2.12-4 Geometry and Shape: Practice Set 4: 30-minute Pack

GL ASSESSMENT GL · Calculators not allowed · about 30 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 State how many sides each polygon has.

(a) A heptagon. **(1)**

(b) A nonagon. **(1)**

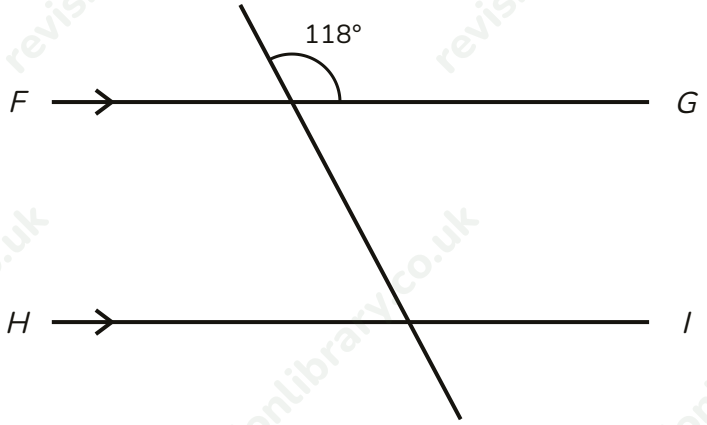
(c) A hendecagon (also called an undecagon). **(1)**

(d) A dodecagon. **(1)**

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2 Two parallel lines FG and HI are cut by a straight line. One of the angles formed, where the straight line crosses FG, is 118 degrees.

Diagram NOT accurately drawn



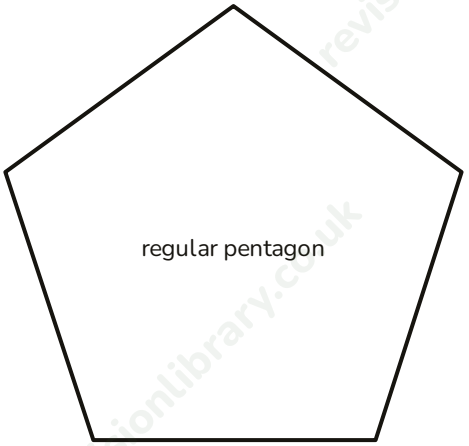
(a) State the size of the angle vertically opposite the 118 degree angle, giving a reason. **(2)**

(b) Calculate the size of the angle next to the 118 degree angle on the same straight line, giving a reason. **(2)**

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3 A regular pentagon has five equal sides and five equal angles.

Diagram NOT accurately drawn



(not to scale)

(a) Calculate the size of one exterior angle of the pentagon. **(2)**

.....

(b) Hence calculate the size of one interior angle of the pentagon. **(2)**

.....

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4 Calculate the sum of the interior angles of a polygon with 13 sides.

(2)

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5 The exterior angles of a pentagon are x degrees, 58 degrees, 71 degrees, 84 degrees and 65 degrees. The exterior angles of any convex polygon sum to 360 degrees. Calculate the value of x.

(2)

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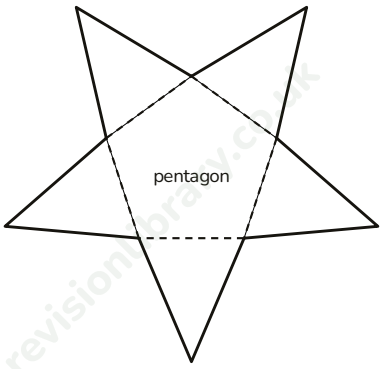
6 Rectangle A measures 4 cm by 6 cm. Rectangle B is similar to rectangle A and has a shorter side of 10 cm. Calculate the length of the longer side of rectangle B.

(3)

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7 The diagram shows a net made from a regular pentagon in the centre, with five identical isosceles triangles attached, one to each side of the pentagon. Which 3D solid does this net fold up to make?

Diagram NOT accurately drawn



(not to scale)

- ☐ A) Pentagonal prism
- ☐ B) Pentagonal pyramid
- ☐ C) Hexagonal pyramid
- ☐ D) Cone

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8 Euler's formula for solids states that F + V - E = 2, where F is the number of faces, V is the number of vertices and E is the number of edges.

(a) A regular octahedron has 8 faces and 6 vertices. Use Euler's formula (F + V - E = 2) to calculate the number of edges it must have. **(2)**

.....

(b) A different solid has 9 faces and 16 edges. Calculate the number of vertices it must have. **(2)**

.....

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9 A 3D shape has exactly one curved face, no edges and no vertices. What is this shape?

- ☐ A) Cone
- ☐ B) Cylinder
- ☐ C) Sphere
- ☐ D) Hemisphere

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10 A point W has coordinates (-6, -1). In which quadrant of the coordinate grid does W lie?

(1)

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11 Identify the quadrilateral described in each statement.

(a) A quadrilateral with exactly one pair of parallel sides, where the two non-parallel sides are equal in length. **(1)**

(b) A quadrilateral with four right angles and two pairs of equal opposite sides, but where not all four sides are equal. **(1)**

(c) A quadrilateral with two pairs of adjacent equal sides, exactly one pair of equal opposite angles, and diagonals that cross at right angles. **(1)**

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12 Explain, using a calculation, why a regular pentagon cannot tessellate (tile a flat surface with no gaps or overlaps) on its own.

(3)

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Mark scheme · 2.12-4 Geometry and Shape: Practice Set 4: 30-minute Pack

A correct answer earns full marks unless the question asks for working, a method, proof or explanation.

Question 1

(a) 7 cao **B1**

(a) Answer: 7 sides

(b) 9 cao **B1**

(b) Answer: 9 sides

(c) 11 cao **B1**

(c) Answer: 11 sides

(d) 12 cao **B1**

(d) Answer: 12 sides

Question 2

(a) 118 degrees cao **B1**

(a) reason: vertically opposite angles are equal **B1**

(a) Answer: 118 degrees, because vertically opposite angles are equal

(b) 180 - 118 seen (angles on a straight line sum to 180 degrees) **M1**

(b) 62 degrees cao **A1**

(b) Answer: 62 degrees, because angles on a straight line sum to 180 degrees

Question 3

(a) 360 / 5 seen **M1**

(a) 72 degrees cao **A1**

(a) Answer: 72 degrees

(b) 180 - their (a) seen (ft) **M1**

(b) 108 degrees cao (ft) **A1**

(b) Answer: 108 degrees

Question 4

(13 - 2) x 180 seen **M1**

1980 degrees cao **A1**

Answer: 1980 degrees

Question 5

360 - 58 - 71 - 84 - 65 seen **M1**

82 degrees cao **A1**

Answer: x = 82 degrees

Question 6

10 / 4 seen (scale factor) **M1**

2.5 cao **A1**

15 cm cao (ft) **A1**

Answer: 15 cm

Question 7

B cao **B1**

Answer: B) Pentagonal pyramid

Question 8

(a) E = F + V - 2 seen, i.e. 8 + 6 - 2 **M1**

(a) 12 cao **A1**

(a) Answer: 12 edges

(b) V = 2 - F + E seen, i.e. 2 - 9 + 16 **M1**

(b) 9 cao **A1**

(b) Answer: 9 vertices

Question 9

C cao **B1**

Answer: C) Sphere

Question 10

third quadrant cao **B1**

Answer: third quadrant

Question 11

(a) isosceles trapezium cao (accept trapezium) **B1**

(a) Answer: isosceles trapezium

(b) rectangle cao **B1**

(b) Answer: rectangle

(c) kite cao **B1**

(c) Answer: kite

Question 12

108 degrees seen (interior angle of a regular pentagon, from (5 - 2) x 180 / 5) **M1**

360 / 108 = 3.33... (or 3 1/3) seen **M1**

correct conclusion: since 360 / 108 is not a whole number, a whole number of pentagons cannot fit exactly around a point, so regular pentagons cannot tessellate on their own **A1**

Answer: 360 / 108 = 3.33..., which is not a whole number, so regular pentagons cannot tessellate on their own

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