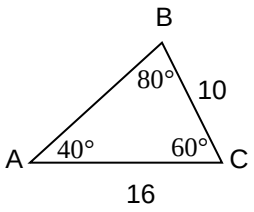
Geometry: Similar Triangles—Explanation & Practice

Similar triangles are triangles in which corresponding angles are equal. Similar triangles have the same shape and differ only in the lengths of their sides. The symbol ~ stands for "is similar to."

In similar triangles, the sides that are opposite the equal angles are called **corresponding sides**. The lengths of each pair of corresponding sides can be written as a ratio. A proportion can then be written using two of the ratios.

Example 1.

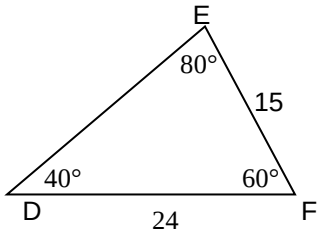


Δ*ABC* and Δ*DEF* are similar triangles because they have the same three angles. We can write a proportion as follows:

Step 1. Identify the pairs of corresponding sides.

AC and *DF* are corresponding sides. (Each is opposite an 80° angle.)

BC and *EF* are corresponding sides. (Each is opposite a 40° angle.)

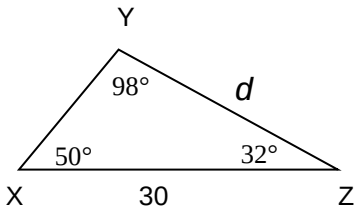


Step 2. Write a proportion using pairs of corresponding sides.

$$\frac{BC}{EF}=\frac{AC}{DF} \text{ or } \frac{10}{15}=\frac{16}{24}$$

Note: The numerator of each fraction is from one triangle, while each denominator is from the other triangle.

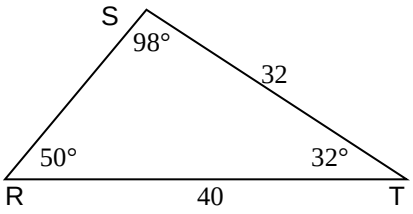
Example 2.



Δ*XYZ* and Δ*RST* are similar triangles. The length of side *YZ* is unknown and is represented as *d*. Find this length.

Step 1. Write a proportion using the corresponding sides. To simplify your work, write the proportion so that *d* (the unknown length) is the numerator of the left-side fraction.

$$\frac{YZ}{ST}=\frac{XZ}{RT} \text{ or } \frac{d}{32}=\frac{30}{40}$$



Step 2. Cross multiply and solve for *d*.

$40d = 30(32) = 960$

$$d = \frac{960}{40} = \mathbf{24}$$

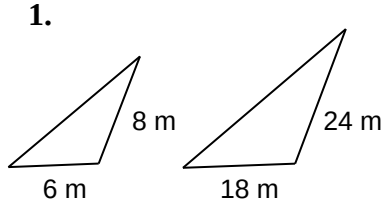
All lengths are in inches.

Answer: The length of *YZ* is 24 inches.

Practice

Find the ratio of corresponding sides for the similar triangles. Reduce to lowest terms.

1.



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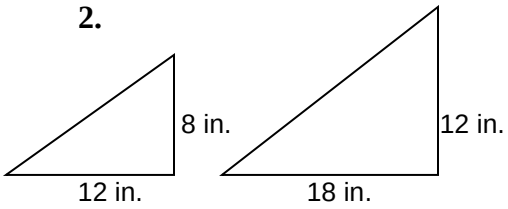

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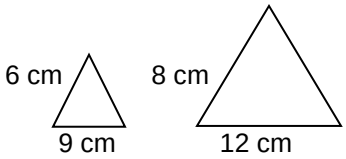

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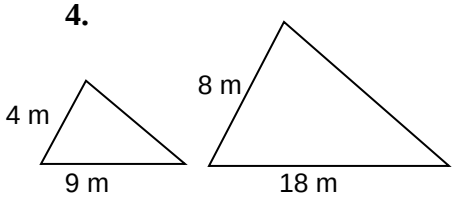
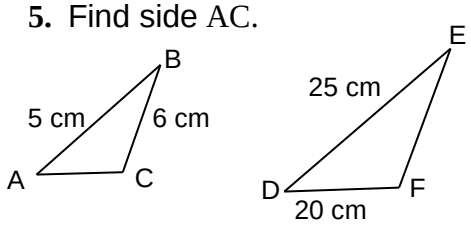


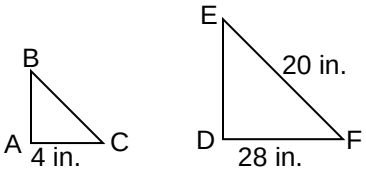
Triangles ABC and DEF are similar.

Find the indicated length. Round to the nearest tenth.

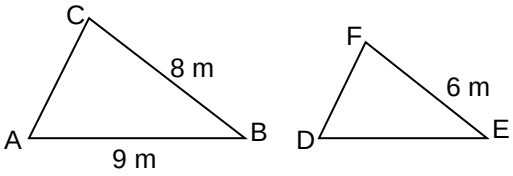
5. Find side AC.



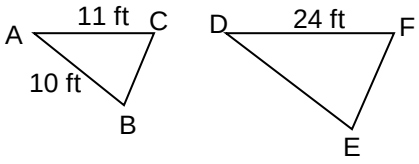
6. Find side BC.



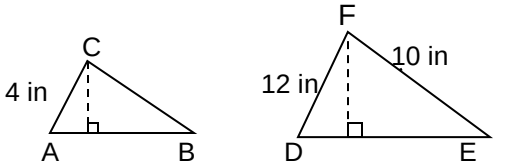
7. Find side DE.



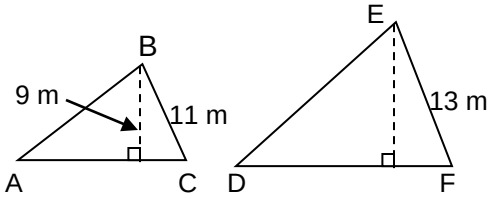
8. Find side DE.



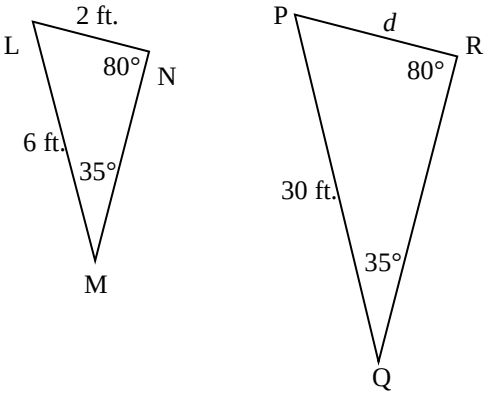
9. Find the height of triangle ABC.



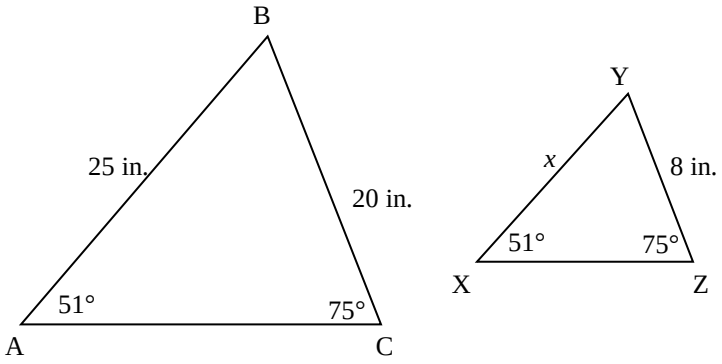
10. Find the height of triangle DEF.



11. $\Delta LMN \sim \Delta PQR$. What is the length of d?

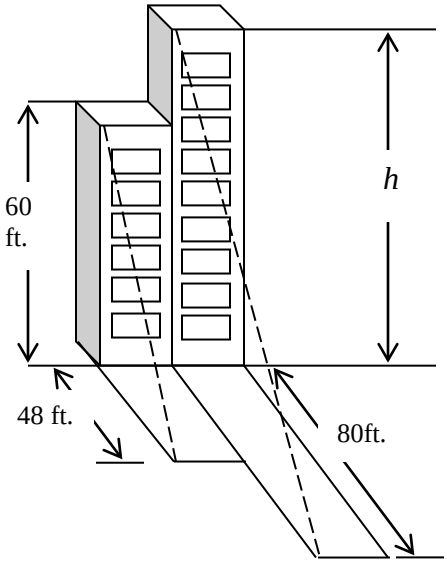


12. $\Delta ABC \sim \Delta XYZ$. What is the length of x?

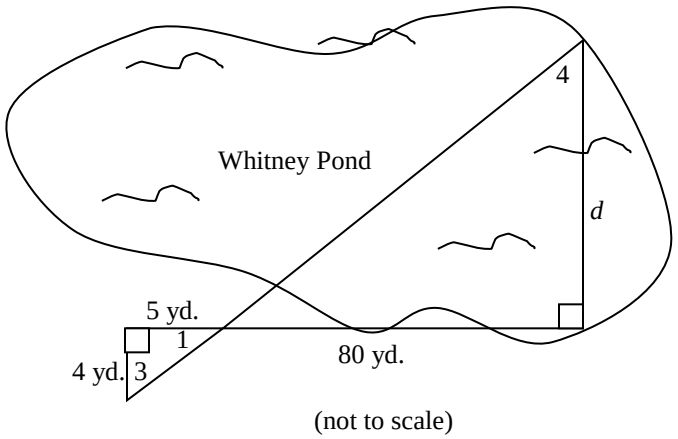


Use a proportion to solve each problem.

13. Two buildings stand side by side. The shorter building is 60 feet high and casts a shadow of 48 feet. At the same time of day, the taller building casts a shadow of 80 feet. What is the height (h) of the taller building? (Hint: Similar triangles are formed by the buildings, the ground, and the dotted lines that represent the sun's rays.)



14. To measure the distance (d) across Whitney Pond, Lewis measured off distances as shown below. Use this drawing to determine d. (Hint: The two triangles indicated in the drawing are similar because all three pairs of angles are equal. Here's why:
    - Each has a right angle (90°). These angles are indicated by squares.
    - The angles labeled 1 and 2 are equal because they are vertical angles.
    - The angles labeled 3 and 4 are also equal. If two triangles have two equal angles, the third angles are equal because the sum of the angles in each triangle must total 180°.)



(not to scale)

Answer Key

Geometry: Similar Triangles – Explanation & Practice

1. 1/3
2. 2/3
3. ¾
4. ½
5. 4 cm.
6. 2.9 cm.
7. 6.8 cm.
8. 21.8 ft.
9. 3.3 in.
10. 10.6 m.
11. 10 ft.
12. 10 in.
13. 100 ft.
14. 64 yd.