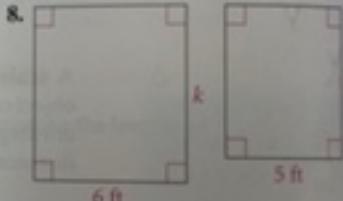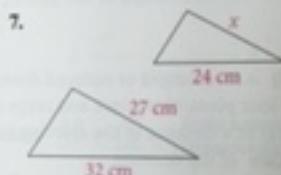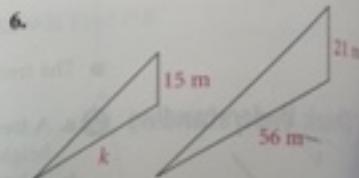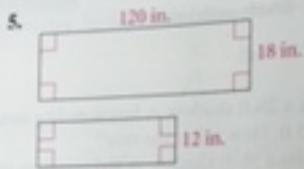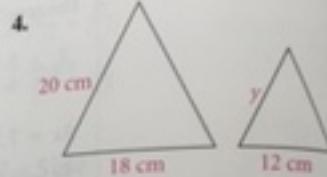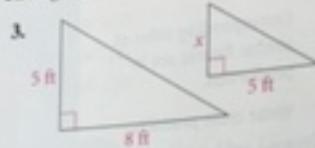
Example 2
(page 191)

The child in the figure is 3 ft tall.

60 in.   8 ft
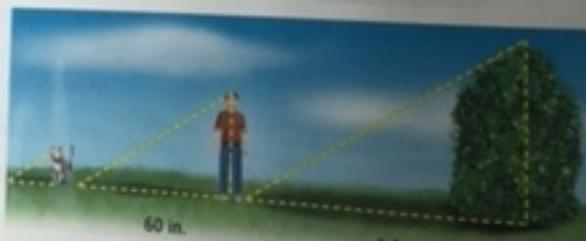
9. How tall is the tree?

10. The cat casts an 18-in. shadow. How tall is the cat?

Example 3
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The scale of a map is 1 in.:17.5 mi. Find the actual distance corresponding to each map distance.

11. 5 in.

12. 8.3 in.

13. 18.6 in.

14. 20 in.

15. a. Use a ruler and the map at the left. Find the distance from each town to the others.

b. A student lives halfway between Lincoln and San Paulo and takes the shortest route to school in Duncanville. How far does the student travel each day to school?

16. The actual distance between two towns is 28 km. Suppose you measure the distance on your map and find that it is 3.5 cm. What is the scale of your map?

Using each of the following scales, find the dimensions in a blueprint of an 8 ft-by-12 ft room.

17. 1 in. : 2 ft   **18.** 1 in. : 3 ft   **19.** 1 in. : 4 ft   **20.** 1 in. : 2.5 ft

21. Two rectangles are similar. The first is 4 in. wide and 15 in. long. The second is 9 in. wide. Find the length of the second rectangle.

22. Architecture A blueprint scale is 1 in. : 9 ft. On the plan, the room measures 2.5 in. by 3 in. What are the actual dimensions of the room?

23. Error Analysis The two figures are similar. Robert uses the proportion $\frac{GH}{PQ} = \frac{GK}{RQ}$ to find RQ.
a. What is Robert's error?
b. What proportion should he have used?

**Architecture** A 2-in. length in the scale drawing represents an actual length of 24 ft.

24. What is the scale of the drawing?

25. What are the actual dimensions of the kitchen?

26. Find the actual width of the doorways that lead into the kitchen and the dining room.

27. Find the actual area of the dining room.

28. Can a table 7 ft long and 4 ft wide fit into the narrower section of the dining room? Explain your answer.

29. Two rectangles are similar. One is 5 cm by 12 cm. The longer side of the second rectangle is 8 cm greater than twice its shorter side. Find its length and width.

30. Geometry Rectangle $ABCD$ is similar to rectangle $KLMN$.
a. What is the width w of rectangle $KLMN$?
b. What is the perimeter of each rectangle?
c. Is the ratio of the perimeters of the rectangles (small : large) equal to the ratio of corresponding sides? Explain.
d. What is the area of each rectangle?
e. Critical Thinking Find the ratio of the areas (small : large). Explain how the ratio of the areas is related to the ratio of the corresponding sides.

31. Open-Ended Give some examples of similar figures found in everyday life.

32. a. Writing Are the two cubes similar? Explain your answer.
  b. Explain how the ratio of volumes (small : large) is related to the ratio of their sides (small : large).
  c. If the ratio of the sides of the two cubes is 3 : 1, what is the ratio of their volumes?


4 cm
4 cm
4 cm

8 cm

33. Geometry The perimeter of a triangle with sides a, b, and c is 24 cm. Side a is 2 cm longer than side b. The ratio of the lengths of sides b and c is 3 : 5. What are the lengths of the three sides of the triangle?

C Challenge

34. The state of Alabama is about 335 mi long and 210 mi wide. What scale would you use to draw a map of Alabama on an $8\frac{1}{2}$ in.-by-11 in. paper to make the map as large as possible?

35. Astronomy You can block out the moon by holding a coin up at a distance from your eye that is 110 times the diameter of the coin. Using similar figures, $\frac{coin\ diameter}{moon\ diameter} = \frac{coin\ distance}{moon\ distance}$. The moon is roughly 3640 kilometers in diameter. How far away is it?

Diameter of coin
Diameter of moon
Distance to coin
Distance to moon
Not drawn to scale

36. Geometry In the figure at the right, $\triangle ABC \sim \triangle ADE$.
  a. Substitute values from the diagram into the following proportion. $\frac{AD}{AB} = \frac{DE}{BC}$
  (Hint: $AB = AD + DB$.)
  b. Solve the proportion for x.
  c. Find the length of AB.
  d. What is the area of $\triangle ABC$?

C
E
5 in.
A
8 in.
D   x   B