GCSE Foundation Mathematics
Practice Test 8: Geometry and Measures

Instructions:
Answer all questions. Show your working clearly.
Calculators may be used unless stated otherwise.
Time allowed: 90 minutes

Section A: Angles

1. Classify these angles as acute, obtuse, or reflex:
   (a) 82°
   (b) 138°
   (c) 317°
   (d) 47°
   (e) 256°
   (f) 91°
2. Find the missing angles:
   (a) Two angles on a straight line are 143° and x°. Find x.
   (b) Three angles around a point are 158°, 97°, and y°. Find y.
   (c) Two angles are vertically opposite. One angle is 128°. Find the other angle.
3. In a triangle, two angles are 47° and 68°. Find the third angle.
4. The angles in a triangle are in the ratio $2 : 5 : 11$. Find the size of each angle.
5. Find the missing angles in these triangles:
   (a) An isosceles triangle with base angles of x° and vertex angle of 68°
   (b) An equilateral triangle (all angles equal)
   (c) A right-angled triangle with one angle of 31°

Section B: Polygons and Angle Rules

6. Find the sum of interior angles for:
   (a) A hexagon (6 sides)
   (b) A decagon (10 sides)
   (c) A 14-sided polygon
   (d) A 25-sided polygon

7. Find the size of each interior angle in:
   (a) A regular hexagon
   (b) A regular decagon
   (c) A regular 14-sided polygon
   (d) A regular 25-sided polygon
8. Find the size of each exterior angle in:
   (a) A regular hexagon
   (b) A regular decagon
   (c) A regular 14-sided polygon
   (d) A regular 25-sided polygon
9. A regular polygon has an exterior angle of 30°. How many sides does it have?
10. In a quadrilateral, three angles are 79°, 102°, and 96°. Find the fourth angle.
11. A regular polygon has an interior angle of 168°. Find:
    (a) The exterior angle
    (b) The number of sides

Section C: Properties of Shapes

12. State the properties of these quadrilaterals:
    (a) Rectangle (sides, angles)
    (b) Parallelogram (sides, angles, diagonals)
    (c) Trapezium (sides, angles)
    (d) Square (sides, angles, diagonals)
13. How many lines of symmetry do these shapes have?
    (a) Regular pentagon
    (b) Rectangle
    (c) Regular nonagon
    (d) Parallelogram
    (e) Equilateral triangle
    (f) Circle
14. What is the order of rotational symmetry for:
    (a) Regular pentagon
    (b) Regular nonagon
    (c) Rectangle
    (d) Equilateral triangle
15. Name these 3D shapes:
    (a) 1 pentagonal base and 5 triangular faces
    (b) 2 circular faces and 1 curved surface joining them
    (c) 6 square faces forming a cube

(d) 1 circular base and 1 curved surface to a point

(e) 8 triangular faces meeting at 6 vertices

16. How many faces, edges, and vertices do these shapes have?

(a) Pentagonal prism

(b) Heptagonal pyramid

(c) Tetrahedron (4 triangular faces)

(d) Triangular prism

Section D: Transformations

17. Describe the transformation that maps:

(a) Shape A to Shape B (enlargement scale factor $\frac{2}{5}$, centre origin)

(b) Shape B to Shape C (rotation 120° clockwise about origin)

(c) Shape C to Shape D (reflection in line $x = 3$)

(d) Shape D to Shape E (translation 9 units left, 7 units down)

18. A point P(16, 21) is transformed. Find the image coordinates after:

(a) Reflection in the x-axis

(b) Reflection in the y-axis

(c) Reflection in the line $y = x$

(d) Translation by vector $\begin{pmatrix} -9 \\ 6 \end{pmatrix}$

19. An octagon has vertices at A(8, 16), B(16, 16), C(20, 8), D(16, 0), E(8, 0), F(4, 8), G(8, 12), and H(12, 12). Find the coordinates after:

(a) Rotation 180° about the origin

(b) Enlargement scale factor $\frac{3}{4}$, centre origin

(c) Translation by vector $\begin{pmatrix} -6 \\ 8 \end{pmatrix}$

20. A shape is enlarged by scale factor $\frac{3}{4}$. If the original area is 144 cm^2, what is the new area?

21. Shape A is enlarged to Shape B with scale factor $\frac{4}{9}$. If Shape A has a perimeter of 108 cm, what is the perimeter of Shape B?

Section E: Perimeter and Area

22. Calculate the perimeter of these shapes:

(a) Rectangle: length 34 cm, width 19 cm

(b) Square: side length 26 cm

(c) Triangle: sides 22 cm, 24 cm, 28 cm

(d) Regular pentagon: side length 11 cm

23. Calculate the area of these shapes:

(a) Rectangle: length 37 cm, width 21 cm

(b) Square: side length 27 cm

(c) Triangle: base 36 cm, height 17 cm

(d) Parallelogram: base 26 cm, height 14 cm

24. Calculate the area and circumference of circles with:

(a) Radius 15 cm

(b) Diameter 32 cm

(c) Radius 12.5 cm

(d) Diameter 42 cm

25. A rectangular playground is 95 m long and 64 m wide. Find:

(a) The perimeter

(b) The area

(c) The cost of boundary fencing at £48 per metre

(d) The cost of safety surfacing at £12 per m^2

26. Find the area of these compound shapes:

(a) A rectangle 32 cm by 20 cm with two squares of side 5 cm removed from opposite corners

(b) An L-shape made from two rectangles: 26 cm by 10 cm and 12 cm by 18 cm overlapping

(c) Half of a circle with radius 14 cm attached to a rectangle with length 28 cm and width 20 cm

Section F: Volume and Surface Area

27. Calculate the volume of these prisms:

(a) Cuboid: length 26 cm, width 17 cm, height 14 cm

(b) Cube: side length 16 cm

(c) Triangular prism: triangular face area 54 cm^2, length 18 cm

(d) Cylinder: radius 13 cm, height 20 cm

28. Calculate the surface area of:

(a) Cube: side length 18 cm

(b) Cuboid: length 28 cm, width 21 cm, height 15 cm

(c) Cylinder: radius 12 cm, height 19 cm

29. A cylindrical storage tank has radius 10 m and height 18 m. Find:

(a) The volume in m^3

(b) The volume in litres (1 m^3 = 1000 litres)

(c) The curved surface area

(d) The total surface area

30. A cube has volume 3375 cm^3. Find:

(a) The side length

(b) The surface area

31. A rectangular container is 55 m long, 26 m wide, and 8 m high. Find:

(a) The volume of materials it can hold

(b) The area of the base

(c) The area of the four walls

Section G: Pythagoras' Theorem

32. Use Pythagoras' theorem to find the missing side in these right-angled triangles:

    (a) Two shorter sides are 27 cm and 36 cm. Find the hypotenuse.

    (b) Hypotenuse is 73 cm, one side is 55 cm. Find the other side.

    (c) Two shorter sides are 39 cm and 52 cm. Find the hypotenuse.

    (d) Hypotenuse is 89 cm, one side is 80 cm. Find the other side.

33. A cable of length 17 m is stretched from the top of a 15 m pole to the ground. How far from the base of the pole does the cable reach?

34. A rectangle has length 56 cm and width 18 cm. Find the length of its diagonal.

35. Find the distance between these pairs of points:

    (a) (0, 0) and (27, 36)

    (b) (9, 15) and (21, 20)

    (c) (-7, 11) and (5, 26)

36. A right-angled triangle has legs of length x cm and $(x + 15)$ cm, and hypotenuse $(x + 75)$ cm. Find the value of x.

37. Determine whether these triangles are right-angled:

    (a) Sides 27 cm, 72 cm, 75 cm

    (b) Sides 21 cm, 28 cm, 35 cm

    (c) Sides 45 cm, 60 cm, 75 cm

    (d) Sides 33 cm, 44 cm, 55 cm

Section H: Problem Solving

38. A circular fountain has radius 16 m. A decorative border of width 4 m surrounds the fountain. Find:

    (a) The area of the fountain

    (b) The area of the border

    (c) The total area including the border

39. A regular 24-sided polygon has perimeter 168 cm. Find:

    (a) The length of each side

    (b) Each interior angle

    (c) Each exterior angle

40. A cylindrical chemical tank has radius 15 cm and height 40 cm. Find:

    (a) How much chemical it can store (volume)

    (b) The area of steel needed to construct it (surface area)

    (c) The cost of steel at £0.15 per cm^2

41. Triangle STU is isosceles with ST = SU. Angle TSU = 22°. Find angles STU and SUT.

42. A regular octagon and a circle have the same area. If the octagon has side length 15 cm, find the radius of the circle (use octagon area $4.83 \times \text{side}^2$).

43. A triangle has vertices at A(10, 15), B(22, 15), and C(16, 30). Find:

    (a) The length of each side

    (b) The perimeter

    (c) The area

    (d) Whether the triangle is right-angled

44. A cone has base radius 21 cm and slant height 35 cm. Find:

    (a) The vertical height

    (b) The volume

    (c) The curved surface area

45. A garden patio is 30 m by 22 m. Pentagonal tiles with side length 40 cm are used to cover the area. Approximately how many tiles are needed? (Use pentagon area $\approx 1.7 \times \text{side}^2$)

Answer Space

Use this space for your working and answers.

END OF TEST

Total marks: 100

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