

15

Stretch lesson: Complex similarity problems

Stretch objectives

Before you start this chapter, mark how confident you feel about each of the statements below:

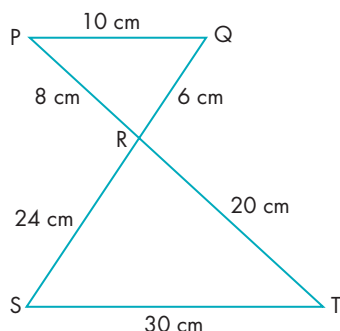
I can solve complex similarity problems.

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.

Go to 15.1

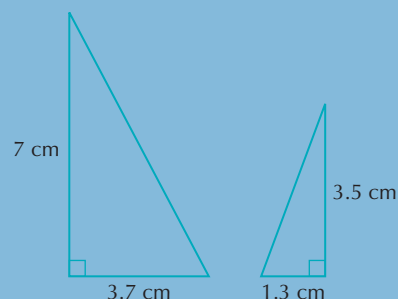


15.1 More complex problems

You may be asked to solve a more complex problem involving similarity using skills from other areas of mathematics.

Example 1

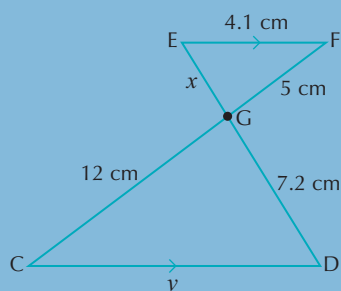
Q Lucy says that these two triangles are similar. Is she correct? Give a reason for your answer.



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.



- Explain why triangles FEG and CDG are similar.
- Calculate the lengths marked x and y .

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

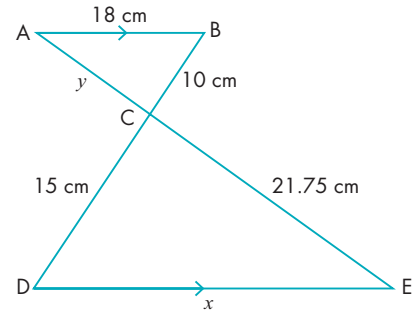
b $\frac{x}{5} = \frac{7.2}{12}$
 $x = \frac{7.2}{12} \times 5$
 $x = 3 \text{ cm}$
 $\frac{y}{12} = \frac{4.1}{5}$
 $y = \frac{4.1}{5} \times 12$
 $y = 9.84 \text{ cm}$

Exam tips

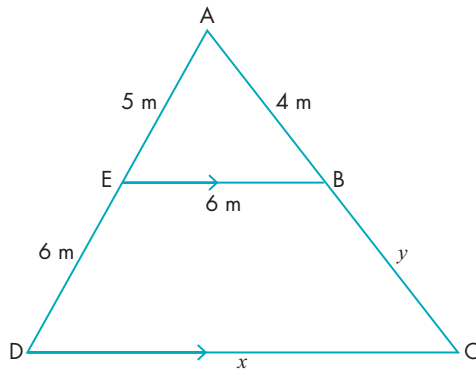
Mark the angles which are equal on the diagram to make sure you match the correct corresponding sides which are opposite angles of the same size.

Practice questions

- 1 In the diagram, AB is parallel to DE.
 $AB = 18\text{ cm}$, $BC = 10\text{ cm}$, $CD = 15\text{ cm}$ and $CE = 21.75\text{ cm}$.
 a Explain why triangles ABC and EDC are similar.
 b Calculate the values of x and y .

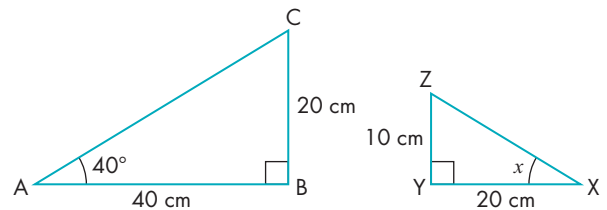


- 2 Triangle ABE is similar to ACD.



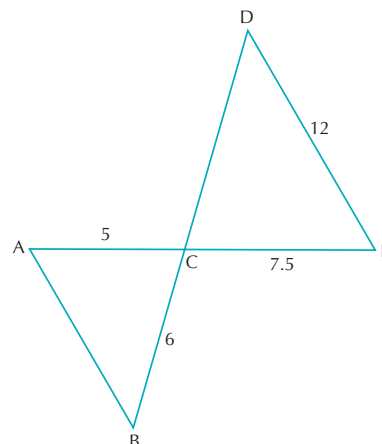
Calculate the values of x and y .

- 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 $\angle PRQ = \angle SRT$ (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