Name: _____ Unit 7- Similarity Day 3

Ratios, Proportions, and Similar Figures

1. What is the ratio of boys to girls in this class? 12 15 $\frac{12}{15}$ or 12:15

2. What is the ratio of girls to students in this class? $\frac{15}{27}$ or 15:27

3. To solve a proportion, you cross multiply.

Example 1: Solve $\frac{4x-5}{3} = \frac{26}{6}$

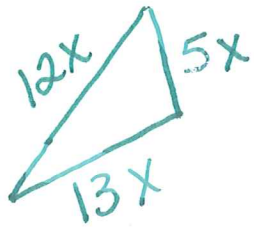
$6(4x-5) = 3(26)$

$24x - 30 = 78$

$24x = 108$

$\boxed{x = 4.5}$

Example 2: In a triangle, the ratio of measures of 3 sides is 5:12:13 and the perimeter is 90 inches. Find the measure of the *shortest* side.



$5x + 12x + 13x = 90$

$30x = 90$

$x = 3$

Shortest side:

$5x = 5(3)$

$= \boxed{15 \text{ in.}}$

Two polygons that have exactly the same shape but not necessarily the same size are similar.

Two polygons are congruent if that have exactly the same shape & size.

Similar figures must have:

1. ≅ corresponding angles AND
2. sides that are proportional (same side length ratio or SLR)

Congruent figures must have:

1. all ≅ sides
2. all ≅ angles

The ratio of the sides is called the scale factor.

Are congruent figures also similar? Why or why not?

Yes. They have a SLR 1:1

Are similar figures congruent? Why or why not?

No (not always). they do not have to be the same size to be similar but must be same size to be ≅

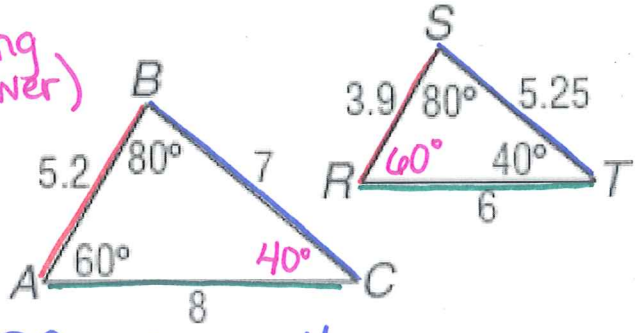
Determine whether each statement is sometimes, always, or never true.

a. Two equilateral triangles are congruent. sometimes true
b. An equilateral triangle is similar to a scalene triangle. never true
c. Two rectangles are similar. Sometimes true
d. Two isosceles right triangles are congruent. sometimes true
e. Two isosceles right triangles are similar. always true
f. Two rectangles in which the length is twice the width are similar. always true

Example 3: Determine if the triangles are similar.

Are corresponding angles equal? (Find the missing ∠s first to answer)

Yes



Are corresponding sides proportional? Yes

$\frac{AB}{RS} = \frac{5.2}{3.9} = \frac{4}{3}$ $\frac{AC}{RT} = \frac{8}{6} = \frac{4}{3}$ $\frac{BC}{ST} = \frac{7}{5.25} = \frac{4}{3}$

Similarity Statement:

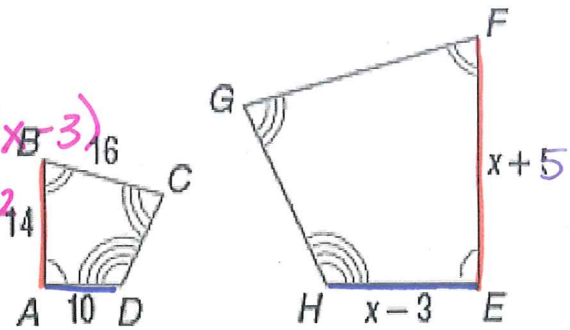
$\triangle ABC \sim \triangle RST$ b/c corresponding angles are $\cong$ and SLR are =.

Example 4: Quadrilateral $ABCD$ ~ Quadrilateral $EFGH$

a) Find x.

$\frac{AB}{EF} = \frac{AD}{HE} \rightarrow \frac{14}{x+5} = \frac{10}{x-3}$

$10(x+5) = 14(x-3)$
$10x+50 = 14x-42$
$4x = 92$
$x = 23$



b) Find the scale factor

$\frac{HE}{AD} = \frac{x-3}{10} = \frac{23-3}{10} = \frac{20}{10} = 2$ ← SLR or scale factor

c) Find GF.

$\frac{GF}{BC} = \frac{2}{1}$ $\frac{GF}{16} = \frac{2}{1}$ $32 = GF$

↑ what we want to find ↑ SLR

Example 5: Find the measurements.

$QUAD \sim SIML$

SL = $\frac{26}{5}$

MI = 10

$\angle D$ = 120°

$\angle U$ = 85°

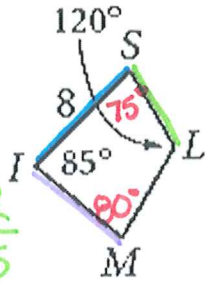
$\angle A$ = 80°

$SLR = \frac{SI}{QU} = \frac{8}{20} = \frac{2}{5}$

$\frac{SL}{QD} = \frac{SI}{QU} \rightarrow \frac{x}{13} = \frac{2}{5}$

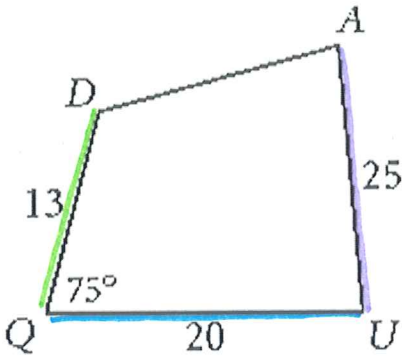
$26 = 5x$

$x = \frac{26}{5}$



$75 + 85 + 120 = 280$

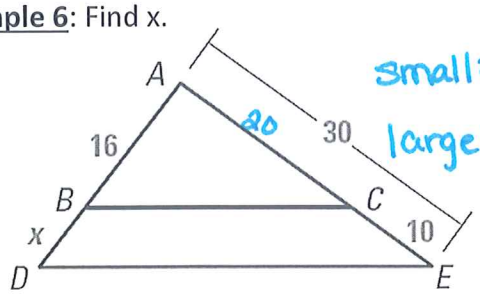
$360 - 280 = 80$



$\frac{MI}{UA} = \frac{2}{5} \rightarrow \frac{x}{25} = \frac{2}{5} \rightarrow 50 = 5x$

$x = 10$

Example 6: Find x.



small: $\frac{AB}{AD} = \frac{AC}{AE} \rightarrow \frac{16}{16+x} = \frac{20}{30}$

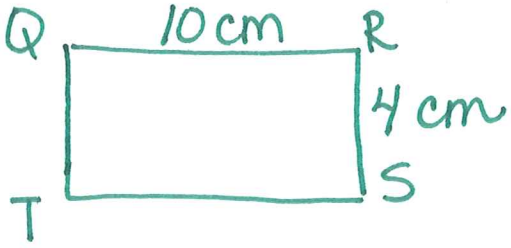
large:

$320 + 20x = 480$

$20x = 160$

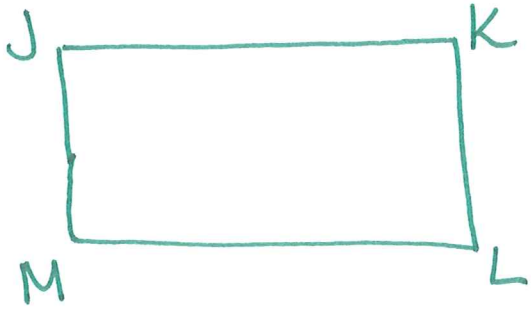
$\boxed{x = 8}$

Ex 7: Rectangle QRST is similar to rectangle JKLM with a scale factor of 1.5. If the length and width of rectangle QRST are 10 cm and 4 cm, what are the length and width of rectangle JKLM?



length = 10 (SLR) = 10 (1.5)

length = 15 cm



width: 4 (SLR) = 4 (1.5)

width = 6 cm

Similar Polygons - Individual Practice

All measurements are in centimeters.

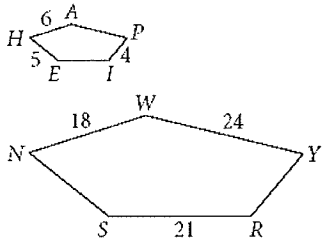
1. $HAPIE \sim NWYRS$

$AP =$ _____

$EI =$ _____

$SN =$ _____

$YR =$ _____



2. Find the measurements.

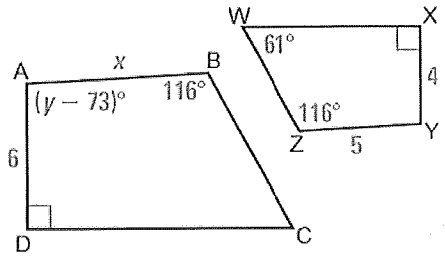
$ABCD \sim YZWX$

AB = _____

y = _____

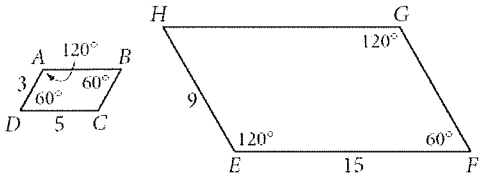
$\angle A =$ _____

$\angle C =$ _____

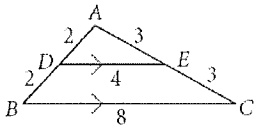


In Exercises 3–6, decide whether or not the figures are similar. Explain why or why not.

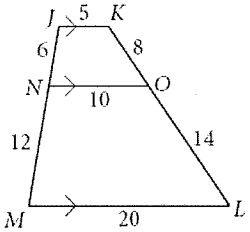
3. $ABCD$ and $EFGH$



4. $\triangle ABC$ and $\triangle ADE$



5. $JKON$ and $JKLM$



6. $ABCD$ and $AEFG$