Test answers - Angles, polygons and properties of shapes

Year: Year 10 · Duration: 45 minutes · /20

Answer to Question 1 (4 marks)

a. $180 - 63 - 57 =$ **60°** (1 for method, 1 for the answer with the reason: angles in a triangle add up to 180°)
b. $180 - 60 =$ **120°** (1), angles on a straight line add up to 180°, or the exterior angle equals $63 + 57 = 120$ (1). So angle $QRS = 120^\circ$.

In (a), the final mark needs the reason written in words, not just the number. Check (b): the exterior angle of a triangle equals the sum of the two interior opposite angles, $63^\circ + 57^\circ = 120^\circ$, which agrees with $180^\circ - 60^\circ$. Both methods are accepted.

Answer to Question 2 (4 marks)

a. Exterior $= 360 \div 20 = 18^\circ$ (1); interior $= 180 - 18 =$ **162°** (1) The exterior angles of a polygon add up to 360°, and each interior angle is 180° minus the exterior angle. The interior angle is 162°.
b. $360 \div 18 =$ **20** sides (1) Divide 360 by the exterior angle to get the number of sides: the polygon has 20 sides.
c. $(7 - 2) \times 180 =$ **900°** (1) A heptagon has 7 sides and splits into 5 triangles, so the angle sum is $5 \times 180 = 900^\circ$.

Answer to Question 3 (4 marks)

a. $x + 2x + 10 + 3x - 20 + 4x = 10x - 10$ (1) and the sum of the angles of a quadrilateral is 360 (1), so $10x - 10 = 360$. Collect the x terms: $x + 2x + 3x + 4x = 10x$, and the numbers: $10 - 20 = -10$.
b. $10x = 370$, $x = 37$ (1). Largest angle $= 4x =$ **148°** (1). (The angles are 37, 84, 91, 148.) Add 10 to both sides, then divide by 10. Check: $37 + 84 + 91 + 148 = 360$. The largest angle is 148°.

In (a), the sum must be stated as 360° for the second mark. A quick check of (b) is that each angle is positive and less than 180°, which is possible for a quadrilateral.

Answer to Question 4 (4 marks)

a. $72 + 180 =$ **252°** (1) A back bearing differs from the bearing by 180°, so the bearing of P from Q is 252°.
b. $252 - 144 =$ **108°** (1) At Q the direction to P is 252° and the direction to R is 144°.

The difference between them is angle $PQR = 108°$.

c. Triangle PQR is isosceles, so $QPR = (180 - 108) \div 2 = 36°$ (1). Bearing of R from P $= 72 + 36 =$ **108°** (1). Since PQ = QR, the base angles at P and R are equal. Add angle QPR to the bearing of Q from P. The bearing of R from P is $108°$.

Answer to Question 5 (4 marks)

a. $AOC = 2 \times 64 =$ **128°** (1), the angle at the centre is twice the angle at the circumference (1)

b. $(180 - 128) \div 2 =$ **26°** (1) The radii OA and OC are equal, so the two base angles are equal and each is $26°$.

c. $90 - 26 =$ **64°** (1), because the tangent is perpendicular to the radius OA (this also agrees with the alternate segment theorem, $TAC = ABC = 64°$). So angle $TAC = 64°$.