In each of the questions, 1 to 24, write the correct answer from the given four options.

1. 196 is the square of

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

Answer: (c) 14

Given, the square of a number is 196.

We have to find the number.

Number obtained when a number is multiplied by itself is called the square of the number.

if $m = n^2$, then m is a perfect square where m and n are natural numbers.

Now, $11 \times 11 = 121$

$12 \times 12 = 144$

$14 \times 14 = 196$

$16 \times 16 = 256$

Therefore, the square of 14 is 196.

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

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

Answer: (a) 144

We have to find the square of an even number.

The number obtained when a number is multiplied by itself is called the square of the number.

if $m = n^2$, then m is a perfect square where m and n are natural numbers.

Considering 144,

$\sqrt{144} = 12$

Considering 169,

$\sqrt{169} = 13$

Considering 441,

$\sqrt{441} = 21$

Considering 625,

$\sqrt{625} = 25$

Therefore, the square of an even number 12 is 144.

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

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

Answer: (c) 1

Given, a number ends in 9.

We have to find the unit's place of the square of a number ending in 9.

The unit digit of a perfect square can be only 0, 1, 4, 5, 6 or 9.

The square of a number having 1 or 9 at the unit's place ends in 1.

Therefore, a number ending in 9 will have the unit's place of its square as 1.

4. Which of the following will have 4 at the unit's place?

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

Answer: (b) 62^2

We have to find the square of the number which will have 4 at the unit's place.

The unit digit of a perfect square can be only 0, 1, 4, 5, 6, or 9.

The unit's place of $14^2 = 4^2 = 16 = 6$

The unit's place of $62^2 = 2^2 = 4$

The unit's place of $27^2 = 7^2 = 49 = 9$

The unit's place of $35^2 = 5^2 = 25 = 5$

Therefore, 62^2 will have 4 at the unit's place.

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

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

Answer: (b) 10

We have to find the number of natural numbers that lie between 5^2 and 6^2.

Number of natural numbers lying between n^2 and $(n+1)^2 = (n+1)^2 - n^2 - 1 = 2n$

Here, n = 5

n + 1 = 6

So, number of natural numbers between 5^2 and $6^2 = 2(5)$

= 10

Therefore, the required value is 10.

6. Which of the following cannot be a perfect square?

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

Answer: (c) 198

We have to find the number which is not a perfect square.

The unit digit of a perfect square can be only 0, 1, 4, 5, 6, or 9.

841 has the unit digit as 1

This implies that 841 is a perfect square

529 has a unit digit of 9

This implies that 529 is a perfect square

198 has the unit digit as 8

Since the unit digit of a perfect square cannot be 8.

Therefore, 198 is not a perfect square.

7. The one's digit of the cube of 23 is

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

Answer: (c) 198

Given, that the number is 23.

We have to find the unit's place on the cube of 23.

Number obtained when a number is multiplied by itself three times is called a cube number.

If $m = n^3$, then m is a perfect cube where m and n are natural numbers.

Cube of 23 = 23 × 23 × 23

= 529 × 23

= 12167

Therefore, the unit's digit is 7.

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**

Answer: (b) 12 units

Given, a square board has an area of 144 square units.

We have to find the length of each side of the board.

We know, the area of square = $side^2$

Given, area of the square board = 144

$Side^2 = 144$

Taking square root,

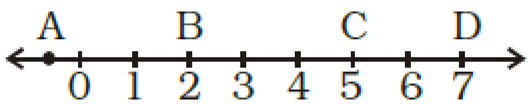
Side = $\sqrt{144}$

Side = 12 units

Therefore, the length of each side of the board is 12 units.

9. Which letter best represents the location of √25 on a number line?

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



Answer: (c) C

Given, that the number is 25.

We have to find the letter that represents the location of 25 on a number line.

The number obtained when a number is multiplied by itself is called the square of the number.

if $m = n^2$, then m is a perfect square where m and n are natural numbers.

The square root is an inverse operation of the square.

Considering 25,

$\sqrt{25} = 5$

Letter C on the number line represents 5.

Therefore, the required letter is 5.

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

Answer: (b) $m^2 + 1$, $m^2 – 1$

Given, one member of a Pythagorean triplet is 2m.

We have to find the other two numbers.

Pythagorean triples formula is used to find the triples or group of three terms that satisfy the Pythagorean theorem.

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

Other two members are $m^2 - 1$ and $m^2 + 1$

Example: Consider 2m = 4

m = 4/2

m = 2

So, $m^2-1 = (2)^2 - 1$

= 4 - 1

= 3

So, $m^2+1 = (2)^2 + 1$

= 4 + 1

= 5

The Pythagorean triplet is 3, 4, 5.

Therefore, the other two members are m^2+1, m^2-1

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

Answer: (b) 64

Given, the successive odd numbers are 1, 3, 5, 7, 9, 11, 13 and 15.

We have to find the sum of successive odd numbers.

We know that the sum of first n odd natural numbers is n^2.

Here, n = 8

$n^2 = 8^2$

= 64

Verification:

Sum of successive odd numbers = 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15

= 25 + 24 + 15

= 49 + 15

= 64

Therefore, the required sum is 64.

12. The sum of first n odd natural numbers is

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

Answer: (b) n^2

We have to find the sum of n odd natural numbers.

Natural numbers are a part of the number system, including all the positive integers from 1 to infinity.

Natural numbers are also called counting numbers because they do not include zero or negative numbers.

Odd numbers definition is given as those numbers which cannot be divided into two parts equally.

We know that the sum of first n odd natural numbers is given by n^2.

Example: Consider 1, 3, 5, 7, 9, 11, 13, 15, 17, 19.

Here, n = 10

$n^2 = 10^2 = 100$

Sum of successive odd numbers = 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19

= 25 + 24 + 32 + 19

= 49 + 32 + 19

= 100

Therefore, the required value is n^2.

13. Which of the following numbers is a perfect cube?

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

Answer: (d) 8640

We have to find the number which is a perfect cube.

Number obtained when a number is multiplied by itself three times is called a cube number.

If $m = n^3$, then m is a perfect cube where m and n are natural numbers.

Considering 243,

By prime factorisation,

243 = 3 × 3 × 3 × 3 × 3

We observe that 3 × 3 does not occur in pairs.

Therefore, 243 is not a perfect cube.

Considering 216,

By prime factorisation,

216 = 2 × 2 × 2 × 3 × 3 × 3

Therefore, 216 is a perfect cube.

Considering 392,

By prime factorisation,

392 = 2 × 2 × 2 × 7 × 7

We observe that 7 × 7 do not occur in pairs.

Therefore, 392 is not a perfect cube.

Considering 8640,

By prime factorisation,

8640 = 2 × 2 × 2 × 2 × 2 × 2 × 3 × 3 × 3 × 5

We observe that 5 does not occur in pairs.

Therefore, 8640 is not a perfect cube.

14. The hypotenuse of a right triangle with its legs of lengths 3x × 4x is

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

Answer: (a) 5x

The legs of a right triangle have lengths 3x × 4x

We have to find the hypotenuse of the triangle.

By the Pythagorean theorem,

$\text{Hypotenuse}^2 = \text{base}^2 + \text{perpendicular}^2$

Let base = 3x

Let perpendicular = 4x

Now, $\text{hypotenuse}^2 = (3x)^2 + (4x)^2$

$\text{Hypotenuse}^2 = 9x^2 + 16x^2$

$\text{Hypotenuse}^2 = 25x^2$

Taking square root,

Hypotenuse = $\sqrt{25x^2}$

Hypotenuse = 5x

Therefore, the hypotenuse is 5x units.

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

Answer: (b) 36, 49

Given, the number pattern is 1, 4, 9, 16, 25,....

We have to find the next two numbers in the pattern.

Now, $1^2 = 1$

$2^2 = 4$

$3^2 = 9$

$4^2 = 16$

$5^2 = 25$

The pattern can be written as $(1)^2, (2)^2, (3)^2, (4)^2, (5)^2$,..

Next two numbers will be $6^2 = 36$

$7^2 = 49$

Therefore, the next two numbers will be 36 and 49.

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

Answer: (d) 59^2

Given, the numbers are 43^2, 67^2, 52^2, 59^2

We have to find the square of the number that ends with digit 1.

Number obtained when a number is multiplied by itself is called the square of the number.

if $m = n^2$, then m is a perfect square where m and n are natural numbers.

The unit digit of a perfect square can be only 0, 1, 4, 5, 6 or 9.

The square of a number having 1 or 9 at the unit's place ends in1.

43^2 has 3 at the end.

67^2 has 7 at the end

52^2 has 2 at the end

Therefore, 43^2, 67^2, and 52^2 will not have 1 at the unit's place

59^2 has 9 at the end

Therefore, the unit's digit of 59^2 is 1.

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

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

Answer: (d) 59^2

We have to find if a perfect square can have 1, 8, 0 or 6 at one's place or not.

The unit digit of a perfect square can be only 0, 1, 4, 5, 6 or 9.

The square of a number having:

1 or 9 at the unit's place ends in 1.

2 or 8 at the unit's place ends in 4.

3 or 7 at the unit's place ends at 9.

4 or 6 at the unit's place ends at 6.

5 at the unit's place ends in 5.

From the above statement,

It is clear that a perfect square can have 1, 5, 6 at the unit's place.

Therefore, 8 can never be at the unit's place of a perfect square.

18. Which of the following numbers is not a perfect cube?

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

Answer: (b) 567

We know that

216 = 6 × 6 × 6

567 = 3 × 3 × 3 × 3 × 7

125 = 5 × 5 × 5

343 = 7 × 7 × 7

It is shown clearly that 567 is not a perfect cube

While grouping the factors in triplets, two factors 3 × 7 is pending

Therefore, the number 567 is not a perfect cube.

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

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

Answer: (a) 10

Given, the number is 1000.

We have to find the cube root of 1000.

Cube root is the inverse operation of a cube.

$\sqrt[3]{1000}$ = 10 x 10 x 10

= 10

Therefore, the cube root of 1000 is 10.

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) √m

Answer: (d) √m

Given, m is the square of a natural number n.

We have to find the value of n.

The number obtained when a number is multiplied by itself is called the square of the number.

if $x = y^2$, then x is a perfect square where x and y are natural numbers.

Given, $m = n^2$

A square root is the inverse operation of a square.

Taking square root,

$n = \sqrt{m}$

Therefore, $n = \sqrt{m}$

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

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

Answer: (b) n/2 digit

Given, a perfect square number has n digits.

n is even

We have to find the digits the square root will have.

If a perfect square is of n digits, then its square root will have n/2 digit if n is even.

Example: consider a perfect square 36

Number of digits, n = 2

n is even.

Square root of 36 = $\sqrt{36}$ = 6

$n/2 = 2/2 = 1$

Number of digits in square root = 1

Therefore, the square root will have n/2 digits.

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

(a) m^3 (b) √m (c) m/3 (d) ^{3}√m

Answer: (b) n/2 digit

Given, m is the cube root of n.

We have to find the value of n.

The cube root is the inverse operation of a cube.

Given, m = ∛n

The number obtained when a number is multiplied by itself three times is called the cube of the number.

if $x = y^3$, then x is a perfect square where x and y are natural numbers.

On cubing both sides,

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

$m^3 = n$

Therefore, $n = m^3$

23. The value of √(248 + √(52 + √144)) is

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

Answer: (c) 16

Given, the expression is (√248 + (√52 + (√144))

We have to find the value of the expression.

√144 = √12 × 12 = 12

√52 + 12 = √64

= √8 × 8

= 8

√248 + 8 = √256

= √16 × 16

= 16

Therefore, the value of the expression is 16.

24. Given that √4096 = 64, the value of √4096 + √40.96 is

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

Answer: (d) 70.4

Given, √4096 = 64

We have to find the value of √4096 + √40.96

√40.96 can be written as √4096/√100

√4096/√100 = 64/10

= 6.4

Now, √4096 + √40.96 = 64 + 6.4

= 70.4

Therefore, the required value is 70.4

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

25. There are _________ perfect squares between 1 and 100.

Answer:

Given, there are _________ perfect squares between 1 and 100.

We have to fill in the blanks to make the statement true.

Square of 1 = 1

Square of 2 = 4

Square of 3 = 9

Square of 4 = 16

Square of 5 = 25

Square of 6 = 36

Square of 7 = 49

Square of 8 = 64

Square of 9 = 81

Square of 10 = 100

Perfect squares between 1 and 100 = 4, 9, 16, 25, 36, 49, 64, 81

Number of perfect squares between 1 and 100 = 8

Therefore, there are 8 perfect squares between 1 and 100.

26. There are _________ perfect cubes between 1 and 1000.

Answer:

Given, there are _________ perfect cubes between 1 and 1000.

We have to fill in the blanks to make the statement true.

Cube of 1 = 1

Cube of 2 = 8

Cube of 3 = 27

Cube of 4 = 64

Cube of 5 = 125

Cube of 6 = 216

Cube of 7 = 343

Cube of 8 = 512

Cube of 9 = 729

Cube of 10 = 1000

Perfect cubes between 1 and 1000 = 8, 27, 64, 125, 216, 343, 512, 729

Number of perfect cubes between 1 and 1000 = 8

Therefore, there are 8 perfect cubes between 1 and 1000.

27. The units digit in the square of 1294 is _________.

Answer:

Given, the number is 1294.

We have to find the unit's digit in the square of 1294.

The unit digit of a perfect square can be only 0, 1, 4, 5, 6 or 9.

The square of a number having 4 or 6 at the unit's place ends in 6.

5 at the unit's place ends in 5.

The given number 1294 ends with 4.

The square of a number having 4 at the unit's place will end with 6.

Therefore, the unit's digit in the square of 1294 is 6.

28. The square of 500 will have _________ zeroes.

Answer:

Given, that the square of 500 will have ______ zeroes.

We have to fill in the blanks to make the statement true.

The number obtained when a number is multiplied by itself is called the square of the number.

if $m = n^2$, then m is a perfect square where m and n are natural numbers.

Square of 500 = $(500)^2$

= 500 x 500

= 250000

Number of zeros in the square of 500 = 4

Therefore, the required value is 4.

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

Answer:

Given, there are ________ natural numbers between n^2 and $(n+1)^2$.

We have to fill in the blanks to make the statement true.

Natural numbers between n^2 and $(n+1)^2 = [(n+1)^2 - n^2] - 1$

By using algebraic identity,

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

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

Now, $[(n+1)^2 - n^2] - 1 = n^2 + 2n + 1 - n^2 - 1$

$= 2n$

Therefore, the natural number between n^2 and $(n+1)^2$ is 2n.

30. The square root of 24025 will have _________ digits.

Answer:

Given, the square root of 24025 will have _____ digits.

We have to fill in the blanks to make the statement true.

If a perfect square is of n digits, then its square root will have (n+1)/2 digit if n is odd.

Given, the number is 24025

Number of digits, n = 5

So, n is odd

The square root of 24025 will have (n+1)/2 digit

= (5+1)/2

= 6/2

= 3

Therefore, the square root of 24025 will have 3 digits.

32. The square root of 5.3 × 5.3 is _________.

Answer:

Given, the square root of 5.3 × 5.3 is _________.

We have to fill in the blanks to make the statement true.

Square root is an inverse operation of a square.

Square root of 5.3 × 5.3 = $\sqrt{(5.3)^2}$

= 5.3

Therefore, the square root of 5.3 × 5.3 is 5.3

33. The cube of 100 will have _________ zeroes.

Answer:

Given, the cube of 100 will have __________ zeroes.

We have to fill in the blanks to make the statement true.

Number obtained when a number is multiplied by itself three times is called a cube number.

If $m = n^3$, then m is a perfect cube where m and n are natural numbers.

Cube of 100 = 100 × 100 × 100

= 10000 × 100

= 1000000

Number of zeros in 1000000 = 6

Therefore, the required value is 6.

34. 1m^2 = _________ cm^2.

Answer:

Given, 1 m^2 = ________ cm^2.

We have to fill in the blanks to make the statement true.

We know, 1 m = 100 cm

So, 1 m^2 = $(100)^2$ cm^2

= 10000 cm^2

Therefore, 1 m^2 = 10000 cm^2

35. 1m^3 = _________ cm^3.

Answer:

Given, 1 m^3 = ________ cm^3.

We have to fill in the blanks to make the statement true.

We know, 1 m = 100 cm

So, 1 m^3 = $(100)^3$ cm^3

= 1000000 cm^3

Therefore, 1 m^3 = 1000000 cm^3

36. Ones digit in the cube of 38 is _________.

Answer:

Given, one's digit in the cube of 38 is _______.

We have to fill in the blanks to make the statement true.

Cubes of the numbers ending with the digits 0, 1, 4, 5, 6 and 9 end with digits 0, 1, 4, 5, 6 and 9 respectively.

Cube of the number ending in 2 ends in 8.

Cube of the number ending in 3 ends in 7.

Cube of 38 = 38 × 38 × 38

= 1444 × 38

= 54872

Therefore, the one's digit in the cube of 38 is 2.

37. The square of 0.7 is _________.

Answer:

Given, the square of 0.7 is ______.

We have to fill in the blanks to make the statement true.

Number obtained when a number is multiplied by itself is called the square of the number.

if $m = n^2$, then m is a perfect square where m and n are natural numbers.

Square of 0.7 = $(0.7)^2$

= 0.7 × 0.7

= 0.49

Therefore, the square of 0.7 is 0.49

38. The sum of the first six odd natural numbers is _________.

Answer:

Given, the sum of the first six odd natural numbers is _______.

We have to fill in the blanks to make the statement true.

We know that the sum of the first n odd natural numbers is n^2.

Here, n = 6

Sum of first 6 odd natural numbers = $(6)^2$

= 36

Therefore, the required sum is 36.

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

Answer:

Given, the digit at the one's place of 57^2 is ______.

We have to fill in the blanks to make the statement true.

The unit digit of a perfect square can be only 0, 1, 4, 5, 6 or 9.

The square of a number having 3 or 7 at the unit's place ends in 9.

Given, the number is 57.

The number ends with 7.

The square of the number ending with 7 will have 9 at the unit's place.

Therefore, the digit at the one's place of 57^2 is 9.

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

Answer:

Given, the sides of a right triangle whose hypotenuse is 17cm are _________ and _________.

We have to fill in the blanks to make the statement true.

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

By Pythagorean theorem,

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

$m^2 + 1 = 17$

$m^2 = 17 - 1$

$m^2 = 16$

Taking square root,

m = 4

Now, 2m = 2(4) = 8 cm

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

= 16 - 1

= 15 cm

Therefore, the required sides are 8 cm and 15 cm.

41. $\sqrt{(1.96)}$ = _________.

Answer:

Given, $\sqrt{1.96}$ = ______.

We have to fill in the blanks to make the statement true.

$\sqrt{1.96}$ can be written as $\sqrt{196}/\sqrt{100}$

$\sqrt{196}/\sqrt{100} = \sqrt{14\times14}/\sqrt{10\times10}$

= 14/10

= 1.4

Therefore, $\sqrt{1.96}$ = 1.4

42. $(1.2)^3$ = _________.

Answer:

Given, $(1.2)^3$ = _________.

We have to fill in the blanks to make the statement true.

Number obtained when a number is multiplied by itself three times is called a cube number.

If $m = n^3$, then m is a perfect cube where m and n are natural numbers.

Cube of 1.2 = 1.2 × 1.2 × 1.2

= 1.44 × 1.2

= 1.728

Therefore, $(1.2)^3$ = 1.728

43. The cube of an odd number is always an _________ number.

Answer:

Given, the cube of an odd number is always an _________ number.

We have to fill in the blanks to make the statement true.

Consider an odd number 3

Cube of 3 = 3 × 3 × 3

= 9 × 3

= 27

We observe 27 is an odd number.

Therefore, the cube of an odd number is always an odd number.

44. The cube root of a number x is denoted by _________.

Answer:

Given, the cube root of a number x is denoted by _________.

We have to fill in the blanks to make the statement true.

Number obtained when a number is multiplied by itself three times is called a cube number.

If $m = n^3$, then m is a perfect cube where m and n are natural numbers.

Given, cube of a number = x

Cube root is an inverse operation of the cube.

Cube root of x = $\sqrt[3]{x}$

Therefore, cube root of x is $\sqrt[3]{x}$

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

Answer:

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

Factors of 125 = 5 × 5 × 5

By grouping the factors in triplets of equal factors,

125 = 5 × 5 × 5

Here, 5 = without a pair

So, we have to multiply the number by 5

5	125
5	25
5	5
	1

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

Answer:

72= 2 × 2 × 2 × 3× 3

$= (23 \times 32) = (2)^3 \times 3^2$

In this factorisation there is no triplet for 3.

So, 72 is not a perfect cube.

Therefore, 72 has to be multiplied by 3 to make it a perfect cube.

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

Answer:

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

Factors of 72 = 2 × 2 × 2 × 3 × 3

By grouping the factors in triplets of equal factors,

72 = 2 × 2 × 2 × 3 ×3

Here, if we divide 72 by 3×3

The quotient would be 2×2×2, that is a perfect cube.

Now,

So, the least number by which 72 be divided to make it, a perfect cube.

2	72
2	36
2	18
3	9
3	3
	1

48. The cube of a number ending in 7 will end in the digit _______________.

Answer:

Given, the Cube of a number ending in 7 will end in the digit _______________.

We have to fill in the blanks to make the statement true.

Cubes of the numbers ending with the digits 0, 1, 4, 5, 6, and 9 ends with digits 0, 1, 4, 5, 6 and 9 respectively.

We know that the cubes of the numbers ending in digits 3 or 7 end in digits 7 or 3, respectively.

For example: 7 × 7 × 7

7 × 7 × 7 = 49 × 7

= 343

Therefore, for a number ending in 7, its cube will end in 3.

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

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

Answer: True

Given, the square of 86 will have 6 at the unit's place.

The unit digit of a perfect square can be only 0, 1, 4, 5, 6 or 9.

The square of a number having 4 or 6 at the unit's place ends in 6.

Square of 86 = 86 × 86 = 7396

Therefore, the unit's place is 6.

50. The sum of two perfect squares is a perfect square.

Answer: False

Given, the sum of two perfect squares is a perfect square.

The number obtained when a number is multiplied by itself is called the square of the number.

if $m = n^2$, then m is a perfect square where m and n are natural numbers.

Example: Consider two perfect squares 36 and 49

Sum of perfect squares = 36 + 49 = 85

85 is not a perfect square.

Therefore, the sum of two perfect squares is not a perfect square.

51. The product of two perfect squares is a perfect square.

Answer: True

Given, that the product of two perfect squares is a perfect square.

The number obtained when a number is multiplied by itself is called the square of the number.

if $m = n^2$, then m is a perfect square where m and n are natural numbers.

Example: Consider two perfect squares 4 and 9

Product of two perfect squares = 4 × 9

= 36

Square of 6 = 36

Therefore, the product of two perfect squares is a perfect square.

52. There is no square number between 50 and 60.

Answer: True

Given, there is no square number between 50 and 60.

Square of 7 = 49

Square of 8 = 64

It is clear that there is no square between 50 and 60.

Therefore, the given statement is true.

53. The square root of 1521 is 31.

Answer: False

Given, that the square root of 1521 is 31.

The number obtained when a number is multiplied by itself is called the square of the number.

if $m = n^2$, then m is a perfect square where m and n are natural numbers.

Square of 31 = $(31)^2$

= 31 x 31

= 961

The square root is an inverse operation of the square.

So, the square root of 1521 = 39

Therefore, the square root of 1521 is 39 not 31.

54. Each prime factor appears 3 times in its cube.

Answer: True

We know, each prime factor appears 3 times in its cube.

For example, consider the cube of 6.

That is, 63 = (2 × 3) 3 = 23 × 33.

Here, the prime factors of 6 are 2 and 3.

Also, in the cube of 6, its prime factors 2 and 3 appear 3 times.

55. The square of 2.8 is 78.4.

Answer: False

Given, the square of 2.8 is 78.4.

The number obtained when a number is multiplied by itself is called the square of the number.

if $m = n^2$, then m is a perfect square where m and n are natural numbers.

Square of 2.8 = $(2.8)^2$

= 2.8 × 2.8

= 7.84

Therefore, the square of 2.8 is 7.84.

56. The cube of 0.4 is 0.064.

Answer: True

Given, the cube of 0.4 is 0.064.

Number obtained when a number is multiplied by itself three times is called a cube number.

If $m = n^3$, then m is a perfect cube where m and n are natural numbers.

Cube of 0.4 = $(0.4)^3$

= 0.4 × 0.4 × 0.4

= 0.064

Therefore, the cube of 0.4 is 0.064

57. The square root of 0.9 is 0.3.

Answer: False

Given, the square root of 0.9 is 0.3.

Number obtained when a number is multiplied by itself three times is called a cube number.

If $m = n^2$, then m is a perfect square where m and n are natural numbers.

Square of 0.3 = $(0.3)^2$

= 0.3 x 0.3

= 0.09

Square root is an inverse operation of the square.

Therefore, square root of 0.9 is not 0.3

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

Answer: False

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

Number obtained when a number is multiplied by itself three times is called a cube number.

If $m = n^2$, then m is a perfect square where m and n are natural numbers.

Example: consider 1

Square of 1 = 1

Example: consider 2

Square of 2 = 4

Therefore, the square of every natural number is not always greater than the number itself.

59. The cube root of 8000 is 200.

Answer: False

Given, the cube root of 8000 is 200.

We have to determine if the given statement is true or false.

Number obtained when a number is multiplied by itself three times is called a cube number.

If $m = n^3$, then m is a perfect cube where m and n are natural numbers.

Cube of 200 = $(200)^3$

= 200 × 200 × 200

= 8000000

Cube root is an inverse operation of a cube.

Cube root of 8000 = $\sqrt[3]{8000}$

= 20

Therefore, the cube root of 8000 is 20.

60. There are five perfect cubes between 1 and 100.

Answer: False

Given, there are five perfect cubes between 1 and 100.

Number obtained when a number is multiplied by itself three times is called a cube number.

If $m = n^3$, then m is a perfect cube where m and n are natural numbers.

Cube of 1 = 1

Cube of 2 = 8

Cube of 3 = 27

Cube of 4 = 64

Cube of 5 = 125

Perfect cubes between 1 and 100 = 8, 27, 64

Number of cubes between 1 and 100 = 3

Therefore, there are three perfect cubes between 1 and 100.

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

Answer: False

Given, there are 200 natural numbers between 100^2 and 101^2.

Natural numbers between n^2 and $(n+1)^2 = [(n+1)^2 - n^2] - 1$

$= n^2 + 2n + 1 - n^2 - 1$

$= 2n$

Natural numbers between n^2 and $(n+1)^2$ is 2n.

Here, n = 100

n+1 = 101

Natural numbers between 100^2 and $101^2 = 2(100)$

= 200

Therefore, there are 200 natural numbers between 100^2 and 101^2.

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

Answer: True

Given, that the sum of the first n odd natural numbers is n^2.

Natural numbers are a part of the number system, including all the positive integers from 1 to infinity.

Natural numbers are also called counting numbers because they do not include zero or negative numbers.

Odd numbers definition is given as those numbers which cannot be divided into two parts equally.

We know that the sum of first n odd natural numbers is given by n^2.

Example: Consider 1, 3, 5, 7, 9, 11, 13, 15, 17.

Here, n = 9

$n^2 = 9^2 = 81$

Sum of successive odd numbers = 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17

= 25 + 24 + 32

= 49 + 32

= 81

Therefore, the given statement is true.

63. 1000 is a perfect square.

Answer: False

It is not a perfect square.

1000 is a perfect cube, i.e. 10 × 10 × 10 = 1000

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

Answer: False

Given, a perfect square can have 8 as its unit's digit.

We have to determine if the given statement is true or false.

Number obtained when a number is multiplied by itself three times is called a cube number.

If $m = n^2$, then m is a perfect square where m and n are natural numbers.

The unit digit of a perfect square can be only 0, 1, 4, 5, 6 or 9.

The square of a number having:

1 or 9 at the unit's place ends in1.

2 or 8 at the unit's place ends in 4.

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

4 or 6 at the unit's place ends in 6.

5 at the unit's place ends in 5.

Therefore, 8 cannot be the unit's digit of a perfect square.

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

Answer: False

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

Pythagorean triples formula is used to find the triples or group of three terms that satisfy the Pythagorean theorem.

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

Other two members are $m^2 - 1$ and $m^2 + 1$

Example: Consider $2m = 4$

$m = 4/2$

$m = 2$

So, $m^2 - 1 = (2)^2 - 1$

$= 4 - 1$

$= 3$

So, $m^2 + 1 = (2)^2 + 1$

$= 4 + 1$

$= 5$

The Pythagorean triplet is 3, 4, 5.

Therefore, the given statement is false.

66. All numbers of a Pythagorean triplet are odd.

Answer: False

Given, that all numbers of a Pythagorean triplet are odd.

Pythagorean triples formula is used to find the triples or group of three terms that satisfy the Pythagorean theorem.

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

Other two members are $m^2 - 1$ and $m^2 + 1$

Example: Consider 2m = 4

m = 4/2

m = 2

So, $m^2-1 = (2)^2 - 1$

= 4 - 1

= 3

So, $m^2+1 = (2)^2 + 1$

= 4 + 1

= 5

The Pythagorean triplet is 3, 4, 5.

Therefore, all numbers of a Pythagorean triplet are not odd.

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

Answer: False

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

Example: Consider a = 2

Square of a = $(2)^2$

= 2 × 2

= 4

Cube of a = $(2)^3$

= 2 × 2 × 2

= 8

We observe that 8 is greater than 4.

Therefore, a^3 is always greater than a^2.

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

Answer: False

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

We have to determine if the given statement is true or false.

Example: Consider x = -2 and y = 1

$x^2 = (-2)^2 = 4$

$y^2 = (1)^2 = 1$

4 > 1

Therefore, $x^2 > y^2$

$x^3 = (-2)^3 = -8$

$y^3 = (1)^3 = 1$

1 > -8

Therefore, $x^3 < y^3$

Therefore, if $x^2 > y^2$ then $x^3 < y^3$

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

Answer: True

Given, that x and y are natural numbers

If x divides y, then x^3 divides y^3

x divides y can be written as (y/x)

On cubing,

$(y / x)^3 = y^3 / x^3$

Now, x^3 divides y^3 can be written as y^3/x^3

Therefore, the given statement is true.

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

Answer: False

Given, if a^2 ends in 5, then a^3 ends in 25.

Let a = 15

Square of a = $a^2 = (15)^2$

$= 15 \times 15 = 225$

Cube of a = $a^3 = (15)^3$

$= 15 \times 15 \times 15$

= 225 × 15

= 3375

We observe that a^2 ends in 5 and a^3 ends in 75

Therefore, the given statement is false.

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

Answer: False

Given, if a^2 ends in 9, then a^3 ends in 7.

Let a = 7

Square of a = $a^2 = (7)^2$

= 7 × 7 = 49

Cube of a = $a^3 = (7)^3$

= 7 × 7 × 7

= 49 × 7

= 343

We observe that a^2 ends in 9 and a^3 ends in 3

Therefore, the given statement is false.

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

Answer: True

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

We have to determine if the given statement is true or false.

Example: consider a perfect square 625

Number of digits, n = 3

n is odd, number of digits in square root = (3+1)/2

= 4/2 = 2

Verification: Square root of 625 = $\sqrt{(25)^2}$ = 25

Number of digits = 2

Therefore, the square root of a perfect square of n digits will have (n+1)/2 digits, if n is odd

73. The square root of a number x is denoted by √x.

Answer: True

Given, the square root of a number x is denoted by √x.

Number obtained when a number is multiplied by itself is called a square number.

If $m = n^2$, then m is a perfect square where m and n are natural numbers.

Given, square of a number = x

Square root is an inverse operation of the square.

Square root of x = √x

Therefore, the given statement is true.

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

Answer: False

Given, a number having 7 at its one's place will have 3 at the unit's place of its square.

Example: consider a number having 7 at its one's place

Let the number be 17

Square of number = $(17)^2$

= 17 × 17 = 289

Similarly, $(27)^2$ = 729

The number having 7 at its one's place will have 9 at the unit's place of its square.

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

Answer: True

Given, a number having 7 at its one's place will have 3 at the one's place of its cube.

Example: consider a number having 7 at its one's place.

Let the number be 17

Cube of number = $(17)^3$

= 17 × 17 × 17

= 289 × 17 = 4913

Similarly, $(27)^3$ = 19683

The number having 7 at its one's place will have 3 at the unit's place of its cube.

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

Answer: False

Given, the cube of a one-digit number cannot be a two-digit number.

Number obtained when a number is multiplied by itself three times is called a cube number.

If $m = n^3$, then m is a perfect cube where m and n are natural numbers.

Cube of 1 = 1

Cube of 2 = 8

Cube of 3 = 27

It is clear that the cube of a one-digit number 3 is 27, which is a two-digit number.

Therefore, the given statement is false.

77. The cube of an even number is odd.

Answer: False

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

$2^3 = 8$

$4^3 = 64$

78. Cube of an odd number is even.

Answer: False

Given, the Cube of an odd number is even.

Number obtained when a number is multiplied by itself three times is called a cube number.

If $m = n^3$, then m is a perfect cube where m and n are natural numbers.

Example: consider an odd number

Let the number be 5

Cube of 5 = $(5)^3$

= 5 × 5 × 5

= 25 × 5

= 125

Similarly, $3^3 = 27$

Therefore, the cube of an odd number is odd.

79. Cube of an even number is even.

Answer: True

Given, the Cube of an even number is even.

Number obtained when a number is multiplied by itself three times is called a cube number.

If $m = n^3$, then m is a perfect cube where m and n are natural numbers.

Example: consider an even number

Let the number be 6

Cube of 6 = $(6)^3$

$= 6 \times 6 \times 6$

$= 36 \times 6$

$= 216$

Similarly, $4^3 = 64$

Therefore, the cube of an even number is even.

80. Cube of an odd number is odd.

Answer: True

Given, the Cube of an odd number is odd.

Number obtained when a number is multiplied by itself three times is called a cube number.

If $m = n^3$, then m is a perfect cube where m and n are natural numbers.

Example: consider an odd number

Let the number be 5

Cube of 5 = $(5)^3$

$= 5 \times 5 \times 5$

$= 25 \times 5$

$= 125$

Similarly, $3^3 = 27$

Therefore, the cube of an odd number is odd.

81. 999 is a perfect cube.

Answer: False

Prime factorising 999:

999 = 3 × 3 × 3 × 37 = 3 × 3 × 3 × 37.

We know, a perfect cube has multiples of 3 as powers of prime factors.

Here, number of 3's is 3 and number of 37's is 1.

Therefore, 999 is not a perfect cube.

3	999
3	333
3	111
37	37
	1

82. 363 × 81 is a perfect cube.

Answer: False

Prime factorizing, we get,

363 = 3 × 11 × 11

81 = 3 × 3 ×3 × 3.

Then, 363 × 81

= 3 × 11 × 11 × 3 × 3 × 3 × 3

= 3 × 3 × 3 × 3 × 3 ×11 × 11.

Here, 3 and 11 do not occur as triplets.

Therefore, 363×81 is not a perfect cube.

Given, Cube roots of 8 are +2 and -2.

Cube root is an inverse operation of a cube.

(i) Consider +2

Cube of +2 = $(+2)^3$

= 2 × 2 × 2

= 4 × 2

= 8

(ii) Consider -2

Cube of -2 = $(-2)^3$

= -2 × -2 × -2

= 4 × -2

= -8

Therefore, cube root of 8 cannot be -2.

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

Answer: False

Given, Cube roots of 8 are +2 and -2.

Cube root is an inverse operation of a cube.

(i) Consider +2

Cube of +2 = $(+2)^3$

= 2 × 2 × 2

= 4 × 2

= 8

(ii) Consider -2

Cube of -2 = $(-2)^3$

= -2 × -2 × -2

= 4 × -2

= -8

Therefore, cube root of 8 cannot be -2.

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

Answer: False

Given, $\sqrt[3]{(8 + 27)} = \sqrt[3]{8} + \sqrt[3]{27}$

LHS: $\sqrt[3]{(8 + 27)}$

$= \sqrt[3]{35}$

RHS: $\sqrt[3]{8} + \sqrt[3]{27}$

$\sqrt[3]{8} = \sqrt[3]{(2)^3} = 2$

$\sqrt[3]{27} = \sqrt[3]{(3)^3} = 3$

$\sqrt[3]{8} + \sqrt[3]{27} = 2 + 3 = 5$

LHS ≠ RHS

Therefore, $\sqrt[3]{(8 + 27)} \neq \sqrt[3]{8} + \sqrt[3]{27}$

85. There is no cube root of a negative integer.

Answer: False

Given, $\sqrt[3]{(8 + 27)} = \sqrt[3]{8} + \sqrt[3]{27}$

LHS: $\sqrt[3]{(8 + 27)}$

$= \sqrt[3]{35}$

RHS: $\sqrt[3]{8} + \sqrt[3]{27}$

$\sqrt[3]{8} = \sqrt[3]{(2)^3} = 2$

$\sqrt[3]{27} = \sqrt[3]{(3)^3} = 3$

$\sqrt[3]{8} + \sqrt[3]{27} = 2 + 3 = 5$

LHS ≠ RHS

Therefore, $\sqrt[3]{(8 + 27)} \neq \sqrt[3]{8} + \sqrt[3]{27}$

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

Consider a number -5

Square of -5 = $(-5)^2$

$= -5 \times -5 = 25$

Cube of -5 = $(-5)^3$

$= -5 \times -5 \times -5$

$= 25 \times -5$

$= -125$

We observe that the square of -5 is positive and the cube of -5 is negative.

86. The square of a number is positive, so the cube of that number will also be positive.

Answer:

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

Consider a number -5

Square of -5 = $(-5)^2$

$= -5 \times -5$

$= 25$

Cube of -5 = $(-5)^3$

$= -5 \times -5 \times -5$

$= 25 \times -5$

$= -125$

We observe that the square of -5 is positive and the cube of -5 is negative.

87. Write the first five square numbers.

Answer: We have to write the first five square numbers.

The first five numbers are 1, 2, 3, 4, 5.

Number obtained when a number is multiplied by itself is called a square number.

If $m = n^2$, then m is a perfect square where m and n are natural numbers.

Square of 1 = $1^2 = 1$

Square of 2 = $2^2 = 4$

Square of 3 = $3^2 = 9$

Square of 4 = $4^2 = 16$

Square of 5 = $5^2 = 25$

Therefore, the squares of the first five numbers are 1, 4, 9, 16 and 25.

88. Write cubes of the first three multiples of 3.

Answer: We have to write the cube of the first three multiples of 3.

First 3 multiples of 3 are

$3 \times 1 = 3$

$3 \times 2 = 6$

$3 \times 3 = 9$

Number obtained when a number is multiplied by itself three times is called a cube number.

If $m = n^3$, then m is a perfect cube where m and n are natural numbers.

Cube of 3 = $3^3 = 27$

Cube of 6 = $6^3 = 216$

Cube of 9 = $9^3 = 729$

Therefore, the required cubes are 27, 216 and 729.

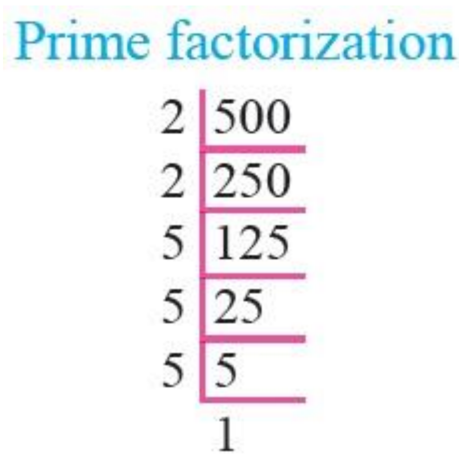
89. Show that 500 is not a perfect square.

Answer:

Given, the number is 500.

We have to show that 500 is not a perfect square.

Using prime factorisation,



So, $500 = 2 \times 2 \times 5 \times 5 \times 5$

We observe that 5 occur without a pair.

Therefore, 500 is not a perfect cube.

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

Answer: We have to express 81 as the sum of the first nine consecutive odd numbers.

We know that the sum of the first n odd natural numbers is given by n^2.

Given, $n^2 = 81$

Taking square root,

n = 9

This implies the sum of the first nine consecutive odd numbers is 81.

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

Therefore, the required sum is 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 = 81

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

(a) 484

Answer:

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 × 2 × 11 × 11

Now, grouping the prime factors = (2 × 2) × (11 × 11)

$= 2^2 \times 11^2$

There is no unpaired factor remains here.

∴ 484 is a perfect square.

(b) 11250

Answer:

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

2	11250
3	5625
3	1875
5	625
5	125
5	25
5	5
	1

So, prime factors of 11250 = 2 × 3 × 3 × 5 × 5 × 5 × 5

Now, grouping the prime factors = 2 × (3 × 3) × (5 × 5) × (5 × 5)

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

Factor 2 has no pair.

∴ 11250 is not a perfect square.

(c) 841

Answer:

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

29	841
29	29
	1

So, prime factors of 841 = 29 × 29

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

= 29^2

There is no unpaired factor remains here.

∴ 841 is a perfect square.

(d) 729

Answer:

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

3	729
3	243
3	81
3	27
3	9
3	3
	1

So, prime factors of 729 = 3 × 3 × 3 × 3 × 3 × 3

Now, grouping the prime factors = (3 × 3) × (3 × 3) × (3 × 3)

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

There is no unpaired factor remains here.

∴ 729 is a perfect square.

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

(a)128

Answer:

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

2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

So, prime factors of 128 = 2 × 2 × 2 × 2 × 2 × 2 × 2

Now, grouping the prime factors = (2 × 2 × 2) × (2 × 2 × 2) × 2

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

Factor 2 remains unpaired after grouping in triplets.

∴ 128 is not a perfect cube.

(b) 343

Answer:

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

7	343
7	49
7	7
	1

So, prime factors of 343 = 7 × 7 × 7

Now, grouping the prime factors = (7 × 7 × 7)

= 7^3

There is no unpaired factor remaining here.

∴ 343 is a perfect cube.

(c) 729

Answer:

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

3	729
3	243
3	81
3	27
3	9
3	3
	1

So, prime factors of 729 = 3 × 3 × 3 × 3 × 3 × 3

Now, grouping the prime factors = (3 × 3 × 3) × (3 × 3 × 3)

= $3^3 \times 3^3$

There is no unpaired factor remaining here.

∴ 729 is a perfect cube.

(d) 1331

Answer:

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

11	1331
11	121
11	11
	1

So, prime factors of 1331 = 11 × 11 × 11

Now, grouping the prime factors = (11 × 11 × 11)

= 11^3

There is no unpaired factor remaining here.

∴1331 is a perfect cube.

93. Using distributive law, find the squares of

(a) 101

Answer: Given, that the number is 101.

The distributive property is also known as the distributive law of multiplication over addition and subtraction.

The name itself signifies that the operation includes dividing or distributing something.

The distributive law is applicable to addition and subtraction.

A (B + C) can be solved as A × (B + C) = AB + AC.

A (B - C) can be solved as A × (B - C) = AB - AC.

101 can be written as (100 + 1)

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

Using distributive law,

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

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

= 100(101) + 101

= 10100 + 101

= 10201

Therefore, $101^2 = 10201$.

(b) 72

Answer: 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 × 70) + (70 × 2)) + ((2 × 70) + (2 × 2))

= 4900 + 140 + 140 + 4

= 5184

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

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

Answer:

Given, the sides of a triangle are 6 cm, 10 cm and 8 cm.

We have to determine if the given sides form a right triangle.

According to the Pythagorean theorem,

The square of the hypotenuse is equal to the sum of the square of the base and the square of the altitude.

$(\text{Hypotenuse})^2 = (\text{Base})^2 + (\text{Altitude})^2$

Let the hypotenuse be 10 cm

Let the base and perpendicular be 6 cm and 8 cm.

LHS: $(\text{Hypotenuse})^2$

$(\text{Hypotenuse})^2 = (10)^2$

= 100

RHS: $(\text{Base})^2 + (\text{Altitude})^2$

$(\text{Base})^2 + (\text{Altitude})^2 = (6)^2 + (8)^2$

= 36 + 64

= 100

LHS = RHS

The given sides satisfy the conditions of a right triangle.

Therefore, the given sides form a right triangle.

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

Answer:

Given, one of the numbers is 4.

We have to write a Pythagorean triplet.

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

Given, $2m = 4$

m = 4/2

m = 2

So, $m^2-1 = (2)^2 - 1$

= 4 - 1

= 3

So, $m^2+1 = (2)^2 + 1$

= 4 + 1

= 5

Therefore, the Pythagorean triplet is 3, 4, 5.

96. Using prime factorisation, find the square roots of

(a)11025

Answer:

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

3	11025
3	3675
5	1225
5	249
7	49
7	7
	1

So, prime factors of 11025 = 3 × 3 × 5 × 5 × 7 × 7

Now, grouping the prime factors = (3 × 3) × (5 × 5) × (7 × 7)

Then, Square root of 11025 = √11025

= √((3 × 3) × (5 × 5) × (7 × 7))

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

= 3 × 5 × 7

= 105

∴ The Square root of 11025 is 105.

(b) 4761

Answer:

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

3	4761
3	1587
23	529
23	23
	1

So, prime factors of 4761 = 3 × 3 × 23 × 23

Now, grouping the prime factors = (3 × 3) × (23 × 23)

Then, Square root of 4761 = √4761

= √((3 × 3) × (23 × 23))

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

= 3 × 23

= 69

∴ The Square root of 4761 is 69.

97. Using prime factorisation, find the cube roots of

(a)512

Answer:

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

2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

So, prime factors of 512 = 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2

Now, grouping the prime factors = (2 × 2 × 2) × (2 × 2 × 2) × (2 × 2 × 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 × 2 × 2

= 8

∴The cube root of 512 is 8.

(b) 2197

Answer:

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 × 13 × 13

Now, grouping the prime factors = (13 × 13 × 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.

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

Answer:

Given, the number is 176.

We have to determine if 176 is a perfect square or not.

Prime factorization is a way of expressing a number as a product of its prime factors.

A prime number is a number that has exactly two factors, 1 and the number itself.

Using prime factorisation,

2	176
2	88
2	44
2	22
11	11
	1

So, 176 = 2 × 2 × 2 × 2 × 11

We observe that 11 occurs without a pair.

Therefore, 176 is not a perfect square.

We have to determine the smallest number by which 176 should be multiplied to get a perfect square.

176 should be multiplied by 11.

So, 176 × 11 = 1936

Factors of 1936 = 2 × 2 × 2 × 2 × 11 × 11

= $\sqrt{1936}$

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

= 2 × 2 × 11

= 44

Therefore, the smallest number to be multiplied is 11.

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

Answer:

Given, the number is 9720.

We have to determine if 9720 is a perfect cube or not.

Prime factorization is a way of expressing a number as a product of its prime factors.

A prime number is a number that has exactly two factors, 1 and the number itself.

Using prime factorisation,

2	9720
2	4860
2	2430
3	1215
3	405
3	135
3	45
3	15
5	5
	1

So, 9720 = 2 × 2 × 2 × 3 × 3 × 3 × 3 × 3 × 5

We observe that 3 and 5 occur without pairs.

Therefore, 9720 is not a perfect cube.

We have to determine the smallest number by which 9720 should be divided to get a perfect cube.

9720 should be divided by 3 × 3 × 5

3 × 3 × 5 = 45

So, 9720/45 = 216

Factors of 216 = 2 × 2 × 2 × 3 × 3 × 3

Therefore, the smallest number to be divided is 45.

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

Answer:

Given, one of the numbers is 5.

We have to write a Pythagorean triplet.

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

Given, $m^2 + 1 = 5$

$m^2 = 5 - 1$

$m^2 = 4$

Taking square root,

$m = 2$

So, $m^2-1 = (2)^2 - 1$

= 4 - 1

= 3

So, 2m = 2(2)

= 4

Therefore, the Pythagorean triplet is 3, 4, 5.

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.

Answer:

Given, the number is 216.

Prime factorization is a way of expressing a number as a product of its prime factors.

A prime number is a number that has exactly two factors, 1 and the number itself.

Using prime factorisation,

2	216
2	108
2	54
3	27
3	9
3	3
	1

So, 216 = 2 × 2 × 2 × 3 × 3 × 3

We observe that 2 and 3 occur without a pair.

216 must be divided by 2 × 3

2 × 3 = 6

So, 216 / 6 = 36

This implies the quotient is a perfect square.

Therefore, the smallest number by which 216 must be divided is 6.

Square root is an inverse operation of a square.

So, $\sqrt{36} = \sqrt{(6)^2}$

= 6

Therefore, the square root of the quotient is 6.

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.

Answer:

Given, that the number is 3600.

Prime factorization is a way of expressing a number as a product of its prime factors.

A prime number is a number that has exactly two factors, 1 and the number itself.

Using prime factorisation,

2	3600
2	1800
2	900
2	450
3	225
3	75
5	25
5	5
	1

So, 3600 = 2 × 2 × 2 × 2 × 3 × 3 × 5 × 5

We observe that 2 occurs once and 3,5 occur twice.

3600 must be multiplied by 2 × 2 × 3 × 5 to make it a perfect cube.

2 × 2 × 3 × 5 = 60

So, 3600 × 60 = 216000

Therefore, the smallest number by which 3600 must be multiplied is 60.

Cube root is an inverse operation of a cube.

216000 = 2 × 2 × 2 × 2 × 2 × 2 × 3 × 3 × 3 × 5 × 5 × 5

So, $\sqrt[3]{216000} = \sqrt[3]{(2^3 \times 2^3 \times 3^3 \times 5^3)}$

= 2 × 2 × 3 × 5

= 60

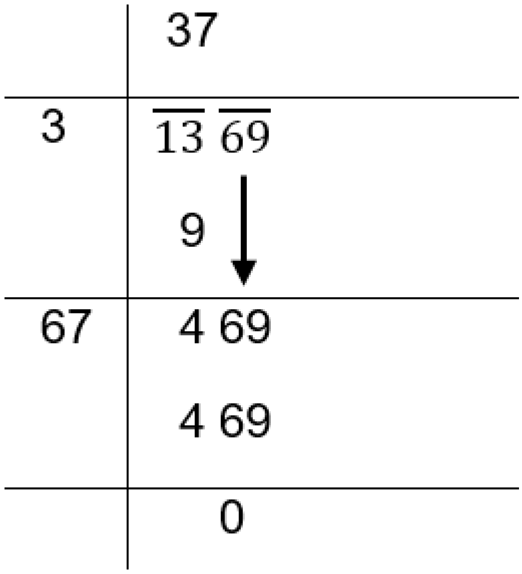
Therefore, the cube root of the quotient is 60.

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

(a)1369

Answer:

We have,

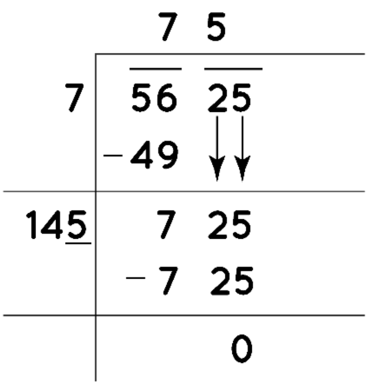


∴ √1369 = 37

(b) 5625

Answer:

We have,

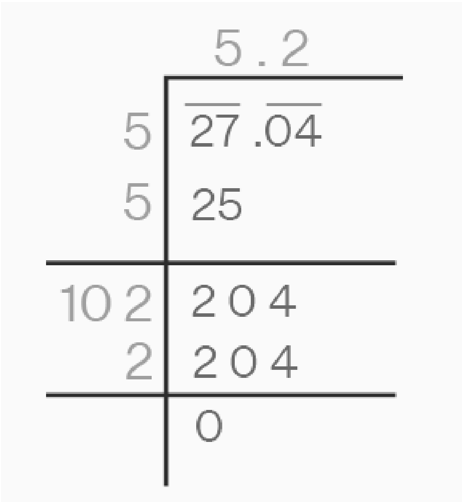


∴ √5625 = 75

104. Find the square root of the following using the long division method.

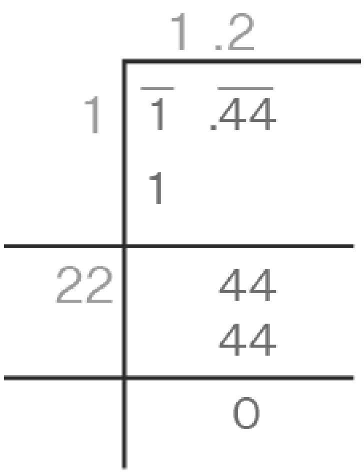
(a) 27.04

Answer:



$\therefore \sqrt{27.04} = 5.2$

(b) 1.44



$\therefore \sqrt{1.44} = 1.2$

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.

Answer: Given, that the number is 1385.

Long division method is an easy method to get the accurate square root of numbers.

There are 5 main operations that are used- divide, multiply, subtract, bring down and repeat.

By using long division method,

	3 7
3	$\overline{13}$ $\overline{85}$
	9
67	4 85
	4 69
742	16

We observe that the remainder of the long division is 16

The least number to be subtracted from 1385 is 16.

So, 1385 - 16 = 1369

Therefore, the least number to be subtracted is 16.

We have to find the square root of the perfect square.

The perfect square is 1369.

	37
3	$\overline{13}$ $\overline{69}$
	9 ↓
67	4 69
	4 69
	0

Therefore, the square root of 1369 is 37.

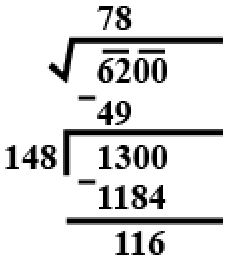
106. What is the least number that should be added to 6200 to make it a perfect square?

Answer: Given, the number is 6200.

Long division method is an easy method to get the accurate square root of numbers.

There are 5 main operations that are used- divide, multiply, subtract, bring down and repeat.

By using long division method,



Now, $(78)^2 = 6084$

We observe that 6084 is less than 6200.

The next perfect square is $(79)^2 = 6241$

The least number to be added to 6200 = 6241 – 6200 = 41

Therefore, the least number to be added is 41.

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

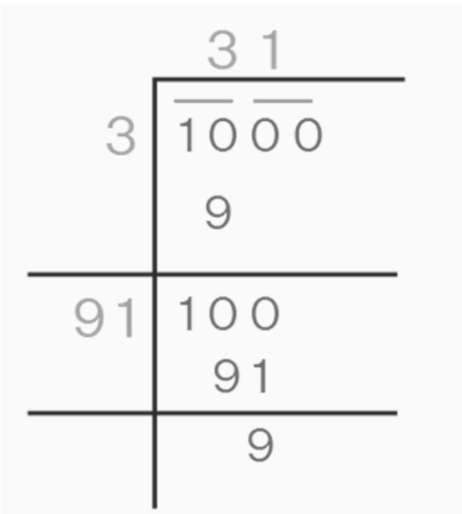
Answer: Given, that the number is the least four-digit number.

Let the least four-digit number be 1000.

The long division method is an easy method to get the accurate square root of numbers.

There are 5 main operations that are used- divide, multiply, subtract, bring down, and repeat.

By using long long-division method,



Now, $(31)^2 = 961$

We observe that 961 is less than 1000.

The next perfect square is $(32)^2 = 1024$

Therefore, the least four-digit number that is a perfect square is 1024.

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

Answer: Given, that the number is the greatest three digits.

Let us consider the number as 999.

Long division method is an easy method to get the accurate square root of numbers.

There are 5 main operations that are used- divide, multiply, subtract, bring down and repeat.

By using long division method,

	31
3	999
3	9
61	099
1	61
	38

We observe that the remainder on a long division of 999 is 38.

To get a perfect square, 999 - 38 = 961

Now, $(31)^2 = 961$

$(32)^2 = 1024$

Therefore, the required greatest number of three digits is 961.

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

Answer: We know that the least square number divisible by the given set of numbers is the LCM of the given numbers.

On finding the LCM of 3, 4, 5, 6 and 8

2	3, 4, 5, 6, 8
2	3, 2, 5, 3, 4
2	3, 1, 5, 3, 2
3	3, 1, 5, 3, 1
5	1, 1, 5, 1, 1
	1, 1, 1, 1, 1

Required LCM = 2 × 2 × 2 × 3 × 5

$= 8 \times 3 \times 5$

$= 40 \times 3$

$= 120$

So, $120 = 2 \times 2 \times 2 \times 3 \times 5$

We observe that 2, 3 and 5 occur without a pair.

To get a perfect square, $120 \times 2 \times 3 \times 5$

$= 120 \times 30$

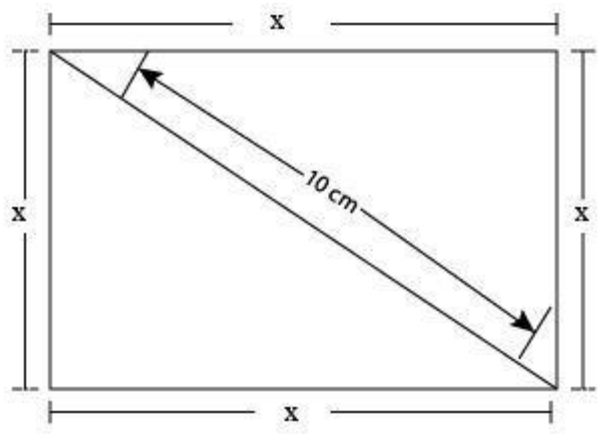
$= 3600$

Therefore, the required least square number is 3600.

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

Answer: Given, the length of the diagonal of a square is 10 cm.

We have to find the length of the side of a square.



Let us consider a square ABCD with side y.

Diagonal AC = 10 cm

Considering triangle ABC,

ABC is a triangle right angled at B

By Pythagorean theorem,

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

$(10)^2 = x^2 + x^2$

$100 = 2x^2$

$x^2 = 100/2$

$x^2 = 50$

Taking square root,

$x = \sqrt{50}$

$= 5\sqrt{2}$

Therefore, the side of the square is $5\sqrt{2}$ cm.

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

Answer: Given, a decimal number is multiplied by itself.

The product is 51.84.

We have to find the decimal number.

Let the decimal number be x.

According to the question,

$x \times x = 51.84$

$x^2 = 51.84$

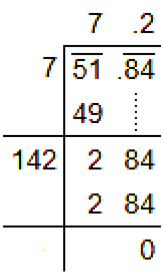
Square root is an inverse operation of a square.

So, $x = \sqrt{51.84}$

Long division method is an easy method to get the accurate square root of numbers.

There are 5 main operations that are used- divide, multiply, subtract, bring down and repeat.

By using long division,



So, $\sqrt{51.84} = 7.2$

Therefore, $x = 7.2$

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

Answer: Given, a decimal fraction is multiplied by itself.

The product is 84.64.

We have to find the decimal fraction.

Let the decimal fraction be x.

According to the question,

$x \times x = 84.64$

$x^2 = 84.64$

The square root is an inverse operation of a square.

So, $x = \sqrt{84.64}$

The long division method is an easy method to get the accurate square root of numbers.

There are 5 main operations that are used- divide, multiply, subtract, bring down, and repeat.

By using long division,

```
        9  .2
     ________
  9 | 84 .64
    | 81
 ---|--------
182 |  3 64
    |  3 64
 ---|--------
    |     0
```

So, $\sqrt{84.64} = 9.2$

Therefore, $x = 9.2$

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

Answer: Given, a farmer wants to plough his square field of side 150 m.

We have to find the area of the field to plough.

A square is a closed two-dimensional shape with four sides.

All four sides of a square are equal and parallel to each other.

We know area of the square = $(\text{side})^2$

Given, side = 150 m

Area of the field = $(150)^2$

= 150 × 150

= 2250 m^2

Therefore, the required area is 2250 m^2.

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?

Answer: Given, the total number of unit squares on square graph paper is 256.

We have to find the number of unit squares on each side of a square graph paper.

A square is a closed two-dimensional shape with four sides.

All four sides of a square are equal and parallel to each other.

We know area of the square = $(\text{side})^2$

Given, $(\text{side})^2 = 256$

The square root is an inverse operation of a square.

So, side = $\sqrt{256}$

We know, the square of 16 = 256

Now, $\sqrt{256} = \sqrt{(16)^2} = 16$

Therefore, the required number of unit squares on each side is 16.

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

Answer:

Given, one side of a cube is 15 m.

We have to find the volume of the cube.

A cube is a three-dimensional object that has 6 congruent square faces.

Dimensions of all the 6 square faces of the cube are the same.

Volume of cube = side × side × side

= 15 × 15 × 15

= 225 × 15

= 3375 cubic metres.

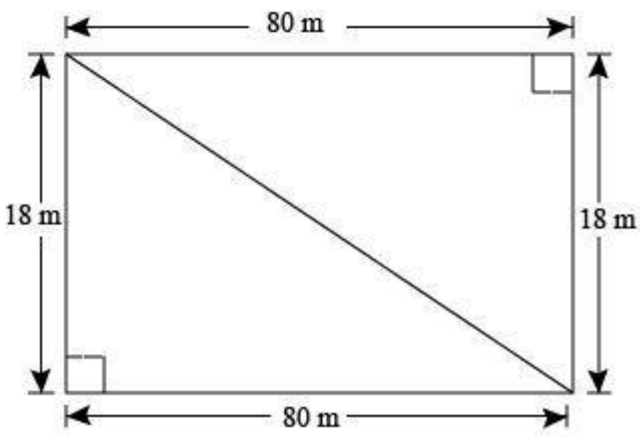
Therefore, the volume of the cube is 3375 cubic metres.

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

Answer:

Given, the dimensions of a rectangular field are 80 m and 18 m.

We have to find the length of the diagonal.



Length of rectangular field = 80 m

Breadth of rectangular field = 18 m

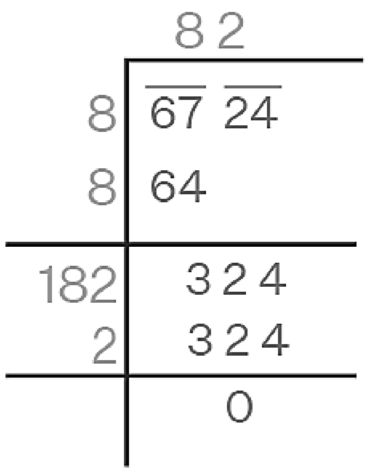
Length of diagonal = $\sqrt{(length^2 + breadth^2)}$

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

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

= $\sqrt{6724}$

By using long division to find the square root of 6724,



So, $\sqrt{6724}$ = 82 m

Therefore, the length of the diagonal is 82 m.

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

Answer: Given, the perimeter of a square field is 96 m.

We have to find the area of the square field.

A square is a closed two-dimensional shape with four sides.

All four sides of a square are equal and parallel to each other.

We know, Perimeter of square = sum of all sides

= 4(sides)

Given, perimeter = 96 m

Let the side of a square be x

96 = 4(x)

x = 96/4

x = 24 m

The length of the side of the square field is 24 m.

We know area of the square = $(\text{side})^2$

Area = $(24)^2$

= 576 square metres.

Therefore, the required area is 576 m^2

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

Answer:

Given, the volume of a cube is 512 cm^3.

We have to find the length of each side of a cube.

A cube is a three-dimensional object that has 6 congruent square faces.

Dimensions of all the 6 square faces of the cube are the same.

Volume of cube = side × side × side = a^3

Given, $a^3 = 512\ cm^3$

Cube root is an inverse operation of a cube.

Taking cube root,

$\sqrt[3]{a^3} = \sqrt[3]{512}$

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

= 8 cm

Therefore, the length of each side of the cube is 8 cm.

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

Answer: Given, three numbers are in the ratio 1 : 2 : 3

The sum of their cubes is 4500.

We have to find the numbers.

Let the numbers be x, 2x and 3x.

According to the question,

$x^3 + (2x)^3 + (3x)^3 = 4500$

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

$36x^3 = 4500$

$x^3 = 4500/36$

$x^3 = 500/4$

$x^3 = 125$

Taking cube root,

$\sqrt[3]{x^3} = \sqrt[3]{125}$

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

So, x = 5

Now, 2x = 2(5) = 10

3x = 3(5) = 15

Therefore, the required numbers are 5, 10, and 15.

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

Answer: Given, the side of a square room is 6.5 m

We have to find the area of carpet required for the square room.

We know area of the square = $(\text{side})^2$

Area = $(6.5)^2$

$= 6.5 \times 6.5$

= 42.25 square metres.

Therefore, the required area is 42.25 m^2

How many square metres of carpet will be required for a square room of side 6 m to be carpeted.

Given, side of a square room is 6 m

We have to find the area of carpet required for the square room.

We know area of the square = $(side)^2$

Area = $(6)^2$

= 6 × 6

= 36 square metres.

Therefore, the required area is 36 m^2

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

Answer: Given, the dimensions of a rectangle are 6.4 m and 2.5 m

Area of the square is equal to the area of the rectangle.

We have to find the side of the square.

Length of rectangle = 6.4 m

Breadth of rectangle = 2.5 m

We know, area of rectangle = length × breadth

= 6.4 × 2.5

= 16 square metres.

According to the question,

Area of square = 16 square metres.

We know area of the square = $(side)^2$

$(side)^2$ = 16

Taking square root,

Side = 4 m

Therefore, the side of the square is 4 m.

122. The difference between the 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.

Answer: Given, difference of two perfect cubes is 189.

We have to find the cube root of the larger number.

Given, cube root of smaller number = 3

On cubing both sides,

Cube of smaller number = $(3)^3 = 27$

Let the cube root of the larger number be y.

According to the question,

Cube of larger number - cube of smaller number = 189

$y^3 - 27 = 189$

$y^3 = 189 + 27$

$y^3 = 216$

Taking cube root,

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

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

$y = 6$

Therefore, the cube root of the larger number is 6.

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

Answer: Given, that the total number of plants is 1024.

We have to find the number of plants in each row.

Given, the number of plants in a row is the same as the number of rows.

Let the number of plants in each row = x

So, the number of rows = x

Total number of plants = x^2

Now, $x^2 = 1024$

Taking square root,

$x = \sqrt{1024}$

By using long division method,

	32
3	$\overline{10}\ \overline{24}$
	9
62	1 24
	1 24
	0

$\sqrt{1024} = 32$

Therefore, the number of plants in each row is 32.

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.

Answer: Given, a hall has a capacity of 2704 seats.

We have to find the number of seats in each row.

Given, the number of rows is equal to the number of seats in each row.

Let the number of seats in each row = x

So, the number of rows = x

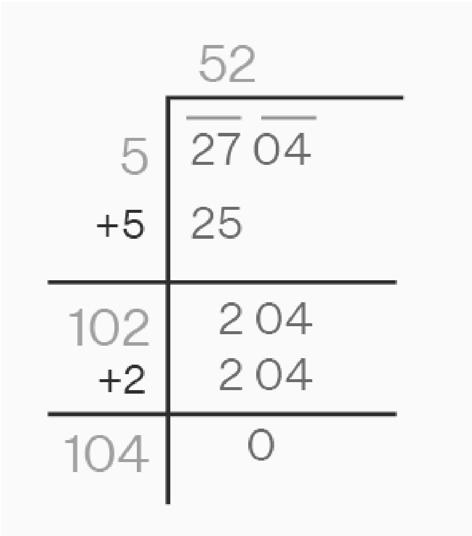
Total number of seats = x^2

Now, $x^2 = 2704$

Taking square root,

$x = \sqrt{2704}$

By using long division method,



$\sqrt{2704} = 52$

Therefore, the number of seats in each row is 52.

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?

Answer: Given, a General wishes to draw up his 7500 soldiers in the form of a square.

After arranging, he found out that some of the soldiers were left out.

We have to find the number of soldiers left out.

According to the question,

The number of soldiers in each row is equal to the number of rows

Let the number of soldiers in each row = x

So, the number of rows = x

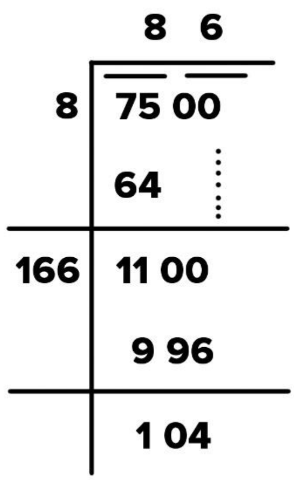
Total number of soldiers = x^2

Now, $x^2 = 7500$

Taking square root,

$x = \sqrt{7500}$

By using long division method,



We observe that the remainder of the long division is 104.

Therefore, the number of soldiers left out was 104.

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?

Answer: Given, 8649 students were sitting in a lecture room.

We have to find the number of students in each row of the lecture room.

Given, the number of rows is equal to the number of students in each row.

Let the number of students in each row = x

So, the number of rows = x

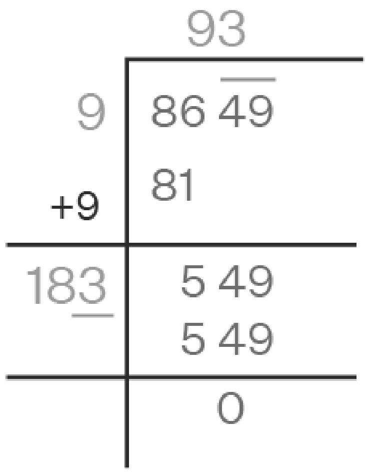
Total number of students = x^2

Now, $x^2 = 8649$

Taking square root,

$x = \sqrt{8649}$

By using long division method,



√8649 = 93

Therefore, the number of students in each row is 93.

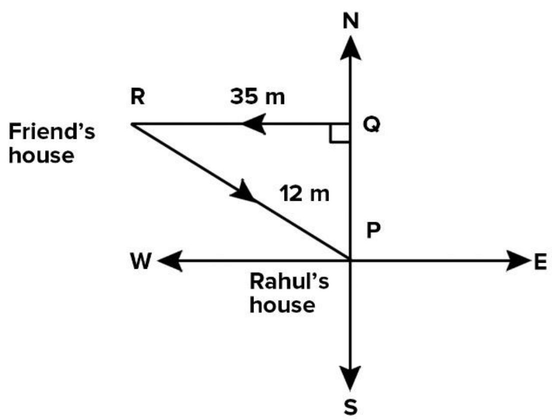
127. Rahul walks 12m north from his house and turns west to walk 35m to reach his friend's house. While returning, he walks diagonally from his friend's house to reach back to his house. What distance did he walk while returning?

Answer: Rahul walks 12 m north from his house.

Rahul turns west to walk 35 m to reach his friend's house.

While returning, he walks diagonally from his friend's house to reach his house.

We have to find the diagonal distance traveled by Rahul.



Considering triangle RQP,

RQP is a triangle right angled at Q

By Pythagorean theorem,

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

$RP^2 = (35)^2 + (12)^2$

$RP^2 = 1225 + 144$

$RP^2 = 1369$

Taking square root,

$RP = \sqrt{1369}$

By using long division,

	37
3	$\overline{13}\ \overline{69}$
	9 ↓
67	4 69
	4 69
	0

$\sqrt{1369} = 37$

Therefore, the diagonal distance is 37 m.

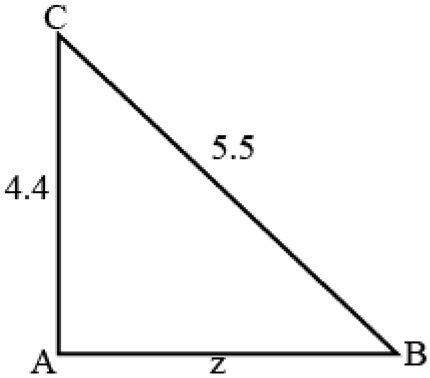
128. A 5.5m long ladder is leaned against a wall. The ladder reaches the wall to a height of 4.4m. Find the distance between the wall and the foot of the ladder.

Answer: Given, the length of the ladder is 5.5 m.

The ladder rests against a vertical wall.

The ladder reaches the wall to a height of 4.4m.

We have to find the distance between the wall and the foot of the ladder.



Let RQ be length of the ladder such that RQ = 5.5 m

Let PQ be the distance between the foot of the ladder and the wall.

Let RP be the height of the wall such that RP = 4.4 m

Now, RPQ is a triangle right angled at P.

By Pythagorean theorem,

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

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

$30.25 = 19.36 + PQ^2$

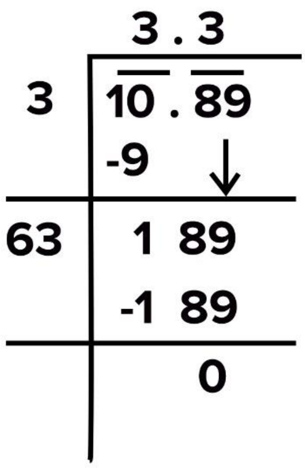
$PQ^2 = 30.25 - 19.36$

$PQ^2 = 10.89$

Taking square root,

$PQ = \sqrt{10.89}$

By using long division,



√10.89 = 3.3

Therefore, the distance between the foot of the ladder and the wall is 3.3 m.

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?

Answer:

A king wanted to reward his advisor.

The King asked the wiseman to name his own reward.

The wiseman 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.

We have to find the number of coins the advisor will get in that month.

The pattern is 1 + 3 + 5 + …… for 30 days.

We observe that it is the sum of odd numbers where the number of observations is 30 days.

We know that, sum of first n odd natural numbers = n^2

Here, n = 30

So, sum of coins = $(30)^2$

= 900

Therefore, the advisor asked for 900 gold coins in a month.

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

Answer: Given, three numbers are in the ratio 2 : 3 : 5

The sum of their squares is 608.

We have to find the numbers.

Let the numbers be 2x, 3x and 5x.

According to the question,

$(2x)^2 + (3x)^2 + (5x)^2 = 608$

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

$38x^2 = 608$

$x^2 = 608/38$

$x^2 = 304/19$

$x^2 = 16$

Taking square root,

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

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

So, x = 4

Now, 2x = 2(4) = 8

3x = 3(4) = 12

5x = 5(4) = 20

Therefore, the required numbers are 8, 12, and 20.

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

Answer: We have to find the smallest square divisible by 8, 9, and 10.

The least number divisible by 8, 9, and 10 is their LCM.

On finding 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

Now, LCM of 8, 9 and 10 = 2 × 2 × 2 × 3 × 3 × 5 = 360

We observe that 2 and 5 do not occur in pairs.

So, 360 is not a perfect square.

Now, 360 must be multiplied by 2 × 5 to get a perfect square

= 360 × 5 × 2

= 360 × 10

= 3600

Therefore, 3600 is a perfect square.

132. The area of a square plot is $101\frac{1}{400}$ m². Find the length of one side of the plot.

Answer: Given, the area of a square plot is 101 1/400 m²

We have to find the length of one side of the plot.

Let the length of one side of the square plot be x.

We know, area of square = $(\text{side})^2$

Given, area of square plot, x^2 = 101 1/400 m²

Converting 101 1/400 to normal fraction,

101 1/400 = [101(400)+1]/400

= (40400+1)/400

= 40401/400

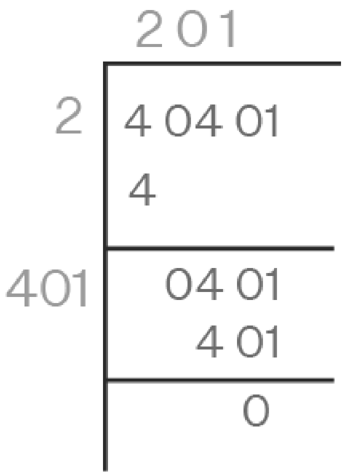
So, x^2 = 40401/400

Taking square root,

$\sqrt{x^2} = \sqrt{(40401/400)}$

x = √40401 / √400

By using long division,



So, √40401 = 201

Similarly, $\sqrt{400} = \sqrt{(20)^2} = 20$

Now, x = 201/20

201/20 = 10 $\frac{1}{20}$m

Therefore, the required length is 10 $\frac{1}{20}$m.

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

Answer: We have to determine the square root of 324 by the method of repeated subtraction.

We have to subtract successive odd numbers starting from 1.

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

This implies that 324 reduces to 0 after subtracting 18 odd numbers.

Therefore, the square root of 324 is 18.

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

Answer: Given, three numbers are in the ratio 2 : 3: 4

The sum of their cubes is 0.334125.

We have to find the numbers.

Let the numbers be 2x, 3x and 4x.

According to the question,

$(2x)^3 + (3x)^3 + (4x)^3 = 0.334125$

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

$99x^3 = 0.334125$

$x^3 = 0.334125/99$

$x^3 = 0.003375$

Taking cube root,

$\sqrt[3]{x^3} = \sqrt[3]{0.003375}$

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

By using long division,

3	3375
3	1125
3	375
5	125
5	25
5	5
	1

3375 = 3 × 3 × 3 × 5 × 5 × 5

$\sqrt[3]{3375} = \sqrt[3]{(15)^3}$

= 15

10	1000000
10	10000
10	1000
10	100
10	10
10	1

1000000 = 10 × 10 × 10 × 10 × 10 × 10

$\sqrt[3]{1000000}$ = 10 × 10 × 10

= 1000

So, x = 15/1000 = 0.015

Now, 2x = 2(0.015) = 0.030

3x = 3(0.015) = 0.045

4x = 4(0.015) = 0.060

Therefore, the required numbers are 0.03, 0.045 and 0.06.

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

Answer: Given, the expression is $\sqrt[3]{27} + \sqrt[3]{0.008} + \sqrt[3]{0.064}$

We have to evaluate the expression.

$\sqrt[3]{27} = \sqrt[3]{(3)^3} = 3$

$\sqrt[3]{0.008}$ can be written as $\sqrt[3]{(8/1000)}$

$\sqrt[3]{8} = \sqrt[3]{(2)^3} = 2$

$\sqrt[3]{1000} = \sqrt[3]{(10)^3} = 10$

So, $\sqrt[3]{0.008} = 2/10 = 0.2$

$\sqrt[3]{0.064}$ can be written as $\sqrt[3]{(64/1000)}$

$\sqrt[3]{64} = \sqrt[3]{(4)^3} = 4$

$\sqrt[3]{1000} = \sqrt[3]{(10)^3} = 10$

So, $\sqrt[3]{0.064} = 4/10 = 0.4$

$\sqrt[3]{27} + \sqrt[3]{0.008} + \sqrt[3]{0.064} = 3 + 0.2 + 0.4$

$= 3 + 0.6$

$= 3.6$

Therefore, the required value is 3.6

136. $\{(5^2 + (12^2)^{1/2})\}^3$

Answer:

Given, the expression is $\{5^2 + (12^2)^{½}\}^3$

We have to evaluate the expression.

$5^2 = 5 \times 5 = 25$

$(12^2)^{1/2} = 12$

$5^2 + (12^2)^{½} = 25+12$

$= 37$

$\{5^2 + (12^2)^{½}\}^3 = (37)^3$

$= 37 \times 37 \times 37$

$= 50653$

Therefore, the required value is 50653.

137. $\{(6^2 + (8^2)^{1/2})\}^3$

Answer:

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

We have to evaluate the expression.

$6^2 = 6 \times 6 = 36$

$(8^2)^{1/2} = 8$

$6^2 + (8^2)^{1/2} = 36+8$

$= 44$

$\{6^2 + (8^2)^{1/2}\}^3 = (44)^3$

$= 44 \times 44 \times 44$

$= 85184$

Therefore, the required value is 85184.

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, and even. Find the number.

Answer:

Given, 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, and even.

We have to find the number.

Consider abcd is a perfect square

where, a = even number

b = even number

c = odd number

d = even number

We know the square root of the smallest four-digit number is $32 \times 32 = 1024$

We know that the square root of the largest four-digit number is $99 \times 99 = 9801$

This implies that the number lies between 32 and 99.

Since the unit place number is even, abcd will be the square of an even number.

The value of the digit a has to be 2, 4, 6, 8.

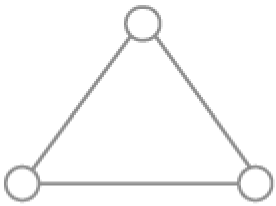
It is clear that the squares will be in the range 42 to 98 as 32, 34, etc do not satisfy the given conditions.

Now, 94 × 94 = 8836

Here, a = 8; b = 8; c = 3 and d = 6

Therefore, the required number is 8836.

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.



Answer: Put three different numbers in the circles.

On adding the numbers at the end of each line we get a perfect square.

A natural number is called a perfect square if it is the square of some natural number.

i.e., if $m = n^2$, then m is a perfect square where m and n are natural numbers.

Let us fill one circle with the number 6

Fill the next circle with the number 19

Adding both, 6 + 19 = 25

Square of 5 = 25

Therefore, 25 is a perfect square.

Fill the third circle with the number 30

On adding, 19 + 30 = 49

Square of 7 = 49

Therefore, 49 is a perfect square.

Now add 6 + 30 = 36

Square of 6 = 36

Therefore, 36 is a perfect square.

Therefore, the required numbers are 6, 19 and 30.

140. The perimeters of the 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.

Answer: Given, the perimeters of two squares are 40 and 96 metres.

Another square is equal in area to the sum of the first two squares.

We have to find the perimeter of another square.

We know that perimeter of square = 4(side)

Considering square 1,

Given, perimeter = 40 m

40 = 4(side)

Side of square 1 = 40/4

= 10 m

Considering square 2,

Given perimeter = 96 m

96 = 4(side)

Side of square 2 = 96/4 = 24 m

We know area of square = $(side)^2$

Area of square 1 = $(10)^2 = 100\ m^2$

Area of square 2 = $(24)^2 = 576\ m^2$

Sum of area of two squares = $100 + 576 = 676\ m^2$

According to the question,

Area of another square = $676\ m^2$

$(side)^2 = 676$

Taking square root,

Side of another square = 26 m

Now, perimeter of another square = 4(26) = 104 m

Therefore, the required perimeter is 104 m.

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.)

Answer: Given, the number is a three-digit perfect square.

If viewed upside down, the number seen is also a perfect square.

We have to find the number.

The numbers 0, 1, and 8 will look the same when viewed upside down.

The number 6 becomes 9 and 9 becomes 6 when viewed upside down.

Let us consider a three-digit perfect square 196.

Square of 14 = 196

On viewing the number 169 upside down, we get 961

Square of 31 = 961

Therefore, the required three-digit perfect square is 169.

142. 13 and 31 are 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?

Answer: Given, 13 and 31 is a strange pair of numbers.

The squares of 13 and 31 i.e.,169 and 961 are mirror images of each other.

We have to find the other two such pairs.

(i) Let us consider 12 and 21

Square of 12 = $(12)^2$ = 144

Square of 21 = $(21)^2$ = 441

144 and 441 are mirror images of each other.

(ii) Let us consider 102 and 201

Square of 102 = $(102)^2$ = 10404

Square of 201 = $(201)^2$ = 40401

10404 and 40401 are mirror images of each other.

Therefore, the required pairs are 12, 21, and 102, 201.