SECTION – A

Questions 1 to 10 carry 1 mark each.

1. Which of the following numbers will definitely not be a perfect square?
(a) 1936 (b) 2500 (c) 1729 (d) 1600

2. The number of lockers that remain open in the "locker puzzle" with 225 lockers is:
(a) 15 (b) 225 (c) 30 (d) 16

3. Which of the following square numbers will end with the digit 1?
(a) 15^2 (b) 18^2 (c) 21^2 (d) 32^2

4. The smallest number by which 882 must be multiplied to make it a perfect square is:
(a) 2 (b) 3 (c) 7 (d) 11

5. Which of the following is not a perfect cube?
(a) 2197 (b) 2744 (c) 4913 (d) 2500

6. The value of 126^2, if $125^2 = 15625$, is:
(a) 15625 + 126 (b) 15625 + 251 (c) 15625 + 253 (d) 15625 + 252

7. The cube root of 3375 is:
(a) 12 (b) 15 (c) 18 (d) 25

8. Which of the following numbers is not a perfect cube?
(a) 1331 (b) 512 (c) 1000 (d) 2000

In the following questions 9 and 10, a statement of assertion (A) is followed by a statement of Reason (R). Choose the correct answer out of the following choices.
(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true but R is not the correct explanation of A.
(c) A is true but R is false.
(d) A is false but R is true.

9. **Assertion (A):** A square number always has an odd number of factors.
Reason (R): Square numbers have one unpaired factor which is repeated.

10. **Assertion (A):** No cube can end with exactly two zeros.

Reason (R): Cube numbers always contain factors grouped in triplets.

SECTION – B

Questions 11 to 14 carry 2 marks each.

11. Find the smallest square number which is exactly divisible by 12, 15, and 20.

12. Find the square root of 2401 by prime factorisation method.

13. Find the cube root of 2744, by the prime factorisation method.

14. Find the smallest number by which 200 must be multiplied so that the product becomes a perfect cube.

SECTION – C

Questions 15 to 17 carry 3 marks each.

15. Find the smallest number by which 405 must be divided to obtain a perfect square. Also, find the square root of the quotient.

16. Find the smallest number by which 1352 must be multiplied so that the product has a cube root. Also, find the cube root of the product.

17. Find the smallest number by which 1536 must be divided so that the quotient has a cube root. Also, find the cube root of the quotient.

SECTION – D

Questions 18 carry 5 marks each.

18. A school has 1475 students. What is the minimum number of students that need to be added so that the total number of students can be arranged in a perfect square grid?

SECTION – E (Case Study Based Question)

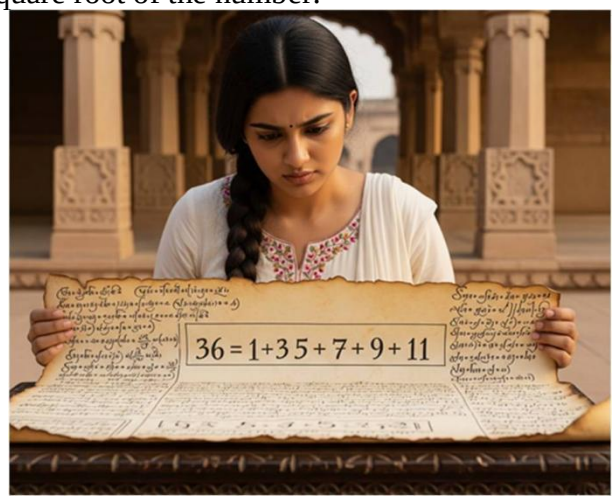
Question 19 to 20 carry 4 mark

19. Case Study – 1 (Squares and Odd Numbers)

Riya was reading about ancient Indian mathematicians. She discovered that square numbers can be expressed as the sum of consecutive odd numbers. She tried with 36:

$36 = 1 + 3 + 5 + 7 + 9 + 11$.

She wondered if she could find other squares this way. She also noticed that the number of odd numbers added equals the square root of the number.



Answer the following:

(a) Express 49 as the sum of consecutive odd numbers.

(b) How many odd numbers are required to express 121 as a sum?
(c) Find whether 50 can be expressed as the sum of consecutive odd numbers.
(d) If 2025 is a perfect square, how many odd numbers will be required to express it?

20. Case Study – 2 (Cubes and Taxicab Numbers)

During a math club discussion, Arjun told the famous story of Hardy and Ramanujan. Hardy thought 1729 was dull, but Ramanujan replied it was special since $1729 = 1^3 + 12^3 = 9^3 + 10^3$. This made Arjun curious about cubes and their properties. He started exploring other such numbers called "taxicab numbers."

Answer the following:

(a) Find the units digit of the cube of 25.
(b) What is the smallest number by which 250 must be multiplied to make it a perfect cube?
(c) What is the cube root of 2744?
(d) Can a perfect cube end with the digits 00? Justify your answer.