# GCSE Maths Set 4: 100 Geometry & Measures Practice Questions

## Mensuration and Calculation

1. Calculate the area of a triangle with base 10 cm and height 8 cm.
2. Find the volume of a cylinder with radius 5 cm and height 12 cm.
3. Calculate the surface area of a sphere with radius 7 cm.
4. Find the length of an arc in a circle with radius 9 cm and central angle 60°.
5. Calculate the total surface area of a cone with radius 4 cm and slant height 10 cm.
6. Calculate the volume of a cone with height 9 cm and base radius 3 cm.
7. Find the area of a sector with radius 12 cm and angle 90°.
8. Calculate the perimeter of a trapezium with parallel sides 8 cm and 5 cm and height 4 cm.
9. Find the volume of a prism with base area 30 $cm^2$ and length 15 cm.
10. Calculate the surface area of a cuboid with edges 7 cm, 4 cm and 3 cm.

## Vectors

11. Given vectors a = (2, 3) and b = (-1, 5), calculate 3a - 2b.
12. Find the magnitude of vector (6, 8).
13. Determine whether vectors (4, 6) and (2, 3) are parallel.
14. Calculate the scalar product of vectors a = (1, 2) and b = (3, 4).
15. Find the vector from point A(3, 2) to B(7, 10).
16. Find the midpoint of the segment joining points (5, 12) and (9, 4).
17. Determine the angle between vectors a = (1, 0) and b = (0, 1).
18. Find the unit vector in the same direction as (4, -3).
19. Find the vector that results from reflecting (2, 5) in the y-axis.
20. Calculate the resultant vector when vectors (3, 4) and (-2, 1) are added.

## Properties and Constructions

21. Define the properties of a rhombus.
22. Construct an equilateral triangle given one side.
23. Construct the perpendicular bisector of a line segment.
24. Prove that two triangles with two angles and included side equal are congruent.
25. Find the size of the missing angle in a triangle with angles 45° and 70°.
26. List the properties of a parallelogram.
27. Prove the diagonals of a rectangle are equal.
28. Construct an angle bisector of a given angle.
29. Describe the transformations for a shape under enlargement with scale factor -2.
30. Explain the meaning of rotational symmetry of order 4.

## Angles and Triangles

31. Calculate the third angle in a triangle with angles of 50° and 60°.
32. Find the exterior angle of a regular octagon.
33. Calculate the base angles of an isosceles triangle with apex angle 40°.
34. Calculate the area of a triangle with sides 7 cm, 8 cm and included angle 60° using the formula ½ab sin C.
35. Use sine rule to find missing side when one angle and two sides are known.
36. Use cosine rule to find the missing side in triangle with known two sides and included angle.
37. Calculate the height of a triangle with base 12 cm and area 48 $cm^2$.
38. Determine if triangle with sides 6 cm, 8 cm and 10 cm is right angled.
39. Find the size of an interior angle of a regular decagon.
40. Calculate the sum of the interior angles of a 20-sided polygon.

## Circles and Circle Theorems

41. Calculate the circumference of a circle with diameter 14 cm.
42. Find the length of a chord subtending a central angle of 90° in a circle of radius 10 cm.
43. Use the alternate segment theorem to find missing angle in a circle problem.

44. Find the radius of a circle with area 153.86 $cm^2$.
45. Calculate the angle between two tangents from a point outside a circle of radius 7 cm, 15 cm from the center.
46. Prove that the angle subtended by a diameter is 90°.
47. Find the equation of a circle with center (-3, 4) and radius 5.
48. Calculate the area of a sector with radius 6 cm and angle 45°.
49. Find the length of the tangent from a point 13 cm from center of a circle of radius 5 cm.
50. Apply circle theorems to find missing angles in cyclic quadrilaterals.

## Bearings and Coordinates

51. Find the bearing from point A(2,3) to B(7,8).
52. Calculate the distance between points (4, 5) and (9, 12).
53. Convert a length of 5 cm on a map with scale 1:250,000 to actual length.
54. Find the midpoint of a line segment with endpoints (10, -4) and (2, 8).
55. Determine the coordinates of a point after reflection in the line y = x.
56. Find the equation of the line passing through points (3, 2) and (7, 10).
57. Calculate the gradient of the line passing through (-1, 4) and (3, -2).
58. Describe the transformation mapping (3, 4) to (6, 8).
59. Find coordinates of the image of (5, -3) after rotation 90° anticlockwise about the origin.
60. Determine the translation vector that maps point A(1, 5) to B(4, 9).

## Perimeters and Areas

61. Calculate the perimeter of a regular hexagon with side 7 cm.
62. Find the area of a parallelogram with base 12 cm and height 8 cm.
63. Calculate the area of a trapezium with parallel sides 10 cm and 6 cm and height 4 cm.
64. Find the perimeter of an isosceles triangle with equal sides 10 cm and base 12 cm.
65. Calculate the area of a semicircle with radius 9 cm.
66. Calculate the circumference of a circle with radius 11 cm.
67. Find the area of a circle with diameter 14 cm.

68. Find the area and perimeter of a rectangle length 15 cm and width 9 cm.
69. Calculate the perimeter of a kite with sides length 8 cm and 13 cm.
70. Calculate the total surface area of a cube with side length 6 cm.

## Volume and Surface Area

71. Calculate the volume of a cylinder with radius 3 cm and height 20 cm.
72. Find the volume of a prism with base area 25 $cm^2$ and height 14 cm.
73. Calculate the total surface area of a cylinder with radius 8 cm and height 13 cm.
74. Find the volume of a sphere with radius 5 cm.
75. Calculate the surface area of a sphere with radius 7 cm.
76. Determine the volume of a pyramid with base area 40 $cm^2$ and height 15 cm.
77. Find the radius of a sphere given volume 113.1 $cm^3$.
78. Find the lateral surface area of a cone with radius 6 cm and slant height 10 cm.
79. Calculate the surface area of a cuboid with edges 12 cm, 5 cm and 8 cm.
80. Calculate the diagonal length of a cuboid with edges 3 cm, 4 cm and 12 cm.

## Transformations

81. Describe the effect of a reflection in the y-axis on point (3, 5).
82. Find the image of point (4, -6) after rotation of 180° about the origin.
83. Describe the vector translation that maps (1, 2) to (5, 7).
84. Describe the enlargement of scale factor 3 of triangle with vertices at (1,1), (3,1), (2, 3).
85. Find the coordinates of the image of (6, 2) after reflection in the line y = x.
86. Find the point image of (7, 3) after rotation 90° clockwise about the origin.
87. Describe the invariant points under a rotation of 360°.
88. Calculate the coordinates after translation by vector (3, -2) of point (4, 9).
89. Find the transformation from shape A to shape B if the size doubles and shape moves 4 units right.
90. State the vector for a translation that moves every point 5 units left and 3 units down.

## Geometric Reasoning and Proof

91. Prove that the base angles in an isosceles triangle are equal.
92. Prove the sum of interior angles of a triangle is 180°.
93. Show that the diagonals of a parallelogram bisect each other.
94. Use geometric reasoning to prove the exterior angle of a triangle is equal to the sum of the two opposite interior angles.
95. Prove that the opposite angles of a cyclic quadrilateral sum to 180°.
96. Prove the congruency of two right triangles using RHS congruence.
97. Show that the diagonals of a rectangle are equal in length.
98. Deduce the size of all angles in an equilateral triangle.
99. Explain why the diagonals of a kite are perpendicular.
100. Use similar triangles to explain why triangle areas are proportional to the squares of the corresponding sides.