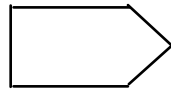


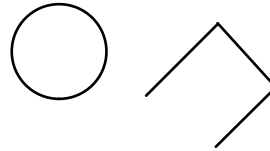
Section 7.3 - Similar Polygons

* a Polygon is a closed shape with straight sides.
Exactly 2 sides meet at a vertex.

Polygon



Not a Polygon



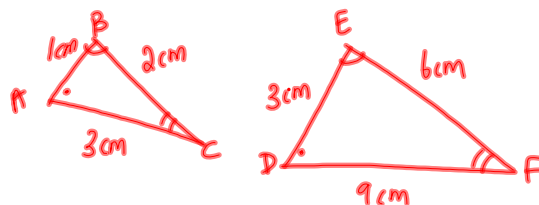
* when one polygon is an enlargement or reduction of another polygon we say the polygons are similar.

* similar polygons have the same shape, but not necessarily the same size

** when two polygons are similar:

- ① matching angles are equal
- ② matching sides are proportional

* when all pairs of matching sides have the same scale factor, we say matching sides are proportional.



① check matching angles:

$$\begin{aligned} \angle A &= \angle D \\ \angle B &= \angle E \\ \angle C &= \angle F \end{aligned} \quad \text{matching angles are equal.}$$

② check proportional sides:

$$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$$

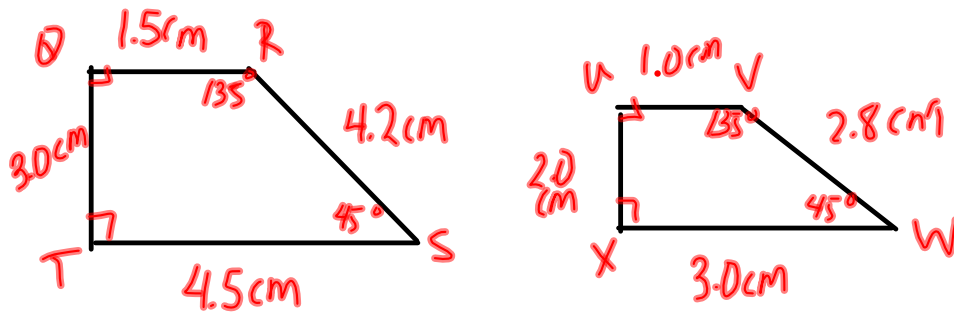
$$\frac{1}{3} = \frac{2}{6} = \frac{3}{9}$$

$$\frac{1}{3} = \frac{1}{3} = \frac{1}{3} \quad \checkmark$$

So matching sides are proportional
therefore these two triangles are similar.

Ⓐ Identify Similar Polygons

Example: Are these quadrilaterals similar?



Solution: ① we check matching angles:

$$\angle Q = \angle U, \angle T = \angle X, \angle R = \angle V, \\ \angle S = \angle W$$

so matching angles are equal.

② check matching sides to see if they are proportional (find scale factor)

$$\frac{QR}{UV} = \frac{1.5}{1} = 1.5$$

$$\frac{RS}{VW} = \frac{4.2}{2.8} = 1.5$$

$$\frac{ST}{XW} = \frac{4.5}{3.0} = 1.5$$

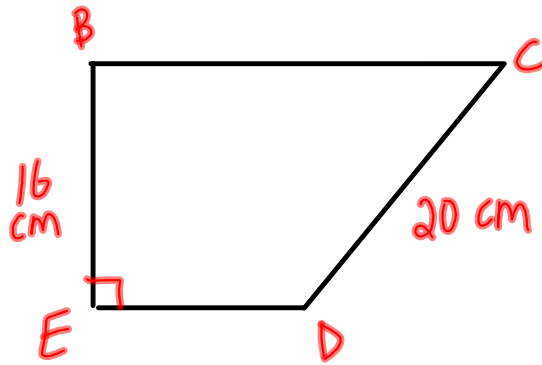
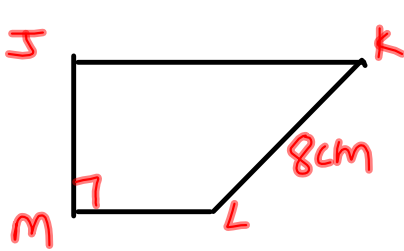
$$\frac{QT}{UX} = \frac{3.0}{2.0} = 1.5$$

all scale factors are equal, so matching sides are proportional

therefore, these quadrilaterals are similar.

B Determining lengths in Similar Polygons

Example: These quadrilaterals are similar. Find the length of JM.



Solution:

$$\frac{JK}{BC} = \frac{KL}{CD} = \frac{LM}{DE} = \frac{JM}{BE}$$

$$\frac{8}{20} = \frac{JM}{16}$$

$$8(16) = 20(JM)$$

$$\frac{128}{20} = \frac{JM}{1}$$

$$6.4 \text{ cm} = JM$$

OR you could use the scale factor at the beginning to do this.

Ⓒ Solving Problems using the properties of Similar polygons

Example: pg 339: These two octagonal garden plots are similar.

a) calculate the length of GH.

b) calculate the length of NP.

Solution:

$$\frac{AB}{IS} = \frac{BC}{JK} = \frac{CD}{KL} = \frac{DE}{LM} = \frac{EF}{MN} = \frac{FG}{NP} = \frac{HG}{QP}$$

$$\frac{5.4}{8.1} = \frac{27}{y} = \frac{x}{32.4}$$

$$\frac{5.4}{8.1} = \frac{27}{y} \quad \left\{ \quad \frac{5.4}{8.1} = \frac{x}{32.4} \right.$$

$$5.4y = 27(8.1)$$

$$\frac{5.4y}{5.4} = \frac{218.7}{5.4}$$

$$y = 40.5 \text{ m}$$

$$NP = 40.5 \text{ m}$$

$$5.4(32.4) = 8.1x$$

$$\frac{174.96}{8.1} = \frac{8.1x}{8.1}$$

$$21.6 \text{ m} = x$$

$$21.6 \text{ m} = GH$$

Complek: pg. 341 # 6, 9-13