

Measuring and Drawing Lines and Angles

Solutions

For Pearson Edexcel GCSE Mathematics (1MA1) • 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 this line.



Line up the 0 on the ruler with one end of the line.

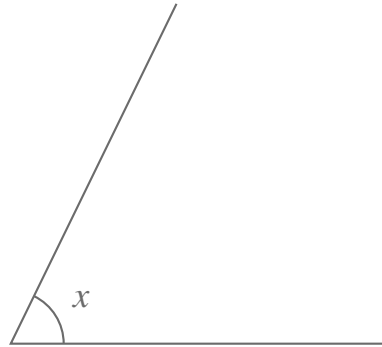
Read the ruler at the other end: 8.3 cm.

Answer: 8.3 cm (accept 8.1 to 8.5)

Tip: Start from the 0 mark, not the end of the ruler. Starting at 1 would make your answer 1 cm too big.

2 (1 mark)

Measure the size of the angle marked 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.

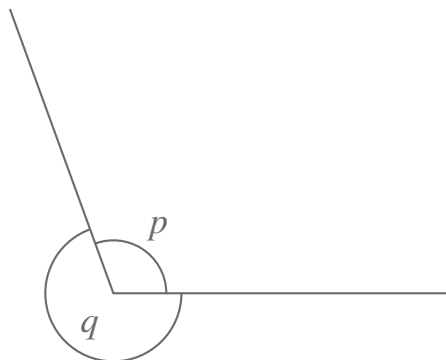
It is an acute angle, so the answer must be less than 90° .

Answer: 64° (accept 62 to 66)

Tip: A protractor has two scales. Reading the wrong one here would give 116° , which cannot be right for an acute angle.

3 (2 marks)

Here are two angles, p and q , at a point.



(a) Measure the size of angle p .

Put the centre of the protractor on the vertex, with the zero line along the bottom arm.

Angle p is obtuse, so read the scale that gives more than 90° .

$$p = 110^\circ$$

Answer: 110° (accept 108 to 112)

- (b) Use your answer to part (a) to work out the size of angle q .

Angles p and q together make a full turn.

Angles round a point add up to 360° .

$$q = 360 - 110 = 250^\circ$$

q is a reflex angle (between 180° and 360°).

Answer: 250° (or $360 -$ your answer to (a))

Tip: A protractor only goes up to 180° . To find a reflex angle, measure the angle on the other side and take it away from 360° .

4 (1 mark)

Here is a list of angles.

35° 90° 105° 178° 182° 270°

Write down all the angles in the list that are obtuse.

An obtuse angle is more than 90° and less than 180° .

90° is a right angle, so it is not obtuse.

182° and 270° are more than 180° , so they are reflex.

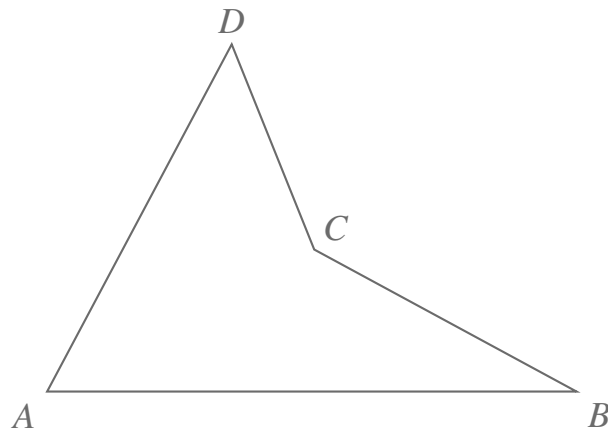
The obtuse angles are 105° and 178° .

Answer: 105° and 178°

Tip: 90° is exactly a right angle, so it is not obtuse. Anything more than 180° is reflex, not obtuse.

5 (3 marks)

Here is an accurately drawn quadrilateral $ABCD$.



- (a) Measure the distance from A to C .
Give your answer in millimetres.

Line up the 0 on the ruler with A .

Read the ruler at C : 4.0 cm.

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

Answer: 40 mm (accept 38 to 42)

- (b) Measure the size of angle BAD .

Angle BAD is the angle at A , between AB and AD .

Put the centre of the protractor on A , with the zero line along AB .

The angle is acute, so the answer is less than 90° .

Answer: 62° (accept 60 to 64)

- (c) Angle BCD , inside the quadrilateral, is a reflex angle.
Measure the size of angle BCD .

The angle inside the shape at C is more than 180° .

Measure the angle on the outside of the shape at C instead: about 140° .

Angles round a point add up to 360° .

$$360 - 140 = 220^\circ$$

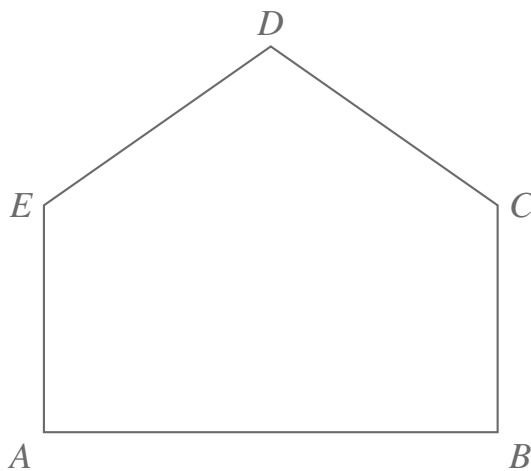
Answer: 220° (accept 218 to 222)

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

6 (4 marks)

Here is a pentagon $ABCDE$.

The pentagon is accurately drawn.



- (a) Measure the length of the side CD .

Line up the 0 on the ruler with C and read the ruler at D .

Answer: 3.7 cm (accept 3.5 to 3.9)

- (b) Measure the size of angle CDE .

Angle CDE is the angle at D , at the top of the shape.

Put the centre of the protractor on D , with the zero line along DC .

The angle is obtuse, so use the scale that gives more than 90° .

Answer: 110° (accept 108 to 112)

Tip: Before you measure, decide if the angle is acute or obtuse. Then you will know which scale to read.

- (c) By measuring, work out the perimeter of the pentagon $ABCDE$.

Perimeter is the total distance round the outside.

Measure the five sides:

$$AB = 6.0 \text{ cm}, BC = 3.0 \text{ cm}, CD = 3.7 \text{ cm}, DE = 3.7 \text{ cm}, EA = 3.0 \text{ cm}$$

$$6.0 + 3.0 + 3.7 + 3.7 + 3.0 = 19.4 \text{ cm}$$

Answer: 19.4 cm (accept 18.8 to 20.0)

Marks: 1 mark for adding your five measured sides. 1 mark for an answer in the accepted range.

7 (1 mark)

The points P and M are on the line below.

M is the midpoint of the line PQ .

Mark with a cross ($\times$) the position of Q on the line.

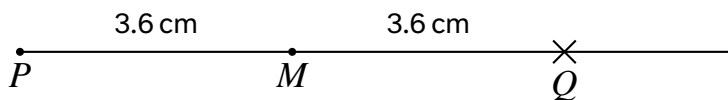


M is halfway between P and Q , so MQ is the same length as PM .

Measure PM : 3.6 cm.

Measure another 3.6 cm along the line from M , away from P .

Mark Q there: 7.2 cm from P .

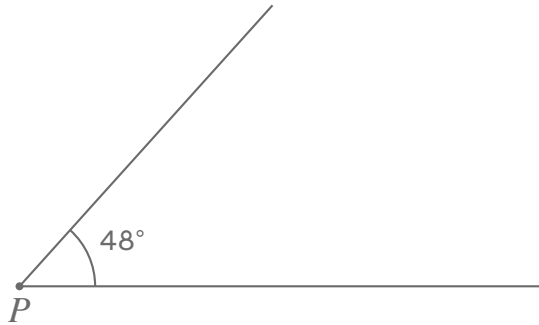


Answer: Cross 7.2 cm from P (3.6 cm beyond M)

Tip: M is the midpoint, so Q is the same distance from M as P is. Q is not at the end of the drawn line.

8 (1 mark)

Draw an angle of 48° at the point P .
Use the line as one arm of the angle.



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

Count round from the 0 on the line and mark 48° .

Join the mark to P with a ruler.

48° is acute, so the angle should look smaller than a right angle.

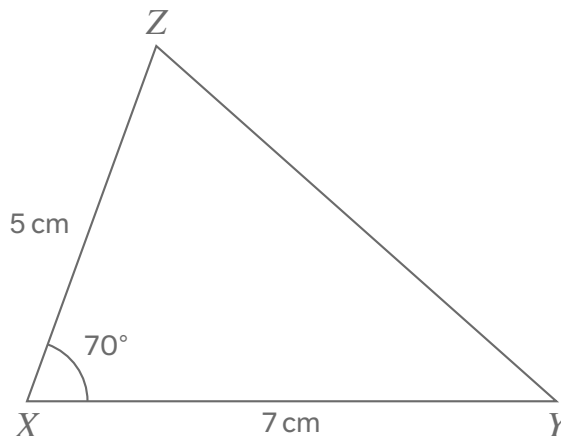
Answer: An angle of 48° (accept 46 to 50)

9 (2 marks)

In the space below, make an accurate drawing of triangle XYZ .

$XY = 7\text{ cm}$, $XZ = 5\text{ cm}$, angle $YXZ = 70^\circ$

The side XY has been drawn for you.



Angle YXZ is the angle at X , between XY and XZ .

Put the protractor on X , with the zero line along XY , and mark 70° .

Draw a line from X through the mark.

Measure 5 cm along this line from X and mark Z .

Join Z to Y .

Check: YZ should be about 7.0 cm .

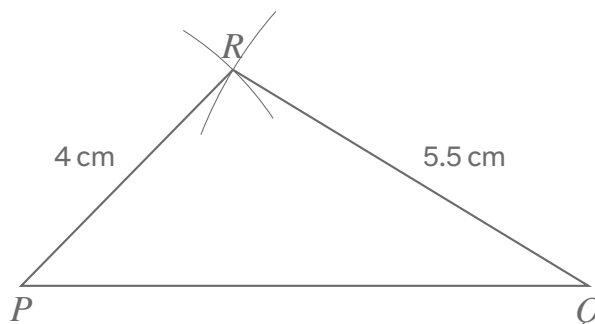
Answer: Accurate triangle

Tip: The middle letter of angle YXZ tells you where the angle is: at X .

Marks: 1 mark for the 70° angle at X or for $XZ = 5\text{ cm}$. 1 mark for a fully correct triangle.

10 (2 marks)

Make an accurate drawing of triangle PQR , where $PQ = 7.5$ cm, $PR = 4$ cm and $QR = 5.5$ cm.



Open the compasses to 4 cm. Put the point on P and draw an arc above the line.

Open the compasses to 5.5 cm. Put the point on Q and draw an arc to cross the first arc.

The arcs cross at R .

Join R to P and to Q with a ruler.

Answer: Accurate triangle with $PR = 4$ cm and $QR = 5.5$ cm

Tip: Put the 4 cm arc at P and the 5.5 cm arc at Q , not the other way round. Leave your arcs showing.

Marks: 1 mark for one correct arc (or side) from P or Q (within 2 mm). 1 mark for the correct triangle.

11 (3 marks)

The accurately drawn map shows a campsite C , a lake L and a viewpoint V . Scale: 1 cm represents 0.5 km.

- (a) Work out the real distance from the campsite to the lake.
Give your answer in kilometres.

Measure CL on the map: 3.0 cm.

1 cm represents 0.5 km.

$$3.0 \times 0.5 = 1.5 \text{ km}$$

Answer: 1.5 km (accept 1.45 to 1.55)

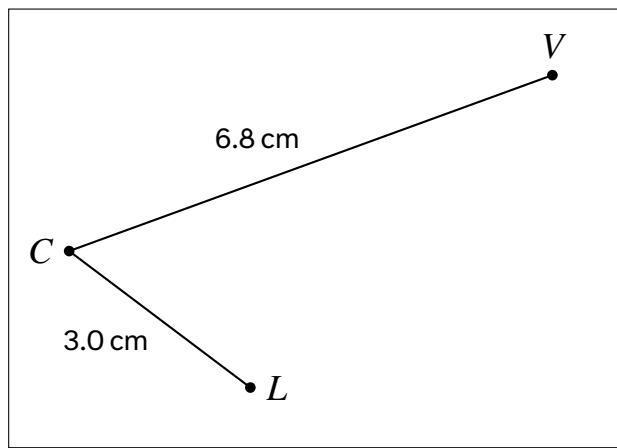
(b) Priti says,

‘The viewpoint is more than twice as far from the campsite as the lake is.’

Is Priti correct?

You must show how you get your answer.

Measure CV on the map: 6.8 cm.



Scale: 1 cm represents 0.5 km

Real distance: $6.8 \times 0.5 = 3.4 \text{ km}$.

Twice the distance to the lake: $2 \times 1.5 = 3.0 \text{ km}$.

3.4 km is more than 3.0 km.

Answer: Yes: $CV = 3.4 \text{ km}$, which is more than $2 \times 1.5 = 3.0 \text{ km}$

Tip: You can compare on the map (6.8 cm and $2 \times 3.0 = 6.0 \text{ cm}$) or in real distances. Either way, show your numbers.

Marks: 1 mark for $CV = 6.8 \text{ cm}$ or 3.4 km (or CV compared with $2 \times CL$ on the map). 1 mark for Yes with correct figures.