15 Stretch lesson: Complex similarity problems

Check-in questions

- Complete these questions to assess how much you remember about each topic. Then mark your work using the answers at the end of the lesson.
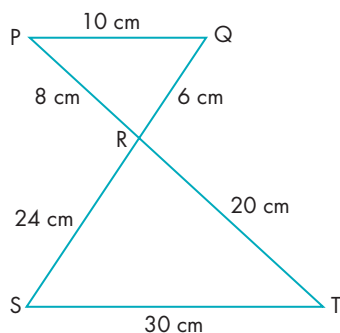- If you score well on all sections, you can go straight to the Revision Checklist and Exam-style Questions at the end of the lesson. If you don't score well, go to the lesson section indicated and work through the examples and practice questions there.

1 Zac says that the triangles PQR and RST are similar. Is he correct? Show your working to explain your answer.
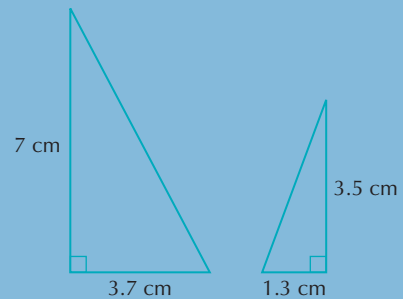
15.1 More complex problems

You may be asked to solve a more complex problem involving similarity using skills from other areas of mathematics.
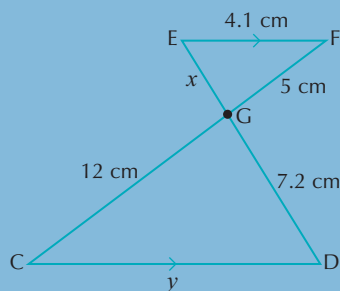
Example 1	**Q** Lucy says that these two triangles are similar. Is she correct? Give a reason for your answer.

7 cm

3.5 cm

3.7 cm 1.3 cm

A Lucy is not correct. $\frac{7}{3.5} = 2$ but $\frac{3.7}{1.3} = 2.8$, so the ratios of the corresponding lengths are not the same.

Example 2	**Q** In the diagram CD is parallel to EF.

EF = 4.1 cm, FG = 5 cm, DG = 7.2 cm and CG = 12 cm.

E   4.1 cm   F

x 5 cm

G

12 cm   7.2 cm

C y D

a Explain why triangles FEG and CDG are similar.

b Calculate the lengths marked x and y.

A **a**   Angle FEG = angle GDC (alternate angles are equal) •⎯⎯⎯ See Chapter 17.

Angle EFG = GCD (alternate angles are equal)

Angle EGF = angle CGD (vertically opposite angles are equal)

The corresponding angles are all equal so triangles FEG and CDG are similar.

b $\frac{x}{5} = \frac{7.2}{12}$

$x = \frac{7.2}{12} \times 5$

$x = 3$ cm

$\frac{y}{12} = \frac{4.1}{5}$

$y = \frac{4.1}{5} \times 12$

$y = 9.84$ cm

Exam tips   Mark the angles which are equal on the diagram to make sure you match the correct corresponding sides which are opposite angles of the same size.

Practice questions

1 In the diagram, AB is parallel to DE.

AB = 18 cm, BC = 10 cm, CD = 15 cm and CE = 21.75 cm.

a Explain why triangles ABC and EDC are similar.

b Calculate the values of x and y.
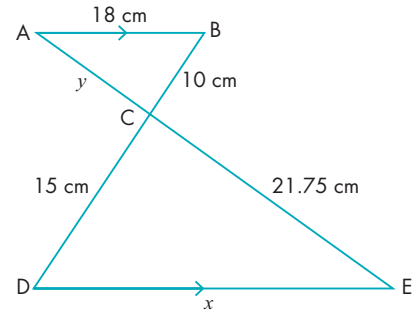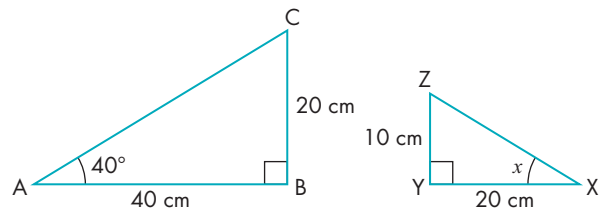

**2** Triangle ABE is similar to ACD.
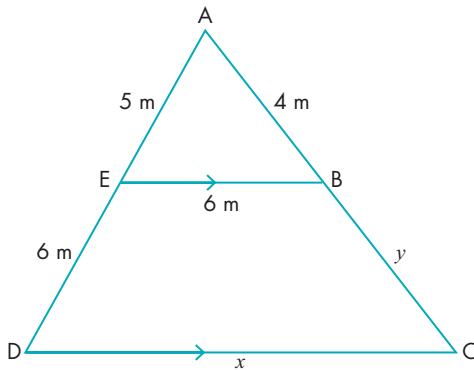
Calculate the values of x and y.

3 A mobile phone mast is 18 m high. At 11:00 a.m. it casts a shadow 32 m long. At the same time, an electricity pylon near to the mast casts a shadow 56 m long. Calculate the length of the pylon. (Make a sketch to help you.)

4 Triangle ABC is similar to XYZ.

Write down the size of the angle marked x.

Exam-style questions

1 Triangles ABC and CDE are similar.

a What is the length of AB?

b What is the length of CD?
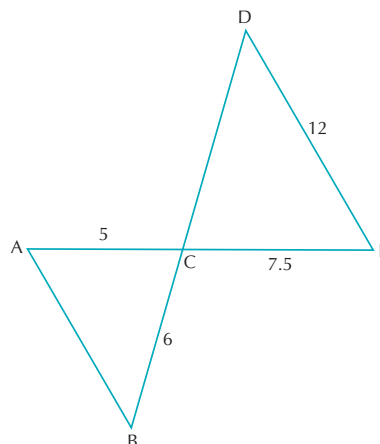
Chapter 15 Stretch lesson: Answers

Check-in questions

1 ∠PRQ = ∠SRT (vertically opposite). So PQ and ST are corresponding sides and their ratio is $\frac{30}{10} = 3$.

For the triangles to be similar, either $\frac{20}{6}$ or $\frac{20}{8}$ needs to be 3, which is not true.

So triangles PQR and RST are not similar.

15.1 More complex problems

1 a Corresponding angles are equal.
  b $x = 27$, $y = 14.5$ (Scale factor between corresponding sides is 1.5).

2 $x = 13.2$, $y = 4.8$

3 31.5 m

4 40°

Exam-style questions

1 a 8   **b** 9