GCSE Foundation Mathematics
Practice Test 7: 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) 68°

    (b) 152°

    (c) 284°

    (d) 29°

    (e) 203°

    (f) 89°

2. Find the missing angles:

    (a) Two angles on a straight line are 127° and $x°$. Find x.

    (b) Three angles around a point are 145°, 92°, and $y°$. Find y.

    (c) Two angles are vertically opposite. One angle is 134°. Find the other angle.

3. In a triangle, two angles are 39° and 82°. Find the third angle.

4. The angles in a triangle are in the ratio 3 : 7 : 8. 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 74°

    (b) An equilateral triangle (all angles equal)

    (c) A right-angled triangle with one angle of 23°

Section B: Polygons and Angle Rules

6. Find the sum of interior angles for:

    (a) An octagon (8 sides)

    (b) A decagon (10 sides)

    (c) A dodecagon (12 sides)

    (d) A 15-sided polygon

7. Find the size of each interior angle in:

    (a) A regular octagon
    (b) A regular decagon
    (c) A regular 15-sided polygon
    (d) A regular dodecagon

8. Find the size of each exterior angle in:

    (a) A regular octagon
    (b) A regular decagon
    (c) A regular 15-sided polygon
    (d) A regular dodecagon

9. A regular polygon has an exterior angle of 24°. How many sides does it have?

10. In a quadrilateral, three angles are 73°, 118°, and 89°. Find the fourth angle.

11. A regular polygon has an interior angle of 162°. Find:

    (a) The exterior angle
    (b) The number of sides

Section C: Properties of Shapes

12. State the properties of these quadrilaterals:

    (a) Kite (sides, angles)
    (b) Square (sides, angles, diagonals)
    (c) Rhombus (sides, angles, diagonals)
    (d) Isosceles trapezium (sides, angles, diagonals)

13. How many lines of symmetry do these shapes have?

    (a) Regular decagon
    (b) Rhombus
    (c) Regular octagon
    (d) Kite
    (e) Isosceles triangle
    (f) Regular hexagon

14. What is the order of rotational symmetry for:

    (a) Regular decagon
    (b) Regular octagon
    (c) Rhombus
    (d) Isosceles triangle

15. Name these 3D shapes:

    (a) 1 octagonal base and 8 triangular faces
    (b) 2 hexagonal faces and 6 rectangular faces
    (c) 8 triangular faces meeting at vertices

  (d) 2 circular faces and 1 curved surface

  (e) 5 rectangular faces and 2 triangular faces

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

  (a) Hexagonal prism

  (b) Octagonal pyramid

  (c) Icosahedron (20 triangular faces)

  (d) Pentagonal prism

Section D: Transformations

17. Describe the transformation that maps:

  (a) Shape A to Shape B (enlargement scale factor $\frac{1}{3}$, centre origin)

  (b) Shape B to Shape C (rotation 60° anticlockwise about origin)

  (c) Shape C to Shape D (reflection in line $y = -2$)

  (d) Shape D to Shape E (translation 8 units right, 6 units up)

18. A point P(12, 15) 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 $\begin{pmatrix} -8 \\ 5 \end{pmatrix}$

19. A hexagon has vertices at A(6, 12), B(12, 12), C(15, 6), D(12, 0), E(6, 0), and F(3, 6). Find the coordinates after:

  (a) Rotation 90° anticlockwise about the origin

  (b) Enlargement scale factor $\frac{2}{3}$, centre origin

  (c) Translation by vector $\begin{pmatrix} -7 \\ 4 \end{pmatrix}$

20. A shape is enlarged by scale factor $\frac{4}{5}$. If the original area is 125 cm^2, what is the new area?

21. Shape A is enlarged to Shape B with scale factor $\frac{2}{7}$. If Shape A has a perimeter of 91 cm, what is the perimeter of Shape B?

Section E: Perimeter and Area

22. Calculate the perimeter of these shapes:

  (a) Rectangle: length 29 cm, width 16 cm

  (b) Square: side length 22 cm

  (c) Triangle: sides 19 cm, 21 cm, 25 cm

  (d) Regular octagon: side length 9 cm

23. Calculate the area of these shapes:

  (a) Rectangle: length 31 cm, width 18 cm

  (b) Square: side length 24 cm

    (c) Triangle: base 32 cm, height 15 cm

    (d) Parallelogram: base 23 cm, height 12 cm

24. Calculate the area and circumference of circles with:

    (a) Radius 13 cm

    (b) Diameter 28 cm

    (c) Radius 9.5 cm

    (d) Diameter 38 cm

25. A rectangular sports field is 85 m long and 52 m wide. Find:

    (a) The perimeter

    (b) The area

    (c) The cost of boundary fencing at £42 per metre

    (d) The cost of grass seeding at £8 per m^2

26. Find the area of these compound shapes:

    (a) A rectangle 28 cm by 18 cm with two squares of side 4 cm removed from opposite corners

    (b) A plus sign made from two rectangles: 24 cm by 8 cm and 10 cm by 22 cm overlapping

    (c) Two-thirds of a circle with radius 12 cm attached to a triangle with base 24 cm and height 18 cm

Section F: Volume and Surface Area

27. Calculate the volume of these prisms:

    (a) Cuboid: length 22 cm, width 15 cm, height 12 cm

    (b) Cube: side length 14 cm

    (c) Triangular prism: triangular face area 48 cm^2, length 16 cm

    (d) Cylinder: radius 11 cm, height 18 cm

28. Calculate the surface area of:

    (a) Cube: side length 15 cm

    (b) Cuboid: length 24 cm, width 18 cm, height 13 cm

    (c) Cylinder: radius 10 cm, height 17 cm

29. A cylindrical water tank has radius 8 m and height 15 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 2744 cm^3. Find:

    (a) The side length

    (b) The surface area

31. A rectangular warehouse is 45 m long, 22 m wide, and 6 m high. Find:

    (a) The volume of goods it can store

    (b) The area of the floor

    (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 24 cm and 32 cm. Find the hypotenuse.
    (b) Hypotenuse is 65 cm, one side is 63 cm. Find the other side.
    (c) Two shorter sides are 36 cm and 48 cm. Find the hypotenuse.
    (d) Hypotenuse is 97 cm, one side is 72 cm. Find the other side.

33. A ladder of length 15 m is placed against a wall. The foot of the ladder is 9 m from the base of the wall. How high up the wall does the ladder reach?

34. A rectangle has length 52 cm and width 16 cm. Find the length of its diagonal.

35. Find the distance between these pairs of points:

    (a) (0, 0) and (24, 32)
    (b) (8, 13) and (20, 18)
    (c) (-6, 9) and (6, 24)

36. A right-angled triangle has legs of length x cm and $(x + 13)$ cm, and hypotenuse $(x + 67)$ cm. Find the value of x.

37. Determine whether these triangles are right-angled:

    (a) Sides 24 cm, 70 cm, 74 cm
    (b) Sides 20 cm, 48 cm, 52 cm
    (c) Sides 42 cm, 56 cm, 70 cm
    (d) Sides 39 cm, 52 cm, 65 cm

Section H: Problem Solving

38. A circular garden has radius 14 m. A pathway of width 3 m surrounds the garden. Find:

    (a) The area of the garden
    (b) The area of the pathway
    (c) The total area including the pathway

39. A regular 20-sided polygon has perimeter 140 cm. Find:

    (a) The length of each side
    (b) Each interior angle
    (c) Each exterior angle

40. A cylindrical oil tank has radius 13 cm and height 35 cm. Find:

    (a) How much oil it can store (volume)
    (b) The area of metal needed to construct it (surface area)
    (c) The cost of metal at £0.12 per cm^2

41. Triangle PQR is isosceles with PQ = PR. Angle QPR = 18°. Find angles PQR and PRQ.

42. A regular hexagon and a circle have the same area. If the hexagon has side length 12 cm, find the radius of the circle (use hexagon area $= \frac{3\sqrt{3}}{2} \times side^2$).

43. A triangle has vertices at A(8, 12), B(20, 12), and C(14, 27). 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 18 cm and slant height 30 cm. Find:

    (a) The vertical height

    (b) The volume

    (c) The curved surface area

45. A swimming pool area is 25 m by 18 m. Octagonal tiles with side length 30 cm are used around the pool edge. Approximately how many tiles are needed for a 2 m wide border? (Use octagon area $\approx 4.8 \times$ side^2)

Answer Space

Use this space for your working and answers.

END OF TEST

Total marks: 100

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