

Reasoning and Problem Solving – Angles in a Triangle – Missing Angles

National Curriculum Objectives:

Mathematics Year 6: (6G4b) [Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles](#)

Differentiation:

Questions 1, 4 and 7 (Reasoning)

Developing Explain how it's possible to find missing angles using knowledge of angles in a triangle and angles on a straight line. Includes angles measured to the nearest five degrees.

Expected Explain how it's possible to find missing angles using knowledge of angles in a triangle, angles on a straight line and a complete rotation around a point. Includes angles measured to the nearest whole degree.

Greater Depth Explain how it's possible to find missing angles using knowledge of angles in a triangle, angles on a straight line, vertically opposite angles and a complete rotation around a point. Includes angles measured to the nearest whole degree.

Questions 2, 5 and 8 (Reasoning)

Developing Explain who has calculated the missing angle correctly using knowledge of angles in a triangle and angles on a straight line. Includes angles measured to the nearest five degrees.

Expected Explain who has calculated the missing angle correctly using knowledge of angles in a triangle, angles on a straight line and vertically opposite angles. Includes angles measured to the nearest whole degree.

Greater Depth Explain who has calculated the missing angle correctly using knowledge of angles in a triangle, angles on a straight line, vertically opposite angles and a complete rotation around a point. Includes angles measured to the nearest whole degree.

Questions 3, 6 and 9 (Problem Solving)

Developing Find 1 incorrect angle and fix the mistake. Includes angles measured to the nearest five degrees.

Expected Find 1 incorrect angle and fix the mistake. Includes angles measured to the nearest whole degree.

Greater Depth Find 2 incorrect angles and fix the mistake. Includes angles measured to the nearest whole degree.

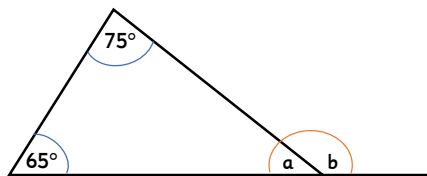
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Reasoning and Problem Solving – Angles in a Triangle – Missing Angles

1a. Kelly says:

It's impossible for me to calculate all of the missing angles.



Is Kelly correct? Explain why.

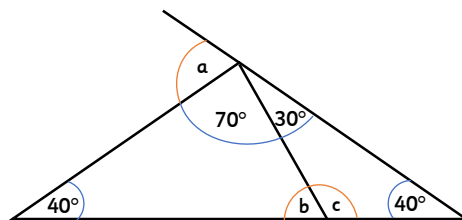


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1b. Matt says:

It is possible for me to calculate all of the missing angles.



Is Matt correct? Explain why.

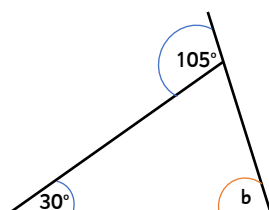


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2a. Saskia thinks that angle b measures 70° . Oscar thinks that angle b measures 75° .

Who is correct? Explain why.

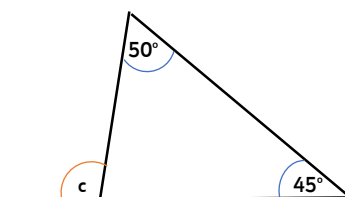


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2b. Troy thinks that angle c measures 95° . Ellie thinks that angle c measures 100° .

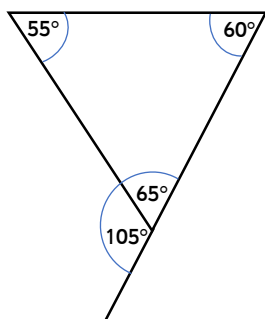
Who is correct? Explain why.



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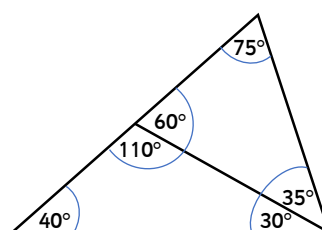
3a. One of these angles is wrong. Find and fix the mistake.



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PS

3b. One of these angles is wrong. Find and fix the mistake.



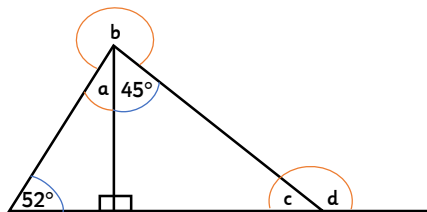
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Reasoning and Problem Solving – Angles in a Triangle – Missing Angles

4a. Rosie says:

It's impossible for me to calculate all of the missing angles.



Is Rosie correct? Explain why.

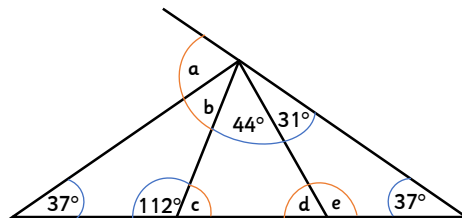


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4b. Stan says:

It is possible for me to calculate all of the missing angles.



Is Stan correct? Explain why.

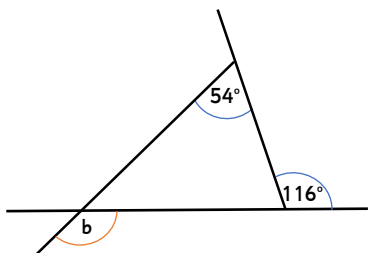


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5a. Charles thinks that angle b measures 62° . Chrissy thinks that angle b measures 118° .

Who is correct? Explain why.

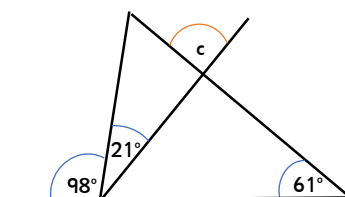


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5b. Mary thinks that angle c measures 58° . Hassan thinks that angle c measures 122° .

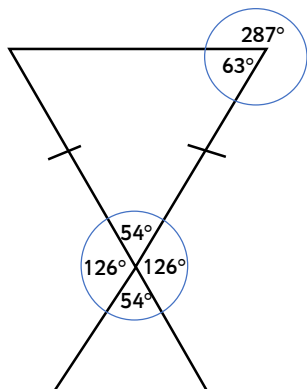
Who is correct? Explain why.



(Not to scale)

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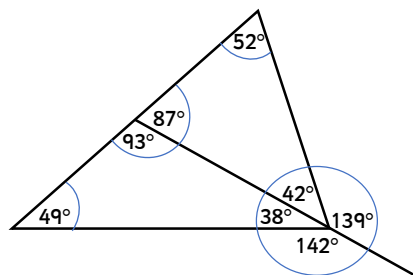
6a. One of these angles is wrong. Find and fix the mistake.



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6b. One of these angles is wrong. Find and fix the mistake.



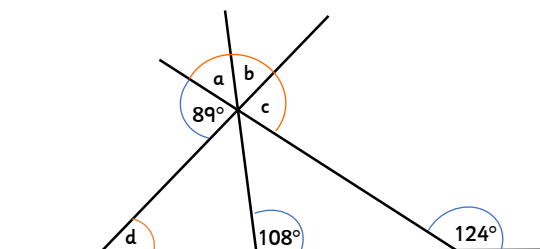
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Reasoning and Problem Solving – Angles in a Triangle – Missing Angles

7a. Rob says:

It's impossible for me to calculate all of the missing angles.



Is Rob correct? Explain why.

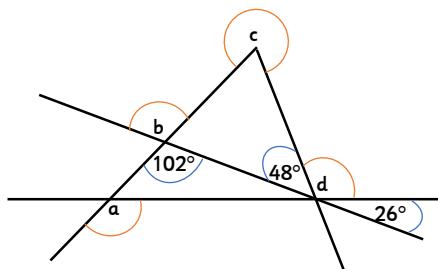


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7b. Balvinder says:

It is possible for me to calculate all of the missing angles.



Is Balvinder correct? Explain why.

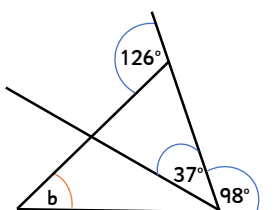


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8a. Alex thinks that angle b measures 44° . George thinks that angle b measures 91° .

Who is correct? Explain why.

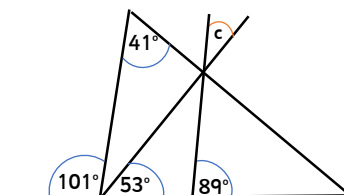


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8b. Sid thinks that angle c measures 36° . Hazel thinks that angle c measures 26° .

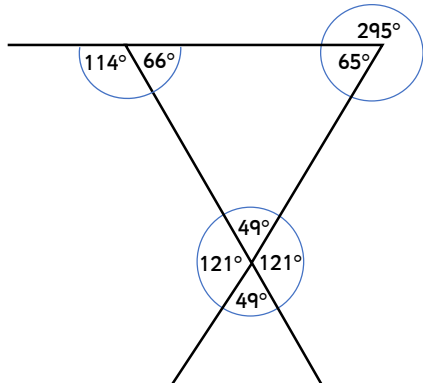
Who is correct? Explain why.



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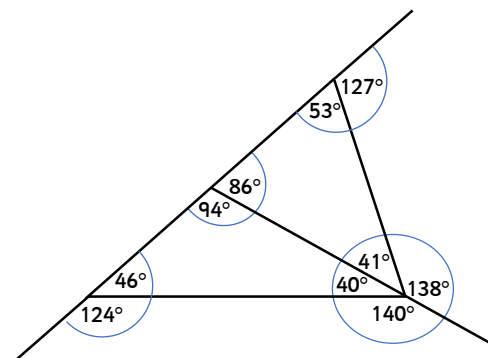
9a. Some of these angles are wrong. Find and fix the mistakes.



(Not to scale)

PS

9b. Some of these angles are wrong. Find and fix the mistakes.



(Not to scale.)

PS

Reasoning and Problem Solving – Angles in a Triangle – Missing Angles

Developing

- 1a. Kelly is wrong as $a = 40^\circ$ and $b = 120^\circ$. Angle a is calculated by knowing that angles in a triangle total 180° . Angle b is calculated by knowing that angles on a straight line total 180° ($180^\circ - 40^\circ = 120^\circ$).
- 1b. Matt is correct as $a = 80^\circ$, $b = 70^\circ$ and $c = 110^\circ$. Angles b and c can be calculated by understanding that angles in a triangle total 180° . Angle a can be calculated by calculating $70^\circ + 30^\circ = 100^\circ$, then $180^\circ - 100^\circ = 80^\circ$.
- 2a. Oscar is correct. If he calculates the angle of the straight line first ($180^\circ - 105^\circ = 75^\circ$) he can then add the two angles in the triangle ($30^\circ + 75^\circ = 105^\circ$) and subtract that answer from 180° to give him 75° .
- 2b. Troy is correct. The missing angle inside the triangle is 85° ($50^\circ + 45^\circ = 95^\circ$ then $180^\circ - 95^\circ = 85^\circ$). The angle of a straight line is 180° , so $180^\circ - 85^\circ = 95^\circ$.
- 3a. 105° should be 115° .
- 3b. 60° should be 70° .

Expected

- 4a. Rosie is wrong as $a = 38^\circ$, $b = 277^\circ$, $c = 45^\circ$ and $d = 135^\circ$. Angles a and c can be calculated using knowledge that angles in a triangle total 180° . Angle b can be calculated once angle a is known and using knowledge that the angle of a complete circle is 360° . Angle d can be calculated using knowledge that the angle of a straight line is 180° .
- 4b. Stan is correct as $a = 74^\circ$, $b = 31^\circ$, $c = 68^\circ$, $d = 68^\circ$ and $e = 112^\circ$. Angles b and e can be calculated using knowledge that angles in a triangle total 180° . Angles a , c and d can be calculated using knowledge that the angle of a straight line is 180° .
- 5a. Chrissy is correct. Using knowledge that the angle of a straight line is 180° , it's possible to calculate all of the angles in the triangle. Then, it's possible to calculate $180^\circ - 62^\circ = 118^\circ$. Charles calculated the size of the angle next to angle b .
- 5b. Mary is correct. She has used her knowledge of vertically opposite angles. Hassan has chosen the wrong vertically opposite angle.
- 6a. 287° should be 297° .
- 6b. 42° should be 41° .

Greater Depth

- 7a. Rob is wrong as $a = 16^\circ$, $b = 75^\circ$, $c = 89^\circ$ and $d = 33^\circ$. The angles can be calculated using knowledge of the angle of a straight line, angles in a triangle and vertically opposite angles.
- 7b. Balvinder is correct as $a = 128^\circ$, $b = 102^\circ$, $c = 306^\circ$ and $d = 106^\circ$. The angles can be calculated using knowledge of the angle of a straight line, angles in a triangle, a complete rotation around a point and vertically opposite angles.
- 8a. Alex is correct. He needed to calculate the angles of a straight line first ($98^\circ + 37^\circ = 135^\circ$, $180^\circ - 135^\circ = 45^\circ$ and $180^\circ - 126^\circ = 54^\circ$). He can then calculate the missing angle in the triangle as 89° . $180^\circ - 89^\circ = 91^\circ$. $91^\circ + 45^\circ = 136^\circ$. $180^\circ - 136^\circ = 44^\circ$.
- 8b. Sid is correct. He needed to calculate $180^\circ - 89^\circ = 91^\circ$ then $91^\circ + 53^\circ = 144^\circ$. Then $180^\circ - 144^\circ = 36^\circ$. Angle c can then be calculated as 36° using knowledge of vertically opposite angles.
- 9a. Both 121° should be 131° .
- 9b. 138° should be 139° and 124° should be 134° .