

GCSE Maths: Ruler and compass constructions (Higher): answers

GCSE Maths - Loci, Bearings and Vectors - Higher - Lesson 22.2

Answers. Final answers to the worksheet questions. Full step-by-step solutions for every question are free at websink.site/gcse/maths/ch22-constructions-loci-bearings-vectors/higher/ruler-and-compass-constructions/

Exercise 22C Constructions: method and accuracy Non-calculator

1 Put the steps in the correct order. Write the letters.

(a) Constructing the perpendicular bisector of AB:

- A** Keep the same radius, put the point on B and draw arcs that cross the first two.
- B** Draw the line AB with a ruler.
- C** Join the two crossing points with a ruler.
- D** Open the compasses to more than half the length of AB.
- E** Put the compass point on A and draw an arc above and below AB.

Answer: B, D, E, A, C

(b) Bisecting an angle:

- A** Keep the same radius and draw an arc from the second crossing so that the arcs cross.
- B** Put the compass point on the corner O and draw an arc that crosses both arms.
- C** Draw a straight line from O through the point where the arcs cross.
- D** Put the point on the first crossing and draw an arc inside the angle.

Answer: B, D, A, C

2 Draw a line AB that is 8 cm long. Construct the perpendicular bisector of AB. Mark the midpoint M. What is the length AM?

Answer: AM = 4 cm

3 Construct the bisector of each angle. State the size of each of the two equal angles.

(a) An angle of 50°

Answer: 25°

(b) An angle of 80°

Answer: 40°

(c) An angle of 120°

Answer: 60°

(d) An angle of 140°

Answer: 70°

4 Describe how to construct each angle using only a ruler and compasses. What does the angle measure when you check it with a protractor?

(a) An angle of 60°

Answer: 60° constructed (Construct 60° with the arc method)

(b) An angle of 120°

Answer: 120° constructed (Construct 60° twice)

- (c) An angle of 45°

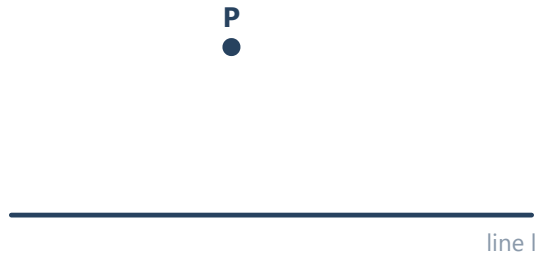
Answer: 45° constructed (Construct 90° , then bisect it)

- (d) An angle of 90°

Answer: 90° constructed (Construct a perpendicular at A)

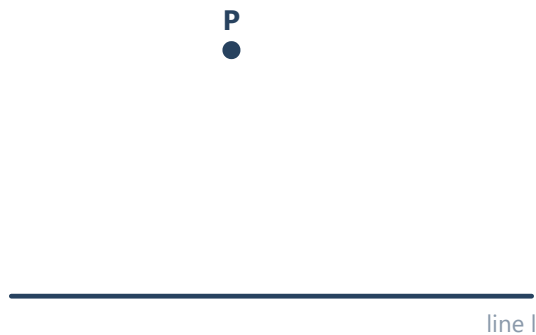
- 5 Each diagram is drawn actual size. Construct the perpendicular from P to the line, then measure the shortest distance from P to the line.

(a)



Answer: 2.8 cm

(b)



Answer: 4.1 cm

- 6 Aisha rubs out her construction arcs after she has drawn a perpendicular bisector. She says: "The line is right, so the arcs are not needed." Explain why she should leave the arcs on her work.

Answer: The arcs show the method; marks are awarded for them.

- 7 A is the point (1, 3) and B is the point (5, 1). Find the point on the x-axis that is the same distance from A and from B. You can find it by constructing the perpendicular bisector of AB on a grid, or by algebra.

Answer: (2, 0)

- 8 A straight path runs along a line. A point P is on the path. Construct the perpendicular to the path at P. Q is the point on this perpendicular that is 4 cm from P. The point A is on the path 3 cm from P. Work out the distance AQ.

Answer: 5 cm

- 9 Explain why the perpendicular distance from a point P to a line is shorter than the distance from P to any other point on the line. Use P that is 3 cm from the line and a point X on the line that is 4 cm along from the foot of the perpendicular.

Answer: $PX = 5$ cm, which is more than 3 cm.

- 10 Challenge.** A triangle has sides of 3 cm, 4 cm and 5 cm. The bisectors of its three angles meet at one point I. The distance from I to each side of the triangle is the same, r . Work out r . (Use $\text{area} = r \times s$, where s is half of the perimeter.)

Answer: 1 cm