Shapes and Patterns

Standard difficulty · 20 questions · 40 marks · Time: 54 minutes

Name: _____ Date: _____ Score: ____ / 40

Show your working for Sections B and C. Answers are on the last page — try every question first!

Section A — Choose the correct answer — 8 × 1 = 8 marks

1. A triangle has sides of 8 cm, 8 cm and 8 cm. What kind of triangle is it?

(a) Equilateral **(b)** Isosceles **(c)** Scalene **(d)** Rhombus

2. How many sides do 2 octagons and 1 hexagon have in all?

(a) 22 **(b)** 16 **(c)** 3 **(d)** 30

3. A quadrilateral has all four sides equal, but its angles are not right angles. What is it?

(a) Square **(b)** Kite **(c)** Rhombus **(d)** Rectangle

4. Each side of a regular shape is 9 cm, and all its sides add up to 45 cm. What is the shape?

(a) Pentagon **(b)** Hexagon **(c)** Square **(d)** Triangle

5. A triangle with all three sides equal is:

(a) a kite **(b)** isosceles only **(c)** scalene **(d)** equilateral

6. A 5 × 5 × 5 cube made of small cubes is painted on the outside. How many small cubes have no face painted?

(a) 27 **(b)** 8 **(c)** 36 **(d)** 54

7. A weaving strip follows the pattern over, over, under, under, over, over, under, under, … Is the 37th step over or under?

(a) Under **(b)** Both **(c)** Neither **(d)** Over

8. A block is built from small cubes: 4 long, 2 wide and 2 high. How many small cubes are used?

(a) 16 **(b)** 8 **(c)** 24 **(d)** 20

Section B — Short answer — 8 × 2 = 16 marks

9. Is a triangle with sides 7 cm, 7 cm and 7 cm equilateral, isosceles or scalene?

10. How many corners do 5 hexagons have in all?

11. Each side of a regular pentagon is 15 cm. What is the total length of all its sides?

12. Name the quadrilateral: it has four sides of 3 cm, but no right angles.

13. A 4 × 4 × 4 cube is painted red on the outside and cut into small cubes. How many small cubes have exactly two red faces?

14. A triangular prism has 5 faces and 6 corners. For these solids, faces + corners − edges = 2. How many edges does it have?

15. Tiles are laid in the repeating colour pattern yellow, green, red, blue, yellow, green, red, blue, … What colour is tile number 40?

16. A shape is made of 6 equal triangles. Another is made of 8 of the same triangles. How many triangles do both use together, and how many more does the bigger one use?

Section C — Word problems — 4 × 4 = 16 marks

17. A big 6 × 6 × 6 cube made of small cubes is painted on all its faces. (a) How many small cubes are there? (b) How many have no face painted? (c) How many have exactly 1 face painted? (d) How many have 3 faces painted?

18. Sort these triangles as equilateral, isosceles or scalene: (a) 9 cm, 14 cm, 10 cm; (b) 7 cm, 7 cm, 7 cm; (c) 10 cm, 18 cm, 10 cm.

19. Which of these regular shapes can tile a floor with no gaps: square, hexagon, triangle? For each one that cannot, say what goes wrong.

20. Asha cuts 2 equilateral triangles and 2 squares, all with sides of 10 cm. (a) How many sides are there in all? (b) What is the total length of the triangles' sides? (c) Of the squares' sides?

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Answer key

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Q	Answer	Working
1	**(a) Equilateral**	equilateral: 3 equal sides; isosceles: 2; scalene: none
2	**(a) 22**	2 × 8 + 1 × 6
3	**(c) Rhombus**	—
4	**(a) Pentagon**	45 ÷ 9 = 5 sides
5	**(d) equilateral**	—
6	**(a) 27**	a 3 × 3 × 3 block inside
7	**(d) Over**	the pattern repeats every 4 steps; 37 ÷ 4 leaves 1
8	**(a) 16**	4 × 2 = 8 in each layer; 2 layers
9	**Equilateral**	—
10	**30**	each hexagon has 6 corners
11	**75 cm**	5 equal sides: 5 × 15
12	**Rhombus**	—
13	**24**	2 on each of 12 edges
14	**9**	5 + 6 − 2
15	**Blue**	40 ÷ 4 leaves 0
16	**14; 2**	—
17	**(a) 216; (b) 64; (c) 96; (d) 8**	the corners have 3, the edges have 2, the face middles have 1; 64 inside have none
18	**(a) scalene; (b) equilateral; (c) isosceles**	—
19	**square: yes; hexagon: yes; triangle: yes**	regular triangles, squares and hexagons fit together at every corner
20	**(a) 14; (b) 60 cm; (c) 80 cm**	2 × 3 + 2 × 4

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