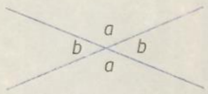
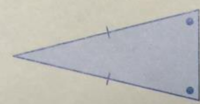
Angle Properties

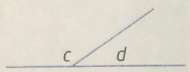
When two lines intersect, the **opposite angles** are equal.



The angles opposite the equal sides of an isosceles triangle are equal.

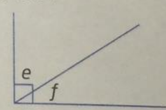


Supplementary angles sum to 180°.



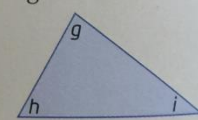
$c + d = 180°$

Complementary angles sum to 90°.



$e + f = 90°$

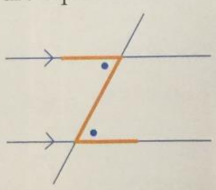
The sum of the interior angles in a triangle is 180°.



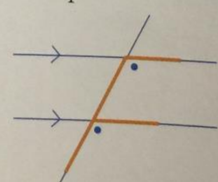
$g + h + i = 180°$

When a transversal crosses parallel lines, many pairs of angles are related.

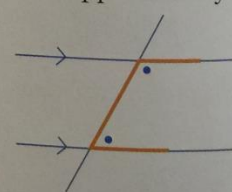
alternate angles are equal



corresponding angles are equal

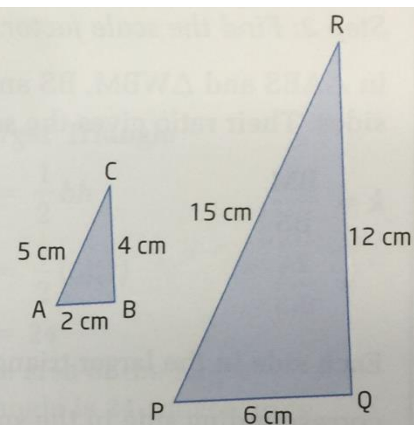


co-interior angles are supplementary



The **scale factor, k**, is a useful quantity when working with similar triangles such as the ones shown.

The value of k relating corresponding sides in these two triangles is 3, because if you multiply each side length in △ABC by 3, you obtain the corresponding side length in △PQR.

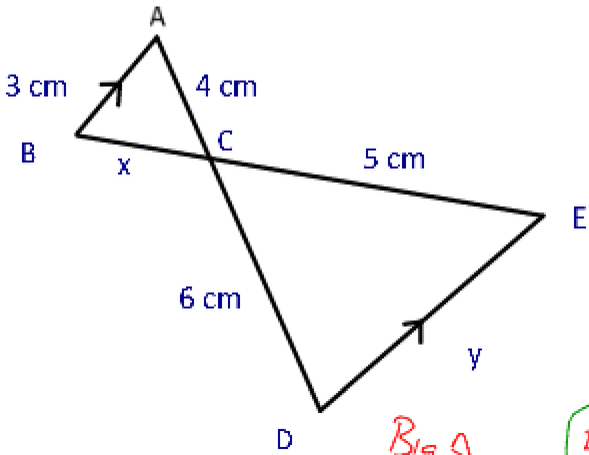


△ABC Side Lengths (cm)	Multiply by k	△PQR Side Lengths (cm)
AB = 2	$2 \times 3 = 6$	PQ = 6
BC = 4	$4 \times 3 = 12$	QR = 12
CA = 5	$5 \times 3 = 15$	RP = 15

You can apply the scale factor to find an unknown side length in one triangle if you know the corresponding side length in a similar triangle.

Ex. 1: Prove the triangles are similar, then solve for the unknown(s).

a)



Z-Pattern

$\angle B = \angle E$

$\angle A = \angle D$

$\therefore \triangle ABC \sim \triangle DEC$ (AA~)

$\frac{\text{Big } \triangle}{\text{Little } \triangle}$

$$\frac{5}{x} = \frac{6}{4} = \frac{y}{3}$$

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

$$20 = 6x$$

$$x = \frac{10}{3}\text{ cm}$$

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

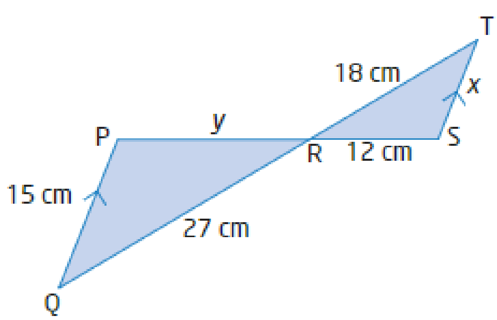
$$\frac{9}{2} = y$$

Textbook problems (Page 348)

For help with questions 5 to 7, see Example 1.

5. a) Show why $\triangle PQR$ is similar to $\triangle STR$.

b) Find the lengths x and y.



7. Find the length of x in each.

a)