Solve Problems Using Similar Figures

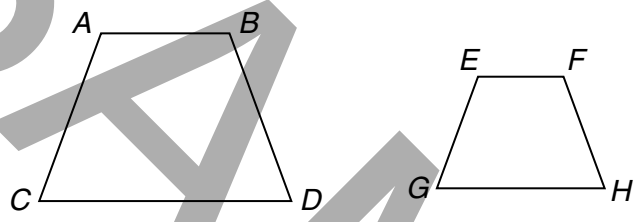
S 7.5(A) Generalize the critical attributes of similarity, including ratios within and between similar shapes.
R 7.5(C) Solve mathematical and real-world problems involving similar shape and scale drawings.

Understand the TEKS

Did You Know?

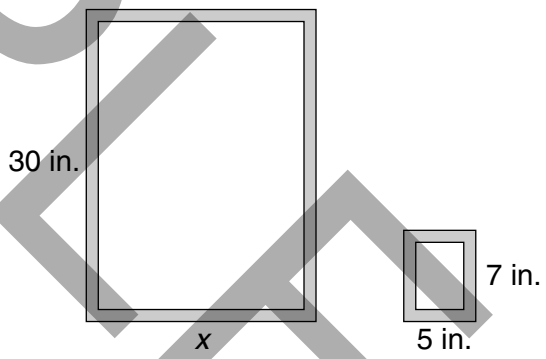
PROBLEM-SOLVING STRATEGY Remember there are multiple ways to set up a proportion. Select corresponding sides from each shape to solve for an unknown side.

Recall that the corresponding side lengths of similar shapes are proportional. In the previous lesson, you learned which angles were congruent and which sides were proportional for the trapezoids below. What if you know the length of sides *AB*, *BD*, and *EF*, but you do not know the length of *FH*?



Because the corresponding sides are proportional, the ratios between corresponding sides are equal. In the two example trapezoids, $\frac{AB}{EF} = \frac{BD}{FH}$ and $\frac{AB}{BD} = \frac{EF}{FH}$. You can solve for an unknown side length of a similar figure by choosing a variable to represent the side, setting up a proportion, then cross multiplying to solve for the variable.

Two picture frames are proportional in size. The smaller frame is 5 inches wide by 7 inches tall. The larger frame is 30 inches tall. What is the width of the larger frame?



Step 1 Draw a diagram and label each side.
Label the unknown side with a variable, *x*.
So *x* is the unknown width of the larger frame.

Step 2 Set up a proportion. Use the values of the corresponding side lengths between the two frames, and the variable *x* for the missing side length.

$\frac{5}{x} = \frac{\_\_\_\_}{\_\_\_\_}$

Step 3 Cross multiply to solve for *x*. Round to the nearest tenth.

$7x = 30 \times$ _____

$7x =$ _____

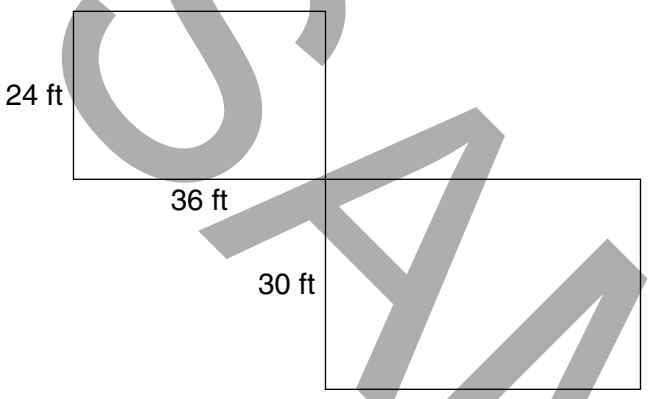
$x \approx$ _____

So the missing side length of the larger frame is approximately _____ inches.

★ Practice

DIRECTIONS Read each question. Then circle the letter for the correct answer.

1 Two neighbors have rectangular gardens that form similar rectangles and touch at one vertex. They want to buy fencing material in bulk. What is the total length of fence they need to enclose both gardens?



A 220 ft

B 240 ft

C 270 ft

D 300 ft

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2 The ratio of the corresponding dimensions between two similar right triangles is 2:3. The ratio of the base to the hypotenuse of the larger triangle is 3:4. The base of the larger triangle is 9 inches. What is the hypotenuse of the smaller triangle?

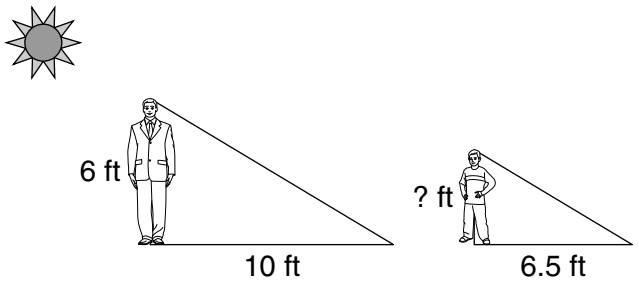
F 2 inches

G 4 inches

H 6 inches

J 8 inches

3 A man 6 feet tall casts a shadow 10 feet long. At the same time, his son casts a shadow that is 6.5 feet long. Which proportion will **not** give the height of the son?



A $\frac{6}{10} = \frac{6.5}{x}$

B $\frac{10}{6} = \frac{6.5}{x}$

C $\frac{6}{x} = \frac{10}{6.5}$

D $\frac{10}{6.5} = \frac{6}{x}$

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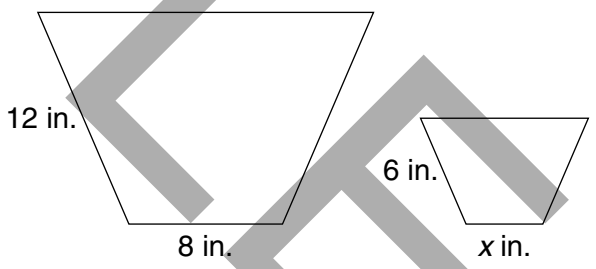
4 The trapezoids below are similar. What is the value of x?



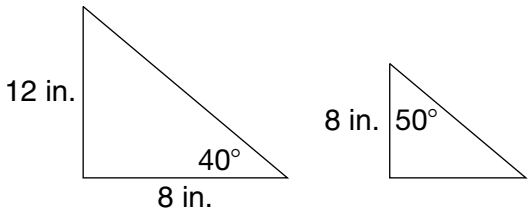
F 16 in.

G 8 in.

H 4 in.

J 2 in.

5 Two similar right triangles are shown.



What is the ratio of the base of the larger triangle to the base of the smaller triangle?

A 2:1

B 1.5:1

C 8:6

D 12:10.5

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6 A room has a length of 15 feet and a width of 9 feet. A similar room has a length of 10 feet. What is the area of the smaller room?

F 30 square feet

G 36 square feet

H 60 square feet

J 81 square feet

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7 A tree casts a shadow of 12 feet. A nearby flagpole that is 20 feet tall casts a shadow of 36 feet. What is the approximate height of the tree?

A 6.7 feet

B 10.8 feet

C 21.6 feet

D 32 feet

8 A rectangular classroom has a length of 16 feet and an area of the floor measuring 192 square feet. A similar classroom has a length of 12 feet. What is the perimeter of the smaller classroom?

F 36 feet

G 42 feet

H 108 feet

J 120 feet

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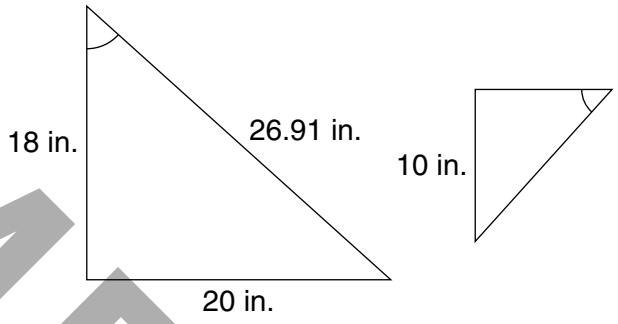
9 Two similar right triangles are shown.



What is the length of the hypotenuse of the smaller triangle? Round to the nearest tenth.

Record your answer and fill in the bubbles on the following grid. Be sure to use the correct place value.