KS3.M-G6 Measuring, Drawing and Constructing

AQA KS3.M-G6 · Calculators not allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Use a protractor to measure the acute angle shown. Give your answer to the nearest degree.

> ***Figure (to be drawn):*** *A diagram shows two rays meeting at a point with the smaller angle labelled with a thin arc; the angle measures 35 degrees.*

(1)

---

2 Write down the name of a 3-sided polygon and state how many degrees the interior angles add to.

(1)

---

3 Use a ruler and protractor to draw triangle ABC where AB = 6 cm, angle A = 50 degrees and angle B = 60 degrees. Work out the size of angle C.

(2)

---

4 Construct the perpendicular bisector of a line segment PQ of length 8 cm. State the length of the two equal parts of PQ after construction.

(2)

5 On a centimetre grid, draw a line of length 7.5 cm and then draw its perpendicular through the midpoint. What are the coordinates of the midpoint if the line has endpoints at (2, 3) and (9.5, 3)?

(2)

---

6 Triangle DEF has sides DE = 5 cm, EF = 6 cm and DF = 7 cm. Use compasses and ruler to construct triangle DEF. Explain why the construction is possible from these three lengths.

(3)

---

7 Angle XOY is 140 degrees. Construct the angle bisector of angle XOY. What is the size of each angle made by the bisector with the sides OX and OY?

(3)

---

8 A student draws triangle GHI with GH = 8 cm and HI = 6 cm. They mark the perpendicular from H to GI and it meets GI at J. If angle H is 90 degrees, calculate the length of GJ when GJ + JI = GI and GI = 10 cm.

(3)

9 A circle has centre O and radius 4 cm. Construct the chord AB with length 6 cm. Work out the distance from O to the chord AB.

(3)

---

10 Construct triangle JKL given JL = 7 cm, angle J = 45 degrees and angle L = 55 degrees. Work out the size of angle K.

(a) Construct the triangle using ruler and protractor. **(2)**

(b) Work out the size of angle K. **(2)**

---

11 Draw a right-angled triangle ABC with AB = 9 cm and angle B = 90 degrees. Work out the height from B to the hypotenuse AC (the side opposite the right angle), given that AC = 15 cm.

(4)

---

12 A student constructs the perpendicular bisector of segment MN. The endpoints are M(1, 2) and N(9, 6). Find the equation of the perpendicular bisector in the form y = mx + c.

(4)

13 Using compasses, construct an equilateral triangle PQR with side length 6 cm. Measure the angle at P and give the value.

(4)

---

14 Stretch question. A quadrilateral has vertices A, B, C, D on a circle with centre O. AB is a diameter of the circle and AC is a chord. Prove that angle ADB is a right angle. You may give a brief geometric argument.

(4)

Mark scheme · KS3.M-G6 Measuring, Drawing and Constructing

Question 1

- **B1** 35 degrees cao
- Answer: **35 degrees**

Question 2

- **B1** Triangle; interior angles add to 180 degrees cao
- Answer: **Triangle; 180 degrees**

Question 3

- **M1** uses angle sum of triangle: 50 + 60 + C = 180 or equivalent
- **A1** C = 70 degrees cao
- Answer: **70 degrees**

Question 4

- **M1** correct construction method indicated: arcs from P and Q with same radius, join intersections to get perpendicular bisector
- **A1** each part is 4 cm cao
- Answer: **4 cm and 4 cm**

Question 5

- **M1** uses midpoint formula or average of x and y coordinates: ((2 + 9.5)/2 , (3 + 3)/2)
- **A1** (5.75, 3) cao
- Answer: **(5.75, 3)**

Question 6

- **M1** correct construction method: draw one side, then arcs of given radii from endpoints to locate third point
- **M1** identifies triangle inequality check or equivalent method: largest side 7 < 5 + 6 = 11
- **A1** valid explanation that since 7 < 5 + 6 the triangle inequality holds so the lengths make a triangle cao
- Answer: **Construction shown; because 7 < 5 + 6 the triangle inequality holds so the lengths make a triangle**

Question 7

- **M1** correct construction method for bisector using arcs from O and intersection points
- **M1** states each part is 70 degrees via 140/2 or equivalent
- **A1** each angle is 70 degrees cao
- Answer: **70 degrees and 70 degrees**

Question 8

- **M1** uses GI = 10 and notes GJ + JI = 10 and right triangle properties
- **M1** uses Pythagoras in either triangle GHI or decomposition: $GH^2 = (GJ)^2 + (HJ)^2$ and $HI^2 = (JI)^2 + (HJ)^2$ to eliminate HJ
- **A1** GJ = 6.4 cm cao (to 1 decimal place) ft from working
- Answer: **6.4 cm**

Question 9

- **M1** recognises perpendicular from centre bisects chord so half chord = 3 cm and uses right triangle with hypotenuse 4 and one side 3
- **M1** uses Pythagoras to find distance: $d^2 + 3^2 = 4^2$
- **A1** $d = \sqrt{7}$ cm approximately 2.65 cm cao
- Answer: **$\sqrt{7}$ cm**

Question 10

- (a) **M1** correct construction approach: draw JL = 7 cm then construct angles 45 degrees at J and 55 degrees at L and join intersection to make K
- (a) **A1** triangle constructed with correct vertices and sides visible
- (b) **M1** uses angle sum: 45 + 55 + K = 180 or equivalent
- (b) **A1** K = 80 degrees cao
- (b) Answer: **80 degrees**

Question 11

- **M1** recognises relation between sides and right angle and uses area or similar triangles approach: height h satisfies (1/2)*AC*h = (1/2)*AB*BC or uses Pythagoras to find BC first
- **M1** finds the other leg BC using Pythagoras: $BC^2 = AC^2 - AB^2 = 15^2 - 9^2 = 144$, so BC = 12 cm
- **A1** sets up (1/2)*15*h = (1/2)*9*12 = 54
- **A1** correct final answer h = 108/15 = 7.2 cm cao
- Answer: **7.2 cm**

Question 12

- **M1** finds midpoint: ((1+9)/2, (2+6)/2) = (5, 4)
- **M1** finds gradient of MN: (6-2)/(9-1) = 4/8 = 1/2 and uses negative reciprocal for perpendicular gradient -2
- **A1** substitutes midpoint to get c: 4 = -2*5 + c so c = 14
- **A1** gives final equation y = -2x + 14 cao
- Answer: **y = -2x + 14**

Question 13

- **M1** correct construction method: draw side PQ = 6 cm, then arcs radius 6 from P and Q to find R
- **M1** recognises equilateral triangle has equal angles or measures angle
- **A1** angle at P = 60 degrees cao
- **A1** supports answer by noting interior angles sum to 180 and are equal so 180/3 = 60
- Answer: **60 degrees**

Question 14

- **M1** states theorem: angle in a semicircle is a right angle or uses that AB is diameter so any angle subtended by AB is 90 degrees
- **M1** applies theorem to triangle ADB where A and B are endpoints of diameter and D lies on circle so angle ADB is subtended by diameter
- **A1** concludes angle ADB = 90 degrees
- **A1** gives brief justification or diagram reference linking diameter to right angle
- Answer: **Angle ADB = 90 degrees**