Summer Block 1

Shape

Small steps

Step 1	Understand and use degrees
Step 2	Classify angles
Step 3	Estimate angles
Step 4	Measure angles up to 180°
Step 5	Draw lines and angles accurately
Step 6	Calculate angles around a point
Step 7	Calculate angles on a straight line
Step 8	Lengths and angles in shapes

Small steps

Step 9	Regular and irregular polygons
Step 10	3-D shapes

Understand and use degrees

Notes and guidance

In this small step, children recap and build on learning from previous years. They should already be familiar with the idea that an angle is a measure of turn and be able to describe angles as acute or obtuse by comparing them to a right angle.

This step introduces degrees as a unit of measure for turn, including the degree symbol. Children explore the fact that there are 360° in a full turn, and therefore 180° in half a turn, 90° in a quarter turn (or right angle) and 270° in a three-quarter turn. They use this knowledge and the language of clockwise and anticlockwise to describe turns, including in the context of compass directions and clocks.

Children may begin to recognise other common angles, such as 45° being half a right angle, but there is no requirement to measure or explore more complex angles, such as 67° or 241°, at this point, as this is covered in later steps.

Things to look out for

- Children may confuse the terms clockwise and anticlockwise.
- Children may find it trickier to identify angles that are not shown in a standard orientation, for example a $\frac{3}{4}$ turn from north-east to north-west.

Key questions

- What does a full/half/quarter/three-quarter turn look like?
- What does “clockwise”/“anticlockwise” mean?
- What is a right angle?

  How many right angles are there in a full turn?
- If there are 360° in a full turn, how many degrees are there in a right angle/quarter turn/half turn/three-quarter turn?
- If you are performing a full/half/quarter turn, does it matter if you turn clockwise or anticlockwise?

Possible sentence stems

- There are ______° in a full turn, so there are ______° in a ______ turn.
- There are ______° in a right angle.
- Turning ______° ______ is the same as turning ______° ______

National Curriculum links

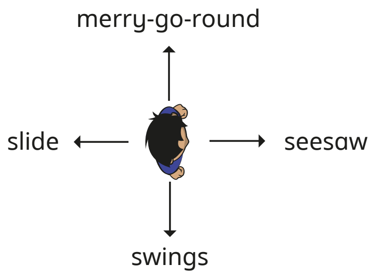
- Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles

Understand and use degrees

Key learning

- Amir is facing the seesaw.

  He turns 360° and is facing the seesaw again.



  Complete the sentences.

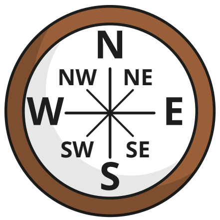
  There are 360° in a ______ turn.

  There are ______° in a half turn.

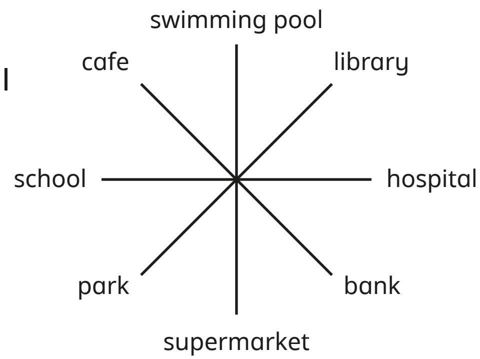
  There are ______° in a quarter turn.

  Describe some turns to a partner and work out what Amir will be facing after each turn.

- Work out the angle of each turn in degrees.
  - north to west clockwise
  - north to west anticlockwise
  - east to north clockwise
  - north-west to south-east anticlockwise



- Aisha, Scott, Huan and Dani are standing in the centre.
  - Work out what each child is facing after their turn.
    - Aisha is facing the hospital and turns 90° clockwise.
    - Scott is facing the supermarket and turns 270° anticlockwise.
    - Huan is facing the cafe and turns 180°.
    - Dani is facing the library and turns 360°.

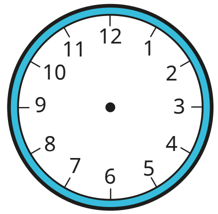


  - Explain why it does not matter whether Huan and Dani turned clockwise or anticlockwise.

- The minute hand turns from the start time to the end time.

  Use the clock to help you complete the table.

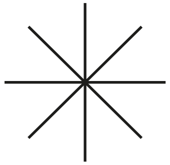
Start time	End time	Degrees
3 o'clock	quarter to 4	
4:10 pm	4:40 pm	
5:30 am		270°
	21:05	90°



Understand and use degrees

Reasoning and problem solving

Use the clues to label the diagram.



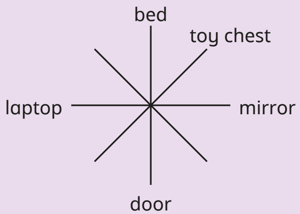
- Ron is standing in the middle of his bedroom.
- He is facing his bed.
- He turns 180° and is facing the door.
- He then makes a 90° turn clockwise and is facing his laptop.
- He turns another 90° clockwise, and then makes a $\frac{3}{4}$ turn anticlockwise. He is now facing the mirror.

Compare diagrams with a partner.

His toy chest is between the bed and the mirror.

Describe the turn from the bed to the toy chest.

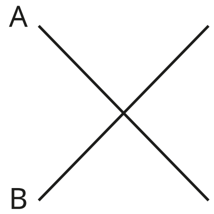
any rotation of:

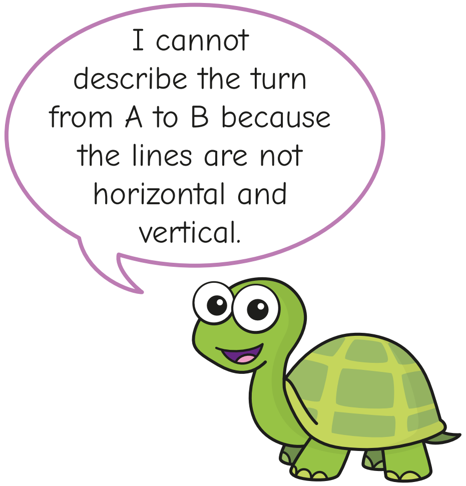


45° clockwise

or $\frac{1}{8}$ of a turn clockwise

or half of a quarter turn clockwise





Explain why Tiny is incorrect.

Describe the turn from A to B in two different ways.

$\frac{3}{4}$ turn (or 270°) turn clockwise

$\frac{1}{4}$ turn (or 90°) turn anticlockwise

Classify angles

Notes and guidance

In this small step, children classify angles using knowledge of right angles from the previous step. In Year 4, children classified angles as acute or obtuse based on whether an angle was less than or greater than a quarter turn (right angle). They begin by revisiting this and are also introduced to reflex angles for the first time.

It is important that children are able to visually classify an angle as acute, obtuse or reflex by comparing them to right angles and straight lines. Use of angle finders, such as the right angle, may provide support. Once secure in this, children can then begin to look at classifying angles numerically. They should be able to state, for example, that 23° is an acute angle because it is less than 90°, 134° is an obtuse angle because it is greater than 90° but less than 180°, and 210° is a reflex angle because it is greater than 180°.

As well as identifying and classifying angles, children should draw examples of each angle type.

Things to look out for

- Children may find it more challenging to classify angles that are close to 90° or 180°.
- Children may need to turn the paper to help classify angles that are not presented horizontally or vertically.

Key questions

- What does a right angle look like?
- What does the angle on a straight line look like?
- How many degrees are there in a right angle/on a straight line?
- Is the drawn angle less than or greater than a right angle?
- What does "acute"/"obtuse" mean?
- Can an angle be greater than 180°? What do you call an angle such as this?
- If an angle is ______ degrees, what type of angle is it?

Possible sentence stems

- Angles less than ______° are called ______ angles.
- Angles greater than ______° but less than ______° are called ______ angles.
- Angles greater than ______° are called ______ angles.

National Curriculum links

- Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles

Classify angles

Key learning

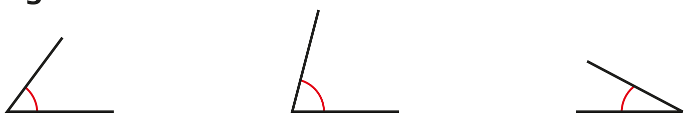
- Here is a right angle and a straight line.

  How many degrees are there in a right angle?

  How many degrees are there on a straight line?

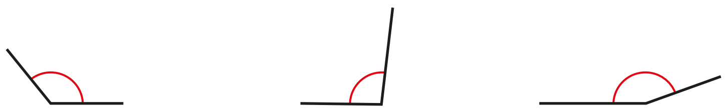
- Complete the sentences to describe the types of angles.

  acute angles



  Acute angles are less than ______°.

  obtuse angles



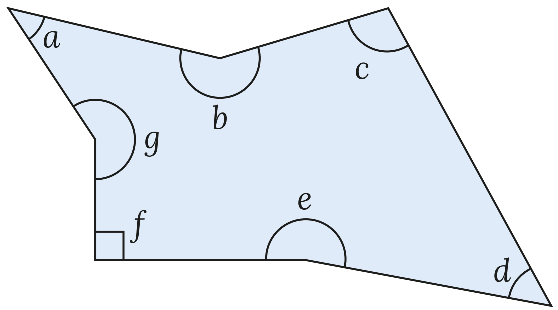
  Obtuse angles are greater than ______° but less than ______°.

  reflex angles

  Reflex angles are greater than ______°.

- Draw and label two different diagrams that show each type of angle.
  - acute
  - obtuse
  - reflex

- Classify angles a to g as acute, obtuse, reflex or right angle.



- Sort the angles into acute, obtuse and reflex.

23°	123°	91°	359°	99°
190°	19°	181°	89°	165°

- Draw a triangle and a quadrilateral.

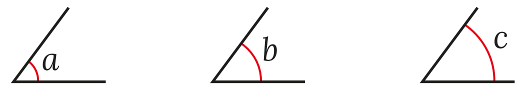
  For each shape, label the angles as acute, obtuse, reflex or right angle.

  Compare diagrams with a partner.

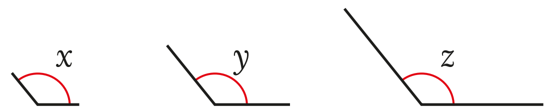
Classify angles

Reasoning and problem solving

Sam: Angle a is the smallest and angle c is the greatest.



Jack: Angle x is the smallest and angle z is the greatest.



Do you agree with Sam and Jack?

Explain your reasoning.

No

Are the statements always true, sometimes true or never true?

- Two acute angles added together make an obtuse angle.
- Two obtuse angles added together make a reflex angle.
- Subtracting an obtuse angle from a reflex angle leaves an acute angle.
- Subtracting an acute angle from a reflex angle leaves an obtuse angle.

Draw examples to support your answers.

sometimes true

always true

sometimes true

sometimes true

Estimate angles

Notes and guidance

In this small step, children estimate the sizes of angles based on knowledge of what right angles and angles on a straight line look like and measure in degrees.

Children should already be able to look at an angle and identify whether it is acute, obtuse or reflex, and they now progress to estimating the size of the angle. To begin with, it is important to explore the idea of halfway between already known angles, for example 45° is half of a right angle and 135° is halfway between a right angle and a straight line. From here, children can start to estimate given angles by comparing them to these key amounts. For example 80° is greater than half a right angle but less than a right angle and is closer to 90° than 45°. As well as estimating the sizes of given angles, children start to draw angles approximately of a given size.

Things to look out for

- Children may find angles that are not given in standard orientations more difficult to estimate.
- Children may want to find exact measurements rather than estimates, and may need support to realise that different answers are acceptable.

Key questions

- What does a right angle/straight line look like?
- How many degrees are there in a right angle/on a straight line?
- What angle is halfway between 0° and 90°/90° and 180°?
- Is the angle acute, obtuse or reflex? How do you know?
- Is the angle closer to 0° or 90°/90° or 180°?
- Is the angle closer to 45° or 90°/90° or 135°?

Possible sentence stems

- Angles less than ______° are called ______ angles.
- Angles greater than ______° but less than ______° are called ______ angles.
- Angles greater than ______° are called ______ angles.
- The angle is a ______ angle, so it must be …
- The angle is closer to ______ than ______, so it could be ______°.

National Curriculum links

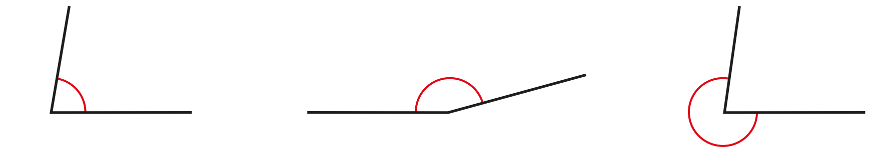
- Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles

Estimate angles

Key learning

- Which is the most appropriate estimate for the size of each angle?

  Explain your reasons to a partner.

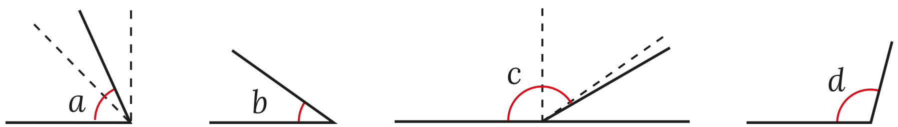


80° or 110° | 165° or 185° | 249° or 278°

- The diagonal lines cut the right angles in half.

  What are the sizes of angles a and b?

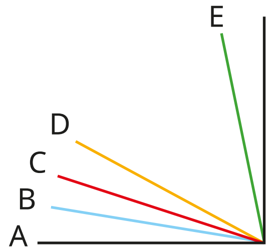
- Match each angle to an appropriate estimate of its size.



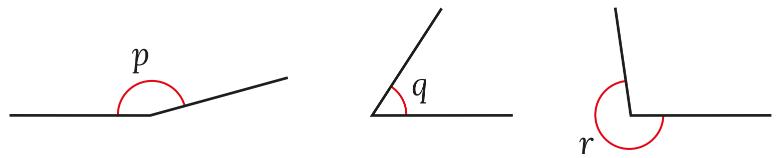
150° | 35° | 89° | 65° | 105° | 170° | 95°

Compare answers with a partner.

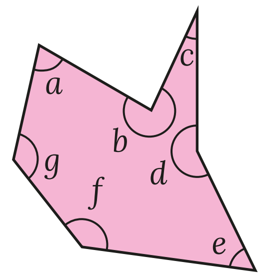
- Estimate the size of the angle formed by each line from line A.



- Estimate the sizes of the angles.



- Estimate the size of each angle in the shape.

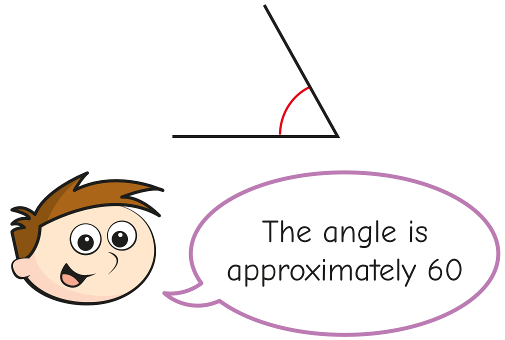


- Draw angles that are approximately of each size.

40° | 85° | 110° | 165° | 240°

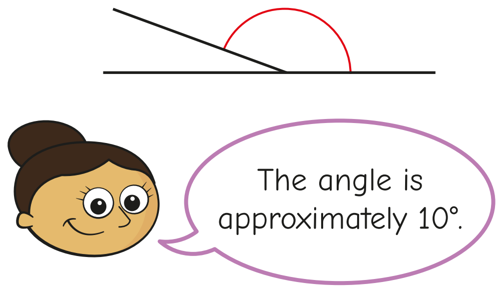
Estimate angles

Reasoning and problem solving



What mistake has Teddy made?

Teddy has forgotten to give the unit of measure: degrees or °.



Do you agree with Dora?

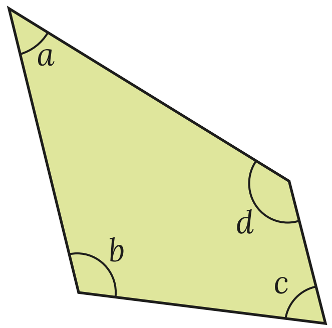
Explain your reasons.

No

Use the clues to draw an approximate diagram of the angle described.

- The angle is obtuse.
- The size of the angle is a cube number.

angle of approximately 125°



Is the statement true or false?

angle a + angle b > angle c + angle d

Use estimates to explain your answer.

False

approximate sizes of angles are:

a = 45°, b = 110°, c = 70°, d = 135°

45 + 110 < 70 + 135

Measure angles up to 180°

Notes and guidance

In this small step, children use a protractor to measure angles up to 180°.

It is important to begin by recapping the concept of estimating angles. Children then read the sizes of angles, where a protractor is shown over the top of the angle, so they know that the protractor is already in the correct position.

Children should then be given protractors to position themselves in order to measure angles. Model the steps to successfully using a protractor: make sure that the zero line of the protractor is on one of the lines of the angle; position the centre point of the protractor on the vertex; read the correct scale to determine what size the angle is. Children count up from the zero line to get to the correct angle. By estimating the size of the angle before measuring, they are less likely to read the wrong scale.

For this step, children do not measure angles greater than 180°.

Things to look out for

- Children may place the protractor in the incorrect place.
- Children may read the incorrect scale on the protractor.

Key questions

- What is an angle?
- What unit do you use to measure an angle?
- What can you use to measure the size of an angle?
- How can you tell the difference between an acute angle and an obtuse angle?
- Where should you put the protractor when measuring an angle?
- Which scale will you use when reading the protractor?
- How does moving the paper help you to measure some angles?

Possible sentence stems

- The angle is less than ______°, so it is an ______ angle.
- The angle is greater than ______°, so it is an ______ angle.
- The angle is an ______ angle, so the number of degrees must be more/less than ______

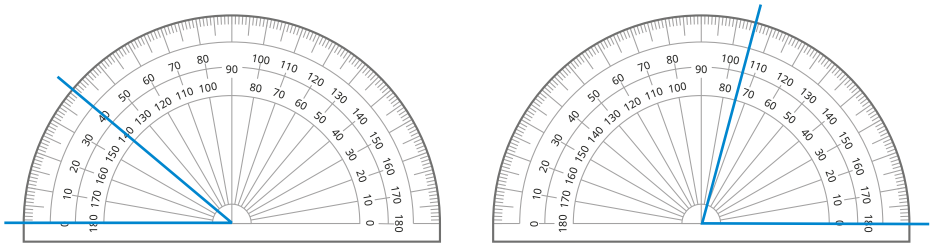
National Curriculum links

- Draw given angles, and measure them in degrees (°)

Measure angles up to 180°

Key learning

- Is each angle acute or obtuse?

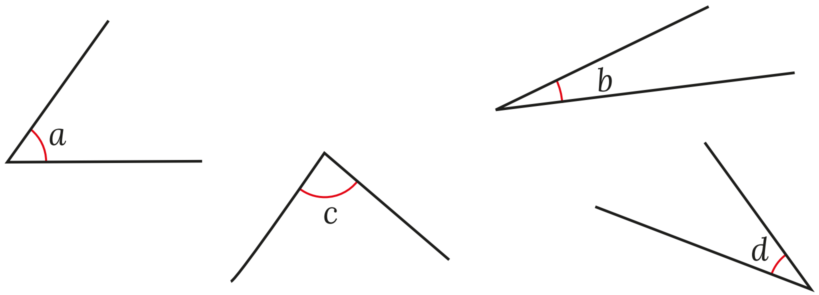


What is the size of each angle?

What is the same and what is different about the angles?

- Is each angle acute or obtuse?

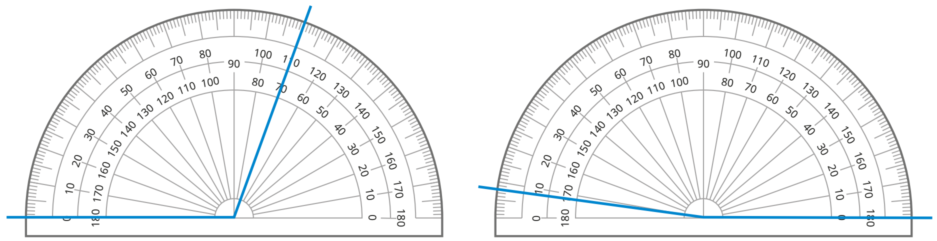
Estimate the size of each angle.



Measure each angle with a protractor.

How close were your estimates to the actual measurements?

- Is each angle acute or obtuse?



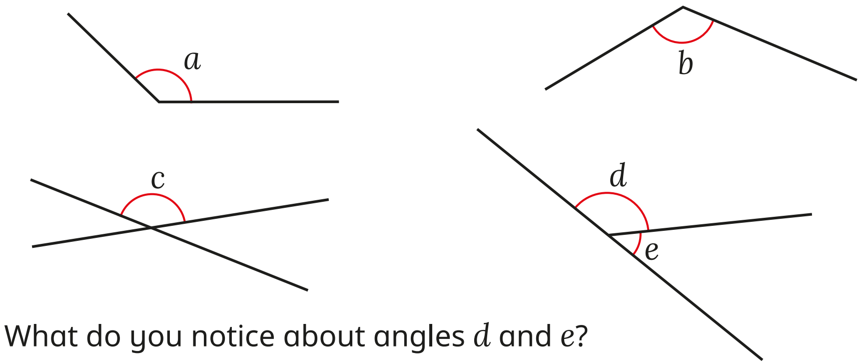
What is the size of each angle?

What is the same and what is different about the angles?

- Is each angle acute or obtuse?

Estimate the sizes of the angles.

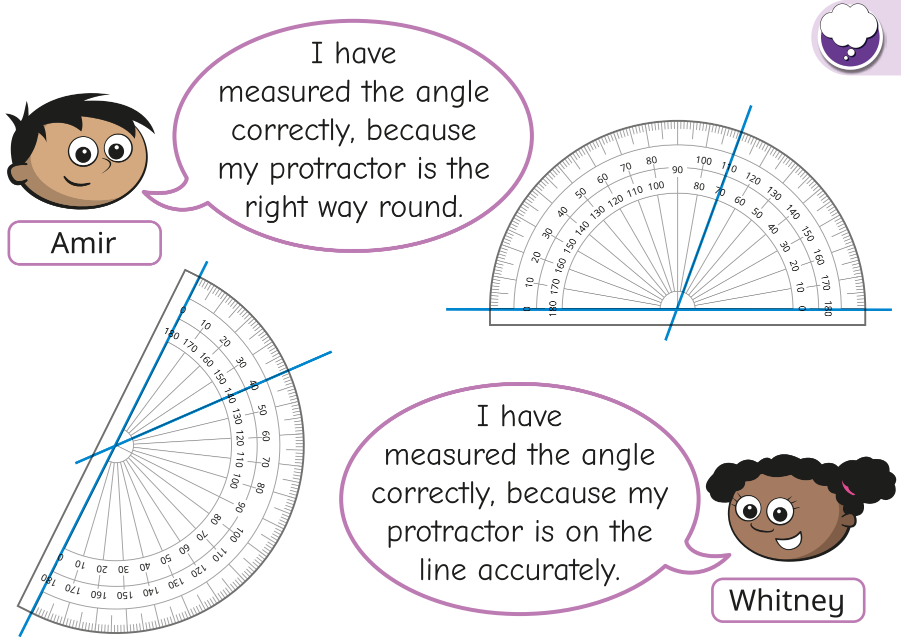
Then measure them with a protractor.



What do you notice about angles d and e?

Measure angles up to 180°

Reasoning and problem solving

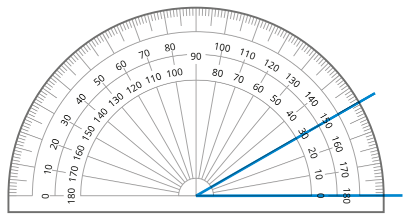


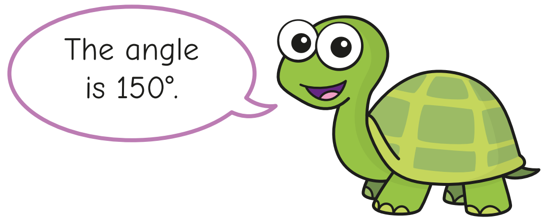
Who do you agree with?

Explain your answer.

They are both correct.

Tiny is measuring angles.





Do you agree with Tiny?

Explain your answer.

What steps for measuring an angle has Tiny done correctly?

What steps has Tiny got wrong?

No

Tiny has used the wrong scale. The angle is 30°, not 150°.

Draw lines and angles accurately

Notes and guidance

In this small step, children draw lines and angles accurately and use what they have learnt about shapes to construct shapes.

Children begin by drawing straight lines of given lengths, in both centimetres and millimetres. Ensure that children are measuring using the correct scale, for example centimetres, not inches.

Model how to use a protractor to draw a given angle. Instruct children to draw a straight line, then to move the protractor so that the zero line is on the line they have drawn, and the centre of the protractor is on the end of the line. They then mark the angle, remove the protractor and draw another line. Encourage children to label any angles that they draw. Once comfortable with drawing given lines and angles, they can explore drawing whole shapes accurately from a given description.

This step is a good opportunity to revisit the properties of different triangles and quadrilaterals.

Things to look out for

- When using a ruler, children may start their line at the edge rather than at zero on the scale.
- Children may use the wrong scale on the ruler.
- Children may use the wrong scale on the protractor.

Key questions

- What are the steps to draw a straight line of a given length with a ruler?
- Are you drawing the line in millimetres, centimetres or inches?
- How can you use a protractor to draw a given angle accurately?
- Where on the line should you place the protractor?
- Is the angle you want to draw acute or obtuse?
- Which scale on the protractor should you use? Why?
- How can you accurately draw a polygon if you know the measurements?
- What are the features of a rhombus/isosceles triangle?

Possible sentence stems

- When drawing an angle of ______ degrees, I know it will be greater/smaller than a right angle, so I will use the inner/outer scale.

National Curriculum links

- Draw given angles, and measure them in degrees (°)

Draw lines and angles accurately

Key learning

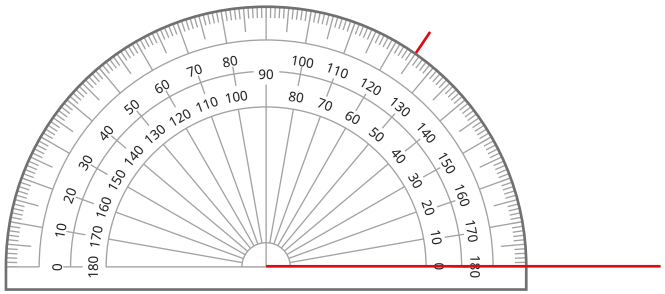
- Use a ruler to accurately draw the lines.

12 cm	6.5 cm	75 mm	105 mm

- Aisha is asked to draw an angle.

  She draws a horizontal line, then puts the protractor on the line.

  She then makes a mark.



  What size angle is Aisha drawing?

- Use a protractor to accurately draw and label the angles.

  Draw a horizontal line for each one.

45°	15°	110°	155°

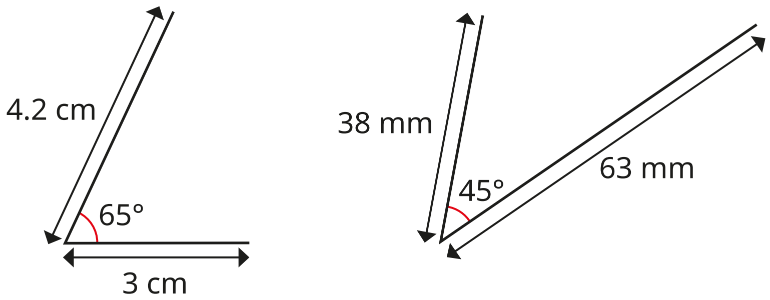
- Accurately draw and label a square that has a perimeter of 22 cm.

- Draw a straight line and label the ends A and B.

  Draw an angle of 140° from point A.

  Draw an angle of 40° from point B.

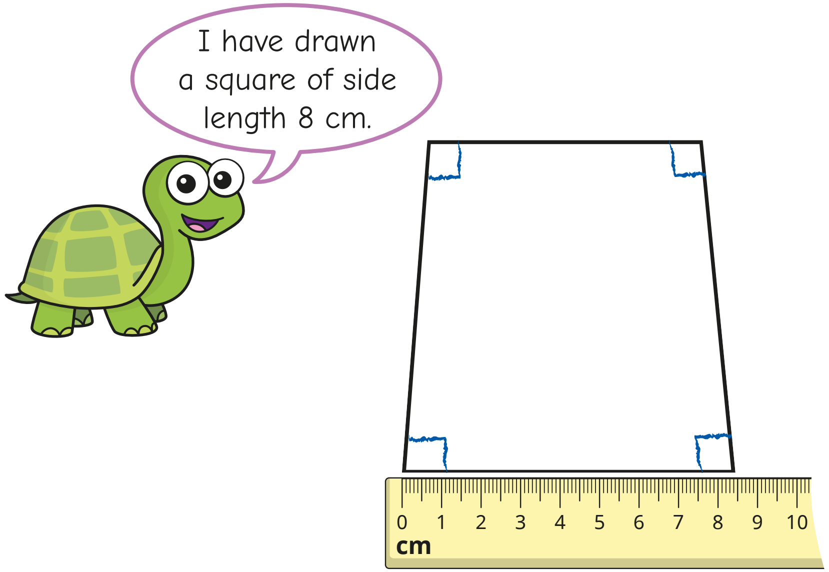
- Use a ruler and a protractor to accurately draw and label the lines and angles.



- Use a ruler and protractor to accurately draw and label:
  - an angle of 50° with the arms of the angle 50 mm long
  - an isosceles triangle that has a base of 4 cm and angles of 70°
  - a rhombus with sides of 35 mm, one pair of 50° angles and one pair of 130° angles

Draw lines and angles accurately

Reasoning and problem solving

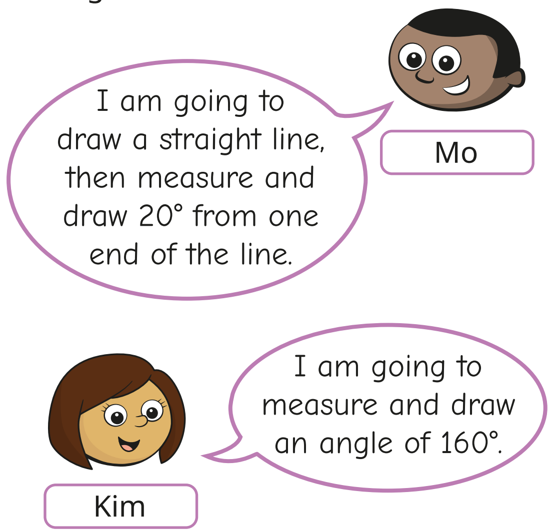


What mistakes has Tiny made?

Tiny has not drawn the side lengths or measured the angle sizes accurately.

All angles should be 90° and all lengths should be exactly 8 cm.

Mo and Kim are drawing an angle of 200°.



Talk to a partner about how both strategies will create an angle of 200°.

Use both strategies to draw an angle of 200°.

accurately drawn diagrams of 200° angles

White Rose Maths

Calculate angles around a point

Notes and guidance

In this small step, children move on to calculating angles based on given information, rather than always using a protractor to measure angles. When looking at drawings of angles, distinguish between those that are and are not to scale, and discuss why a protractor is or is not useful in that context.

Recap prior learning that a full turn is 360° and model this with a child turning through 360°. Children use a protractor to measure angles around a point to see that they add up to 360°. Any slight differences will be due to human error and should be discussed. Children then calculate missing angles using the knowledge that all the angles sum to 360°. They can either subtract each known angle from the total of 360°, or add the known angles first and then subtract this total from 360°. Children should also recognise that if they know that the angles around a point are equal, 360 can be divided by the number of angles to find the size of one of the angles.

Things to look out for

- Children may use a protractor to measure a missing angle, rather than calculating from the given information.
- Children may not see or understand the notation for a right angle and exclude this from any calculations.

Key questions

- What is a full turn?
- How many right angles are there in a full turn?
- How many degrees are there in a full turn?
- If you know three out of four angles around a point, how can you work out the fourth angle?
- Do you need to add or subtract to find the unknown angle? How do you know?
- If all the angles around a point are equal in size, how can you work out the size of each one?

Possible sentence stems

- A full turn is ______ degrees and is made up of ______ right angles.
- Angles around a point sum to ______°.
- The missing angle is ______° subtract the total of ______°, ______° and ______°.

National Curriculum links

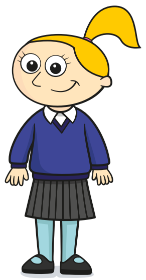
- Identify angles at a point and 1 whole turn (total 360°)

Calculate angles around a point

Key learning

- Eva faces in one direction.

  She then does a complete turn and ends up facing the same direction.

  ▸ Discuss with a partner how many right angles Eva has turned.

  ▸ Complete the sentences.

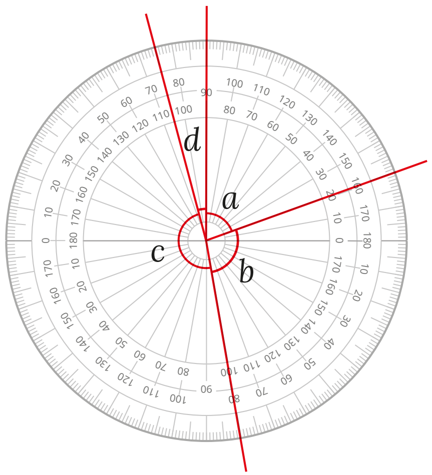
  1 complete turn = ______ right angles = ______°

  $\frac{1}{2}$ of a complete turn = ______ right angles = ______°

  $\frac{1}{\square}$ of a complete turn = 1 right angle = ______°

  $\frac{3}{4}$ of a complete turn = ______ right angles = ______°

- Measure the angles.

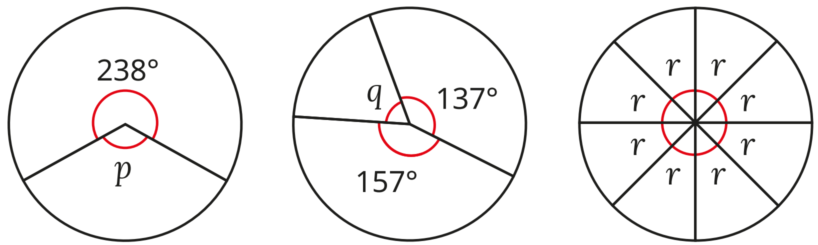
  

  a = ______° b = ______°

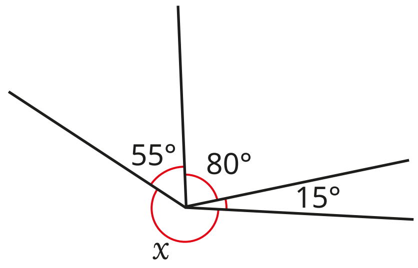
  c = ______° d = ______°

  The sum of all four angles = ______°

- Work out the missing angles.

- Use the fact that angles around a point add up to 360° to work out the size of the angle marked x.

  Compare methods with a partner.

- There are three angles around a point.

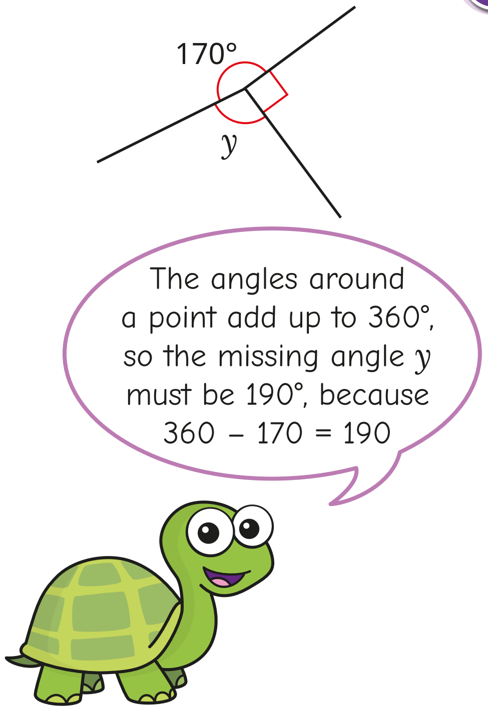
  Angle a is half the size of angle b.

  Angle c is the same size as the total of angles a and b.

  What are the sizes of angles a, b and c?

Calculate angles around a point

Reasoning and problem solving



Do you agree with Tiny?

Explain your answer.

No

Are the statements always true, sometimes true or never true?

If three of the angles around a point are right angles, any remaining angles will be acute.

If there are only three angles around a point, they must all be obtuse.

If there are only five equal angles around a point, they will all be acute.

If there are four angles around a point, they could all be acute.

Give reasons for your answers.

sometimes true

sometimes true

always true

never true

Calculate angles on a straight line

Notes and guidance

In this small step, children see that the total of the angles on a straight line is half the total of the angles around a point.

Children should recognise that a half turn is the same as a straight line, meaning that adjacent angles on a straight line sum to 180°. Looking at a protractor will reinforce this point, as children will see that the 0° to 180° line is a straight line.

Once children are secure in the understanding that both a half turn and a straight line are equal to 180°, they move on to working out unknown angles on a straight line. As with the previous step, explore both methods of calculation: the whole (180°) subtract each part; or add the parts first, then subtract from the whole.

Finally, children use division to work out equal angles knowing that the total is 180°, for example five equal angles on a straight line will all be 36°, because 180 ÷ 5 = 36

Things to look out for

- Children may use a protractor to measure missing angles, rather than calculating from the given information.
- Children may confuse this step with the previous one and think that 360° is the whole rather than 180°.

Key questions

- How many right angles are there in a half turn?
- How many degrees are there in a half turn?
- How can you work out a missing angle on a straight line if you know the size of the other angle/angles?
- What strategies can you use to work out missing angles?
- Do you need to add or subtract to find the unknown angle? Why?
- If there is more than one missing angle but they are equal, how can division help you to work them out?

Possible sentence stems

- Angles on a straight line sum to ______°.
- The missing angle is ______° subtract ______°, ______° and ______°.

National Curriculum links

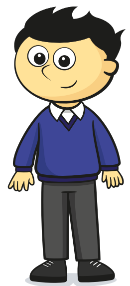
- Identify: angles at a point and 1 whole turn (total 360°); angles at a point on a straight line and half a turn (total 180°)

Calculate angles on a straight line

Key learning

- Jack faces in one direction.

  He then turns around to face the opposite direction.

  - How many right angles has Jack turned?
  - Complete the sentences.

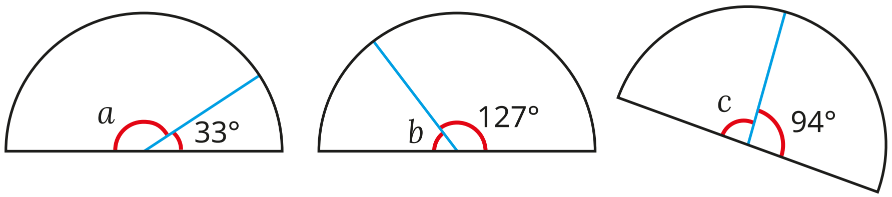
    $\frac{1}{4}$ of a complete turn = ______ right angle = ______°

    There are ______ right angles in a straight line.

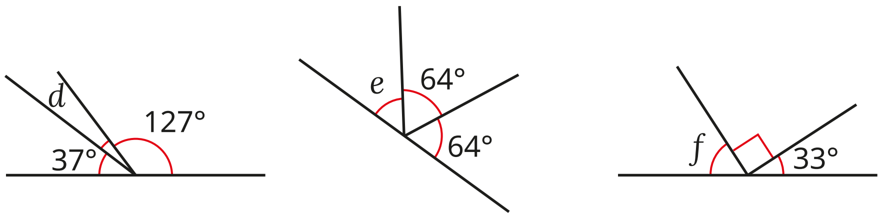
    1 half turn = ______ right angles = ______°

    There are ______° in a straight line.

- Work out the missing angles.

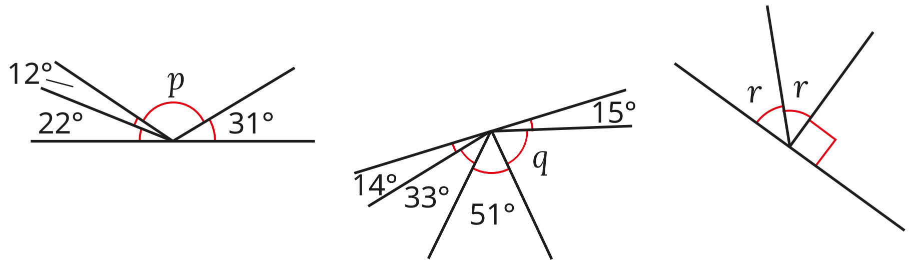
  

- Work out the missing angles.

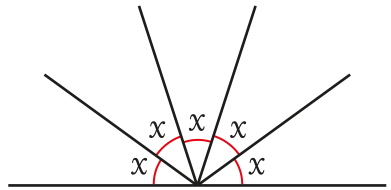
  

  Is there more than one way to work out each angle?

- Work out the missing angles.

- The five angles are on a straight line.

  Work out the size of each angle.

- There are three angles on a straight line.

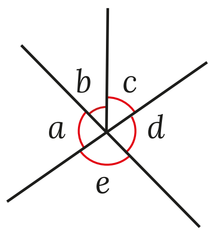
  Angle a is half the size of angle b.

  Angle c is the same size as the total of angles a and b.

  Work out the sizes of the angles.

Calculate angles on a straight line

Reasoning and problem solving



$a + b + c + d + e = 360°$
$d + e = 180°$

Write some number sentences about this diagram.

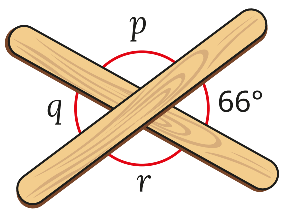
multiple possible answers, e.g.

$a + b + c = d + e$

$360° - e - d = 180°$

Two lolly sticks are on a table.

Work out the three missing angles.

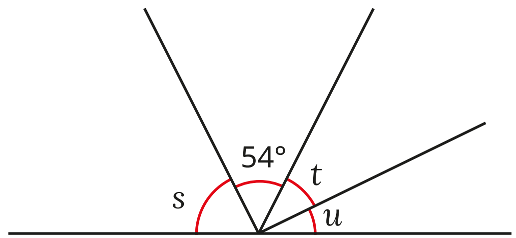


$p = 114°$

$q = 66°$

$r = 114°$

The angles are on a straight line.



- Angle s is 9° greater than the size of the given angle.
- Angle t is 11° greater than angle u.

Work out the sizes of the angles.

Create your own straight-line problem for a partner.

$s = 63°$

$t = 37°$

$u = 26°$

Lengths and angles in shapes

Notes and guidance

In this small step, children explore different strategies for calculating missing lengths and angles in shapes.

Start by recapping what perimeter is and how to calculate it, so that children can use this to work out missing lengths. Once children are confident at calculating the perimeter of a rectangle, move on to the perimeter of compound shapes composed of multiple rectangles. Encourage them to explore the fact that the area is multiplied by the number of rectangles used, but the same relationship is not true for the perimeter.

Using what they have learnt in previous steps, children can work out missing angles within shapes, both on a straight line and around a point. The rule that angles in a triangle sum to 180° is not covered formally until Year 6

Things to look out for

- Children may use a ruler or a protractor to measure a length or an angle, rather than calculating from the given information.
- Children may assume that angles that look similar are equal in size.

Key questions

- What is the perimeter of the shape?
- If two of these shapes are joined together, does the perimeter double?
- What is the perimeter of the compound shape?
- If you know the size of angle x in the shape, how can you work out the sizes of other angles in the shape?
- If the perimeter of the shape is ______, what is the length of the line marked ______?

Possible sentence stems

- Angles on a straight line sum to ______°.
- Angles around a point sum to ______°.
- If the perimeter is ______ cm and the sides I know sum to ______ cm, then the missing side is ______ cm.

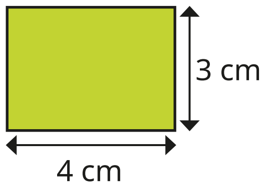
National Curriculum links

- Identify: angles at a point and 1 whole turn (total 360°); angles at a point on a straight line and half a turn (total 180°)
- Use the properties of rectangles to deduce related facts and find missing lengths and angles

Lengths and angles in shapes

Key learning

- A rectangle measures 4 cm by 3 cm.

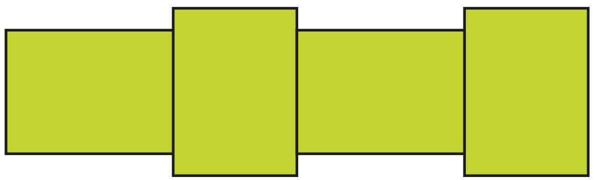


  - Calculate the area and perimeter of the rectangle.

  This compound shape is made from three of the rectangles.

  - Calculate the area and perimeter of the compound shape.
  - What do you notice about the changes in area and perimeter from the first shape to the second? Why do you think this is?

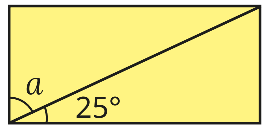
  This compound shape is made from four of the rectangles.



  - Calculate the area and perimeter of the compound shape.

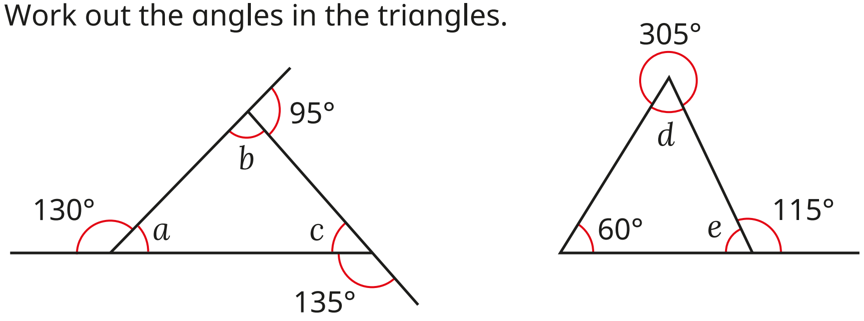
    Which was easier to work out?

- A rectangle has been split into two triangles.



  - Work out the size of angle a.
  - What other missing angles can you calculate in the rectangle?

- Work out the angles in the triangles.

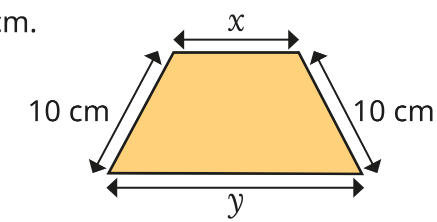


  What do you notice about the angles of each triangle?

- The perimeter of the trapezium is 44 cm.

  Side y is twice the length of side x.

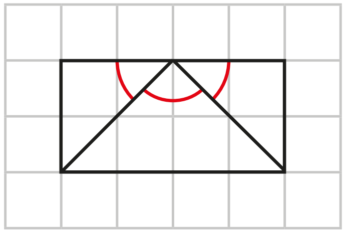
  Calculate the length of side y.

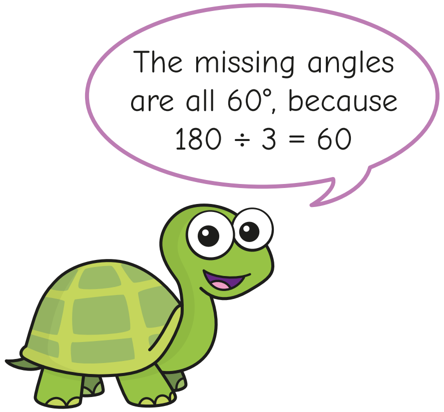


Lengths and angles in shapes

Reasoning and problem solving

Tiny is working out angles.



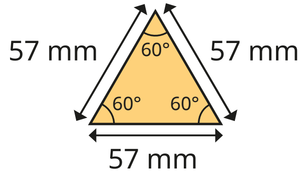


Do you agree with Tiny?

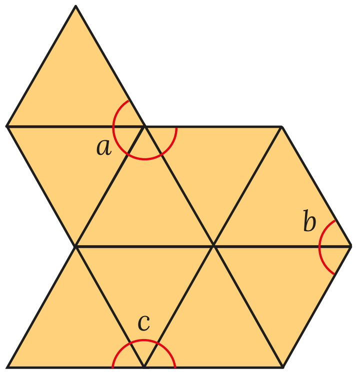
Explain your answer.

No

The lengths and interior angles of a triangular sticker are shown.



Some of these stickers are used to make this compound shape.



Work out the perimeter of the compound shape.

Work out the sizes of the angles marked with letters.

513 mm

a = 240°

b = 120°

c = 180°

Regular and irregular polygons

Notes and guidance

In this small step, children explore regular and irregular polygons. It is important to discuss with children that the words “polygon” and “shape” are not interchangeable. A polygon refers to a 2-D, fully enclosed shape formed from straight lines. Show examples and non-examples of polygons to help with this understanding.

Move on to explore what a regular polygon is, allowing children to see that not only do all sides have to be the same length, but the angles must also be equal. A good example is the difference between a square and a rectangle: while the angles are all equal, the sides are not. Ensure that children understand that equal sides are indicated by hatch marks.

Once children are confident at identifying regular and irregular polygons, ask them to calculate the perimeter of regular shapes when given the length of one side. They may also explore finding the length of each side of a regular polygon when given the perimeter.

Things to look out for

- Children may not identify polygons correctly.
- Children may think that a polygon with equal angles but different length sides, or with equal length sides and different angles, is regular.

Key questions

- What is a polygon?
- What are the features of a polygon?
- Can a polygon have a curved side?
- How can you measure the perimeter of a polygon?
- What is a regular polygon?
- Is a shape with all equal sides always a regular polygon?
- How do you know that the shape is regular/irregular?

Possible sentence stems

- In a regular polygon, all angles are ______ and all sides are ______
- In a regular polygon, if one side is ______ then the perimeter can be found by …

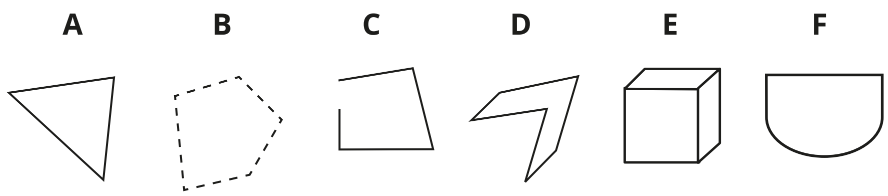
National Curriculum links

- Distinguish between regular and irregular polygons based on reasoning about equal sides and angles

Regular and irregular polygons

Key learning

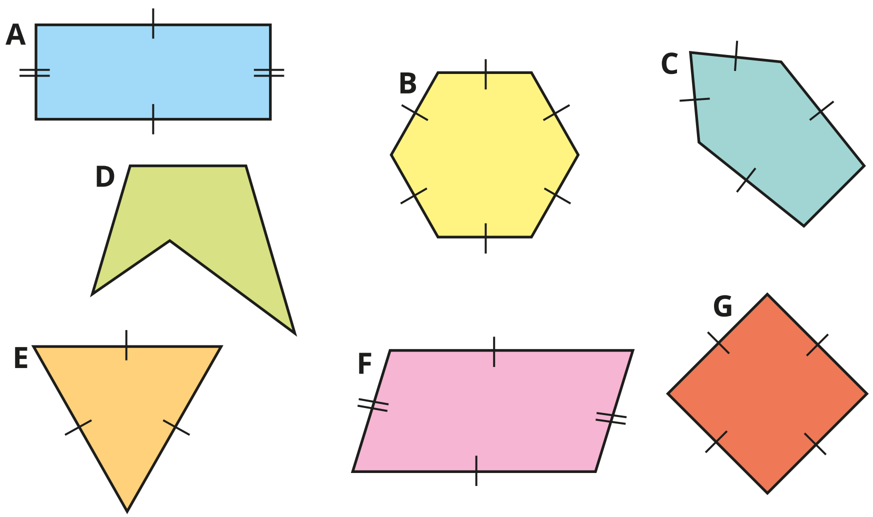
- Which of the shapes are polygons?



  How do you know?

- In a regular polygon, all angles are equal and all sides are equal.

  Sort the shapes into regular and irregular polygons.



- Draw a regular polygon and an irregular polygon.

  Compare shapes with a partner.

  What is the same and what is different about your two shapes?

- Brett draws a regular triangle.

  Each side is 6 cm.

  What is the perimeter of Brett's triangle?

- Nijah draws a regular hexagon.

  Each side is 12 cm.

  What is the perimeter of Nijah's hexagon?

- Teddy draws a shape with four straight lines.

  There are four right angles in Teddy's shape.

  Is Teddy's shape regular, irregular or is it impossible to tell?

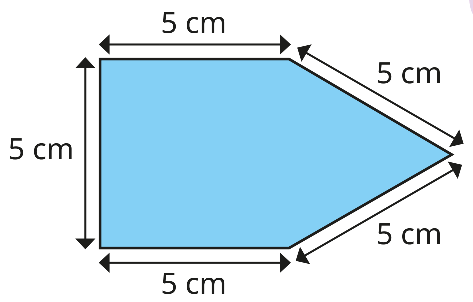
  Explain your answer.

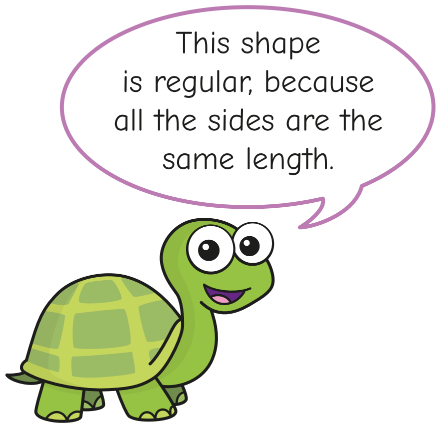
- The perimeter of a regular pentagon is 60 mm.

  What is the length of each side?

Regular and irregular polygons

Reasoning and problem solving





Do you agree with Tiny?

Explain your answer.

No

Are the statements always true, sometimes true or never true?

A regular polygon has equal sides, but not equal angles.
A triangle is a regular polygon.
A rhombus is a regular polygon.
In any polygon, the number of angles is the same as the number of sides.

Explain your answers.

never true

sometimes true

sometimes true

always true

3-D shapes

Notes and guidance

In this small step, children start by recapping the names of 3-D shapes, and then move on to their properties. Seeing models of 3-D shapes will help to remind children of the differences between faces, edges and vertices. Identifying the 2-D shapes on the faces of the 3-D shapes allows children to compare shapes and will provide a basis for their learning of nets in Year 6

Children also look at 2-D drawings of 3-D shapes on isometric paper, identifying the 3-D shape as well as its properties. By counting the dots on each side, they can identify equal lengths that can be used to tell the difference between, for example, a cube and a cuboid.

Finally, children look at drawings of compound 3-D shapes made up of two or three simple 3-D shapes and identify which 3-D shapes were used to make the shape.

Things to look out for

- Children may only count the faces, vertices and edges that they can see on the 2-D representation.
- Children may confuse some 3-D shapes, such as triangular-based pyramids and triangular prisms.

Key questions

- What is the mathematical name for this 3-D shape?
- How many faces/edges/vertices are there on this 3-D shape?
- What 3-D shape is shown by this 2-D representation?
- How can you tell how many faces/edges/vertices there are on this 3-D shape when they are not all visible?
- What 2-D shapes can you see on the faces of the 3-D shape?
- What 3-D shapes is this compound shape made up of?

Possible sentence stems

- This shape has ______ faces, ______ edges and ______ vertices.
- This shape is made up of a ______ and a ______

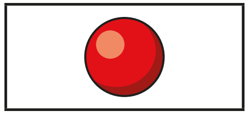
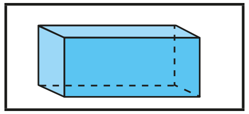
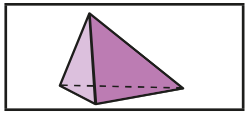
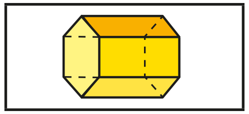
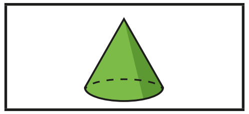
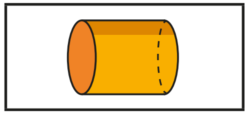
National Curriculum links

- Identify 3-D shapes, including cubes and other cuboids, from 2-D representations

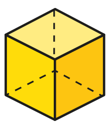
3-D shapes

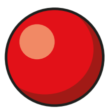
Key learning

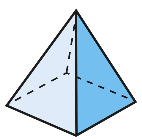
- Match the 3-D shapes to their names.

	cuboid
	triangular-based pyramid
	cone
	sphere
	hexagonal prism
	cylinder

- How many faces, edges and vertices does each shape have?

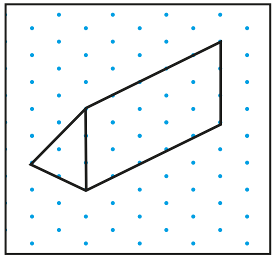




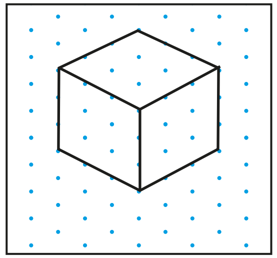


- Sam, Tommy and Ron have each drawn a 3-D shape on isometric paper.

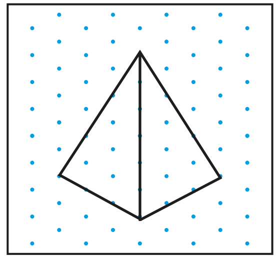
Sam



Tommy



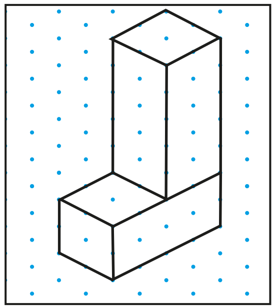
Ron

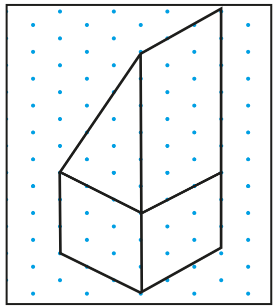


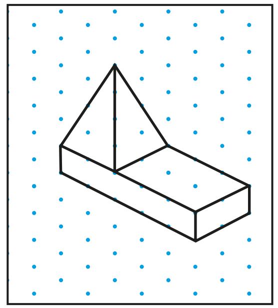
What 3-D shapes have they drawn? Is there more than one answer?

How many faces, edges and vertices does each shape have?

- Alex draws compound shapes made from other 3-D shapes.







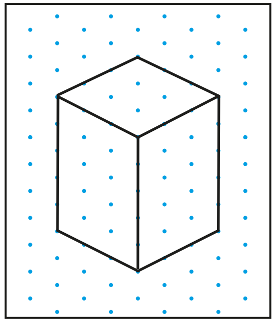
What shapes has Alex used?

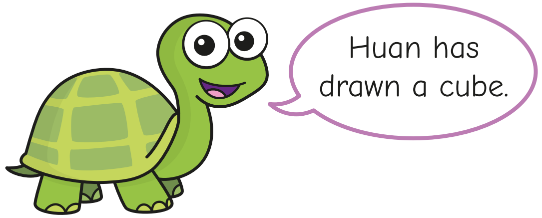
How many faces are there on each of Alex's shapes?

3-D shapes

Reasoning and problem solving

Huan has drawn this shape on isometric paper.

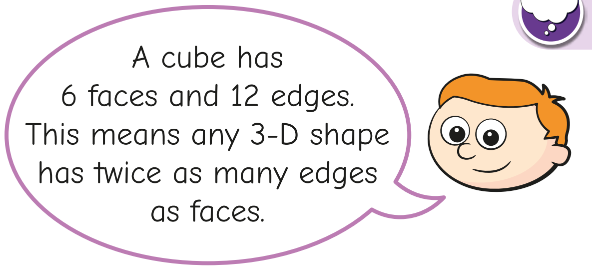




Do you agree with Tiny?

Explain your answer.

No

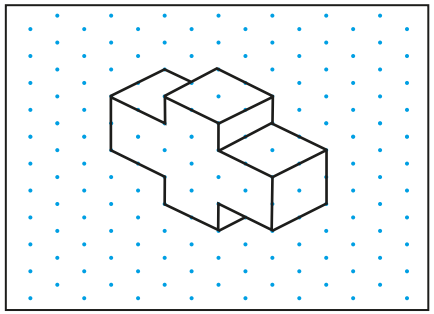


Do you agree with Ron?

Explain your answer.

No

How many faces does the shape have?



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