

Mental Floss: Tues, Feb 21st



Solve the following proportions.

1.) $\frac{x}{4} = \frac{7}{10}$

$10x = 28$
 $x = 2.8$

2.) $\frac{x+3}{10} = \frac{4}{8}$ (Hint: $y \neq 4.625$)

$8(x+3) = 40$
 $8x + 24 = 40$
 $8x = 16$
 $x = 2$

3.) $\frac{4}{y} = \frac{y}{16}$ (Hint: More than 1 answer)

$y^2 = 64$
 $\sqrt{y^2} = \sqrt{64}$
 $y = \pm 8$

4.) $\frac{y-7}{12} = \frac{y+13}{20}$ (Hint: $y \neq 2$ or 2.5)

$20(y-7) = 12(y+13)$
 $20y - 140 = 12y + 156$
 $8y = 296$
 $y = 37$

8.1 - Ratios, Proportions, and Similarity

Definitions

Ratio = Comparison between two numbers usually written as a quotient

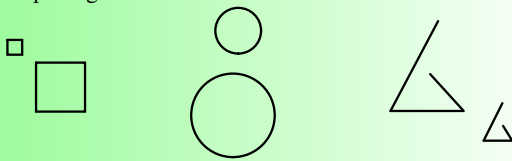
$1/2$ $1:2$ 1 to 2

Proportion: Two equivalent ratios.

$\frac{1}{2} = \frac{3}{6}$

Similar Figures - Same shape, different size

Example Figures:

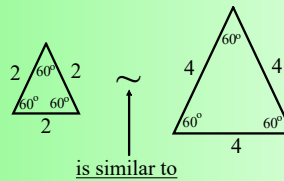


Dilations = Enlargement

Reductions = Smaller

Similar Polygons

- The ratios of the measures of corresponding sides are equal.
- Corresponding angles are congruent.

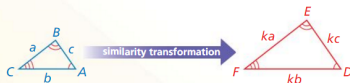


Scale Factor
Factor (multiple) by which a figure is enlarged or reduced.

Core Concept

Corresponding Parts of Similar Polygons

In the diagram below, $\triangle ABC$ is similar to $\triangle DEF$. You can write " $\triangle ABC$ is similar to $\triangle DEF$ " as $\triangle ABC \sim \triangle DEF$. A similarity transformation preserves angle measure. So, corresponding angles are congruent. A similarity transformation also enlarges or reduces side lengths by a scale factor k . So, corresponding side lengths are proportional.



Corresponding angles

$\angle A \cong \angle D, \angle B \cong \angle E, \angle C \cong \angle F$

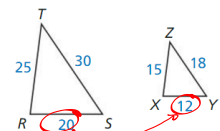
Ratios of corresponding side lengths

$\frac{DE}{AB} = \frac{EF}{BC} = \frac{FD}{CA} = k$

Example #1 Using Similarity Statements

In the diagram, $\triangle RST \sim \triangle XYZ$.

- Find the scale factor from $\triangle RST$ to $\triangle XYZ$.
- List all pairs of congruent angles.
- Write the ratios of the corresponding side lengths in a statement of proportionality.



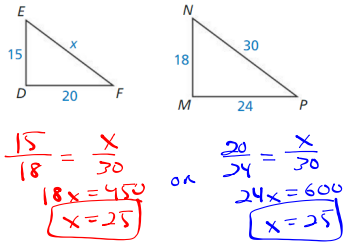
a) $\frac{20}{12} = \frac{5}{3}$

c) $\frac{RS}{XY} = \frac{ST}{YZ} = \frac{RT}{XZ}$

b) $\angle R \cong \angle X$
 $\angle S \cong \angle Y$
 $\angle T \cong \angle Z$

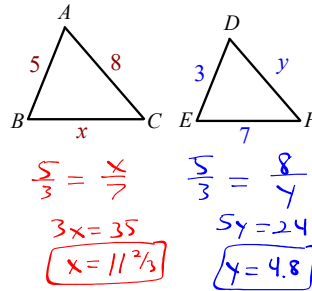
Example #2 Finding a Corresponding Length

In the diagram, $\triangle DEF \sim \triangle MNP$. Find the value of x .

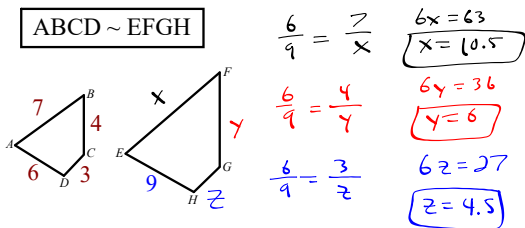


Example #3 Find the values of x and y .

$\triangle ABC \sim \triangle DEF$



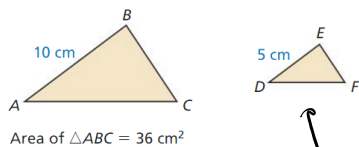
Example #6 Find measures of the missing sides EF, FG, and GH.



Ratio of corresponding sides: $\frac{4}{7}$
 Ratio of perimeters: $\frac{4}{7}$
 Ratio of areas: $\frac{16}{49}$

Example #9 Finding Areas of Similar Polygons

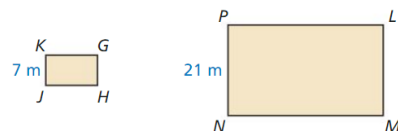
In the diagram, $\triangle ABC \sim \triangle DEF$. Find the area of $\triangle DEF$.



RATIOS:
 SIDES: $\frac{10}{5} = \frac{2}{1}$
 PERIM: $\frac{2}{1}$
 AREA: $\frac{4}{1}$
 $\frac{4}{1} = \frac{36}{A}$
 $4A = 36$
 $A = 9 \text{ cm}^2$

Example #10

In the diagram, $GHIK \sim LMNP$. Find the area of $LMNP$.



RATIOS:
 SIDES: $7:21 \rightarrow 1:3$
 PERIM: $1:3$
 AREA: $1:9$
 $\frac{1}{9} = \frac{84}{A}$
 $A = 9 \cdot 84$
 $A = 756 \text{ m}^2$