

EX 1: Converting Units.

A) $\frac{34 \text{ cm}}{4 \text{ cm}} \Rightarrow \frac{17}{2} \text{ OR } 17:2$

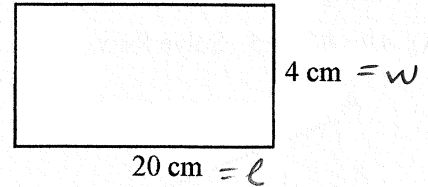
B) $\frac{10 \text{ ft}^{(12)}}{40 \text{ in}} \Rightarrow \frac{120 \text{ in}}{40 \text{ in}} = 3 \text{ OR } 3:1$

B) $\frac{3 \text{ yd}^{(3)}}{15 \text{ ft}} \Rightarrow \frac{9 \text{ ft}}{15 \text{ ft}} = \frac{3}{5} \text{ OR } 3:5$

EX 2: Writing Ratios.

A) Find the width to length ratio of each rectangle. Then simplify the ratio.

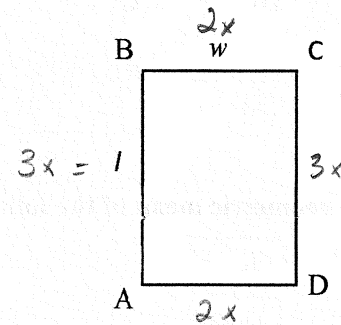
$\frac{4 \text{ cm}}{20 \text{ cm}} = \frac{1}{5} \text{ OR } 1:5$



EX 3: Using Ratios.

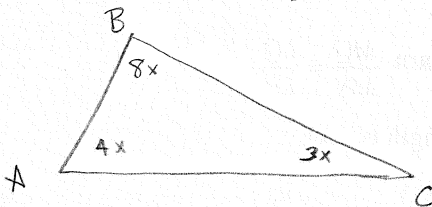
The perimeter of rectangle ABCD is 60 cm. The ratio of AB:BC is 3:2. Find the length and width of the rectangle.

$P = 2w + 2l \Rightarrow 60 = 2(2x) + 2(3x)$
 $60 = 4x + 6x$
 $\frac{60}{10} = \frac{10x}{10}$
 $6 = x$
 $l = 3(6) = 18 \text{ cm}$
 $w = 2(6) = 12 \text{ cm}$



EX 4: Extended Ratios (Comparing more than two items)

The measures of the angles in a triangle are in the extended ratio 3:4:8. Find the measures of the angles. (Draw a sketch)



$3x + 4x + 8x = 180^\circ$
 $\frac{15x}{15} = \frac{180^\circ}{15}$
 $x = 12$

$m\angle A = 4(12) = 48^\circ$
 $m\angle B = 8(12) = 96^\circ$
 $m\angle C = 3(12) = 36^\circ$

If $\frac{m}{a} = \frac{b}{r}$, which of the following is not true?

a. $\frac{a}{m} = \frac{r}{b}$

b. $mb = ar$

c. $mr = ab$

d. $\frac{r}{a} = \frac{b}{m}$

True, Prop #2

False

True, Prop #1

True; Prop #2/#3

EX 5: Solving Proportions. (Cross Multiplying)

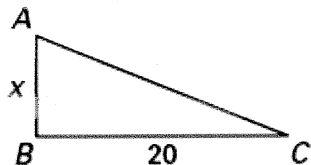
A) Solve: $\frac{2}{7} = \frac{6}{x} \Rightarrow \frac{2x}{2} = \frac{42}{2}$
 $x = 21$

B) Solve: $\frac{x-6}{4} = \frac{x}{10} \Rightarrow 10(x-6) = 4x$
 $10x - 60 = 4x$
 $-10x \quad -10x$
 $-60 = -6x$
 $\frac{-60}{-6} = \frac{-6x}{-6}$
 $10 = x$

C) Solve: $\frac{2}{3x-10} = \frac{8}{20} \Rightarrow 20(2) = 8(3x-10)$
 $40 = 24x - 80$
 $120 = 24x$
 $\frac{120}{24} = \frac{24x}{24}$
 $5 = x$

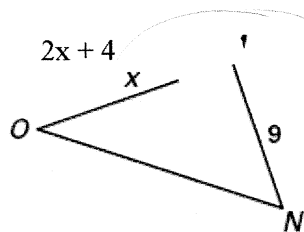
EX 6: Using Proportions.

A) $AB : BC$ 2:5. Solve for x .



$\frac{2}{5} = \frac{x}{20} \Rightarrow \frac{40}{5} = \frac{5x}{5}$
 $8 = x$

→ B) $MN : MO$ is 3:4



$\frac{3}{4} = \frac{9}{2x+4} \Rightarrow 3(2x+4) = 36$
 $6x + 12 = 36$
 $6x = 24$
 $x = 4$

EX 7: Find the geometric mean of the following numbers.

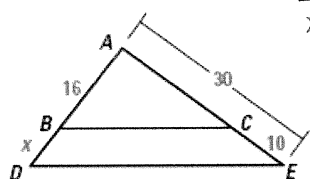
a) 36, 4 $\Rightarrow \sqrt{36 \cdot 4}$
 $= \sqrt{144}$
 $= 12$

b) 16, 25 $\Rightarrow \sqrt{16 \cdot 25}$
 $= \sqrt{400}$
 $= 20$

c) 12, 30 $\Rightarrow \sqrt{12 \cdot 30}$
 $= \sqrt{360}$
 $= 2 \cdot 3 \sqrt{2 \cdot 5} = 6\sqrt{10}$

EX 1: In the diagram $\frac{AB}{BD} = \frac{AC}{CE}$.

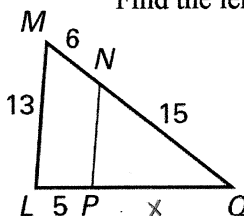
Find the length of BD.



$\frac{16}{x} = \frac{20}{10} \Rightarrow \frac{160}{20} = \frac{20x}{20}$
 $8 = x$

EX 2: In the diagram $\frac{MO}{MN} = \frac{LO}{LP}$.

Find the length of LQ.



$\frac{21}{6} = \frac{x+5}{5} \Rightarrow 105 = 6(x+5)$
 $105 = 6x + 30$
 $75 = 6x$
 $12.5 = x$

EX 3: A scale model of the Titanic is 107.5 inches long and 11.25 inches wide. The Titanic itself was 882.75 feet long. How wide was it?

$\frac{\text{Model length}}{\text{Actual length}} = \frac{\text{Model width}}{\text{Actual width}}$
 $\frac{107.5 \text{ in}}{882.75 \text{ ft}} = \frac{11.25 \text{ in}}{x}$
 $107.5x = 9,930.9375$
 $x \approx 92.38 \text{ ft}$

EX 4: You are building a scale model of your uncle's fishing boat. The boat is 62 ft long and 23 ft wide. The model will be 14 inches long. How wide should it be?

$\frac{\text{Model length}}{\text{Actual length}} = \frac{\text{Model width}}{\text{Actual width}}$
 $\frac{14 \text{ in}}{62 \text{ ft}} = \frac{x}{23 \text{ ft}}$
 $322 = 62x$
 $5.19 \text{ in} \approx x$

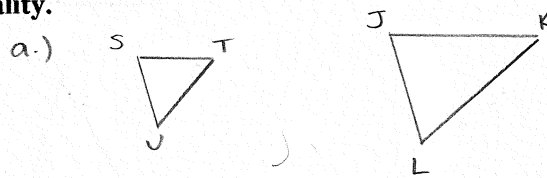
EX 1: Triangle JKL and STU are similar.

- a.) Draw a sketch (JKL is larger)
- b.) List all the pairs of congruent angles.
- c.) Write the ratios of the corresponding sides in a statement of proportionality.
- d.) Write the statement of proportionality.

b.) $\angle S \cong \angle J$
 $\angle T \cong \angle K$
 $\angle U \cong \angle L$

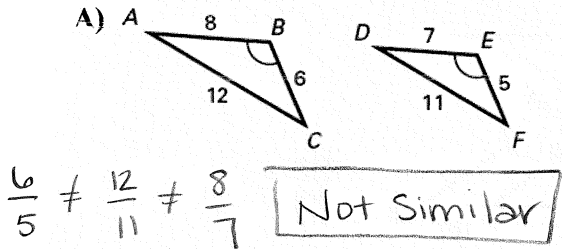
c.) $\frac{ST}{JK} = \frac{TU}{KL} = \frac{US}{LJ}$

d.) $\Delta STU \sim \Delta JKL$

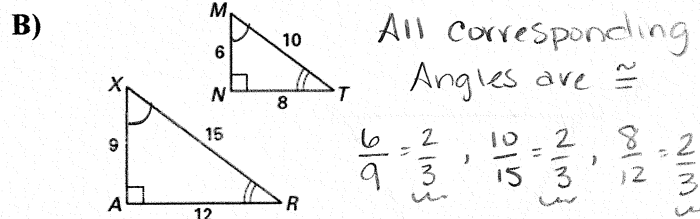


EX 2: Comparing Similar Polygons.

Decide if the figures are similar. If the figures ARE similar, write a similarity statement.



Sides are not the same proportion / scale factor.

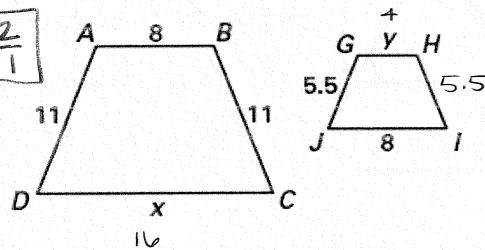


Yes, $\Delta XAR \sim \Delta MNT$ are proportional.

All corresponding sides

EX 3: Using Similar Polygons $ABCD \sim GHJ$.

A) Find the scale factor of $ABCD$ to GHJ . $\Rightarrow \frac{11}{5.5} = \frac{110}{55} = \frac{2}{1}$



B) Find the scale factor of GHJ to $ABCD$. $\Rightarrow \frac{5.5}{11} = \frac{55}{110} = \frac{1}{2}$

C) Find the values of x and y.

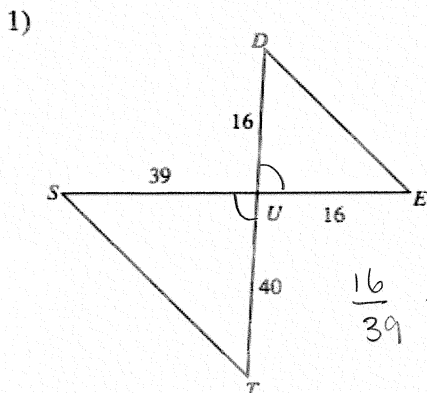
$\frac{2}{1} = \frac{8}{y} \rightarrow 2y = 8 \rightarrow y = 4$

$\frac{2}{1} = \frac{x}{8} \rightarrow x = 16$

D) Find the ratio of the perimeter of $ABCD = 46$ units to the perimeter of $GHJ = 23$ units

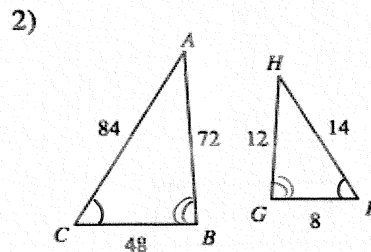
$\frac{46}{23} = \frac{2}{1}$ (same as side ratio)

EX 1: Determine if the triangles are similar. If so, state how you know they are similar and complete the similarity statement. If not, explain why.



$\Delta UTS \sim$ _____

Not Similar, does not show 2 sets of proportional sides

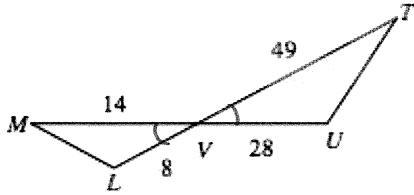


$\Delta CBA \sim \Delta FGH$ by SSS

$\frac{8}{12} = \frac{1}{3}, \frac{48}{8} = \frac{1}{3}, \frac{72}{14} = \frac{1}{3}$

All corresponding sides have the same proportion / scale factor

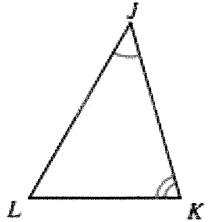
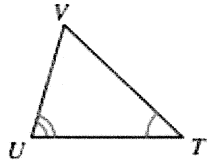
3)



$\Delta VUT \sim \Delta VLM$ by SAS

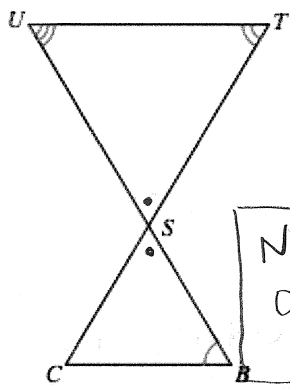
$\angle MVL \cong \angle TVU$ $\frac{8}{28} = \frac{2}{7}$ $\frac{14}{49} = \frac{2}{7}$

4)



$\Delta JKL \sim \Delta TVU$ by AA

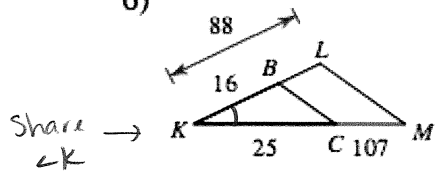
5)



Not similar; Only one set of \cong corresponding angles.

$\Delta STU \sim$ _____

6)

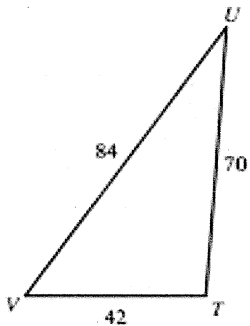


$\frac{16}{88} = \frac{2}{11}$

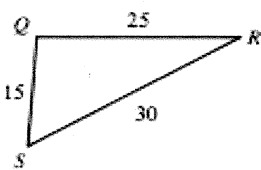
$\Delta KLM \sim$ _____ $\frac{25}{107}$

Not similar; does not have 2 sets of proportional corresponding sides

7)



$\frac{42}{15} = \frac{14}{5}$

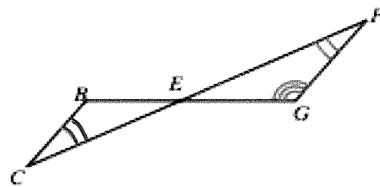


$\frac{84}{30} = \frac{14}{5}$

$\frac{70}{25} = \frac{14}{5}$

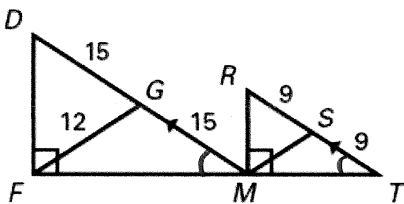
$\Delta TUV \sim \Delta QRS$ by SSS

8)



$\Delta EFG \sim \Delta ECB$ by AA

EX 2: Find the length of the altitude MS.

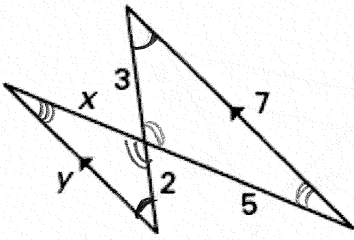


$\frac{30}{12} = \frac{18}{A} \Rightarrow \frac{30A}{30} = \frac{216}{30}$

$A = 7.2$ units

EX 3: The triangles are similar. Find the value of the variable.

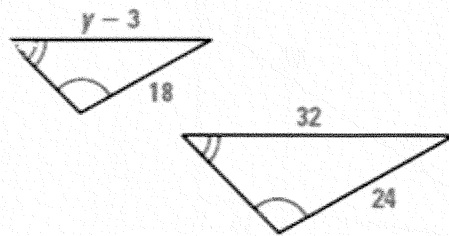
A)



$$\frac{2}{3} = \frac{y}{7} \Rightarrow \frac{14}{3} = \frac{3y}{3} \Rightarrow y = 4\frac{2}{3} \text{ units}$$

$$\frac{2}{3} = \frac{x}{5} \Rightarrow \frac{10}{3} = \frac{3x}{3} \Rightarrow 3\frac{1}{3} \text{ units} = x$$

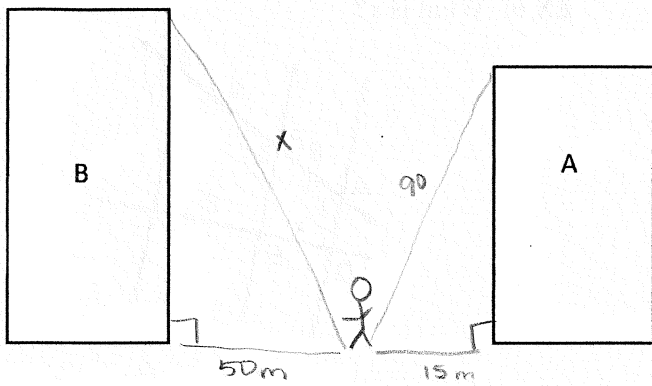
B)



$$\frac{18}{24} = \frac{y-3}{32} \Rightarrow \frac{576}{24} = \frac{24(y-3)}{24} \Rightarrow 24 = y-3 \Rightarrow y = 27 \text{ units}$$

EX 4: Using Similar Triangles.

A) You are standing 15 m from building A and 50 m from building B. Building A is 90 m tall. Find the height of building B.



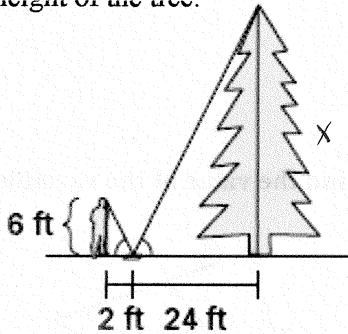
$$\frac{A}{B} \Rightarrow \frac{15}{50} = \frac{90}{x}$$

$$15x = 4500$$

$$\frac{15x}{15} = \frac{4500}{15}$$

$$x = 300 \text{ m}$$

B) Find the height of the tree.

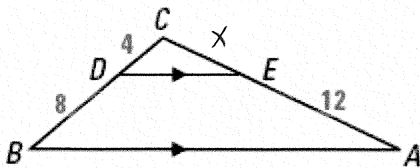


$$\frac{\text{person}}{\text{tree}} \Rightarrow \frac{2}{24} = \frac{6}{x}$$

$$\frac{2x}{2} = \frac{144}{2}$$

$$x = 72 \text{ ft}$$

EX 1: Find the length of EC.

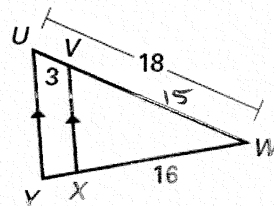


$$\frac{4}{8} = \frac{x}{12} \Rightarrow \frac{48}{8} = \frac{8x}{8}$$

$$6 = x$$

$$EC = 6 \text{ units}$$

EX 2: Find the length of YX.

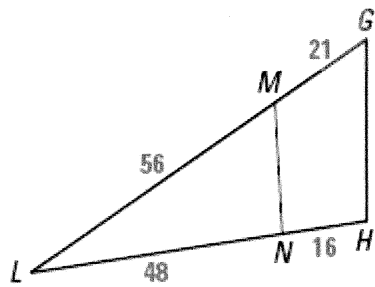


$$\frac{15}{3} = \frac{16}{x} \Rightarrow \frac{15x}{15} = \frac{48}{15}$$

$$x = 3.2$$

$$YX = 3.2 \text{ units}$$

EX 3: Determine whether $\overline{MN} \parallel \overline{GH}$.

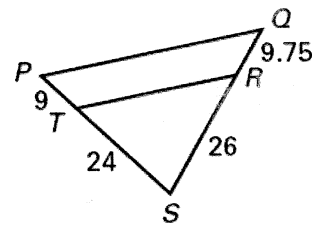


$$\frac{56}{21} = \frac{48}{16}$$

$$896 \neq 1,008$$

No, $\overline{MN} \not\parallel \overline{GH}$

EX 4: Determine whether $\overline{PQ} \parallel \overline{TR}$.

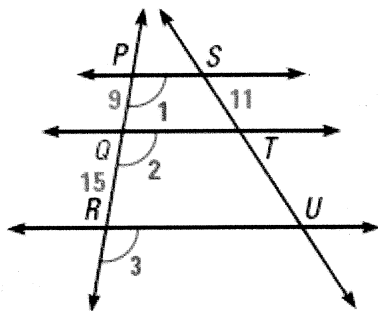


$$\frac{24}{9} = \frac{26}{9.75}$$

$$234 = 234$$

Yes; $\overline{PQ} \parallel \overline{TR}$

EX 5: What is the length of TU?



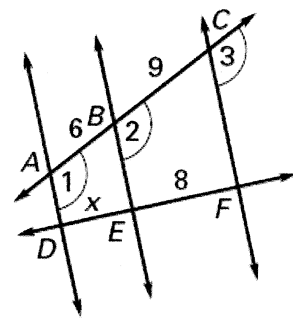
$$\frac{9}{15} = \frac{11}{x}$$

$$9x = 165$$

$$x = 18\frac{1}{3}$$

$TU = 18\frac{1}{3}$ units

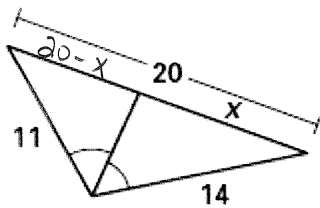
EX 6: What is x?



$$\frac{x}{8} = \frac{6}{9} \rightarrow \frac{9x}{9} = \frac{48}{9}$$

$x = 5\frac{1}{3}$ units

EX 7: Find the value of the x.



$$\frac{20-x}{x} = \frac{11}{14} \Rightarrow$$

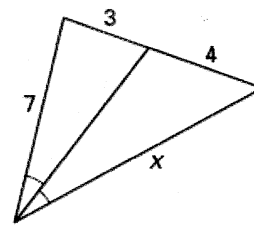
$$14(20-x) = 11x$$

$$280 - 14x = 11x$$

$$\frac{280}{25} = \frac{25x}{25}$$

11.2 units = x

EX 8: Find the value of the variables.



$$\frac{3}{4} = \frac{7}{x} \Rightarrow \frac{3x}{3} = \frac{28}{3}$$

$x = 9\frac{1}{3}$ units