



THIRD SPACE
LEARNING

Diagnostic Questions

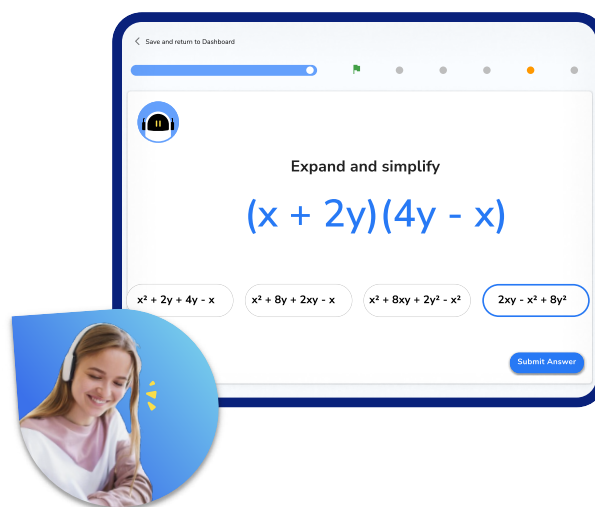
Congruence & Similarity |
Geometry & Measure

This resource in a nutshell

Diagnostic questions are a quick and easy way of assessing your students' knowledge and understanding of a particular topic.

Students may be struggling with **congruence & similarity** for a number of different reasons. Diagnostic questions can help to identify the particular misconception that the student has and help to determine the specific support they will need in order to improve.

They are low stakes and support students developing metacognition around how their learning is progressing and what they need to do to improve further.



At Third Space Learning, we use diagnostic questions before and after online tutoring sessions to identify gaps and track progress, an example of this is shown above.

How to use the questions in this resource

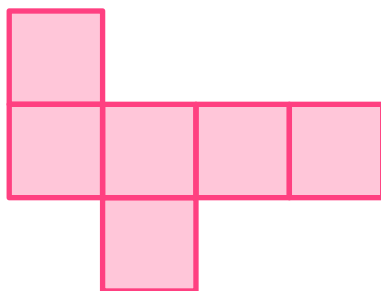
There are 20 multiple choice questions, each designed to assess each of the key skills required to master the given topic. Each question has **one correct answer** and **three carefully chosen incorrect answers** that are designed to identify and highlight fundamental misconceptions, including: **Congruence proof**, **Multiplying and dividing by fractions and decimals**, and **Incorrect scale factors for length / area and volume**.

When answering these questions, students should be **encouraged to explain why they have chosen a particular answer**, and why the other three answers are incorrect. This can be done verbally in small groups, or written down on the worksheet or in their books.

This resource has been designed to be as **flexible** as possible with questions that can be easily chopped up and reordered, and come with a separate answer sheet that details all of the misconceptions highlighted in the answers.

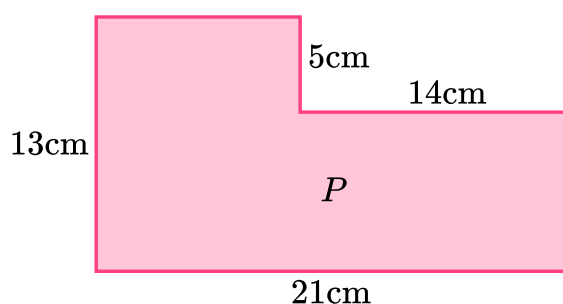
Diagnostic Questions: Congruence & Similarity

1. Select the shape that is congruent to:



| | |
|-----------|-----------|
| <p>A)</p> | <p>B)</p> |
| <p>C)</p> | <p>D)</p> |

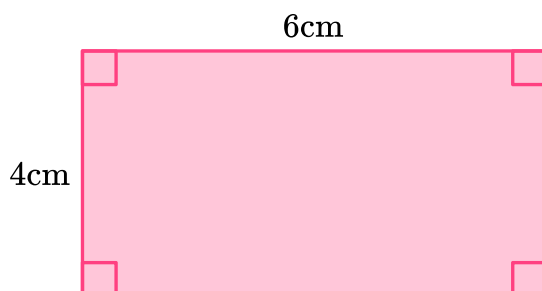
2. Which shape is congruent to shape P?

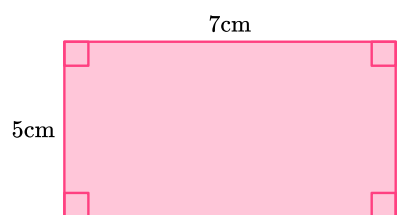
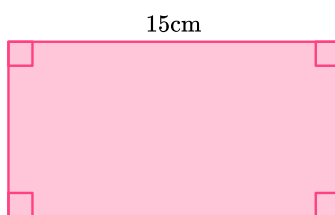
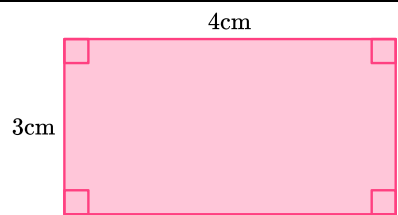
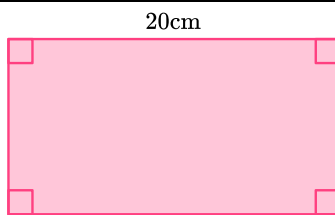


| | |
|-----------|-----------|
| <p>A)</p> | <p>B)</p> |
| <p>C)</p> | <p>D)</p> |

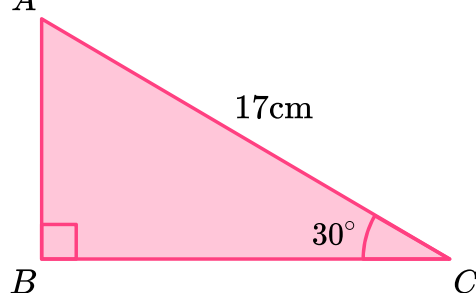
Diagnostic Questions: Congruence & Similarity

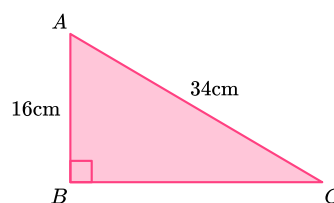
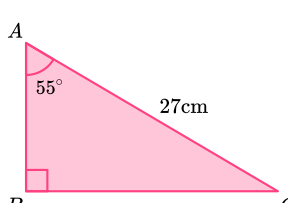
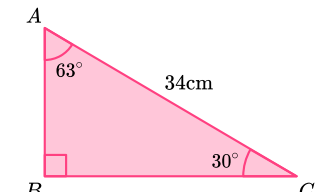
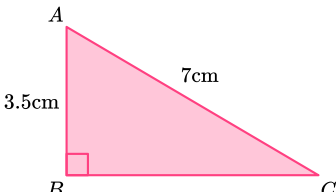
3. Choose the shape that is mathematically similar to:



| | |
|--|---|
| <p>A)</p>  | <p>B)</p>  |
| <p>C)</p>  | <p>D)</p>  |

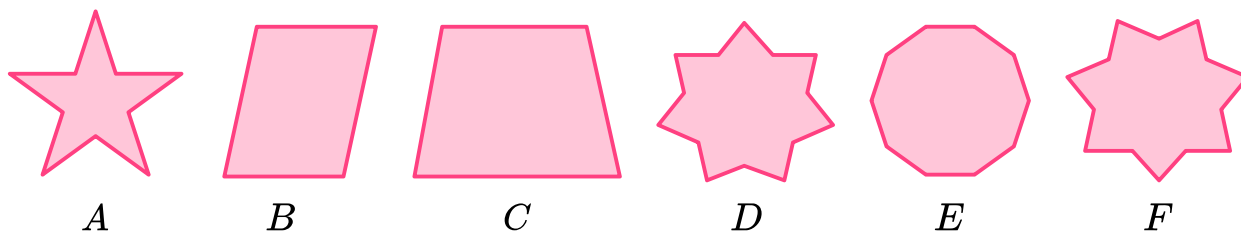
4. Which triangle is similar to:



| | |
|---|--|
| <p>A)</p>  | <p>B)</p>  |
| <p>C)</p>  | <p>D)</p>  |

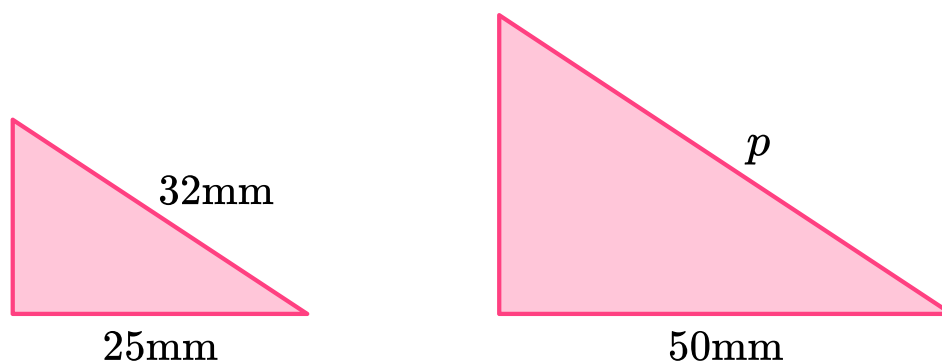
Diagnostic Questions: Congruence & Similarity

5. Which two shapes are congruent?



| | |
|------------|------------|
| A) D and F | B) A and D |
| C) B and C | D) A and E |

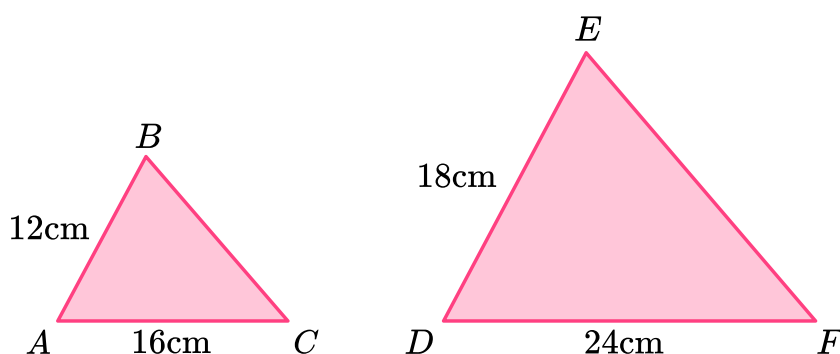
6. These two triangles are similar. Determine length p :



| | |
|-----------------|-----------------|
| A) 57 <i>mm</i> | B) 68 <i>mm</i> |
| C) 64 <i>mm</i> | D) 16 <i>mm</i> |

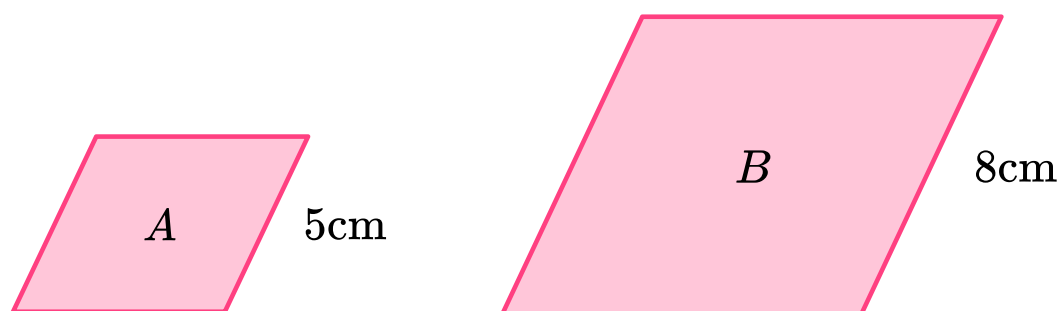
Diagnostic Questions: Congruence & Similarity

7. These two triangles are similar. What is the linear scale factor from ABC to DEF?



| | |
|---------|---------|
| A) 0.75 | B) 2 |
| C) 1.5 | D) 1.33 |

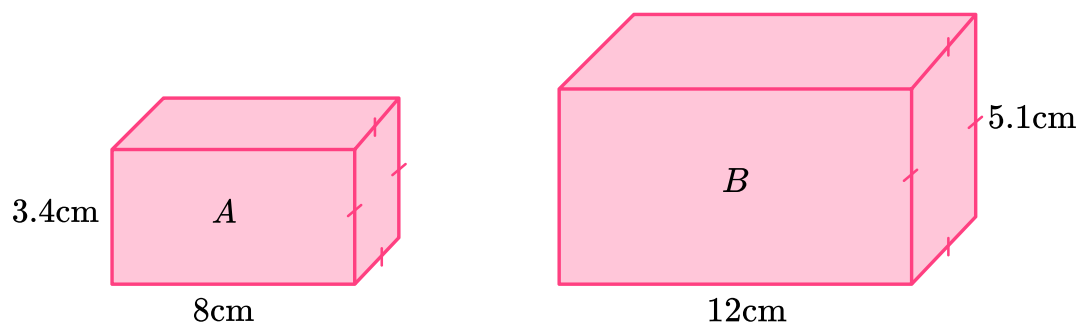
8. Given that shapes A and B are similar, determine the area scale factor from A to B:



| | |
|---------|------|
| A) 2.56 | B) 3 |
| C) 1.6 | D) 9 |

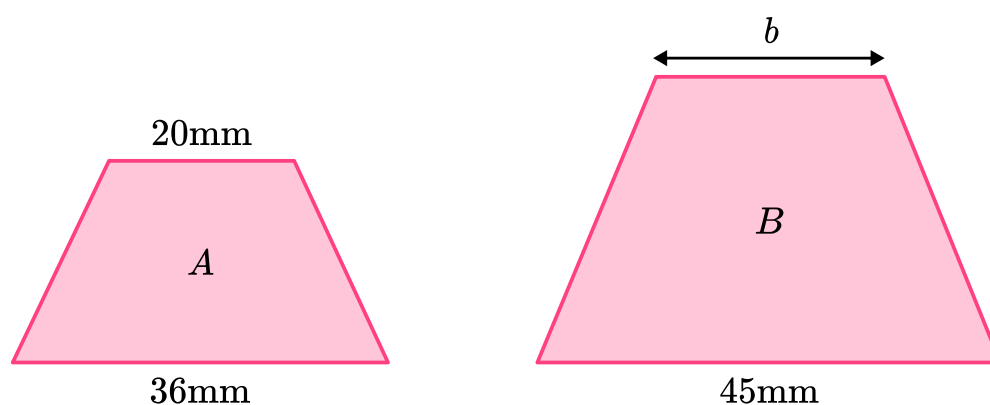
Diagnostic Questions: Congruence & Similarity

9. Determine the volume scale factor from A to B, giving your answer as an improper fraction in its simplest form:



| | |
|------------------|-------------------|
| A) $\frac{9}{4}$ | B) $\frac{27}{8}$ |
| C) $\frac{3}{2}$ | D) $\frac{9}{2}$ |

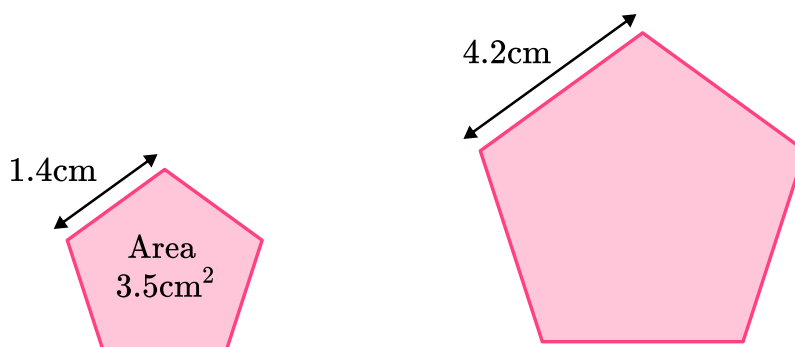
10. Trapezium A and trapezium B are similar. Determine the length b :



| | |
|----------|----------|
| A) 28 mm | B) 29 mm |
| C) 16 mm | D) 25 mm |

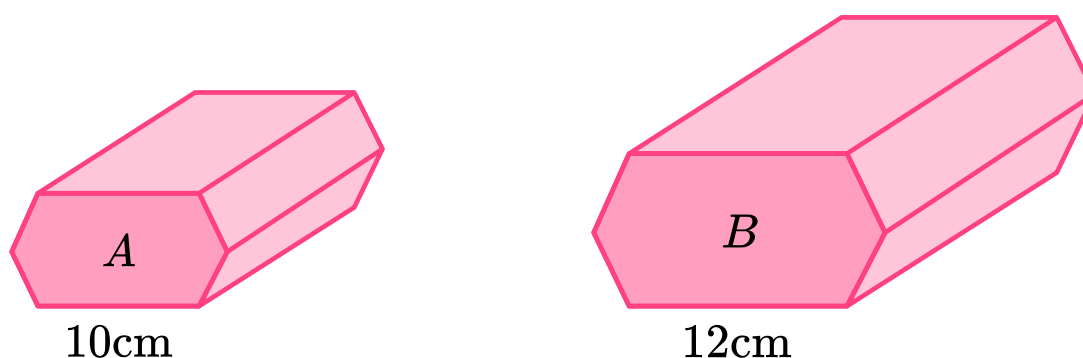
Diagnostic Questions: Congruence & Similarity

11. Given that these two pentagons are similar, determine the area of the larger pentagon:



| | |
|------------------------|-------------------------|
| A) 14.7 cm^2 | B) 10.5 cm^2 |
| C) 31.5 cm^2 | D) 27.44 cm^2 |

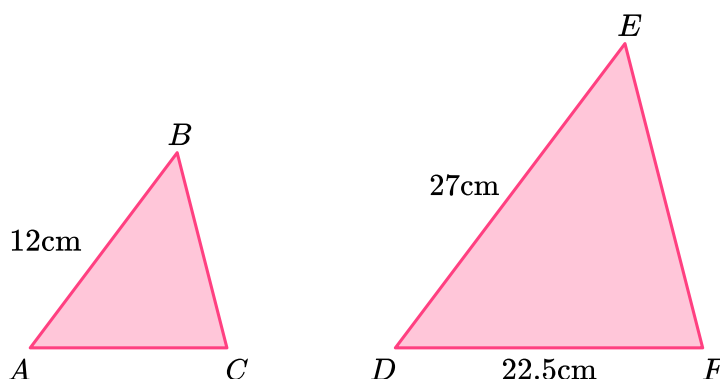
12. Prisms A and B are similar. The volume of prism A is 800 cm^3 . Determine the volume of prism B:



| | |
|--------------------------|------------------------|
| A) 1382.4 cm^3 | B) 6400 cm^3 |
| C) 960 cm^3 | D) 1152 cm^3 |

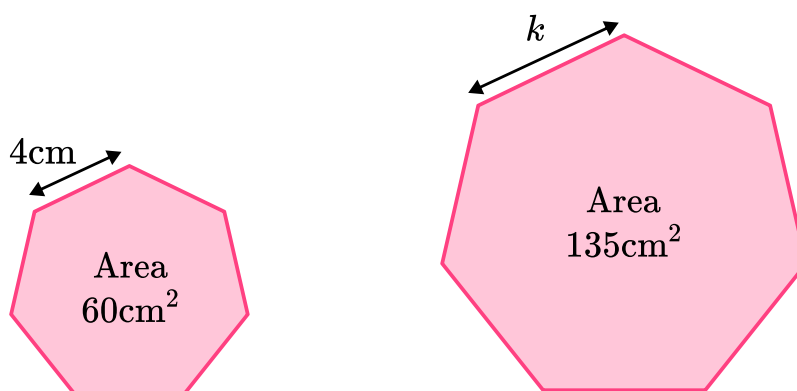
Diagnostic Questions: Congruence & Similarity

13. Triangles ABC and DEF are similar. Determine the length of AC:



| | |
|------------|------------|
| A) 7.5 cm | B) 10 cm |
| C) 10.5 cm | D) 50.6 cm |

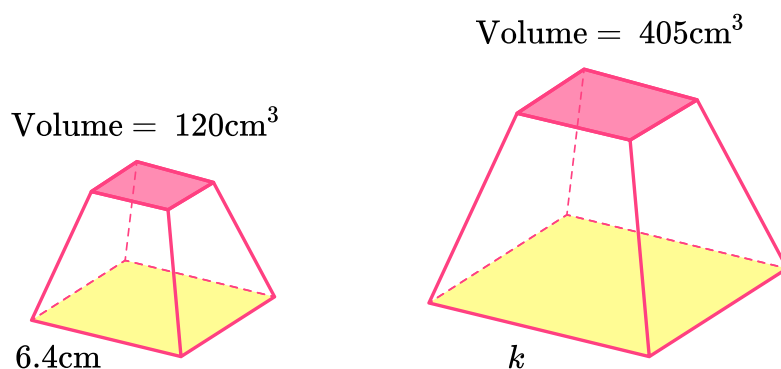
14. Given that these two heptagons are similar, determine the length k :



| | |
|------------|-------------|
| A) 9 cm | B) 20.25 cm |
| C) 6.25 cm | D) 6 cm |

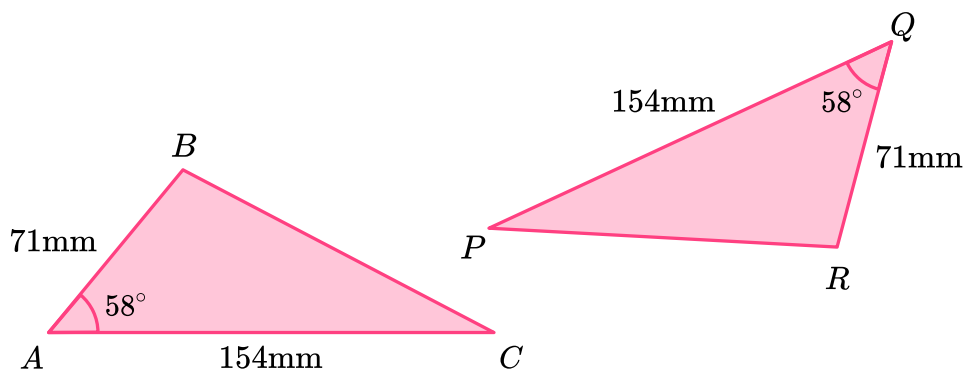
Diagnostic Questions: Congruence & Similarity

15. The two frustums are similar. Determine length k :



| | |
|------------|------------|
| A) 9.6 cm | B) 13.0 cm |
| C) 21.6 cm | D) 11.8 cm |

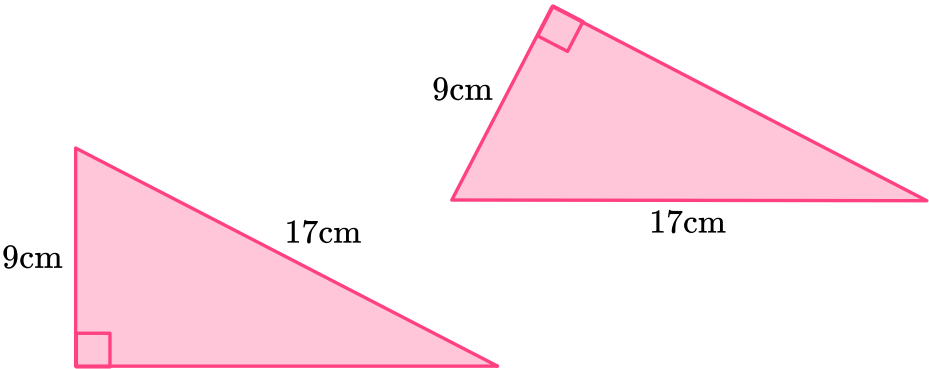
16. Triangle ABC is congruent to triangle PQR. Which congruence condition is satisfied?



| | |
|--------|--------|
| A) RHS | B) SSS |
| C) ASA | D) SAS |

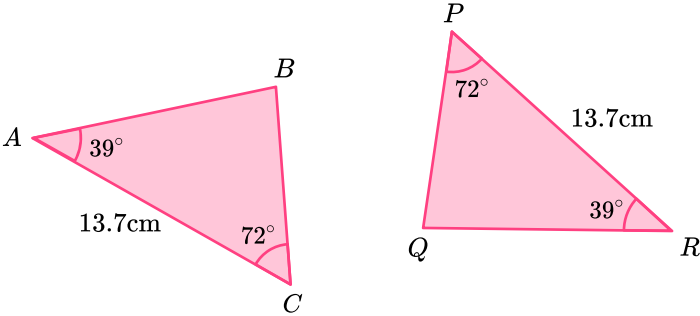
Diagnostic Questions: Congruence & Similarity

17. Here is a pair of congruent triangles. Which congruence condition is satisfied?



| | |
|--------|--------|
| A) ASA | B) RHS |
| C) SSS | D) SAS |

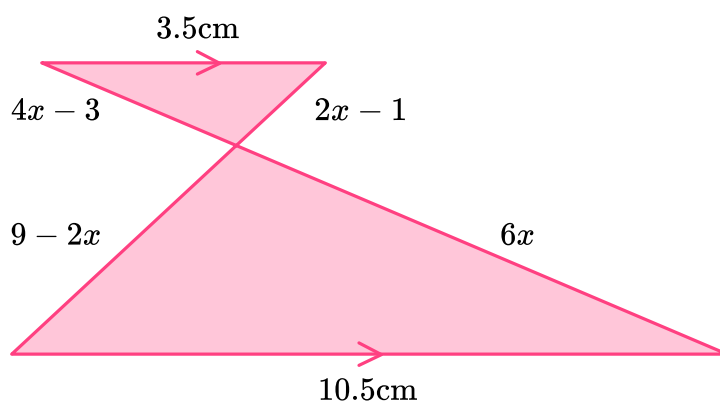
18. Prove that triangle ABC is congruent to triangle PQR:



| | |
|--|--|
| A) <i>ASA</i> $\angle BAC = \angle QPR$ $AC = PR$ $\angle BCA = \angle QPR$ | B) <i>AAA</i> $\angle BAC = \angle QRP$ $\angle BCA = \angle QPR$ $\angle ABC = \angle PQR$ |
| C) <i>ASA</i> $\angle BAC = \angle QRP$ $AC = PR$ $\angle BCA = \angle PQR$ | D) <i>ASA</i> $\angle BAC = \angle QRP$ $AC = PR$ $\angle BCA = \angle QPR$ |

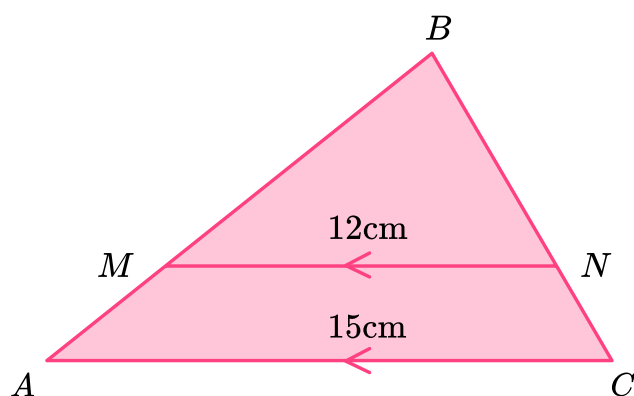
Diagnostic Questions: Congruence & Similarity

19. Solve for x :



| | |
|---------------|--------------|
| A) $x = 2.5$ | B) $x = 1.5$ |
| C) $x = 0.67$ | D) $x = 3$ |

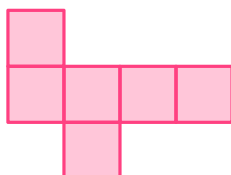
20. Given that $BN = 7 \text{ cm}$, calculate the length NC :

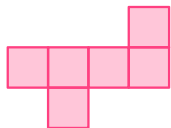
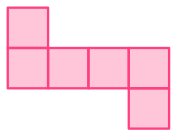
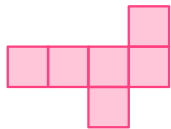
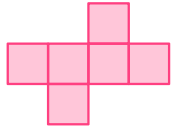


| | |
|----------------------|----------------------|
| A) 5.6 cm | B) 3 cm |
| C) 1.75 cm | D) 8.75 cm |

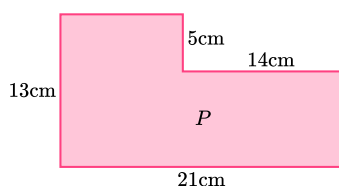
Diagnostic Questions: Congruence & Similarity Answers

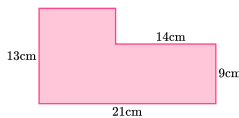
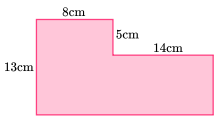
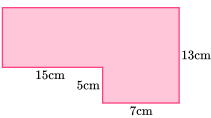
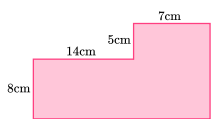
1. Select the shape that is congruent to:



- A)  Student does not understand how to reflect compound shapes
- B)  Student did not take account of the square in the lower right
- C)  **Correct answer**
- D)  Student did not take into account square in the top of image

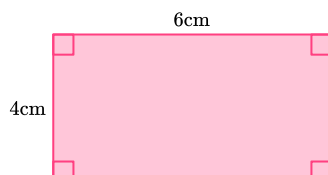
2. Which shape is congruent to shape P?



- A)  Student did not check lengths of the vertical sides
- B)  Student did not check lengths of the horizontal sides
- C)  Student did not check lengths of horizontal sides following rotation
- D)  **Correct answer**

Diagnostic Questions: Congruence & Similarity Answers

3. Choose the shape that is mathematically similar to:



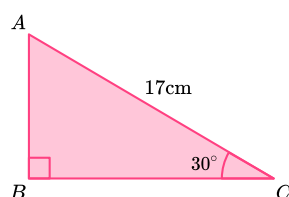
A)  Student used an additive (not multiplicative relationship)

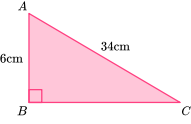
B)  **Correct answer**

C)  Student did not fully consider the orientation of the shape

D)  Student multiplied lengths by different scale factors

4. Which triangle is similar to:



A)  Student did not check angles; angle ACB is 28° using trig (not 30°)

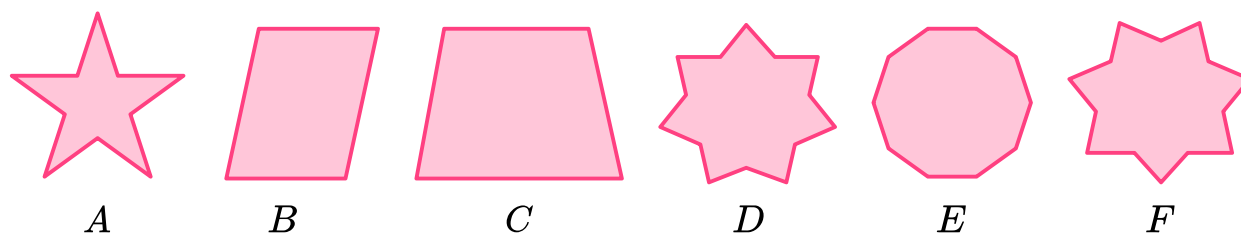
B)  Student did not check angles; angle ACB is 25° (not 30°)

C)  Student forgot to check angle ABC, which is not 90°

D)  **Correct answer**

Diagnostic Questions: Congruence & Similarity Answers

5. Which two shapes are congruent?



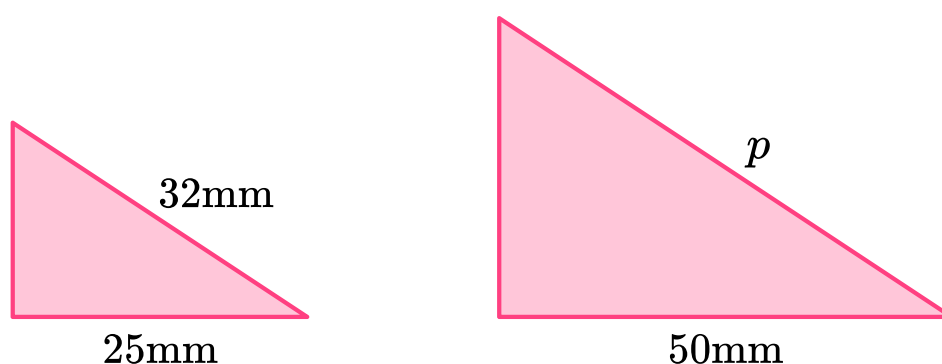
A) D and F Correct answer

B) A and D Student picked stars that do not have the same number of points

C) B and C Student picked quadrilaterals, but B is a parallelogram and C is a trapezium

D) A and E Student picked 10-sided shapes, but the angle sizes are different

6. These two triangles are similar. Determine length p :



A) 57 *mm* Student found the sum of the given lengths of the smaller triangle

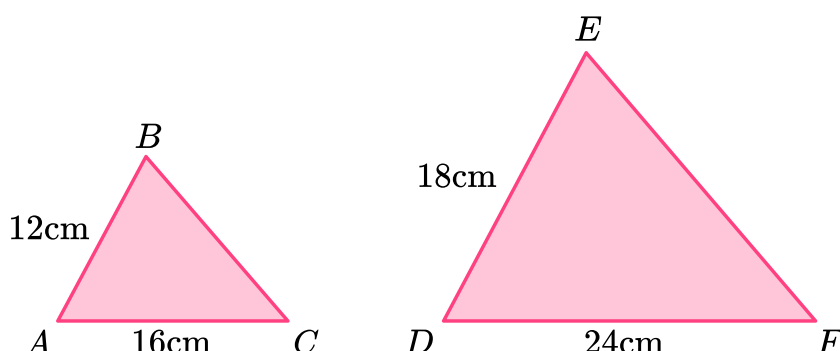
B) 68 *mm* Student added $(50 - 32)\text{mm}$ to 50 *mm*

C) 64 *mm* Correct answer

D) 16 *mm* Student divided by 2, instead of multiplying by 2

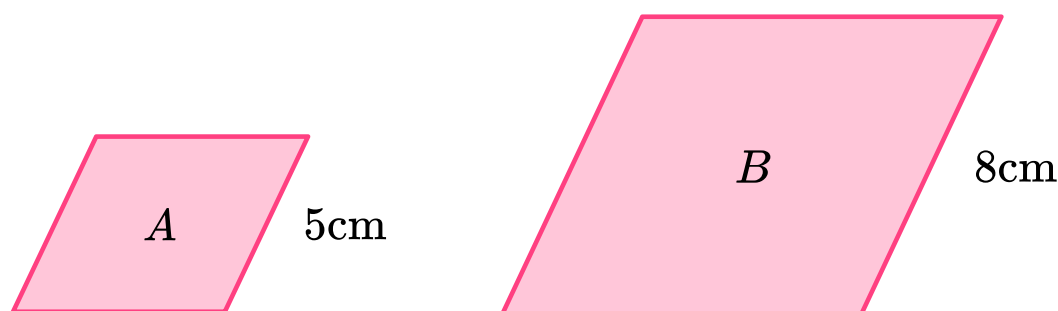
Diagnostic Questions: Congruence & Similarity Answers

7. These two triangles are similar. What is the linear scale factor from ABC to DEF?



- A) 0.75 Student divided length AB by AC (or DE by DF)
- B) 2 Student used sides AB and DF (not corresponding sides)
- C) 1.5 Correct answer
- D) 1.33 Student divided length AC by AB (or DF by DE)

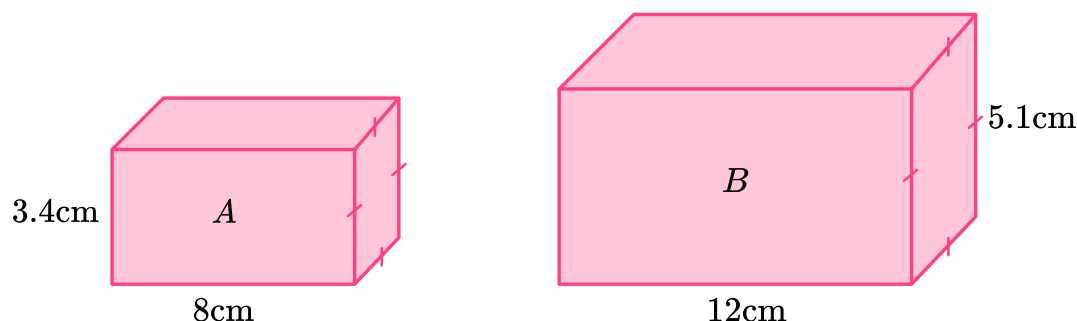
8. Given that shapes A and B are similar, determine the area scale factor from A to B:



- A) 2.56 Correct answer
- B) 3 Student found the difference in corresponding lengths
- C) 1.6 Student forgot to square the linear scale factor
- D) 9 Student squared the difference in corresponding lengths

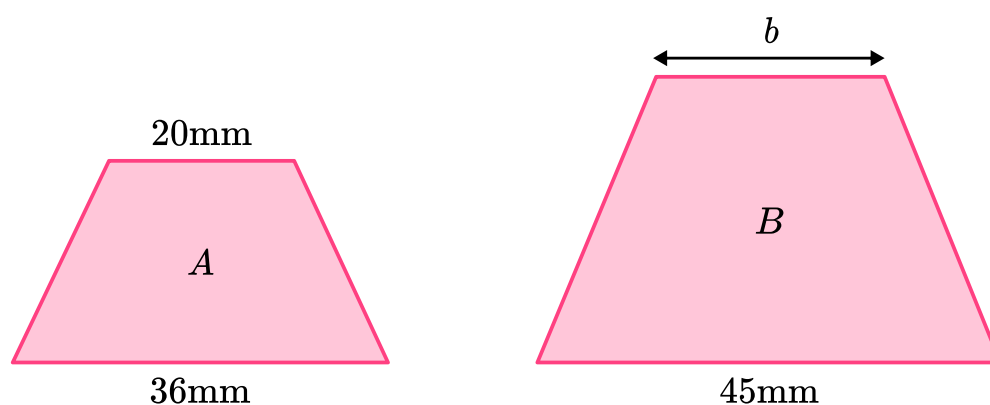
Diagnostic Questions: Congruence & Similarity Answers

9. Determine the volume scale factor from A to B, giving your answer as an improper fraction in its simplest form:



- A) $\frac{9}{4}$ Student squared the linear SF instead of cubing
- B) $\frac{27}{8}$ Correct answer
- C) $\frac{3}{2}$ Student forgot to cube the linear SF
- D) $\frac{9}{2}$ Student multiplied the linear SF by 3

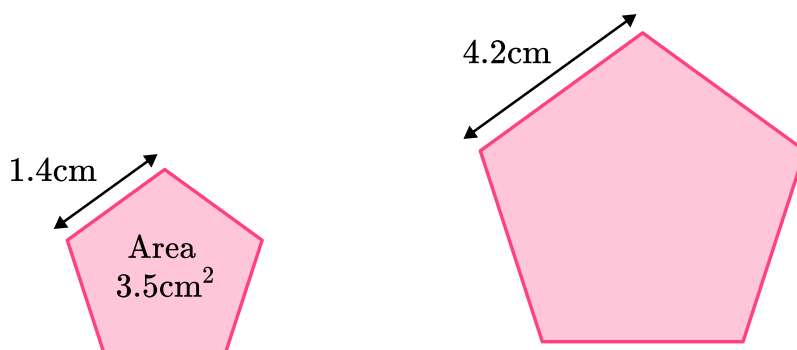
10. Trapezium A and trapezium B are similar. Determine the length b :



- A) 28 mm Student added parallel sides of A and divided by 2
- B) 29 mm Student added the difference of known sides to 20
- C) 16 mm Student multiplied 20 by 0.8 (scale factor in wrong direction)
- D) 25 mm Correct answer

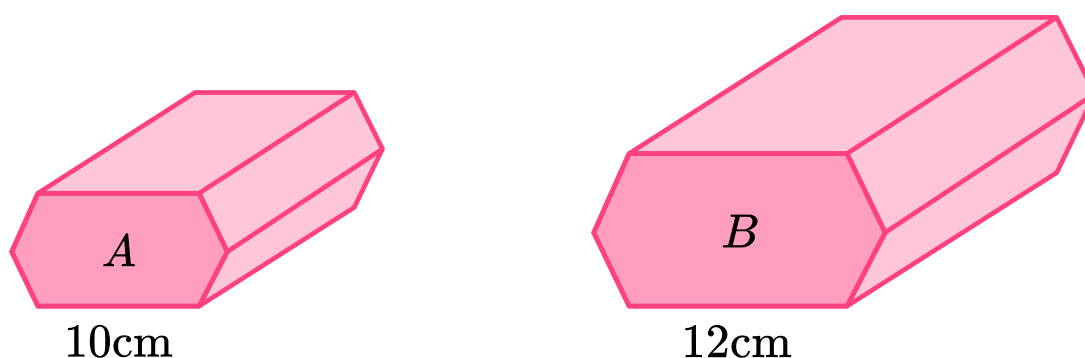
Diagnostic Questions: Congruence & Similarity Answers

11. Given that these two pentagons are similar, determine the area of the larger pentagon:



- A) 14.7 cm^2 Student multiplied the known area by the length of the larger pentagon
 B) 10.5 cm^2 Student used the linear scale factor without squaring
 C) 31.5 cm^2 Correct answer
 D) 27.44 cm^2 Student incorrectly found the linear scale factor to be 2.8

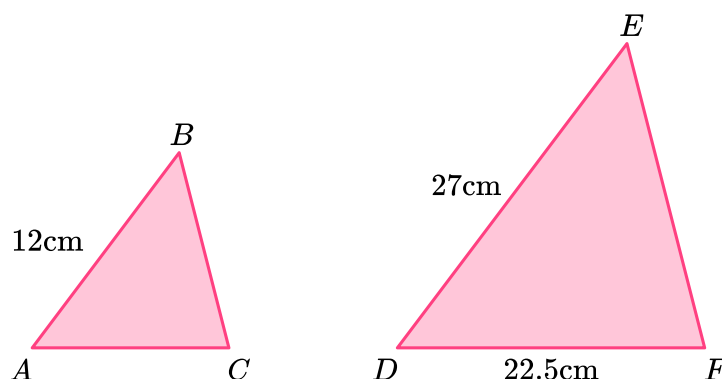
12. Prisms A and B are similar. The volume of prism A is 800 cm^3 . Determine the volume of prism B:



- A) 1382.4 cm^3 Correct answer
 B) 6400 cm^3 Student found the linear SF as 2 (12 - 10)
 C) 960 cm^3 Student multiplied by the linear SF (1.2)
 D) 1152 cm^3 Student squared the linear SF before multiplying

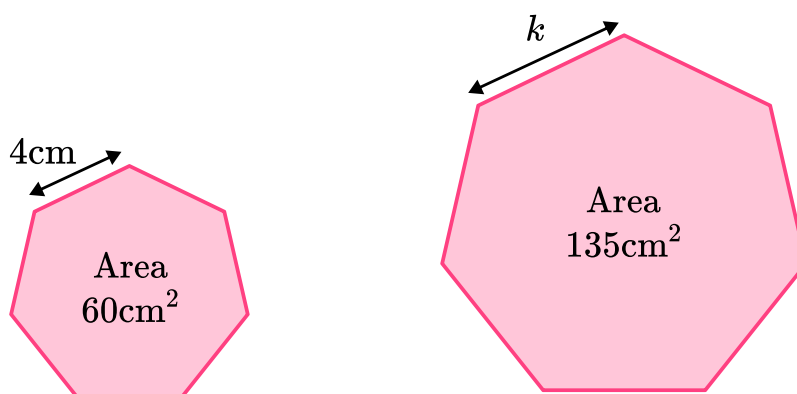
Diagnostic Questions: Congruence & Similarity Answers

13. Triangles ABC and DEF are similar. Determine the length of AC:



- A) 7.5 *cm* Student subtracted (DE - AB) from DF
- B) 10 *cm* Correct answer
- C) 10.5 *cm* Student subtracted AB from DF
- D) 50.6 *cm* Student used SF in wrong direction

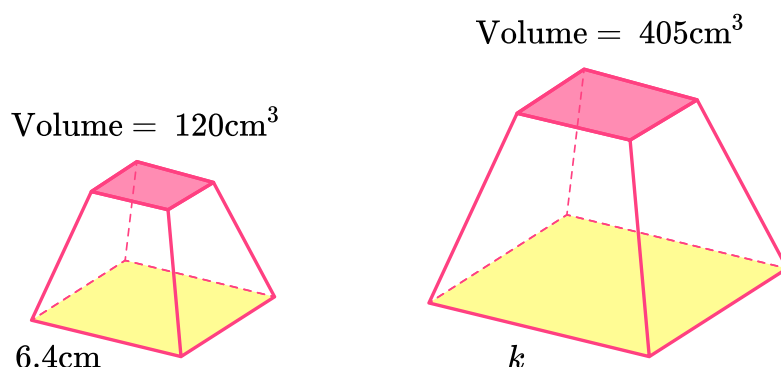
14. Given that these two heptagons are similar, determine the length k :



- A) 9 *cm* Student used the area SF as a linear SF without square rooting
- B) 20.25 *cm* Student squared (instead of square rooting) the area SF
- C) 6.25 *cm* Student added the area SF to 4cm
- D) 6 *cm* Correct answer

Diagnostic Questions: Congruence & Similarity Answers

15. The two frustums are similar. Determine length k :



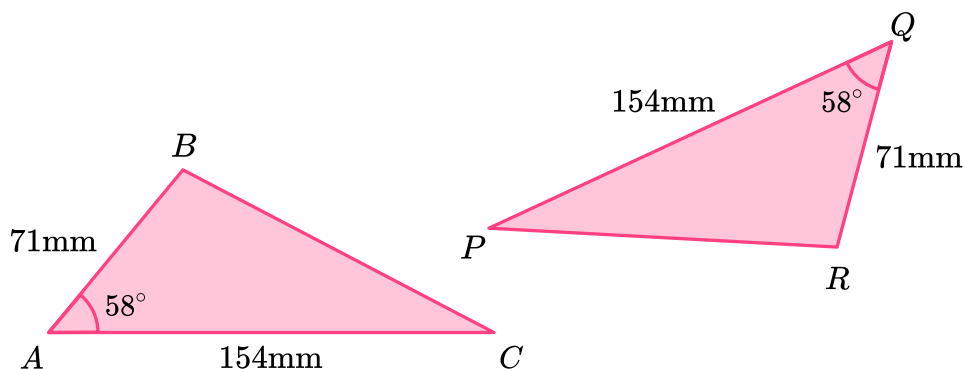
A) 9.6 *cm* Correct answer

B) 13.0 *cm* Student cube rooted the difference in volumes, then added to known length

C) 21.6 *cm* Student did not cube root volume SF

D) 11.8 *cm* Student square rooted volume SF

16. Triangle ABC is congruent to triangle PQR. Which congruence condition is satisfied?



A) RHS Student assumed AC and QP were hypotenuse without checking

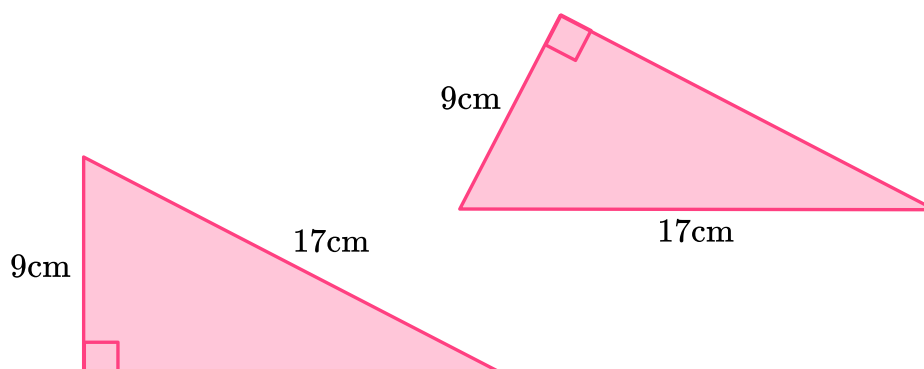
B) SSS Student would need to use cosine rule to use this condition

C) ASA Student confused criteria for sides and angles

D) SAS Correct answer

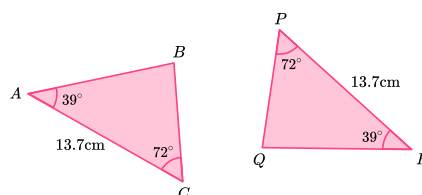
Diagnostic Questions: Congruence & Similarity Answers

17. Here is a pair of congruent triangles. Which congruence condition is satisfied?



- A) ASA Student would need to use trigonometry to calculate another angle for this condition
- B) RHS Correct answer**
- C) SSS Student would need to use Pythagoras' theorem to calculate another side length for this condition
- D) SAS Student assumed any two sides and any angle justify this condition

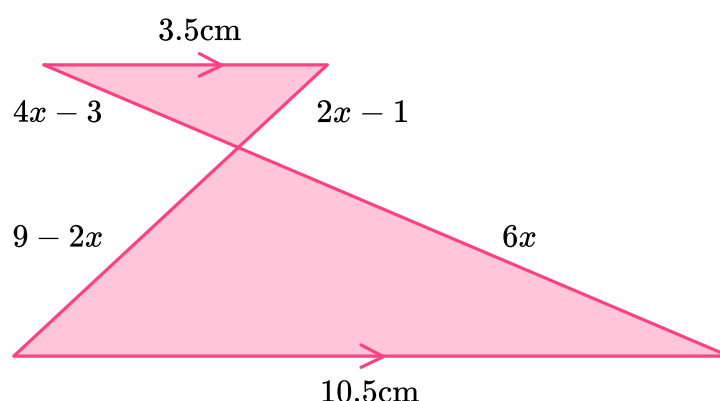
18. Prove that triangle ABC is congruent to triangle PQR:



- A) *ASA*
 $\angle BAC = \angle QPR$
 $AC = PR$
 $\angle BCA = \angle QPR$
 Student got the angle equalities mixed up
- B) *AAA*
 $\angle BAC = \angle QRP$
 $\angle BCA = \angle QPR$
 $\angle ABC = \angle PQR$
 Student proved similarity, not congruence
- C) *ASA*
 $\angle BAC = \angle QRP$
 $AC = PR$
 $\angle BCA = \angle PQR$
 Student made error equating angles
- D) *ASA***
 $\angle BAC = \angle QRP$
 $AC = PR$
 $\angle BCA = \angle QPR$
Correct answer

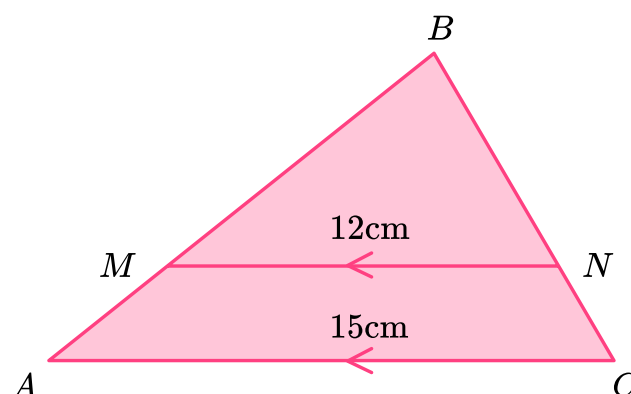
Diagnostic Questions: Congruence & Similarity Answers

19. Solve for x :



- A) $x = 2.5$ Student equated $9 - 2x$ and $2x - 1$, without applying SF
 B) $x = 1.5$ Correct answer
 C) $x = 0.67$ Student set up equation correctly but made a mistake solving
 D) $x = 3$ Student gave the SF instead of solving for x

20. Given that $BN = 7\text{ cm}$, calculate the length NC :



- A) 5.6 cm Student formed SF using MN and AC but used incorrectly
 B) 3 cm Student found difference between AC and MN
 C) 1.75 cm Correct answer
 D) 8.75 cm Student found BC but then forgot to subtract BN

Where to go next?

For more ^x diagnostic questions, and GCSE maths revision resources and worksheets to support students in fixing any misconceptions take a look at the free Third Space Learning [GCSE maths revision](#) pages.

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