Proportional Reasoning: Thinking Puzzles

Standard difficulty · 20 questions · 40 marks · Time: 37 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. Two ratios a : b and c : d are in proportion when:
(a) a × b = c × d **(b)** a − b = c − d **(c)** a + d = b + c **(d)** a × d = b × c

2. ₹779 is shared in the ratio 4 : 7 : 8. What is the largest share (in ₹)?
(a) 328 **(b)** 164 **(c)** 259 **(d)** 369

3. A jug has 9 litres of milk and water in the ratio 2 : 1. 3 litres of water are added. What is the new ratio of milk to water?
(a) 3 : 1 **(b)** 2 : 4 **(c)** 2 : 1 **(d)** 1 : 1

4. 20 workers can finish a job in 21 days. Working at the same rate, how many days would 28 workers take?
(a) 29 days **(b)** 16 days **(c)** 13 days **(d)** 15 days

5. Four blocks with a circle, a triangle, a square and a star are stacked one on top of another.
• The triangle is immediately above the square.
• The circle is somewhere above the square.
How many different stacks follow all the rules?
(a) 3 **(b)** 6 **(c)** 5 **(d)** 4

6. On a map, 1 cm stands for 10 km. Two towns are 35 cm apart on the map. How far apart are they really?
(a) 3,500 km **(b)** 350 km **(c)** 45 km **(d)** 360 km

7. The ages of three cousins are in the ratio 7 : 3 : 6, and their ages add up to 80 years. How old is the youngest?
(a) 26 years **(b)** 35 years **(c)** 3 years **(d)** 15 years

8. Which ratio is in proportion with 8 : 9?
(a) 81 : 72 **(b)** 72 : 81 **(c)** 72 : 82 **(d)** 17 : 18

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

9. What is the difference between direct and inverse proportion? Give one example of each.

10. Divide ₹429 in the ratio 4 : 7 : 2. Write the three shares in order.

11. A mixture has 4 litres of milk and 24 litres of water (ratio 1 : 6). How many litres of water must be added to make the ratio 1 : 7?

12. 20 pumps empty a tank in 30 hours. How long would 4 such pumps take?

13. Four blocks with a circle, a triangle, a square and a star are stacked one on top of another.
- The star is not at the bottom.
- The square is immediately above the circle.
- The square is somewhere above the triangle.

How many different stacks follow all the rules?

14. A recipe for 2 people uses 20 g of rice. How much rice is needed for 8 people?

15. A bus covers 244 km in 4 hours. At the same speed, how far does it go in 2 hours?

16. Find the missing number: 2 : 10 = 18 : □

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

17. A can holds 20 litres of milk and water in the ratio 3 : 1. (a) How much milk is there? (b) How much water? (c) How much water must be added to make the ratio 3 : 5?

18. On a map, 1 cm stands for 50 km. Town A is 21 cm from town B, and town B is 27 cm from town C. (a) How far is A from B really? (b) B from C? (c) What is the real difference between the two distances?

19. Four blocks with a circle, a triangle, a square and a star are stacked one on top of another.
(1) The triangle is immediately above the star.
(2) The triangle is somewhere above the square.
(a) How many different stacks follow all the rules? (b) How many follow all of them except rule (2)?

20. In a class, boys and girls are in the ratio 5 : 4, and there are 36 students. Then 3 more girls join. (a) How many boys are there? (b) How many girls are there now? (c) How many more girls would make the numbers equal?

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Answer key

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Q	Answer	Working
1	**(d) a × d = b × c**	—
2	**(a) 328**	779 ÷ 19 = 41 per part; × 8
3	**(d) 1 : 1**	milk 6 L, water 3 + 3 = 6 L; 6 : 6 = 1 : 1
4	**(d) 15 days**	20 × 21 = 420 worker-days; ÷ 28
5	**(a) 3**	from the top: circle/triangle/square/star; circle/star/triangle/square; star/circle/triangle/square
6	**(b) 350 km**	35 × 10
7	**(d) 15 years**	80 ÷ 16 = 5; × 3
8	**(b) 72 : 81**	8 × 9 : 9 × 9
9	**Direct: both grow together (cost and number of pens); inverse: one grows as the other shrinks (workers and days).**	—
10	**₹132, ₹231, ₹66**	429 ÷ 13 = 33 per part
11	**4 litres**	water needed = 4 × 7 ÷ 1 = 28; 28 − 24
12	**150 hours**	20 × 30 ÷ 4
13	**2**	from the top: square/circle/star/triangle; star/square/circle/triangle
14	**80 g**	20 ÷ 2 × 8
15	**122 km**	244 ÷ 4 = 61 km per hour; × 2
16	**90**	18 ÷ 2 = 9; 10 × 9
17	**(a) 15 litres; (b) 5 litres; (c) 20 litres**	20 ÷ 4 = 5 per part; new water 5 × 5 = 25
18	**(a) 1050 km; (b) 1350 km; (c) 300 km**	multiply map distances by 50
19	**(a) 3; (b) 6**	all rules, from the top: circle/triangle/star/square; triangle/star/circle/square; triangle/star/square/circle
20	**(a) 20; (b) 19; (c) 1**	36 ÷ 9 = 4 per part

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