Properties of Shape

Master The Curriculum

6

Fluency Teaching Slides

Measure with a Protractor

6

Fluency Teaching Slides

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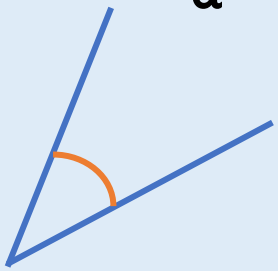
Activity 1 Measure with a Protractor

Identify the type of angle, and measure the angle using a protractor.

a



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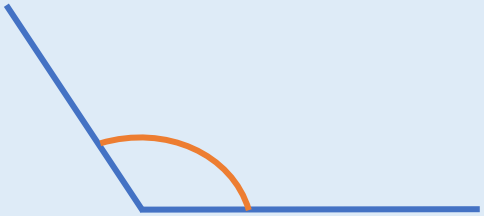
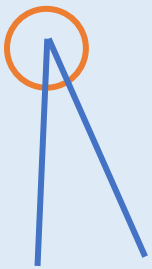


c



Angle _____ is an _____ angle.

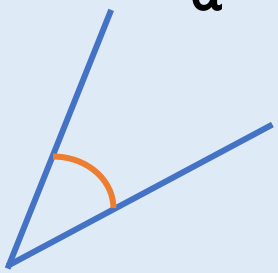
It measures _____.

Can we name and describe the 4 different types of angles?

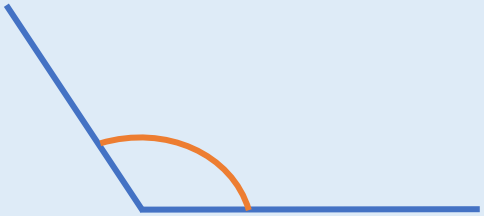
Activity 1 Measure with a Protractor

Identify the type of angle, and measure the angle using a protractor.

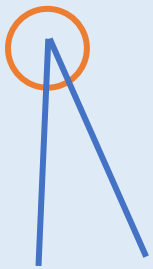
a



b



c

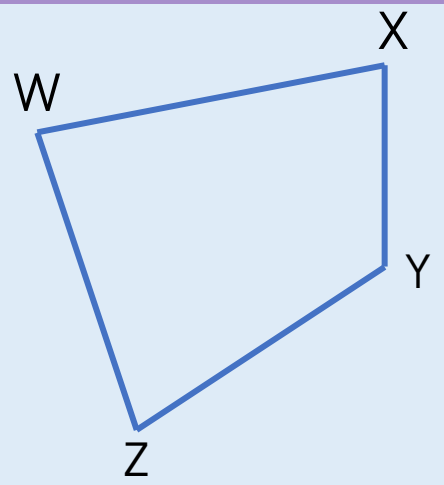


Angle b is an obtuse angle.

It measures 30°.

Activity 2 Measure with a Protractor

Estimate, then measure each of the angles at the vertices of the quadrilateral.



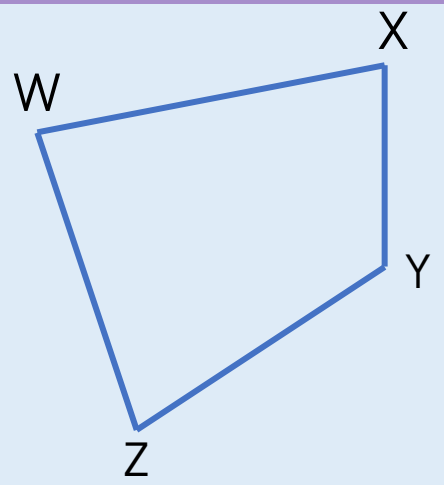
W: X:

Y: Z:

What unit do we use to measure angles?

Activity 2 Measure with a Protractor

Estimate, then measure each of the angles at the vertices of the quadrilateral.



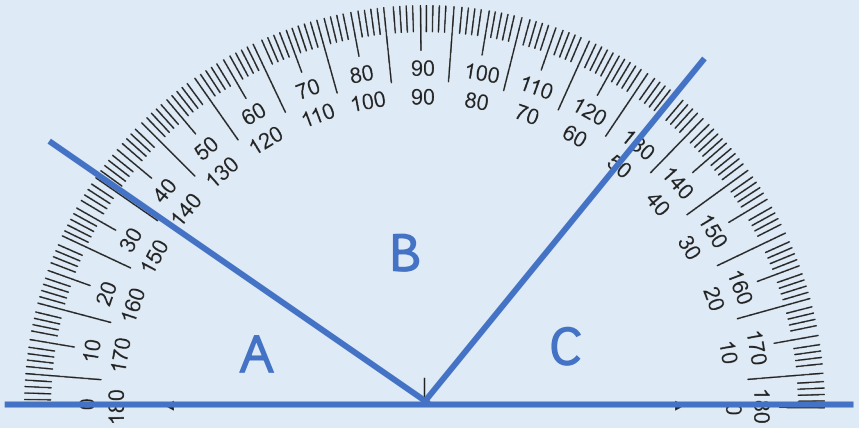
W: 100° X: 165°

Y: 120° Z: 165°

Activity 3

Measure with a Protractor

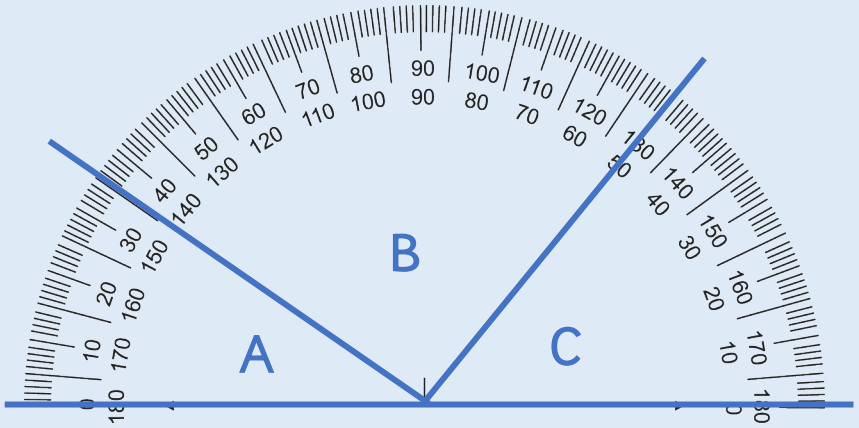
Work out the size of each angle.
Explain how you found your answers.



What mistakes could we make when measuring with a protractor?

Activity 3 Measure with a Protractor

Work out the size of each angle.
Explain how you found your answers.



A = 35° B = 75° C = 50°

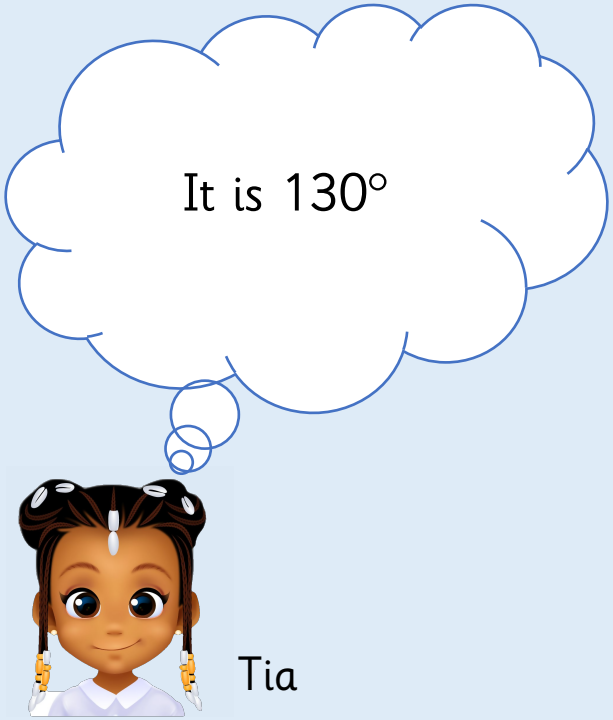
Reasoning - 1 Measure with a Protractor

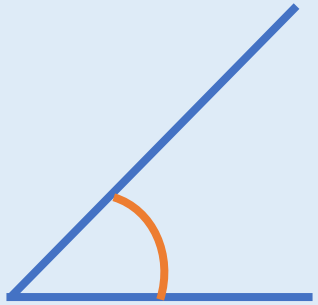
Cut out a circle and draw a line from the centre to the edge. Add a spinner in the centre.

- Put the arrow in the starting position as shown above.
- Turn over a flash card with an angle on.
- Estimate the given angle by moving the spinner.
- Check how close you are using a protractor.

Reasoning – 2 Measure with a Protractor

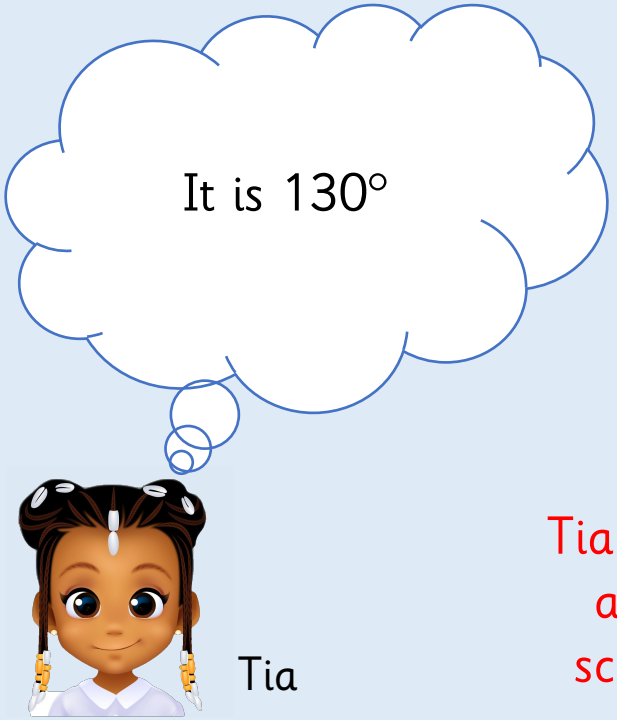
Tia measures this angle.
Explain what she has done wrong.



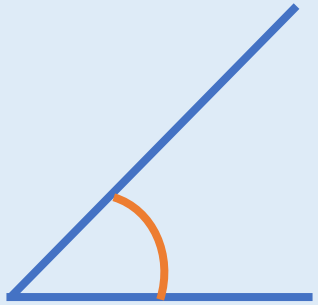


Reasoning – 2 Measure with a Protractor

Tia measures this angle.
Explain what she has done wrong.



Tia



Tia is wrong because 130°is an obtuse angle and the angle indicated is acute. She has used the wrong scale on the protractor. She should have measured the angle to be 50°.

Discussion

Measure with a Protractor

Can we name and describe the 4 different types of angles? (right angle, obtuse, acute, reflex)

What unit do we use to measure angles?

Does it matter which side of the protractor I use?

What mistakes could we make when measuring with a protractor?

How would I measure a reflex angle?

Look at a compass, what angles can we identify using the compass?

Introduce Angles

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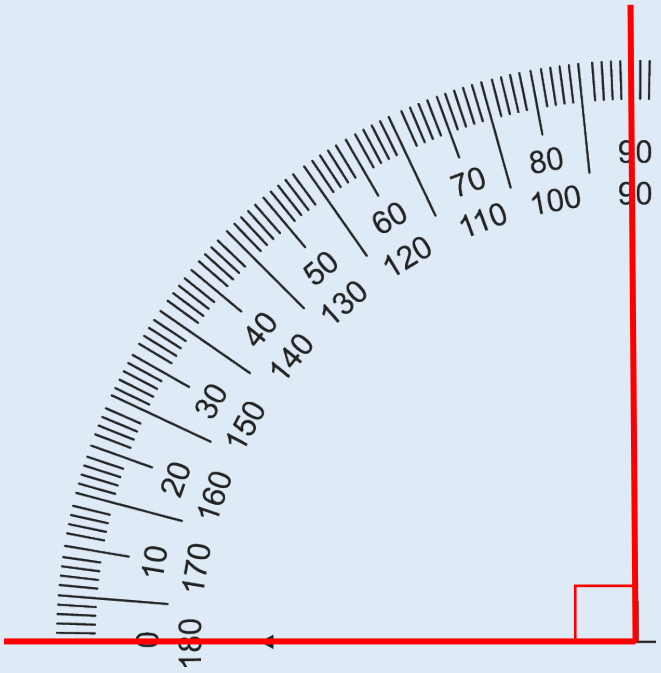
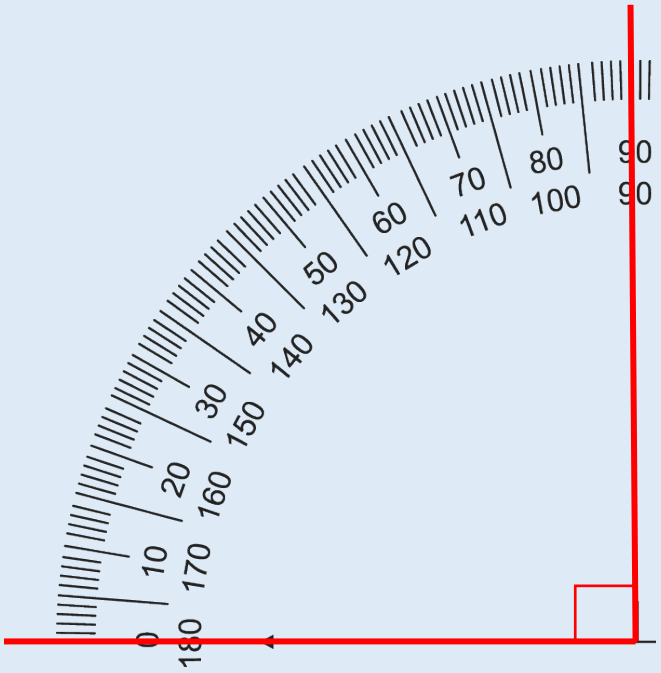
Activity 1 Introduce Angles



There are _____ degrees in a right angle.

If there are 90 degrees in one right angle, how many are there in two?

Activity 1 Introduce Angles



There are 90 degrees in a right angle.

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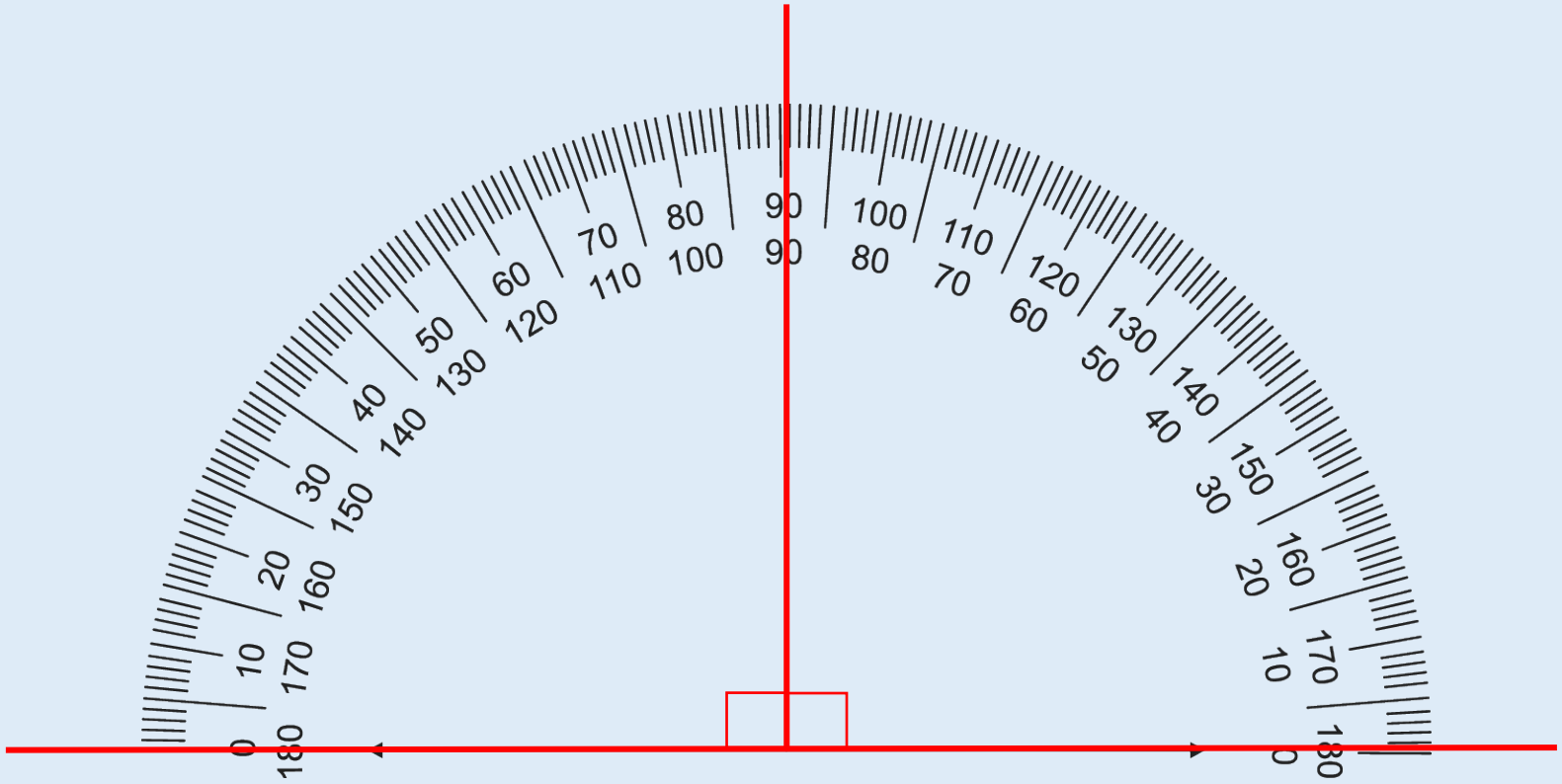
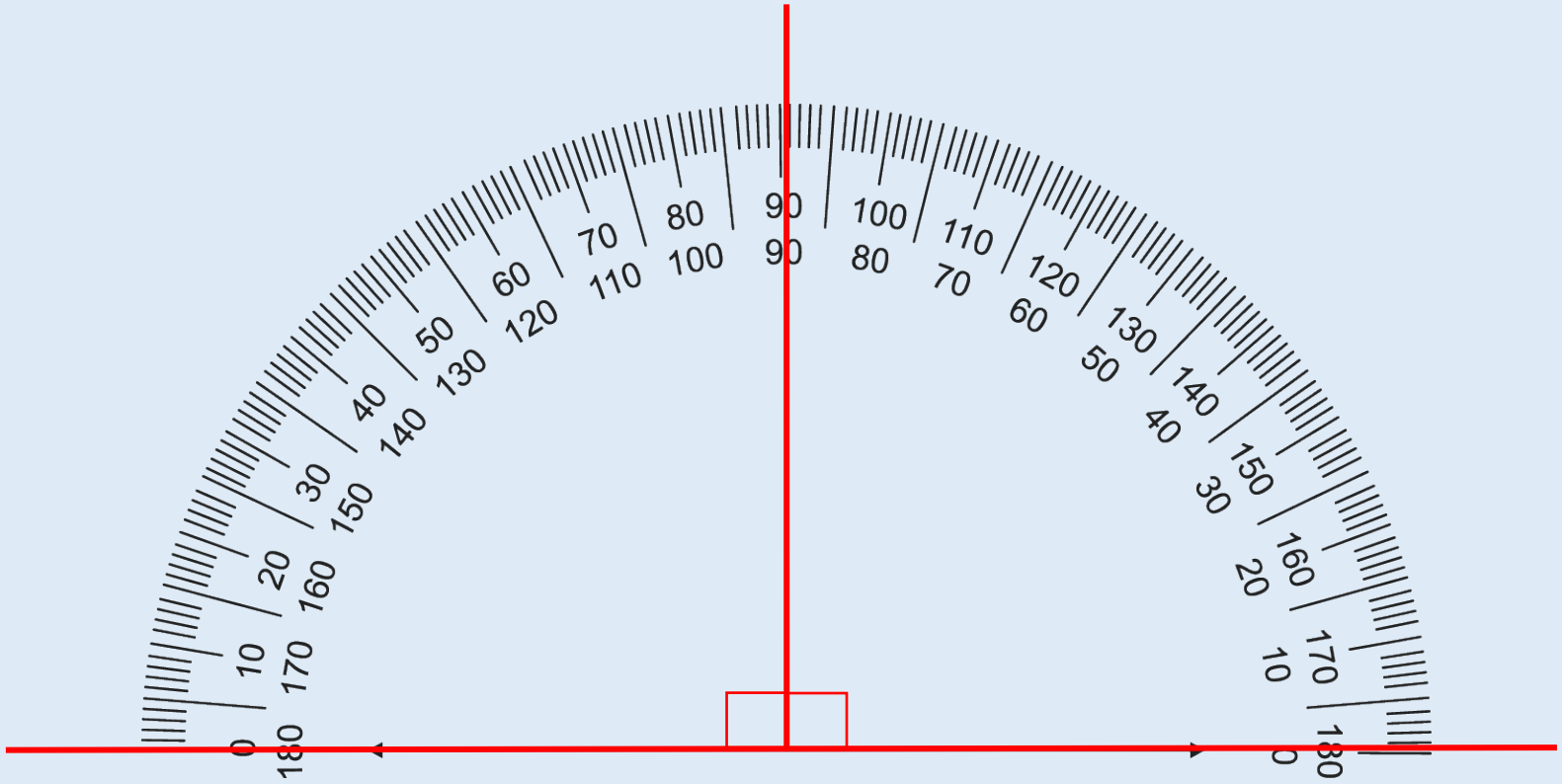


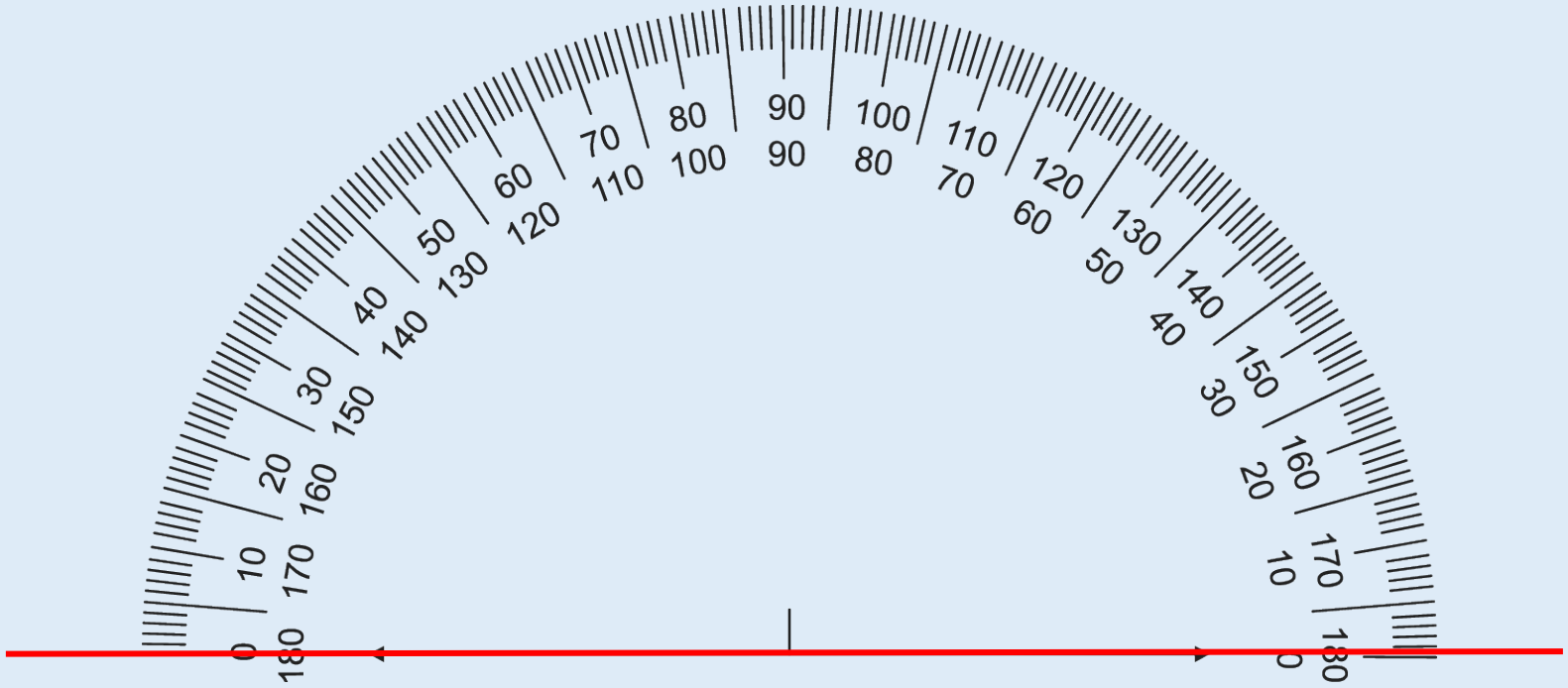
There are _____ right angles on a straight line.

Activity 1 Introduce Angles



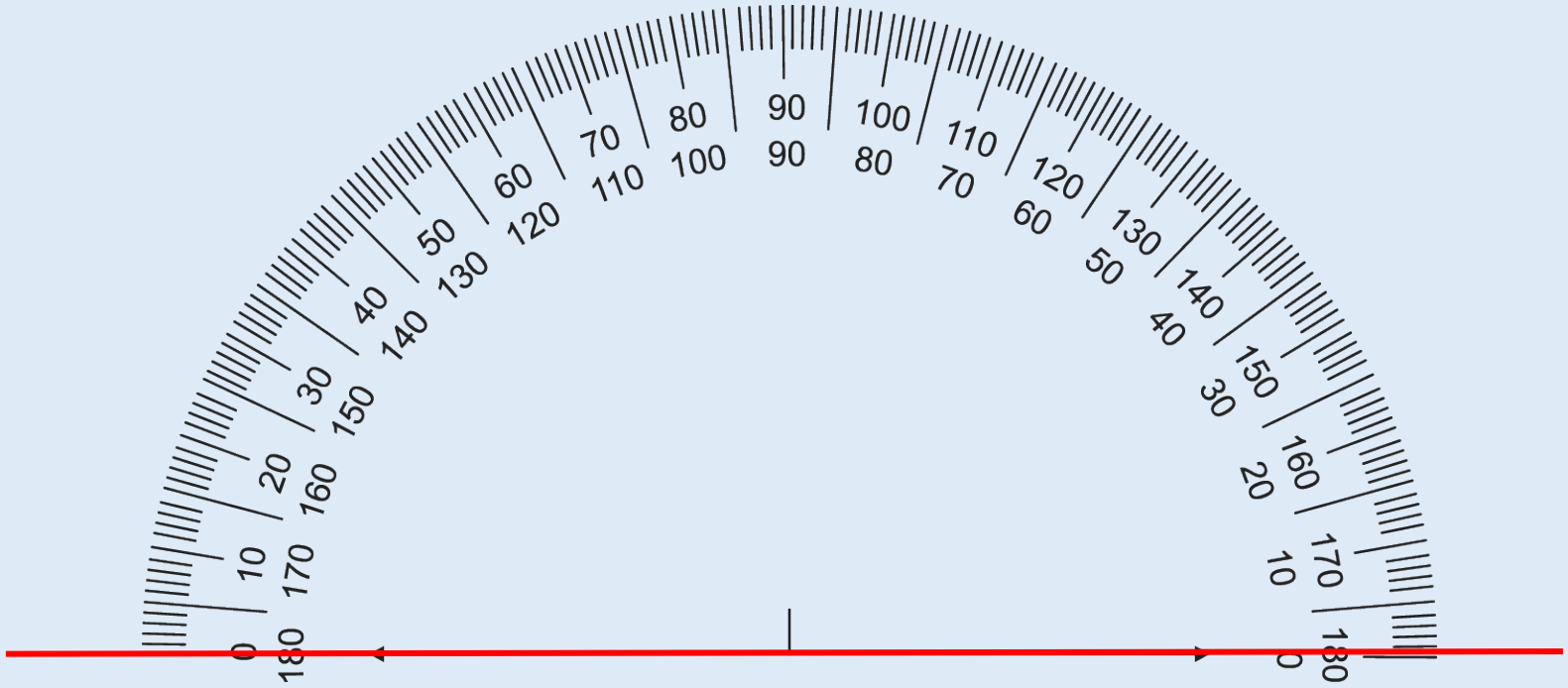
There are 2 right angles on a straight line.

Activity 1 Introduce Angles



There are _____ degrees on a straight line.

Activity 1 Introduce Angles



There are 180 degrees on a straight line.

Activity 2 Introduce Angles

Complete the table.

Angle	Fraction of a full turn	Degrees
Right angle	$\frac{1}{4}$	90
Straight line		
Three right angles		
Full turn		

How many degrees are there in a quarter/half turn?

Activity 2 Introduce Angles

Complete the table.

Angle	Fraction of a full turn	Degrees
Right angle	$\frac{1}{4}$	90
Straight line	$\frac{1}{2}$	180
Three right angles	$\frac{3}{4}$	270
Full turn	1	360

Activity 3 Introduce Angles

Use a compass to identify how many degrees there are between:

North & South (turning clockwise)
South & East (turning anti-clockwise)
North-East and South-West (turning clockwise)

Between which two compass points can you see a right angle/half turn/three quarter turn?

Activity 3 Introduce Angles

Use a compass to identify how many degrees there are between:

North & South (turning clockwise)
South & East (turning anti-clockwise)
North-East and South-West (turning clockwise)

North & South → 180 degrees
South & East → 90 degrees
North-East & South-West → 180 degrees

Reasoning - 1 Introduce Angles

Leanna and Esin are asked how many degrees there are between North-West and South-West.
Who do you agree with? Explain why.

There are 90 degrees between NW and SW.

Leanna

There are 270° between NW and SW.

Esin

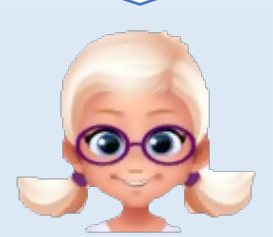
Reasoning - 1 Introduce Angles

Leanna and Esin are asked how many degrees there are between North-West and South-West.
Who do you agree with? Explain why.

There are 90 degrees between NW and SW.

Leanna

There are 270° between NW and SW.



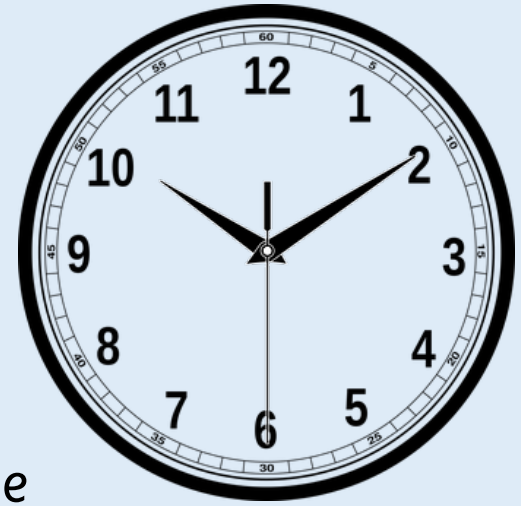
Esin

They are both correct. Leanna measured anti-clockwise whereas Esin measured clockwise.

Reasoning - 2 Introduce Angles

If it takes 60 minutes for the minute hand to travel all the way around the clock, how many degrees does the minute hand travel in:

- 6 minutes
- 10 minutes



How many minutes have passed if the minute hand has moved 120°?

Reasoning - 2 Introduce Angles

If it takes 60 minutes for the minute hand to travel all the way around the clock, how many degrees does the minute hand travel in:

- 6 minutes
- 10 minutes

How many minutes have passed if the minute hand has moved 120°?

360 ÷60 =6 so the minute hand travels 6°per minute.

6 minutes : 36°

10 minutes : 60°

120°: 20 minutes

Reasoning - 3 Introduce Angles

Always, Sometimes, Never?

W to S = 90 degrees

NE to SW =180 degrees

E to SE in a clockwise direction >90°

Reasoning - 3 Introduce Angles

Always, Sometimes, Never?

W to S = 90 degrees

Sometimes

NE to SW =180 degrees

Always

E to SE in a clockwise direction >90°

Never

Discussion

Introduce Angles

If there are 90 degrees in one right angle, how many are there in two? What about three?

How many degrees are there in a quarter/half turn?

Between which two compass points can you see a right angle/half turn/three quarter turn?

Calculate Angles

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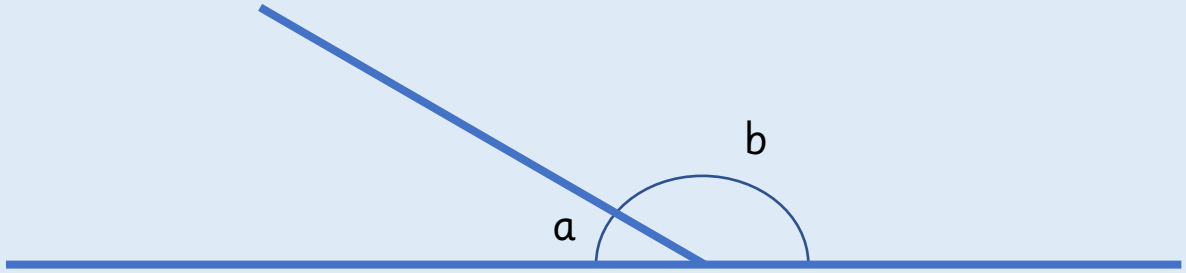
Activity 1 Calculate Angles

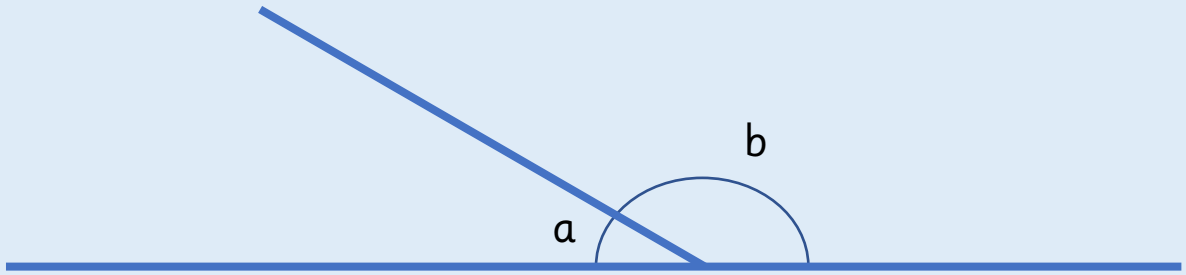


a + b = _____ _____ - a = b

b + a = _____ _____ - b = a

What do we know about a and b? How do we know this?

Activity 1 Calculate Angles



$a + b =$ 180

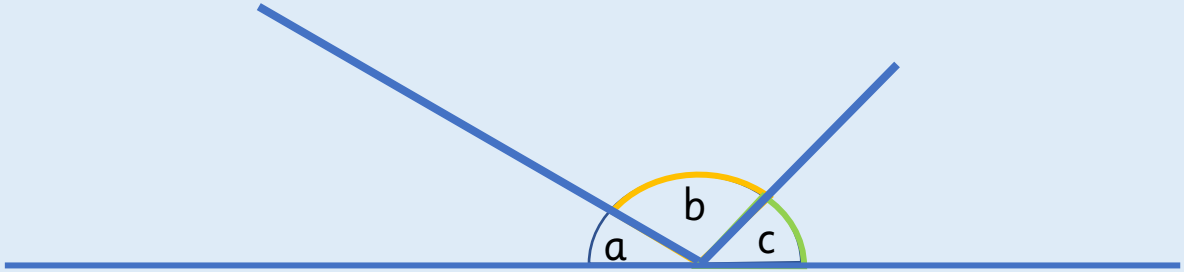
180 $- a = b$

$b + a =$ 180

180 $- b = a$

Activity 2 Calculate Angles

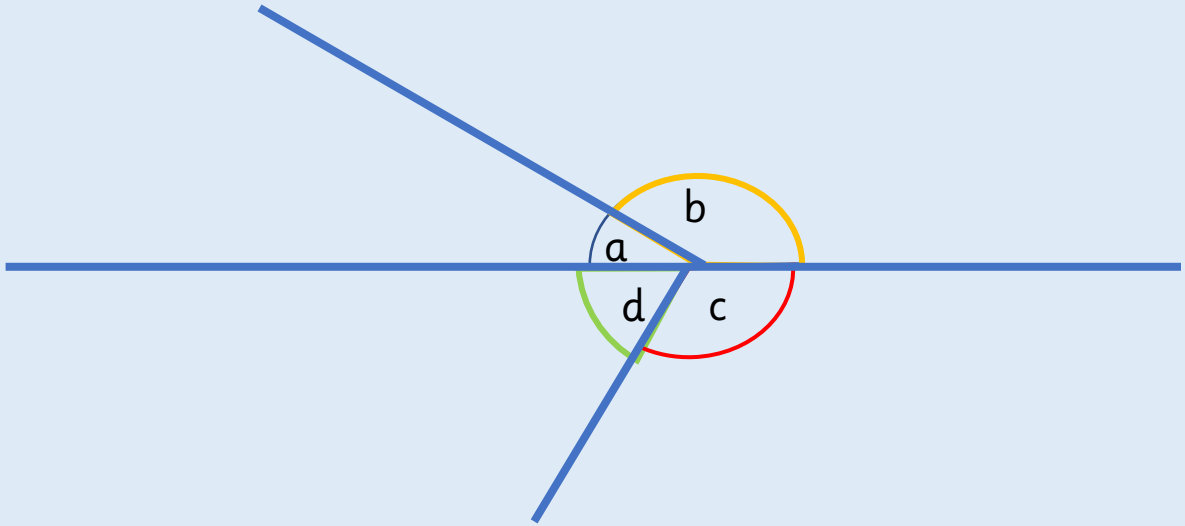
How many number sentences can you write from the images?



Which angle fact might you need to use when answering this question?

Activity 2 Calculate Angles

How many number sentences can you write from the images?



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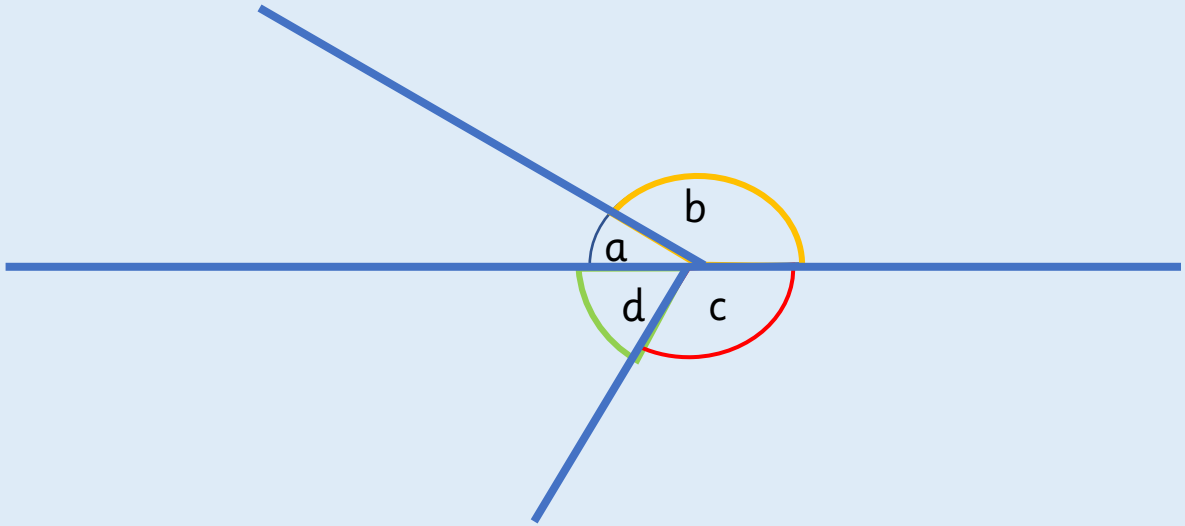
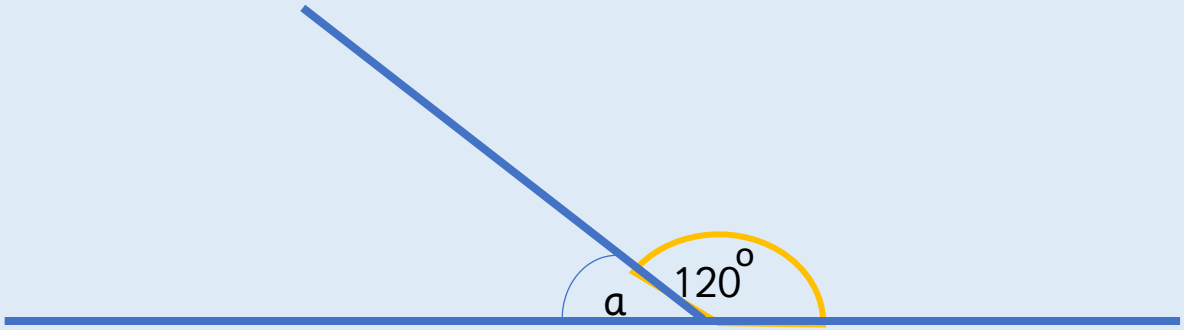


Activity 3 Calculate Angles

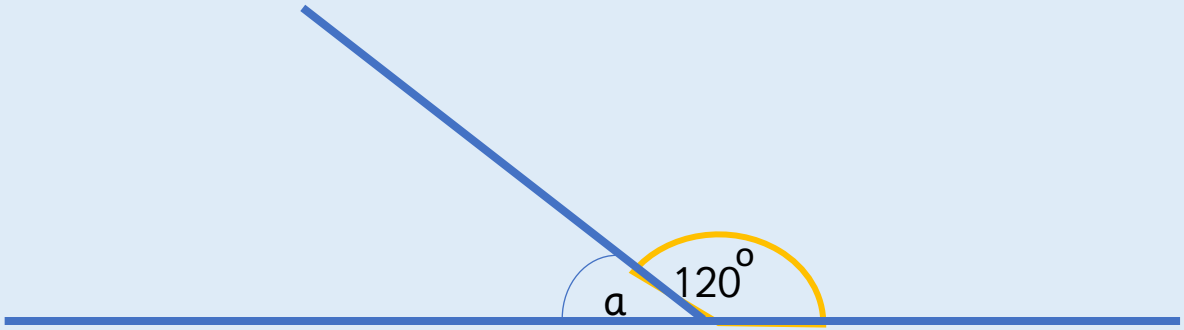
Calculate the missing angles.



Which angles are already given?

Activity 3 Calculate Angles

Calculate the missing angles.

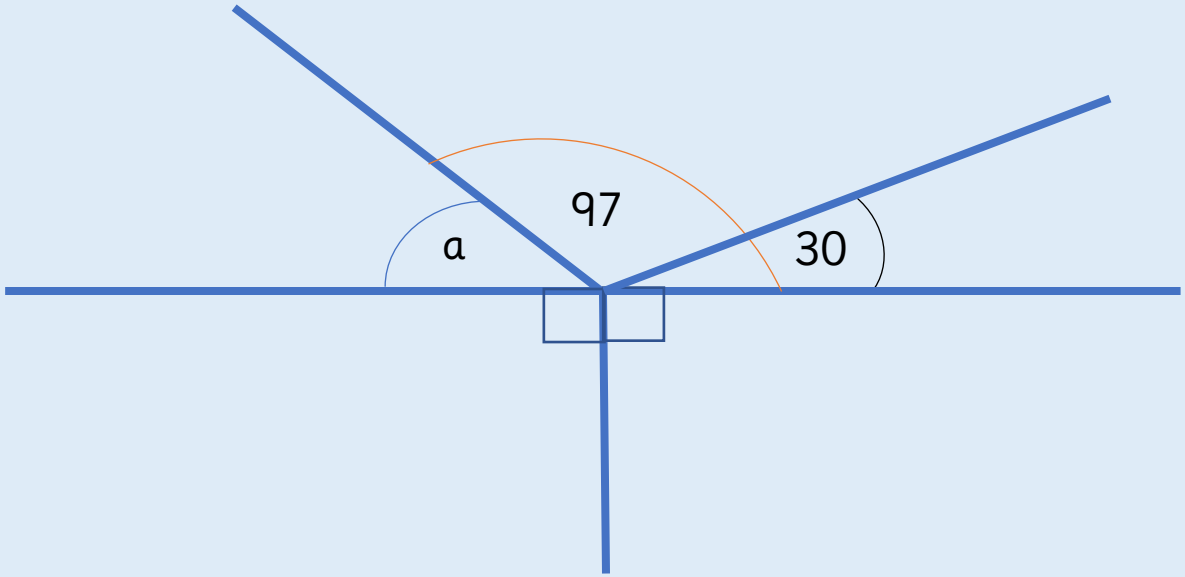


$a = 180 - 120$

$a = 60$

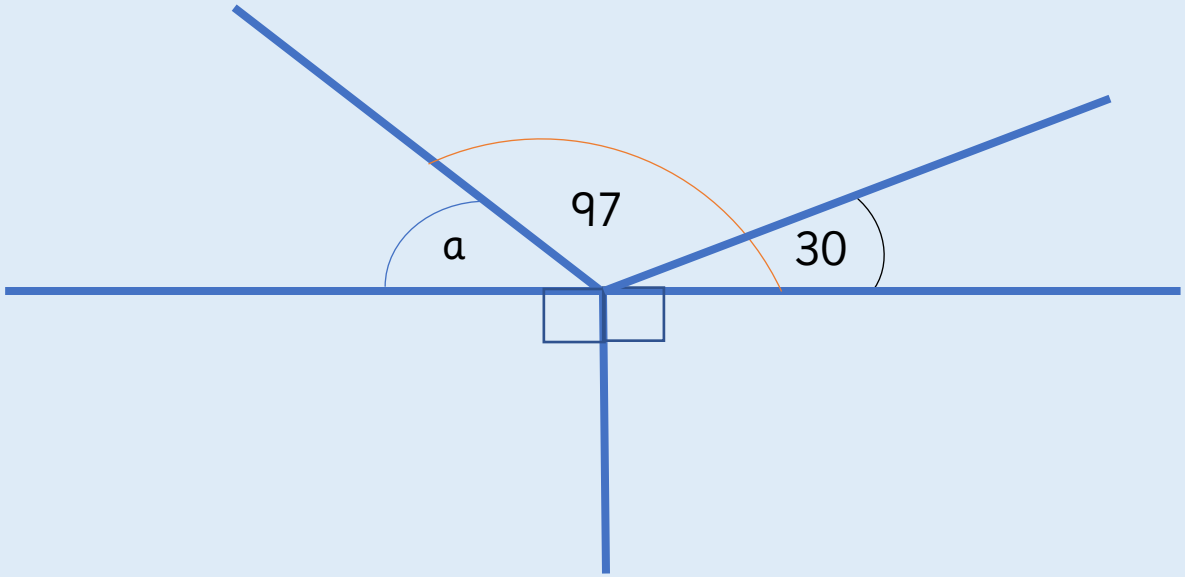
Activity 3 Calculate Angles

Calculate the missing angles.



Activity 3 Calculate Angles

Calculate the missing angles.

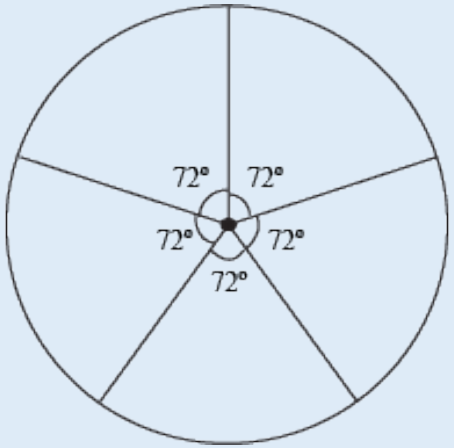


a = 180 – 97

a = 83

Reasoning - 1 Calculate Angles

There are five equal angles around a point.
What is the size of each angle?
Explain how you know.



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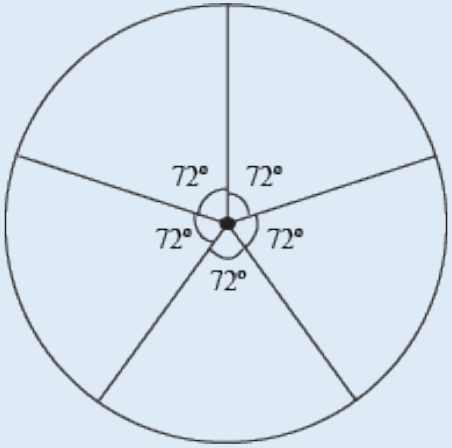


72° because
360 ÷ 5 = 72

Reasoning - 2 Calculate Angles

Four angles meet at the same point on a straight line.

One angle is 75°

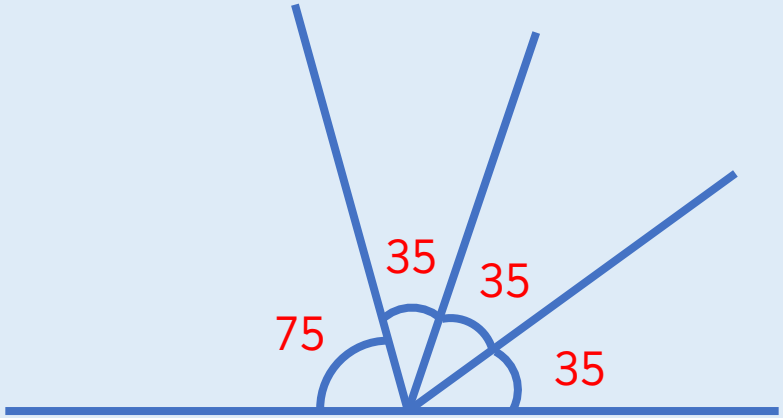
The other three angles are equal.

What size are the other three angles?

Draw a diagram to prove your answer.

Reasoning - 2 Calculate Angles

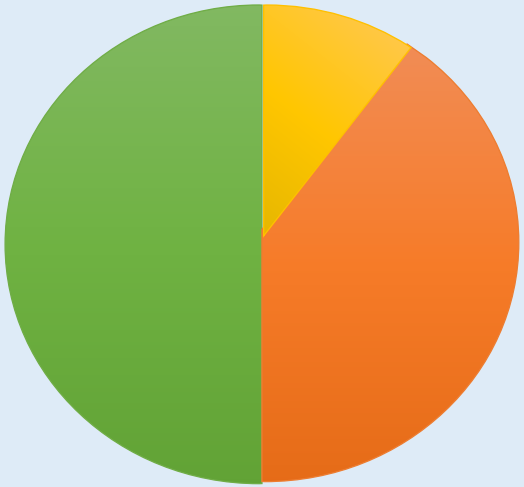
Four angles meet at the same point on a straight line. One angle is 75°
The other three angles are equal.
What size are the other three angles?
Draw a diagram to prove your answer.



180 –75 = 105°
105 ÷3 = 35°

Reasoning - 3 Calculate Angles

Here is a pie chart showing the colour of cars sold by a car dealer.



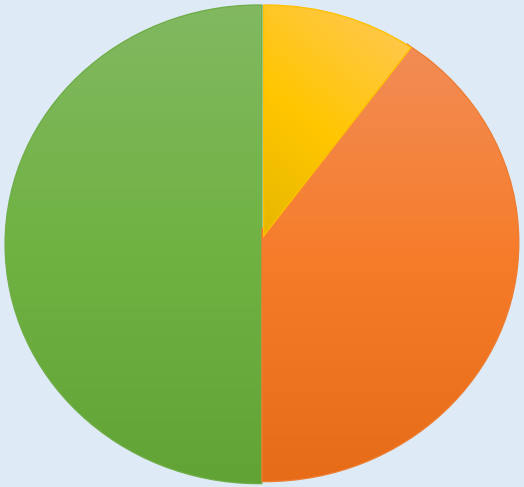
The number of green cars sold is equal to the total number of orange and yellow cars sold.

The number of orange cars sold is twice the number of yellow cars sold.

Work out the size of the angle for each

Reasoning - 3 Calculate Angles

Here is a pie chart showing the colour of cars sold by a car dealer.



The number of green cars sold is equal to the total number of orange and yellow cars sold.

The number of orange cars sold is twice the number of yellow cars sold.

Work out the size of the angle for each

Green : 180°
Orange : 120°
Yellow : 60°

Discussion

Calculate Angles

What do we know about a and b? How do we know this?

Which angle fact might you need to use when answering this question?

Which angles are already given? How can we use this to calculate unknown angles?

Vertically Opposite Angles

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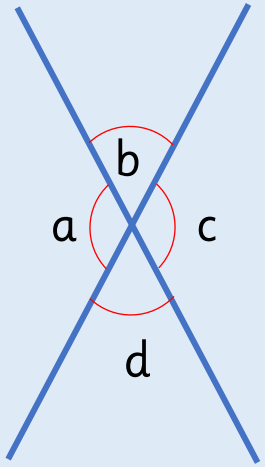
Fluency Teaching Slides

Activity 1 Vertically Opposite Angles

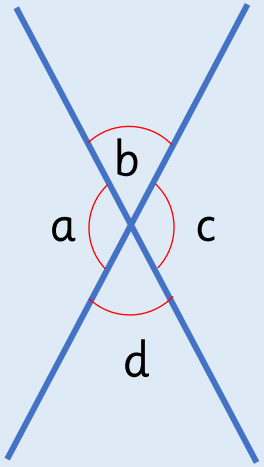
Take a piece of paper and draw a large 'X'. Mark the angles on as shown. Measure the angles you have drawn. What do you notice about angles b and d? What do you notice about angles a and c? Is this always the case? Investigate with other examples.



What sentences can we write about vertically opposite angles in relation to other angles?

Activity 1 Vertically Opposite Angles

Take a piece of paper and draw a large 'X'. Mark the angles on as shown. Measure the angles you have drawn. What do you notice about angles b and d? What do you notice about angles a and c? Is this always the case? Investigate with other examples.

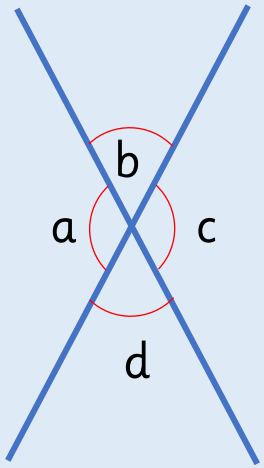


Angles b and d have the same size.

Angles a and c have the same size.

Activity 2 Vertically Opposite Angles

Use the letters from the diagram to fill in the blanks.



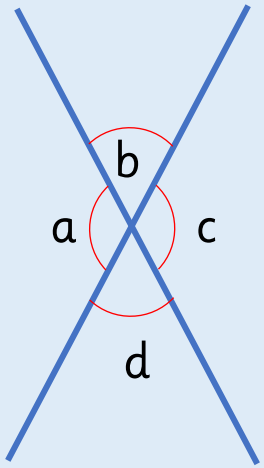
_____ = _____ _____ = _____

_____ + _____ = 180 _____ + _____ = 180

How can we find the missing angle?

Activity 2 Vertically Opposite Angles

Use the letters from the diagram to fill in the blanks.

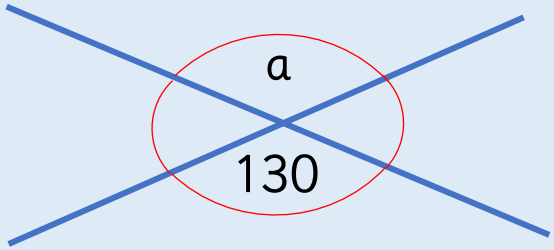


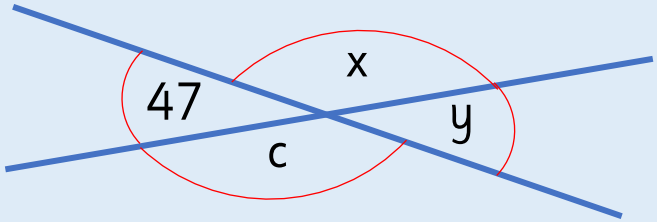
a = c b = d

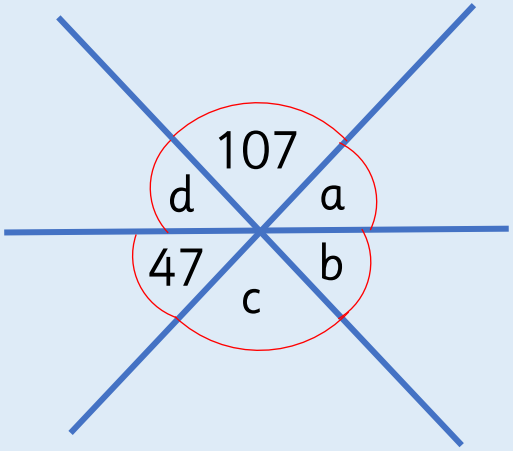
b + c = 180 a + d = 180

Activity 3 Vertically Opposite Angles

Find the size of the missing angles.



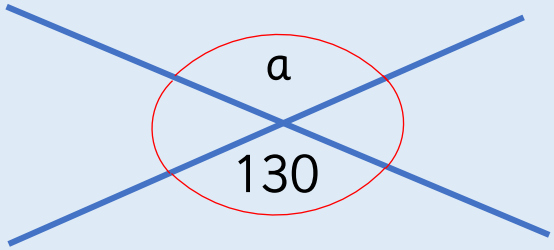




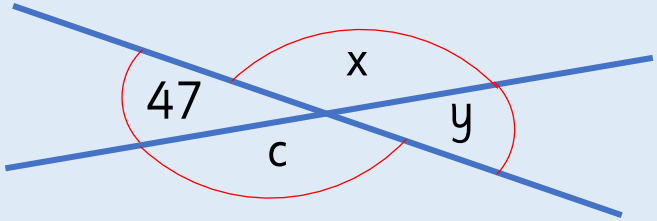
Is there more than one way to find this angle?

Activity 3 Vertically Opposite Angles

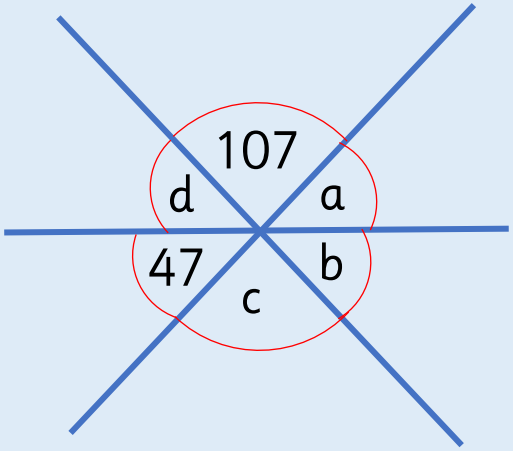
Find the size of the missing angles.



a = 130



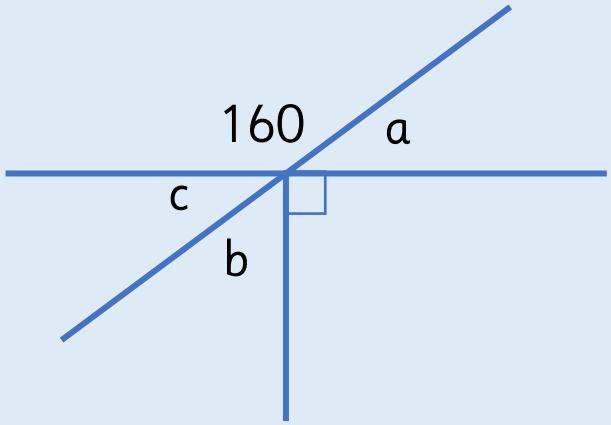
c = 133
x = 133
y = 47



a = 47
b = 26
c = 107
d = 26

Reasoning - 1 Vertically Opposite Angles

The diagram below is drawn using three straight lines. Tia says that it's not possible to calculate all of the missing angles. Do you agree? Explain why.



Reasoning - 1 Vertically Opposite Angles

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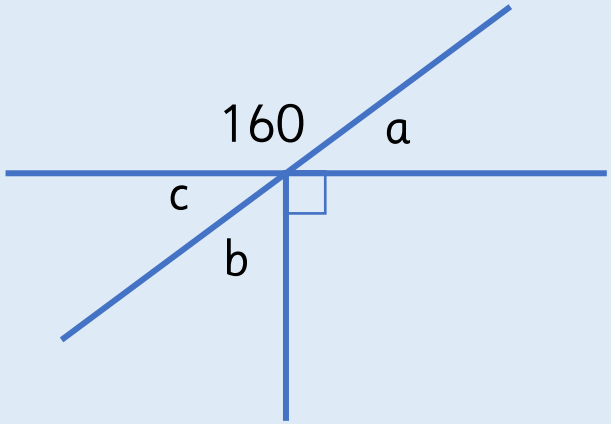
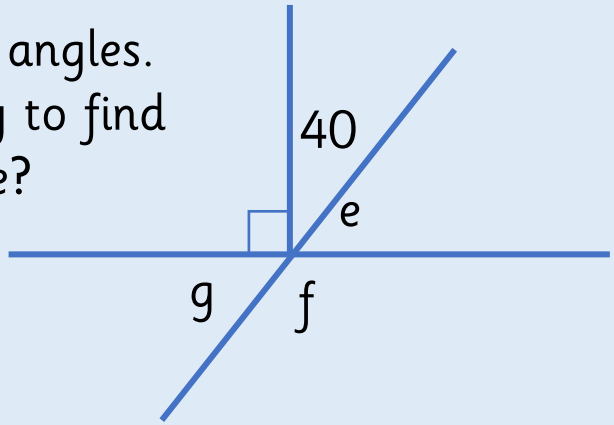


I disagree because 180 –160 = 20 so a = 20° because angles on a straight line add up to 180°. Angles a and c are equal because they are vertically opposite so c =20°. Angles around a point add up to 360° so b =70°

Reasoning - 2 Vertically Opposite Angles

The diagram below is drawn using three straight lines. Malachi says that angle g is equal to 40° because vertically opposite angles are equal. Do you agree? Explain your answer. Find the size of all missing angles.

Find the size of all missing angles.
Is there more than one way to find the size of each angle?



Reasoning - 2 Vertically Opposite Angles

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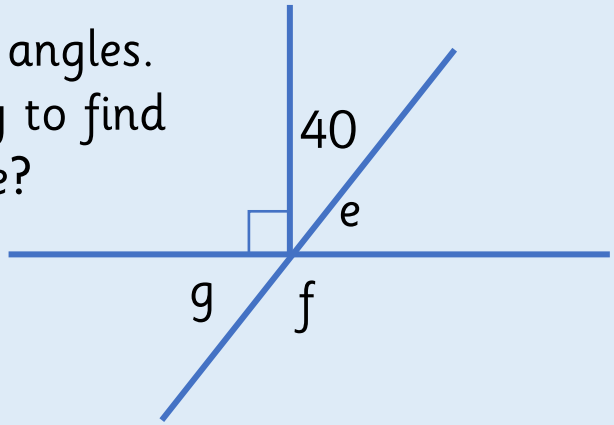
Is there more than one way to find the size of each angle?



e =50°
g =50°
f =130°

Malachi is wrong because g is vertically opposite to e, not to 40° so g would actually be 50°. There are multiple ways to find the size of each angle.

Discussion

Vertically Opposite Angles

What sentences can we write about vertically opposite angles in relation to other angles?

How can we find the missing angle?

Is there more than one way to find this angle?

Angles in a Triangle (1)

6

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Activity 1 Angles in a Triangle (1)

Use different coloured pieces of card to make an equilateral, isosceles, scalene make an equilateral, isosceles, scalene and right-angled triangle.

Use a protractor to measure each interior angle, then add them up.

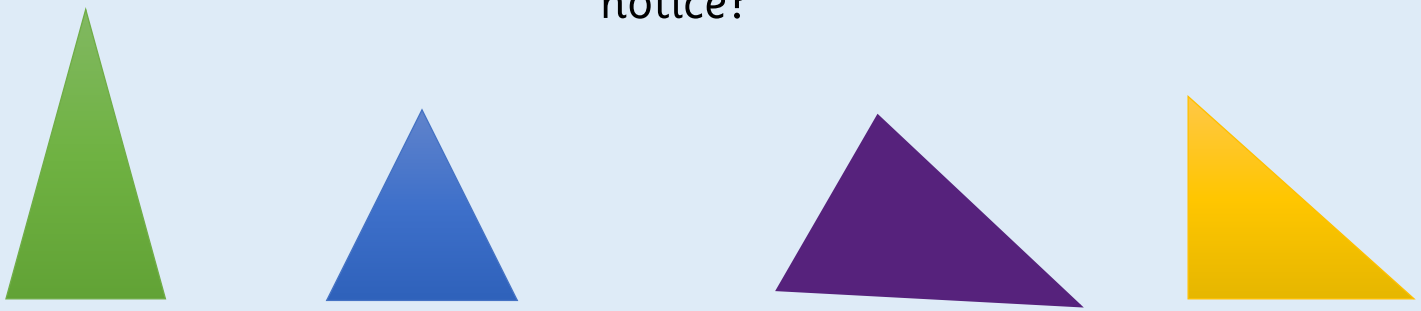
What do you notice?

What's the same and what's different about the four types of triangle?

Activity 1 Angles in a Triangle (1)

Use different coloured pieces of card to make an equilateral, isosceles, scalene make an equilateral, isosceles, scalene and right-angled triangle.

Use a protractor to measure each interior angle, then add them up. What do you notice?

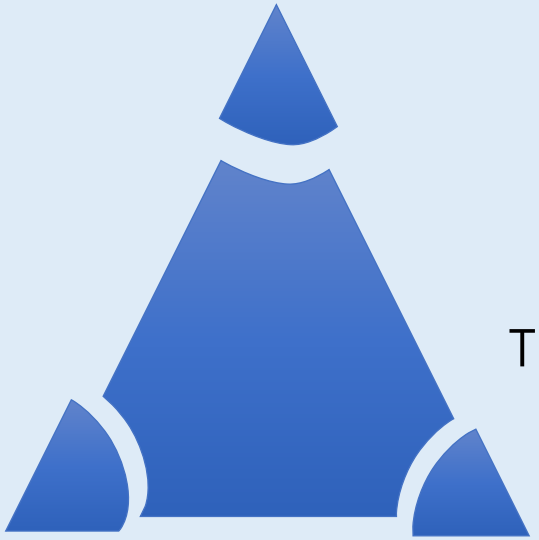


isosceles equilateral scalene right-angled

The total of interior angles of all triangles are the same.

Activity 1 Angles in a Triangle (1)

Now take any of the triangles and tear the corners off. Arrange the corners to make a straight line.

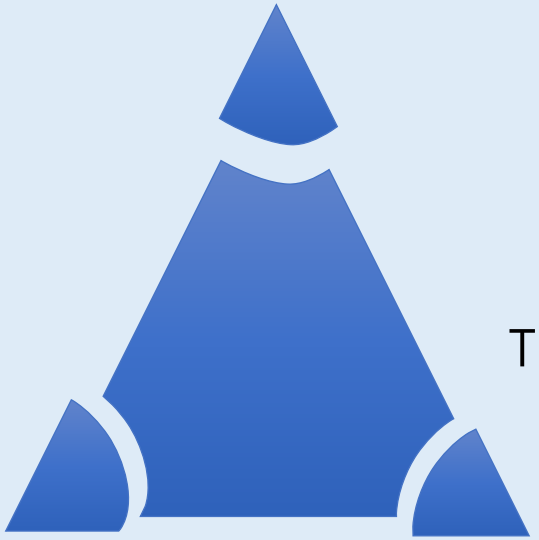


The interior angles of a triangle add up to _____.

What do the three interior angles add up to?

Activity 1 Angles in a Triangle (1)

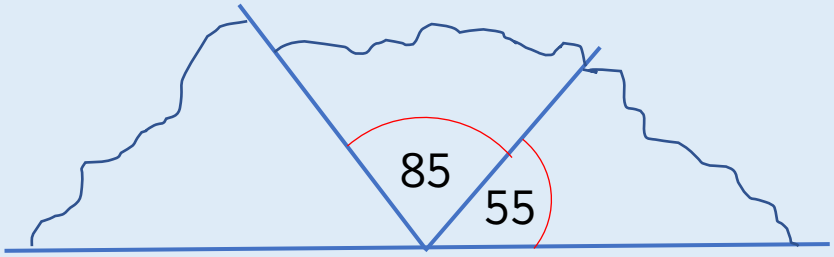
Now take any of the triangles and tear the corners off. Arrange the corners to make a straight line.



The interior angles of a triangle add up to 180.

Activity 2 Angles in a Triangle (1)

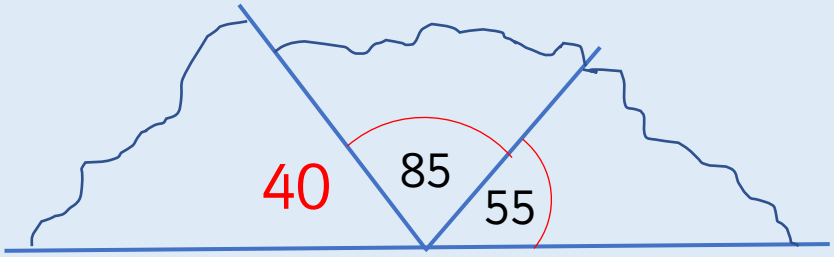
Calculate the missing angles and state the type of triangle that these corners have been torn from.



Does the type of triangle change anything?

Activity 2 Angles in a Triangle (1)

Calculate the missing angles and state the type of triangle that these corners have been torn from.



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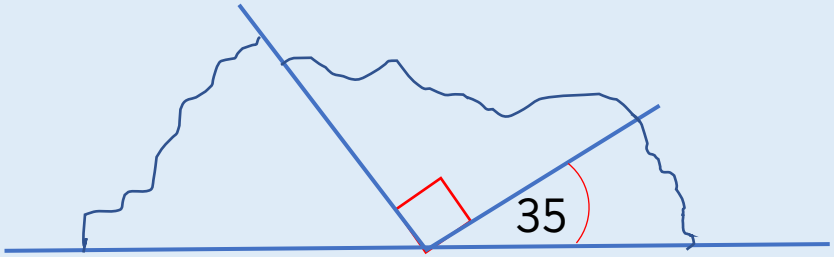

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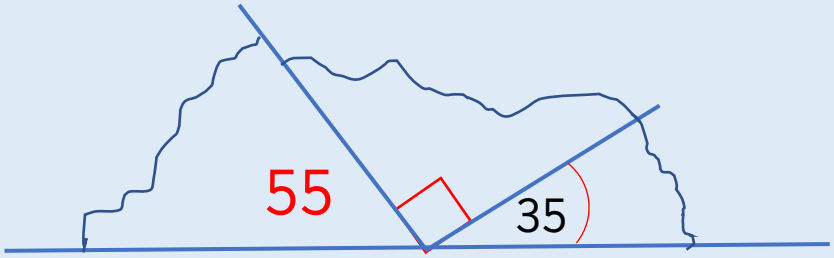

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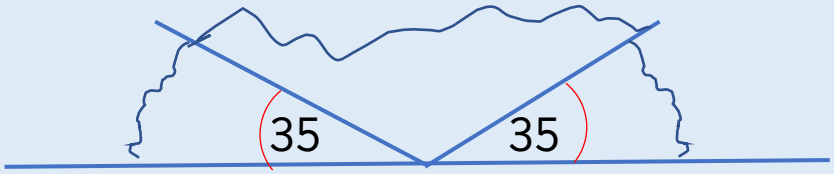

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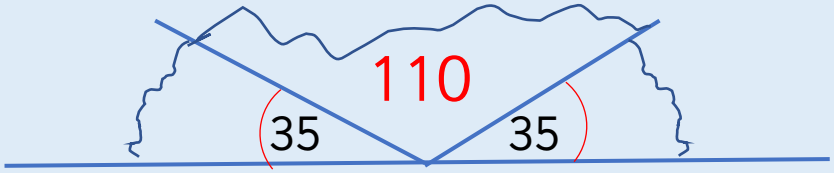
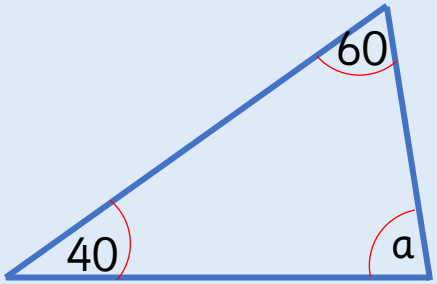
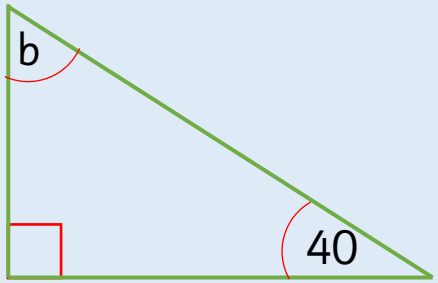
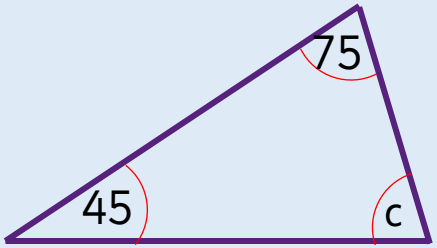


Activity 3 Angles in a Triangle (1)

Calculate the missing angles.



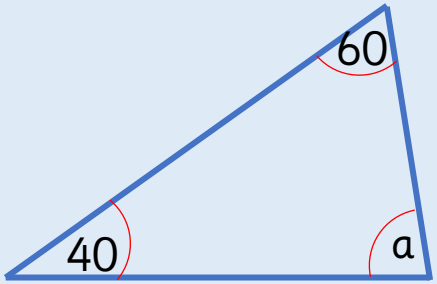




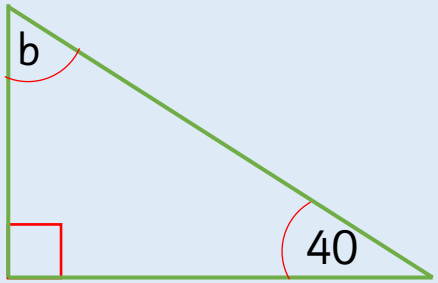
Does the size of the triangle matter?

Activity 3 Angles in a Triangle (1)

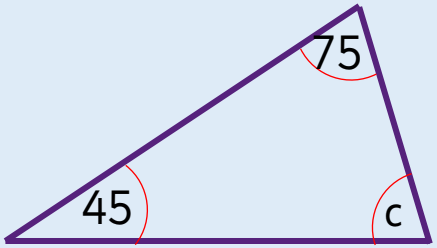
Calculate the missing angles.



a = 80



b = 50



c = 70

Reasoning - 1 Angles in a Triangle (1)

Can Malachi be correct? Can you demonstrate this?

My triangle has two 90°angles.

Malachi

Reasoning - 1 Angles in a Triangle (1)

Can Malachi be correct? Can you demonstrate this?

My triangle has two 90°angles.

Malachi

Malachi can't be correct because these two angles would add up to 180 degrees, and the third angle can't be 0 degrees.

Reasoning - 2 Angles in a Triangle (1)

Work out the size of each of the angles in the triangle.

My triangle is a scalene triangle. One angle is obtuse. One of the angles measures 56° The obtuse angle is three times the smallest angle.

Esin

Reasoning - 2 Angles in a Triangle (1)

Work out the size of each of the angles in the triangle.

My triangle is a scalene triangle. One angle is obtuse. One of the angles measures 56° The obtuse angle is three times the smallest angle.

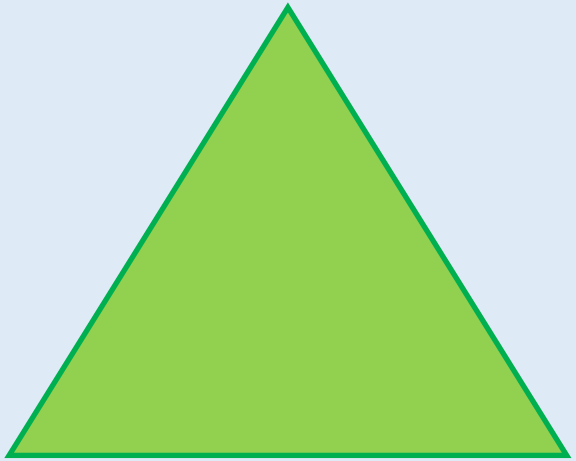
Esin

The interior angles of Esin's triangle are 56°, 93° and 31°

Reasoning - 3 Angles in a Triangle (1)

True or False?

A triangle can never have 3 acute angles.



Angles in a Triangle (1)

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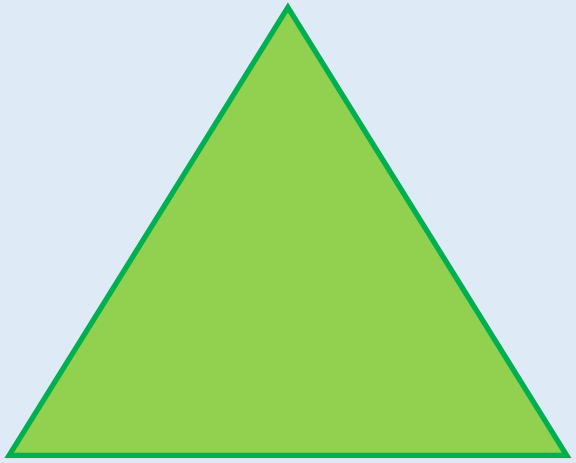

False.
Children could use multiple examples to show this.

Discussion

Angles in a Triangle (1)

What's the same and what's different about the four types of triangle?

What do the three interior angles add up to? Would this work for all triangles?

Does the type of triangle change anything?

Does the size of the triangle matter?

Angles in a Triangle (2)

6

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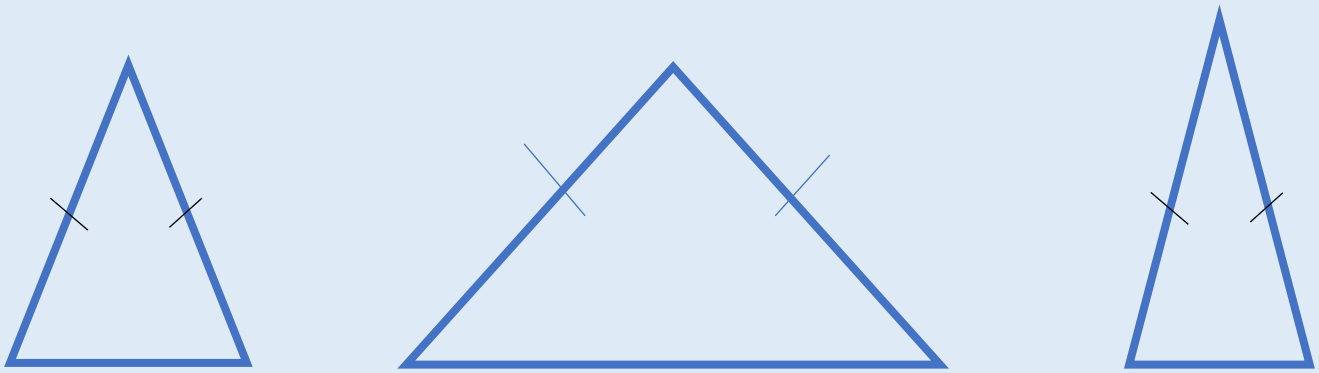
Activity 1 Angles in a Triangle (2)

Identify which angles will be identical in the isosceles triangles.



How can we identify sides which are the same length on a triangle?

Activity 1 Angles in a Triangle (2)

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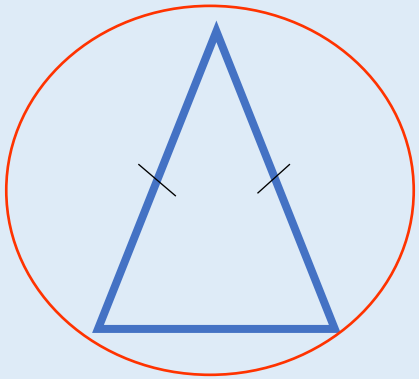
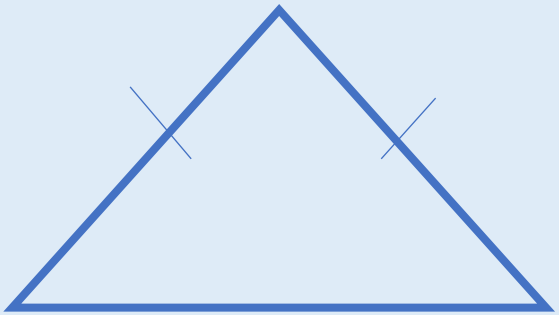
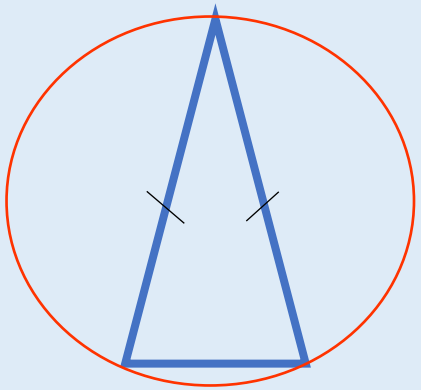
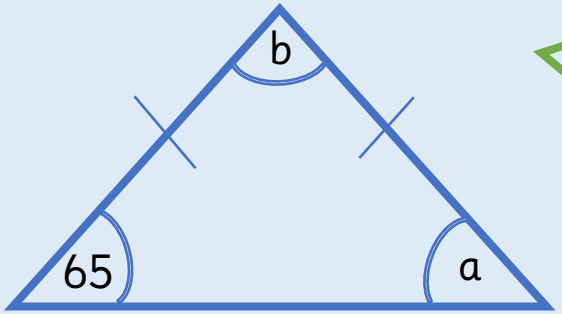


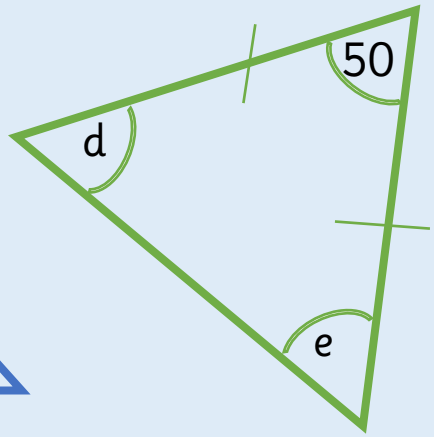


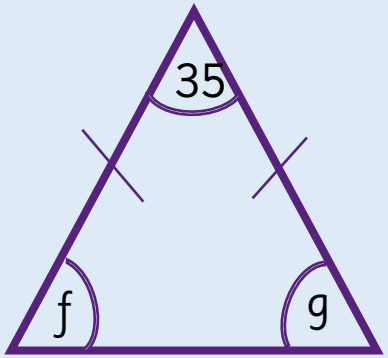


Activity 2 Angles in a Triangle (2)

Calculate the missing angles in the isosceles triangles.



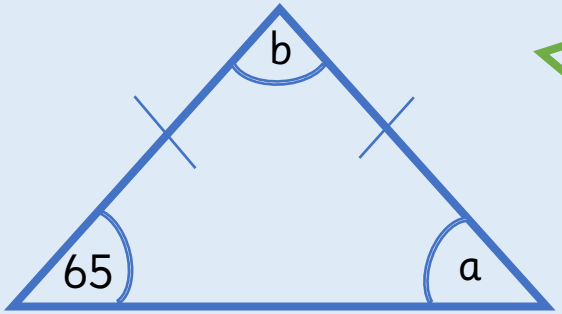


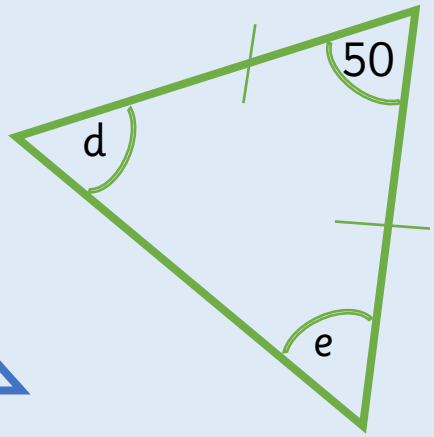


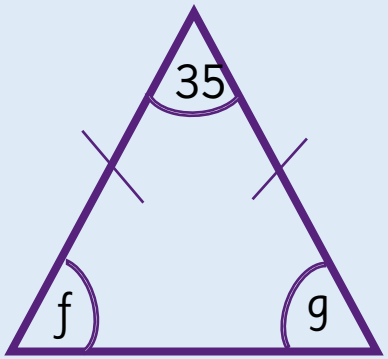
How can we use the use the hatch marks to identify the equal angles?

Activity 2 Angles in a Triangle (2)

Calculate the missing angles in the isosceles triangles.







a = 65
b = 50

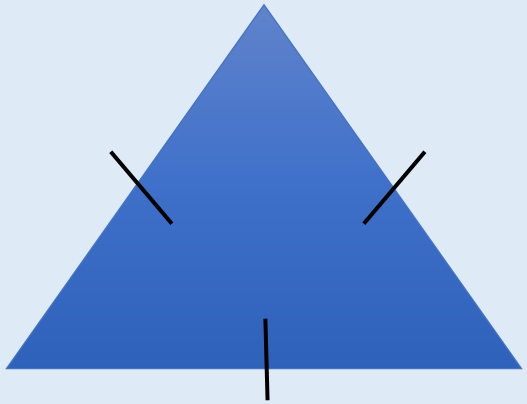
e = 65
d = 65

f = 72.5
g = 72.5

Activity 2

Angles in a Triangle (2)

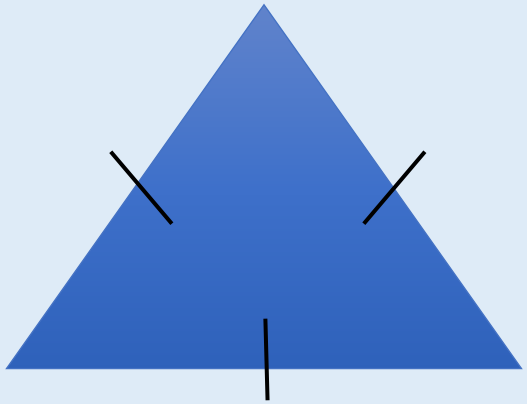
What type of triangle is this? What will the size of each angle be? How do you know? Will this always be the same for this type of triangle?
Explain your answer.



If you know one angle in an isosceles triangle, what else do you know?

Activity 2 Angles in a Triangle (2)

What type of triangle is this? What will the size of each angle be? How do you know? Will this always be the same for this type of triangle?
Explain your answer.

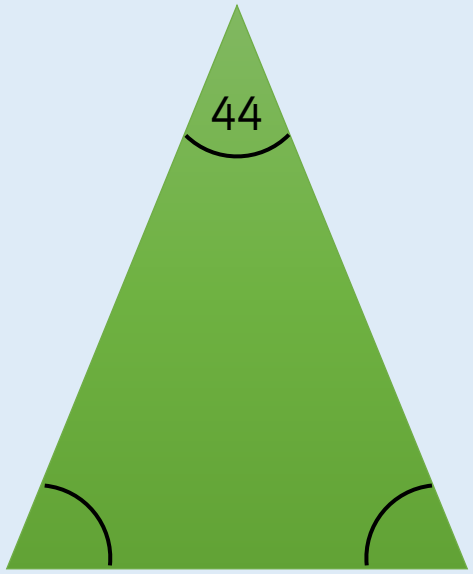


Equilateral triangle. Equilateral triangle have the same angle size.

Reasoning - 1

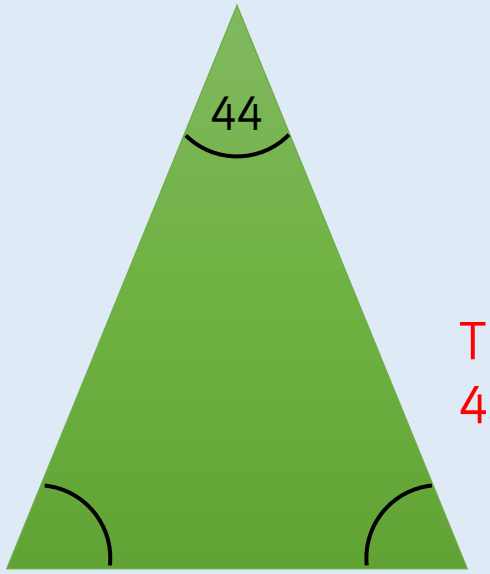
Angles in a Triangle (2)

I have an isosceles triangle. One angle measures 44 degrees. What could the other angles measure?



Reasoning - 1 Angles in a Triangle (2)

I have an isosceles triangle. One angle measures 44 degrees. What could the other angles measure?



The angles could be:
43°, 43°, 92° or 43°, 68°, 68°

Reasoning - 2 Angles in a Triangle (2)

What type of triangle is each person describing?
Explain how you know.

My angles are 70°, 70° and 40°

Esin

My angles are 45°, 45° and 90°

Malachi

My angles are 60°, 60°and 60°

Tia

Reasoning - 2 Angles in a Triangle (2)

What type of triangle is each person describing?
Explain how you know.

My angles are 70°, 70° and 40°

Esin

Esin is describing an isosceles triangle.

My angles are 45°, 45° and 90°

Malachi

Malachi is describing an isosceles right-angled triangle.

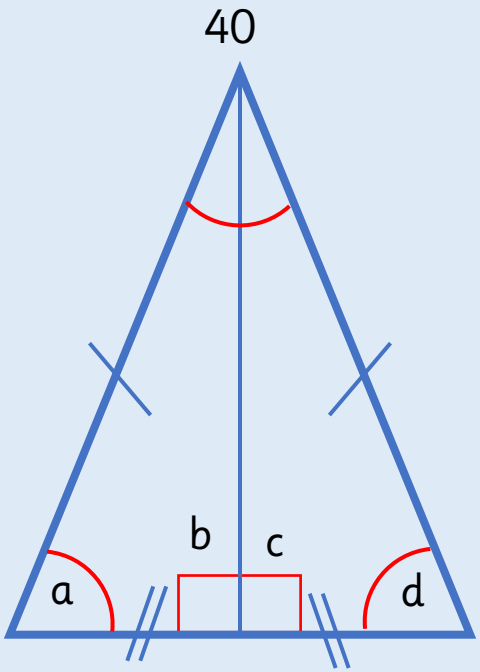
My angles are 60°, 60°and 60°

Tia

Tia is describing an equilateral triangle.

Reasoning - 2 Angles in a Triangle (2)

How many sentences can you write to express the relationships between the angles in the triangles? One has been done for you.



$40° + a + b = 180°$

Reasoning - 2 Angles in a Triangle (2)

How many sentences can you write to express the relationships between the angles in the triangles? One has been done for you.

Possible responses:

$20° + a + b = 180°$

$20° + c + d = 180°$

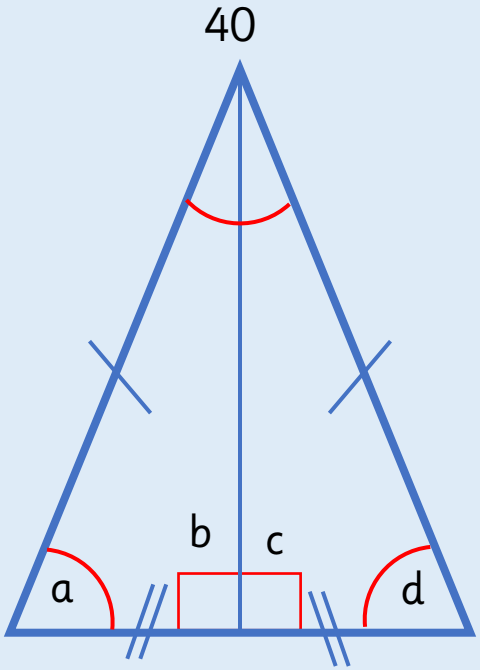
$b = 90°$

$c = 90°$

$b = c$

$a = d$

etc.



$40° + a + b = 180°$

Children could also work out the value of each angle.

Discussion

Angles in a Triangle (2)

How can we identify sides which are the same length on a triangle?

How can we use the use the hatch marks to identify the equal angles?

If you know one angle in an isosceles triangle, what else do you know?

Can you have an isosceles right-angled triangle?

Angles in a Triangle (3)

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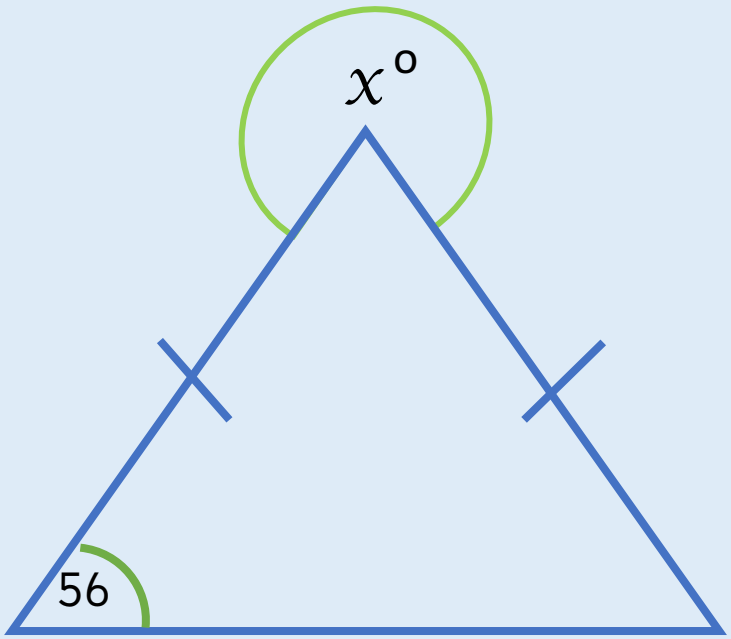
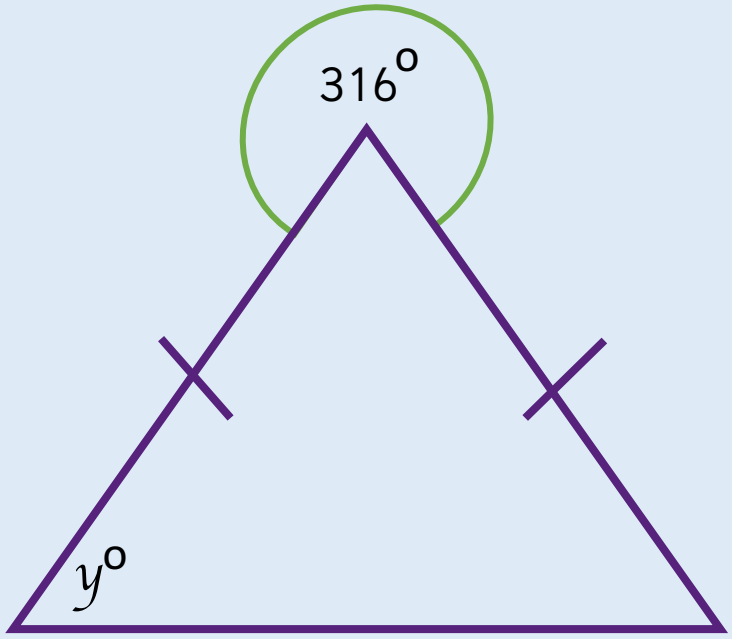
Activity 1 Angles in a Triangle (3)

Work out the value of x and y. Explain each step of your working.

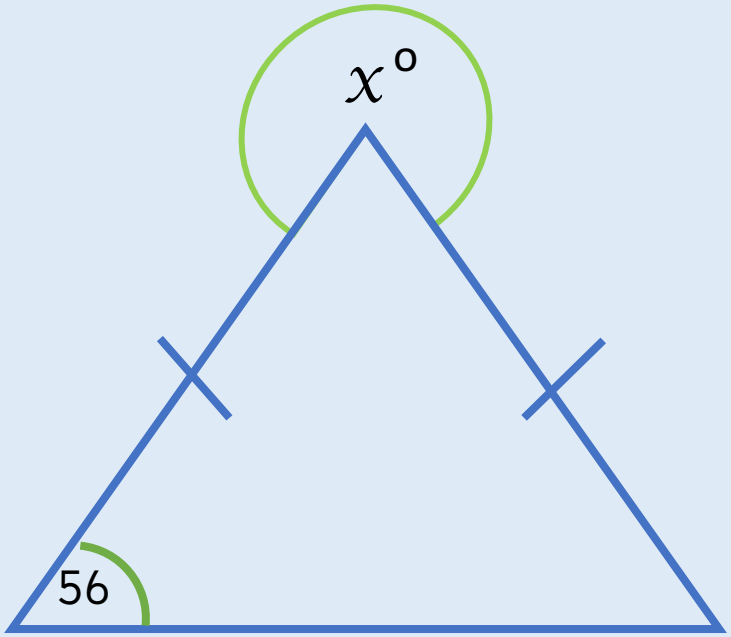




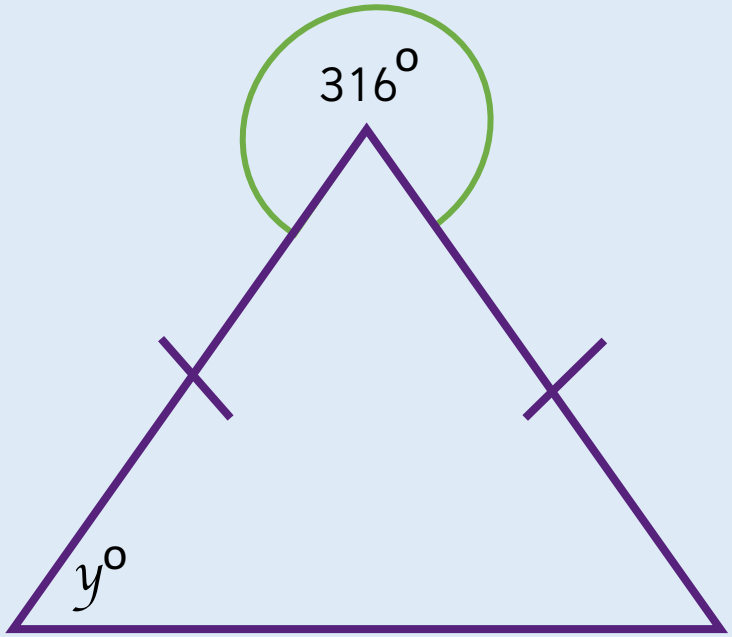
? Is it sensible to estimate the angles before calculating them?

Activity 1 Angles in a Triangle (3)

Work out the value of x and y. Explain each step of your working.



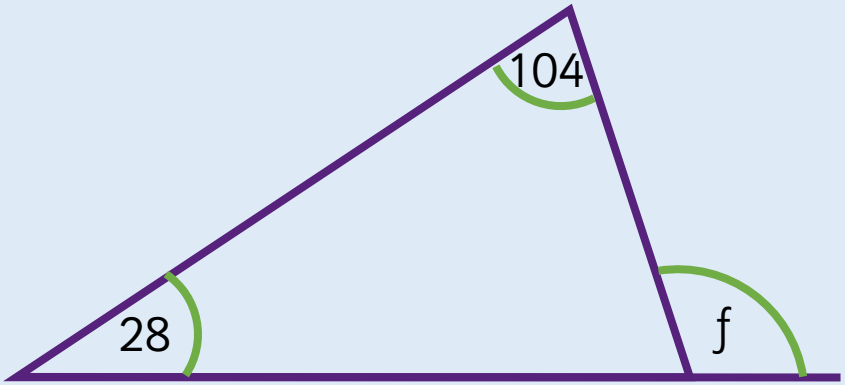
x = 292

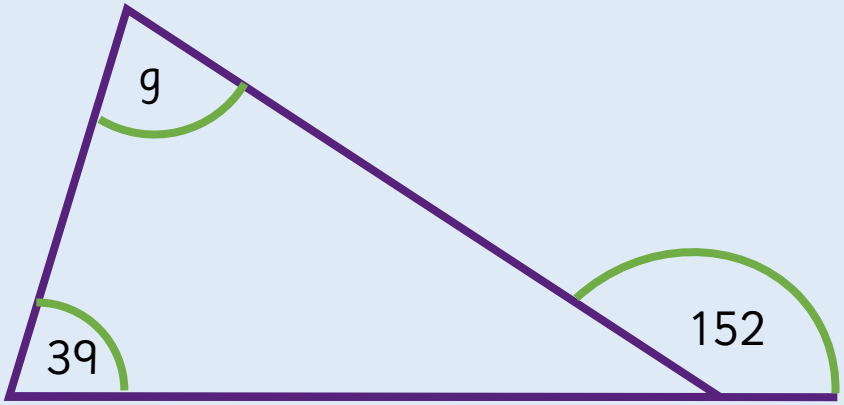


y = 68

Activity 2 Angles in a Triangle (3)

Work out the value of f and g.
Explain each step of your working out.

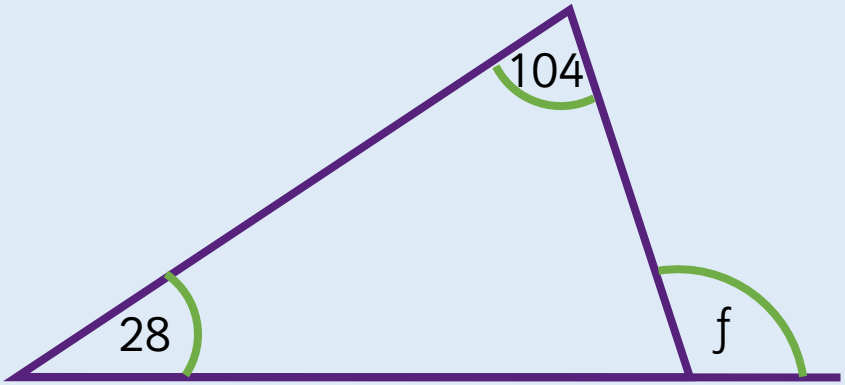


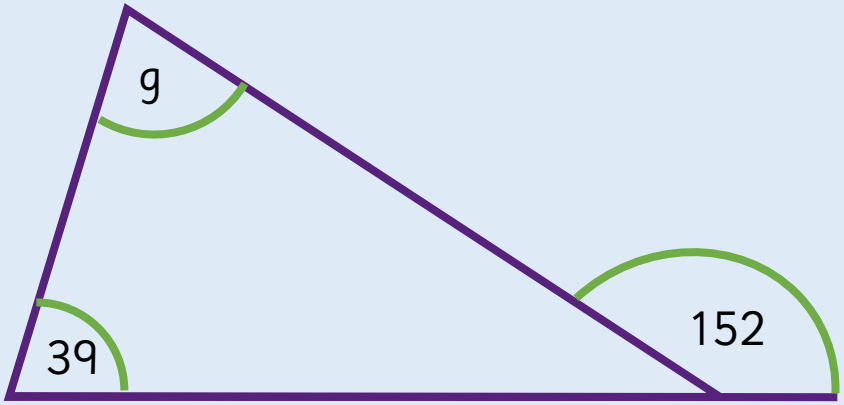


Can you identify the type of triangle? How will this help you

Activity 2 Angles in a Triangle (3)

Work out the value of f and g.
Explain each step of your working out.



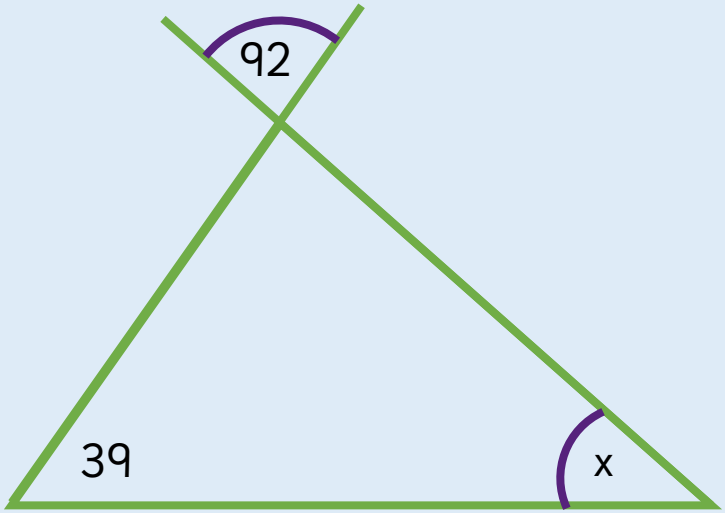


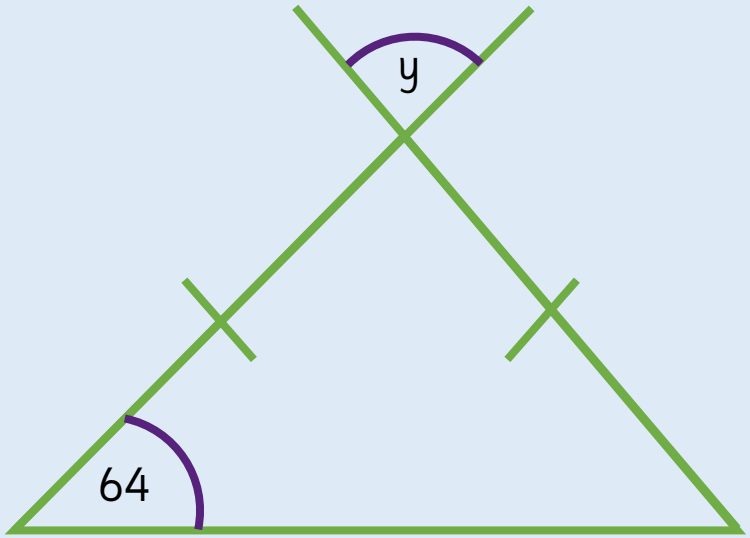
f = 132

g = 113

Activity 3 Angles in a Triangle (3)

Work out the value of x and y.
Explain each step of your working out.

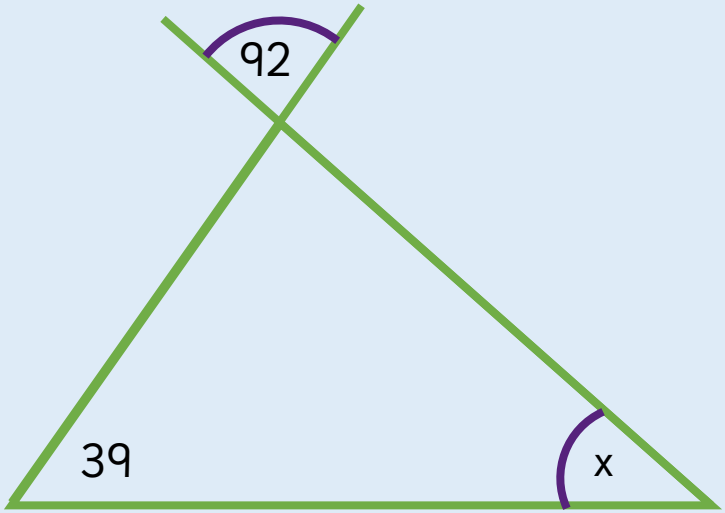




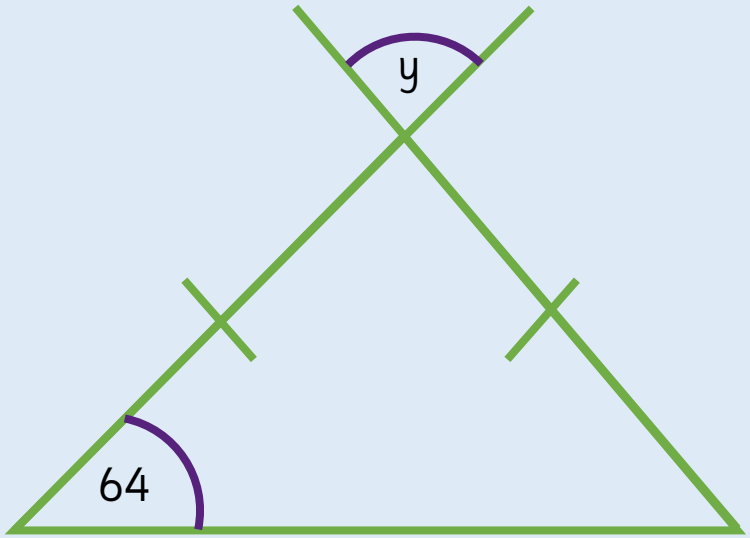
Which angle can you work out first? Why?

Activity 3 Angles in a Triangle (3)

Work out the value of x and y.
Explain each step of your working out.



x = 49

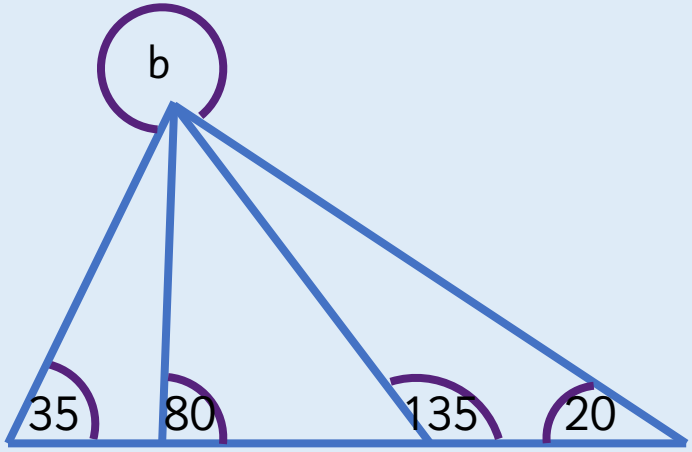


y = 52

Reasoning - 1

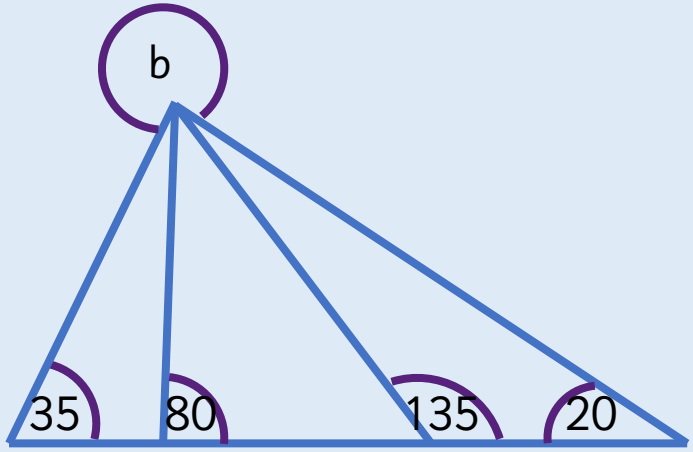
Angles in a Triangle (3)

Calculate the size of the reflex angle b.



Reasoning - 1 Angles in a Triangle (3)

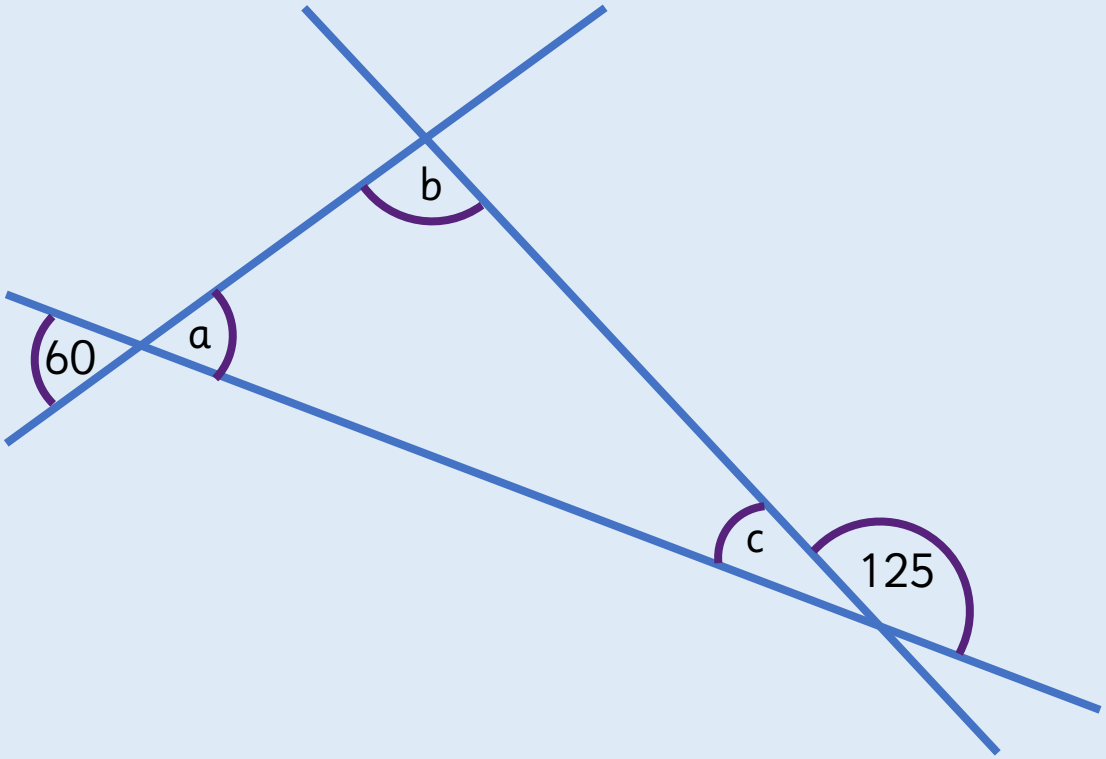
Calculate the size of the reflex angle b.



235°

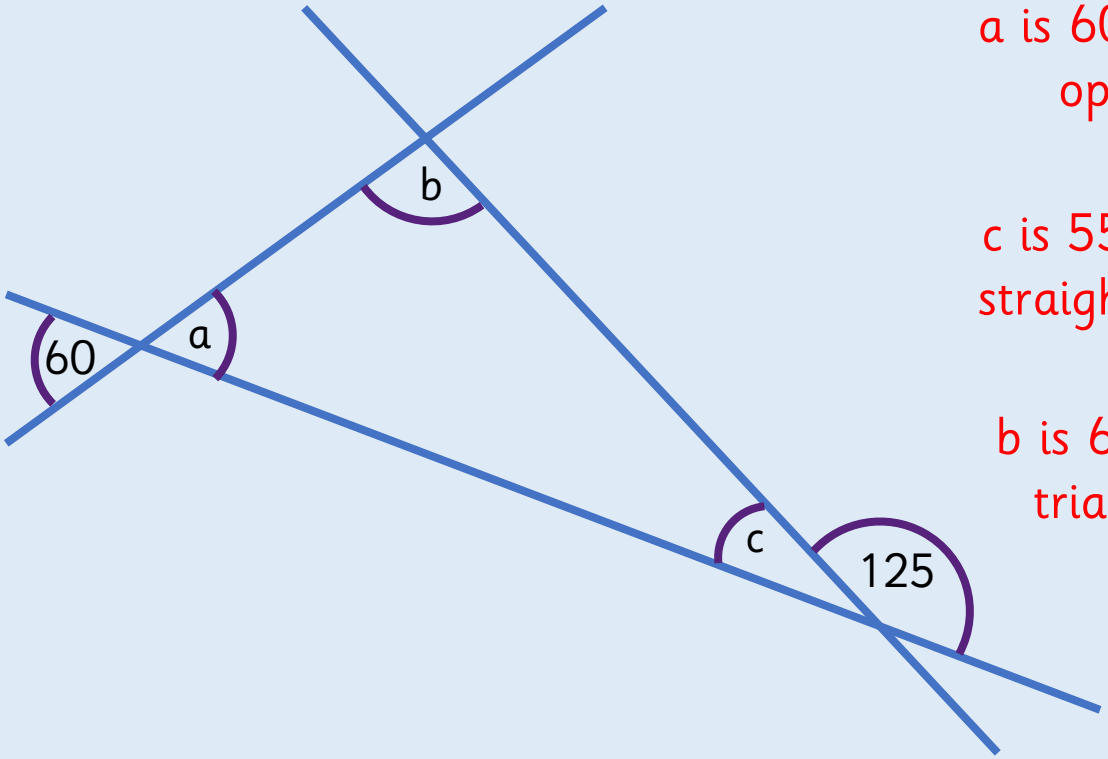
Reasoning - 2 Angles in a Triangle (3)

Calculate the size of angles a, b and c. Give reasons for all of your answers.



Reasoning - 2 Angles in a Triangle (3)

Calculate the size of angles a, b and c. Give reasons for all of your answers.



a is 60 degrees because vertically opposite angles are equal.

c is 55 degrees because angles on a straight line add up to 180 degrees.

b is 65 degrees because angles in a triangle add up to 180 degrees.

Discussion

Angles in a Triangle (3)

Is it sensible to estimate the angles before calculating them? Are the triangles drawn accurately?

Can you identify the type of triangle? How will this help you calculate the missing angle?

Which angle can you work out first? Why? What else can you work out?

Angles in Quadrilaterals

6

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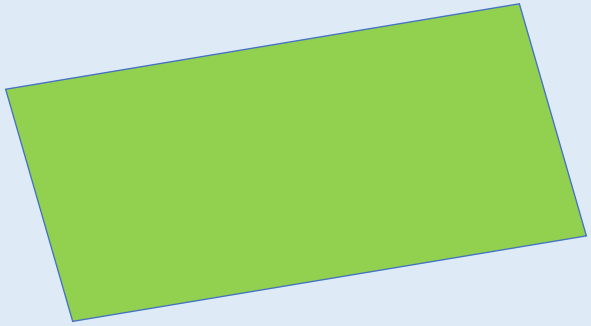
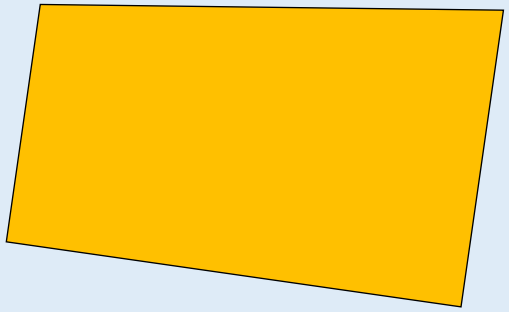
Activity 1 Angles in Quadrilaterals

Take two quadrilaterals. For the first quadrilateral, measure the interior angles using a protractor.

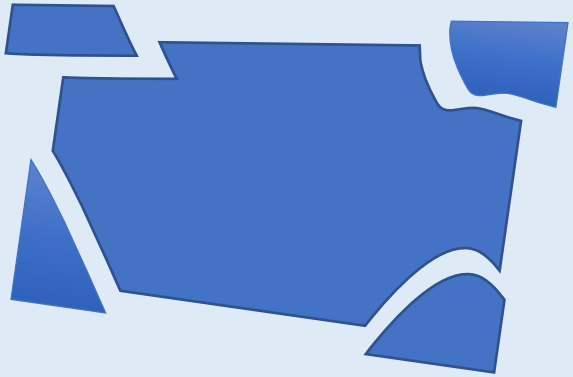




? Is a rectangle a parallelogram? Is a parallelogram a rectangle?

Activity 1 Angles in Quadrilaterals

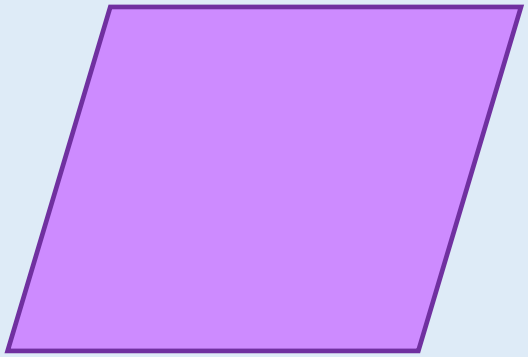
For the second, tear the corners off and place the interior angles at a point as shown.



What's the same?
What's different?
Is this the case for other quadrilaterals?

Activity 2 Angles in Quadrilaterals

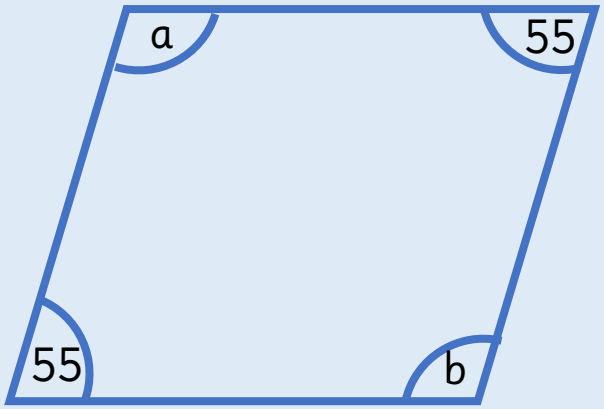
Here are two trapeziums. What's the same? What's different? Can you draw a different trapezium? Measure the interior angles of each one and find the total.

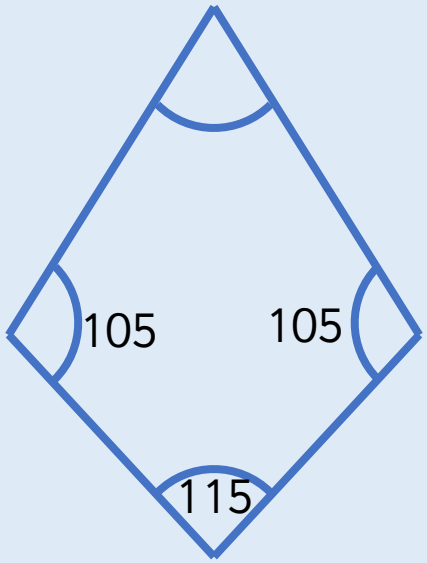


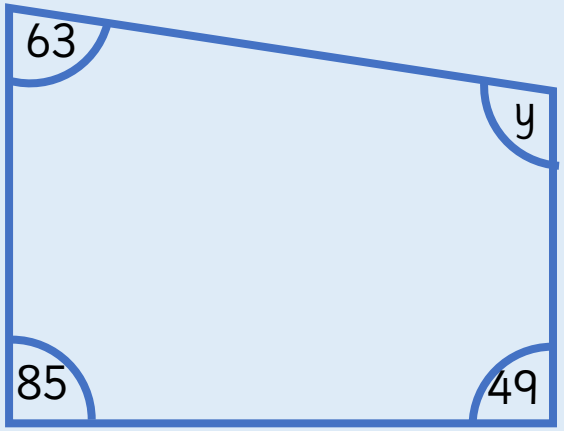
What is the difference between a trapezium and an isosceles trapezium?

Activity 3 Angles in Quadrilaterals

Calculate the missing angles.



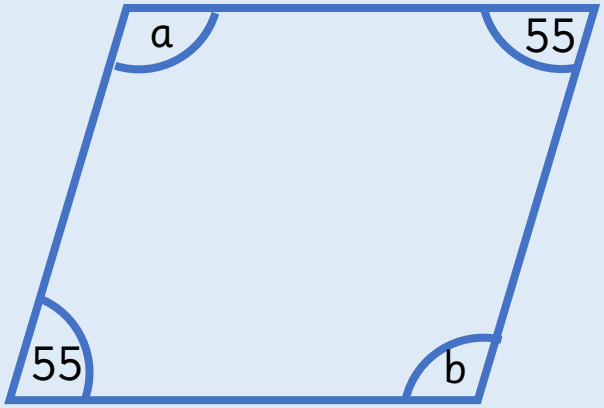




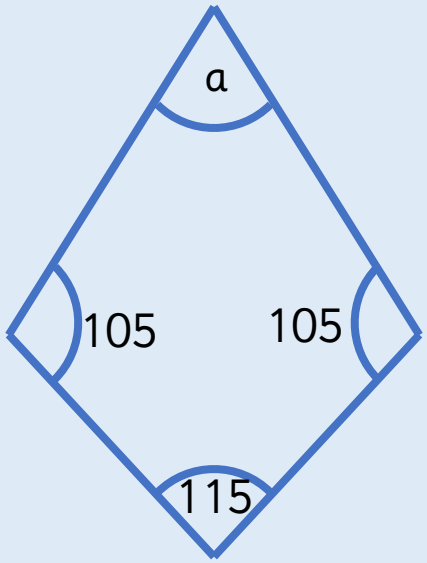
If you know 3 of the interior angles, how could you work out the fourth angle?

Activity 3 Angles in Quadrilaterals

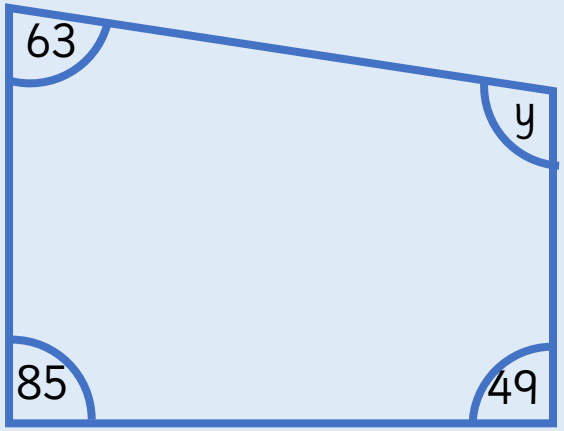
Calculate the missing angles.



a = 125
b = 125



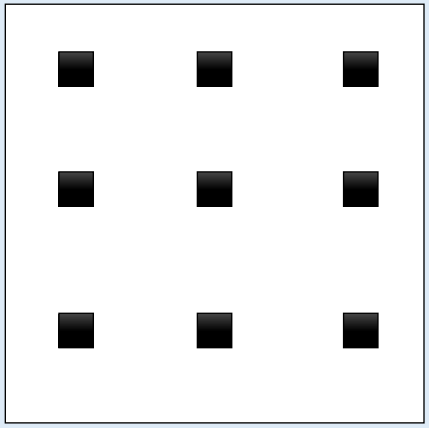
a = 35



y = 163

Reasoning - 1 Angles in Quadrilaterals

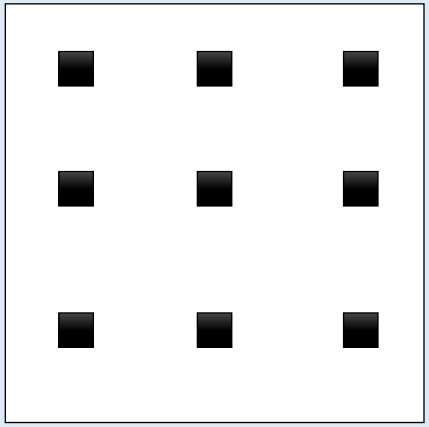
How many quadrilaterals can you make on the geoboard?



Identify the names of the different quadrilaterals. What do you notice about the angles in certain quadrilaterals? If your geoboard was 4 ×4, would you be able to make any different quadrilaterals?

Reasoning - 1 Angles in Quadrilaterals

How many quadrilaterals can you make on the geoboard?

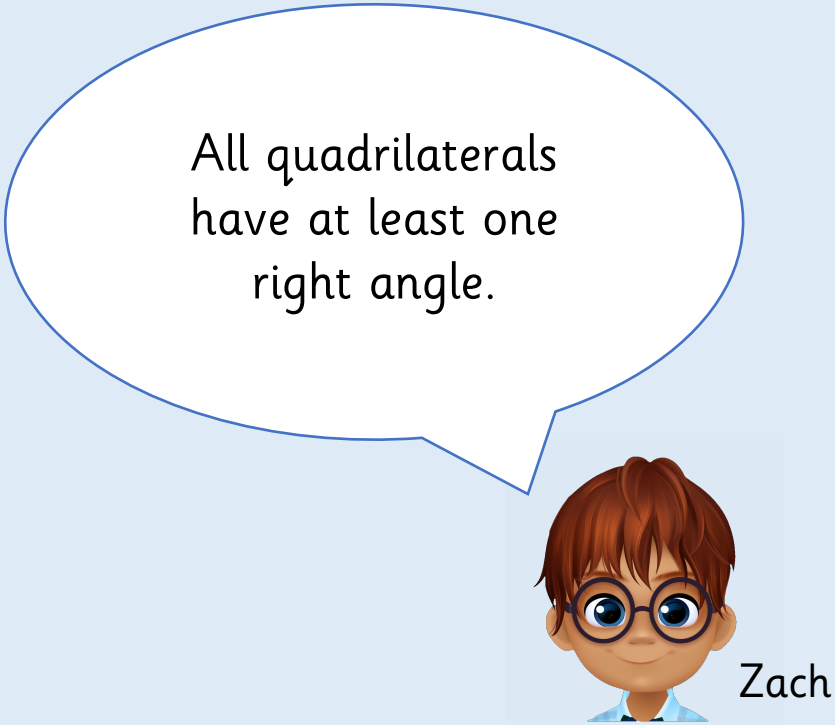


Identify the names of the different quadrilaterals. What do you notice about the angles in certain quadrilaterals? If your geoboard was 4 ×4, would you be able to make any different quadrilaterals?

There are lots of different quadrilaterals children could make. They should notice that opposite angles in a parallelogram and rhombus are equal. They should also identify that a kite has a pair of equal angles, and some kites have a right angle. On a larger grid, they could draw a trapezium without a right angle.

Reasoning - 2 Angles in Quadrilaterals

Draw two different shapes to prove Zach wrong.
Measure and mark on the angles.



Reasoning - 2 Angles in Quadrilaterals

Draw two different shapes to prove Zach wrong.
Measure and mark on the angles.

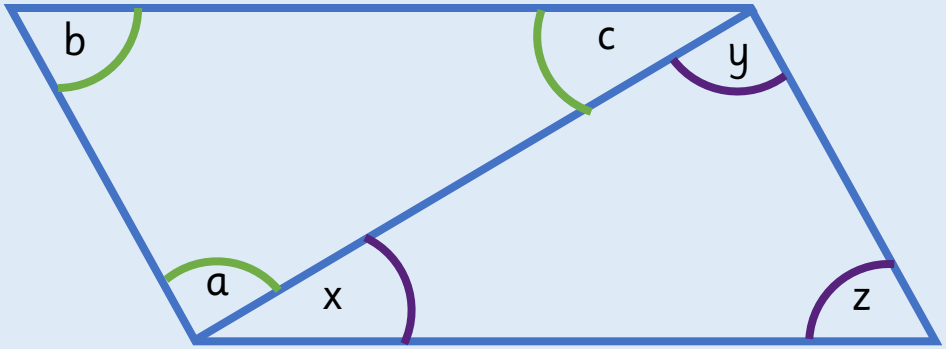
All quadrilaterals have at least one right angle.

Zach

Examples:
Trapezium (without a right angle)
Rhombus
Parallelogram

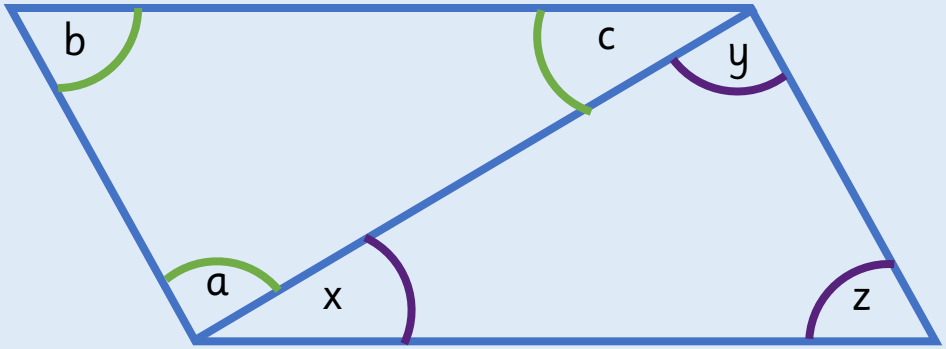
Reasoning - 3 Angles in Quadrilaterals

This quadrilateral is split into two triangles. Use your knowledge of angles in a triangle to find the sum of angles in a quadrilateral. Split other quadrilaterals into triangles too. What do you notice?



Reasoning - 3 Angles in Quadrilaterals

This quadrilateral is split into two triangles. Use your knowledge of angles in a triangle to find the sum of angles in a quadrilateral. Split other quadrilaterals into triangles too. What do you notice?



Children should find that angles in all quadrilaterals will always sum to 360 degrees.

Discussion

Angles in Quadrilaterals

Is a rectangle a parallelogram? Is a parallelogram a rectangle?

What do you notice about the opposite angles in a parallelogram?

Is a square a rhombus? Is a rhombus a square?

What do you notice about the opposite angles in a rhombus?

What is the difference between a trapezium and an isosceles trapezium?

If you know 3 of the interior angles, how could you work out the fourth angle?

Angles in Polygons

6

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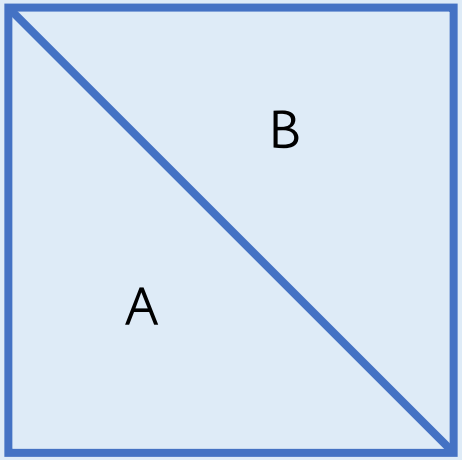
Activity 1 Angles in Polygons

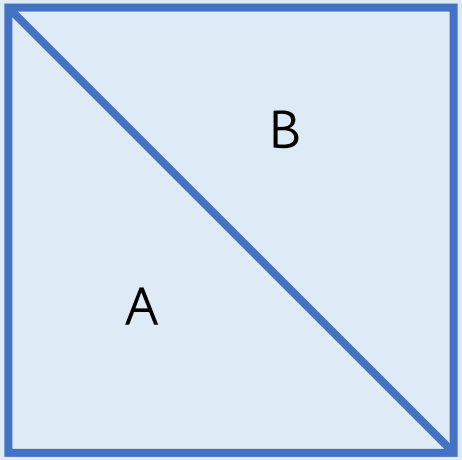
Draw any quadrilateral and partition it into 2 triangles. What do the interior angles of triangle A add up to? What do the interior angles of triangle B add up to? What is the sum of angles in a quadrilateral?



What is the sum of interior angles of a triangle?

Activity 1 Angles in Polygons

Draw any quadrilateral and partition it into 2 triangles. What do the interior angles of triangle A add up to? What do the interior angles of triangle B add up to? What is the sum of angles in a quadrilateral?



Total of interior angles for both A and B is 180. So, A + B = 360.

Sum of angles in a quadrilateral is 360.

Activity 2 Angles in Polygons

Use the same method to complete the table. What do you notice? Can you predict the angle sum of any other polygons?

Shape	No. of sides	No. of triangles	180 x no. of angles	Sum of internal angles
Quadrilateral	4	2	180 x 2	360
Pentagon	5	3		
Hexagon				
Heptagon				

What is the sum of interior angles of a triangle?

Activity 2 Angles in Polygons

Use the same method to complete the table. What do you notice? Can you predict the angle sum of any other polygons?

Shape	No. of sides	No. of triangles	180 x no. of angles	Sum of internal angles
Quadrilateral	4	2	180 x 2	360
Pentagon	5	3	180 x 3	540
Hexagon	6	4	180 x 4	720
Heptagon	7	5	180 x 5	900

Reasoning - 1 Angles in Polygons

Use the clues to work out what shape each person has.
What is the sum of the interior angles of each shape?

My polygon is made up of 5 triangles.

Leanna

The sum of my angles is more than 540°but less than 900°

Zack

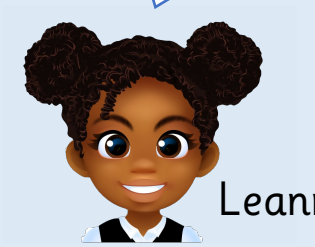
The sum of my angles is equivalent to the sum of angles in 3 triangles.

Esin

Reasoning - 1 Angles in Polygons

Use the clues to work out what shape each person has.
What is the sum of the interior angles of each shape?

My polygon is made up of 5 triangles.



Leanna

Heptagon –900°

The sum of my angles is more than 540°but less than 900°

Zack

Hexagon –720°

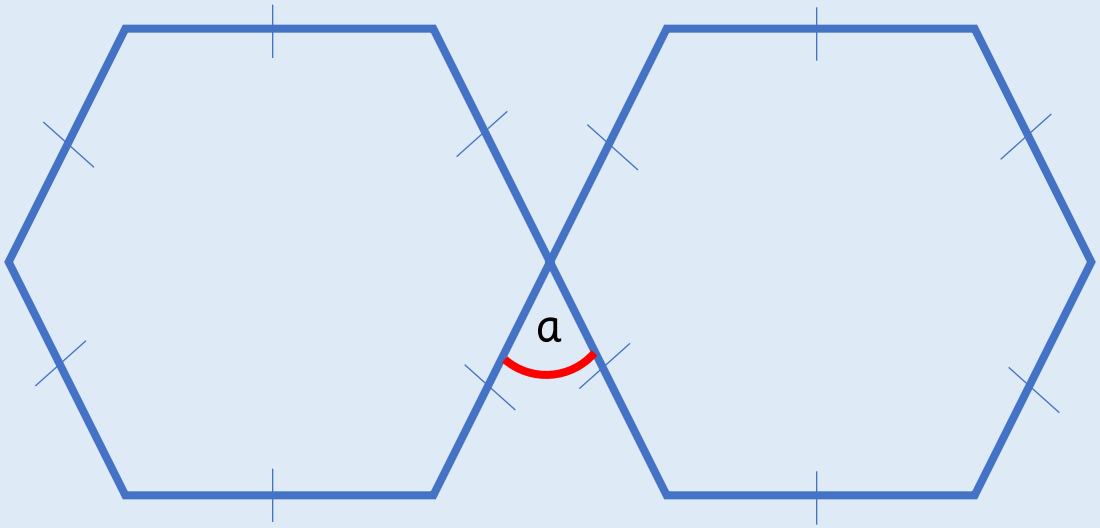
The sum of my angles is equivalent to the sum of angles in 3 triangles.

Esin

Pentagon –540°

Reasoning - 2 Angles in Polygons

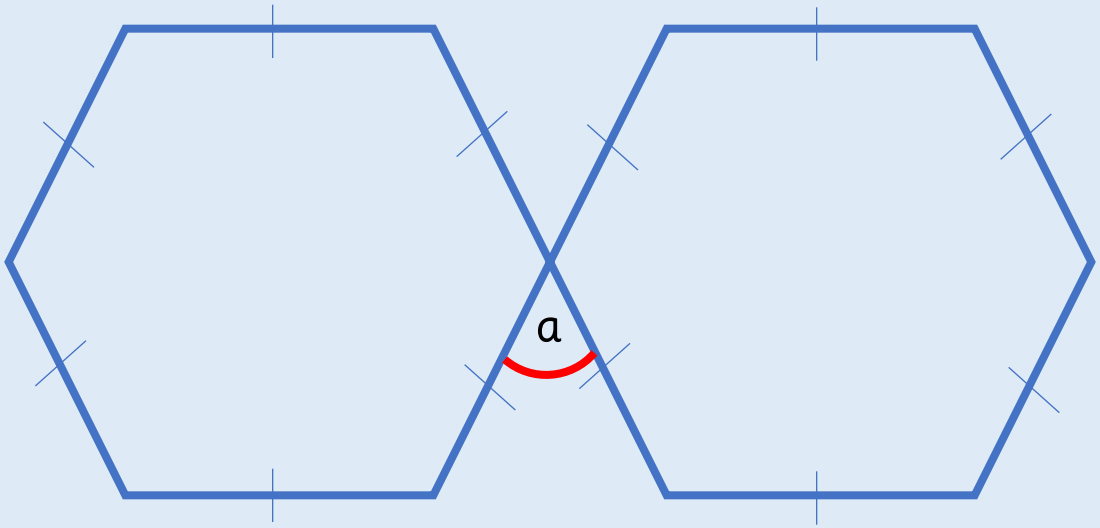
Here are two regular hexagons. The interior angles of a hexagon sum to 720°. Use this fact to work out angle a in the diagram.



60°

Reasoning - 2 Angles in Polygons

Here are two regular hexagons. The interior angles of a hexagon sum to 720°. Use this fact to work out angle a in the diagram.



Discussion

Angles in Polygons

What is a regular polygon? What is an irregular polygon?

What is the sum of interior angles of a triangle?

How can we use this to work out the interior angles of polygons?

Can we spot a pattern in the table? What predictions can we make?

Drawing Shapes Accurately

6

Fluency Teaching Slides

Activity 1 Drawing Shapes Accurately

On a piece of squared paper, accurately draw the shapes.

- A square with perimeter 16 cm.
- A rectangle with an area of 20 cm2.
- A right-angled triangle with a height of 8 cm and a base of 6 cm.
- A parallelogram with sides 3 cm and 5 cm.

What do you know about the shapes which will help you draw them?

Activity 1 Drawing Shapes Accurately

On a piece of squared paper, accurately draw the shapes.

- A square with perimeter 16 cm.
- A rectangle with an area of 20 cm2.
- A right-angled triangle with a height of 8 cm and a base of 6 cm.
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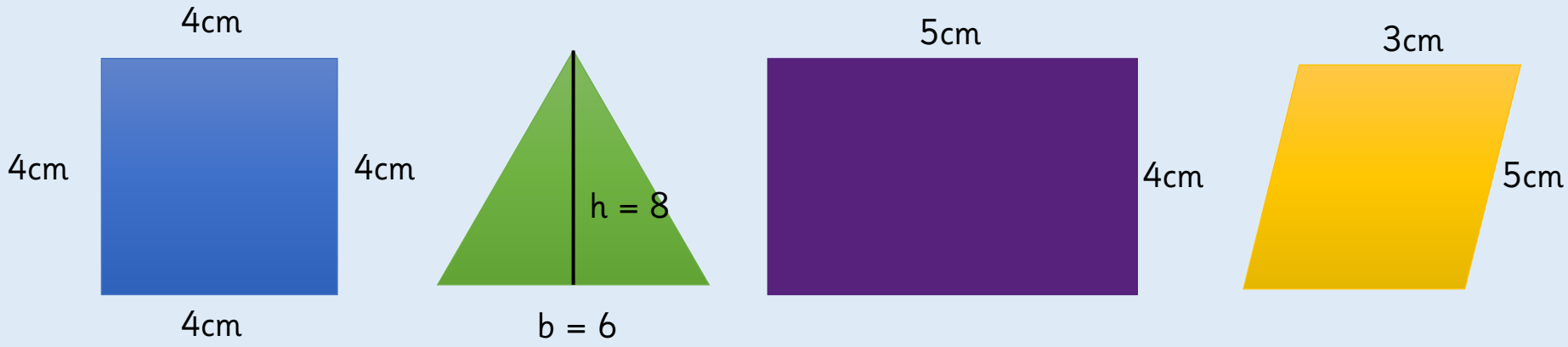
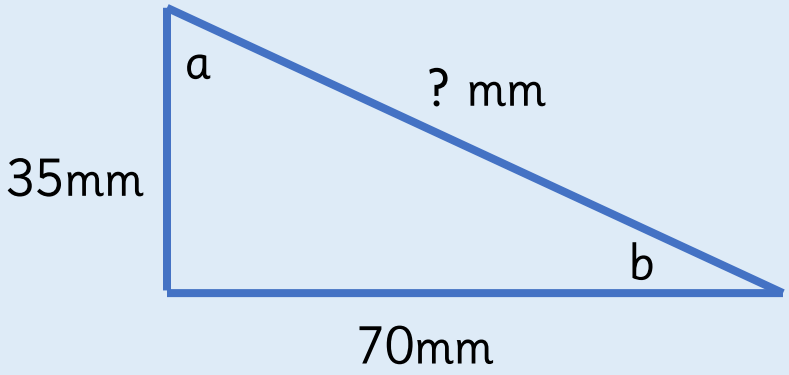


Activity 2 Drawing Shapes Accurately

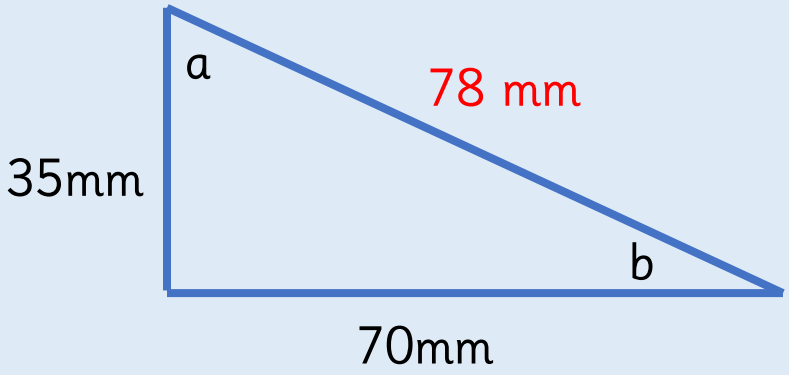
Draw the triangle accurately on squared paper to work out the missing length. Measure the size of angles A and B.



How can we ensure our measurements are accurate?

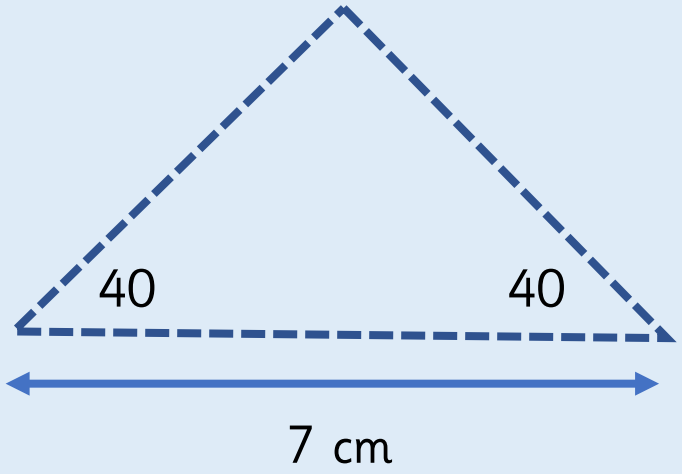
Activity 2 Drawing Shapes Accurately

Draw the triangle accurately on squared paper to work out the missing length. Measure the size of angles A and B.



Activity 3 Drawing Shapes Accurately

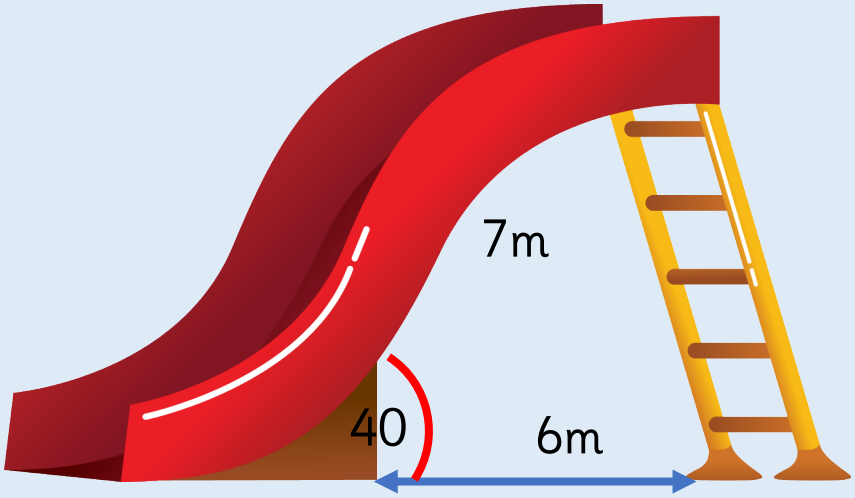
Rosie has been asked to draw this triangle on plain paper using a protractor. Create a step-by-step plan to show how she would do this.



How would you draw a triangle on a plain piece of paper using a protractor?

Reasoning - 1 Drawing Shapes Accurately

Mr. Harrison is designing a slide for the playground. Use a scale of 1 cm to represent 1 m. Draw a scale diagram.
Use the diagram to find out how long Mr. Harrison needs the ladder to be.



Reasoning - 1 Drawing Shapes Accurately

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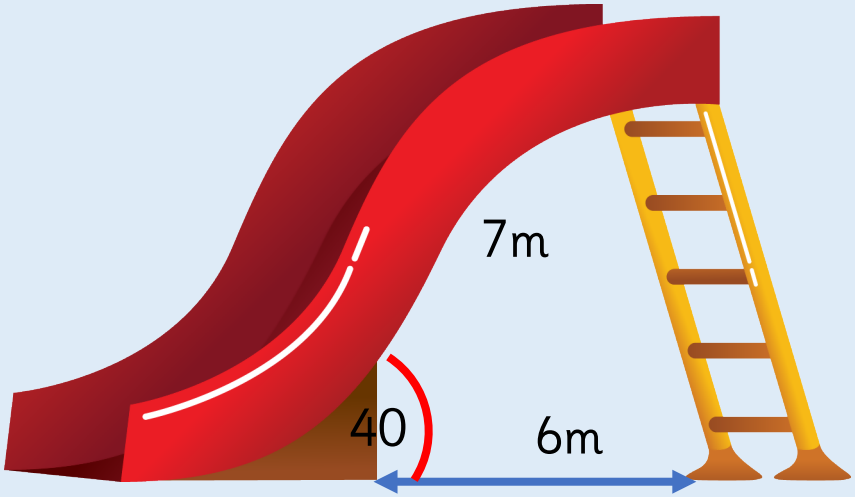
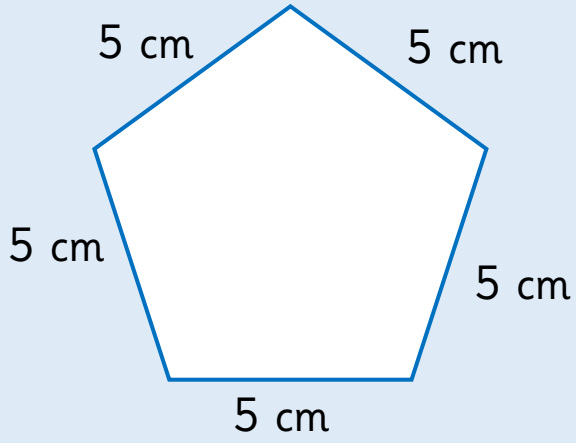


Children will have to use the scale to give their answer in m once they have measured it in cm.

The ladder should be approximately 4.5 m

Reasoning - 2 Drawing Shapes Accurately

What is the size of each interior angle of the regular shape below. Accurately draw a regular pentagon with side length 5 cm.



Reasoning - 2 Drawing Shapes Accurately

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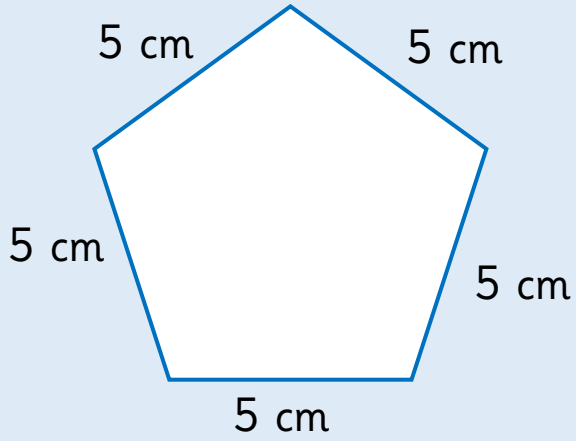
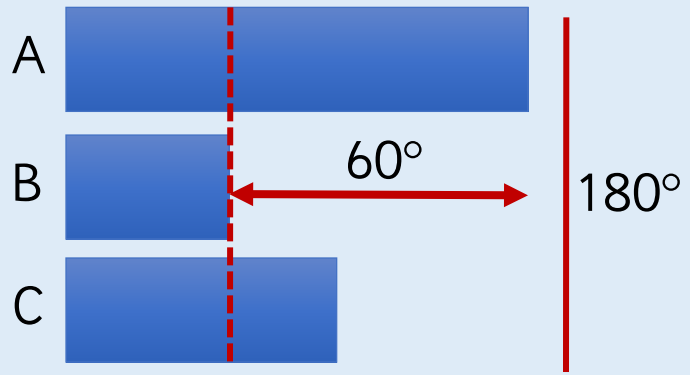


108°

Reasoning - 3 Drawing Shapes Accurately

Esin has drawn a scalene triangle. Angle A is the biggest angle. Angle C is 20° larger than angle B. Angle B is the smallest angle, and it is 60° smaller than angle A. Use a bar model to help you calculate the size of each angle, then construct Esin's triangle. Is there more than one way to construct the triangle?



Reasoning - 3 Drawing Shapes Accurately

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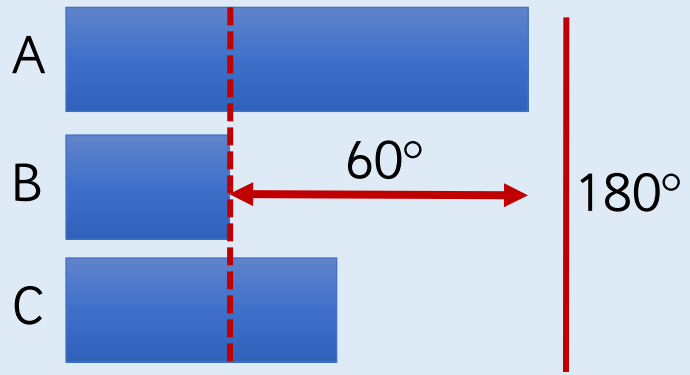

Angle A: 100°
Angle B: 40°
Angle C: 60°
These angles would work with different side lengths.

Discussion

Drawing Shapes Accurately

What do you know about the shapes which will help you draw them?

How can we ensure our measurements are accurate?

How would you draw a triangle on a plain piece of paper using a protractor?

Nets of 3-D Shapes

6

Fluency Teaching Slides

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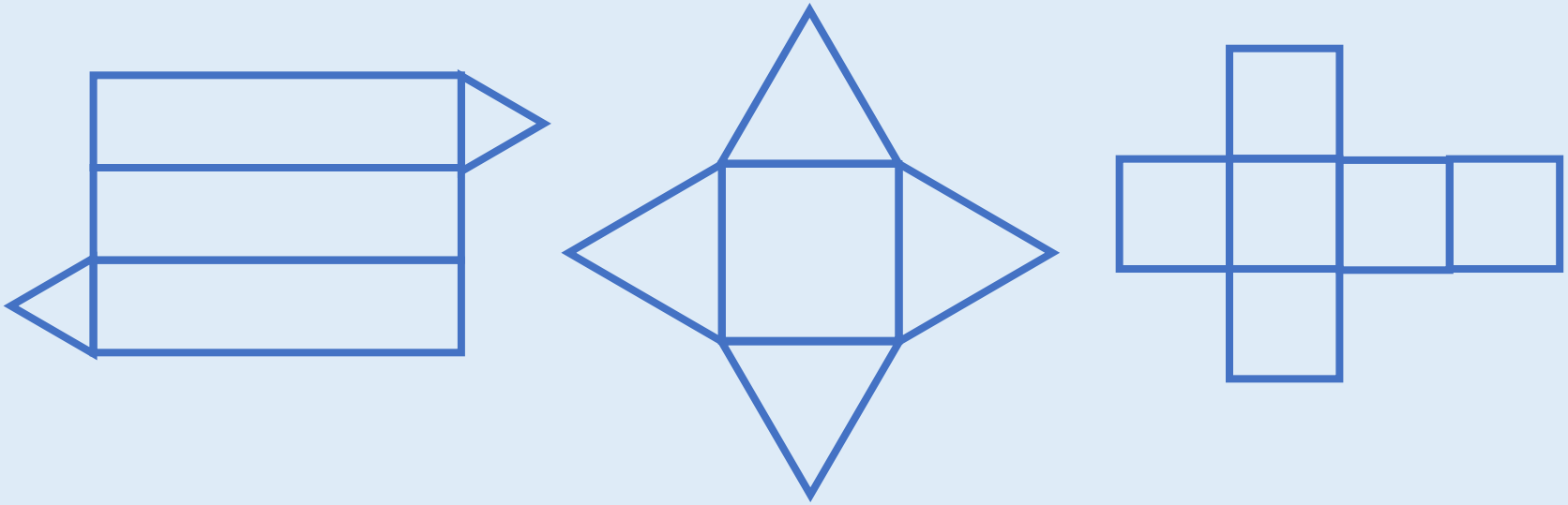
Activity 1 Nets of 3-D Shapes

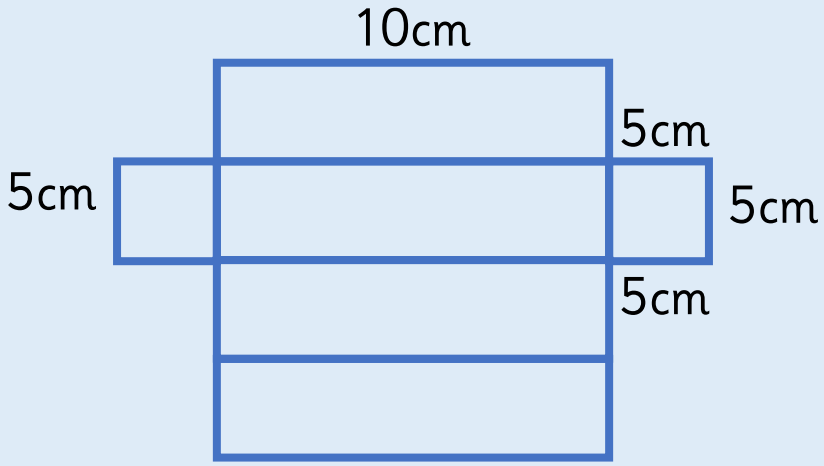
What three-dimensional shape can be made from these nets? Identify and describe the faces of each shape.



What do you know about the shapes which will help you draw them?

Activity 2 Nets of 3-D Shapes

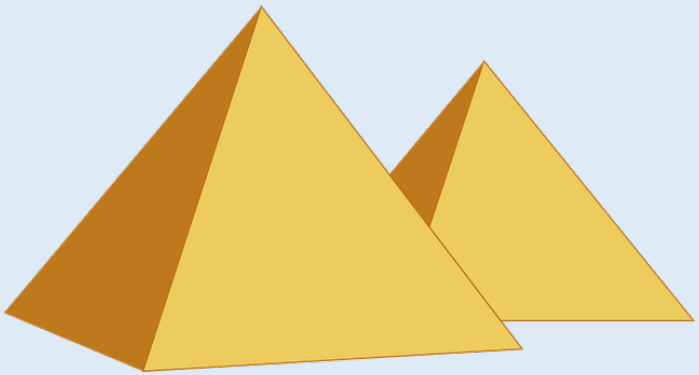
Accurately draw this net. Cut, fold and stick to create a cuboid.



What is a net? What shape will this net make?

Activity 3 Nets of 3-D Shapes

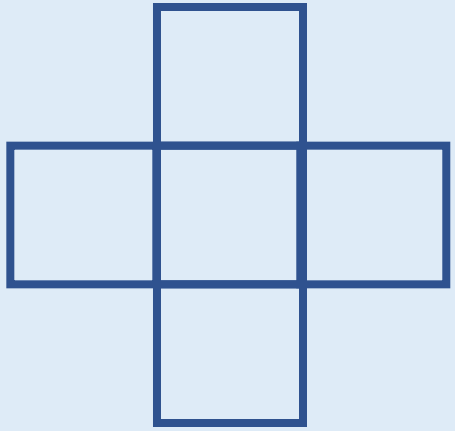
Draw possible nets of these three-dimensional shapes.



If you make this net, what would happen if you were not accurate with your measuring?

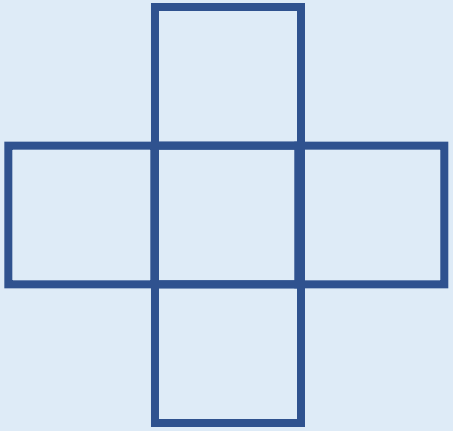
Reasoning - 1 Nets of 3-D Shapes

Leanna thinks that this net will fold to create a cube. Do you agree with Leanna? Explain your answer.



Reasoning - 1 Nets of 3-D Shapes

Leanna thinks that this net will fold to create a cube. Do you agree with Leanna? Explain your answer.



Leanna is incorrect because a cube has 6 faces, this net would only have 5

Reasoning - 2 Nets of 3-D Shapes

Use Polydrons to investigate how many different nets can be made for a cube. Is there a rule you need to follow? Can you spot an arrangement that won't work before you build it? How do you know why it will or won't work? Can you record your investigation systematically?

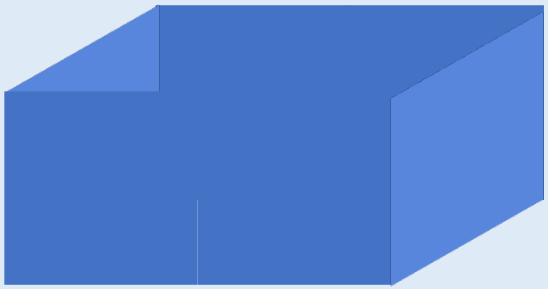
Reasoning - 2 Nets of 3-D Shapes

Use Polydrons to investigate how many different nets can be made for a cube. Is there a rule you need to follow? Can you spot an arrangement that won't work before you build it? How do you know why it will or won't work? Can you record your investigation systematically?

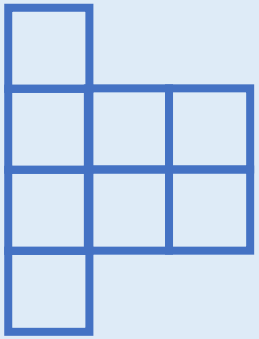
There are 11 possible nets.

Reasoning - 3 Nets of 3-D Shapes

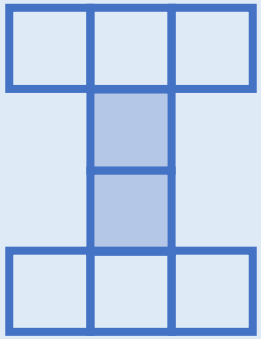
Here is an open box.
Which of the nets will fold together to make the box? The grey squares show the base.



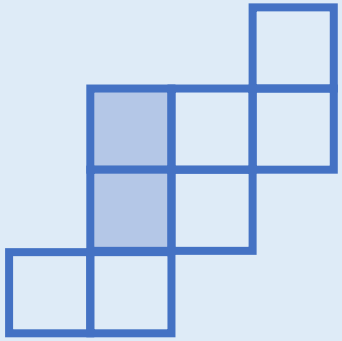
A



B



C



Reasoning - 3 Nets of 3-D Shapes

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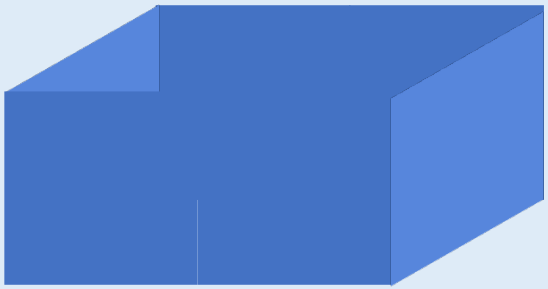
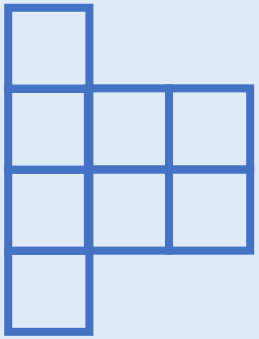
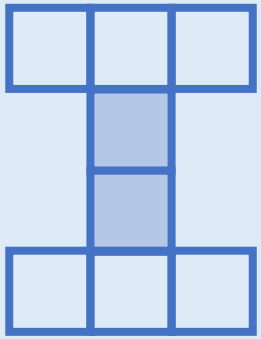


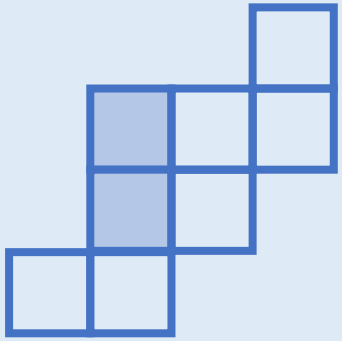
A



B



C



A and B

Discussion

Nets of 3-D Shapes

Looking at the faces of a three-dimensional shape, what two-dimensional shapes can you see?

What is a net? What shape will this net make? How do you know? What shape won't it make?

If you make this net, what would happen if you were not accurate with your measuring?