

Similar Triangles

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Mathematics 9 Similar Triangles Solving Similar Triangles

A. Definitions

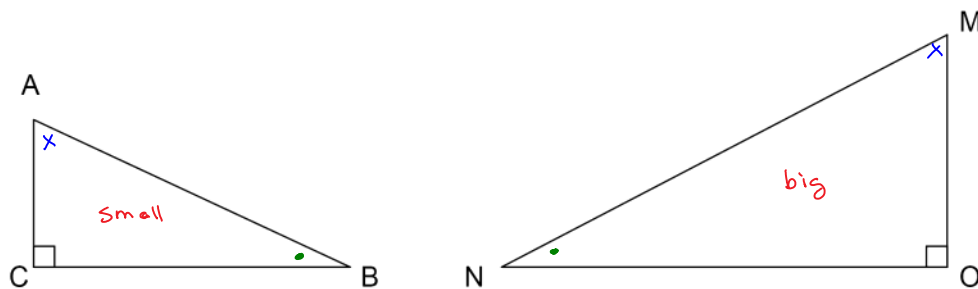
Similar Triangles: triangles which have exactly the same shape but different sizes. They have **corresponding angles** which are equal and the ratios of the **corresponding sides** are in the same proportions.

Corresponding Angles: angles that have the same relative position in two geometric figures.

Corresponding Sides: sides that have the same relative position in two geometric figures.

B. Looking at Similar Triangles

In the following diagram $\triangle ABC$ is similar to $\triangle MNO$. Identify the corresponding angles and the corresponding sides



Corresponding Angles

Symbol for angle

$$\begin{aligned}\angle C &= \angle O \\ \angle A &= \angle M \\ \angle B &= \angle N\end{aligned}$$

Corresponding Sides

Symbol for similar

$$\begin{aligned}AC &\sim MO \\ AB &\sim MN \\ ON &\sim BC.\end{aligned}$$

C. Using Ratios and Proportions to Solve Similar Triangles

We define **Similar Triangles** as triangles which have corresponding angles that are equal, and corresponding sides that are in the same proportions.

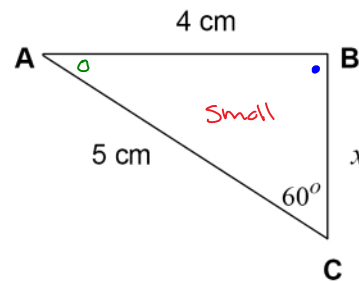
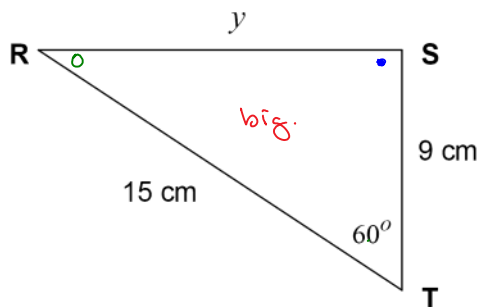
As soon as you have established that the triangles are similar (based on the angles) you can use your understanding of ratios and how to solve proportions to help find the length of missing sides within the triangles.

$$\frac{\text{Side A (small)}}{\text{Side A (big)}} = \frac{\text{Side B (small)}}{\text{Side B (big)}}$$

D. Using Similar Triangles to Determine the Length of a Missing Side

Remember that since Similar Triangles have sides that must be in the same proportion, we can use the proportions to find the length of a missing side.

1. The $\triangle RST$ is similar to $\triangle ABC$, use proportions to find the length of the missing sides.



$$\frac{\text{Small AC}}{\text{big RT}} = \frac{\text{Small BC}}{\text{big ST}}$$

$$45 \left[\frac{5}{15} = \frac{x}{9} \right]$$

$$\frac{15}{5} = \frac{x}{9}$$

$$3 = x$$

or

$$x = 3 \text{ cm}$$

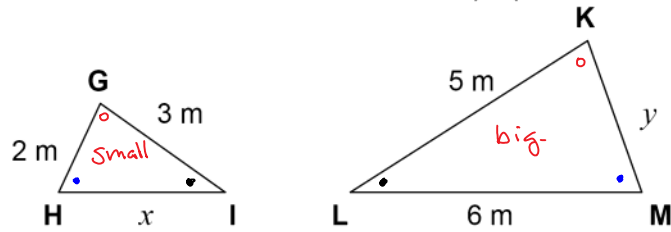
$$\frac{\text{Small AC}}{\text{big RT}} = \frac{\text{Small AB}}{\text{big RS}}$$

$$15y \left[\frac{5}{15} = \frac{4}{y} \right]$$

$$\frac{y}{3} = \frac{60}{5}$$

$$y = 12 \text{ cm}$$

2. The $\triangle GHI$ is similar to $\triangle KLM$. Use proportions to find the length of the missing sides.



$$\frac{\text{Small GI}}{\text{big KL}} = \frac{\text{Small HI}}{\text{big LM}}$$

$$30 \left[\frac{3}{5} = \frac{x}{6} \right]$$

$$\frac{18}{5} = \frac{x}{6}$$

$$\frac{18}{5} = x$$

$$x = \frac{18}{5} \text{ or } 3\frac{3}{5} \text{ m}$$

$$\frac{\text{Small GI}}{\text{big KL}} = \frac{\text{Small GH}}{\text{big KM}}$$

$$5y \left[\frac{3}{5} = \frac{2}{y} \right]$$

$$\frac{3}{3}y = \frac{10}{3}$$

$$y = \frac{10}{3} \text{ or } 3\frac{1}{3} \text{ m}$$

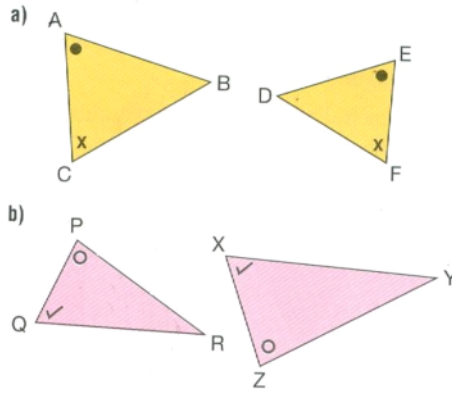
Assignment:

Similar Triangles Assignment

Name: _____

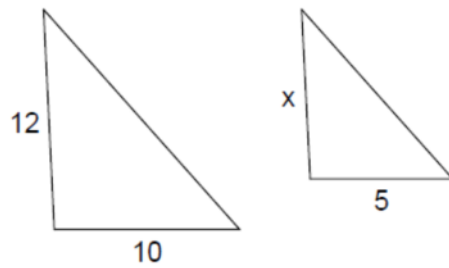
Similar Triangles Assignment

1. For each pair of similar triangles, list the corresponding sides and angles.

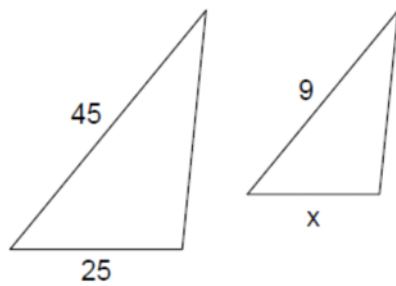


2. Each pair of triangles is similar. Use a proportion to solve for x .

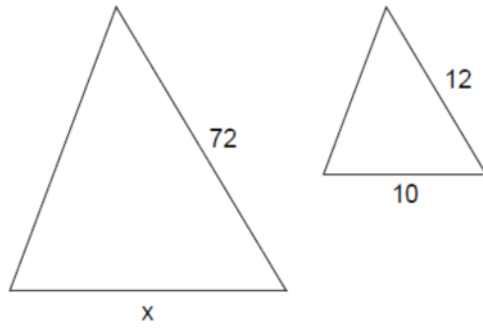
a)



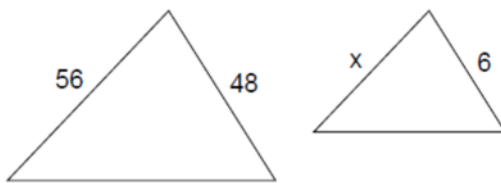
b)



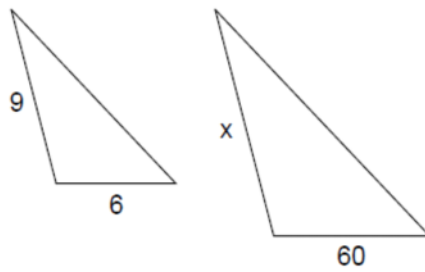
c)



d)

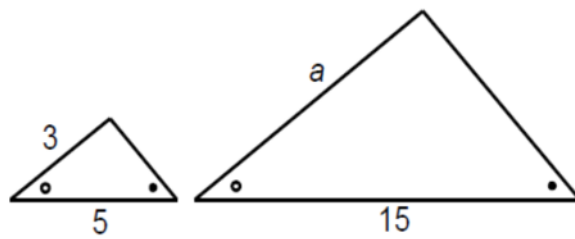


e)

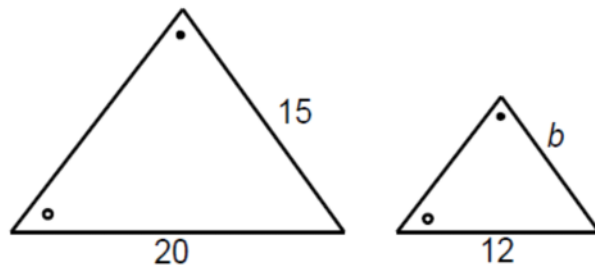


3. Each pair of triangles is similar. Use a proportion to solve for the missing letter.

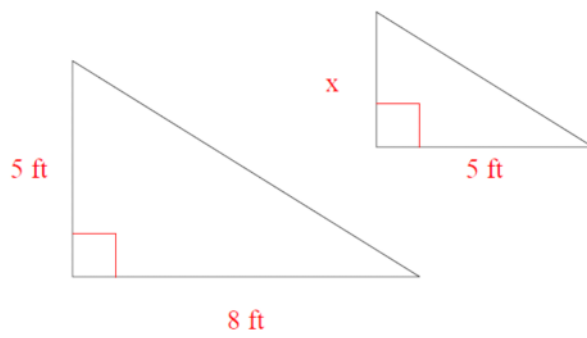
a)



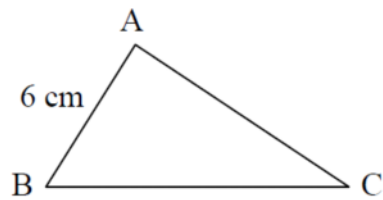
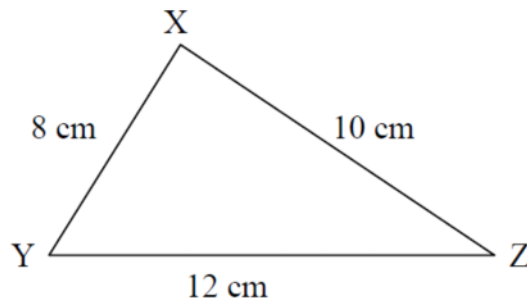
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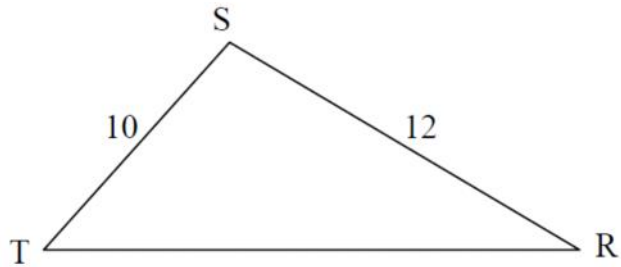
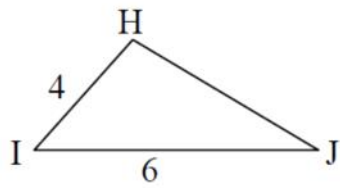
c)



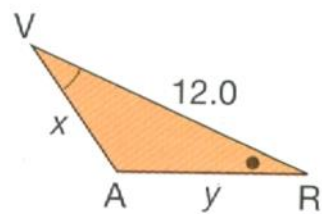
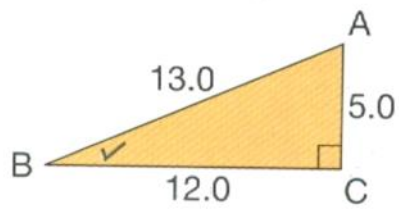
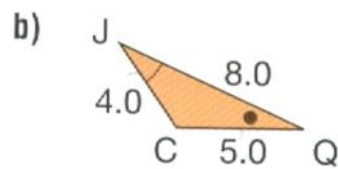
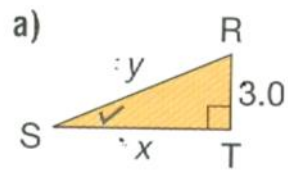
4. The $\triangle ABC$ is similar to $\triangle XYZ$. Find the measure of AC and BC.



5. The $\triangle HIJ$ is similar to $\triangle STR$. Find the measure of TR and HJ.



6. Each pair of triangles is similar. Use a proportion to solve for x and y .



Answers

1. $\angle A = \angle E$, $\angle B = \angle D$, $\angle C = \angle F$, $AB = ED$, $AC = EF$, $BC = DF$
 $\angle P = \angle Z$, $\angle Q = \angle X$, $\angle R = \angle Y$, $PQ = ZX$, $QR = XY$, $PR = ZY$

2. a) $x = 6$ b) $x = 5$ c) $x = 60$
d) $x = 7$ e) $x = 90$

3. a) $a = 9$ b) $b = 9$ c) $x = \frac{25}{8}$ or $3\frac{1}{8}$ ft

4. $AC = \frac{15}{2}$ or $7\frac{1}{2}$ cm, $BC = 9$ cm

5. $TR = 15$ cm, $HJ = \frac{24}{5}$ or $4\frac{4}{5}$ cm

6. a) $x = \frac{36}{5}$ or $7\frac{1}{5}$, $y = \frac{39}{5}$ or $7\frac{4}{5}$

b) $x = 6$, $y = \frac{15}{2}$ or $7\frac{1}{2}$