Same-Day Intervention Assessment	Child A	Child B	Child C	Child D	Child E
Calculate vertically opposite angles.					
Calculate angles on a straight line.					
Calculate complex missing angles.					

Name: Date:

Additional Notes

Reasoning Poster

Oscar has made the following statements about the diagram below. Decide whether each statement is true or false and explain how you know.
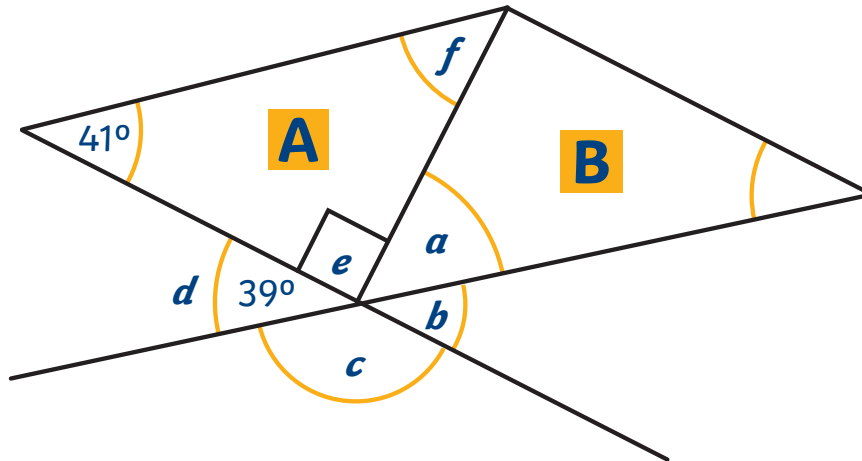

1. Angle **a** has the value of 39° because it is vertically opposite the angle measuring 39°.

2. To find angle **f**, subtract 41° and the value of a right angle from 180°.

3. The total of the interior angles of the triangles A and B will be the same.

4. To work out the value of angle **b**, subtract the value of a right angle from 180°.

Challenge

Write your own true or false statement for a friend.

Oscar has made the following statements about the diagram below. Decide whether each statement is true or false and explain how you know.

1. Angle **a** has the value of 39° because it is vertically opposite the angle measuring 39°.

   This is false because angle *a* is not vertically opposite the angle with a value of 39°.

2. To find angle **f**, subtract 41° and the value of a right angle from 180°.

   This is true because the three angles in triangle A must total 180°.

3. The total of the interior angles of the triangles A and B will be the same.

   This is true because the interior angles of a triangle always total 180°.

4. To work out the value of angle **b**, subtract the value of a right angle from 180°.

   This is false as angle *b* is vertically opposite to angle *d* so must equal 39°. Alternatively, to find the value of angle *b*, subtract 90° and the value of angle *a* from 180°.
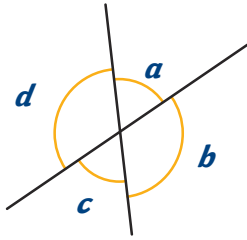
Challenge

Write your own true or false statement for a friend.
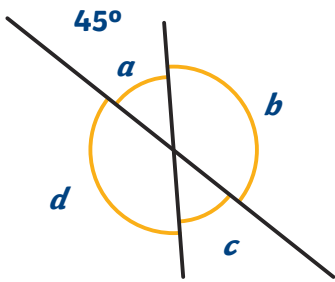
Children's answers will vary.

Calculating Missing Angles 1

1.
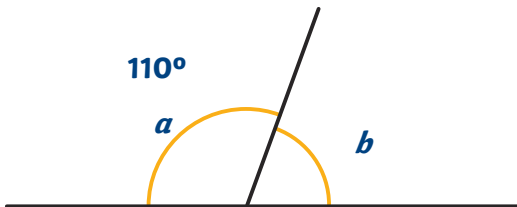

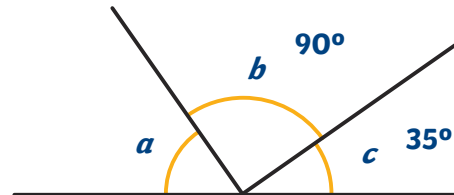The equal angles are _____

and _____ .

2.

45°

a

b

d

c

C =

3.

a

a =

4.

110°

a

b

b =

5.

b 90°

a

c 35°

a =

6.

50°

b

a

95°

c

C =

7.

a

31°   68°
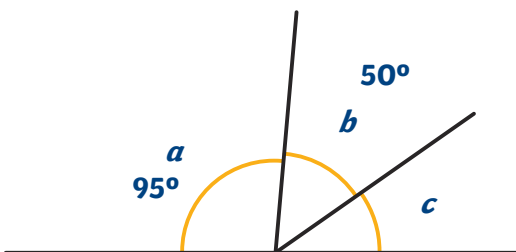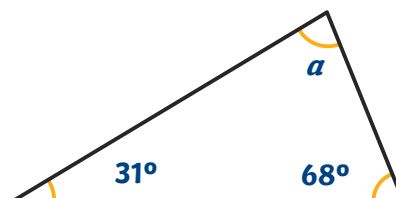
a =

not drawn to scale

Calculating Missing Angles 2

1.

135º
a
d
b
c

Angle	Value of Angle
a	135º
b	
c	
d	

2.

150º
a
d
b
c

Angle	Value of Angle
a	150º
b	
c	
d	

3.

72º   61º

a

a =

4.

a   132º

a =

5.

51º

d

d =

6.

42º

111º   b
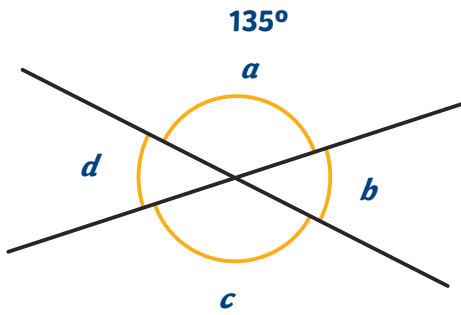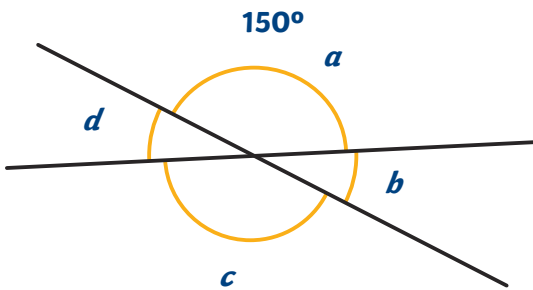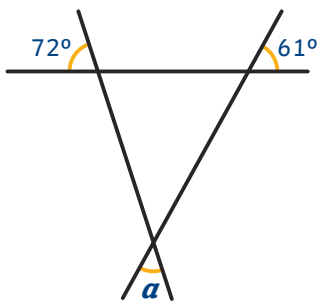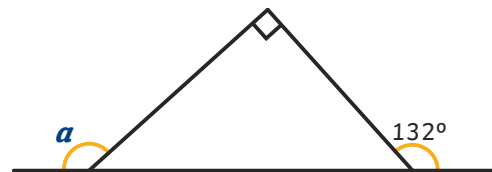
b =

not drawn to scale

■ Same-Day Intervention: Calculating Complex Missing Angles

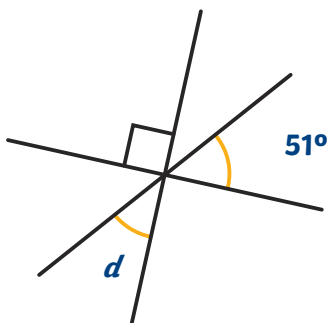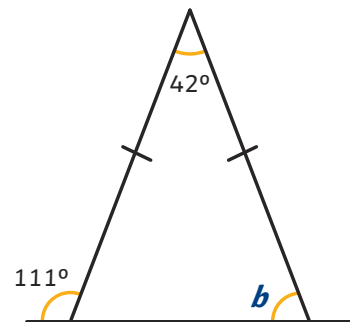**Children will learn to apply their knowledge of angles of triangles to solve complex missing angle problems.**

Pre-Intervention Check

To access this intervention, can the children...

Tick as appropriate.

...calculate missing angles on a straight line, about a point and in a triangle?* ⬡

**...identify that vertically opposite angles are equal?*** ⬡

Explaining the Misconception in Mathematical Understanding

Common Misconception:

Not being able to identify where and how to apply their knowledge of angles.

For example, if presented with a problem where children need to combine knowledge of different angles, such as in the example shown, a child may not know where to start. They may begin calculating angles that will not help them to find the missing angle rather than combining their knowledge of vertically opposite angles and the sum of angles in a triangle.
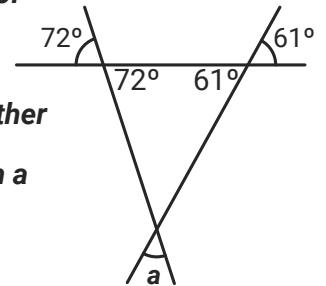
This intervention will help prepare children to solve more complex missing angles problems in key stage 3.

Summary of Intervention

Calculate vertically opposite angles.

Calculate angles on a straight line.

Calculate complex missing angles.

| Preparation	Key Vocabulary
• **Calculating Missing Angles 1** (A3 copy for display and 1 A4 copy per pair) • **Calculating Missing Angles 2** (A3 copy for display and 1 A4 copy per pair) • **Reasoning Poster** (A3 copy for display, optional) • Pens/pencils	• Angle • Vertical • Opposite • Interior • Calculate • Straight line, about a point, in a triangle

Key Questions for Deepening Understanding

Calculate vertically opposite angles.

Display the **A3 Calculating Missing Angles 1** and give each pair an A4 copy. Focus on question 1.
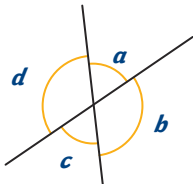
- **What do you notice about the angles?**

Explain that the values of vertically opposite angles are equal/the same.

- **Can you spot any angles that are equal?** (*d* and *b*, *a* and *c*)

(Children could colour each pair of equal angles in a different colour.)

- **If angle *a* is 55°, what is angle *c*?** (55°)

- **If angle *d* is 125°, what is angle *b*?** (125°)

Focus on question 2.

- **What is the value of angle *c*? Explain why.** (Angle *c* is 45° because it is vertically opposite an angle that has a value of 45°.)
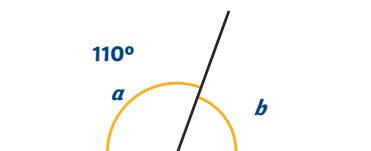
Calculate angles on a straight line.

Focus on question 3.

- **What does this image show?** (an angle on a straight line)

- **What do angles on a straight line always total?** (180°)

Focus on question 4.

Explain that we need to work out the value of angle *b*.

- **What do you notice about this image?** (There are two angles on a straight line and the value of one angle is given.)

- **How can we use the knowledge that two angles on a straight line add to 180° to help us calculate the missing angle?**

Explain that the total of the two angles together is 180° so if we subtract 110° from 180°, it will give the value of the missing angle. 180° – 110° = 70° so angle *b* is 70°.

Focus on question 5.
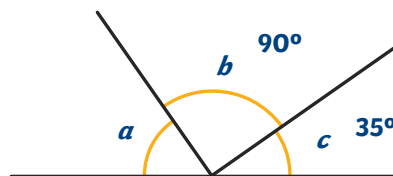
- **What is different about this image?** (This time there are three angles on a straight line.)

- **What do the three angles total together?** (180°)

- **How can we calculate angle *a*?**

Explain that we need to find 90° + 35° and then subtract this total from 180°.

90° + 35° = 125°

180° – 125° = 55° so angle *a* is 55°.

Children complete question 6. (angle *c* = 35°)

Focus on question 7.

- **What do interior angles of a triangle total?** (180°)

Explain that we calculate a missing angle in a triangle in the same way as finding a missing angle on a straight line.
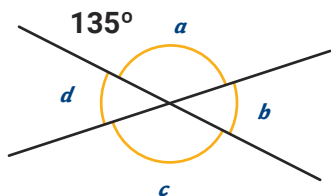
- **What is the missing angle *a*?** (81°) **How did you work it out?**

Key Questions for Deepening Understanding (Continued)

Calculate complex missing angles.

Display the A3 **Calculating Missing Angles 2** and give each pair an A4 copy. Focus on question 1.

Explain that we need to work out the missing angles.

- **What do you notice about the angles?**

- **Which angles are vertically opposite?** (**a** and **c**, **b** and **d**)

- **What must the value of angle c be? Why?** (Angle **c** is 135° because it is vertically opposite angle **a** which is 135°.)

Write 135° in the table and on the image.

- **Can you spot any straight lines?**

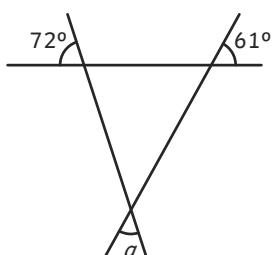Highlight the example shown below. (There is more than one example.)
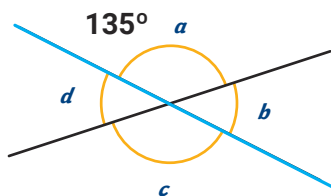
Explain that angles **a** and **b** are on the same straight line so must total 180°. 180° − 135° = 45° so angle **b** must equal 45°.

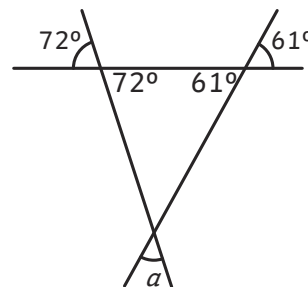- **Angle d is vertically opposite b. What must the value of angle d be?** (45°)

Children answer question 2. (**c** = 150°, **b** and **d** = 30°)

Focus on question 3.

Explain that we need to find the value of angle **a**.

- **What do you notice about this image and the angles that have been given?** (vertically opposite angles)

- **Can you use these angles to calculate any unknown angles?** Label these on the image (as shown).
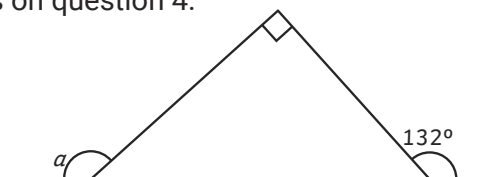

- **What do interior angles in a triangle total?** (180°)

- **What is the value of the missing interior angle in the triangle? How can we work it out?** (72° + 61° = 133° and then 180° − 133° = 47°.)

The missing interior angle in the triangle is 47°.

- **What must angle a be and why?** (Angle **a** is 47° because it is a vertically opposite angle.)

Focus on question 4.

Explain that we need to find the value of angle **a**.

- **What do you notice about this image?**

- **Can you use any of the angles given to calculate any unknown angles?**

- **What does the square angle marker represent?** (90°)

- **Are there any angles on a straight line? Can you use this knowledge to find the value of the unlabelled angle on the straight line with 132°?** (180° − 132° = 48°)
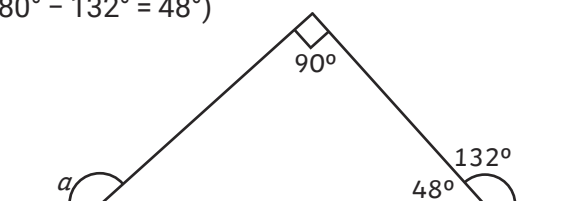
Key Questions for Deepening Understanding (Continued)

- **Can you use your knowledge of angles in a triangle to help you find the value of the other missing angle in the triangle?** (90° + 48° = 138°, 180° − 138° = 42°)
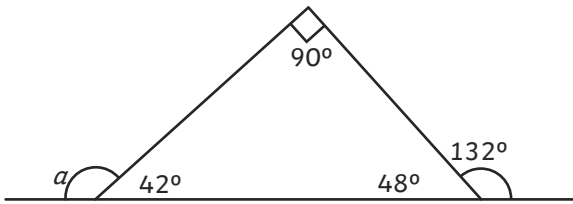
- **Can you use your knowledge of angles on a straight line to work out angle *a*?** (180° − 42° = 138° so angle *a* must equal 138°.)

Children answer the remaining two questions on the sheet and go through the answers together. (5. *d* = 39°, 6. *b* = 69°)

Additional Opportunities to Reinforce Learning

Display the **Reasoning Poster.** By looking at the diagram, children decide if the given statements are true or false and explain how they know.

Reasoning Poster

Oscar has made the following statements about the diagram below. Decide whether each statement is true or false and explain how you know.

1. Angle *a* has the value of 39° because it is vertically opposite the angle measuring 39°.

2. To find angle *f*, subtract 41° and the value of a right angle from 180°.

3. The total of the interior angles of the triangles A and B will be the same.

4. To work out the value of angle *b*, subtract the value of a right angle from 180°.

Challenge
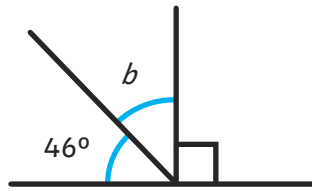Write your own true or false statement for a friend.

Home Learning Slip

Today, at school, your child has been learning to find complex missing angles using their knowledge of angles. For example, angles on a straight line and angles in a triangle total 180° and angles that are vertically opposite have the same value.
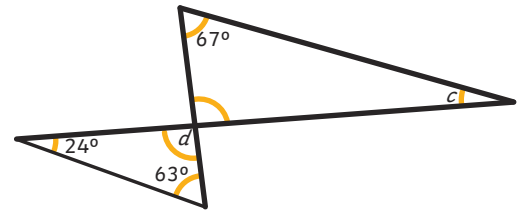
To support your child further, you could ask them to find the missing angles in the diagrams below.
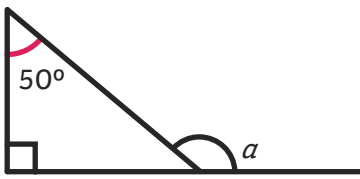
angle **a** = _____ º

angle **b** = _____ º

angle **c** = _____ º

angle **d** = _____ º

Answers

a = 140°, **b** = 44°, **c** = 20°, **d** = 93°

Thank you for your support with this. Your help will really make a difference to your child.
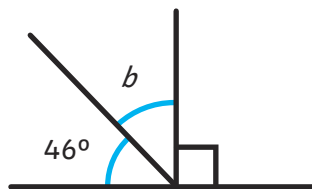

Home Learning Slip

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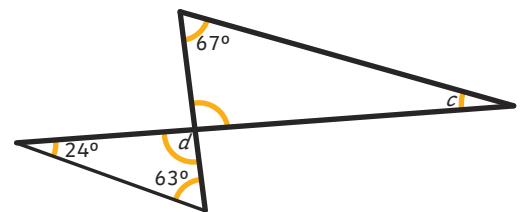
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angle **c** = _____ º

angle **d** = _____ º

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