

Measuring and Drawing Lines and Angles

Solutions

For AQA GCSE Mathematics (8300) • Foundation tier

Each question is shown in grey, followed by the working, one step per line. The final answer is in a box. *Marks* shows how the marks are usually given in the exam, and **Tip** points out a common mistake.

1 (1 mark)

Measure the length of the line AB .
Give your answer in millimetres.



Line up the 0 on the ruler with A (not the end of the ruler).

Read the ruler at B : 7.3 cm.

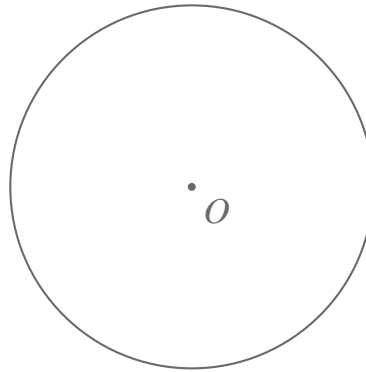
1 cm = 10 mm, so 7.3 cm = 73 mm.

Answer: 73 mm (accept 72 to 74)

Tip: Check the units asked for. The answer must be in **mm**, so 7.3 (cm) or 730 would be wrong.

2 (1 mark)

Here is a circle with centre O .



Measure the diameter of the circle.

Give your answer in millimetres.

The diameter goes all the way across the circle, through the centre O .

Line up the 0 on the ruler with the edge of the circle and pass the ruler through O .

Read the ruler at the opposite edge: 4.8 cm.

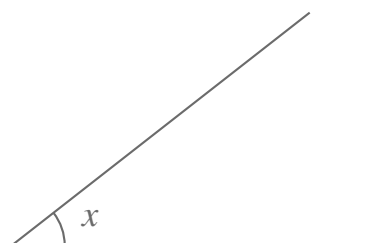
$$4.8 \times 10 = 48 \text{ mm}$$

Answer: 48 mm (accept 46 to 50)

Tip: Make sure your ruler passes through the centre O . Measuring from O to the edge gives the radius (24 mm), which is only half the diameter.

3 (1 mark)

Use a protractor to measure the size of angle x .



Put the centre of the protractor on the vertex (the point of the angle).

Line up the zero line with one arm.

Read the scale that starts at 0 on that arm.

Angle x is acute (less than 90°), so the answer must be less than 90.

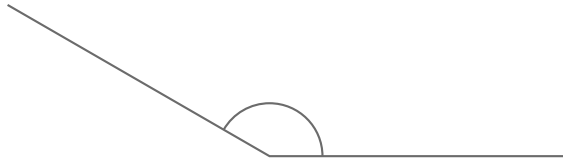
Answer: 38° (accept 36 to 40)

Tip: A protractor has two scales. Use the one that starts at 0 on the arm you lined up. Reading the other scale here would give 142° , which is obtuse.

4 (1 mark)

Estimate the size of this angle.

Circle your answer.



Options: 30° , 90° , 150° , 210°

The angle is bigger than a right angle (90°).

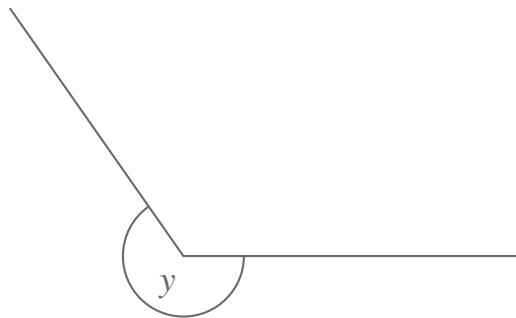
It is smaller than a straight line (180°).

So it is obtuse, and 150° is the only option between 90° and 180° .

Answer: 150°

5 (1 mark)

Measure the size of the reflex angle y .



A protractor only measures up to 180° .

So measure the smaller angle on the other side: 125° .

Angles round a point add up to 360° .

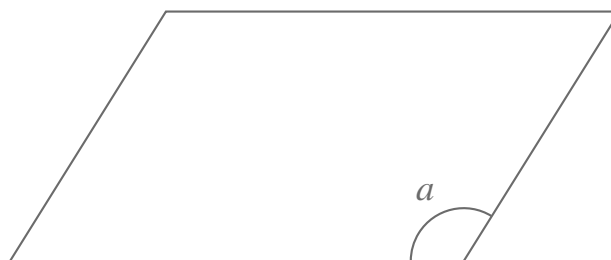
$$y = 360 - 125 = 235^\circ$$

Answer: 235° (accept 233 to 237)

Tip: A reflex angle is more than 180° . If your answer is less than 180° , you have measured the wrong angle.

6 (1 mark)

The diagram shows a parallelogram.



Use a protractor to measure angle a .

Put the centre of the protractor on the corner where angle a is.

Line up the zero line with the bottom side of the parallelogram.

Angle a is obtuse (bigger than a right angle), so read the scale that gives more than 90° .

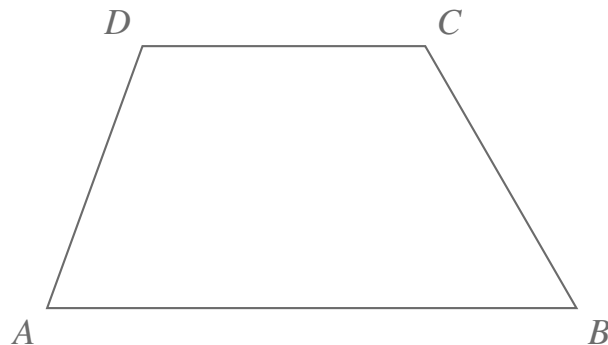
Angle a is about 122° .

Answer: 122° (accept 120 to 124)

Tip: Decide first whether the angle is acute or obtuse. Here the other scale gives 58° , which cannot be right for an obtuse angle.

7 (2 marks)

Here is a trapezium $ABCD$.



- (a) Measure the length of side BC .
Give your answer in millimetres.

Line up the 0 on the ruler with B .

Read the ruler at C : 4.0 cm.

$$4.0 \times 10 = 40 \text{ mm}$$

Answer: 40 mm (accept 39 to 41)

- (b) Measure angle ADC .

Angle ADC is the angle at D , between DA and DC .

Put the centre of the protractor on D and line up the zero line with DC .

Angle ADC is obtuse, so the answer is more than 90° .

Answer: 110° (accept 108 to 112)

Tip: The middle letter tells you where the angle is: angle ADC is at D .

8 (1 mark)

In the space below, draw a straight line of length 6.4 cm.

Use a ruler and a sharp pencil.

Start at 0 and draw along the ruler to 6.4 cm (64 mm).

Mark both ends clearly.

Answer: A line 6.4 cm long (accept 6.3 to 6.5 cm)

9 (1 mark)

Use a protractor to draw an angle of 125° at P .

Use the line PQ as one arm of the angle.



Put the centre of the protractor on P , with the zero line along PQ .

Count round from the 0 on PQ and make a mark at 125° .

Join the mark to P with a ruler.

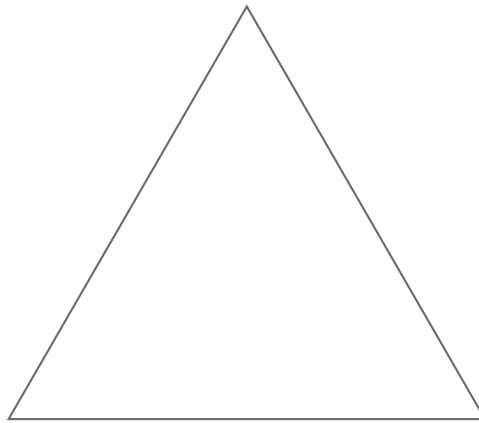
125° is obtuse, so the angle should look bigger than a right angle.

Answer: An angle of 125° at P (accept 123 to 127)

10 (3 marks)

Use a ruler for this question.

Here is an accurate drawing of an equilateral triangle.



By measuring, work out the perimeter of the triangle.

State the units of your answer.

Measure one side: 6.3 cm (63 mm).

In an equilateral triangle all three sides are equal.

Perimeter = $6.3 + 6.3 + 6.3 = 18.9$ cm

Answer: 18.9 cm (accept 18.3 to 19.5 cm, or 183 to 195 mm)

Tip: The question says “State the units”. Many students lose a mark by writing just 18.9 with no cm.

Marks: 1 mark for measuring a side as 6.3 cm (within 2 mm). 1 mark for your side $\times 3$. 1 mark for the answer with correct units.

11 (2 marks)

Here is a rectangle.



By measuring, work out the area of the rectangle.

Give your answer in cm^2

Measure the length: 6.5 cm.

Measure the width: 3.2 cm.

Area of a rectangle = length $\times$ width

$$\text{Area} = 6.5 \times 3.2 = 20.8 \text{ cm}^2$$

Answer: 20.8 cm^2 (accept 19.8 to 21.8)

Tip: Area means length $\times$ width. Don't add up the sides, as that gives the perimeter.

Marks: 1 mark for measuring both lengths (within 2 mm). 1 mark for multiplying your length by your width.

12 (2 marks)

In the space below, draw triangle ABC accurately.

$$AB = 8 \text{ cm}, \quad \text{angle } A = 40^\circ, \quad \text{angle } B = 60^\circ$$

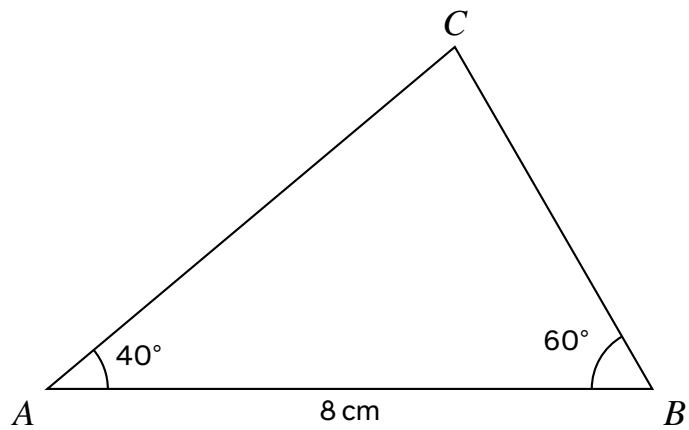
Draw the line AB , 8 cm long.

At A , use a protractor to draw a line at 40° to AB .

At B , draw a line at 60° to BA .

The two lines cross at C .

Check: AC should be about 7.0 cm and BC about 5.2 cm.



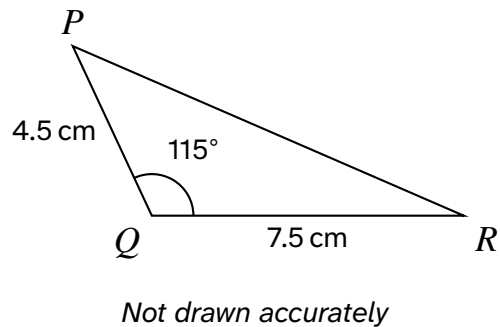
Answer: Accurate triangle

Tip: Make sure the 40° is at A and the 60° is at B . Don't draw the same angle at both ends.

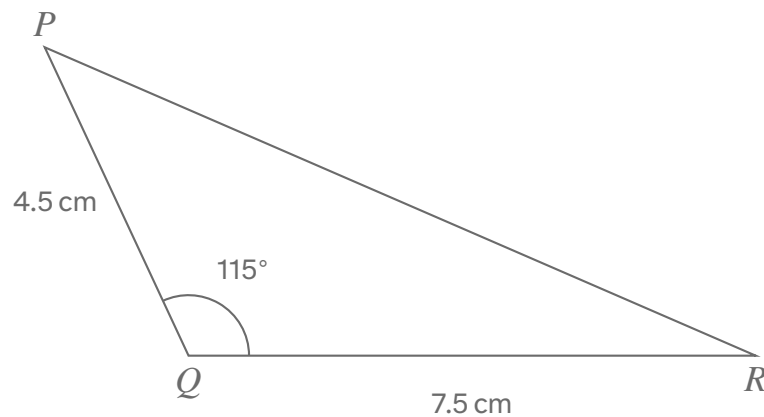
Marks: 1 mark for $AB = 8$ cm with one correct angle. 1 mark for a fully correct triangle.

13 (2 marks)

Here is a sketch of triangle PQR .



Make an accurate drawing of triangle PQR .



Put the centre of the protractor on Q , with the zero line along QR .

Count round from the 0 on QR and mark 115° . Draw a line from Q through the mark.

Measure 4.5 cm along this line from Q and mark P .

Join P to R with a ruler.

Check: PR should be about 10.3 cm.

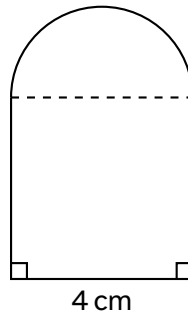
Answer: Accurate triangle

Tip: The 115° angle is obtuse, so it must open out wider than a right angle. Reading the wrong protractor scale gives 65° .

Marks: 2 marks for $PQ = 4.5$ cm (within 2 mm), angle $Q = 115^\circ$ (within 2°) and the triangle completed. 1 mark for just one of $PQ = 4.5$ cm or angle $Q = 115^\circ$ correct.

14 (2 marks)

This shape is made from a semicircle and a square.



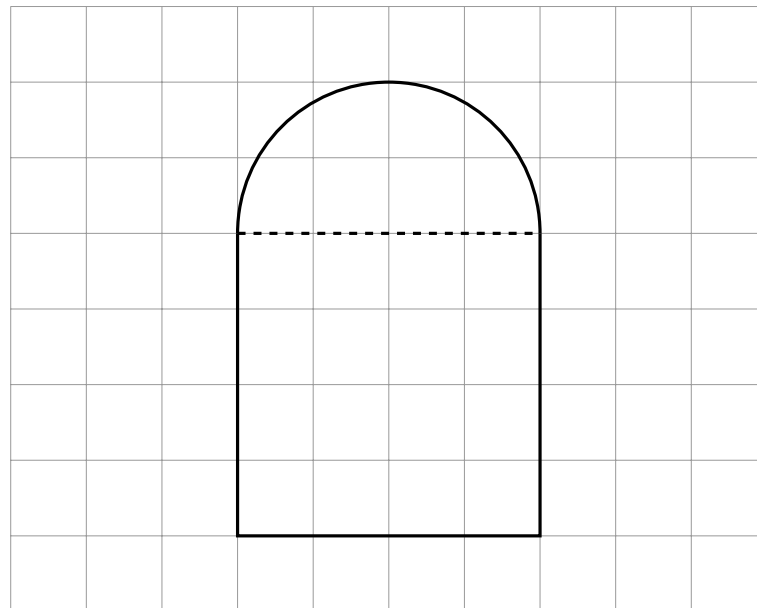
Not drawn accurately

On the centimetre grid below, make an accurate drawing of the shape.

Draw a square 4 cm by 4 cm on the grid.

The semicircle's diameter is the top side, 4 cm, so its radius is 2 cm.

Set the compasses to 2 cm and draw the half circle from the middle of the top side.



Answer: 4 cm square with a semicircle of radius 2 cm on one side

Tip: The compasses are set to the **radius** (2 cm), not the diameter (4 cm).

Marks: 1 mark for the 4 cm square. 1 mark for the semicircle of radius 2 cm.