GCSE Maths Set 3: 100 Geometry & Measures Questions

Properties and Constructions

1. Define the properties of an isosceles triangle.
2. Construct the perpendicular bisector of a given line segment.
3. Find the size of angle x in a set of parallel lines cut by a transversal with alternate interior angles given.
4. Prove that two triangles are congruent using SAS criteria.
5. Describe the effect on side lengths and angles when a shape is enlarged by a scale factor of 3.
6. List all circle theorems related to tangents and radii.
7. Explain why the diagonals of a rectangle are equal.
8. Identify the number of faces, edges, and vertices of a cuboid.
9. Draw the plans and elevations of a given 3D shape.
10. Explain how to construct a triangle given two sides and the included angle.

Mensuration and Calculation

11. Convert 500 cm to meters.
12. Measure the angle between two roads given a map scale.
13. Calculate the area and perimeter of a parallelogram with base 7 cm and height 5 cm.
14. Work out the volume of a cylinder with radius 4 cm and height 10 cm.
15. Calculate the surface area of a cone with radius 3 cm and slant height 5 cm.
16. Find the arc length of a sector with radius 8 cm and central angle 60°.
17. Explain the relationship between congruent lengths and areas.
18. Use Pythagoras' theorem to find the length of the hypotenuse in a right triangle with legs 6 cm and 8 cm.

19. Calculate the lengths using trigonometric ratios in a right-angled triangle (opposite 7 cm, angle 35°).
20. Apply sine and cosine rules to solve a triangle with given sides and angles.

Vectors

21. Express vector a = (3, 4) in unit vector notation.
22. Calculate $2a - 3b$ where $a = (1,5)$ and $b = (4,2)$.
23. Find the magnitude of vector (6, 8).
24. Determine if vectors (2, 3) and (4, 6) are parallel.
25. Find the scalar product of vectors (3, -1) and (5, 2).
26. Calculate the angle between vectors a = (1, 0) and b = (0, 1).
27. Find the result of adding vectors a = (2, 3) and b = (-1, 4).
28. Calculate the vector from point P(2, 5) to Q(7, 9).
29. Determine whether vectors c = (1,2) and d = (4, 8) are multiples.
30. Find the midpoint of a line segment with endpoints (6, -4) and (2, 6).

Area and Perimeter of 2D shapes

31. Calculate the area and perimeter of a rectangle length 15 cm and width 8 cm.
32. Find the perimeter of an equilateral triangle with side 9 cm.
33. Calculate the area of a trapezium with parallel sides 10 cm and 6 cm and height 5 cm.
34. Find the perimeter of a regular pentagon with side length 12 cm.
35. Calculate the area of a triangle given base 10 cm and height 8 cm.
36. Determine the perimeter of a circle with radius 7 cm.
37. Calculate the area of a sector with radius 5 cm and angle 72°.
38. Find the total surface area of a cube with side length 5 cm.
39. Work out the perimeter of a rhombus with side 9 cm.
40. Calculate the base lengths of an isosceles triangle with equal sides 8 cm and base angle 50°.

Volume and Surface Area of 3D Solids

41. Calculate the volume of a prism with base area 24 cm^2 and height 10 cm.

42. Find the surface area of a hemisphere with radius 6 cm.
43. Calculate the volume of a pyramid with base area 30 cm^2 and height 9 cm.
44. Find the total surface area of a cylinder with radius 4 cm and height 12 cm.
45. Calculate the volume of a cone with radius 5 cm and height 12 cm.
46. Find the diagonal of a cuboid with edges 3 cm, 4 cm, and 5 cm.
47. Calculate the surface area of a regular tetrahedron with edge length 7 cm.
48. Find the volume of a sphere with radius 6 cm.
49. Calculate the curved surface area of a cone with radius 3 cm and slant height 8 cm.
50. Work out the surface area of a rectangular prism with sides 7 cm, 5 cm, and 4 cm.

Angles and Triangles

51. Find the missing angle in a triangle with two angles 40° and 65°.
52. Calculate the base angles of an isosceles triangle with apex angle 40°.
53. Determine the angle between two lines with gradients 3 and -2.
54. Work out the exterior angle of a regular hexagon.
55. Calculate the size of an interior angle of a regular octagon.
56. Find the sum of interior angles of a 13-sided polygon.
57. Determine an unknown angle in a parallelogram where one angle is 75°.
58. Use the sine rule to find side lengths in triangle ABC: angle A = 30°, side a = 7 cm, angle B = 50°.
59. Apply the cosine rule to find side c given sides a = 8 cm, b = 6 cm and included angle C = 60°.
60. Calculate the area of a triangle using Heron's formula with sides 7 cm, 8 cm, and 9 cm.

Circles and Circle Theorems

61. Calculate the diameter of a circle with circumference 31.4 cm.
62. Find the length of a chord subtending a 60° angle in a circle of radius 10 cm.
63. Work out the area of a sector with radius 8 cm and central angle 45°.
64. Find the length of a tangent drawn from a point 13 cm away from the center of a circle with radius 5 cm.
65. Apply the alternate segment theorem to find angle in circle problems.

66. Use angle at the center theorem to calculate arc lengths.
67. Prove that the angle subtended by a diameter is 90°.
68. Calculate the radius of a circle whose area is 154 cm^2 (use $\pi = 3.14$).
69. Use the intersecting chords theorem to find missing lengths.
70. Find the equation of a circle with center (-2, 3) and radius 5.

Bearings and Scale Drawings

71. Calculate the bearing from point A (3, 4) to point B (7, 8).
72. Find the distance between two locations given coordinates A(1,2) and B(5,6).
73. Convert a scale drawing length of 4 cm to real length given scale 1:50.
74. Find the missing bearing given two bearings on a straight line.
75. Calculate the shortest distance between a point and a line using coordinates.
76. Work out an unknown angle in a scale drawing involving bearings.
77. Use Pythagoras theorem to calculate direct distance between two points.
78. Calculate the length of a journey based on a scaled map distance.
79. Find an unknown length in a bearing triangle with two known sides and included angle.
80. Determine the bearing of a ship travelling from one coordinate point to another.

Translations, Rotations, Reflections, Enlargements

81. Describe the translation vector that maps point A(2,3) to B(5,7).
82. Find the coordinates of a point after rotation of 90° clockwise around the origin.
83. Reflect point (3,4) in the y-axis.
84. Enlarge triangle ABC by scale factor 2 with center (0,0).
85. Find coordinates after reflection in the line y = x.
86. Describe the invariant points after a rotation of 180°.
87. Determine the image of point (5, -2) after translation by vector (4, 3).
88. Find coordinates of a shape after enlargement with scale factor -1.
89. Describe rotation needed to map point (1,2) onto point (-2,-1).
90. Work out composite transformation of reflection followed by translation.

Geometric Reasoning and Proof

91. Prove that the base angles in an isosceles triangle are equal.
92. Show that the diagonals of a rhombus are perpendicular.
93. Use parallel lines and alternate angles to prove two lines are parallel.
94. Prove that the sum of angles in a triangle is 180° using geometric reasoning.
95. Use similarity of triangles to solve for unknown lengths.
96. Prove congruency by using RHS condition in a right-angled triangle.
97. Use circle theorems to deduce missing angles in a circle problem.
98. Establish proof that exterior angle of a triangle equals sum of opposite interior angles.
99. Demonstrate the properties of parallelograms using vector methods.
100. Use algebra and geometry to prove triangle inequalities.