

A **ratio** compares two numbers by division. The ratio of two numbers a and b can be written as a to b , $a:b$, or $\frac{a}{b}$, where $b \neq 0$.

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Ex. 1

The ratio of the side lengths of a triangle is 4:7:5, and its perimeter is 96 cm. What is the length of the shortest side?

Solution:

$$4x + 5x + 7x = 96$$

$$16x = 96$$

$$x = 6$$

$$\text{short side} = 4x = 4(6) = 24 \text{ cm}$$

$$\text{other} = 5x = 5(6) = 30 \text{ cm}$$

$$\text{big side} = 7x = 7(6) = 42 \text{ cm}$$



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Ex. 2

try to solve this one

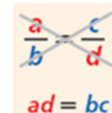
The ratio of the angle measures in a triangle is 1:6:13. What is the measure of each angle?

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A **proportion** is an equation stating that two ratios are equal.

Cross Products Property

In a proportion, if $\frac{a}{b} = \frac{c}{d}$ and b and $d \neq 0$, then $ad = bc$.



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Ex. 3

Solve the proportion.

a) $\frac{7}{x} = \frac{56}{72}$

b) $\frac{2}{x-3} = \frac{8}{3x-3}$

cross and multiply
 $56x = 7(72)$

$$56x = 504$$

$$x = 9$$

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Solve the proportion.

c) $\frac{z-4}{5} = \frac{20}{z-4}$

$$(z-4)(z-4) = 5(20)$$

$$z^2 - 4z - 4z + 16 = 100$$

$$z^2 - 8z - 84 = 0$$

$$(z+6)(z-14) = 0$$

$$\begin{array}{l} z+6=0 \quad \text{or} \quad z-14=0 \\ z=-6 \quad \quad z=14 \end{array}$$

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Ex. 4

An apartment building is 90 ft tall and 55 ft wide. If a scale model of this building is 11 in. wide, how tall is the scale model of the building?

Handwritten solution:

$$\frac{x}{11} = \frac{90}{55}$$

$$55x = 11(90)$$

$$55x = 990$$

$$x = 18 \text{ in}$$

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Figures that are **similar** (\sim) have the same shape but not necessarily the same size.



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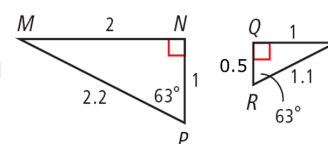
Similar Polygons

DEFINITION	DIAGRAM	STATEMENTS
Two polygons are similar polygons if and only if their corresponding angles are congruent and their corresponding side lengths are proportional.		$\angle A \cong \angle E$ $\angle B \cong \angle F$ $\angle C \cong \angle G$ $\angle D \cong \angle H$ $\frac{AB}{EF} = \frac{BC}{FG} = \frac{CD}{GH} = \frac{DA}{HE} = \frac{1}{2}$

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Ex. 5

Identify the pairs of congruent angles and corresponding sides.



Handwritten solution:

$$MN \cong QT$$

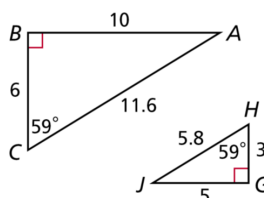
$$\angle N \cong \angle Q$$

$$MP \cong RT$$

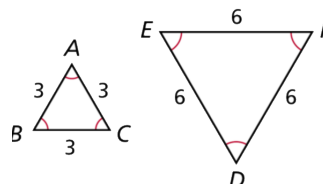
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Ex. 6

Identify the pairs of congruent angles and corresponding sides.



A **similarity ratio** is the ratio of the lengths of the corresponding sides of two similar polygons.



Handwritten solution:

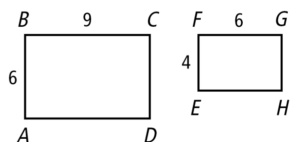
$$\text{Ratio is } 1:2$$

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Determine whether the polygons are similar. If so, write the similarity ratio and a similarity statement.

Ex. 7



rectangles $ABCD$ and $EFGH$

$$\frac{FG}{BC} = \frac{EF}{AB}$$

$$\frac{6}{9} = \frac{4}{6} = 2:3$$

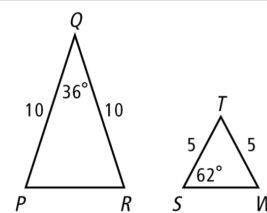
Rectangles $EFGH$ and $ABCD$ are similar to each other

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Ex. 8

Determine whether the polygons are similar. If so, write the similarity ratio and a similarity statement.

$\triangle ABCD$ and $\triangle EFGH$

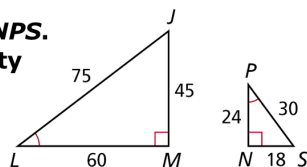


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Ex. 9

Determine if $\triangle JLM \sim \triangle NPS$.

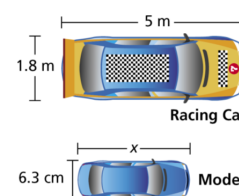
If so, write the similarity ratio and a similarity statement.



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Ex. 10

Find the length of the model to the nearest tenth of a centimeter.



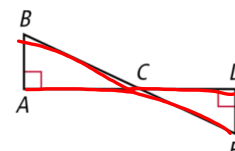
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SAS Similarity

If 2 sides are proportional,
+ \angle in between is \cong , then
 Δ s are similar.

Ex. 11

Explain why the triangles are similar and write a similarity statement.



$\angle A \cong \angle E$ Given

$\angle BCA \cong \angle DEC$ Vert \angle s are \cong

$\triangle ABC \sim \triangle DEC$ AA Similarity

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