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.

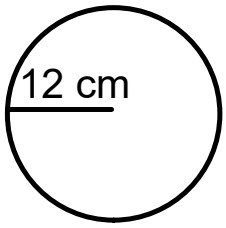
Student Friendly:

Proving triangles are similar and calculating unknown lengths based on similarities.

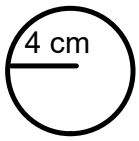
Warm Up

1) Determine the scale factor of the following:

Original



Scale



2) Determine the unknown lengths for the following, if the scale factor is 1/5

75 cm

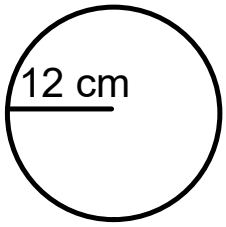
x

3) Determine the unknown lengths for the following

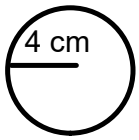
Diameter of original	Diameter of Scale	Scale Factor
23 cm		1/4
18 cm	14 cm	
	3.2 cm	5/2

1) Determine the scale factor of the following:

Original

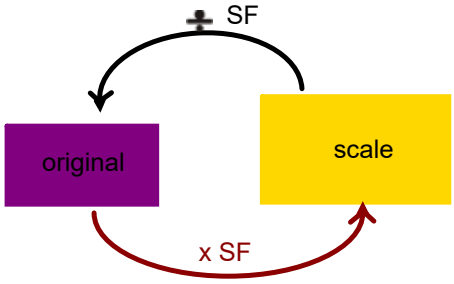


Scale

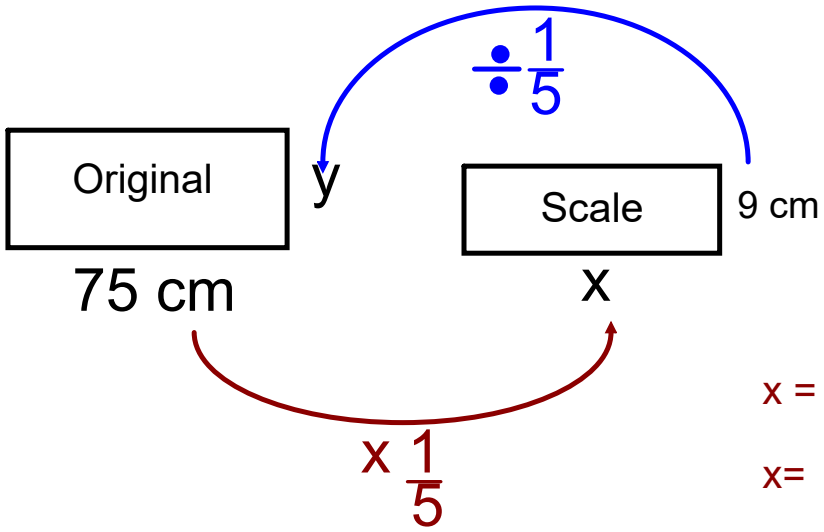


Scale factor = $\frac{\text{scale}}{\text{original}} = \frac{4}{12} = \frac{1}{3}$

$= 0.\overline{3}$



2) Determine the unknown lengths for the following , if the scale factor is 1/5



$y = 9 \div \frac{1}{5}$

$y = 9 \times \frac{5}{1}$

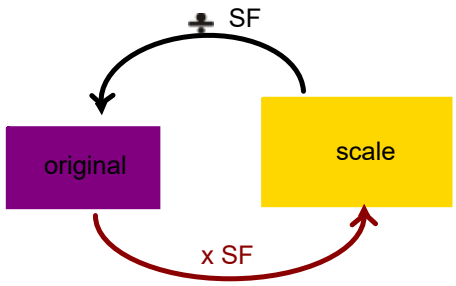
$y = 45$

$x = 75 \times \frac{1}{5}$

$x = \frac{75}{5}$

$x = 15$

Scale factor = $\frac{\text{scale}}{\text{original}}$



3) Determine the unknown lengths for the following

	Diameter of original	Diameter of Scale	Scale Factor
a)	23 cm	5.75	1/4
b)	18 cm	14 cm	14/18 or 7/9
c)	1.28	3.2 cm	5/2

a) Looking for scale

original × scale

23 x 1/4 = 5.75

b) Looking for scale factor

$SF = \frac{S}{O}$

$SF = \frac{14}{18}$

$SF = \frac{7}{9}$

c) Looking for original

Scale ÷ scale factor

3.2 ÷ 5/2

1.28

Quick Review from Chapter 6

Solve the following Ratios for the unknown variable:

$$\frac{4}{5} = \frac{x}{12.5}$$

$$\frac{4(12.5)}{5} = x$$

$$10 = x$$

$$\frac{3}{8} = \frac{15}{y}$$

$$3y = 15\,(8)$$

$$\frac{3y}{3} = \frac{15\,(8)}{3}$$

$$y = 40$$

You Try

$$\frac{x}{6.5} = \frac{8.5}{13}$$

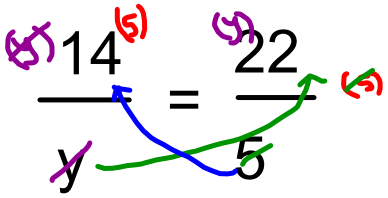
$$\frac{14}{y} = \frac{22}{5}$$

You Try

$$\frac{x}{6.5} = \frac{8.5}{13}$$

$$x = \frac{(8.5)\,(6.5)}{13}$$

$$x = 4.25$$



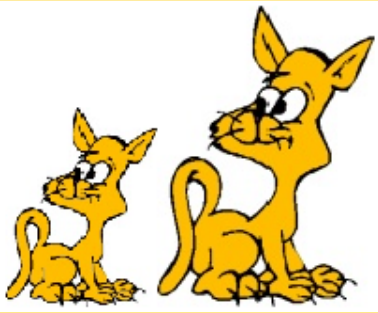
$$\frac{14}{y} = \frac{22}{5}$$

$$(14)\,(5) = (22)\,(y)$$

$$\frac{(14)\,(5)}{(22)} = (y)$$

$$3.18 = y$$


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

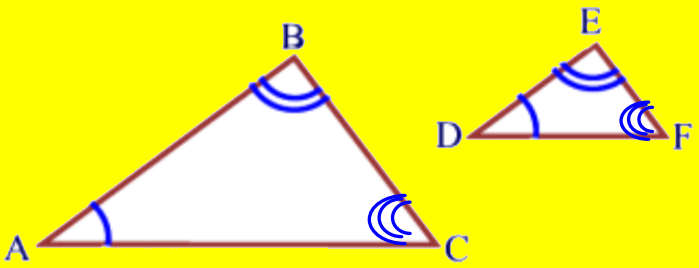
~

THERE ARE 3 WAYS TO PROVE TRIANGLES ARE SIMILAR:

1) **TRIANGLES ARE SIMILAR IF:**

AAA (ANGLE ANGLE ANGLE)

- **ALL THREE PAIRS OF CORRESPONDING ANGLES ARE THE SAME. …**



If

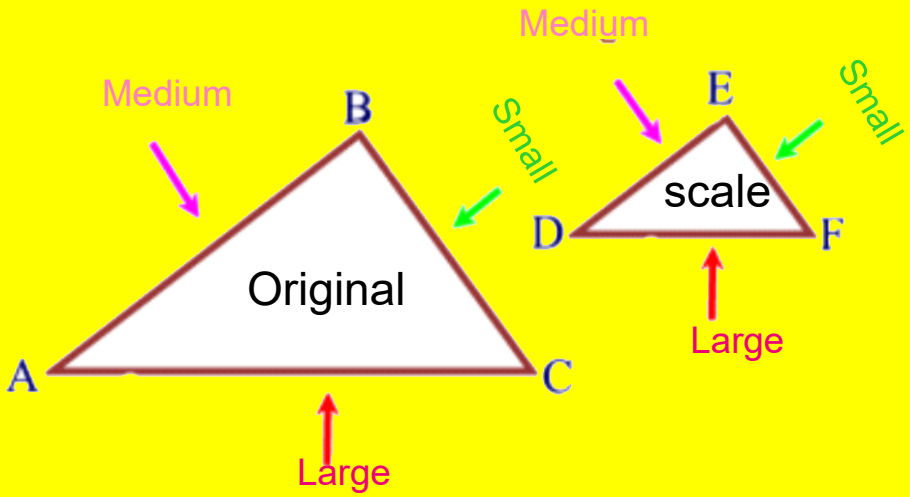
Original	Scale
< A=	< D
< B =	<E
<C =	<F

△ ABC ~ △ DEF (AAA)

2) TRIANGLES ARE SIMILAR IF:

SSS IN SAME PROPORTION (SIDE SIDE SIDE)

- ALL THREE PAIRS OF CORRESPONDING SIDES ARE IN THE SAME PROPORTION. ...



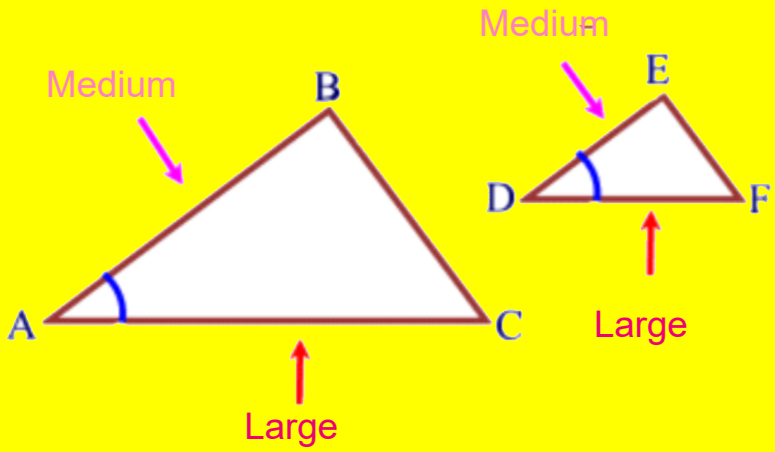
If the side ratios are the same

Small		Medium		Large
$\frac{EF}{BC}$	=	$\frac{DE}{AB}$	=	$\frac{DF}{AC}$

△ ABC ~ △ DEF (SSS)

3) TRIANGLES ARE SIMILAR IF:

- **SAS (SIDE ANGLE SIDE)**
  - **TWO PAIRS OF SIDES IN THE SAME PROPORTION AND THE INCLUDED ANGLE EQUAL.**



If

Side Med / Side Large

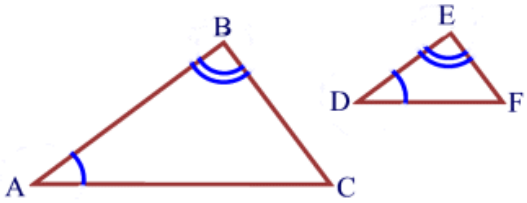
$$\frac{DE}{AB} = \frac{EF}{BC}$$

Angle in between two sides $\angle A = \angle D$

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

Once the triangles are similar:

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

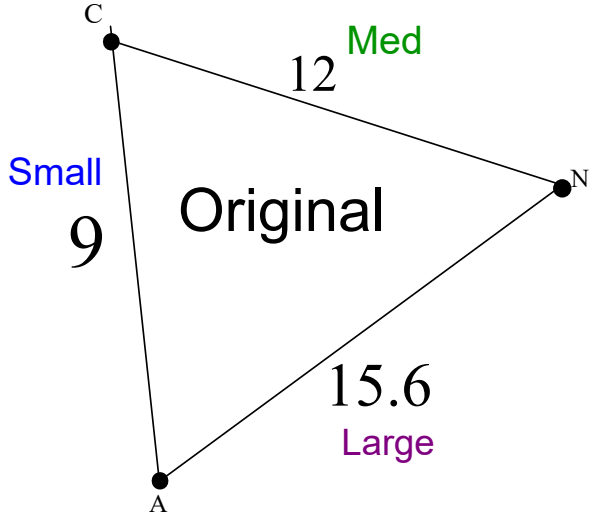


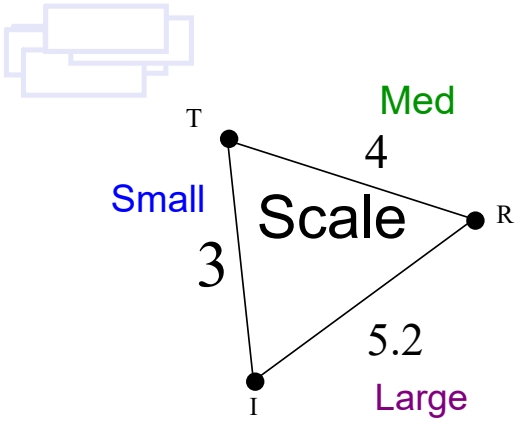
$If: \Delta ABC \sim \Delta DEF$

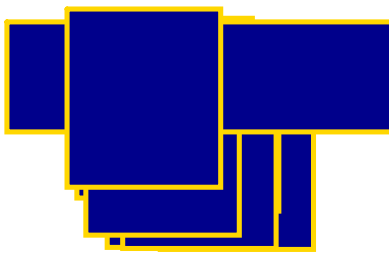
$Then: \frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$

Are these triangles similar?

Triangles are just polygons







Prove similarity: (SSS)

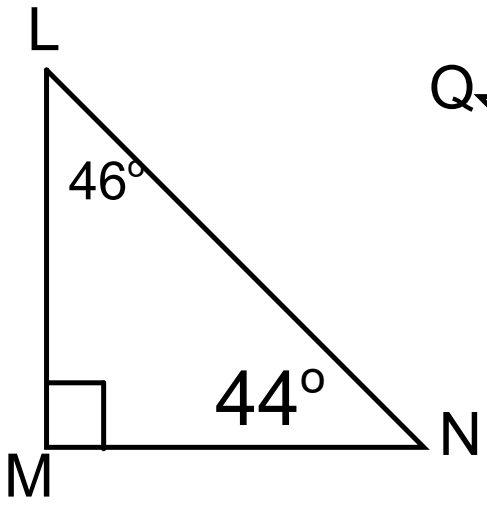
Small		Medium		Large
$\frac{IT}{AC}$	=	$\frac{TR}{CN}$	=	$\frac{IR}{AN}$
$\frac{3}{9}$	=	$\frac{4}{12}$	=	$\frac{5.2}{15.6}$
$0.\overline{3}$	=	$0.\overline{3}$	=	$0.\overline{3}$

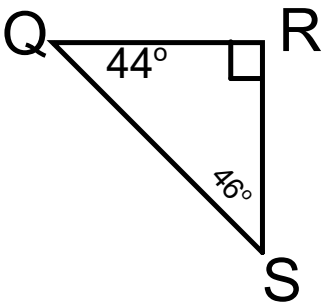
$\triangle$ **ITR** $\sim$ $\triangle$ **ACN** (SSS)

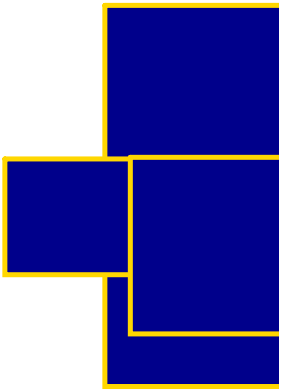
Are these triangles similar?

Triangles are just polygons

Prove Similarity





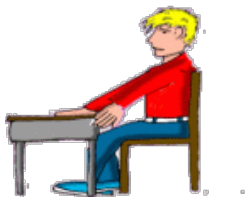


Prove similarity: (AAA)

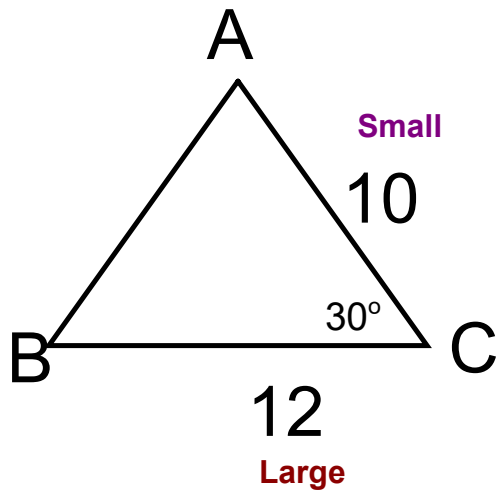
Original	Scale
< L	= <S
< M	= <R
< N	= < Q

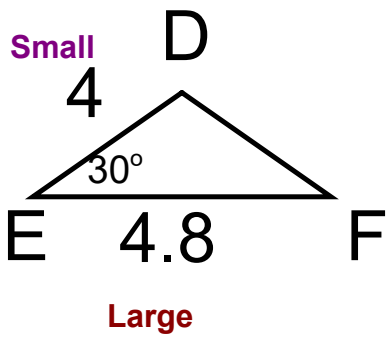
△ **LMN** ~ △ **SRQ** (AAA)

Are these triangles similar?



Prove Similarity





Prove similarity: (SAS)

Side Large Side Small

$$\frac{EF}{CB} = \frac{ED}{CA}$$

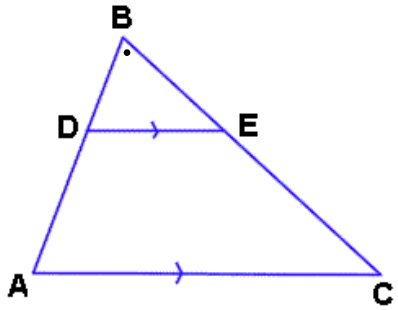
$$\frac{4.8}{12} = \frac{4}{10}$$

$$0.4 = 0.4$$

Angle in between two sides <E= < C

△ **EFD** ~ △ **CBA** (SAS)

Dealing with overlapping triangles:



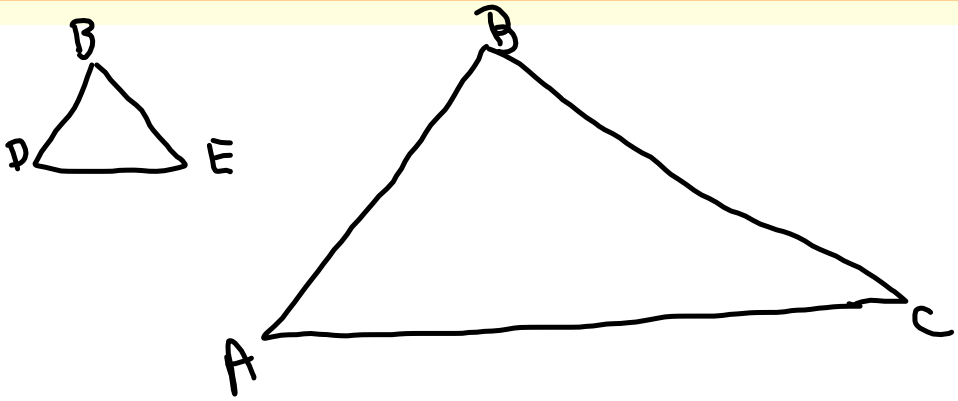
Many problems involving similar triangles have one triangle ON TOP OF (overlapping) another triangle. Since $\overline{DE}$ is marked to be parallel to $\overline{AC}$, we know that we have $\angle BDE$ congruent to $\angle DAC$ (by corresponding angles). $\angle B$ is shared by both triangles, so the two triangles are similar by AA.

There is an additional theorem that can be used when working with overlapping triangles:

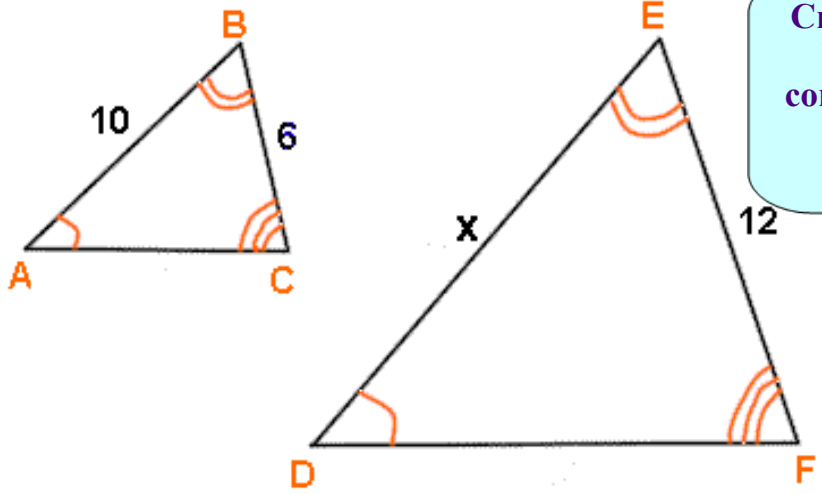
Additional Theorem: If a line is parallel to one side of a triangle and intersects the other two sides of the triangle, the line divides these two sides proportionally.

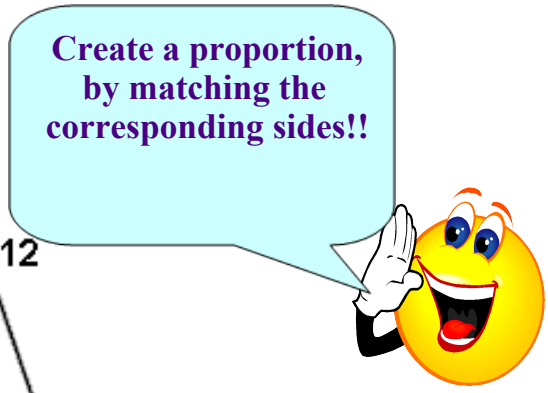
$$If: \overline{DE} \parallel \overline{AC}$$

$$Then: \frac{BD}{DA} = \frac{BE}{EC}$$



Find x:





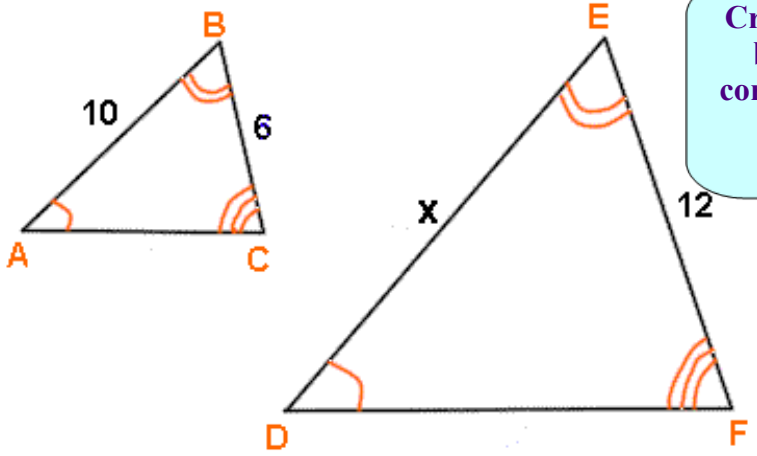
Write the Similarity Statement:

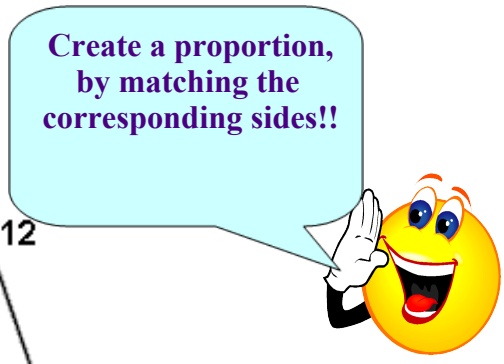
Write the proper ratios:

Fill in the ratios:

Solve:

Find x:





Write the Similarity Statement: <A = <D
<B = <E
<C = <F

△ABC ~△DEF (AAA)

Write the proper ratios:

$\frac{DE}{AB} \quad \frac{EF}{BC} \quad \frac{DF}{AC}$

Fill in the ratios:

$\frac{X}{10} \quad \frac{12}{6} \quad \frac{DF}{AC}$

Solve:

Method 1

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

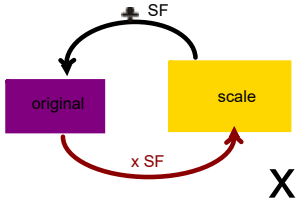
$X = \frac{(12)(10)}{6}$

$X = 20$

Method 2

$SF = \frac{\text{scale}}{\text{original}} = \frac{12}{6}$

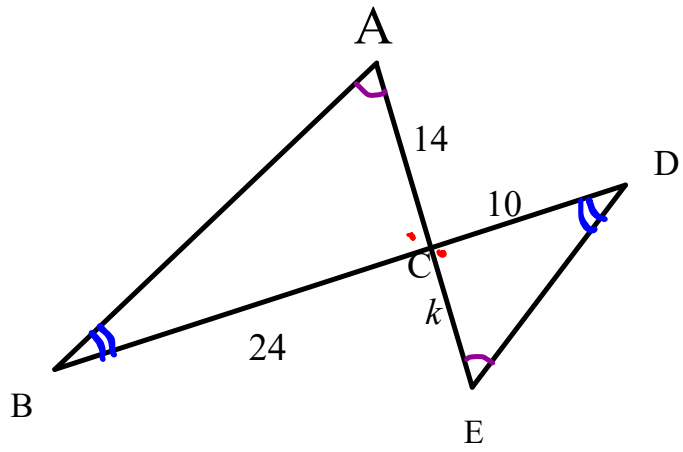
$= 2$



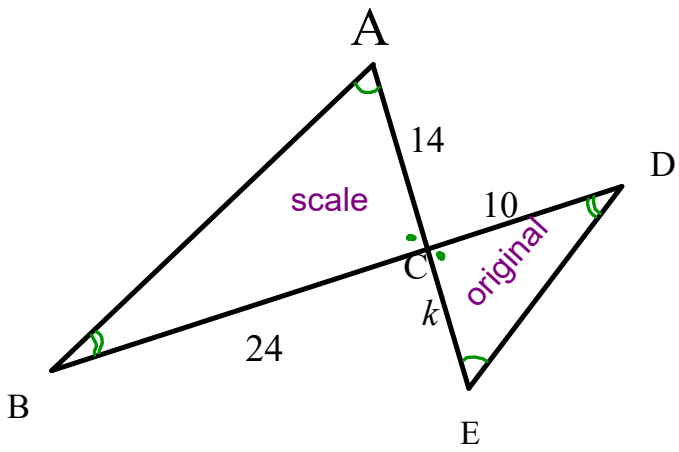
$x = 10 \times 2$

$x = 20$

IF $\triangle ACB \sim \triangle ECD$, solve for "k"



IF $\triangle ACB \sim \triangle ECD$, solve for "k"



Method 1

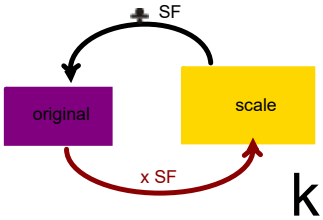
$$\frac{K}{14} = \frac{10}{24}$$

$$K = \frac{(10)(14)}{24}$$

$$K = 5.8\overline{3}$$

Method 2

$$SF = \frac{\text{scale}}{\text{original}} = \frac{24}{10}$$



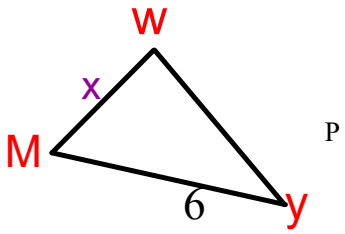
$= 2.4$

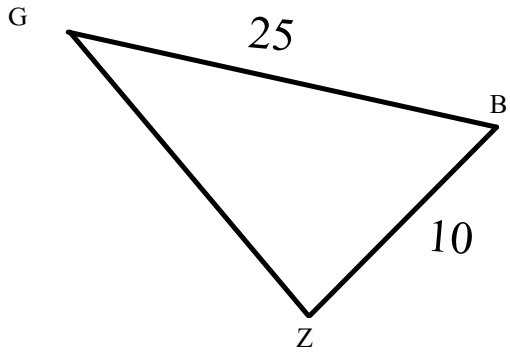
$k = 14 \div 2.4$

$k = 5.8\overline{3}$

IF IT STATE SIMILARITY, DON'T PROVE

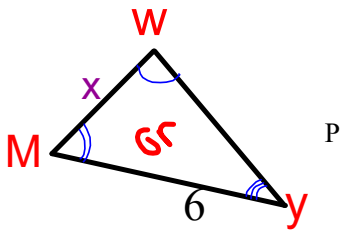
If △ MWY ~△ BZG , determine the value of X

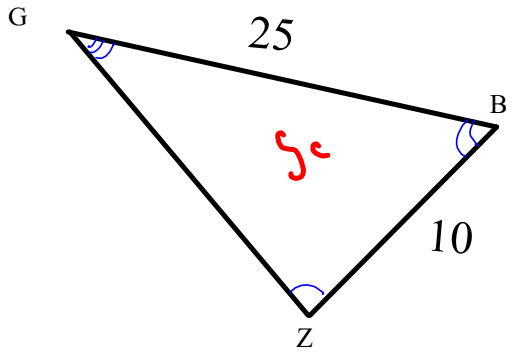




IF IT STATE SIMILARITY, DON'T PROVE

If △ MWY ~△ BZG , determine the value of X





Method 1

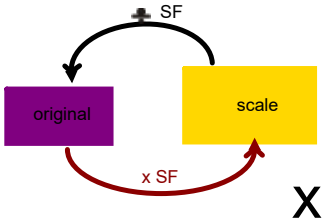
$$\frac{x}{10} = \frac{6}{25}$$

$$x = \frac{(10)(6)}{25}$$

$$x = 2.4$$

Method 2

$$SF = \frac{\text{scale}}{\text{original}} = \frac{25}{6}$$



$$x = 10 \div \frac{25}{6}$$

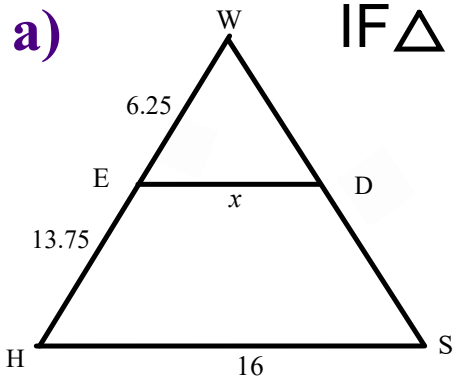
$$x = 10 \times \frac{6}{25}$$

$$x = 2.4$$

Try This !!

Solve for x .

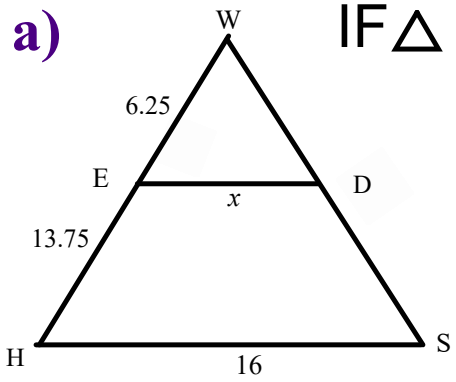
a) IF △ WED ~△ WHS, solve for "X"



Try This !!

Solve for x .

a) IF △ WED ~△ WHS, solve for "X"



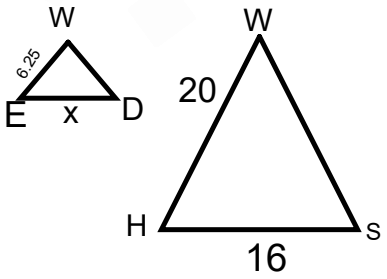
Method 1

$$\frac{ED}{HS} = \frac{WE}{WH}$$

$$\frac{X}{16} = \frac{6.25}{20}$$

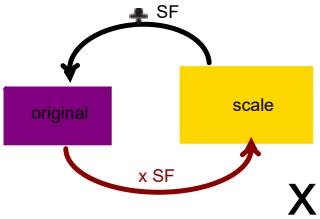
$$x = \frac{(6.25)(16)}{20}$$

$$x = 5$$



Method 2

$$SF = \frac{\text{scale}}{\text{original}} = \frac{20}{6.25}$$



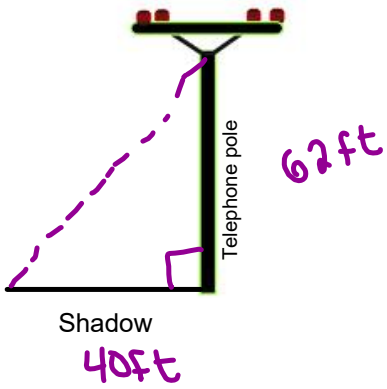
$$= 3.2$$

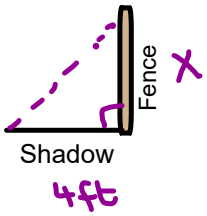
$$x = 16 \div 3.2$$

$$x = 5$$

A telephone pole that is 62 ft tall cast a shadow that is 40 ft long. Find the height of a fence pole that cast a 4 ft shadow.

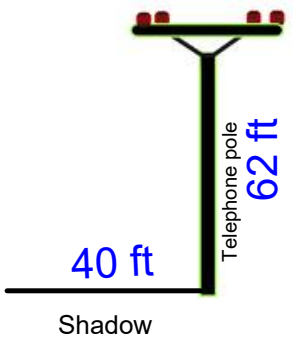
Assume the triangles are similar

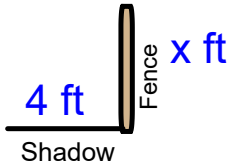




A telephone pole that is 62 ft tall cast a shadow that is 40 ft long. Find the height of a fence pole that cast a 4 ft shadow.

Assume the triangles are similar





Method 1

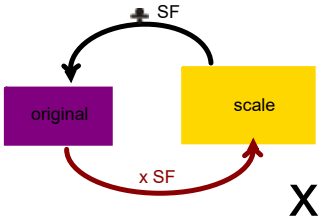
$$\frac{x}{62} = \frac{4}{40}$$

$$x = \frac{(62)(4)}{40}$$

$$x = 6.2 \text{ ft}$$

Method 2

$$SF = \frac{\text{scale}}{\text{original}} = \frac{4}{40}$$

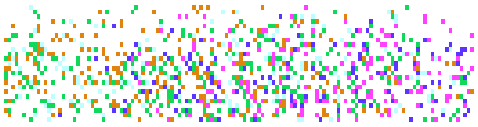


$$= 0.1$$

$$x = 62 \times 0.1$$

$$x = 6.2$$

Class/Homework



-click on the "Homework" link on my teachers page for optional review questions

- If you have any questions you can contact me on the

Remind app

or

through email:

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