Patterns in Mathematics

Standard difficulty · 20 questions · 40 marks · Time: 32 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. What comes next? 9, 17, 25, 33, …

(a) 40 **(b)** 49 **(c)** 50 **(d)** 41

2. What comes next? 9, 27, 81, 243, …

(a) 2187 **(b)** 732 **(c)** 729 **(d)** 405

3. 1, 3, 5, 7, 9, … are the:

(a) square numbers **(b)** triangular numbers
(c) even numbers **(d)** odd numbers

4. Which of these is a triangular number?

(a) 93 **(b)** 85 **(c)** 91 **(d)** 96

5. Which of these is a square number?

(a) 229 **(b)** 228 **(c)** 234 **(d)** 225

6. 1 + 3 + 5 + … + 15 (all the odd numbers up to 15) equals:

(a) 64 **(b)** 128 **(c)** 72 **(d)** 63

7. 1 + 2 + 3 + … + 10 equals:

(a) 55 **(b)** 100 **(c)** 45 **(d)** 50

8. Each number is the sum of the two before it. What comes next? 1, 15, 16, 31, 47, …

(a) 78 **(b)** 94 **(c)** 63 **(d)** 79

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

9. Find the rule and write the next three numbers: 73, 63, 53, 43, …

10. Find 1 + 2 + 3 + … + 63.

11. Find 1 + 2 + … + 36 + 37 + 36 + … + 2 + 1.

12. Find the next two numbers: 17, 26, 37, 50, …

13. Start with 4 and multiply by 3 again and again. What number do you reach after 5 multiplications?

14. Matchsticks make a row of hexagons, each sharing a side with the next. How many matchsticks are needed for 36 hexagons?

15. Find the 24th triangular number.

16. Find 2 + 4 + 6 + … + 78 (all the even numbers up to 78).

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

17. In a hall, the first row has 10 chairs and each row has 6 more chairs than the row in front. How many chairs are in row 15?

18. Meera saves Rs 1 on day 1, Rs 2 on day 2, Rs 3 on day 3, and so on. How much has Meera saved after 26 days?

19. A row of squares sharing sides uses 4 matchsticks for one square and 3 more for each new one. How many squares can be made with 166 matchsticks?

20. At a party, 25 friends each shake hands once with every other friend. How many handshakes are there?

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Answer key

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Q	Answer	Working
1	**(d) 41**	each number is 8 more than the one before: 33 + 8 = 41
2	**(c) 729**	each number is 3 times the one before: 243 × 3 = 729
3	**(d) odd numbers**	each is 2 more than the one before
4	**(c) 91**	91 = 1 + 2 + … + 13
5	**(d) 225**	225 = 15 × 15
6	**(a) 64**	8 odd numbers add up to 8 × 8
7	**(a) 55**	10 × 11 ÷ 2 = 55
8	**(a) 78**	31 + 47 = 78
9	**33, 23, 13**	subtract 10 each time
10	**2016**	pair the numbers: 63 × 64 ÷ 2 = 2016
11	**1369**	counting up to 37 and back down gives 37 × 37 = 1369
12	**65, 82**	square numbers plus 1: $8^2 + 1$, $9^2 + 1$
13	**972**	4, 12, 36, 108, 324, 972
14	**181**	6 for the first, then 5 more for each: 6 + 5 × 35 = 181
15	**300**	1 + 2 + … + 24 = 24 × 25 ÷ 2 = 300
16	**1560**	double 1 + 2 + … + 39: 2 × 780 = 1560
17	**94 chairs**	10 + 6 × 14 = 94
18	**Rs 351**	1 × (1 + 2 + … + 26) = 1 × 351 = 351
19	**55 squares**	(166 − 4) ÷ 3 + 1 = 55
20	**300 handshakes**	24 + 23 + … + 1 = 25 × 24 ÷ 2 = 300

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