Curriculum Outcomes:

(SS3) Demonstrate an understanding of similarity of polygons.

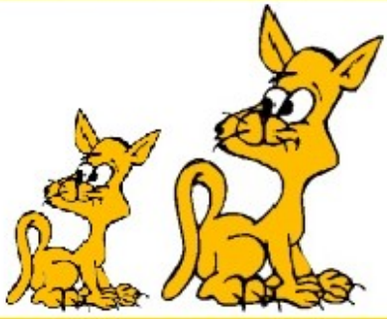
(SS4) Draw and interpret scale diagrams of 2-D shapes.

(SS5) Demonstrate an understanding of line and rotation symmetry.

Student Friendly:

How are diagrams related in size? To increase a length by a certain number be it a fraction or a whole number.


Section 7.4
Similar Triangles



The cat on the right is an enlargement of the cat on the left. They are exactly the same shape, but they are NOT the same size.

These cats are similar figures.

Objects, such as these two cats, that have the same shape, but do not have the same size, are said to be "similar".

The mathematical symbol used to denote similar is ~ .

Similar Symbol

~

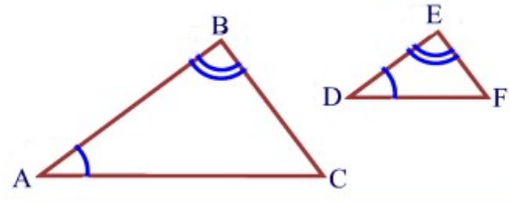
Definition: Two triangles are **similar** if and only if the corresponding sides are in proportion and the corresponding angles are congruent.

There are three accepted methods of proving triangles similar:

AAA

To show two triangles are similar, it is sufficient to show that two angles of one triangle are congruent (equal) to two angles of the other triangle.

Theorem: If two angles of one triangle are congruent to two angles of another triangle, the triangles are similar.



If: $\measuredangle A \cong \measuredangle D$

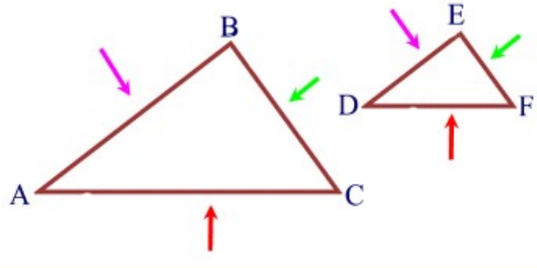
$\measuredangle B \cong \measuredangle E$

Then: $\Delta ABC \sim \Delta DEF$

SSS for similarity

BE CAREFUL!! SSS for similar triangles is NOT the same theorem as we used for congruent triangles. To show triangles are similar, it is sufficient to show that the three sets of corresponding sides are in proportion.

Theorem: If the three sets of corresponding sides of two triangles are in proportion, the triangles are similar.



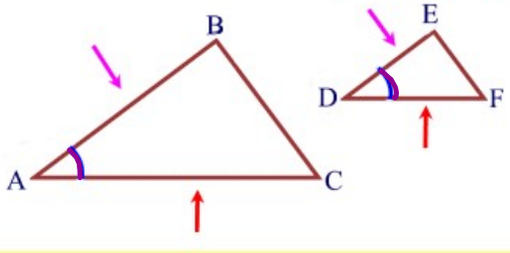
If: $\frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF}$

Then: $\Delta ABC \sim \Delta DEF$

SAS for similarity

BE CAREFUL!! SAS for similar triangles is NOT the same theorem as we used for congruent triangles. To show triangles are similar, it is sufficient to show that two sets of corresponding sides are in proportion and the angles they include are congruent.

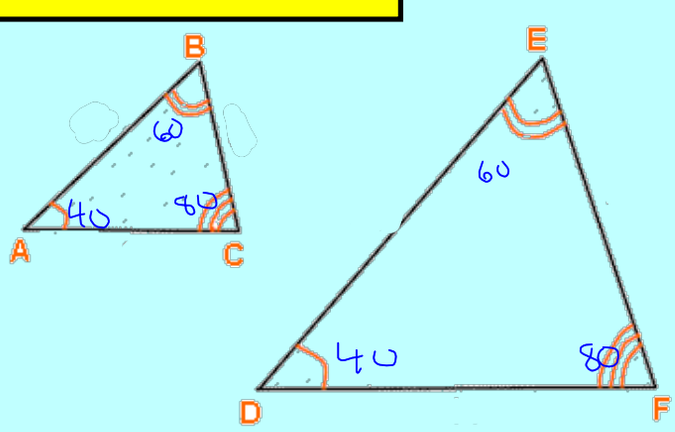
Theorem: If an angle of one triangle is congruent to the corresponding angle of another triangle and the lengths of the sides including these angles are in proportion, the triangles are similar.



If: $\measuredangle A \cong \measuredangle D$

$\frac{AB}{DE} = \frac{AC}{DF}$

Then: $\Delta ABC \sim \Delta DEF$



$\angle A = \angle D$

$\angle B = \angle E$

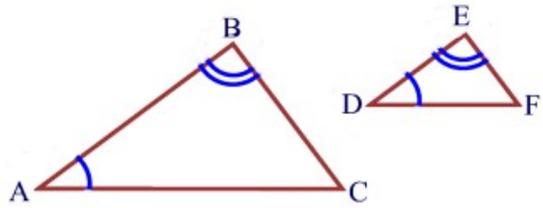
$\angle C = \angle F$

$\therefore$

$\Delta ABC \sim \Delta DEF$ (AAA)

Once the triangles are similar:

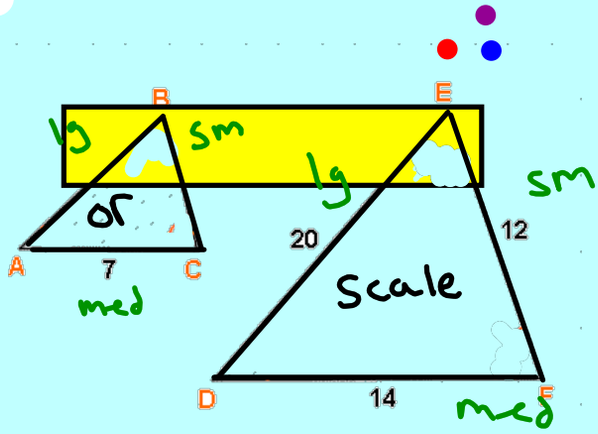
Theorem: The corresponding sides of similar triangles are in proportion.



$If: \Delta ABC \sim \Delta DEF$

$Then: \frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$

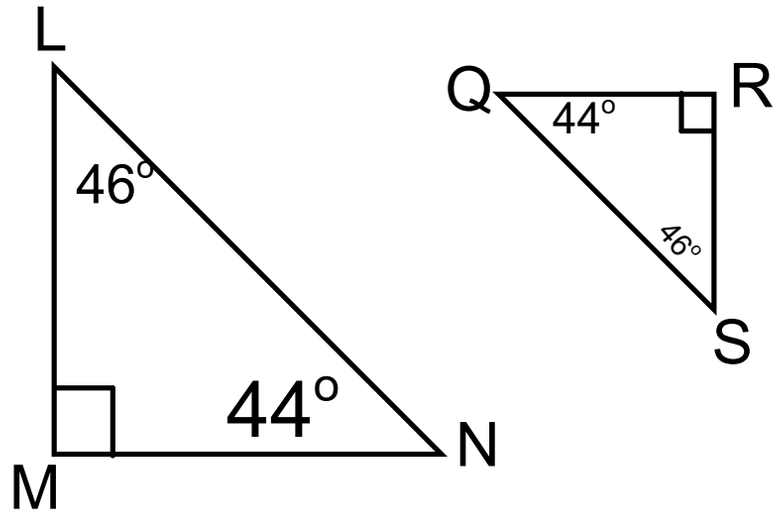
$\triangle ABC \sim \triangle DEF$ ( )



sm	med	lg
$\frac{EF}{BC}$	$\frac{DF}{AC}$	$\frac{DE}{AB}$
$\frac{12}{6}$	$\frac{14}{7}$	$\frac{20}{10}$
$= 2$	$= 2$	$= 2$

$\therefore \Delta ABC \sim \Delta DEF$ (SSS)

Prove Similarity



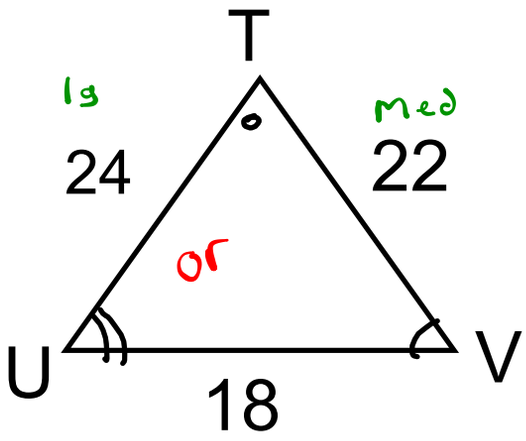
$\angle L = \angle S$

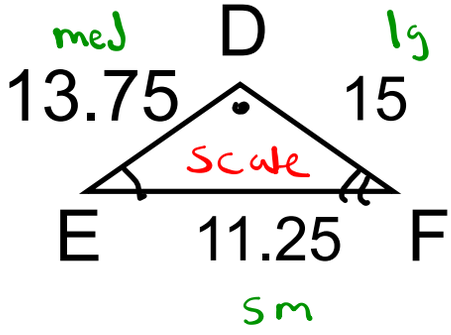
$\angle M = \angle R$

$\angle N = \angle Q$

$\triangle LMN \sim \triangle SRQ$ (~~AAA~~)

Prove Similarity



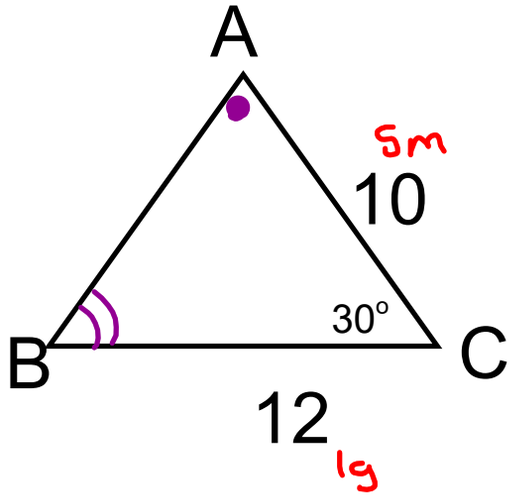


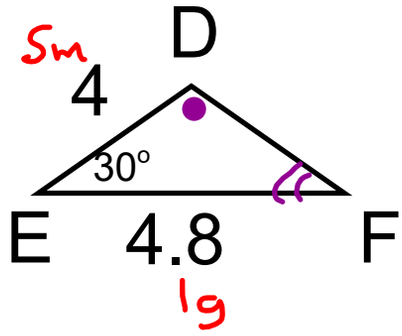
Sm $\frac{EF}{VU}$ med $\frac{ED}{VT}$ lg $\frac{DF}{TU}$

$= \frac{11.25}{18}$ $\frac{13.75}{22}$ $\frac{15}{24}$

$= 0.625$ $= 0.625$ $= 0.625$

$\triangle TUV \sim \triangle DFE$ (SSS)





Prove Similarity

sm
DE
AC

4
10

= 0.4

∠

∠C = ∠E

lg
EF
CB

4.8
12

= 0.4

△ABC ~ △DFE (SAS)

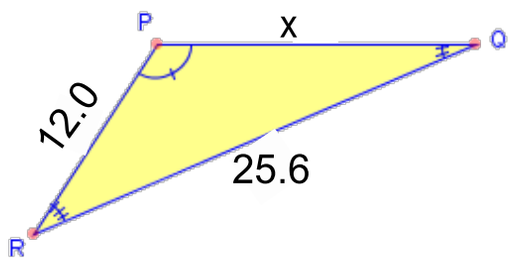
Try This !!

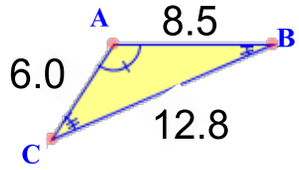
Solve for x .

2 ratios needed

You only need a full ratio and a ratio with the missing side

a)

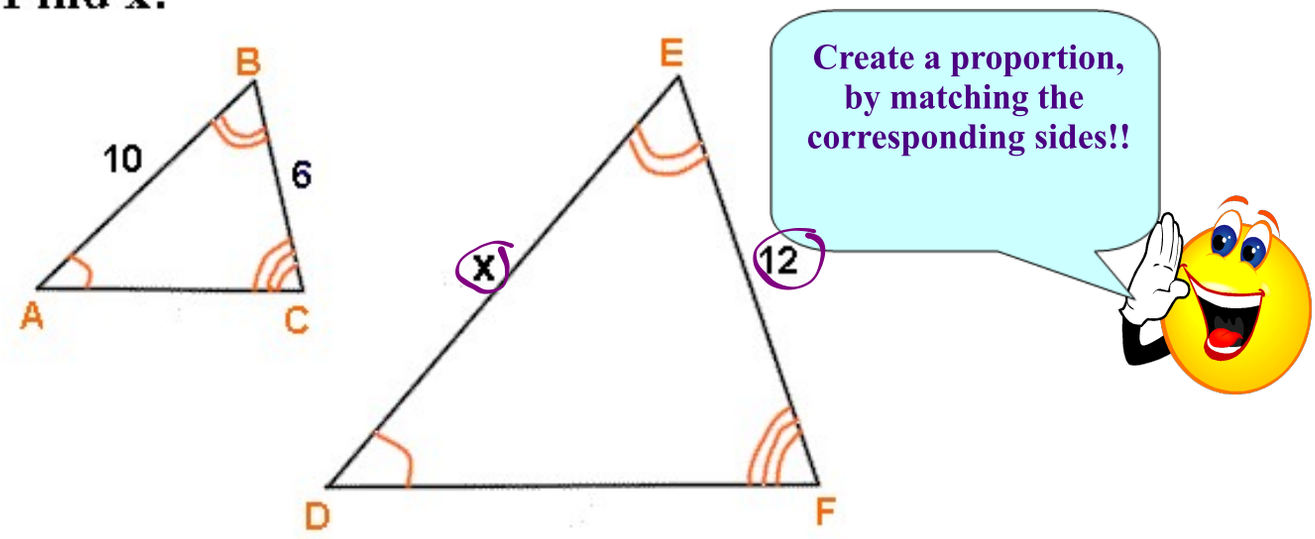




If $\triangle RPQ \sim \triangle CAB$, determine the value of X

WHAT YOU HAVE TO INCLUDE ON A TEST

Find x:



Write the Similarity Statement:

$\angle A = \angle D$
$\angle B = \angle E$
$\angle C = \angle F$

$\triangle ABC \sim \triangle DEF$ (AAA)

Write the proper ratios:

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

Fill in the ratios:

$$\frac{x}{10} = \frac{12}{6}$$

Solve:

$$6x = 120$$

$$x = 20$$

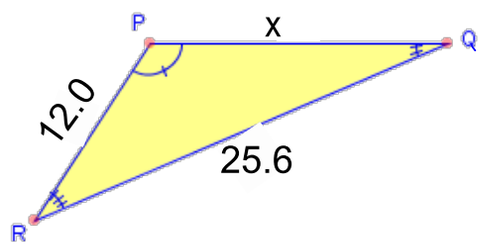
Try This !!

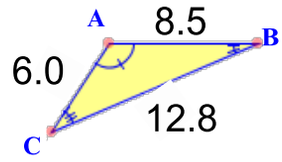
Solve for x .

- 2 ratios needed

You only need a full ratio and a ratio with the missing side

a)





$\angle P = \angle A$
$\angle Q = \angle B$
$\angle R = \angle C$

$\triangle PQR \sim \angle ABC$ (AAA)

$$\frac{PQ}{AB} = \frac{PR}{AC}$$

$$\frac{x}{8.5} = \frac{12}{6}$$

$$6x = 8.5(12)$$

$$x = \frac{8.5(12)}{6}$$

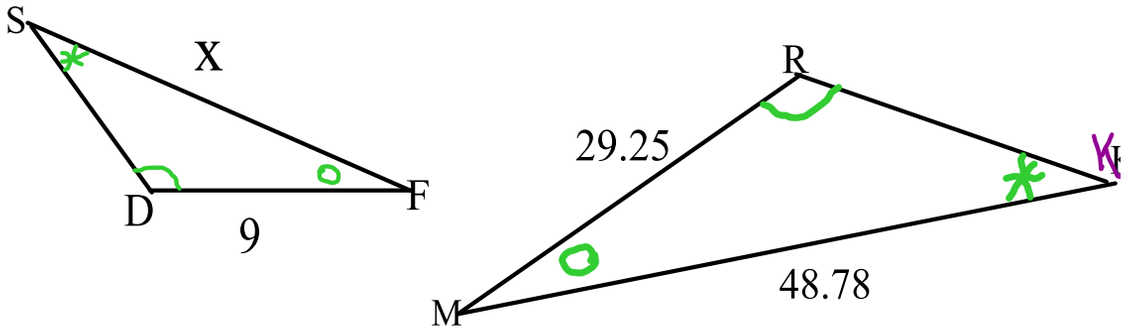
$$x = 4.25$$

IF IT DOES NOT STATE SIMILARITY

i)Determine if the triangles are similar
ii) Write the Ratios
iii) Fill in ratios
iv) solve for "x"

$\angle S = \angle K$
$\angle D = \angle R$
$\angle F = \angle M$

$\triangle SDF \sim \triangle KRM$ (AAA)



$$\frac{SF}{KM} = \frac{DF}{Rm}$$

$$\frac{x}{48.78} = \frac{9}{29.25}$$

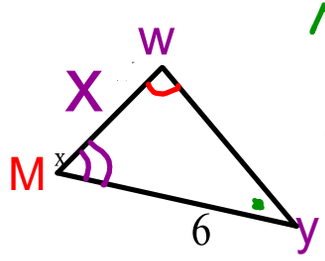
$$29.25x = 9(48.78)$$

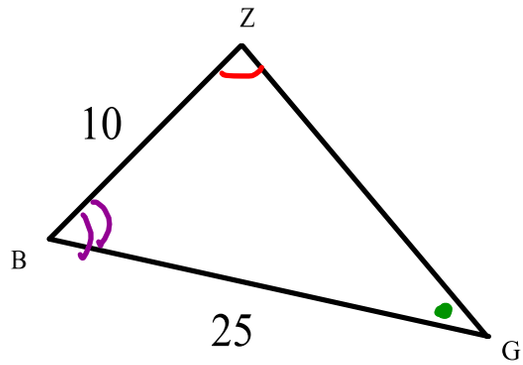
$$x = \frac{9(48.78)}{29.25}$$

$$x = 15$$

If $\triangle MWY \sim \triangle BZG$, determine the value of X

Don't Prove





$$\frac{WM}{ZB} = \frac{MY}{BG}$$

$$\frac{X}{10} = \frac{6}{25}$$

$$25X = 10(6)$$

$$X = \frac{60}{25}$$

$$X = 2.4$$