Here are the answers for SET 3– the 100 GCSE Maths Geometry and Measures questions:

Properties and Constructions

1. Two equal sides, two equal angles opposite those sides, one base unequal side.
2. Draw a perpendicular from midpoint of segment at 90°.
3. Alternate interior angles equal, so angle x = given value.
4. Triangles congruent if two sides and included angle (SAS) are equal.
5. Lengths scale by factor 3; areas scale by factor 9.
6. Radius perpendicular to tangent; angles in same segment equal; angle at center twice angle at circumference; cyclic quadrilateral opposite angles sum to 180°.
7. Diagonals equal by definition of rectangle; can also be proven by congruent triangles.
8. 6 faces, 12 edges, 8 vertices.
9. Draw front, side, top views showing edges and vertices to scale.
10. Use ruler and protractor to construct triangle with 2 sides and included angle.

Mensuration and Calculation

11. 5 m
12. Use protractor and scale map conversion to find angle.
13. Area = 35 cm^2, perimeter = 24 cm
14. Volume = 502.65 cm^3
15. Surface area = 75.4 cm^2
16. Arc length = 8.38 cm
17. Congruent lengths imply equal areas containing them, sharing respective heights.
18. Hypotenuse = 10 cm
19. Length adjacent = 9.65 cm
20. Use sine and cosine formulas accordingly.

Vectors

21. $3\mathbf{i} + 4\mathbf{j}$
22. $(-10,4)$
23. 10
24. Yes, one is scalar multiple of the other
25. 4
26. 90°
27. (1, 7)
28. (5, 4)
29. Yes, vector d = 4 × vector c
30. (4, 1)

Area and Perimeter of 2D shapes

31. Area = 120 cm^2, perimeter = 46 cm
32. 27 cm
33. 40 cm^2
34. 60 cm
35. 40 cm^2
36. 43.96 cm
37. 6.28 cm^2
38. 150 cm^2
39. 54 cm
40. 50°

Volume and Surface Area of 3D Solids

41. 240 cm^3
42. 452.39 cm^2
43. 270 cm^3
44. 402.12 cm^2
45. 314.16 cm^3

46. 7.07 cm
47. 84.87 cm^2
48. 904.78 cm^3
49. 75.4 cm^2
50. 214 cm^2

Angles and Triangles

51. 75°
52. 65°
53. 100.3°
54. 120°
55. 135°
56. 1980°
57. 105°
58. 8.67 cm
59. 6.96 cm
60. 26.83 cm^2

Circles and Circle Theorems

61. 10 cm
62. 10 cm
63. 67.02 cm^2
64. 12 cm
65. Angle between tangent and chord equals angle in alternate segment.
66. Arc length proportional to center angle.
67. Theorem proven by right angle subtended by diameter.
68. 7 cm
69. Use product of segments theorem.
70. $(x + 2)^2 + (y - 3)^2 = 25$

Bearings and Scale Drawings

71. 45°
72. 5.66 units
73. 200 cm
74. Bearings sum to 180°.
75. Use perpendicular distance formula.
76. Use trigonometric relations and scale conversion.
77. Apply Pythagoras.
78. Map distance × scale factor.
79. Apply cosine rule.
80. Use inverse tangent for bearing.

Transformations

81. Vector (3,4)
82. Rotate (x, y) to (y, -x) for 90° clockwise.
83. Reflect (3,4) → (-3,4)
84. Multiply all coordinates by 2.
85. Swap x and y for reflection in y = x.
86. All points rotate 180° to their opposites.
87. Vector addition.
88. Invert coordinates and scale for negative enlargement.
89. Calculate angle between points via vector dot product.
90. Combine transformations algebraically.

Geometric Reasoning and Proof

91. Base angles equal by isosceles triangle properties.
92. Diagonals perpendicular because rhombus has equal sides and symmetry.
93. Alternate interior angles equal leads to parallel lines.

94. Angles sum proof via parallel lines or Euclid's axioms.
95. Use ratio of sides in similar triangles proportionally.
96. Right angle and hypotenuse-side equal confirms RHS congruency.
97. Circle theorem applications with chords and angles.
98. Exterior angle equals sum of opposite interior angles by triangle property.
99. Use vector addition to prove parallelogram properties.
100. Use triangle inequality rules for geometric proof.