Important Questions Class 8 Maths Chapter 5 Square and Square Roots

Question 1:Show that the sum of two consecutive natural numbers is 13^2.

Answer 1: Let $2n + 1 = 13$

So, $n = 6$

So, $(2n + 1)^2 = 4n^2 + 4n + 1$

$= (2n^2 + 2n) + (2n^2 + 2n + 1)$

Substitute $n = 6$,

$(13)^2 = (2 \times 6^2 + 2 \times 6) + (2 \times 6^2 + 2 \times 6 + 1)$

$= (72 + 12) + (72 + 12 + 1)$

$= 84 + 85$

Question 2: What would be the square root of the number 625 using the identity

$(a + b)^2 = a^2 + b^2 + 2ab$?

Answer 2: $(625)^2$

$= (600 + 25)^2$

$= 600^2 + 2 \times 600 \times 25 + 25^2$

$= 360000 + 30000 + 625$

$= 390625$

Question 4:Use the following identity and find the square of 189.

$(a - b)^2 = a^2 - 2ab + b^2$

Answer 4: 189 = (200 – 11) 2

$= 40000 - 2 \times 200 \times 11 + 112$

$= 40000 - 4400 + 121$

= 35721

Question 5: Find the smallest whole number from which 1008 should be multiplied in order to obtain a perfect square number. Also, find out the square root of the square number so obtained.

Answer 5:

Let us factorise the number 1008.

2	1008
2	504
2	252
2	126
3	63
3	21
7	7
	1

1008 = 2 × 2 × 2 × 2 × 3 × 3 × 7

= (2 × 2) × (2 × 2) × (3 × 3) × 7

Here, 7 cannot be paired.

Therefore, we will multiply 1008 by 7 to get a perfect square.

New number so obtained = 1008 ×7 = 7056

Now, let us find the square root of 7056

2	7056
2	3528
2	1764
2	882
3	441
3	147
7	49
7	7
	1

7056 = 2 × 2 × 2 × 2 × 3 × 3× 7 × 7

7056 = (2 × 2) × (2 × 2) × (3 × 3) ×(7 × 7)

$7056 = 2^2 \times 2^2 \times 3^2 \times 7^2$

$7056 = (2 \times 2 \times 3 \times 7)^2$

Therefore;

$\sqrt{7056} = 2 \times 2 \times 3 \times 7 = 84$

Question 6: The sides of a right triangle whose hypotenuse is 17cm are _________ and _________.

Answer 6:

For each natural number, m > 1, 2m, m2 –1 and m2 + 1 form a Pythagorean triplet.

Now,

$m^2 + 1 = (2m)^2 + (m2 – 1)^2$

Where,

$m^2 + 1 = 17$

$m^2 = 17 – 1$

$m^2 = 16$

m = √16

m = 4

Then,

2m = 2 × 4

= 8

And,

$m^2 – 1 = 4^2 – 1$

= 16 -1

= 15

Question 7: √(1.96) = _________.

Answer 7: We have,

= √(1.96)

= √(196/100)

= √((14 × 14)/(10 × 10))

= √(142 / 102)

= 14/10

= 1.4

Question 8:If m is the required square of a natural number given by n, then n is

(a) the square of m

(b) greater than m

(c) equal to m

(d) √m

Answer 8: √m

$n^2 = m$

Then,

= n = √m

Question 9:There are _________ perfect squares between 1 and 100.

Answer 9: There are 8 perfect squares between 1 and 100.

$2 \times 2 = 4$

$3 \times 3 = 9$

$4 \times 4 = 16$

$5 \times 5 = 25$

$6 \times 6 = 36$

$7 \times 7 = 49$

$8 \times 8 = 64$

$9 \times 9 = 81$

Question 10: By what least number should the given number be divided to get a perfect square number? In each of the following cases, find the number whose square is the new number 1575.

Answer 10: A method for determining the prime factors of a given number, such as a composite number, is known as prime factorisation.

Given 1575,

Resolve 1575 into prime factors, we get

$1575 = 3 X 3 X 5 X 5 X 7 = (3^2 X 5^2 X 7)$

To obtain a perfect square, we have to divide the above equation by 7

Then we get, $3380 = 3 X 3 X 5 X 5$

New number = $(9 X 25) = (3^2 X 5^2)$

Taking squares on both sides of the above equation, we get

∴ New number = $(3 X 5)^2 = (15)^2$

Therefore, the new number is a square of 15

Question 11:Show that each of the numbers is a perfect square. In each case, find the number whose square is the given number:

7056

Answer 11: 7056,

A perfect square is always expressed as a product of pairs of prime factors.

Resolving 7056 into prime factors, we obtain

7056 = 11 X 539

= 12 X 588

= 12 X 7 X 84

= 84 X 84

= $(84)^2$

Thus, 84 is the number whose square is 5929

Therefore,7056 is a perfect square.

Question 12: Without adding, find the sum of the following:

(1+3+5+7+9+11+13+15+17+19+21+23)

Answer 12: (1+3+5+7+9+11+13+15+17+19+21+23)

As per the given property of perfect square, for any natural number n, we

have some of the first n odd natural numbers=n^2

But here n=12

By applying the above the law, we get

thus, (1+3+5+7+9+11+13+15+17+19+21+23) = 12^2 = 144

Question 13: Using the formula $(a – b)^2=(a^2 – 2ab + b^2)$, evaluate:

$(196)^2$

Answer 13: $(196)^2$

We have $(a – b)^2 = (a^2 – 2ab + b^2)$

$(196)^2$ can be written as 200-4

So here, a=200 and b=4

Using the formula,

$(200 – 4)^2 = (200^2 – 2 X 200 X 4 + 4^2)$

On simplifying, we get

$(200 – 4)^2 = (40000 – 1600 +16)$

$(196)^2 =38416$

Question 14: By what least number should the number be divided to obtain a number with a perfect square? In this, in each case, find the number whose square is the new number 4851.

Answer 14: The number is a perfect square if and only if the prime factorization creates pairs; it is not exactly a perfect square if it is not paired up.

Given 4851,

Resolving 4851 into prime factors, we obtain

4851 = 3 X 3 X 7 X 7 X 11

= (32 X 72 X 11)

To obtain a perfect square, we need to divide the above equation by

11

we obtain, 9075 = 3 X 3 X 7 X 7

The new number = (9 X 49)

$= (3^2 X 7^2)$

Taking squares on both sides from the above equation, we obtain

∴ The new number $= (3 X 7)^2$

$= (21)^2$

Therefore, the new number is a square of 21

Question 15: By what least number should the number be divided to obtain a perfect square number? In such a case, find the number whose square is the new number 4500.

Answer 15: The number is exactly a perfect square if and only if the prime factorization creates pairs; or else, it is not a perfect square number.

As per the given 4500,

Resolving 4500 into prime factors, we obtain

3380 = 2 X 2 X 3 X 3 X 5 X 5 X 5

$= (2^2 \times 3^2 \times 5^2 \times 5)$

To obtain a perfect square, we need to divide the above equation by 5

Then we obtain, 4500 = 2 X 2 X 3 X 3 X 5 X 5

The new number = (4 X 9 X 25)

$= (2^2 \times 3^2 \times 5^2)$

Taking squares on both sides from the above equation, we obtain

∴ The new number $= (2 \times 3 \times 5)^2$

$= (30)^2$

Therefore, the new number is a square of 30

Question 16: Write a Pythagorean triplet whose one member is:

(i) 6

(ii) 14

(iii) 16

(iv) 18

Answer 16: Any natural number m, 2m, m2–1, m2+1 is a Pythagorean triplet.

(i) $2m = 6$

$m = 6/2$

$m = 3$

$m^2 - 1 = 3^2 - 1 = 9 - 1 = 8$

$m^2 + 1 = 3^2 + 1 = 9 + 1 = 10$

Thus, (6, 8, 10) is a Pythagorean triplet.

(ii) $2m = 14$

$\Rightarrow m = 14/2 = 7$

$m^2 - 1 = 7^2 - 1 = 49 - 1 = 48$

$m^2 + 1 = 7^2 + 1 = 49 + 1 = 50$

Thus, (14, 48, 50) is not a Pythagorean triplet.

(iii) $2m = 16$

$\Rightarrow m = 16/2 = 8$

$m^2 - 1 = 8^2 - 1 = 64 - 1 = 63$

$m^2 + 1 = 8^2 + 1 = 64 + 1 = 65$

Thus, (16, 63, 65) is a Pythagorean triplet.

(iv) $2m = 18$

$\Rightarrow m = 18/2 = 9$

$m^2 - 1 = 9^2 - 1 = 81 - 1 = 80$

$m^2 + 1 = 9^2 + 1 = 81 + 1 = 82$

Thus, (18, 80, 82) is a Pythagorean triplet.

Question 17: How many numbers lie between the squares of the following numbers?

(i) 12 and 13

(ii) 25 and 26

(iii) 99 and 100

Answer 17: As we know, between n^2 and $(n+1)^2$, the number of non–perfect square numbers are 2n.

(i) Between 122 and 132, there are 2×12 = 24 natural numbers.

(ii) Between 252 and 262, there are 2×25 = 50 natural numbers.

(iii) Between 992 and 1002, there are 2×99 =198 natural numbers.

Question 18: 2025 plants are to be planted in a garden in a way that each of the rows contains as many plants as the number of rows. Find the number of rows and the number of plants in each row.

Answer 18:

Let the number of rows be x.

Thus, the number of plants in each row = x.

Total many contributed by all the students = $x \times x = x^2$

Given, x^2 = Rs.2025

x2 = 3×3×3×3×5×5

⇒ x2 = (3×3)×(3×3)×(5×5)

⇒ x2 = (3×3×5)×(3×3×5)

⇒ x2 = 45×45

⇒ x = √(45×45)

⇒ x = 45

Therefore,

Number of rows = 45

Number of plants in each row = 45

Question 19: The digit at the one's place of the number 572 is _________.

Answer 19: The digit at the one's place of the number 572 is 9.

We see that 3 or 7 at the unit's place ends in 9.

= 572

= 57 × 57

Question 20: Give a reason to show that the number given below is a perfect square:

5963

Answer 20: The unit digit of the square numbers will be 0, 1, 4, 5, 6, or 9 if we examine the squares of numbers from 1 to 10. Thus, the unit digit for all perfect squares will be 0, 1, 4, 5, 6, or 9, and none of the square numbers will end in 2, 3, 7, or 8.

Given 5963

We have the property of a perfect square, i.e. a number ending in 3 is never

a perfect square.

Therefore the given number 5963 is not a perfect square.