

Chapter 3: Squares and Square Roots & Cubes and Cube Roots

NCERT Exemplar · Class 8 · Maths

Questions

Question 1

196 is the square of

(a) 11 (b) 12 (c) 14 (d) 16

Solution

Solution:-

(c) 14

Square of 14 is,

$$= 14 \times 14 = 196$$

Question 2

Which of the following is a square of an even number?

(a) 144 (b) 169 (c) 441 (d) 625

Solution

Solution:-

(a) 144

Square of even number is 144,

$$= 12 \times 12 = 144$$

Question 3

A number ending in 9 will have the units place of its square as

- (a) 3 (b) 9 (c) 1 (d) 6

Solution

Solution:-

- (c) 1

Because, the square of a number having 1 or 9 at the units place ends in 1.

Example: – $11 \times 11 = 121$

Question 4

Which of the following will have 4 at the units place?

- (a) 14^2 (b) 62^2 (c) 27^2 (d) 35^2

Solution

Solution:-

- (b) 62^2

Because, the square of a number having 2 or 8 at the units place ends in 4.

$62 \times 62 = 3844$

Question 5

How many natural numbers lie between 5^2 and 6^2 ?

- (a) 9 (b) 10 (c) 11 (d) 12

Solution

Solution:-

- (b) 10

The natural numbers lie between 5^2 and 6^2 i.e. 25 and 36 are,

26, 27, 28, 29, 30, 31, 32, 33, 34 and 35

Question 6

Which of the following cannot be a perfect square?

(a) 841 (b) 529 (c) 198 (d) All of the above

Solution

Solution:-

(c) 198

Because, we know that the numbers end with 2, 3, 7 and 8 are not perfect squares.

Question 7

The one's digit of the cube of 23 is

(a) 6 (b) 7 (c) 3 (d) 9

Solution

Solution:-

(b) 7

The one's digit of cube 23 i.e. $23 \times 23 \times 23 = 12,167$

So, one's digit is 7

Question 8

A square board has an area of 144 square units. How long is each side of the board? (a) 11 units (b) 12 units (c) 13 units (d) 14 units

Solution

Solution:-

(b) 12 units

We know that area of square = Side $\times$ Side

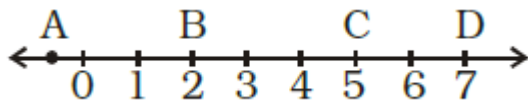
$$= 12 \times 12$$

$$= 144 \text{ square units}$$

Question 9

Which letter best represents the location of $\sqrt{25}$ on a number line?

(a) A (b) B (c) C (d) D

**Solution**

Solution:-

(c) C

$$\sqrt{25} = 5 \times 5 = 5^2 = 25$$

Question 10

If one member of a Pythagorean triplet is $2m$, then the other two members are

(a) $m, m^2 + 1$

(b) $m^2 + 1, m^2 - 1$

(c) $m^2, m^2 - 1$

(d) $m^2, m + 1$

Solution

Solution:-

(b) $m^2 + 1, m^2 - 1$

We know that, for every natural number $m > 1$, $2m$, $m^2 - 1$ and $m^2 + 1$ form a Pythagorean triplet.

Question 11

The sum of successive odd numbers 1, 3, 5, 7, 9, 11, 13 and 15 is

(a) 81 (b) 64 (c) 49 (d) 36

Solution

Solution:-

(b) 64

$$= 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15$$

$$= 64$$

Question 12

The sum of first n odd natural numbers is

(a) $2n + 1$ (b) n^2 (c) $n^2 - 1$ (d) $n^2 + 1$

Solution

Solution:-

(b) n^2

The sum of first n odd natural numbers is given by n^2 .

Question 13

Which of the following numbers is a perfect cube?

(a) 243 (b) 216 (c) 392 (d) 8640

Solution

Solution:-

(b) 216

A perfect cube can always be expressed as the product of triplets of prime factors.

$$216 = 6 \times 6 \times 6 = 6^3$$

Question 14

The hypotenuse of a right triangle with its legs of lengths $3x \times 4x$ is

(a) 5x (b) 7x (c) 16x (d) 25x

Solution

Solution:-

We know that,

$$\text{Pythagoras theorem} = a = \sqrt{b^2 + c^2}$$

Where 'a' is hypotenuse and b and c are the other two legs of triangle.

Then,

$$a = \sqrt{(3x)^2 + (4x)^2}$$

$$a = \sqrt{9x^2 + 16x^2}$$

$$a = \sqrt{9x^2 + 16x^2}$$

$$a = \sqrt{9x + 16x}$$

$$a = \sqrt{25x}$$

$$a = 5x$$

Hence the hypotenuse of the right triangle is 5x.

Question 15

The next two numbers in the number pattern 1, 4, 9, 16, 25 ... are

(a) 35, 48 (b) 36, 49 (c) 36, 48 (d) 35, 49

Solution

Solution:-

(b) 36, 49

The numbers given in the question are perfect square numbers.

$$1^2 = 1, 2^2 = 4, 3^2 = 9, 4^2 = 16, 5^2 = 25$$

$$\text{So, } 6 \times 6 = 36 \text{ and } 7 \times 7 = 49$$

Question 16

Which among 43^2 , 67^2 , 52^2 , 59^2 would end with digit 1?

(a) 43^2 (b) 67^2 (c) 52^2 (d) 59^2

Solution

Solution:-

(d) 59^2

Because, the square of a number having 1 or 9 at the units place ends in 1.

Question 17

A perfect square can never have the following digit in its ones place.

(a) 1 (b) 8 (c) 0 (d) 6

Solution

Solution:-

(b) 8

Question 18

Which of the following numbers is not a perfect cube?

(a) 216 (b) 567 (c) 125 (d) 343

Solution

Solution:-

(b) 567

Because, factors of 216 = $6 \times 6 \times 6$

$567 = 9 \times 9 \times 7$

$125 = 5 \times 5 \times 5$

$343 = 7 \times 7 \times 7$

Question 19

$\sqrt[3]{1000}$ is equal to

- (a) 10 (b) 100 (c) 1 (d) none of these

Solution

Solution:-

(a) 10

$$= \sqrt[3]{1000}$$

$$= \sqrt[3]{(10 \times 10 \times 10)}$$

$$= \sqrt[3]{(10^3)}$$

$$= 10$$

Question 20

If m is the square of a natural number n, then n is

- (a) the square of m
(b) greater than m
(c) equal to m
(d) $\sqrt{m}$

Solution

Solution:-

(d) $\sqrt{m}$

$$n^2 = m$$

Then,

$$= n = \sqrt{m}$$

Question 21

A perfect square number having n digits where n is even will have square root with

(a) $n + 1$ digit (b) $n/2$ digit (c) $n/3$ digit (d) $(n + 1)/2$ digit

Solution

Solution:-

(b) $n/2$ digit

Question 22

If m is the cube root of n , then n is

(a) m^3 (b) $\sqrt{m}$ (c) $m/3$ (d) $\sqrt[3]{m}$

Solution

Solution:-

(a) m^3

Given in the question,

$$\sqrt[3]{n} = m$$

$$n = m^3$$

Question 23

The value of $\sqrt{248 + \sqrt{52 + \sqrt{144}}}$ is

(a) 14 (b) 12 (c) 16 (d) 13

Solution

Solution:-

(c) 16

$$\sqrt{248 + \sqrt{52 + \sqrt{144}}}$$

$$= \sqrt{248 + \sqrt{52 + 12}}$$

$$= \sqrt{248 + \sqrt{64}}$$

$$= \sqrt{248 + 8}$$

$$= \sqrt{256}$$

$$= 16$$

Question 24

Given that $\sqrt{4096} = 64$, the value of $\sqrt{4096} + \sqrt{40.96}$ is

(a) 74 (b) 60.4 (c) 64.4 (d) 70.4

Solution

Solution:-

(d) 70.4

$$\sqrt{4096} + \sqrt{40.96}$$

$$= 64 + 6.4$$

$$= 70.4$$

In questions 25 to 48, fill in the blanks to make the statements true.

Question 25

There are _____ perfect squares between 1 and 100.

Solution

Solution:-

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 26

There are _____ perfect cubes between 1 and 1000.

Solution

Solution:-

There are 8 perfect cubes between 1 and 1000.

$$2 \times 2 \times 2 = 8$$

$$3 \times 3 \times 3 = 27$$

$$4 \times 4 \times 4 = 64$$

$$5 \times 5 \times 5 = 125$$

$$6 \times 6 \times 6 = 216$$

$$7 \times 7 \times 7 = 343$$

$$8 \times 8 \times 8 = 512$$

$$9 \times 9 \times 9 = 729$$

Question 27

The units digit in the square of 1294 is _____.

Solution

Solution:-

The units digit in the square of 1294 is 6.

We know that, 4 or 6 at the units place ends in 6.

Question 28

The square of 500 will have _____ zeroes.

Solution**Solution:-**

The square of 500 will have 4 zeroes.

$$500^2 = 500 \times 500 = 25000$$

Question 29

There are _____ natural numbers between n^2 and $(n + 1)^2$.

Solution**Solution:-**

There are $2n$ natural numbers between n^2 and $(n + 1)^2$.

Question 30

The square root of 24025 will have _____ digits.

Solution**Solution:-**

The square root of 24025 will have 3 digits.

The number given in the question has 5 digits,

$$\text{i.e. } n = 5$$

Then,

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

$$= (5 + 1)/2$$

$$= 6/2$$

$$= 3$$

Question 31

The square of 5.5 is _____.

Solution

Solution:-

The square of 5.5 is 30.25.

$$= 5.5^2 = 5.5 \times 5.5 = 30.25$$

Question 32

The square root of 5.3×5.3 is _____.

Solution

Solution:-

The square root of 5.3×5.3 is 5.3.

$$= \sqrt{5.3 \times 5.3}$$

$$= \sqrt{28.09}$$

$$= 5.3$$

Question 33

The cube of 100 will have _____ zeroes.

Solution

Solution:-

The cube of 100 will have 6 zeroes.

$$= 100^3$$

$$= 100 \times 100 \times 100$$

$$= 1000000$$

Question 34

$$1\text{m}^2 = \underline{\hspace{2cm}} \text{cm}^2.$$

Solution**Solution:-**

We know that, $1\text{m} = 100\text{cm}$

Then,

$$1\text{m}^2 = 10000 \text{cm}^2$$

Question 35

$$1\text{m}^3 = \underline{\hspace{2cm}} \text{cm}^3.$$

Solution**Solution:-**

We know that, $1\text{m} = 100\text{cm}$

Then,

$$1\text{m}^3 = 1000000 \text{cm}^3$$

Question 36

Ones digit in the cube of 38 is .

Solution**Solution:-**

Ones digit in the cube of 38 is 2.

We know that,

$$38 \times 38 \times 38 = 54,872$$

Question 37

The square of 0.7 is .

Solution**Solution:-**

The square of 0.7 is 0.49.

$$= 0.7^2$$

$$= 0.7 \times 0.7$$

$$= 0.49$$

Question 38

The sum of first six odd natural numbers is _____.

Solution**Solution:-**

The sum of first six odd natural numbers is 36.

The first six odd numbers are 1, 3, 5, 7, 9, and 11

Then,

$$\text{Sum of first six odd numbers} = 1 + 3 + 5 + 7 + 9 + 11$$

$$= 36$$

Question 39

The digit at the ones place of 57^2 is _____.

Solution**Solution:-**

The digit at the ones place of 57^2 is 9.

We know that, 3 or 7 at the units place ends in 9.

$$= 57^2$$

$$= 57 \times 57$$

$$= 3249$$

Question 40

The sides of a right triangle whose hypotenuse is 17cm are _____ and _____.

Solution**Solution:-**

For every natural number $m > 1$, $2m$, $m^2 - 1$ and $m^2 + 1$ form a Pythagorean triplet.

Now,

$$m^2 + 1 = (2m)^2 + (m^2 - 1)^2$$

Where,

$$m^2 + 1 = 17$$

$$m^2 = 17 - 1$$

$$m^2 = 16$$

$$m = \sqrt{16}$$

$$m = 4$$

Then,

$$2m = 2 \times 4$$

$$= 8$$

And,

$$m^2 - 1 = 4^2 - 1$$

$$= 16 - 1$$

$$= 15$$

Question 41

$$\sqrt{1.96} = \underline{\hspace{2cm}}.$$

Solution

Solution:-

We have,

$$= \sqrt{1.96}$$

$$= \sqrt{196/100}$$

$$= \sqrt{(14 \times 14)/(10 \times 10)}$$

$$= \sqrt{14^2 / 10^2}$$

$$= 14/10$$

$$= 1.4$$

Question 42

$$(1.2)^3 = \underline{\hspace{2cm}}.$$

Solution

Solution:-

$$(1.2)^3 = 12/10$$

$$= (12/10) \times (12/10) \times (12/10)$$

$$= 1728/1000$$

$$= 1.728$$

Question 43

The cube of an odd number is always an _____ number.

Solution

Solution:-

The cube of an odd number is always an odd.

Question 44

The cube root of a number x is denoted by _____.

Solution

Solution:-

The cube root of a number x is denoted by $\sqrt[3]{x}$ or $x^{1/3}$

Question 45

The least number by which 125 be multiplied to make it a perfect square is _____.

Solution

Solution:-

The least number by which 125 be multiplied to make it a perfect square is 5.

$$125 = 5 \times 5 \times 5$$

Question 46

The least number by which 72 be multiplied to make it a perfect cube is _____.

Solution

Solution:-

The least number by which 72 be multiplied to make it a perfect cube is 3.

$$72 = 2 \times 2 \times 2 \times 3 \times 3$$

Question 47

The least number by which 72 be divided to make it a perfect cube is _____.

Solution

Solution:-

The least number by which 72 be divided to make it a perfect cube is 9.

Question 48

Cube of a number ending in 7 will end in the digit _____.

Solution

Solution:-

Cube of a number ending in 7 will end in the digit 3.

In questions 49 to 86, state whether the statements are true (T) or false (F).

Question 49

The square of 86 will have 6 at the units place.

Solution

Solution:-

True.

The square of a number having 4 or 6 at the units place ends in 6.

Question 50

The sum of two perfect squares is a perfect square.

Solution

Solution:-

False.

Let us take two perfect square 25 and 49.

Then, sum of the two perfect square = $25 + 49 = 74$

So, 74 is not a perfect square.

Question 51

The product of two perfect squares is a perfect square.

Solution

Solution:-

True.

Let us take two perfect square 4 and 9.

Then, product of two perfect square is $= 4 \times 9 = 36$

Question 52

There is no square number between 50 and 60.

Solution

Solution:-

True.

Question 53

The square root of 1521 is 31.

Solution

Solution:-

False.

The square root of 1521 is 39.

Question 54

Each prime factor appears 3 times in its cube.

Solution

Solution:-

True.

We know that, a perfect cube can always be expressed as the product of triplets of prime factors.

Question 55

The square of 2.8 is 78.4.

Solution

Solution:-

False.

$$= 2.8^2$$

$$= (28/10)^2$$

$$= 784/100$$

$$= 7.84$$

Question 56

The cube of 0.4 is 0.064.

Solution

Solution:-

True.

$$= 0.4^3$$

$$= (4/10)^3$$

$$= 64/1000$$

$$= 0.064$$

Question 57

The square root of 0.9 is 0.3.

Solution

Solution:-

False.

$$= \sqrt{0.9}$$

$$= 0.9487$$

$$0.9 = 0.3^2$$

$$= 0.3 \times 0.3$$

$$= 0.09$$

Question 58

The square of every natural number is always greater than the number itself.

Solution

Solution:-

False.

As 1 is a natural number and the square of 1 is not greater itself rather its equal to the number itself

Thus, the given statement is not always true.

Question 59

The cube root of 8000 is 200.

Solution

Solution:-

False

$$\sqrt[3]{8000} = 20$$

Question 60

There are five perfect cubes between 1 and 100.

Solution

Solution:-

False.

There are only 3 perfect cubes between 1 and 100.

$$2 \times 2 \times 2 = 8$$

$$3 \times 3 \times 3 = 27$$

$$4 \times 4 \times 4 = 64$$

Question 61

There are 200 natural numbers between 100^2 and 101^2 .

Solution

Solution:-

True.

We know that, natural numbers between a and b = $b - a - 1$

$$= 101^2 - 100^2 - 1$$

$$= (101 + 100)(101 - 100) - 1$$

$$= 201 - 1$$

$$= 200$$

Question 62

The sum of first n odd natural numbers is n^2 .

Solution

Solution:-

True.

The sum of odd numbers = $\sum (2n - 1)$

$$= (2 \times n \times (n + 1))/2 - n$$

$$= n^2 + n - n$$

$$= n^2$$

Question 63

1000 is a perfect square.

Solution

Solution:-

False.

It is not a perfect square.

1000 is a perfect cube, i.e. $10 \times 10 \times 10 = 1000$

Question 64

A perfect square can have 8 as its unit's digit.

Solution

Solution:-

False.

A perfect square can never have 8 as its unit's digit.

Question 65

For every natural number m , $(2m - 1, 2m^2 - 2m, 2m^2 - 2m + 1)$ is a Pythagorean triplet.

Solution

Solution:-

False.

For every natural number $m > 1$, $2m$, $m^2 - 1$ and $m^2 + 1$ form a Pythagorean triplet.

Question 66

All numbers of a Pythagorean triplet are odd.

Solution

Solution:-

False.

Three natural numbers a, b, c are said to form a Pythagorean triplet if $a^2 + b^2 = c^2$.

Then,

Pythagorean triplet as, $7^2 = 6^2 + 5^2$

6 is not an odd number.

Question 67

For an integer a , a^3 is always greater than a^2 .

Solution

Solution:-

False.

Let us take one negative integer, i.e. -2

Then, $-2^3 = -2 \times -2 \times -2 = -8$

$-2^2 = -2 \times -2 = 4$

Here, $4 > -8$

Hence, -2^2 is greater than -2^3 .

Question 68

If x and y are integers such that $x^2 > y^2$, then $x^3 > y^3$.

Solution

Solution:-

False.

Let us take negative integers -2 and -3

Then,

$$= (-2^2) > (-1^2)$$

$$= (4) > (1)$$

$$\text{and } = -2^3 < -1^3$$

$$= -8 < -1$$

Question 69

Let x and y be natural numbers. If x divides y , then x^3 divides y^3 .

Solution

Solution:-

True.

If x divides y y/x is a natural number

and then x^3 divides $y^3 = y^3/x^3$ is a natural number

Question 70

If a^2 ends in 5, then a^3 ends in 25.

Solution

Solution:-

False.

Let a^2 be 15^2

$$\text{So, } 15^2 = 225$$

$$\text{Then, } 15^3 = 3375$$

Question 71

If a^2 ends in 9, then a^3 ends in 7.

Solution**Solution:-**

False.

Let a^2 be 7^2

So, $7^2 = 49$

Then, $7^3 = 343$

Question 72

The square root of a perfect square of n digits will have $(n + 1)/2$ digits, if n is odd.

Solution**Solution:-**

True.

Let us assume the perfect square has 9 digits, then its square root has 5 digits

i.e. $(9 + 1)/2 = 10/2 = 5$

Question 73

Square root of a number x is denoted by $\sqrt{x}$.

Solution**Solution:-**

True.

Question 74

A number having 7 at its ones place will have 3 at the units place of its square.

Solution**Solution:-**

False.

Let us take the number having 7 at its ones place i.e. 47 and

Its square $47^2 = 2209$

Question 75

A number having 7 at its ones place will have 3 at the ones place of its cube.

Solution

Solution:-

True.

Let us take the number having 7 at its ones place i.e. 37 and

Its square $37^3 = 50,653$

Another number is $27^3 = 19,683$

Question 76

The cube of a one digit number cannot be a two digit number.

Solution

Solution:-

False.

The cube of 3 i.e. $4^3 = 4 \times 4 \times 4 = 64$

Question 77

Cube of an even number is odd.

Solution

Solution:-

False.

The cube of an even number is always an even number.

$$2^3 = 8$$

$$4^3 = 64$$

Question 78

Cube of an odd number is even.

Solution

Solution:-

False.

The cube of odd number is always an odd number.

$$3^3 = 27$$

$$5^3 = 125$$

Question 79

Cube of an even number is even.

Solution

Solution:-

True.

The cube of an even number is always an even number.

$$8^3 = 512$$

$$12^3 = 1728$$

Question 80

Cube of an odd number is odd.

Solution

Solution:-

True.

The cube of odd number is always an odd number.

$$7^3 = 343$$

Question 81

999 is a perfect cube.

Solution

Solution:-

False.

Question 82

363×81 is a perfect cube.

Solution

Solution:-

False.

So, factors of 363×81 are $3 \times 11 \times 11 \times 3 \times 3 \times 3 \times 3$

$$= 3^3 \times 11 \times 11 \times 3 \times 3$$

Question 83

Cube roots of 8 are +2 and -2.

Solution

Solution:-

False.

Because, cube root of 8 is 2 only.

$$\text{i.e. } 2 \times 2 \times 2 = 8$$

Question 84

$$\sqrt[3]{8 + 27} = \sqrt[3]{8} + \sqrt[3]{27}.$$

Solution

Solution:-

False.

$$\text{Let us consider LHS} = \sqrt[3]{8 + 27}$$

$$= \sqrt[3]{35}$$

$$\text{Then, RHS} = \sqrt[3]{8} + \sqrt[3]{27}$$

$$= 2 + 3$$

$$= 5$$

By comparing LHS and RHS

$$\text{LHS} \neq \text{RHS}$$

$$\sqrt[3]{35} \neq 5$$

Question 85

There is no cube root of a negative integer.

Solution

Solution:-

False.

Let us take -27

$$\text{Cube root of -27 i.e. } \sqrt[3]{-27} = \sqrt[3]{(-3) \times (-3) \times (-3)}$$

$$= -3$$

Question 86

Square of a number is positive, so the cube of that number will also be positive.

Solution

Solution:-

False.

Let us take -3

Now, square of the -3 i.e. $-3^2 = 9$

Then, cube of the same number i.e. $-3^3 = -27$

Solve the following questions.

Question 87

Write the first five square numbers.

Solution

Solution:-

The first five square numbers are,

$$1 \times 1 = 1$$

$$2 \times 2 = 4$$

$$3 \times 3 = 9$$

$$4 \times 4 = 16$$

$$5 \times 5 = 25$$

Question 88

Write cubes of first three multiples of 3.

Solution

Solution:-

The first three multiple of 3 are 3, 6 and 9

Then,

Cubes of first three multiples of 3,

$$= 3^3 = 3 \times 3 \times 3 = 27$$

$$= 6^3 = 6 \times 6 \times 6 = 216$$

$$= 9^3 = 9 \times 9 \times 9 = 729$$

Question 89

Show that 500 is not a perfect square.

Solution

Solution:-

Factors of 500 are $2 \times 2 \times 5 \times 5 \times 5$

Now,

Group the factors into pairs,

$$500 = (2 \times 2) \times (5 \times 5 \times 5)$$

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

So, the prime factors 2 and 5 do not occur in pairs.

Therefore, 500 is not a perfect square.

Question 90

Express 81 as the sum of first nine consecutive odd numbers.

Solution

Solution:-

The first nine consecutive odd numbers are 1, 3, 5, 7, 9, 11, 13, 15 and 17

Then,

We know that 81 is a perfect square,

$$81 = (9)^2$$

Now,

The sum of first nine consecutive odd numbers,

$$= 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17$$

$$= 81$$

Question 91

Using prime factorisation, find which of the following are perfect squares.

(a) 484

Solution

Solution:-

First we have to find out the factors by using prime factorisation method.

2	484
2	242
11	121
11	11
	1

So, prime factors of $484 = 2 \times 2 \times 11 \times 11$

Now, grouping the prime factors $= (2 \times 2) \times (11 \times 11)$

$$= 2^2 \times 11^2$$

There is no unpaired factor remains here.

$\therefore$ 484 is a perfect square.

(b) 11250

Solution:-

First we have to find out the factors by using prime factorisation method.

$$\begin{array}{r|l}
 2 & 11250 \\
 \hline
 3 & 5625 \\
 \hline
 3 & 1875 \\
 \hline
 5 & 625 \\
 \hline
 5 & 125 \\
 \hline
 5 & 25 \\
 \hline
 5 & 5 \\
 \hline
 & 1
 \end{array}$$

So, prime factors of 11250 = $2 \times 3 \times 3 \times 5 \times 5 \times 5 \times 5$

Now, grouping the prime factors = $2 \times (3 \times 3) \times (5 \times 5) \times (5 \times 5)$

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

Factor 2 has no pair.

$\therefore$ 11250 is not a perfect square.

(c) 841

Solution:-

First we have to find out the factors by using prime factorisation method.

$$\begin{array}{r|l}
 29 & 841 \\
 \hline
 29 & 29 \\
 \hline
 & 1
 \end{array}$$

So, prime factors of 841 = 29×29

Now, grouping the prime factors = (29×29)

$$= 29^2$$

There is no unpaired factor remains here.

$\therefore$ 841 is a perfect square.

(d) 729

Solution:-

First we have to find out the factors by using prime factorisation method.

$$\begin{array}{r|l}
 3 & 729 \\
 \hline
 3 & 243 \\
 \hline
 3 & 81 \\
 \hline
 3 & 27 \\
 \hline
 3 & 9 \\
 \hline
 3 & 3 \\
 \hline
 & 1
 \end{array}$$

So, prime factors of $729 = 3 \times 3 \times 3 \times 3 \times 3 \times 3$

Now, grouping the prime factors $= (3 \times 3) \times (3 \times 3) \times (3 \times 3)$

$$= 3^2 \times 3^2 \times 3^2$$

There is no unpaired factor remains here.

$\therefore 729$ is a perfect square.

Question 92

Using prime factorisation, find which of the following are perfect cubes.

(a) 128

Solution

Solution:-

First we have to find out the factors by using prime factorisation method.

$$\begin{array}{r|l}
 2 & 128 \\
 \hline
 2 & 64 \\
 \hline
 2 & 32 \\
 \hline
 2 & 16 \\
 \hline
 2 & 8 \\
 \hline
 2 & 4 \\
 \hline
 2 & 2 \\
 \hline
 & 1
 \end{array}$$

So, prime factors of $128 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

Now, grouping the prime factors $= (2 \times 2 \times 2) \times (2 \times 2 \times 2) \times 2$

$$= 2^3 \times 2^3 \times 2$$

Factor 2 remains unpaired after grouping in triplets.

$\therefore 128$ is not a perfect cube.

(b) 343

Solution:-

First we have to find out the factors by using prime factorisation method.

$$\begin{array}{r|l} 7 & 343 \\ \hline 7 & 49 \\ \hline 7 & 7 \\ \hline & 1 \end{array}$$

So, prime factors of $343 = 7 \times 7 \times 7$

Now, grouping the prime factors $= (7 \times 7 \times 7)$

$$= 7^3$$

There is no unpaired factor remains here.

$\therefore 343$ is a perfect cube.

(c) 729

Solution:-

First we have to find out the factors by using prime factorisation method.

$$\begin{array}{r|l} 3 & 729 \\ \hline 3 & 243 \\ \hline 3 & 81 \\ \hline 3 & 27 \\ \hline 3 & 9 \\ \hline 3 & 3 \\ \hline & 1 \end{array}$$

So, prime factors of $729 = 3 \times 3 \times 3 \times 3 \times 3 \times 3$

Now, grouping the prime factors $= (3 \times 3 \times 3) \times (3 \times 3 \times 3)$

$$= 3^3 \times 3^3$$

There is no unpaired factor remains here.

$\therefore 729$ is a perfect cube.

(d) 1331

Solution:-

First we have to find out the factors by using prime factorisation method.

$$\begin{array}{r|l}
 11 & 1331 \\
 \hline
 11 & 121 \\
 \hline
 11 & 11 \\
 \hline
 & 1
 \end{array}$$

So, prime factors of 1331 = $11 \times 11 \times 11$

Now, grouping the prime factors = $(11 \times 11 \times 11)$

$$= 11^3$$

There is no unpaired factor remains here.

$\therefore$ 1331 is a perfect cube.

Question 93

Using distributive law, find the squares of

(a) 101

Solution**Solution:-**

By using distributive law,

We have,

$$101 = 100 + 1$$

So,

$$101^2 = (100 + 1)^2$$

$$= (100 + 1)(100 + 1)$$

$$= 100(100 + 1) + 1(100 + 1)$$

$$= ((100 \times 100) + (100 \times 1)) + ((1 \times 100) + (1 \times 1))$$

$$= 10000 + 100 + 100 + 1$$

$$= 10201$$

∴ The square of the given number i.e. $101^2 = 10201$

(b) 72

Solution:-

By using distributive law,

We have,

$$72 = 70 + 2$$

So,

$$72^2 = (70 + 2)^2$$

$$= (70 + 2) (70 + 2)$$

$$= 70 (70 + 2) + 2 (70 + 2)$$

$$= ((70 \times 70) + (70 \times 2)) + ((2 \times 70) + (2 \times 2))$$

$$= 4900 + 140 + 140 + 4$$

$$= 5184$$

∴ The square of the given number i.e. $72^2 = 5184$

Question 94

Can a right triangle with sides 6cm, 10cm and 8cm be formed? Give reason.

Solution

Solution:-

From the question it is given that,

Sides of the right angle triangle are 6 cm, 10 cm and 8 cm

We know that, the square one side must be equal to the sum of square of other two sides of right angle triangle.

$$\text{i.e. } a^2 = b^2 + c^2$$

Where, $a = 10$ cm, $b = 8$ cm, $c = 6$ cm

$$10^2 = 8^2 + 6^2$$

$$100 = 64 + 36$$

$$100 = 100$$

∴ Right angle triangle is formed by the given sides 6cm, 10cm and 8cm.

Question 95

Write the Pythagorean triplet whose one of the numbers is 4.

Solution

Solution:-

Given, one of the number in the Pythagorean triplet i.e. 4.

Then,

$$2m = 4$$

$$m = 4/2$$

$$m = 2$$

So,

$$= m^2 + 1$$

$$= 2^2 + 1$$

$$= 4 + 1$$

$$= 5$$

And,

$$= m^2 - 1$$

$$= 2^2 - 1$$

$$= 4 - 1$$

$$= 3$$

∴ The Pythagorean triplet is 3, 4 and 5.

Question 96

Using prime factorisation, find the square roots of

(a) 11025

Solution

Solution:-

First we have to find out the factors by using prime factorisation method.

$$\begin{array}{r|l}
 3 & 11025 \\
 \hline
 3 & 3675 \\
 \hline
 5 & 1225 \\
 \hline
 5 & 249 \\
 \hline
 7 & 49 \\
 \hline
 7 & 7 \\
 \hline
 & 1
 \end{array}$$

So, prime factors of 11025 = $3 \times 3 \times 5 \times 5 \times 7 \times 7$

Now, grouping the prime factors = $(3 \times 3) \times (5 \times 5) \times (7 \times 7)$

Then, Square root of 11025 = $\sqrt{11025}$

$$= \sqrt{(3 \times 3) \times (5 \times 5) \times (7 \times 7)}$$

$$= \sqrt{3^2 \times 5^2 \times 7^2}$$

$$= 3 \times 5 \times 7$$

$$= 105$$

∴ The Square root of 11025 is 105.

(b) 4761

Solution:-

First we have to find out the factors by using prime factorisation method.

$$\begin{array}{r|l}
 3 & 4761 \\
 \hline
 3 & 1587 \\
 \hline
 23 & 529 \\
 \hline
 23 & 23 \\
 \hline
 & 1
 \end{array}$$

So, prime factors of 4761 = $3 \times 3 \times 23 \times 23$

Now, grouping the prime factors = $(3 \times 3) \times (23 \times 23)$

Then, Square root of 4761 = $\sqrt{4761}$

$$= \sqrt{(3 \times 3) \times (23 \times 23)}$$

$$= \sqrt{3^2 \times 23^2}$$

$$= 3 \times 23$$

$$= 69$$

∴ The Square root of 4761 is 69.

Question 97

Using prime factorisation, find the cube roots of

(a) 512

Solution

Solution:-

First we have to find out the factors by using prime factorisation method.

$$\begin{array}{r|l}
 2 & 512 \\
 \hline
 2 & 256 \\
 \hline
 2 & 128 \\
 \hline
 2 & 64 \\
 \hline
 2 & 32 \\
 \hline
 2 & 16 \\
 \hline
 2 & 8 \\
 \hline
 2 & 4 \\
 \hline
 2 & 2 \\
 \hline
 & 1
 \end{array}$$

So, prime factors of 512 = $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$

Now, grouping the prime factors = $(2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (2 \times 2 \times 2)$

Then, cube root of 512 = $\sqrt[3]{512}$

$$= \sqrt[3]{((2 \times 2 \times 2) \times (2 \times 2 \times 2) \times (2 \times 2 \times 2))}$$

$$= \sqrt[3]{(2^3 \times 2^3 \times 2^3)}$$

$$= 2 \times 2 \times 2$$

$$= 8$$

∴ The cube root of 512 is 8.

(b) 2197

Solution:-

First we have to find out the factors by using prime factorisation method.

13	2197
13	169
13	13
1	

So, prime factors of 2197 = $13 \times 13 \times 13$

Now, grouping the prime factors = $(13 \times 13 \times 13)$

Then, cube root of 2197 = $\sqrt[3]{2197}$

$$= \sqrt[3]{(13 \times 13 \times 13)}$$

$$= \sqrt[3]{(13^3)}$$

$$= 13$$

∴ The cube root of 2197 is 13.

Question 98

Is 176 a perfect square? If not, find the smallest number by which it should be multiplied to get a perfect square.

Solution

Solution:-

First we have to find out the factors by using prime factorisation method.

$$\begin{array}{r|l}
 2 & 176 \\
 \hline
 2 & 88 \\
 \hline
 2 & 44 \\
 \hline
 2 & 22 \\
 \hline
 11 & 11 \\
 \hline
 & 1
 \end{array}$$

So, prime factors of 176 = $2 \times 2 \times 2 \times 2 \times 11$

Now, grouping the prime factors = $(2 \times 2) \times (2 \times 2) \times (11)$

$$= 2^2 \times 2^2 \times 11$$

Factor 11 has no pair.

$\therefore$ 176 is not a perfect square.

The smallest number it should be multiplied to get a perfect square is 11.

Then,

$$176 \times 11 = 1936$$

$$\text{Factors of } 1936 = 2 \times 2 \times 2 \times 2 \times 11 \times 11$$

$$= \sqrt{1936}$$

$$= \sqrt{(2^2 \times 2^2 \times 11^2)}$$

$$= 2 \times 2 \times 11$$

$$= 44$$

$\therefore$ Square root of 1936 is 44.

Question 99

Is 9720 a perfect cube? If not, find the smallest number by which it should be divided to get a perfect cube.

Solution

Solution:-

First we have to find out the factors by using prime factorisation method.

$$\begin{array}{r|l}
 2 & 9720 \\
 \hline
 2 & 4860 \\
 \hline
 2 & 2430 \\
 \hline
 3 & 1215 \\
 \hline
 3 & 405 \\
 \hline
 3 & 135 \\
 \hline
 3 & 45 \\
 \hline
 3 & 15 \\
 \hline
 5 & 5 \\
 \hline
 & 1
 \end{array}$$

So, prime factors of 9720 = $2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 5$

Now, grouping the prime factors = $(2 \times 2 \times 2) \times (3 \times 3 \times 3) \times 3 \times 3 \times 5$

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

Factors 3 and 4 has no pair.

$\therefore$ 9720 is not a perfect cube.

The smallest number it should be divided to get a perfect cube is $3 \times 3 \times 5 = 45$.

Then,

$$= 9720 \div 45$$

$$= 216$$

Factors of 216 = $(2 \times 2 \times 2) \times (3 \times 3 \times 3)$

$$\sqrt[3]{216} = \sqrt[3]{(2 \times 2 \times 2) \times (3 \times 3 \times 3)}$$

$$= \sqrt[3]{(2^3 \times 3^3)}$$

$$= 6$$

Question 100

Write two Pythagorean triplets each having one of the numbers as 5.

Solution

Solution:-

Given, one of the number in the Pythagorean triplet i.e. 5.

$$= m^2 + 1 = 5$$

$$= m^2 = 4$$

$$= m = 2$$

Then,

$$2m = 2 \times 2$$

$$m = 4$$

So,

And,

$$= m^2 - 1$$

$$= 2^2 - 1$$

$$= 4 - 1$$

$$= 3$$

∴ The Pythagorean triplet is 3, 4 and 5.

Similarly,

The other Pythagorean triplet is 5, 12 and 13.

Question 101

By what smallest number should 216 be divided so that the quotient is a perfect square. Also find the square root of the quotient.

Solution

Solution:-

$$\begin{array}{r|l}
 2 & 216 \\
 \hline
 2 & 108 \\
 \hline
 2 & 54 \\
 \hline
 3 & 27 \\
 \hline
 3 & 9 \\
 \hline
 3 & 3 \\
 \hline
 & 1
 \end{array}$$

Factors of 216 = $2 \times 2 \times 2 \times 3 \times 3 \times 3$

Now, grouping the prime factors = $(2 \times 2) \times 2 \times (3 \times 3) \times 3$

Factors 2 and 3 has no pair.

$\therefore$ 216 is not a perfect square.

The smallest number it should be divided to get a perfect square is $3 \times 2 = 6$.

Then,

$$= 216 \div 6$$

$$= 36$$

Factors of 36 = 6×6

$$\sqrt{36} = \sqrt{(6 \times 6)}$$

$$= \sqrt{(6)}$$

$$= 6$$

$\therefore$ 36 is a perfect square and 6 is the square root of 36.

Question 102

By what smallest number should 3600 be multiplied so that the quotient is a perfect cube. Also find the cube root of the quotient.

Solution

Solution:-

$$\begin{array}{r|l}
 2 & 3600 \\
 \hline
 2 & 1800 \\
 \hline
 2 & 900 \\
 \hline
 2 & 450 \\
 \hline
 3 & 225 \\
 \hline
 3 & 75 \\
 \hline
 5 & 25 \\
 \hline
 5 & 5 \\
 \hline
 & 1
 \end{array}$$

$$\text{Factors of } 3600 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5$$

$$\text{Now, grouping the prime factors} = (2 \times 2 \times 2) \times 2 \times 3 \times 3 \times 5 \times 5$$

Factors 2, 3 and 5 has no pair.

$\therefore 3600$ is not a perfect cube.

The smallest number it should be multiplied to get a perfect cube is $2 \times 2 \times 3 \times 5 = 60$

Then,

$$\text{Product} = 3600 \times 60 = 216000$$

$$\text{Factors of } 21600 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5 \times 5 \times 5$$

$$= \sqrt[3]{216000}$$

$$= \sqrt[3]{(2^3 \times 2^3 \times 3^3 \times 5^3)}$$

$$= 2 \times 2 \times 3 \times 5$$

$$= 60$$

Question 103

Find the square root of the following by long division method.

(a) 1369

Solution

Solution:-

We have,

$$\begin{array}{r}
 37 \\
 3 \overline{) 1369} \\
 \underline{9} \\
 67 \\
 \underline{67} \\
 0
 \end{array}$$

$$\therefore \sqrt{1369} = 37$$

(b) 5625

Solution:-

We have,

$$\begin{array}{r}
 75 \\
 7 \overline{) 5625} \\
 \underline{49} \\
 145 \\
 \underline{145} \\
 0
 \end{array}$$

$$\therefore \sqrt{5625} = 75$$

Question 104

Find the square root of the following by long division method.

(a) 27.04

Solution

Solution:-

We have,

$$\begin{array}{r}
 5.2 \\
 5 \overline{) 27.04} \\
 \underline{25} \\
 102 \\
 \underline{102} \\
 0
 \end{array}$$

$$\therefore \sqrt{27.04} = 5.2$$

(b) 1.44

Solution:-

We have,

	1	.	2
1	1	.44	
	1		00
22		44	
		44	
			0

$$\therefore \sqrt{1.44} = 1.2$$

Question 105

What is the least number that should be subtracted from 1385 to get a perfect square? Also find the square root of the perfect square.

Solution

Solution:-

	3	7
3	13	85
	9	00
67	4	85
	4	69
742		16

From the long division method, the least number that should be subtracted from 1385 to get a perfect square is 16.

Now,

$$= 1385 - 16$$

$$= 1369$$

So,

$$\sqrt{1369} = \sqrt{(37 \times 37)}$$

$$= \sqrt{37^2}$$

$$= 37$$

∴ The square root of a perfect square number 1369 is 37.

Question 106

What is the least number that should be added to 6200 to make it a perfect square?

Solution

Solution:-

	7	8
7	62	00
	49	...
148	13	00
	11	84
1567	1	16

$$\text{So, } 78^2 = 6084$$

By comparing 6084 and 6200, $6084 < 6200$

Then, next perfect square is $79^2 = 6241$

∴ The least number is $(6241 - 6200) = 41$, which should be added to 6200 to get a perfect square.

The required perfect square number is 6241

So,

$$\sqrt{6241} = \sqrt{(41 \times 41)}$$

$$= \sqrt{41^2}$$

$$= 41$$

Question 107

Find the least number of four digits that is a perfect square.

Solution**Solution:-**

We know that, the least number of four digit is 1000

By using long division method we can able to find a perfect square,

32	
3	1000
	9
62	100
	124
	-24

∴ The least number of four digits that is a perfect square = $1000 + 24$

= 1024

Question 108

Find the greatest number of three digits that is a perfect square.

Solution**Solution:-****Solution:-**

We know that, the greatest number of three digit is 999.

By using long division method we can able to find a perfect square,

3 1	
3	9 99
	9 ⋮
61	99
	61
	38

∴ The greatest number of three digits that is a perfect square = $999 - 38$

$$= 961$$

Question 109

Find the least square number which is exactly divisible by 3, 4, 5, 6 and 8.

Solution

Solution:-

First we have to find out the LCM of 3, 4, 5, 6 and 8

$$\begin{array}{r|l}
 2 & 3, 4, 5, 6, 8 \\
 \hline
 2 & 3, 2, 5, 3, 4 \\
 \hline
 2 & 3, 1, 5, 3, 2 \\
 \hline
 3 & 3, 1, 5, 3, 1 \\
 \hline
 5 & 1, 1, 5, 1, 1 \\
 \hline
 & 1, 1, 1, 1, 1
 \end{array}$$

So, LCM of 3, 4, 5, 6 and 8 = $2 \times 2 \times 2 \times 3 \times 5$

$$= 120$$

Now, grouping the factors, $(2 \times 2) \times 2 \times 3 \times 5$

i.e. 2, 3 and 5 is not able to make their pair.

So, to make it perfect square, 120 must be multiplied with $2 \times 3 \times 5 = 30$

Then,

$$= 120 \times 30 = 3600$$

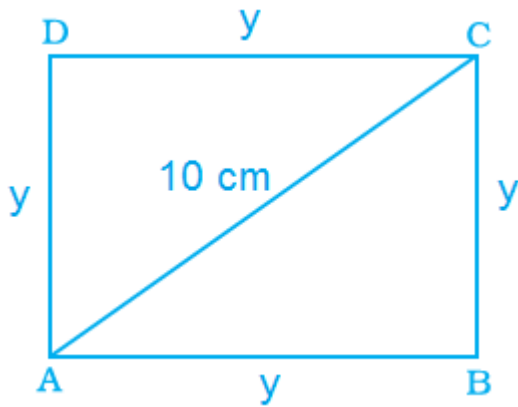
$\therefore$ 3600 is least square number which is exactly divisible by 3, 4, 5, 6, and 8.

Question 110

Find the length of the side of a square if the length of its diagonal is 10cm.

Solution

Solution:-



From the question it is given that,

Length of Diagonal = 10 cm

Let us assume square ABCD.

Sides $AB = y$, $BC = y$, $CD = y$, $DA = y$

Diagonal $AC = 10$ cm

Now, consider triangle ABC

By the rule of Pythagoras theorem,

$$AC^2 = AB^2 + BC^2$$

$$10^2 = y^2 + y^2$$

$$100 = 2y^2$$

$$y^2 = 100/2$$

$$y^2 = 50$$

$$y = \sqrt{50} \text{ cm}$$

$$y = 5\sqrt{2} \text{ cm}$$

$\therefore$ The length of the side of square is $\sqrt{50}$ cm or $5\sqrt{2}$.

Question 111

A decimal number is multiplied by itself. If the product is 51.84, find the number.

Solution

Solution:-

Let us assume decimal number be 'a'.

We know that, $a \times a = a^2$

So,

$$a \times a = 51.84$$

$$a^2 = 51.84$$

$$a = \sqrt{51.84}$$

The required number is found out by using long division method.

	7	.	2
7	51	.84	
	49	...	
142	2	84	
	2	84	
		0	

Then,

$$a = \sqrt{51.84}$$

$$a = 7.2$$

$\therefore 7.2$ is the decimal number is multiplied by itself and its product is 51.84.

Question 112

Find the decimal fraction which when multiplied by itself gives 84.64.

Solution

Solution:-

Let us assume decimal fraction be 'a'.

We know that, $a \times a = a^2$

So,

$$a \times a = 84.64$$

$$a^2 = 84.64$$

$$a = \sqrt{84.64}$$

The required number is found out by using long division method.

	9	.	2
9	84	.64	
	81		
182	3	64	
	3	64	
		0	

Then,

$$a = \sqrt{84.64}$$

$$a = 9.2$$

∴ 9.2 is the decimal fraction is multiplied by itself and its product is 84.64.

Question 113

A farmer wants to plough his square field of side 150m. How much area will he have to plough?

Solution

Solution:-

From the question it is given that,

Length of the side of square field = 150 m

We know that, area of square = side × side

So,

Area of the square field = 150×150

$$= 22,500 \text{ m}^2$$

∴ The farmer have to plough 22,500 m² area.

Question 114

What will be the number of unit squares on each side of a square graph paper if the total number of unit squares is 256?

Solution**Solution:-**

From the question it is given that,

The total number of unit squares is = 256.

Let us assume the number be 'a'

We know that, $a \times a = a^2$

So,

$$a \times a = 256$$

$$a^2 = 256$$

	16	
16	256	
256		0

$$a = \sqrt{256}$$

$$a = \sqrt{(16 \times 16)}$$

$$a = \sqrt{16^2}$$

$$a = 16$$

∴ The number of unit squares are 16.

Question 115

If one side of a cube is 15m in length, find its volume.

Solution**Solution:-**

From the question it is given that,

Length of one side of the a cube = 15 m

We know that, volume of cube = (side)³

$$= 15^3$$

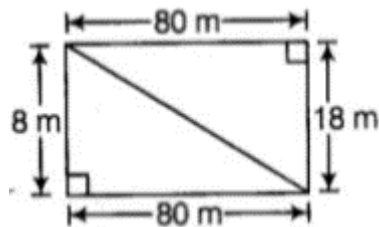
$$= 15 \times 15 \times 15$$

$$= 3375 \text{ m}^3$$

∴ The volume of cube is 3375 m³.

Question 116

The dimensions of a rectangular field are 80m and 18m. Find the length of its diagonal.

Solution**Solution:-**

From the question it is given that,

Length of rectangular field = 80 m

Breadth of rectangular field = 18 m

Then,

$$\text{Length of diagonal} = \sqrt{(\text{length}^2 + \text{breadth}^2)}$$

$$= \sqrt{(80^2 + 18^2)}$$

$$= \sqrt{(6400 + 324)}$$

$$= \sqrt{6724}$$

$$= 82 \text{ m}$$

∴ The Length of diagonal is 82 m.

Question 117

Find the area of a square field if its perimeter is 96m.

Solution

Solution:-

Given, perimeter of the square field = 96 m

We know that, perimeter of square = $4 \times \text{side}$

Then,

$$96 = 4 \times \text{side}$$

$$\text{Side} = 96/4$$

$$\text{Side} = 24 \text{ m}$$

So, the length of the side of square = 24 m

Now,

$$\text{Area of the square field} = (\text{side})^2$$

$$= 24^2$$

$$= 576 \text{ m}^2$$

∴ The area of the square field is 576 m^2 .

Question 118

Find the length of each side of a cube if its volume is 512 cm^3 .

Solution

Solution:-

From the question it is given that,

$$\text{Volume of the cube} = 512 \text{ cm}^3$$

We know that,

$$\text{Volume of cube} = \text{side}^3$$

$$512 = \text{side}^3$$

By taking cube root on both the side,

$$\sqrt[3]{512} = \text{side}$$

$$\text{Side} = \sqrt[3]{(8 \times 8 \times 8)}$$

$$\text{Side} = \sqrt[3]{(8)^3}$$

$$\text{Side} = 8 \text{ cm}$$

∴ The length of each side of a cube is 8 cm.

Question 119

Three numbers are in the ratio 1:2:3 and the sum of their cubes is 4500. Find the numbers.

Solution

Solution:-

Let us assume the three number be a, 2a, 3a

Then,

Given, sum of cube of three numbers is 4500

$$\text{i.e. } a^3 + (2a)^3 + (3a)^3 = 4500$$

$$a^3 + 8a^3 + 27a^3 = 4500$$

$$36a^3 = 4500$$

$$a^3 = 4500/36$$

$$a^3 = 125$$

$$a = \sqrt[3]{125}$$

$$a = \sqrt[3]{(5 \times 5 \times 5)}$$

$$a = \sqrt[3]{(5^3)}$$

$$a = 5$$

∴ The numbers are, $a = 5$

$$2a = 2 \times 5 = 10$$

$$3a = 3 \times 5 = 15$$

Question 120

How many square metres of carpet will be required for a square room of side 6.5m to be carpeted.

Solution

Solution:-

Given, side of square room = 6.5 m

So, area of square room = 6.5^2

$$= 6.5 \times 6.5$$

$$= 42.25 \text{ m}^2$$

Question 121

Find the side of a square whose area is equal to the area of a rectangle with sides 6.4m and 2.5m.

Solution

Solution:-

From the question it is given that,

Length of rectangle = 6.4 m

Breadth of rectangle = 2.5 m

Area of rectangle = length $\times$ breadth

$$= 6.4 \times 2.5$$

$$= 16 \text{ m}^2$$

And also it's given in the question i.e. area of square is equal to the area of rectangle.

Let us assume area of square be 'a'.

Area of square = Area of rectangle

$$a \times a = 16$$

$$a^2 = 16$$

By taking square root on both side

$$a = \sqrt{16}$$

$$a = \sqrt{(4 \times 4)}$$

$$a = \sqrt{4^2}$$

$$a = 4\text{m}^2$$

We know that, area of square = side²

$$4 = \text{side}^2$$

By taking square root on both side

$$\text{side} = \sqrt{4}$$

$$\text{side} = \sqrt{(2 \times 2)}$$

$$\text{side} = \sqrt{2^2}$$

$$\text{side} = 2\text{m}$$

Question 122

Difference of two perfect cubes is 189. If the cube root of the smaller of the two numbers is 3, find the cube root of the larger number.

Solution

Solution:-

From the question it is given that,

Difference of two perfect cubes = 189

The cube root of the smaller of the two numbers = 3

So, cube of smaller number = 3^3

$$= 3 \times 3 \times 3$$

$$= 27$$

Let us assume the cube root of larger number be a^3

Then,

As per the condition given in the question,

$$a^3 - 27 = 189$$

$$a^3 = 189 + 27$$

$$a^3 = 216$$

By taking cube root on both side,

$$a = \sqrt[3]{216}$$

$$a = \sqrt[3]{(6 \times 6 \times 6)}$$

$$a = \sqrt[3]{(6^3)}$$

$$a = 6$$

∴ The cube root of the larger number is 6.

Question 123

Find the number of plants in each row if 1024 plants are arranged so that number of plants in a row is the same as the number of rows.

Solution

Solution:-

From the question it is given that total number of plants arranged = 1024

Let us assume number of plants in each row be 'a'

As per the condition given in the question,

Number of plants in a row is the same as the number of rows i.e. 'a'

Then,

Total number of plants = $a \times a$

$$1024 = a^2$$

By taking square root on both side,

$$a = \sqrt{1024}$$

$$a = \sqrt{32 \times 32}$$

$$a = \sqrt{(32)^2}$$

$$a = 32$$

∴ The number of plants in each row is 32.

Question 124

A hall has a capacity of 2704 seats. If the number of rows is equal to the number of seats in each row, then find the number of seats in each row.

Solution

Solution:-

From the question it is given that total number of seats = 2704

Let us assume number of seats in each row be 'a'

As per the condition given in the question,

Number of rows is equal to the number of seats in each row i.e. 'a'

Then,

Total number of seats = $a \times a$

$$2704 = a^2$$

By taking square root on both side,

$$a = \sqrt{2704}$$

$$a = \sqrt{52 \times 52}$$

$$a = \sqrt{52^2}$$

$$a = 52$$

∴ The number of seats in each row is 52.

Question 125

A General wishes to draw up his 7500 soldiers in the form of a square. After arranging, he found out that some of them are left out. How many soldiers were left out?

Solution

Solution:-

From the question it is given that total number of soldiers = 7500

By using long division method we can able to find number of soldiers left out,

	8 6
8	$\overline{75\ 00}$
	64
	
166	11 00
	9 96
	
	1 04

∴ 104 soldiers were left out.

Question 126

8649 students were sitting in a lecture room in such a manner that there were as many students in the row as there were rows in the lecture room. How many students were there in each row of the lecture room?

Solution

Solution:-

From the question it is given that,

Total number of students were sitting in a lecture room = 8649

Let us assume number of students in each row be 'a'

Then,

Total number of students = $a \times a$

$$8649 = a^2$$

By taking square root on both side,

$$a = \sqrt{8649}$$

$$a = \sqrt{93 \times 93}$$

$$a = \sqrt{93^2}$$

$$a = 93$$

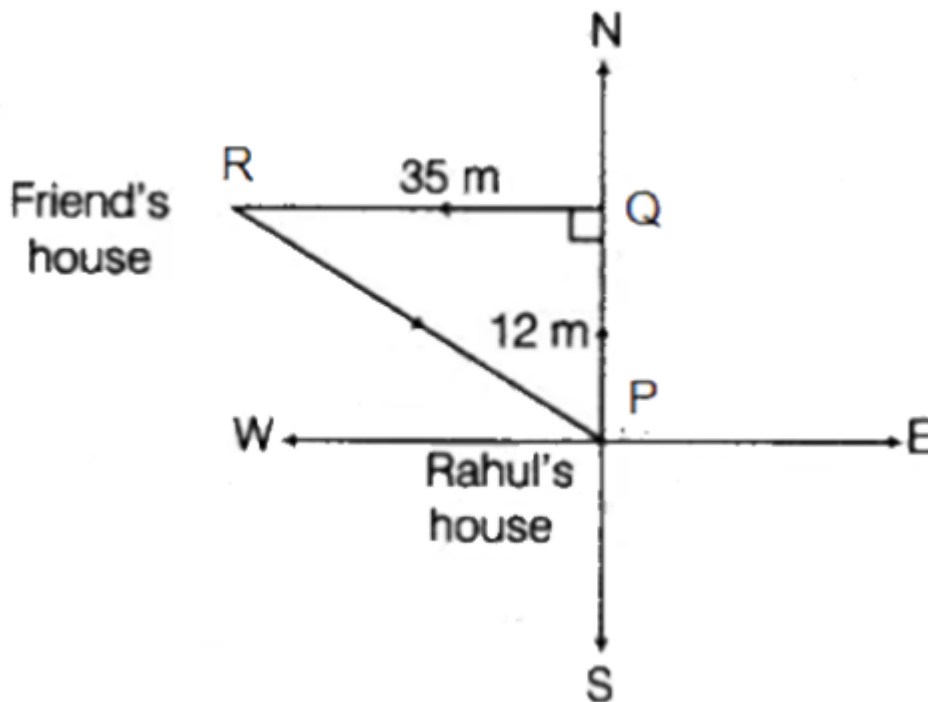
∴ The number of students in each row is 93.

Question 127

Rahul walks 12m north from his house and turns west to walk 35m to reach his friend's house. While returning, he walks diagonally from his friend's house to reach back to his house. What distance did he walk while returning?

Solution

Solution:-



From above the figure,

Consider the triangle PQR.

We know that, Pythagoras theorem,

$$PR^2 = PQ^2 + QR^2$$

$$PR^2 = 12^2 + 35^2$$

$$PR^2 = 144 + 1225$$

$$PR^2 = 1369$$

$$PR = \sqrt{1369}$$

$$PR = 37\text{m}$$

∴ Rahul walked 37m distance for returning to his house.

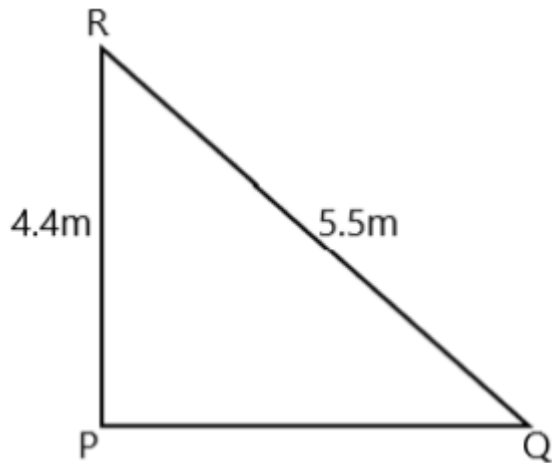
Question 128

A 5.5m long ladder is leaned against a wall. The ladder reaches the wall to a height of 4.4m. Find the distance between the wall and the foot of the ladder.

Solution

Solution:-

Let us consider the right angle triangle PQR



Given,

Long ladder i.e. RQ = 5.5 m

The ladder reaches the wall to a height i.e. PR = 4.4 m

From Pythagoras theorem,

$$RQ^2 = RP^2 + PQ^2$$

$$5.5^2 = 4.4^2 + PQ^2$$

$$PQ^2 = 5.5^2 - 4.4^2$$

$$PQ = \sqrt{5.5^2 - 4.4^2}$$

$$PQ = \sqrt{30.25 - 19.36}$$

$$PQ = \sqrt{10.89}$$

	3	.3
3	10	.89
	9	...
63	1	89
	1	89
		0

$$PQ = 3.3$$

∴ The distance between the wall and the foot of the ladder is 3.3 m.

Question 129

A king wanted to reward his advisor, a wise man of the kingdom. So he asked the wiseman to name his own reward. The wiseman thanked the king but said that he would ask only for some gold coins each day for a month. The coins were to be counted out in a pattern of one coin for the first day, 3 coins for the second day, 5 coins for the third day and so on for 30 days. Without making calculations, find how many coins will the advisor get in that month?

Solution

Solution:-

From the question it is given that,

Total coins the advisor get at the end = $1 + 3 + 5 + \dots$

The coins order is in the series of odd natural number,

So, the number of terms $(n) = 30$

Then,

Sum of odd natural numbers = n^2

$$= 30^2$$

$$= 900$$

∴ Total coins the advisor get at the end is 900.

Question 130

Find three numbers in the ratio 2:3:5, the sum of whose squares is 608.

Solution

Solution:-

Let us assume the three number be $2a, 3a, 5a$

Then,

Given, sum of squares of three numbers is 608

$$\text{i.e. } (2a)^2 + (3a)^2 + (5a)^2 = 608$$

$$4a^2 + 9a^2 + 25a^2 = 608$$

$$38a^2 = 608$$

$$a^2 = 608/38$$

$$a^2 = 16$$

$$a = \sqrt{16}$$

$$a = \sqrt{(4 \times 4)}$$

$$a = \sqrt{(4^2)}$$

$$a = 4$$

$$\therefore \text{The numbers are, } 2a = 2 \times 4 = 8$$

$$3a = 3 \times 4 = 12$$

$$5a = 5 \times 4 = 20$$

Question 131

Find the smallest square number divisible by each one of the numbers 8, 9 and 10.

Solution

Solution:-

First we have to find out the LCM of 8, 9 and 10

2	8, 9, 10
2	4, 9, 5
2	2, 9, 5
3	1, 9, 5
3	1, 3, 5
5	1, 1, 5
	1, 1, 1

$$\text{So, LCM of 8, 9, and 10} = 2 \times 2 \times 2 \times 3 \times 3 \times 5$$

$$= 360$$

Now, grouping the factors, $(2 \times 2) \times 2 \times (3 \times 3) \times 5$

i.e. 2 and 5 is not able to make their pair.

So, to make it perfect square, 360 must be multiplied with $2 \times 5 = 10$

Then,

$$= 360 \times 10 = 3600$$

$\therefore$ 3600 is least square number which is exactly divisible by 8, 9, and 10.

Question 132

The area of a square plot is $101\frac{1}{400}\text{m}^2$. Find the length of one side of the plot.

Solution

Solution:-

From the question it is given that,

Area of a square plot =

$$101\frac{1}{400}\text{m}^2 = 40401/400$$

We know that, area of square plot = side²

$$(40401/400) = \text{side}^2$$

By taking square root on both side,

$$\text{Side} = \sqrt{(40401/400)}$$

$$= \sqrt{((201 \times 201)/(20 \times 20))}$$

$$= \sqrt{(201^2/20^2)}$$

$$= 201/20$$

=

$$10\frac{1}{20}\text{m}$$

∴ the length of one side of the plot is

$$10\frac{1}{20}\text{m}$$

Question 133

Find the square root of 324 by the method of repeated subtraction.

Solution

Solution:-

From the question it is given that 324

Now, we subtract successive odd numbers starting from 1 as:

$$324 - 1 = 323$$

$$323 - 3 = 320$$

$$320 - 5 = 315$$

$$315 - 7 = 308$$

$$308 - 9 = 299$$

$$299 - 11 = 288$$

$$288 - 13 = 275$$

$$275 - 15 = 260$$

$$260 - 17 = 243$$

$$243 - 19 = 224$$

$$224 - 21 = 203$$

$$203 - 23 = 180$$

$$180 - 25 = 155$$

$$155 - 27 = 128$$

$$128 - 29 = 99$$

$$99 - 31 = 68$$

$$68 - 33 = 35$$

$$35 - 35 = 0$$

Here we see 324 reduces to 0 after subtracting 18 odd numbers.

Therefore the square root of 324 is 18.

Question 134

Three numbers are in the ratio 2:3:4. The sum of their cubes is 0.334125. Find the numbers.

Solution

Solution:-

Let us assume the three number be $2a$, $3a$, $4a$

Then,

Given, sum of cube of three numbers is 0.334125

$$\text{i.e. } (2a)^3 + (3a)^3 + (4a)^3 = 0.334125$$

$$8a^3 + 27a^3 + 64a^3 = 0.334125$$

$$99a^3 = 0.334125$$

$$a^3 = 0.334125/99$$

$$a^3 = 0.003375$$

$$a^3 = 3375/1000000$$

$$a = \sqrt[3]{(3375/1000000)}$$

$$a = \sqrt[3]{((15 \times 15 \times 15)/(10 \times 10 \times 10 \times 10 \times 10 \times 10))}$$

$$a = \sqrt[3]{(15^3/10^6)}$$

$$a = 15/1000$$

$$a = 0.015$$

$\therefore$ The numbers are, $2a = 2 \times 0.015 = 0.03$

$$3a = 3 \times 0.015 = 0.045$$

$$4a = 4 \times 0.015 = 0.06$$

Question 135

Evaluate: $\sqrt[3]{27} + \sqrt[3]{0.008} + \sqrt[3]{0.064}$

Solution

Solution:-

$$= \sqrt[3]{27} + \sqrt[3]{0.008} + \sqrt[3]{0.064}$$

$$= \sqrt[3]{(3 \times 3 \times 3)} + (\sqrt[3]{(8/1000)}) + \sqrt[3]{(64/1000)}$$

$$= \sqrt[3]{(3^3)} + (\sqrt[3]{(2 \times 2 \times 2)/(10 \times 10 \times 10)}) + \sqrt[3]{((4 \times 4 \times 4)/(10 \times 10 \times 10))}$$

$$= 3 + (\sqrt[3]{(2^3/10^3)} + \sqrt[3]{(4^3/10^3)})$$

$$= 3 + (2/10) + (4/10)$$

$$= 3 + 0.2 + 0.4$$

$$= 3.6$$

Question 136

$$\{(5^2 + (12^2)^{1/2})\}^3$$

Solution

Solution:-

$$\text{Given, } \{(5^2 + (12^2)^{1/2})\}^3$$

$$= \{(25 + (144)^{1/2})\}^3$$

$$= \{(25 + (12))\}^3$$

$$= \{37\}^3$$

$$= 37 \times 37 \times 37$$

$$= 50,653$$

Question 137

$$\{(6^2 + (8^2)^{1/2})\}^3$$

Solution**Solution:-**

$$\text{Given, } \{(6^2 + (8^2)^{1/2})\}^3$$

$$= \{(36 + (64)^{1/2})\}^3$$

$$= \{(36 + (8))\}^3$$

$$= \{44\}^3$$

$$= 44 \times 44 \times 44$$

$$= 85,184$$

Question 138

A perfect square number has four digits, none of which is zero. The digits from left to right have values that are: even, even, odd, even. Find the number.

Solution**Solution:-**

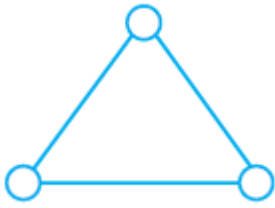
Let us assume PQRS is perfect square,

Where, P = even, Q = even, R = odd, S = even

So, 8836 is the perfect square.

Question 139

Put three different numbers in the circles so that when you add the numbers at the end of each line you always get a perfect square.



Solution

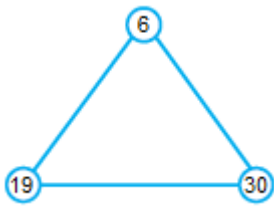
Solution:-

6, 19 and 30 are the three numbers in which, when we add the end of each line we always get a perfect square.

$$6 + 19 = 25$$

$$6 + 30 = 36$$

$$19 + 30 = 49$$



Question 140

The perimeters of two squares are 40 and 96 metres respectively. Find the perimeter of another square equal in area to the sum of the first two squares.

Solution

Solution:-

From the question it is given that,

Perimeters of first squares = 40m

Perimeter of second square = 96m

Let us assume side of first square = x_1

and assume side of second square = x_2

WKT, perimeter of first square = $4 \times \text{side}$

$$40 = 4x_1$$

$$X_1 = 40/4$$

$$X_1 = 10 \text{ m}$$

Then,

Perimeter of second square = $4 \times \text{side}$

$$96 = 4x_2$$

$$X_2 = 96/4$$

$$X_2 = 24 \text{ m}$$

As per the condition given in the question area of another square is equal to the first two squares.

Let us assume y^2 be the area of another square.

So,

$$y^2 = x_1^2 + x_2^2$$

$$y^2 = 10^2 + 24^2$$

$$y^2 = 100 + 576$$

$$y = \sqrt{676}$$

$$y = 26 \text{ m}$$

Then,

Perimeter of another square = $4 \times \text{side}$

$$= 4 \times y$$

$$= 4 \times 26$$

$$= 104 \text{ m}$$

Question 141

A three digit perfect square is such that if it is viewed upside down, the number seen is also a perfect square. What is the number?

(Hint: The digits 1, 0 and 8 stay the same when viewed upside down, whereas 9 becomes 6 and 6 becomes 9.)

Solution**Solution:-**

A three digit perfect square is such that if it is viewed upside down are 196 and 961.

Question 142

13 and 31 is a strange pair of numbers such that their squares 169 and 961 are also mirror images of each other. Can you find two other such pairs?

Solution**Solution:-**

First pair is 12 and 21

Squares of numbers, $12^2 = 144$ and $21^2 = 441$

Second pair is 102 and 201

Squares of numbers, $102^2 = 10404$ and $201^2 = 40401$
