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CHAPTER 01: A SQUARE AND A CUBE

SUBJECT: MATHEMATICS CLASS: VIII MAX. MARKS: 40DURATION: 1½ hr

SECTION – A | Questions 1 to 10 carry 1 mark each.

1. Which of the following cannot be a perfect square?
(a) 4096 (b) 3025 (c) 2450 (d) 1764
2. The square root of 7056 is:
(a) 82 (b) 84 (c) 86 (d) 88
3. Which of the following square numbers ends with digit 9?
(a) 14^2 (b) 17^2 (c) 22^2 (d) 26^2
4. The smallest number by which 1008 must be divided to make it a perfect square is:
(a) 2 (b) 3 (c) 5 (d) 7
5. Which of the following is a perfect cube?
(a) 1000 (b) 1024 (c) 1500 (d) 2000
6. The value of 76^2, if $75^2 = 5625$, is:
(a) 5625 + 75 (b) 5625 + 151 (c) 5625 + 76 (d) 5625 + 150
7. The cube root of 9261 is:
(a) 19 (b) 21 (c) 23 (d) 27
8. Which of the following is not a perfect cube?
(a) 729 (b) 1728 (c) 3375 (d) 4000

In questions 9 and 10, a statement of Assertion (A) is followed by a statement of Reason (R). Choose the correct option:
(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):** The square of an even number is always even.
Reason (R): Even numbers have 2 as a factor, so their squares always have 2^2 as a factor.

10. **Assertion (A):** A perfect cube can end with exactly one zero.
Reason (R): For a number to be a perfect cube, the zeros at the end must come in groups of three.

SECTION – B | Questions 11 to 14 carry 2 marks each.

11.Find the smallest perfect square number which is exactly divisible by 6, 9, and 15.

12.Find the square root of 3136 by prime factorisation method.

13.Find the cube root of 13824 by the prime factorisation method.

14.Find the smallest number by which 675 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 720 must be divided to obtain a perfect square. Also, find the square root of the resulting quotient.

16.Find the smallest number by which 2916 must be multiplied so that the product is a perfect cube. Also, find the cube root of the product.

17.Find the smallest number by which 3456 must be divided so that the quotient is a perfect cube. Also, find the cube root of the quotient.

SECTION – D | Question 18 carries 5 marks.

18.A rectangular garden has an area of 2025 m^2. The gardener wishes to reshape it into a square plot using the same area. Find the side of the square plot. He then wants to plant trees along the boundary such that trees are placed at every 3 m interval. How many trees will be needed? Also verify that 2025 is a perfect square by prime factorisation.

SECTION – E | Questions 19 to 20 carry 4 marks each. (Case Study Based)

Case Study – 1: Square Patterns on a Chessboard

Meena was studying patterns on a chessboard. She observed that the total number of squares of all sizes on an n×n board forms a pattern related to square numbers. She found that a standard 8×8 board contains $1^2 + 2^2 + 3^2 + \ldots + 8^2 = 204$ squares in total. She also noticed that certain square numbers can be written as the difference of two consecutive triangular numbers. She began exploring these properties further. Answer the following based on the case study above:

(a) Write 64 as the sum of consecutive odd numbers starting from 1.

(b) Is 2601 a perfect square? Verify by prime factorisation.

(c) How many odd numbers are required to express 144 as their sum?

(d) Find the value of $\sqrt{2025} - \sqrt{1225}$ using prime factorisation.

Case Study – 2: Packing Cubes in a Warehouse

A warehouse stores identical small cubical boxes. The manager wants to stack them into larger perfect cube shapes to save space. He has 13824 small boxes. He checks: is 13824 a perfect cube? If so, he stacks them into a single large cube. If not, he finds the minimum extra boxes needed or boxes to remove to form a perfect cube. The side of each small box is 1 unit. Answer the following based on the case study above:

(a) Find the units digit of the cube of 34.

(b) What is the smallest number by which 1458 must be multiplied to make it a perfect cube?

(c) What is the cube root of 13824? Is 13824 a perfect cube?

(d) Can a perfect cube end with the digit 8? Give one example to justify.