Curriculum Outcomes:

(SS3) Demonstrate an understanding of similarity of polygons.

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

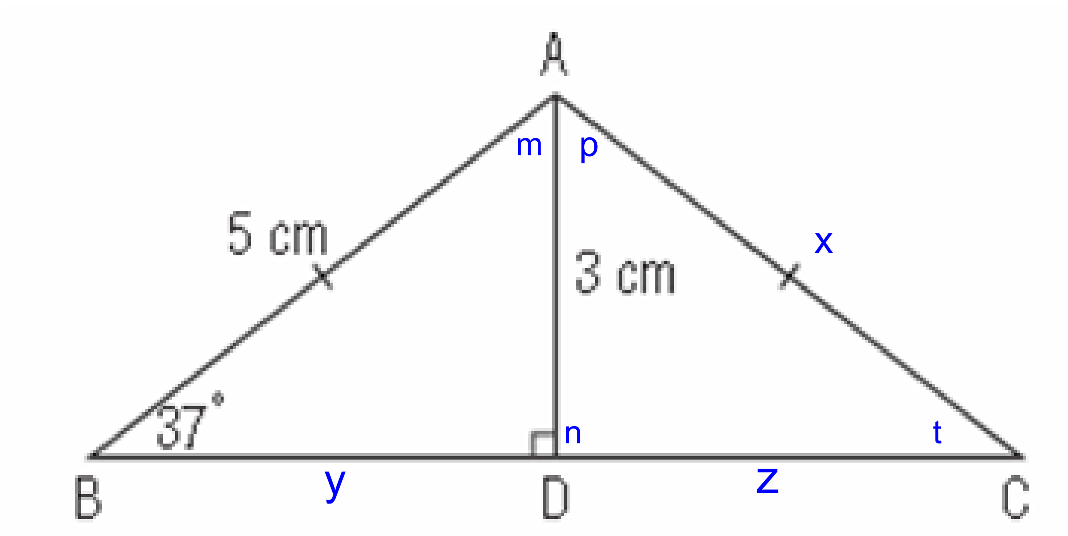
(SS5) Demonstrate an understanding of line and rotation symmetry.

Student Friendly:

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

Warm Up

Solve for all the unknowns:



Hints:

How many triangles do you see?

What does the "ticks" on the triangle mean?

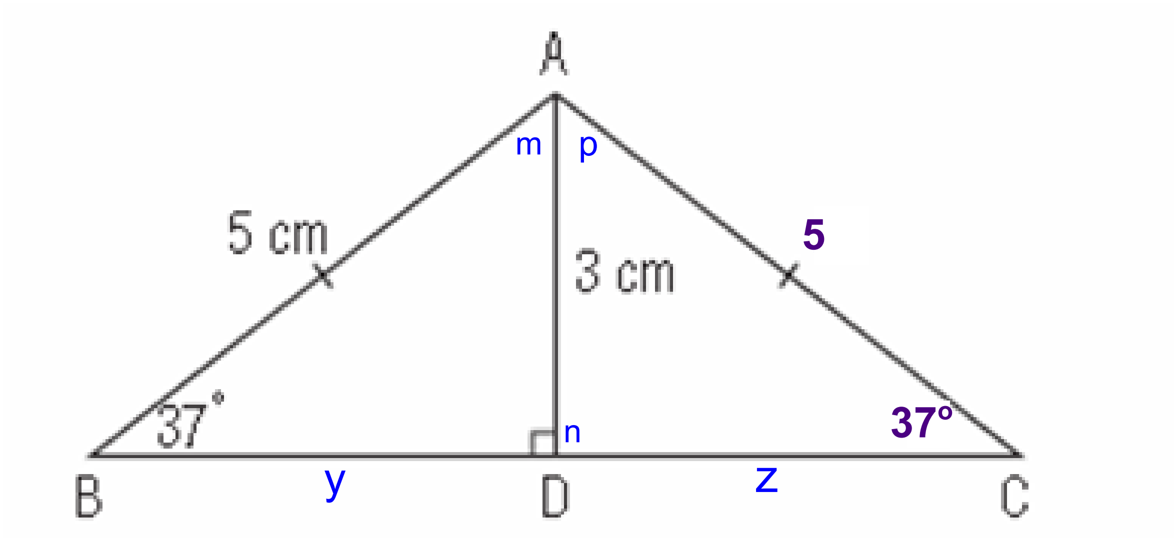
What does the angles in a triangle add up to?

What does the angles straight line add up to?

Can you use Pythagorean Theorem ?

Warm Up

Solve for all the unknowns:



How many triangles do you see? __3__

What does the "ticks" on the triangle mean?

AB = AC

5 = 5

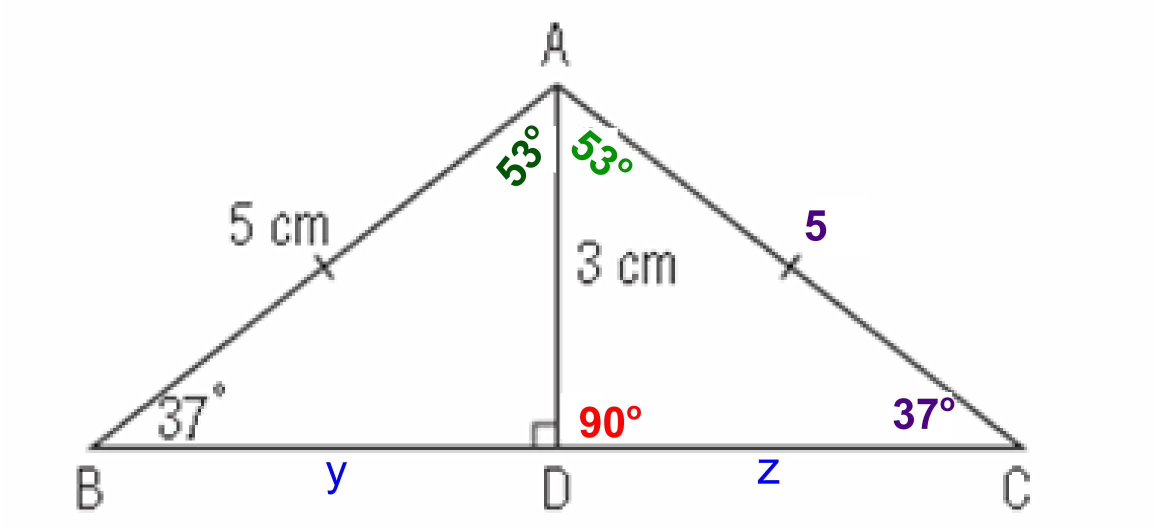
so triangle ABC is an isosceles triangle

<ABC = <ACB

37° = 37°

Warm Up

Solve for all the unknowns:



What does the angles straight line add up to? **180°**

<ADB = 90°

so

<ADC= 90°

What does the angles triangle add up to? **180°**

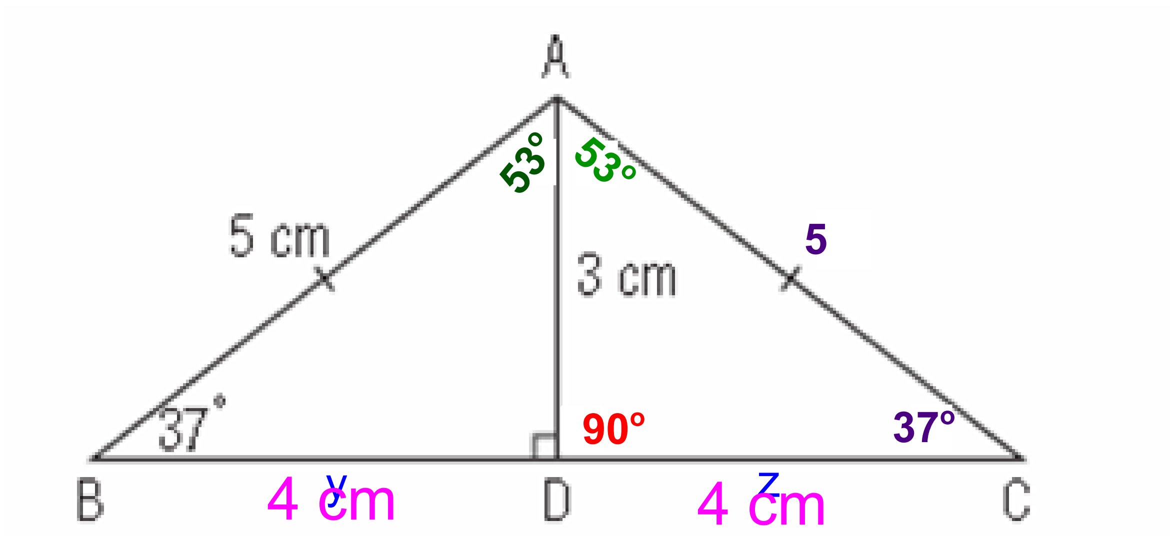
<DAC = 53°

so

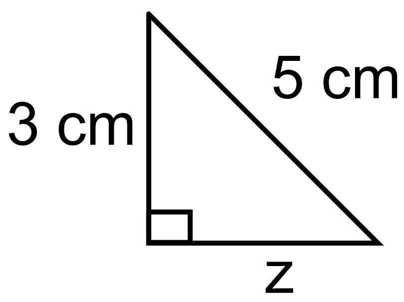
<DAB= 53°

Warm Up

Solve for all the unknowns:



Do you see a right angle triangle?



$b^2 = c^2 - a^2$

$b^2 = 5^2 - 3^2$

$b^2 = 25 - 9$

$b^2 = \sqrt{16}$

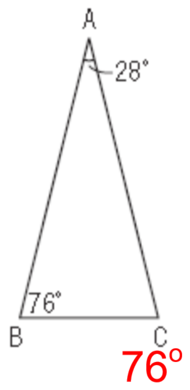
$b = 4$

BD = DC = 4

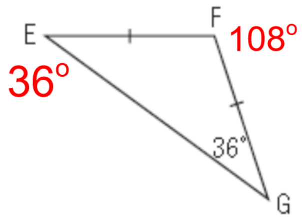
Check

1. Calculate the measure of each angle.

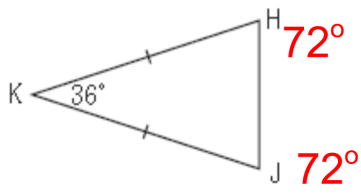
a) ∠ACB



b) ∠GEF and ∠GFE



c) ∠HJK and ∠KHJ



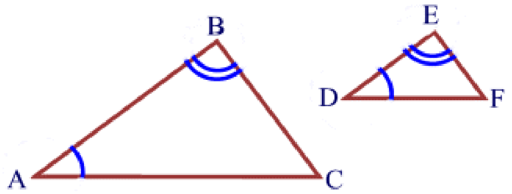
Review

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:

AA 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.



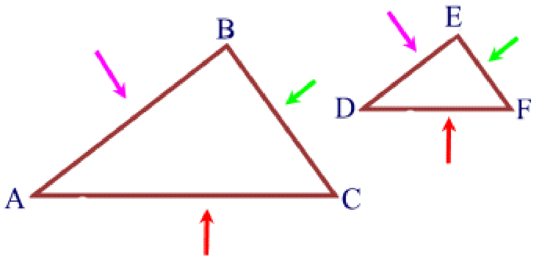
If: $\measuredangle A \cong \measuredangle D$

$\measuredangle B \cong \measuredangle E$

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.

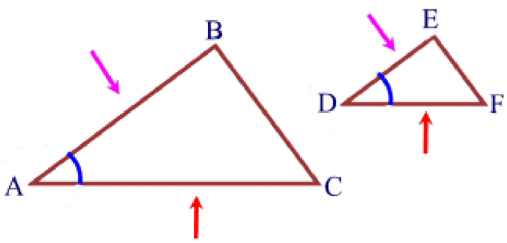


If: $\frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF}$

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.



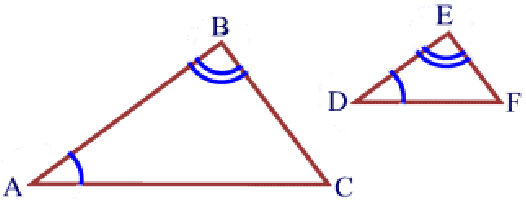
If: $\measuredangle A \cong \measuredangle D$

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

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

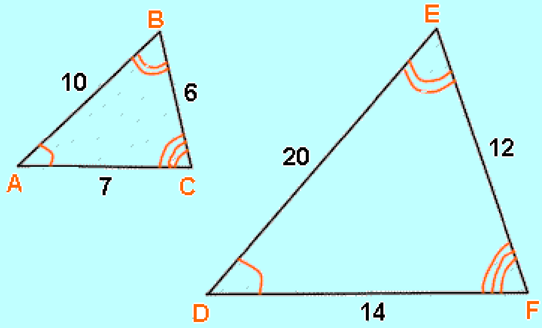
Once the triangles are similar:

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



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

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

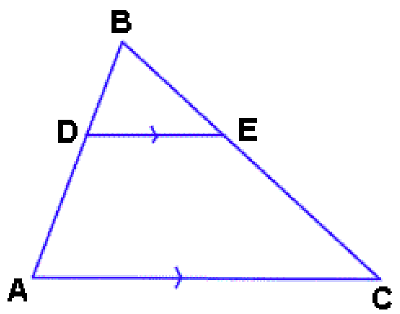


$\Delta ABC \sim \Delta DEF$

Facts about similar triangles:	
$\measuredangle A \cong \measuredangle D$	$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$
$\measuredangle B \cong \measuredangle E$	
$\measuredangle C \cong \measuredangle F$	

Angles equal and sides are proportionate

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.

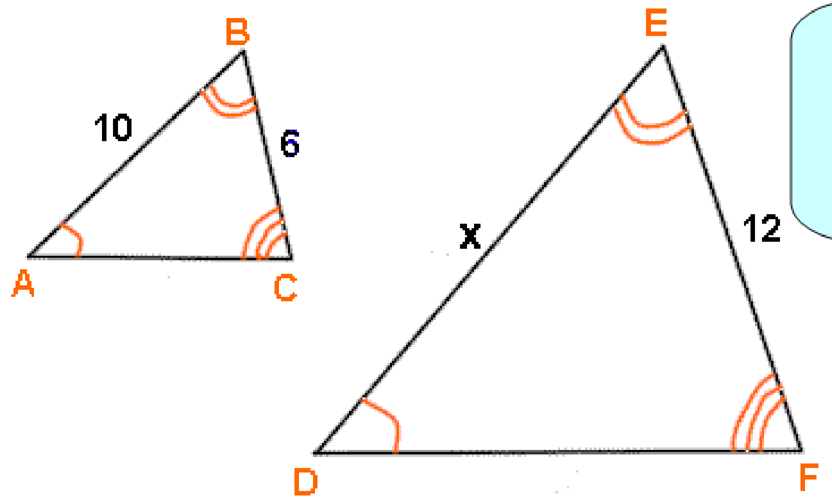
There is an additional theorem that can be used when working with overlapping triangles:

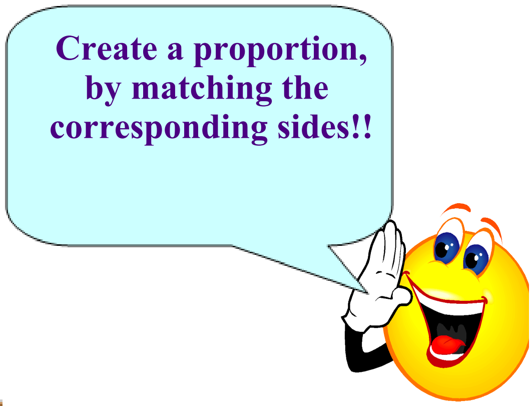
Additional Theorem: If a line is parallel to one side of a triangle and intersects the other two sides of the triangle, the line divides these two sides proportionally.

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

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

Find x: IF $\triangle ACB \sim \triangle DEF$, solve for "x"





Solve:

Method 1

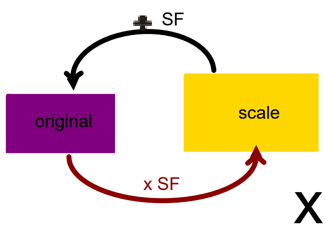
$$\frac{X}{10} = \frac{12}{6}$$

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

$$X = 20$$

Method 2

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

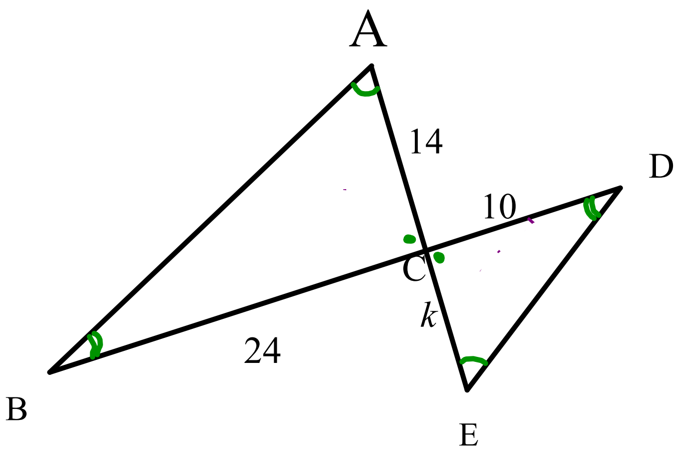


$= 2$

$x = 10 \times 2$

$x = 20$

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



Method 1

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

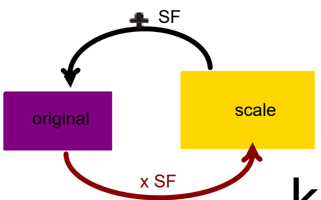
$$K = \frac{(10)(14)}{24}$$

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

Method 2

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

$$= 2.4$$

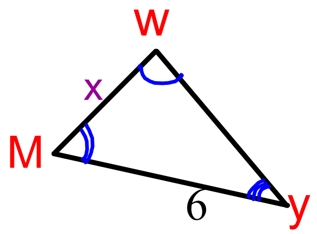


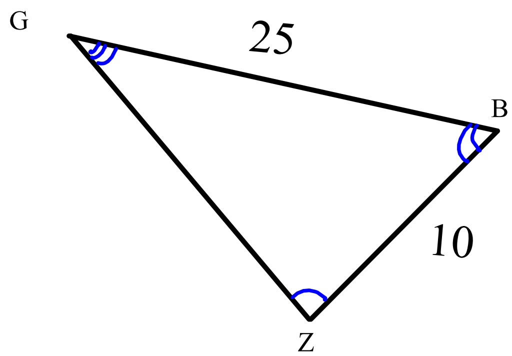
$$k = 14 \div 2.4$$

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

IF IT STATE SIMILARITY, DON'T PROVE

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





Method 1

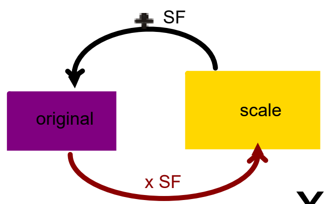
$$\frac{x}{10} = \frac{6}{25}$$

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

$$x = 2.4$$

Method 2

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



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

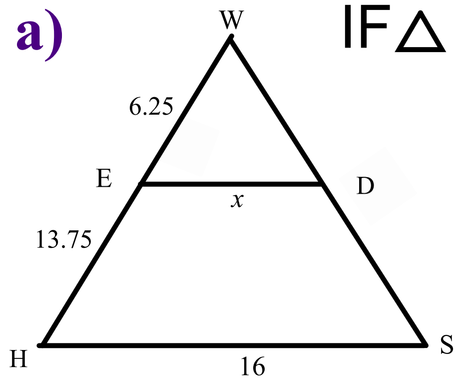
$$x = 10 \times \frac{6}{25}$$

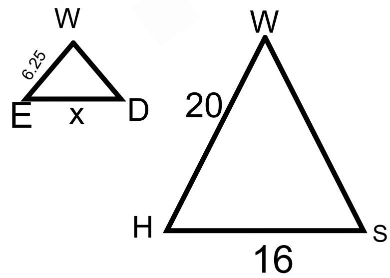
$$x = 2.4$$

Try This !!

Solve for x .

a) IF △ WEF ~△ WHS, solve for "X"





Method 1

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

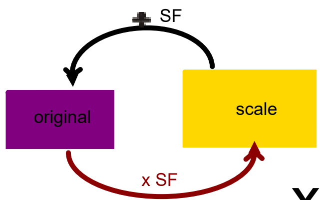
$$x = \frac{(6.25)(16)}{20}$$

x = 5

Method 2

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

$= 3.2$

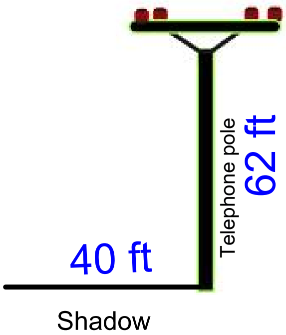


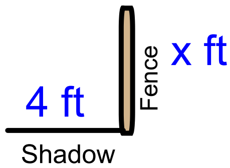
x = 16 ÷ 3.2

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





Method 1

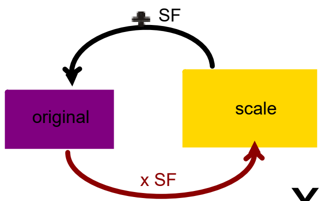
$$\frac{x}{4} = \frac{62}{40}$$

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

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

Method 2

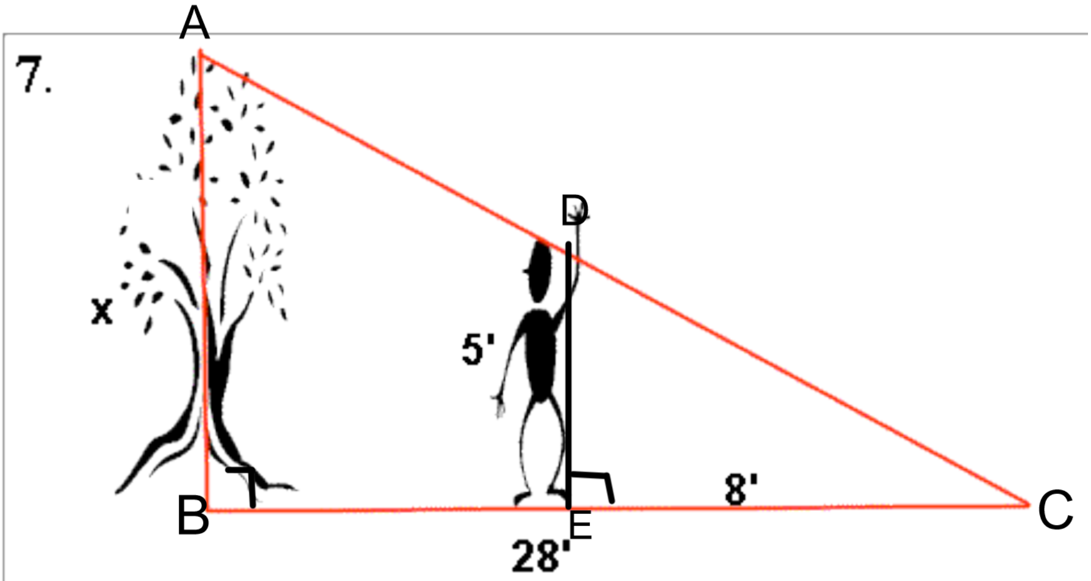
$$SF = \frac{\text{scale}}{\text{original}} = \frac{4}{40}$$



$$= 0.1$$

$$x = 62 \times 0.1$$

$$x = 6.2$$



At a certain time of the day, the shadow of a 5' boy is 8' long. The shadow of a tree at this same time is 28' long. How tall is the tree?

Method 1

$$\frac{x}{28} = \frac{5}{8}$$

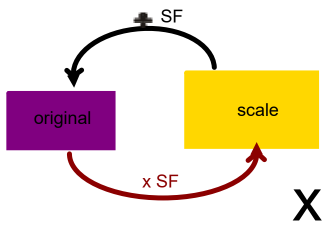
$$x = \frac{(28)(5)}{8}$$

$$x = 17.5 \text{ ft}$$

Method 2

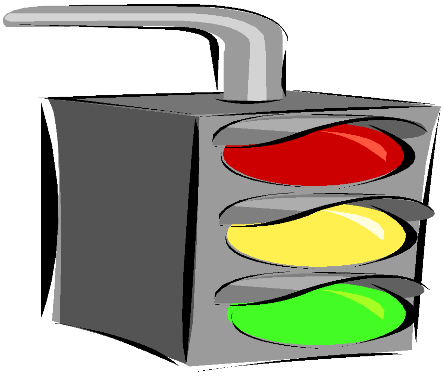
$$SF = \frac{\text{scale}}{\text{original}} = \frac{28}{8}$$

$$= 3.5$$



$$x = 5 \times 3.5$$

$$x = 17.5$$



Must
Show
ALL
WORK

Class/Homework

PAGE 349-351

QUESTIONS

6, 7, 9, 10 ,11, 12, 14