

## Unit 4: Scale Factors & Similarity

### 4.4 Similar Polygons

**Polygon:**

*A two dimensional closed figure made up of 3 or more line segments*

We can extend the idea of similar triangles to similar polygons, with one key difference.

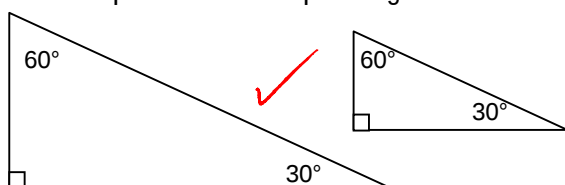
Similar Triangles

vs.

Similar Polygons (4 sides or more)

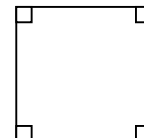
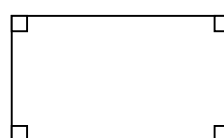
Conditions for Similarity

- Equal corresponding angles
- OR**
- Proportional corresponding sides



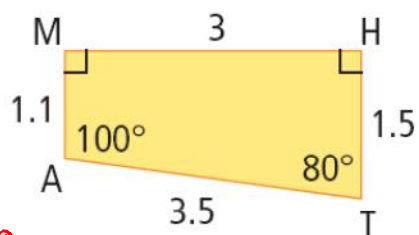
Conditions for Similarity

- Equal corresponding angles
- AND**
- Proportional corresponding sides



Ex. Are figures A & B similar?

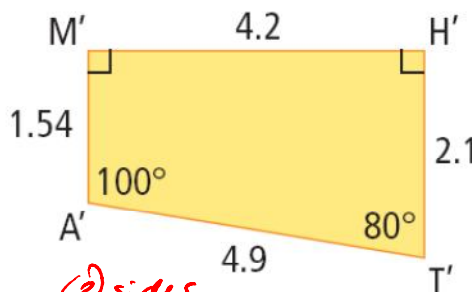
Figure A



① angles

$$\begin{aligned}\angle M &= \angle M' = 90^\circ \\ \angle H &= \angle H' = 90^\circ \\ \angle A &= \angle A' = 100^\circ \\ \angle T &= \angle T' = 80^\circ\end{aligned}$$

Figure B

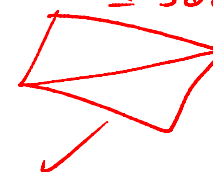


② sides

$$\begin{aligned}\frac{4.2}{3} &= 1.4 & \frac{2.1}{1.5} &= 1.4 & \frac{1.54}{1.1} &= 1.4 & \frac{4.9}{3.5} &= 1.4\end{aligned}$$

$$MATH \sim M'A'T'H'$$

\* sum of the angles in 4 sided polygon = 360°



What is the scale factor from B to A?

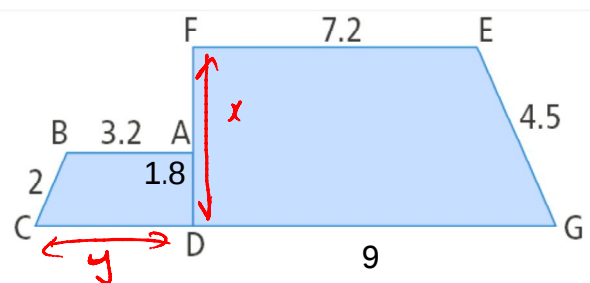
$$\begin{aligned}\frac{\text{diagram}}{\text{actual}} &= \frac{A}{B} = \frac{1.5}{2.1} \approx 0.714... \\ \frac{1.5 \times 10}{2.1 \times 10} &= \frac{15}{21} = \frac{5}{7}\end{aligned}$$

What is the scale of A compared to B? [in 1: \_\_\_ form]

A diagram B actual

$$\begin{aligned}\text{diagram: actual} & \div 1.5 \\ 1.5 : 2.1 &= \boxed{1 : 1.4}\end{aligned}$$

Ex. The two trapezoids shown are similar. Determine the missing side lengths FD and CD.



$$\frac{x}{1.8} = \frac{4.5}{2}$$

$$x = \frac{1.8(4.5)}{2}$$

$$\boxed{FD = 4.05}$$

$$\frac{y}{9} = \frac{3.2}{7.2}$$

$$y = \frac{9(3.2)}{7.2}$$

$$\boxed{CD = 4}$$