EP.M117 Angles on Lines, at Points and in Triangles

Total Marks

GL ASSESSMENT GL-11PLUS-MATHS · Calculators not allowed · about 55 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A straight line contains two adjacent angles. One angle measures 65 degrees and the other is x degrees. What is x?

- ☐ A) 65
- ☐ B) 115
- ☐ C) 125
- ☐ D) 55
- ☐ E) 180

(Total for Question 1 is 1 mark)

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2 Four angles around a point are 140 degrees, 85 degrees, 45 degrees and x degrees. Calculate x.

- ☐ A) 75
- ☐ B) 80
- ☐ C) 85
- ☐ D) 90
- ☐ E) 95

(Total for Question 2 is 1 mark)

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3 In triangle ABC the angles at A and B are 50 degrees and 60 degrees. Work out the angle at C.

- ☐ A) 60
- ☐ B) 70
- ☐ C) 80
- ☐ D) 90
- ☐ E) 50

(Total for Question 3 is 1 mark)

4 The three angles of a triangle are 3x, 2x and x degrees.

Calculate x and find the size of each angle.

(Total for Question 4 is 2 marks)

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5 Triangle PQR is isosceles with PQ = PR. Angle Q measures 48 degrees.

Find angle P.

(Total for Question 5 is 2 marks)

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6 Three adjacent angles on a straight line are 2x, 3x and 4x.

(a) Find x. **(2)**

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(b) Find each angle. **(2)**

.....

(Total for Question 6 is 4 marks)

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7 In triangle ABC angle B = 40 degrees. The exterior angle at C (formed by extending BC) measures 110 degrees.

Find angle A.

(Total for Question 7 is 2 marks)

8 An isosceles triangle has its apex angle equal to 36 degrees. What is the size of each base angle?

- ☐ A) 72
- ☐ B) 82
- ☐ C) 54
- ☐ D) 144
- ☐ E) 36

(Total for Question 8 is 1 mark)

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9 At vertex B of triangle ABC the exterior angle (outside the triangle) measures 120 degrees. Inside the triangle angle C measures 30 degrees.

Calculate angle A.

(Total for Question 9 is 2 marks)

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10 Triangle ABC has AB = AC. Angle B = 58 degrees.

Give the size of angle C and state a reason for your answer.

(Total for Question 10 is 2 marks)

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11 Five angles around a point are x degrees, 2x degrees, 3x degrees, 40 degrees and 20 degrees.

(a) Find x. **(2)**

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(b) Find each angle in degrees. **(2)**

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(Total for Question 11 is 4 marks)

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12 Give a brief reason why the three interior angles of any triangle add up to 180 degrees.

(Total for Question 12 is 1 mark)

13 Triangle DEF is isosceles with DE = DF. The base angles are (x + 15) degrees and (2x - 5) degrees.

(a) Find x. **(2)**

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(b) Find the three angles. **(1)**

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(Total for Question 13 is 3 marks)

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14 Triangle ABC is isosceles with AB = AC. The exterior angle at B (outside the triangle) measures 110 degrees.

Find the three interior angles of the triangle.

(Total for Question 14 is 3 marks)

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15 In a right-angled triangle one acute angle is 45 degrees. What is the other acute angle?

- ☐ A) 35
- ☐ B) 45
- ☐ C) 55
- ☐ D) 90
- ☐ E) 135

(Total for Question 15 is 1 mark)

Mark scheme · EP.M117 Angles on Lines, at Points and in Triangles

Question 1

- **B1** correct option B (115) cao
- **Answer: B) 115 degrees, because 65 + 115 = 180 (straight line). (Answer: 115 degrees.)**

Question 2

- **B1** correct option D (90) cao
- **Answer: D) 90 degrees (360 - (140 + 85 + 45) = 90).**

Question 3

- **B1** correct option B (70) cao
- **Answer: B) 70 degrees (180 - 50 - 60 = 70).**

Question 4

- **M1** form correct equation 3x + 2x + x = 180 or 6x = 180 seen
- **A1** x = 30 and angles 90, 60, 30 cao
- **Answer: x = 30. The angles are 3x = 90 degrees, 2x = 60 degrees, x = 30 degrees.**

Question 5

- **M1** state that base angles at Q and R are equal (or identify two angles are 48) or set up 48 + 48 + P = 180
- **A1** P = 84 degrees cao
- **Answer: 84 degrees (180 - 48 - 48 = 84).**

Question 6

- (a) **M1** form equation 2x + 3x + 4x = 180 or 9x = 180
- (a) **A1** x = 20 cao
- **(a) Answer: x = 20**
- (b) **M1** substitute x = 20 into 2x, 3x, 4x seen or equivalent
- (b) **A1** angles 40, 60 and 80 degrees cao
- **(b) Answer: 2x = 40, 3x = 60, 4x = 80**

Question 7

- **M1** use exterior angle = sum of opposite interior angles (A + B = exterior) or state A = exterior - B
- **A1** A = 70 degrees cao
- **Answer: 70 degrees (A = 110 - 40).**

Question 8

- **B1** correct option A (72) cao
- **Answer: A) 72 degrees ((180 - 36)/2 = 72).**

Question 9

- **M1** use exterior angle = sum of opposite interior angles so A = exterior - C
- **A1** A = 90 degrees cao
- **Answer: 90 degrees (A = 120 - 30).**

Question 10

- **B1** Angle C = 58 degrees cao
- **B1** reason: angles opposite equal sides are equal (or 'base angles are equal')
- **Answer: Angle C = 58 degrees. Reason: angles opposite equal sides are equal (base angles equal in an isosceles triangle).**

Question 11

- (a) **M1** form equation x + 2x + 3x + 40 + 20 = 360 or 6x + 60 = 360
- (a) **A1** x = 50 cao
- **(a) Answer: x = 50**
- (b) **M1** substitute x = 50 into expressions or list values
- (b) **A1** angles 50, 100, 150, 40 and 20 degrees cao
- **(b) Answer: Angles are 50, 100, 150, 40 and 20 degrees.**

Question 12

- **B1** reference to drawing a parallel through a vertex and using alternate interior angles to show sum 180, or statement 'straight line = 180 and alternate interior angles show two angles add to a straight line' oe
- **Answer: Because if a line is drawn through one vertex parallel to the opposite side the two alternate interior angles plus the vertex angle make a straight line (180 degrees).**

Question 13

- (a) **M1** use equality of base angles: x + 15 = 2x - 5 or equivalent
- (a) **A1** x = 20 cao
- **(a) Answer: x = 20**
- (b) **A1** angles 35, 35 and 110 degrees cao
- **(b) Answer: Base angles are 35 degrees and 35 degrees, vertex angle = 110 degrees.**

Question 14

- **M1** use exterior angle = sum of opposite interior angles and set up equations (let base angle = b, vertex = v and use v + b = 110 and v + 2b = 180 or equivalent)
- **M1** solve to find b = 70 and v = 40 (or show correct substitution)
- **A1** angles 40, 70, 70 degrees cao
- **Answer: Angles are 40 degrees (vertex), 70 degrees and 70 degrees (base angles).**

Question 15

- **B1** correct option B (45) cao
- **Answer: B) 45 degrees (90 - 45 = 45).**