Notes for Lesson 7-3: Similar Polygons
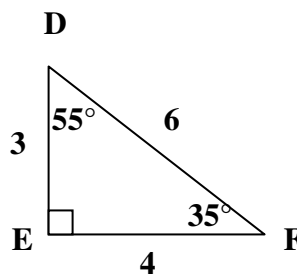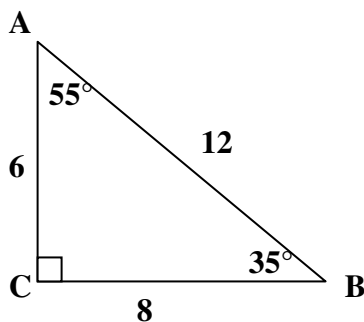
Two polygons are similar if their vertices can be paired so that:
1) Corresponding angles are congruent
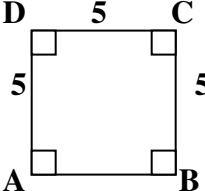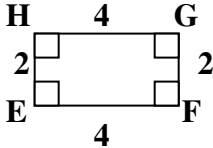2) Corresponding sides are in proportion (their lengths are all based on the same ratio)

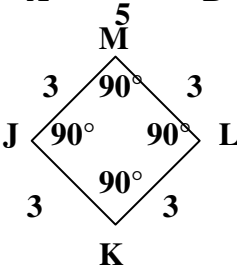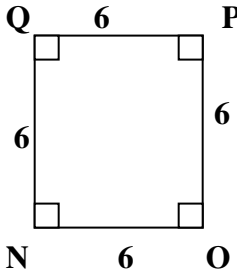When naming similar polygons you must list their congruent vertices in the same order.

A triangle with vertices A (top), C (bottom left), B (bottom right): angle A = 55°, side AC = 6, side AB = 12, angle B = 35°, side CB = 8, right angle at C.

A triangle with vertices D (top), E (bottom left), F (bottom right): angle D = 55°, side DE = 3, side DF = 6, angle F = 35°, side EF = 4, right angle at E.

Similar to

For the triangles above we can say that ΔABC ~ ΔDFE since m< A = m< D, m< B = m< F, m< C = m< E and all the sides of ΔABC are in a ratio of 2:1 with the sides from ΔDFE.

Ex 1: Use the measures for the given pictures to decide if the following are similar shapes.

a) ABCD and EFGH **NO** b) ABCD and JKLM **yes** c) ABCD and NOPQ **yes** d) JKLM and NOPQ **yes**	Square ABCD: D–C = 5, C–B = 5, A–B = 5, D–A = 5, right angles at all corners. Rectangle EFGH: H–G = 4, G–F = 2, E–F = 4, E–H = 2, right angles at all corners. Diamond JKLM: M top, J left, L right, K bottom; all sides 3, all angles 90°. Rectangle NOPQ: Q–P = 6, P–O = 6, N–O = 6, N–Q = 6, right angles at all corners.

Ex 2: Two similar polygons are shown. Find the measure of each angle.

The first quadrilateral: 100° (top), 65°, 135°, 60°. Smaller: 100°, 65°, 60°, 135°.

The pentagon: 90° (top), 95°, 155°, 110°, 90°. Smaller pentagon: 90°, 95°, 155°, 90°, 110°.
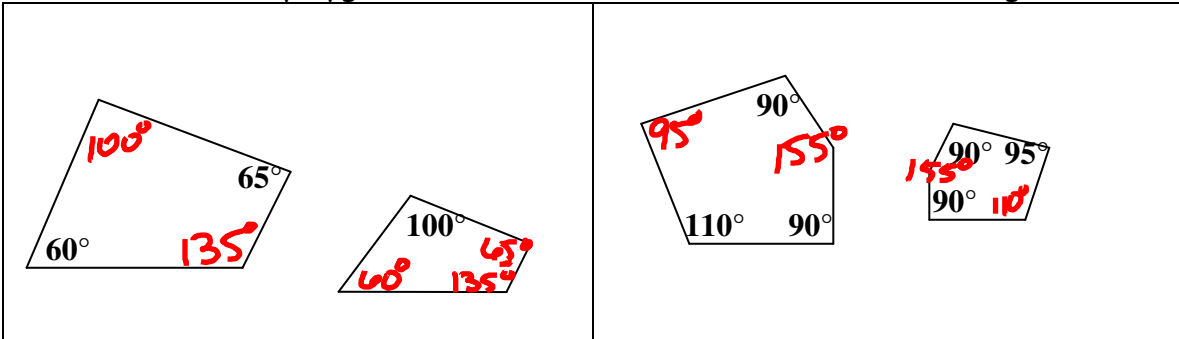
Ex 3: Two similar polygons are shown. Find the scale factor and the values of x, y, and z.

Left polygon sides: 8, 10, 4, x. Right polygon: y, z, 3, 4.

Scale factor: $\frac{4}{3}$

$$\frac{4}{3} = \frac{x}{4}$$

$X = 5\frac{1}{3}$

$$\frac{4}{3} = \frac{8}{y}$$

$Y = 6$

$$\frac{4}{3} = \frac{10}{z}$$

$Z = 7.5$
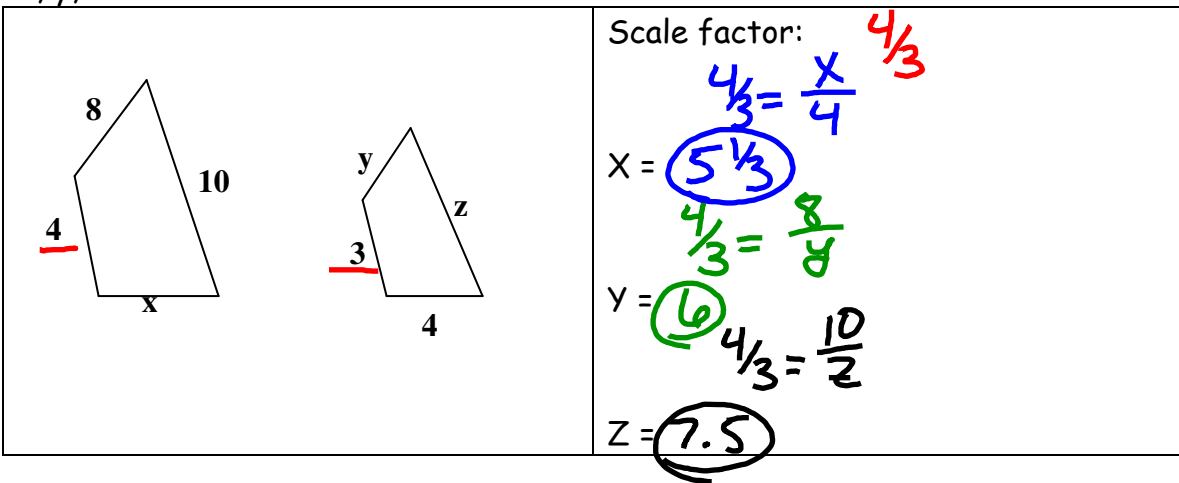
Ex 4: ΔABC ~ ΔDEF. Their scale factor is 7:9. If the perimeter of ΔABC is 42, then the perimeter of ΔDEF = ?

$$\frac{7}{9} = \frac{42}{X}$$

$$7X = 378$$

$$X = 54$$

Ex 5: The perimeters of two similar polygons are 20 and 28. One side of the smaller polygon has length 4. The length of the corresponding side of the larger polygon is ?

$$\frac{20}{28} = \frac{4}{X} \qquad \frac{20X}{20} = \frac{112}{20} \qquad X = 5.6$$