# NCERT Solutions for Class 8 Maths Chapter 1
# A Square and A Cube

## Figure It Out (Pages 10-11)

**1. Which of the following numbers are not perfect squares?**

**(i) 2032**

**(ii) 2048**

**(iii) 1027**

**(iv) 1089**

**Answer:**

(i) 2032 → ends with 2 → **not** a perfect square.

(ii) 2048 → ends with 8 → **not** a perfect square.

(iii) 1027 → ends with 7 → **not** a perfect square.

(iv) 1089 → ends with 9; check: $33^2 = 1089$ → **is** a perfect square.

**Explanation:** Squares can only end in 0, 1, 4, 5, 6, or 9. Any number ending in 2, 3, 7, or 8 cannot be a perfect square.

**2. Which one among 64^2, 108^2, 292^2, 36^2 has the last digit 4?**

**Answer:** $108^2$ and $292^2$.

$64^2 = 4096$ → last digit 6

$108^2 = 11664$ → last digit **4**

$292^2 = 85264$ → last digit **4**

$36^2 = 1296$ → last digit 6

**Explanation:** The last digit of a square depends only on the last digit of the base.

**3. Given 125^2 = 15625, what is the value of 126^2?**

**Answer:** 15876.
Work: Using $(n+1)^2 = n^2 + 2n + 1$ with n = 125:
$126^2 = 15625 + 250 + 1 =$ **15876**.
Explanation: Consecutive squares differ by 2n + 1.|

**4. Find the length of the side of a square whose area is 441 m^2.**

**Answer:** 21 m.
Explanation: If area = $s^2$, then $s = \sqrt{441} =$ **21**.

**5. Find the smallest square number that is divisible by each of the following numbers: 4, 9, and 10.**

**Answer:** 900.
Work: $4 = 2^2$, $9 = 3^2$, $10 = 2 \times 5$.
Smallest square divisible by all has even powers of all primes: $2^2 \times 3^2 \times 5^2 =$ **900**.
Explanation: A perfect square needs even exponents in its prime factorisation.

**6. Find the smallest number by which 9408 must be multiplied so that the product is a perfect square. Find the square root of the product.**

**Answer:** Multiply by **3**; the product is 28224 and $\sqrt{28224}$ = **168**.

Work: $9408 = 2^6 \times 3^1 \times 7^2 \rightarrow$ to make exponents even, multiply by one more 3.

Product: $9408 \times 3 = 28224 = 2^6 \times 3^2 \times 7^2$ (a perfect square).

$\sqrt{28224} = 2^3 \times 3 \times 7 = 8 \times 3 \times 7 =$ **168**.

Explanation: Perfect squares have all prime exponents even.

**7. How many numbers lie between the squares of the following numbers?**

**(i) 16 and 17**

**(ii) 99 and 100**

**Answer:**

**(i) 32**

**(ii) 198**

**Explanation:** For consecutive integers n and n+1, count of integers strictly between $n^2$ and $(n+1)^2$ is $(n+1)^2 - n^2 - 1 = 2n$. So for n = 16, it's 32; for n = 99, it's 198.

**8. In the following pattern, fill in the missing numbers:**

**$1^2 + 2^2 + 2^2 = 3^2$**

**$2^2 + 3^2 + 6^2 = 7^2$**

**$3^2 + 4^2 + 12^2 = 13^2$**

**$4^2 + 5^2 + 20^2 = (__)^2$**

**$9^2 + 10^2 + (__)^2 = (__)^2$**

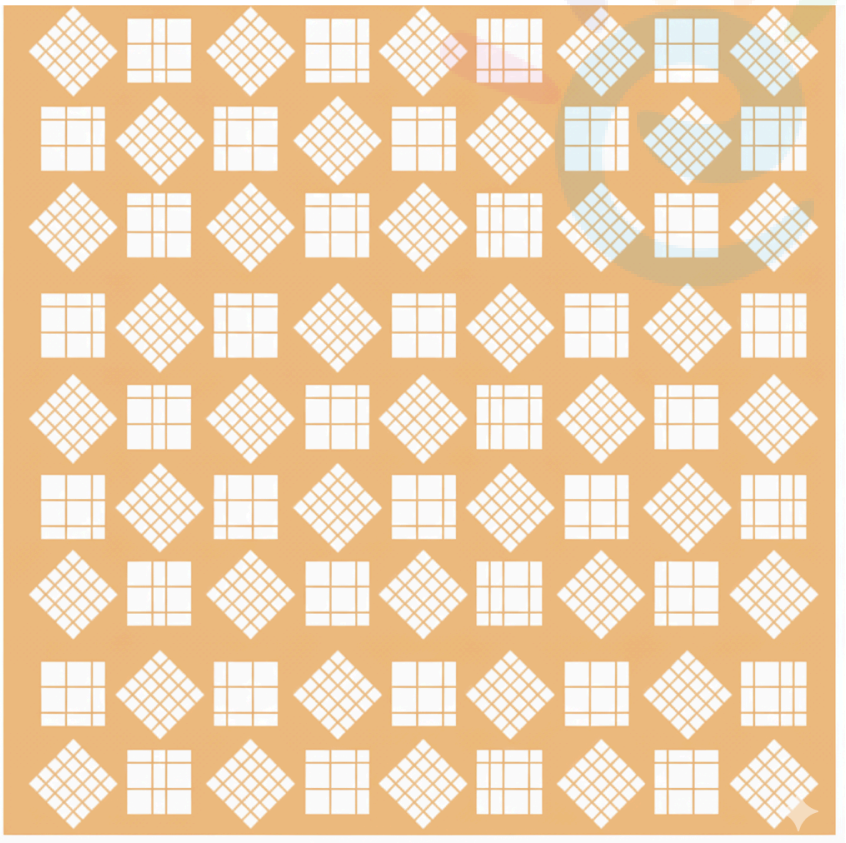
**Answer:**

$4^2 + 5^2 + 20^2 = \mathbf{21^2}$

$9^2 + 10^2 + \mathbf{90^2} = \mathbf{91^2}$

**Explanation:** The third term is the product of the two consecutive numbers (e.g., 4×5=20, 9×10=90), and the right side is one more than that product (20+1=21, 90+1=91), forming a Pythagorean-style identity.

**9. How many tiny squares are there in the following picture? Write the prime factorisation of the number of tiny squares.**



**Answer:**

Big squares in a row = 9
Big squares in a column = 9
Tiny squares in each big square = 25

∴ Total number of tiny squares = 9 × 9 × 25 = 2025

Now, the prime factorization of 2025 = 3 × 3 × 3 × 3 × 5 × 5 = 452

**Figure It Out (Pages 16-17)**

**1. Find the cube roots of 27000 and 10648.**

**Answer:**
$27000 = 27 \times 1000 = (3 \times 10)^3 \Rightarrow \sqrt[3]{27000} =$ **30**.
$10648 = (2 \times 11)^3 \Rightarrow \sqrt[3]{10648} =$ **22**.
**Explanation:** Break each number into a product of two perfect cubes. The cube root of a product is the product of the cube roots.

**2. What number will you multiply by 1323 to make it a cube number?**

**Answer:** Multiply by **7**. The cube number obtained is **9261** ($= 21^3$).
Work: $1323 = 3^3 \times 7^2$. To make a perfect cube, every prime's exponent must be a multiple of 3. Multiply by one more 7 to get $3^3 \times 7^3$.

**3. State true or false. Explain your reasoning.**
**(i) The cube of any odd number is even.**
**(ii) There is no perfect cube that ends with 8.**

**(iii) The cube of a 2-digit number may be a 3-digit number.**
**(iv) The cube of a 2-digit number may have seven or more digits.**
**(v) Cube numbers have an odd number of factors.**

**Answer:**
**False.** Odd × odd × odd stays odd (e.g., $3^3 = 27$).
**False.** $2^3 = 8$, $12^3 = 1728$ — cubes can end in 8.
**False.** The smallest 2-digit number is 10; $10^3 = 1000$ (4 digits). So a 2-digit cube cannot be 3-digit.
**False.** The largest 2-digit cube is $99^3 = 970,299$ (6 digits), not 7+ digits.
**False (in general).** Numbers have an odd number of factors only when they are perfect squares. Typical cubes like 8 ($=2^3$) and 27 ($=3^3$) have an even number of factors.

**Explanation:** Use basic parity rules, last-digit checks for cubes, and digit-count bounds: $10^3 = 1000$ (minimum for 2-digit bases) and $99^3 = 970,299$ (maximum for 2-digit bases). Factor-count parity is odd only for perfect squares.

**4. You are told that 1331 is a perfect cube. Can you guess without factorisation what its cube root is? Similarly, guess the cube roots of 4913, 12167, and 32768.**

**Answer:** $\sqrt[3]{1331}$ = **11**, $\sqrt[3]{4913}$ = **17**, $\sqrt[3]{12167}$ = **23**, $\sqrt[3]{32768}$ = **32**.
How to guess quickly:

**Step 1 (range):** Compare with nearby thousand-cubes: $10^3=1000$, $20^3=8000$, $30^3=27000$, $40^3=64000$, etc., to locate the tens digit.

**Step 2 (units digit rule for cubes):** The last digit of a perfect cube determines the last digit of the base uniquely (e.g., base ending 1→cube ends 1; 7→3; 3→7; 2→8; 8→2; 9→9; 0→0; 4→4; 5→5; 6→6).

**Examples:**

1331 lies between $10^3$ and $20^3$ and ends in 1 ⇒ base ends in 1 ⇒ **11**.

4913 lies between $17^3$ (=4913) and $18^3$ (=5832); last digit 3 ⇒ base ends in 7 ⇒ **17**.

12167 is between $20^3$ and $30^3$; last digit 7 ⇒ base ends in 3 ⇒ **23**.

32768 is between $30^3$ and $40^3$; last digit 8 ⇒ base ends in 2 ⇒ **32**.

**5. Which of the following is the greatest? Explain your reasoning.**

**(i) 673 – 663**

**(ii) 433 – 423**

**(iii) 672 – 662**

**(iv) 432 – 422**

**Answer: (i) 673 – 663** is the greatest.

Reasoning (using identities):

For (i) and (ii): $\mathbf{a^3 - b^3 = (a - b)(a^2 + ab + b^2)}$. Here, a - b = 1, so:

(i): $67^3 - 66^3 = 67^2 + 67 \cdot 66 + 66^2 = 4489 + 4422 + 4356 =$ **13267**.

(ii): $43^3 - 42^3 = 43^2 + 43 \cdot 42 + 42^2 = 1849 + 1806 + 1764 =$ **5419**.

For (iii) and (iv): **$a^2 - b^2 = (a - b)(a + b)$** with a - b = 1, so:

(iii): $67^2 - 66^2 = 67 + 66 =$ **133**.

(iv): $43^2 - 42^2 = 43 + 42 =$ **85**.

Comparing values: 13267 > 5419 > 133 > 85, hence (i) is greatest.