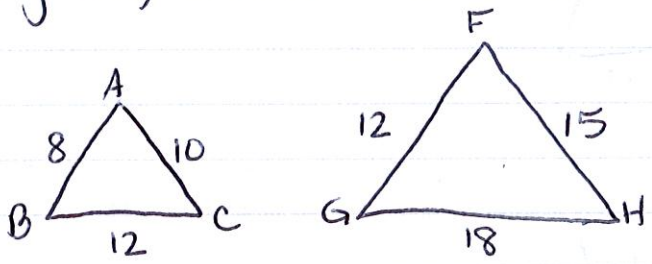
2-8 Proportions and Similar Figures

The symbol ~ means "is similar to." In the diagram, $\triangle ABC \sim \triangle FGH$.



* In similar figures, the measures of corresponding angles are equal, and corresponding side lengths are in proportion. The order of the letters when you name similar figures is important because it tells you which parts of the figures are corresponding parts. , because $\triangle ABC \sim \triangle FGH$, the following is true.

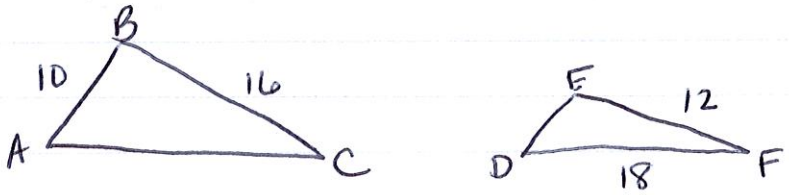
$\angle A \cong \angle F$ $\angle B \cong \angle G$ $\angle C \cong \angle H$ and $\frac{AB}{FG} = \frac{AC}{FH} = \frac{BC}{GH}$

↑ The symbol $\cong$ means "is congruent to." Congruent angles have the same measure.

↑ The ratios are equal.

Finding the Length of a Side

$\triangle ABC \sim \triangle DEF$. What is DE?



large / small $\frac{BC}{EF} = \frac{AB}{DE}$

$\frac{16}{12} = \frac{10}{DE}$

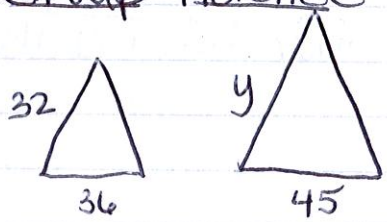
$16(DE) = 12(10)$

$\frac{16(DE)}{16} = \frac{120}{16}$

$\boxed{DE = 7.5}$

2-8 Proportions and Similar Figures
Group Practice

(1)



small $\frac{32}{y} = \frac{36}{45}$
large

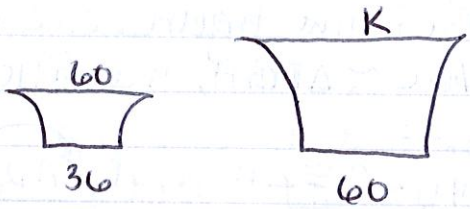
$36y = 32(45)$

$36y = 1440$

$\frac{36y}{36} = \frac{1440}{36}$

$y = 40$

(2)



$\frac{\text{small}}{\text{large}} = \frac{60}{36} = \frac{K}{60}$

$60(60) = 36K$

$3600 = 36K$

$\frac{3600}{36} = \frac{36K}{36}$

$\boxed{100 = K}$

2-8 Proportions and Similar Faures

) The sun's rays strike the building and the girl at the saem angle, forming the two similar trianges. How tall is the building?

2) A man who is 6 ft tall is standing next to a flagepole. The shadow of the man is 3.5 ft. and the shadow of the flagpol is 17.5 ft. What is the height of the flagpole?

) A student who is 5.25 ft tall is standing next to a tree. The shadow of the student is 20 ft and the shadow of the tree is 80 ft. What is the height of the tree?

) A giant model heart is shown. The heart is the ideal size for a person who is 170 ft tall. About what size would you expect the heart of a man who is 6 ft tall to be?

) A scale model of a buiding is 6 in. tall. The scale of the mode is 1 in : 50 ft. How tall is the actual buiding?

) One inch represents 12 mi on a map. If the distance between two buildings is 4 inc. one the map, wat is the actual distance?

) A model of a new campus building is 5 in. tall. If 1 in. represents 8.5 ft., how tall will the building be?

① $\frac{\text{girl}}{\text{building}} = \frac{\text{girl's shadow}}{\text{building shadow}} = \frac{\text{girl's height}}{\text{building's height}}$

$$\frac{3}{15} = \frac{5}{x}$$

$$3x = 15(5)$$

$$3x = 75$$

$$\frac{3x}{3} = \frac{75}{3}$$

$$\boxed{x = 25}$$

② $\frac{\text{man}}{\text{flagpole}} = \frac{\text{man's height}}{\text{flagpole's height}} = \frac{\text{man's shadow}}{\text{flagpole's shadow}}$

$$= \frac{6}{x} = \frac{3.5\text{ft}}{17.5\text{ft}}$$

$$3.5x = 6(17.5)$$

$$3.5x = 105$$

$$\frac{3.5x}{3.5} = \frac{105}{3.5}$$

$$\boxed{x = 30}$$

③ $\frac{\text{student}}{\text{tree}} = \frac{\text{student height}}{\text{tree height}} = \frac{\text{student shadow}}{\text{tree shadow}}$

$$\frac{5.25\text{ft}}{x} = \frac{20\text{ft}}{80\text{ft}}$$

$$20x = 420$$

$$\frac{20x}{20} = \frac{420}{20} \qquad \boxed{x = 21}$$

2-8 Proportions and Similar Figures

Scale Drawing: a drawing that is similar to an actual object. Examples: Blueprints and maps.

* In a scale drawing, the ratio of any length on the drawing to the actual length is always the same.
* This ratio is the scale *

(4) $\frac{\text{giant}}{\text{regular size}} = \frac{\text{giant height of heart}}{\text{height of heart}} = \frac{\text{height of giant person}}{\text{height of regular man}}$

$= \frac{14\text{ ft}}{x} = \frac{170\text{ ft}}{6\text{ ft}}$

$170x = 14(6)$

$170x = 84$

$\frac{170x}{170} = \frac{84}{170}$

$\boxed{x \approx .49\text{ ft}}$

(5) $\frac{1\text{ in}}{50\text{ ft}} = \frac{6\text{ in}}{x\text{ ft}}$

$50(6) = 1(x)$

$\boxed{300\text{ ft} = x}$

(6) $\frac{\text{map distance}}{\text{actual distance}} = \frac{1\text{ in}}{12\text{ mi}} = \frac{4\text{ in}}{x\text{ mi}}$

$12(4) = 1(x)$

$\boxed{48\text{ mi} = x}$

(7) $\frac{\text{Model}}{\text{Actual}} = \frac{5\text{in}}{x} = \frac{1\text{in}}{8.5\text{ft}}$ $\boxed{x = 42.5\text{ ft}}$

$1x = 5(8.5)$