

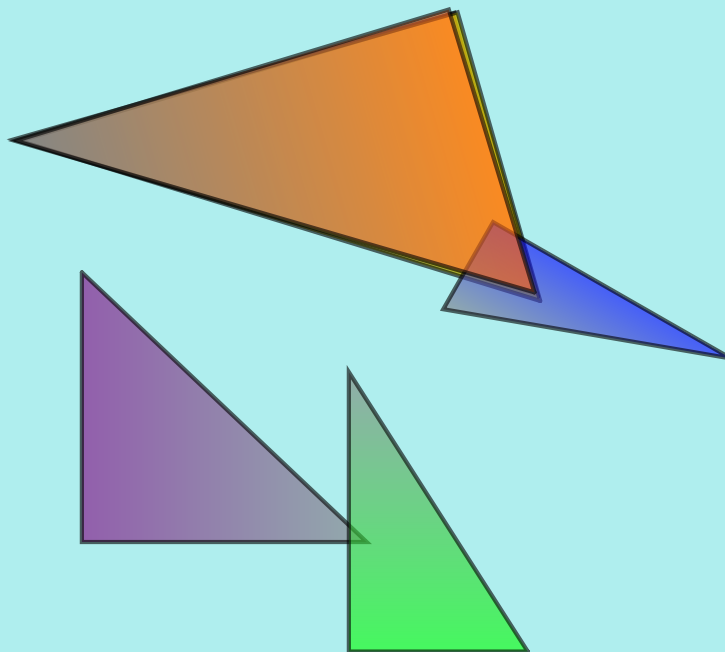
## Unit 5 - Trigonometry Congruent & Similar Triangles

May 9/2016

Definitions:

1. Ratio - a relationship between two quantities, usually expressed as a fraction.  $\frac{3}{5}$  or 3:5
2. Proportional - all ratios between corresponding sides are equal between two objects, and the ratio is called the scale factor.
3. Congruent - two objects are congruent if they have the same dimensions and shape (the scale factor is 1)
4. Similar - objects are proportional, but not congruent (the scale factor is not 1)

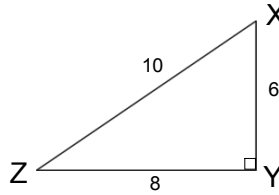
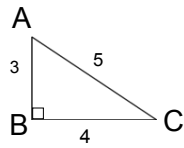
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Which shapes are congruent? proportional? *similar?*

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Ex.1 Are the triangles congruent? Similar? Neither?

(a)



$\triangle ABC$

$\triangle XYZ$

1. Corresponding sides?
2. Calculate ratios

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

$$\frac{BC}{YZ} = \frac{4}{8} = \frac{1}{2}$$

$$\frac{AC}{XZ} = \frac{5}{10} = \frac{1}{2}$$

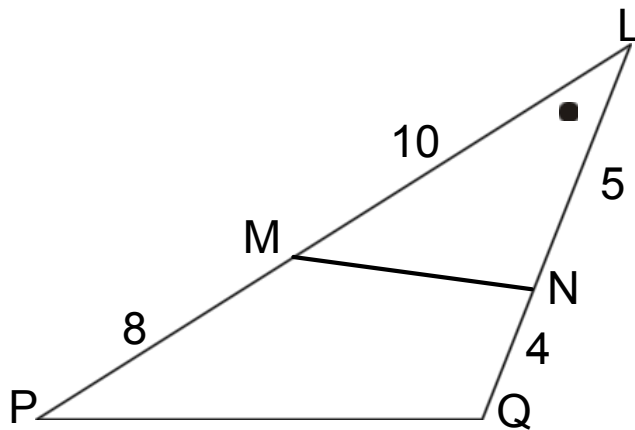
$\therefore$  all ratios are the same

$\therefore$  ratios are NOT 1

$\therefore \triangle ABC \sim \triangle XYZ$  (SSS~)  
 "is similar to"

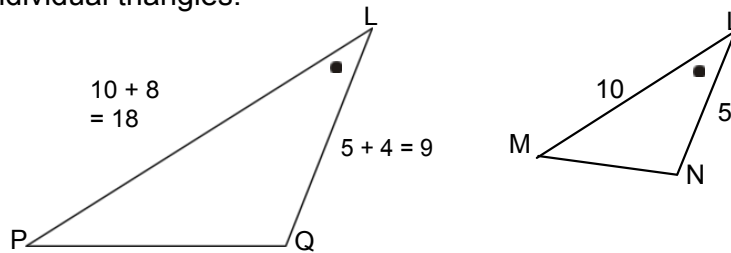
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(b)



May 8 - 2:09 PM

Recommend breaking overlapping triangles into individual triangles.



$$\begin{array}{l} \triangle LMN \\ \triangle LPQ \end{array} \quad \frac{LM}{LP} = \frac{10}{18} = \frac{5}{9} \quad \frac{LN}{LQ} = \frac{5}{9}$$

$$\frac{MN}{PQ} = \frac{?}{?} \quad \left. \vphantom{\frac{MN}{PQ}} \right\} \text{because of the shared angle, these sides has ratio } \frac{5}{9}$$

May 17-9:45 PM

Summary:

If  $\triangle ABC$  is similar to  $\triangle XYZ$ , we write:

$$\triangle ABC \sim \triangle XYZ$$

\* the order that we write the vertices is important

We can show similarity (or congruence) by:

- (a) side-side-side similarity (SSS~)
- (b) side-angle-side similarity (SAS~)
- (c) angle-angle similarity (AA~)

Dec 3-11:12 PM

In similar triangles

- corresponding sides are proportional  
(i.e., the ratios are equal)
- corresponding angles are equal.

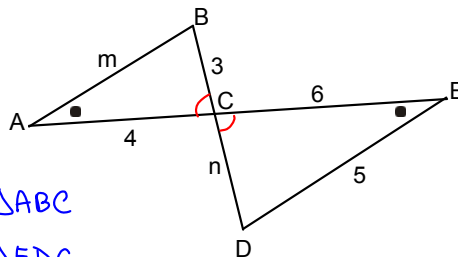
Given  $\triangle ABC \sim \triangle XYZ$

Ratios:  $\frac{AB}{XY} = \frac{BC}{YZ} = \frac{AC}{XZ}$

Angles:  $\angle A = \angle X$   
 $\angle B = \angle Y$   
 $\angle C = \angle Z$

Dec 3-11:12 PM

Ex.2 Determine the value of m & n.



$\triangle ABC$

$\triangle EDC$

$\angle A = \angle E$  (given)  $\therefore \triangle ABC \sim \triangle EDC$   
 $\angle ACB = \angle ECD$  (VAT) (AA  $\sim$ )

$$\frac{AB}{ED} = \frac{BC}{DC} = \frac{AC}{EC}$$

$$\frac{m?}{5\checkmark} = \frac{3\checkmark}{n?} = \frac{4\checkmark}{6\checkmark}$$

$$\frac{m}{5} = \frac{4}{6}$$

$$\frac{3}{n} = \frac{4}{6}$$

$$6m = 20$$

$$\frac{3}{n} = \frac{2}{3}$$

$$m = \frac{20}{6}$$

$$2n = 9$$

$$m = \frac{10}{3}$$

$$n = \frac{9}{2}$$

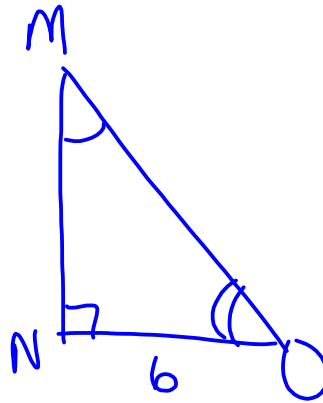
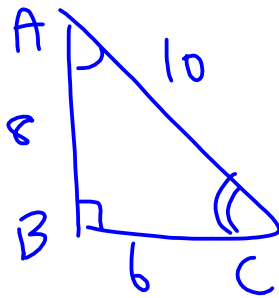
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Assigned Work:

Read p.374 - 378

Answer p.378 # 1, 2, 4ac, 5, 6, 7ab, 8cd, 13  
a

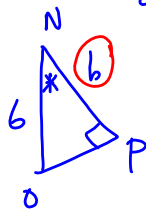
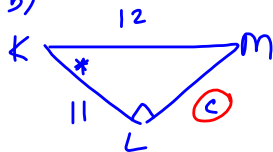
2(a)



$$\frac{BC}{NO} = 1$$

May 8 - 2:27 PM

7(b)



$\triangle KLM \sim \triangle NPO$   
(AA~)

$$\frac{KL}{NP} = \frac{LM}{PO} = \frac{KM}{NO}$$

$$\frac{11}{6} = \frac{c}{PO} = \frac{12}{12}$$

$$\frac{11}{6} = \frac{12}{6}$$

$$\frac{11}{6} = \frac{2}{1}$$

$$2b = 11$$

$$b = \frac{11}{2}$$

$$c^2 + 11^2 = 12^2$$

May 10-1:56 PM

8(c)

$\triangle ACE$  isosceles  
 $f = h$   
 $f + h + 70^\circ = 180^\circ$   
 $2f = 110^\circ$   
 $f = 55^\circ$   
 $h = 55^\circ$

$g = 4$

May 10-2:04 PM

13.

$\triangle ABC \sim \triangle XYZ$  (AA~)

$\frac{AB}{XY} = \frac{BC}{YZ} = \frac{AC}{XZ}$   
 $\frac{AB}{XY} = \frac{2}{25} = \frac{3}{h}$

$\frac{2}{25} = \frac{3}{h}$   
 $2h = 75$   
 $h = \frac{75}{2}$   
 $h = 37.5$

$\therefore$  the height of the building is 37.5m.

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