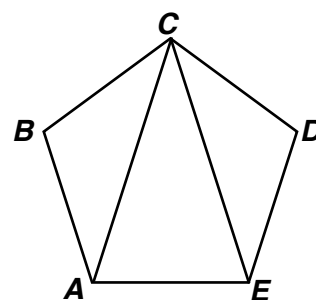


Similar Shapes

Starter

1. (Review of last lesson) ABCDE is a regular pentagon. Prove that triangles ABC and CDE are congruent.



2. What do we need to **multiply** the 1st number by to get the 2nd number? The first one is done for you.

1st number	2nd number	Multiply by
2	6	3 (because $2 \times 3 = 6$)
6	30	
20	5	
3	7	
9	4	
a	b	

3. (a) What do we multiply 5 by to get 11?
 (b) What do we multiply 11 by to get 5?

Notes

Similar shapes are the **same shape** but a **different size** i.e. one shape is an **enlargement** of the other.

When shapes are enlarged, **angles are preserved** i.e. angles remain the same. For example, if a right-angled triangle is enlarged, the right-angle and the other 2 angles will remain the same size.

The key to solving these problems is remembering:

“the length factor from a to b is b over a ”
 i.e. *“from a to b is $\frac{b}{a}$ ”*

N.B. From the **small** shape **to** the **big** shape: length factor > 1
 From the **big** shape **to** the **small** shape: length factor < 1

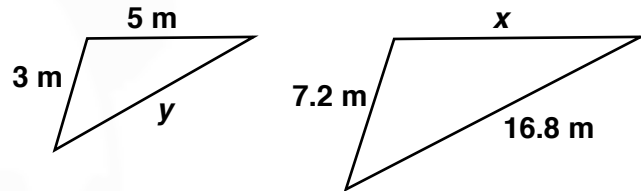
When calculating missing lengths on shapes, there are two methods you can employ — the **ratio method** and the **length factor method**.

Success criteria – ratio method

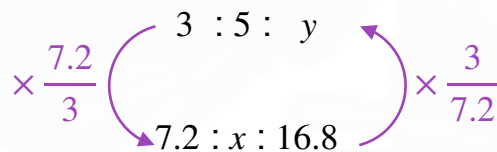
1. By recognising which sides are corresponding, work out the **length factor** in each direction (small to big and big to small)
2. Write the lengths of each shape as a ratio **in ascending order** of size. Write the two ratios one above the other. In this way we make sure corresponding lengths are above each other.
3. When calculating missing lengths, we always go **towards the unknown** (just like life)

N.B. The length factor **multiplies** the length.
Leave the **length factor as a fraction** to avoid rounding errors.

E.g. 1 The two triangles are similar.
Find the missing lengths on the triangles.



Working: The sides 3 and 7.2 are corresponding
Small to big: length factor from 3 to 7.2 is $\frac{7.2}{3}$ **> 1 since small to big**
Big to small: length factor from 7.2 to 3 is $\frac{3}{7.2}$ **< 1 since big to small**

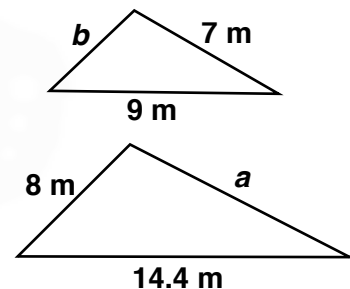


Lengths written as ratios –
one ratio above the other
3 corresponds to 7.2
5 corresponds to x
y corresponds to 16.8

$$x = 5 \times \frac{7.2}{3} = 12 \quad \text{Go towards the unknown, } x \text{ – down arrow}$$

$$y = 16.8 \times \frac{3}{7.2} = 7 \quad \text{Go towards the unknown, } y \text{ – up arrow}$$

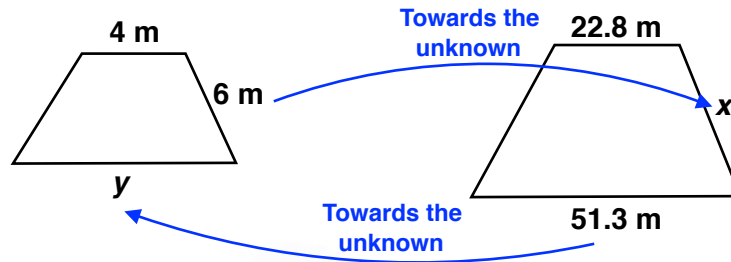
E.g. 2 The two triangles are similar. Find the missing lengths.



Method 2 – length factor

1. By recognising which sides are corresponding, work out the **length factor** in each direction (small to big and big to small).
2. Draw arrows from corresponding sides **towards the unknowns**
3. When calculating missing lengths, we always go **towards the unknown** (just like life)

E.g. 3 The two trapezia are similar. Find the missing lengths.



Working:

The sides 4 and 22.8 are corresponding

Small to big: length factor from 4 to 22.8 is $\frac{22.8}{4} > 1$ since small to big

Big to small: length factor from 22.8 to 22.4 is $\frac{4}{22.8} < 1$ since big to small

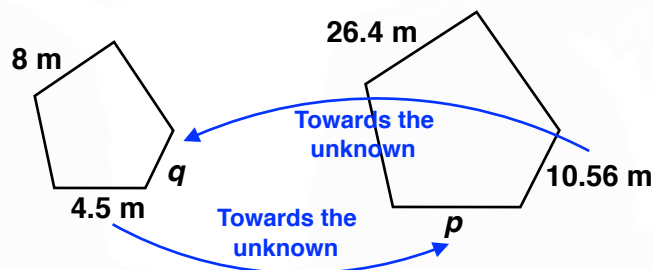
Draw the **lines** on the diagram

$$x = 6 \times \frac{22.8}{4} = 34.2 \quad \text{Go towards the unknown, } x \text{ — left to right}$$

$$y = 51.3 \times \frac{4}{22.8} = 9 \quad \text{Go towards the unknown, } y \text{ — right to left}$$

Have a go at this example using the **length factor** method.

E.g. 4 The two pentagons are similar. Find the missing lengths.

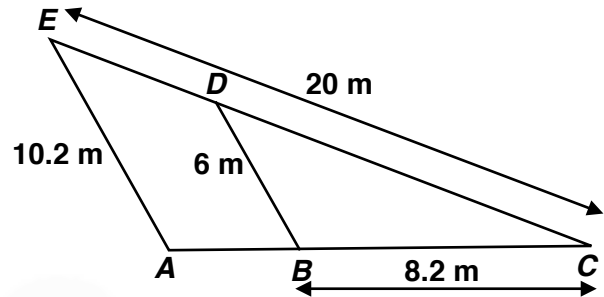


You can choose which method to use

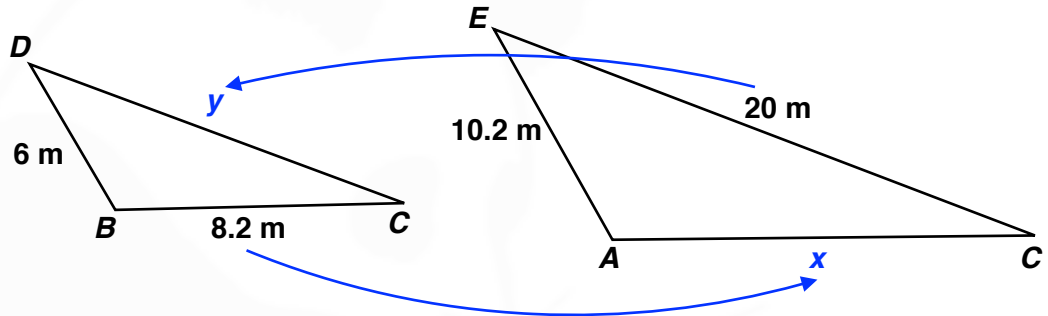
One diagram problems

Some questions provide you with a single diagram within which there are two similar shapes. In such cases, break the diagram into two separate similar shapes.

- E.g. 5** Find:
 (a) the length AC and
 (b) the length CD



Working: First of all draw two separate diagrams



Video: [Similar shapes](#)

[Solutions to Starter and E.g.s](#)

Exercise

- | | |
|----------------------|-------------------|
| 9-1 class textbook: | p448 M13.9 Qu 1-7 |
| A*-G class textbook: | p402 M13.3 Qu 1-6 |
| 9-1 homework book: | p154 M13.9 Qu 1-6 |
| A*-G homework book: | p113 M13.3 Qu 1-6 |

Summary

Similar shapes are the **same shape** but a **different size** i.e. one shape is an **enlargement** of the other. When shapes are enlarged, **angles are preserved**

The length factor from a to b is b over a i.e. “from a to b is $\frac{b}{a}$ ”

Ratio method:

1. By recognising which sides are corresponding, work out the **length factor** in each direction (small to big and big to small)
2. Write the lengths of each shape as a ratio **in ascending order** of size. Write the two ratios one above the other. In this way we make sure corresponding lengths are above each other.
3. When calculating missing lengths, we always go **towards the unknown** (just like life)

Length factor method:

1. By recognising which sides are corresponding, work out the **length factor** in each direction (small to big and big to small).
2. Draw arrows from corresponding sides **towards the unknowns**
3. When calculating missing lengths, we always go **towards the unknown** (just like life)

Leave the **length factor as a fraction** to avoid rounding errors.

[Homework book answers \(only available during a lockdown\)](#)