Congruent and Similar Figures

Objectives:

...to identify polygons that are similar and/or congruent (given either measurements or tic and angle marks)

...to identify corresponding sides and/or angles of similar polygons

...to use proportions to determine if two figures are similar and to do indirect measurements

Assessment Anchor:

7.A.2.2 – Solve problems using ratios, proportions, percents and/or rates

7.C.1.2 – Identify congruence and/or similarity in polygons

Vocabulary alert!!

CONGRUENT FIGURES – figures that have the same shape and the same size

SIMILAR FIGURES – figures that have the same shape, but not necessarily the same size
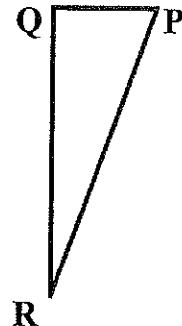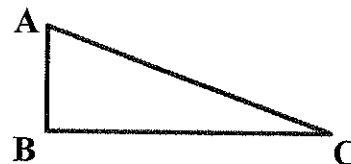
NOTES

Congruent figures have corresponding parts (angles and sides) that are also congruent. There are a few ways that we can prove figures to be congruent...but we'll focus right now on simply identifying them as being congruent, and also identifying their corresponding (matching) parts.

Symbol for congruence

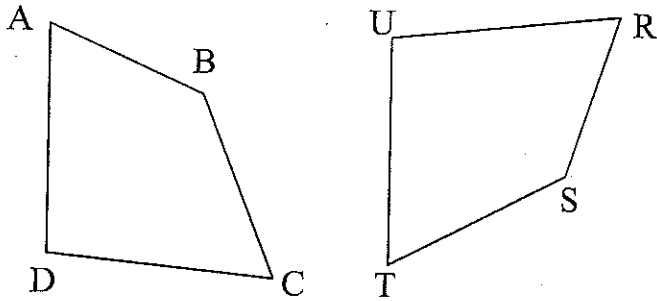$\downarrow$

$\triangle$ ABC $\cong$ $\triangle$ PQR

This statement says that the two triangles are congruent, and therefore each corresponding part is congruent.
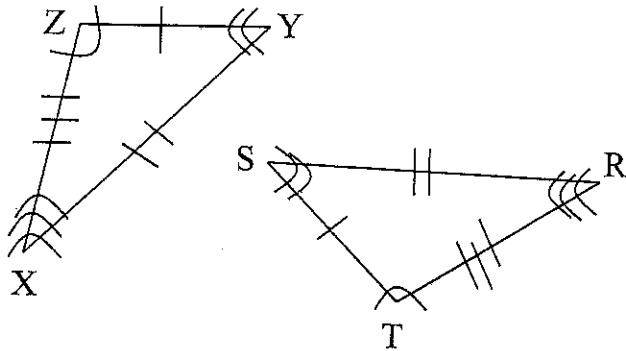
Congruence statements:

Congruent and Similar Figures

Given: ABCD ≅ RSTU

∠A ≅ _____
∠C ≅ _____
∠D ≅ _____

$\overline{AB}$ ≅ _____

$\overline{DA}$ ≅ _____

$\overline{ST}$ ≅ _____

- -

Given:

Δ XYZ ≅ _____

∠Z ≅ _____

∠R ≅ _____

$\overline{YZ}$ ≅ _____

$\overline{TS}$ ≅ _____

- -

***Remember, if these corresponding parts are congruent, that means they have the exact same measurements!

Given: ABCDE ≅ JKLMN
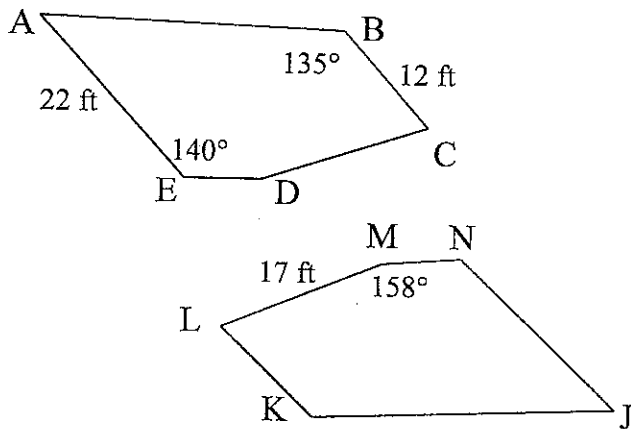
JN = _____

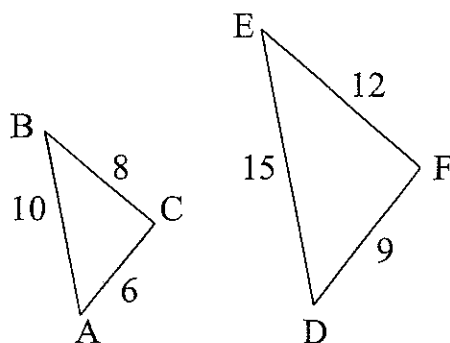DC = _____

KL = _____

m∠D = _____

m∠K = _____

Congruent and Similar Figures

Similar figures have corresponding angles that are congruent, but their corresponding sides are not the same...they are proportional.

Symbol for similarity

↓

Δ ABC ~ Δ DEF
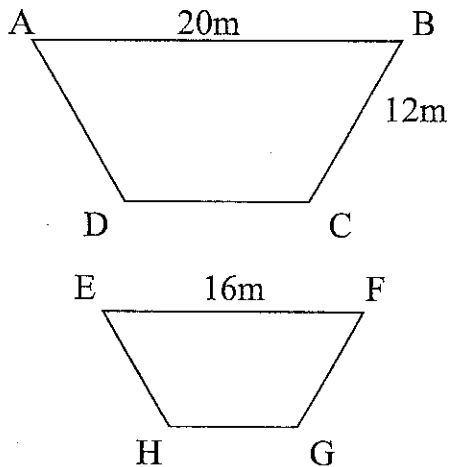
$$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$$

$$\frac{10}{15} = \frac{8}{12} = \frac{6}{9}$$

↓   ↓   ↓

$$\frac{2}{3} \qquad \frac{2}{3} \qquad \frac{2}{3}$$

Given: ABCD ~ EFGH

Find the length of $\overline{FG}$.
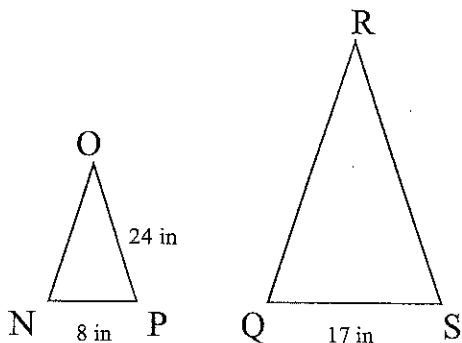
Set up proportion: $\dfrac{AB}{EF} = \dfrac{BC}{FG}$

$$\frac{20}{16} = \frac{12}{x}$$

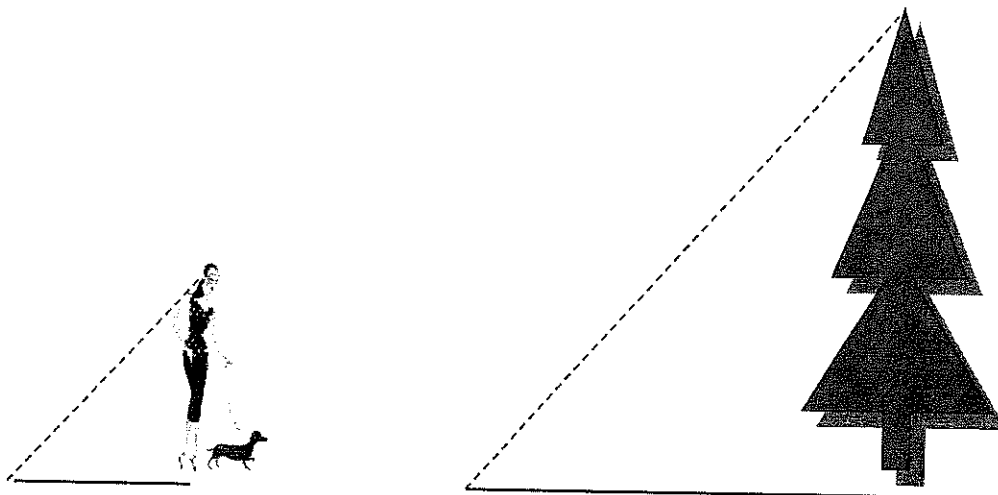Solve proportion:

FG = _____

Given: NOP ~ QRS

Find the length of $\overline{RS}$.

Congruent and Similar Figures

Indirect Measurement uses similar figures to compute distances that are difficult to measure.

Given: A tree casts a shadow that is 10 feet long. A woman who is 5 feet tall casts a shadow that is 4 feet long. Two similar triangles are created. How tall is the tree?
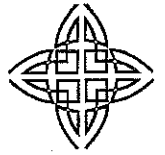

Given: A 6 foot tall man casts a shadow that is 4.5 feet long. A telephone pole casts a shadow that is 15.6 feet long. Two similar triangles are created. How tall is the telephone pole?
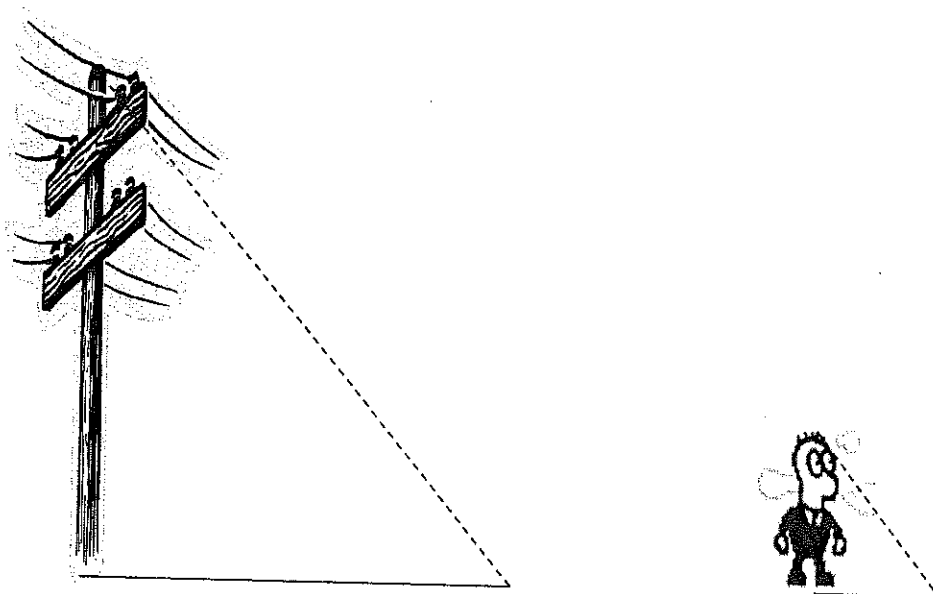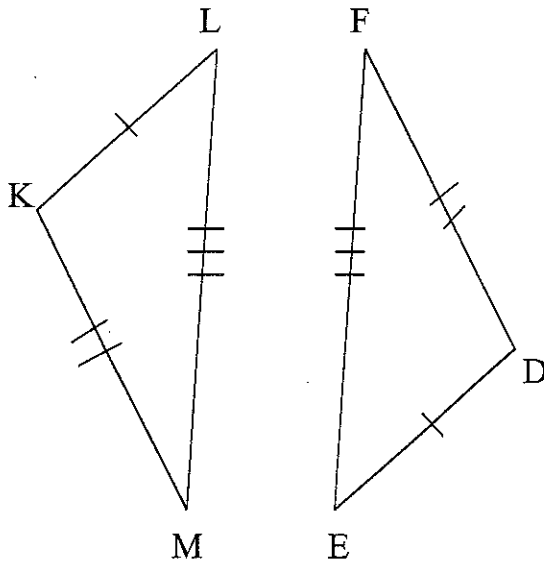
Congruent/Similar Figures – Worksheet #1

1) Given:

KLM ≅ _____

$\overline{DE}$ ≅ _____

$\overline{MK}$ ≅ _____

$\overline{FE}$ ≅ _____
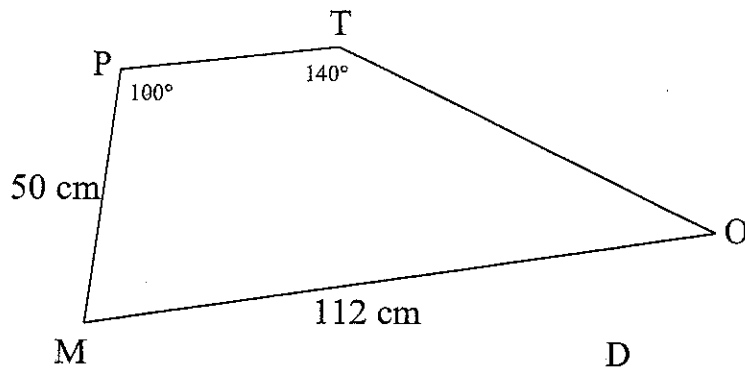
∠ M ≅ _____

∠ F ≅ _____

∠ K ≅ _____

2)   Given: PTOM ≅ CBAD

PT = _____

DA = _____

TO = _____

CD = _____
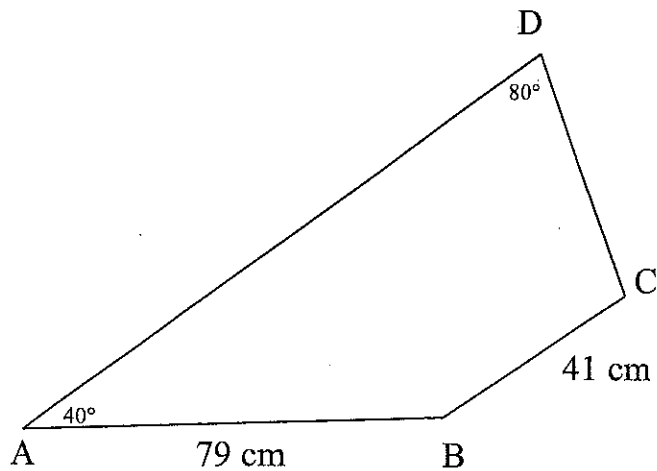
m∠ B = _____

m∠ O = _____

m∠ M = _____

m∠ C = _____

Congruent/Similar Figures – Worksheet #1

3)

Given: ABCD ≅ ZWXY

$\overline{DC} \cong$ _____

$\overline{CB} \cong$ _____

$\overline{AD} \cong$ _____

$m\angle W =$ _____

$m\angle Y =$ _____

$m\angle X =$ _____
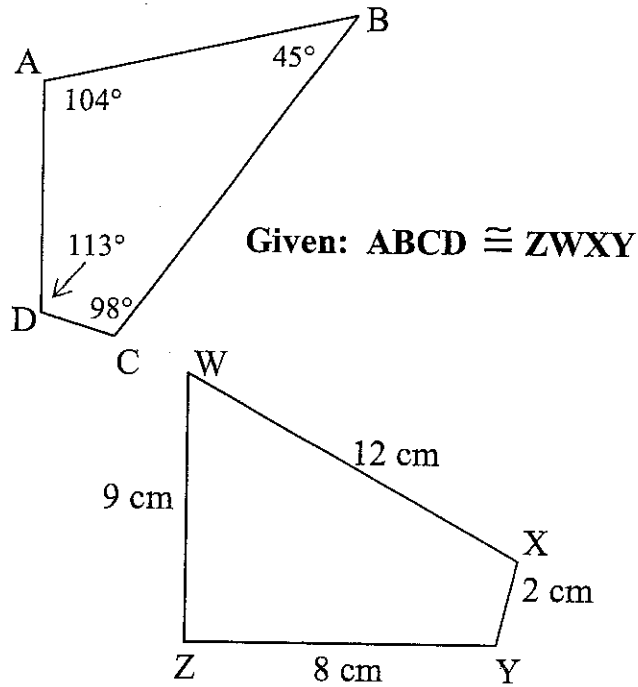
Cumulative Review

1) $5\frac{3}{8} - 2\frac{1}{10} =$

2) $2\frac{2}{3} \times 4\frac{1}{5} =$

3) $8.464 \div 0.04 =$

4) $48.13 + 137 =$

5) Change 5.5% to a fraction in simplest form.
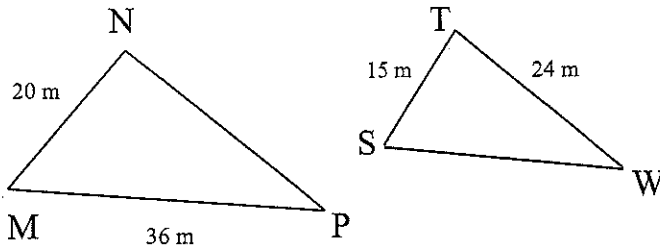
6) $59 - 24 \div 8 \times 3 + 41$
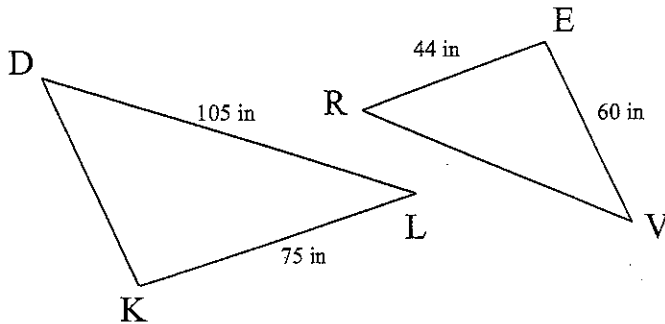
Congruent/Similar Figures – Worksheet #2

Use proportions to find the lengths of the missing sides.

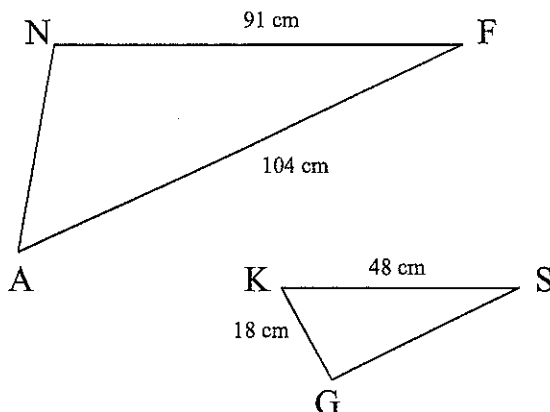1) **Given:** $\triangle MNP \sim \triangle STW$ SW = _____

N
20 m

M   36 m   P

T
15 m   24 m
S
W

2) **Given:** $\triangle DKL \sim \triangle REV$ RV = _____

E
44 in

D
105 in   R   60 in

L
75 in   V

K

3) **Given:** $\triangle ANF \sim \triangle KGS$ AN = _____

N   91 cm   F

104 cm

A   K   48 cm   S

18 cm

G

Congruent/Similar Figures – Worksheet #2

4)   **Given:**   *DONT ~ WALK*   ON = _____

- -
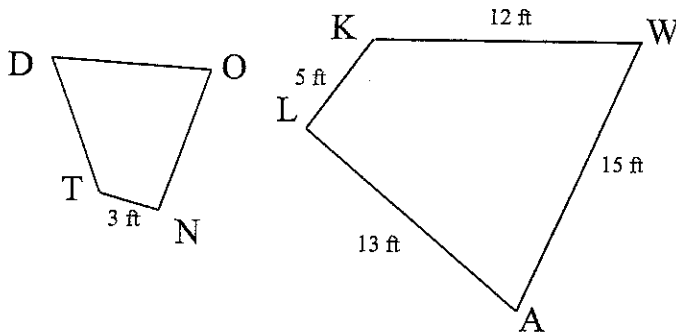
5)   If we are given: MUST ~ WORK

a) Which angle corresponds to $\angle$ R? _____   Do they have the same measure? _____

b) Which segment corresponds to $\overline{ST}$? _____   Do they have the same measure? _____

6)   If we are given:
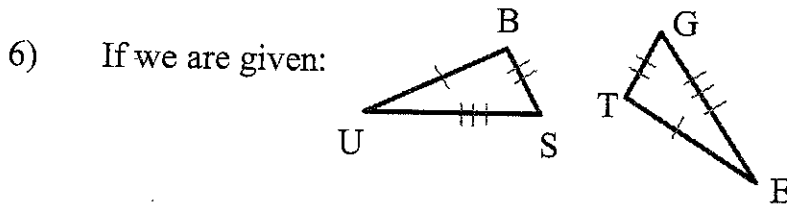
a) What is true about the two triangles? _____

b) Which angle corresponds to $\angle$ S? _____

c) Which segment corresponds to $\overline{ET}$? _____

- -
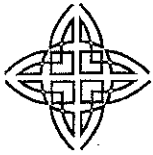
Definitions – Review
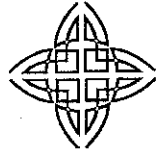
Congruent figures - _____

Similar figures - _____

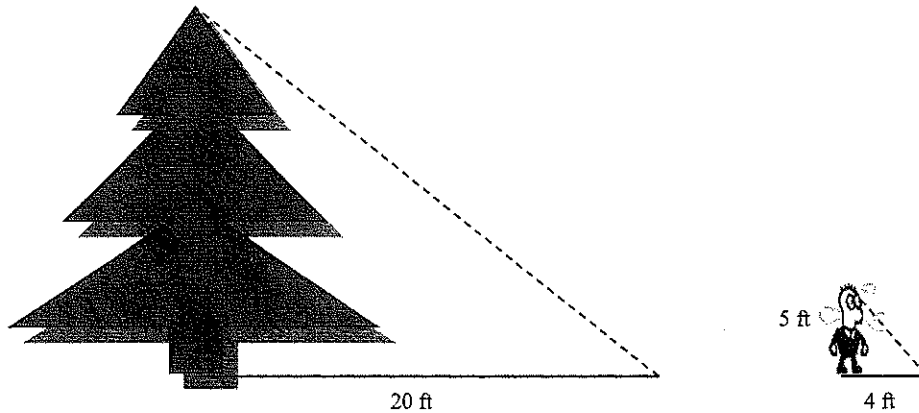Corresponding parts - _____

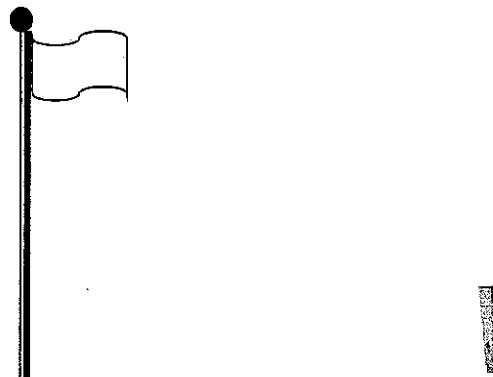Proportion - _____

Congruent/Similar Figures – Worksheet #3

Use indirect measurement to answer the questions.

1) Given: How tall is the tree? _____

5 ft

20 ft   4 ft

2) Given:

A meter stick casts a shadow 1.4 m long at the same time a flagpole casts a shadow 7.7 m long. The two triangles formed are similar. How tall is the flagpole?

3) Given: A telephone pole casts a shadow that is 15.5 feet long. A 5-foot tall boy casts a shadow that is 3.25 feet long. How tall is the telephone pole? <u>HINT: Draw your own picture of this situation!</u>
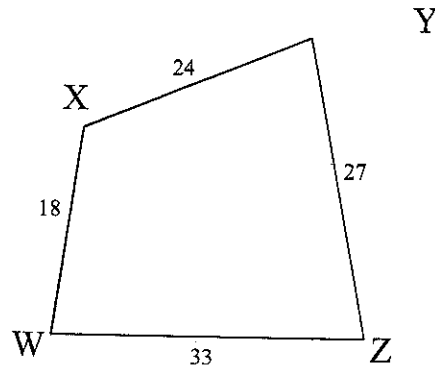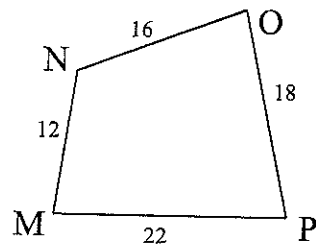
Congruent/Similar Figures – Worksheet #3

4)   Given: $\triangle ABC \sim \triangle HBT$ BC = _____
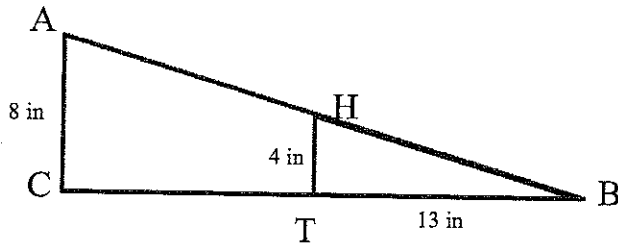
5)   Given: A memorabilia collector secures a valuable photo that is 20 inches wide and 24 inches tall. If he matts and frames it in a frame that is 36 inches tall, how wide is the frame? **(HINT: Draw a picture!)**

6)   Given:

A.   Set up four ratios to compare the sides of MNOP to those of WXYZ.

B.   Write each ratio in **Part A** in lowest terms (simplest form).

C.   Are quadrilaterals MNOP and WXYZ similar? **EXPLAIN** your answer.

_____

_____

_____