3. Squares and Square Roots

Exercise 3A

1. Question

Using the prime factorization method, find which of the following numbers are perfect square numbers:

(i) 441 (ii) 576

(iii) 11025 (iv) 1176

(v) 5625 (vi) 9075

(vii) 4225 (viii) 1089

Answer

(i) 441

In order to find if the given number is a perfect square,

At first,

We'll resolve the given number into prime factors:

Hence,

$441 = 49 \times 9$

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

$= (7 \times 3) \times (7 \times 3)$

$= 21 \times 21$

$= (21)^2$

Hence, it is a perfect square.

(ii) 576

In order to find if the given number is a perfect square,

At first,

We'll resolve the given number into prime factors:

Hence,

$576 = 64 \times 9$

$= 8 \times 8 \times 3 \times 3$

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

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

$= 24 \times 24$

$= (24)^2$

Hence, it is a perfect square.

(iii) 11025

In order to find if the given number is a perfect square,

At first,

We'll resolve the given number into prime factors:

Hence,

$11025 = 441 \times 25$

$= 49 \times 9 \times 5 \times 5$

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

$= (7 \times 5 \times 3 \times 3) \times (7 \times 5 \times 3 \times 3)$

$= 315 \times 315$

$= (315)^2$

Hence,

It is a perfect square.

(iv) 1176

In order to find if the given number is a perfect square,

At first,

We'll resolve the given number into prime factors:

Hence,

$1176 = 7 \times 168$

$= 7 \times 8 \times 21$

$= 7 \times 2 \times 2 \times 2 \times 7 \times 3$

Hence,

We can see that,

The number 1176 cannot be expressed as a product of two equal numbers.

Thus,

1176 is not a perfect square.

(v) 5625

In order to find if the given number is a perfect square,

At first,

We'll resolve the given number into prime factors:

Hence,

$5625 = 225 \times 25$

$= 9 \times 25 \times 25$

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

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

$= 75 \times 75$

$= (75)^2$

Hence,

It is a perfect square.

(vi) 9075

In order to find if the given number is a perfect square,

At first,

We'll resolve the given number into prime factors:

Hence,

9075 = 25 × 363

= 25 × 3 × 121

= 5 × 5 × 3 × 11 × 11

= 25 × 3 × 121

Hence,

We can see that,

The number 9075 cannot be expressed as a product of two equal numbers.

Thus,

9075 is not a perfect square.

(vii) 4225

In order to find if the given number is a perfect square,

At first,

We'll resolve the given number into prime factors:

Hence,

4225 = 25 × 169

= 5 × 5 × 13 × 13

= (5 × 13) × (5 × 13)

= 65 × 65

$= (65)^2$

Hence,

It is a perfect square.

(viii) 1089

In order to find if the given number is a perfect square,

At first,

We'll resolve the given number into prime factors:

Hence,

1089 = 121 × 9

= 11 × 11 × 3 × 3

= 11 × 11 × 3 × 3

= (11 × 3) × (11 × 3)

= 33 × 33

$= (33)^2$

Hence,

It is a perfect square.

2. Question

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

(i) 1225

(ii) 2601

(iii) 5929

(iv) 7056

(v) 8281

Answer

(i) 1225

In order to show that the given number is a perfect square,

At first,

We'll resolve the given number into prime factors:

Hence,

$1225 = 25 \times 49$

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

$= (5 \times 7) \times (5 \times 7)$

$= 35 \times 35$

$= (35)^2$

Hence,

The given number is a perfect square.

And,

It is a perfect square of 35.

(ii) 2601

In order to show that the given number is a perfect square,

At first,

We'll resolve the given number into prime factors:

Hence,

$2601 = 9 \times 289$

$= 3 \times 3 \times 17 \times 17$

$= (3 \times 17) \times (3 \times 17)$

$= 51 \times 51$

$= (51)^2$

Hence,

The given number is a perfect square.

And,

It is a perfect square of 51.

(iii) 5929

In order to show that the given number is a perfect square,

At first,

We’ll resolve the given number into prime factors:

Hence,

$5929 = 11 \times 539$

$= 11 \times 7 \times 77$

$= 11 \times 7 \times 11 \times 7$

$= (11 \times 7) \times (11 \times 7)$

$= 77 \times 77$

$= (77)^2$

Hence,

The given number is a perfect square.

And,

It is a perfect square of 77.

(iv) 7056

In order to show that the given number is a perfect square,

At first,

We’ll resolve the given number into prime factors:

Hence,

$7056 = 12 \times 588$

$= 12 \times 7 \times 84$

$= 12 \times 7 \times 12 \times 7$

$= (12 \times 7) \times (12 \times 7)$

$= 84 \times 84$

$= (84)^2$

Hence,

The given number is a perfect square.

And,

It is a perfect square of 84.

(v) 8281

In order to show that the given number is a perfect square,

At first,

We’ll resolve the given number into prime factors:

Hence,

$8281 = 49 \times 169$

$= 7 \times 7 \times 13 \times 13$

$= (13 \times 7) \times (13 \times 7)$

$= 91 \times 91$

$= (91)^2$

Hence,

The given number is a perfect square.

And,

It is a perfect square of 91.

3. Question

By what least number should the given number be multiplied to get a perfect square number? In each case, find the number whose square is the new number.

(i) 3675 (ii) 2156

(iii) 3332 (iv) 2925

(v) 9075 (vi) 7623

(vii) 3380 (viii) 2475

Answer

(i) 3675

At first,

We'll resolve the given number into prime factors:

Hence,

$3675 = 3 \times 25 \times 49$

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

$= (5 \times 7) \times (5 \times 7) \times 3$

In the above factors only 3 is unpaired

So, in order to get a perfect square the given number should be multiplied by 3

Hence,

The number whose perfect square is the new number is as following:

$= (5 \times 7) \times (5 \times 7) \times 3 \times 3$

$= (5 \times 7 \times 3) \times (5 \times 7 \times 3)$

$= (5 \times 7 \times 3)^2$

$= (105)^2$

(ii) 2156

At first,

We'll resolve the given number into prime factors:

Hence,

$2156 = 4 \times 11 \times 49$

$= 7 \times 7 \times 2 \times 2 \times 11$

$= (2 \times 7) \times (2 \times 7) \times 11$

In the above factors only 11 is unpaired

So, in order to get a perfect square the given number should be multiplied by 11

Hence,

The number whose perfect square is the new number is as following:

$= (2 \times 7) \times (2 \times 7) \times 11 \times 11$

$= (2 \times 7 \times 11) \times (2 \times 7 \times 11)$

$= (5 \times 7 \times 11)^2$

$= (154)^2$

(iii) 3332

At first,

We'll resolve the given number into prime factors:

Hence,

$3332 = 4 \times 17 \times 49$

$= 7 \times 7 \times 2 \times 2 \times 17$

$= (2 \times 7) \times (2 \times 7) \times 17$

In the above factors only 17 is unpaired

So, in order to get a perfect square the given number should be multiplied by 17

Hence,

The number whose perfect square is the new number is as following:

$= (2 \times 7) \times (2 \times 7) \times 17 \times 17$

$= (2 \times 7 \times 17) \times (2 \times 7 \times 17)$

$= (2 \times 7 \times 17)^2$

$= (238)^2$

(iv) 2925

At first,

We'll resolve the given number into prime factors:

Hence,

$2925 = 9 \times 25 \times 13$

$= 3 \times 3 \times 13 \times 5 \times 5$

$= (5 \times 3) \times (5 \times 3) \times 13$

In the above factors only 13 is unpaired

So, in order to get a perfect square the given number should be multiplied by 13

Hence,

The number whose perfect square is the new number is as following:

$= (5 \times 3) \times (5 \times 3) \times 13 \times 13$

$= (5 \times 3 \times 13) \times (5 \times 3 \times 13)$

$= (5 \times 3 \times 13)^2$

$= (195)^2$

(v) 9075

At first,

We'll resolve the given number into prime factors:

Hence,

9075 = 3 × 25 × 121

= 11 × 11 × 3 × 5 × 5

= (5 × 11) × (5 × 11) × 3

In the above factors only 3 is unpaired

So, in order to get a perfect square the given number should be multiplied by 3

Hence,

The number whose perfect square is the new number is as following:

= (5 × 11) × (5 × 11) × 3 × 3

= (5 × 11 × 3) × (5 × 11 × 3)

$= (5 \times 11 \times 3)^2$

$= (165)^2$

(vi) 7623

At first,

We'll resolve the given number into prime factors:

Hence,

7623 = 9 × 7 × 121

= 7 × 3 × 3 × 11 × 11

= (11 × 3) × (11 × 3) × 7

In the above factors only 7 is unpaired

So, in order to get a perfect square the given number should be multiplied by 7

Hence,

The number whose perfect square is the new number is as following:

= (3 × 11) × (3 × 11) × 7 × 7

= (11 × 7 × 3) × (11 × 7 × 3)

$= (11 \times 7 \times 3)^2$

$= (231)^2$

(vii) 3380

At first,

We'll resolve the given number into prime factors:

Hence,

3380 = 4 × 5 × 169

= 2 × 2 × 13 × 13 × 5

= (2 × 13) × (2 × 13) × 5

In the above factors only 5 is unpaired

So, in order to get a perfect square the given number should be multiplied by 5

Hence,

The number whose perfect square is the new number is as following:

$= (2 \times 13) \times (2 \times 13) \times 5 \times 5$

$= (5 \times 2 \times 13) \times (5 \times 2 \times 13)$

$= (5 \times 2 \times 13)^2$

$= (130)^2$

(viii) 2475

At first,

We'll resolve the given number into prime factors:

Hence,

$2475 = 11 \times 25 \times 9$

$= 11 \times 3 \times 3 \times 5 \times 5$

$= (5 \times 3) \times (5 \times 3) \times 11$

In the above factors only 11 is unpaired

So, in order to get a perfect square the given number should be multiplied by 11

Hence,

The number whose perfect square is the new number is as following:

$=(5 \times 3) \times (5 \times 3) \times 11 \times 11$

$= (5 \times 11 \times 3) \times (5 \times 11 \times 3)$

$= (5 \times 11 \times 3)^2$

$= (165)^2$

4. Question

By what least number should the given number be divided to get a perfect square number? In each case, find the number whose square is the new number.

(i) 1575 (ii) 9075

(iii) 4851 (iv) 3380

(v) 4500 (vi) 7776

(vii) 8820 (viii) 4056

Answer

(i) 1575

At first,

We'll resolve the given number into prime factors:

Hence,

$1575 = 7 \times 25 \times 9$

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

$= (5 \times 3) \times (5 \times 3) \times 7$

In the above factors only 7 is unpaired

So, in order to get a perfect square the given number should be divided by 7

Hence,

The number whose perfect square is the new number is as following:

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

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

$= (5 \times 3)^2$

$= (15)^2$

(ii) 9075

At first,

We'll resolve the given number into prime factors:

Hence,

$9075 = 121 \times 25 \times 3$

$= 11 \times 11 \times 3 \times 5 \times 5$

$= (5 \times 11) \times (5 \times 11) \times 3$

In the above factors only 3 is unpaired

So, in order to get a perfect square the given number should be divided by 3

Hence,

The number whose perfect square is the new number is as following:

$=(5 \times 11) \times (5 \times 11)$

$= (5 \times 11)^2$

$= (55)^2$

(iii) 4851

At first,

We'll resolve the given number into prime factors:

Hence,

$4851 = 11 \times 49 \times 9$

$= 11 \times 3 \times 3 \times 7 \times 7$

$= (7 \times 3) \times (7 \times 3) \times 11$

In the above factors only 11 is unpaired

So, in order to get a perfect square the given number should be divided by 11

Hence,

The number whose perfect square is the new number is as following:

$=(7 \times 3) \times (7 \times 3)$

$= (7 \times 3)^2$

$= (21)^2$

(iv) 3380

At first,

We'll resolve the given number into prime factors:

Hence,

3380 = 4 × 5 × 169

= 2 × 13 × 13 × 2 × 5

= (2 × 13) × (2 × 13) × 5

In the above factors only 5 is unpaired

So, in order to get a perfect square the given number should be divided by 5

Hence,

The number whose perfect square is the new number is as following:

=(2 × 13) × (2 × 13)

$= (2 \times 13)^2$

$= (26)^2$

(v) 4500

At first,

We'll resolve the given number into prime factors:

Hence,

4500 = 4 × 125 × 9

= 2 × 2 × 3 × 3 × 5 × 5 × 5

= (5 × 3 × 2) × (5 × 3 × 2) × 5

In the above factors only 5 is unpaired

So, in order to get a perfect square the given number should be divided by 5

Hence,

The number whose perfect square is the new number is as following:

=(5 × 3 × 2) × (5 × 3 × 2)

= (5 × 2 × 3) × (5 × 2 × 3)

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

$= (30)^2$

(vi) 7776

At first,

We'll resolve the given number into prime factors:

Hence,

7776 = 32 × 243

= 2 × 2 × 2 × 2 × 3 × 3 × 3 × 3 × 3 × 2

= (2 × 2 × 3 × 3) × (2 × 2 × 3 × 3) × 2 × 3

In the above factors only 2 and 3 are unpaired

So, in order to get a perfect square the given number should be divided by 6

Hence,

The number whose perfect square is the new number is as following:

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

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

$= (36)^2$

(vii) 8820

At first,

We'll resolve the given number into prime factors:

Hence,

$8820 = 4 \times 5 \times 9 \times 49$

$= 2 \times 2 \times 3 \times 3 \times 7 \times 7 \times 5$

$= (7 \times 3 \times 2) \times (7 \times 3 \times 2) \times 5$

In the above factors only 5 is unpaired

So, in order to get a perfect square the given number should be divided by 5

Hence,

The number whose perfect square is the new number is as following:

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

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

$= (42)^2$

(viii) 4056

At first,

We'll resolve the given number into prime factors:

Hence,

$4056 = 8 \times 3 \times 169$

$= 2 \times 2 \times 13 \times 13 \times 3 \times 2$

$= (13 \times 2) \times (13 \times 2) \times 6$

In the above factors only 6 is unpaired

So, in order to get a perfect square, the given number should be divided by 6

Hence,

The number whose perfect square is the new number is as following:

$=(13 \times 2) \times (13 \times 2)$

$= (13 \times 2)^2$

$= (26)^2$

5. Question

Find the largest number of 2 digits which is a perfect square.

Answer

Let us take the first 3-digit number

First 3-digit number = 100

Now,

We know that,

100 is a perfect square.

And,

Its square root is 10.

Now,

The number before 10 is 9.

Square of 9 = 81

Hence,

The largest 2-digit number which is a perfect square is 81.

6. Question

Find the largest number of 3 digits which is a perfect square.

Answer

At first,

The largest 3 digit number = 999

Now,

The number whose square is 999 is 31.61 (approx.)

Hence,

The square of any number greater than 31.61 would be a 4-digit number.

Therefore,

The square of 31 will be the greatest 3 digit perfect square.

We can calculate the largest 3 digit perfect square number as:

$31^2 = 31 \times 31$

$= 961$

Exercise 3B

1. Question

Give reason to show that none of the numbers given below is a perfect square:

(i) 5372 (v) 360

(ii) 5963 (vi) 64000

(iii) 8457 (vii) 2500000

(iv) 9468

Answer

(i) We know that,

A number which ends with 2 is not a perfect square

Also, the given number 5372 is ending with the digit 2

Therefore,

The given number is not a perfect square

(ii) We know that,

A number which ends with 3 is not a perfect square

Also, the given number 5963 is ending with the digit 3

Therefore,

The given number is not a perfect square

(iii) We know that,

A number which ends with 7 is not a perfect square

Also, the given number 8457 is ending with the digit 7

Therefore,

The given number is not a perfect square

(iv) We know that,

A number which ends with 8 is not a perfect square

Also, the given number 9468 is ending with the digit 8

Therefore,

The given number is not a perfect square

(v) We know that,

Any number which ends with an odd number of zeros is not a perfect square

Also, the given number 360 is ending with the digit 0

Therefore,

The given number is not a perfect square

(vi) We know that,

Any number which ends with an odd number of zeros is not a perfect square

Also, the given number 6400 is ending with the digit 0

Therefore,

The given number is not a perfect square

(vii) We know that,

Any number which ends with an odd number of zeros is not a perfect square

Also, the given number 2500000 is ending with the digit 0

Therefore,

The given number is not a perfect square

2. Question

Which of the following are squares of even numbers?

(i) 196 (ii) 441 (iii) 900 (v) 324

(iv) 625

Answer

(i) We know that,

The square of an even number is always even

The given number is ending with the digit 6 which is an even number

Thus, it must be a square of even number

(ii) We know that,

The square of an even number is always even

The given number is ending with the digit 1 which is an odd number

Thus, it is not square of even number

(iii) We know that,

The square of an even number is always even

The given number is ending with the digit 0 which is an even number

Thus, it must be a square of even number

(iv) We know that,

The square of an even number is always even

The given number is ending with the digit 5 which is an odd number

Thus, it is not a square of even number

(v) We know that,

The square of an even number is always even

The given number is ending with the digit 4 which is an even number

Thus, it must be a square of even number

3. Question

Which of the following are squares of odd numbers?

(i) 484 (ii) 961 (iii) 7396 (iv) 8649 (v) 4225

Answer

(i) We know that,

According to the property of squares, the square of an odd number is an odd number

The given number is ending with the digit 4 which is an even number

Thus, this number is not the square of an odd number.

(ii) We know that,

According to the property of squares, the square of an odd number is an odd number

The given number is ending with the digit 1 which is an odd number

Thus, this number is the square of an odd number.

(iii) We know that,

According to the property of squares, the square of an odd number is an odd number

The given number is ending with the digit 6 which is an even number

Thus, this number is not the square of an odd number.

(iv) We know that,

According to the property of squares, the square of an odd number is an odd number

The given number is ending with the digit 9 which is an odd number

Thus, this number is the square of an odd number

(v) We know that,

According to the property of squares, the square of an odd number is an odd number

The given number is ending with the digit 5 which is an odd number

Thus, this number is the square of an odd number

4. Question

Without adding, find the sum:

(i) (1 + 3 + 5 + 7 + 9 + 11 + 13)

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

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

Answer

(i) We know that,

Sum of first n odd numbers = n^2

Applying this formula in the question, we get

$(1 + 3 + 5 + 7 + 9 + 11 + 13) = (7)^2$

= 49

(ii) We know that,

Sum of first n odd numbers = n^2

Applying this formula in the question, we get

$(1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19) = (10)^2$

= 100

(iii) We know that,

Sum of first n odd numbers = n^2

Applying this formula in the question, we get

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

= 144

5 A. Question

Express 81 as the sum of 9 odd numbers

Answer

We know that,

Sum of first n odd numbers = n^2

Expressing 81 as a sum of 9 odd numbers

$81 = (9)^2$

n = 9

81 = 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17

5 B. Question

Express 100 as the sum of 10 odd numbers

Answer

We know that,

Sum of first n odd numbers = n^2

Expressing 100 as a sum of 10 odd numbers

$100 = (10)^2$

n = 10

100 = 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19

6. Question

Write a Pythagorean triplet whose smallest member is:

(i) 6 (ii) 14 (iii) 16 (iv) 20

Answer

(i) As we know that,

For every number m > 1, the Pythagorean triplet is $(2m, m^2 – 1, m^2 + 1)$

Using this result in the question, we get

2m = 6

m = 3

$m^2 = 9$

$m^2 – 1 = 9 – 1 = 8$

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

Thus,

The Pythagorean triplet is [6, 8, 10]

(ii) As we know that,

For every number m > 1, the Pythagorean triplet is $(2m, m^2 – 1, m^2 + 1)$

Using this result in the question, we get

2m = 14

m = 7

$m^2 = 49$

$m^2 – 1 = 49 – 1 = 48$

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

Thus,

The Pythagorean triplet is [14, 48, 50]

(iii) As we know that,

For every number m > 1, the Pythagorean triplet is $(2m, m^2 – 1, m^2 + 1)$

Using this result in the question, we get

2m = 16

m = 8

$m^2 = 64$

$m^2 – 1 = 64 – 1 = 63$

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

Thus,

The Pythagorean triplet is [16, 63, 65]

(iv) As we know that,

For every number m > 1, the Pythagorean triplet is $(2m, m^2 – 1, m^2 + 1)$

Using this result in the question, we get

$2m = 20$

$m = 10$

$m^2 = 100$

$m^2 – 1 = 100 – 1 = 99$

$m^2 + 1 = 100 + 1 = 101$

Thus,

The Pythagorean triplet is [20, 99, 101]

7. Question

Evaluate:

(i) $(38)^2 - (37)^2$ (ii) $(75)^2 - (74)^2$

(iii) $(92)^2 - (91)^2$ (iv) $(105)^2 - (104)^2$

(v) $(141)^2 -(140)^2$ (vi) $(218)^2 - (217)^2$

Answer

(i) We know that,

$[(n + 1)^2 – n^2] = (n + 1) + n$

$(38)^2 – (37)^2 = 38 + 37$

$= 75$

(ii) We know that,

$[(n + 1)^2 – n^2] = (n + 1) + n$

$(75)^2 – (74)^2 = 75 + 74$

$= 149$

(iii) We know that,

$[(n + 1)^2 – n^2] = (n + 1) + n$

$(92)^2 – (91)^2 = 92 + 91$

$= 183$

(iv) We know that,

$[(n + 1)^2 – n^2] = (n + 1) + n$

$(105)^2 – (104)^2 = 105 + 104$

= 209

(v) We know that,

$[(n + 1)^2 – n^2] = (n + 1) + n$

$(141)^2 – (140)^2 = 141 + 140$

= 281

(vi) We know that,

$[(n + 1)^2 – n^2] = (n + 1) + n$

$(218)^2 – (217)^2 = 218 + 217$

= 435

8. Question

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

(i) $(310)^2$ (ii) $(508)^2$

(iii) $(630)^2$

Answer

(i) We know that,

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

We have,

$310^2 = (300 + 10)^2$

$= [300^2 + 2 (300 \times 10) + 10^2]$

= 90000 + 6000 + 100

= 96100

(ii) We know that,

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

We have,

$508^2 = (500 + 8)^2$

$= [500^2 + 2 (500 \times 8) + 8^2]$

= 250000 + 8000 + 64

= 258064

(iii) We know that,

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

We have,

$630^2 = (600 + 30)^2$

$= [600^2 + 2 (600 \times 30) + 30^2]$

= 360000 + 36000 + 900

= 396900

9. Question

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

(i) $(196)^2$ (ii) $(689)^2$ (iii) $(891)^2$

Answer

(i) We know that,

$(a – b)^2 = (a^2 – 2ab + b^2)$

We have

$(196)^2 = (200 - 4)^2$

$= 200^2 – 2 (200 \times 4) + 4^2$

$= 40000 – 1600 + 16$

$= 3814$

(ii) We know that,

$(a – b)^2 = (a^2 – 2ab + b^2)$

We have

$(689)^2 = (700 - 11)^2$

$= 700^2 – 2 (700 \times 11) + 11^2$

$= 490000 – 15400 + 121$

$= 474721$

(iii) We know that,

$(a – b)^2 = (a^2 – 2ab + b^2)$

We have

$(891)^2 = (900 - 9)^2$

$= 900^2 – 2 (900 \times 9) + 9^2$

$= 810000 – 16200 + 81$

$= 793881$

10. Question

Evaluate:

(i) 69×71 (ii) 94×106.

Answer

(i) We have

$69 \times 71 = (70 – 1) \times (70 + 1)$

$= (70^2 – 1^2)$

$= 4900 – 1$

$= 4899$

(ii) We have

$94 \times 106 = (100 – 6) \times (100 + 6)$

$= (100^2 – 6^2)$

= 10000 – 36

= 9964

11. Question

Evaluate:

(i) 88 × 92 (ii) 78 × 82.

Answer

(i) We have

88 × 92 = (90 – 2) × (90 + 2)

= (90^2 – 2^2)

= 8100 – 4

= 8096

(ii) We have

78 × 82 = (80 – 2) × (80 + 2)

= (80^2 – 2^2)

= 6400 – 4

= 6396

12. Question

Fill in the blanks:

(i) The square of an even number is....

(ii) The square of an odd number is.....

(iii) The square of a proper fraction is .....than the given fraction.

(iv) n^2 = the sum of first n ..... natural numbers.

Answer

(i) The square of an even number is **even**

(ii) The square of an odd number is **odd**

(iii) The square of a proper fraction is **smaller** than the given fraction

(iv) n^2 = the sum of first n **odd** natural numbers

13. Question

Write (T) for true and (F) for false for each of the statements given below:

(i) The number of digits in a perfect square is even.

(ii) The square of a prime number is prime.

(iii) The sum of two perfect squares is a perfect square.

(iv) The difference of two perfect squares is a perfect square.

(v) The product of two perfect squares is a perfect square.

Answer

(i) The given statement is False

As, the number of digits in a square can also be odd

e.g.: 121

(ii) The given statement is False

As, a prime number is one that is not divisible by any other number except by itself and 1

Thus, square of any number cannot be a prime number

(iii) The given statement is False

Let us take an example:

4 + 9 = 13

As, 4 and 9 are perfect squares of 2 and 3 respectively and their sum i.e., 13 is not a perfect square

(iv) The given statement is also False

Let us take an example:

36 – 25 = 11

As, 36 and 25 are perfect squares and their difference is 11 which is not a perfect square

(v) The given statement is True

Exercise 3C

1. Question

Find the value of each of the following, using the column method:

$(23)^2$

Answer

Using column method, we get

Therefore,

a = 2

b = 3

a^2	2ab	b^2
$04 + 1 = \underline{5}$	$12 + 0 = \underline{12}$	$\underline{9}$

Therefore,

$23^2 = 529$

2. Question

Find the value of each of the following, using the column method:

$(35)^2$

Answer

Using column method, we get

Therefore,

a = 3

b = 5

a^2	2ab	b^2
09 +3 = 12	30 +2 = 32	25

Therefore,

$35^2 = 1225$

3. Question

Find the value of each of the following, using the column method:

$(52)^2$

Answer

Using column method, we get

Therefore,

a = 5

b = 2

a^2	2ab	b^2
25 +2 = 27	20	4

Therefore,

$52^2 = 2704$

4. Question

Find the value of each of the following, using the column method:

$(96)^2$

Answer

Using column method, we get

Therefore,

a = 9

b = 6

a^2	2ab	b^2
81 +11 = 92	108 +3 = 111	36

Therefore,

$96^2 = 9216$

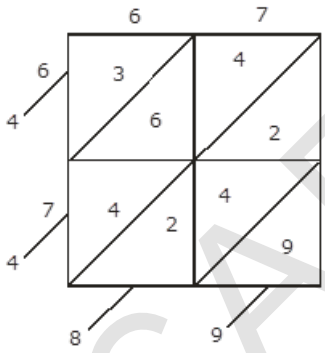
5. Question

Find the value of each of the following, using the diagonal method:

$(67)^2$

Answer

Using diagonal method, we get:



Therefore,

$67^2 = 4489$

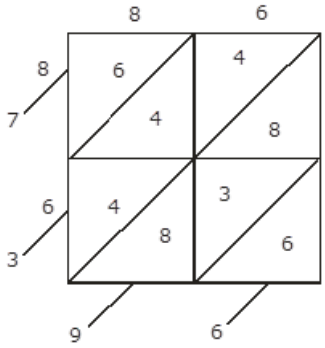
6. Question

Find the value of each of the following, using the diagonal method:

$(86)^2$

Answer

Using diagonal method, we get



Therefore,

$86^2 = 7396$

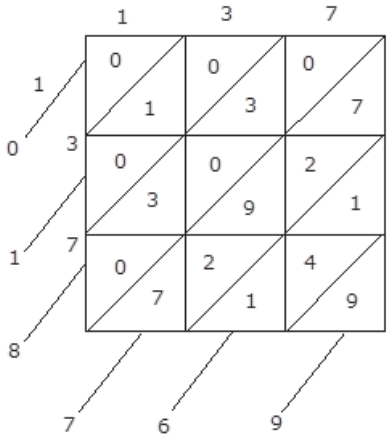
7. Question

Find the value of each of the following, using the diagonal method:

$(137)^2$

Answer

Using diagonal method, we get



Therefore,

$137^2 = 18769$

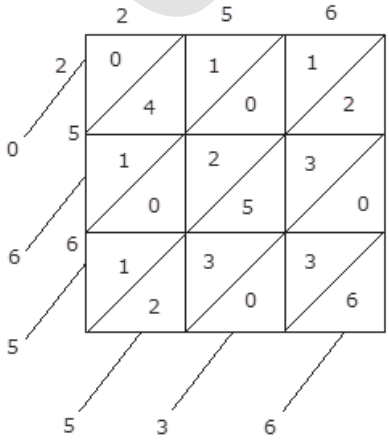
8. Question

Find the value of each of the following, using the diagonal method:

$(256)^2$

Answer

Using diagonal method, we get



Therefore,

$256^2 = 65536$

Exercise 3D

1. Question

Find the square root of each of the following numbers by using the method of prime factorization:

225

Answer

By using prime factorization method, we get

$225 = 3 \times 3 \times 5 \times 5$

$\sqrt{225} = 3 \times 5 = 15$

2. Question

Find the square root of each of the following numbers by using the method of prime factorization:

441

Answer

By using prime factorization method, we get

$441 = 3 \times 3 \times 7 \times 7$

$\sqrt{441} = 3 \times 7 = 21$

3. Question

Find the square root of each of the following numbers by using the method of prime factorization:

729

Answer

By using prime factorization method, we get

$729 = 3 \times 3 \times 3 \times 3 \times 3 \times 3$

$\sqrt{729} = 3 \times 3 \times 3 = 27$

4. Question

Find the square root of each of the following numbers by using the method of prime factorization:

1296

Answer

By using prime factorization method, we get

$1296 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3$

$\sqrt{1296} = 2 \times 2 \times 3 \times 3 = 36$

5. Question

Find the square root of each of the following numbers by using the method of prime factorization:

2025

Answer

By resolving given number into prime factors, we get

2025 = 3 × 3 × 3 × 3 × 5 × 5

Therefore,

$\sqrt{2025}$ = 3 × 3 × 5 = 45

6. Question

Find the square root of each of the following numbers by using the method of prime factorization:

4096

Answer

By resolving given number into prime factors, we get

4096 = 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2

Therefore,

$\sqrt{4096}$ = 2 × 2 × 2 × 2 × 2 × 2 = 64

7. Question

Find the square root of each of the following numbers by using the method of prime factorization:

7056

Answer

By resolving given number into prime factors, we get

4096 = 2 × 2 × 2 × 2 × 3 × 3 × 7 × 7

Therefore,

$\sqrt{7056}$ = 2 × 2 × 3 × 7 = 84

8. Question

Find the square root of each of the following numbers by using the method of prime factorization:

8100

Answer

By resolving given number into prime factors, we get

4096 = 2 × 2 × 3 × 3 × 3 × 3 × 5 × 5

Therefore,

$\sqrt{8100}$ = 2 × 3 × 3 × 5 = 90

9. Question

Find the square root of each of the following numbers by using the method of prime factorization:

9216

Answer

By resolving given number into prime factors, we get

9216 = 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 × 2 × 3 × 3

Therefore,

$\sqrt{9216}$ = 2 × 2 × 2 × 2 × 2 × 3 = 96

10. Question

Find the square root of each of the following numbers by using the method of prime factorization:

11025

Answer

By resolving given number into prime factors, we get

4096 = 3 × 3 × 5 × 5 × 7 × 7

Therefore,

$\sqrt{11025}$ = 3 × 5 × 7 = 105

11. Question

Find the square root of each of the following numbers by using the method of prime factorization:

15876

Answer

By resolving given number into prime factors, we get

4096 = 2 × 2 × 3 × 3 × 3 × 3 × 7 × 7

Therefore,

$\sqrt{15876}$ = 2 × 3 × 3 × 7 = 126

12. Question

Find the square root of each of the following numbers by using the method of prime factorization:

17424

Answer

By resolving given number into prime factors, we get

17424 = 2 × 2 × 2 × 2 × 3 × 3 × 11 × 11

Therefore,

$\sqrt{17424}$ = 2 × 2 × 3 × 11 = 132

13. Question

Find the smallest number by which 252 must be multiplied to get a perfect square. Also, find the square root of the perfect square so obtained.

Answer

Resolving 252 into prime factors, we get

252 = 2 × 2 × 3 × 3 × 7

Thus, the 253 must be multiplied by 7 in order to get a perfect square

Therefore,

New number = 252 × 7 = 1764

Hence,

$\sqrt{1764}$ = 2 × 3 × 7

= 42

14. Question

Find the smallest number by which 2925 must be divided to obtain a perfect square. Also, find the square

root of the perfect square so obtained.

Answer

Resolving 2925 into prime factors, we get

$2925 = 3 \times 3 \times 5 \times 5 \times 13$

Thus, 13 is the smallest number by which 2925 must be divided in order to get a perfect square

Therefore,

New number $= \frac{2925}{13} = 225$

Hence,

$\sqrt{225} = 3 \times 5$

$= 15$

15. Question

1225 plants are to be planted in a garden in such a way that each row contains as many plants as the number of rows. Find the number of rows and the number of plants in each row.

Answer

Let the number of rows be x

Therefore,

The number of plants in each row is also x

Hence,

Total number of plants $= (x \times x) = x^2 = 1225$

$x^2 = 1225 = 5 \times 5 \times 7 \times 7$

$x = \sqrt{1225} = 5 \times 7 = 35$

Thus,

The total number of rows is 35 and the number of plants in each row is also 35

16. Question

The students of a class arranged a picnic. Each student contributed as many rupees as the number of students in the class. If the total contribution is 1156, find the strength of the class.

Answer

Let, the number of students be x

Hence,

The amount contributed by each student is Rs x

Total amount contributed $= x \times x = x^2 = 1156$

$1156 = 2 \times 2 \times 17 \times 17$

$x = \sqrt{1156} = 2 \times 17 = 34$

Therefore,

The strength of class is 34

17. Question

Find the least square number which is exactly divisible by each of the numbers 6, 9, 15 and 20.

Answer

We know that,

The smallest number that is divisible by each o0f these numbers is their L.C.M

So,

L.C.M of 6, 9, 15, 20 = 180

Resolving into prime factors, we get

180 = 2 × 2 × 3 × 3 × 5

So, for making it a perfect square we have to multiply it by 5

Multiplying the number by 5, we get

Required number = 180 × 5

= 900

18. Question

Find the least square number which is exactly divisible by each of the numbers 8, 12, 15 and 20.

Answer

We know that,

The smallest number that is divisible by each o0f these numbers is their L.C.M

So,

L.C.M of 8, 12, 15, 20 = 120

Resolving into prime factors, we get

120 = 2 × 2 × 2 × 3 × 5

So, for making it a perfect square we have to multiply it by 2 × 3 × 5 = 30

Multiplying the number by 30, we get

Required number = 120 × 30

= 3600

Exercise 3E

1. Question

Evaluate:

$\sqrt{576}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method

Hence,

Using long division method,

	54
2	$\overline{576}$
2	4
44	176
4	176
	0

Hence,

The square root of number is 24

2. Question

Evaluate:

$\sqrt{1444}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	38
3	1444
3	9
68	5 44
8	5 44
	0

Hence,

The square root of number is 38

3. Question

Evaluate:

$\sqrt{4489}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	67
6	4489
6	36
127	889
7	889
	0

Hence,

The square root of number is 67

4. Question

Evaluate:

$\sqrt{6241}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	79
7	$\overline{62}\overline{41}$
7	49
149	1341
9	1341
	0

Hence,

The square root of number is 79

5. Question

Evaluate:

$\sqrt{7056}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	84
8	$\overline{70}\overline{56}$
8	64
164	656
4	656
	0

Hence,

The square root of number is 84

6. Question

Evaluate:

$\sqrt{9025}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	95
9	$\overline{90}\overline{25}$
9	81
185	925
5	925
	0

Hence,

The square root of number is 95

7. Question

Evaluate:

$\sqrt{11449}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	107
1	$\overline{1}\,\overline{14}\,\overline{49}$
1	1
207	1449
7	1449
	0

Hence,

The square root of number is 107

8. Question

Evaluate:

$\sqrt{14161}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	119
1	$\overline{1}\,\overline{41}\,\overline{61}$
1	1
21	41
1	21
229	2061
9	2061
	0

Hence,

The square root of number is 119

9. Question

Evaluate:

$\sqrt{10404}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	102
1	$\overline{1}\,\overline{04}\,\overline{04}$
1	1
202	0404
2	0404
	0

Hence,

The square root of number is 102

10. Question

Evaluate:

$\sqrt{17956}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	134
1	$\overline{1}\,\overline{79}\,\overline{56}$
1	1
23	79
3	69
264	1056
	1056
	0

Hence,

The square root of number is 134

11. Question

Evaluate:

$\sqrt{19600}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	140
1	$\overline{1}\,\overline{96}\,\overline{00}$
1	1
24	96
4	96
280	00
0	00
	0

Hence,

The square root of number is 140

12. Question

Evaluate:

$\sqrt{92416}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	304
3	$\overline{9}\,\overline{24}\,\overline{16}$
3	9
604	2416
	2416
	0

Hence,

The square root of number is 304

13. Question

Find the least number which must be subtracted from 2509 to make it a perfect square.

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	50
5	$\overline{25}\,\overline{09}$
5	25
100	09
0	0
	9

Therefore, the number that should be subtracted from the given number to make it a perfect square is 9

14. Question

Find the least number which must be subtracted from 7581 to obtain a perfect square. Find this perfect square and its square root.

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	87
8	$\overline{7581}$
8	64
167	1181
7	1169
	12

Therefore, the number that should be subtracted from the given number to make it a perfect square is 12

Therefore,

Perfect square = 7581 – 12

= 7569

Therefore, its square root is 87

15. Question

Find the least number which must be added to 6203 to obtain a perfect square. Find this perfect square and its square root.

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	78
7	$\overline{6203}$
7	49
148	1303
8	1184
	119

Therefore, to get a perfect square than the given number we have to take the square of the next natural number of the quotient, i.e. 78

792 = 6241

Therefore,

Number that should be added to the given number to make it a perfect square = 6241 – 6203

= 38

Thus, the perfect square obtained is 6241 and its square root is 79

16. Question

Find the least number which must be added to 8400 to obtain a perfect square. Find this perfect square and its square root.

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	91
9	$\overline{84}\,\overline{00}$
9	81
181	300
1	181
	119

The next natural number that is a perfect square can be obtained by squaring the next natural number of the obtained quotient i.e. 91

Therefore,

$(91 + 1)^2 = (92)^2 = 8464$

Hence,

The number that should be added to the given number to make it a perfect square:

= 8464 – 8400

= 64

Thus, the perfect square obtained is 8464 and its square root is 92

17. Question

Find the least number of four digits which is a perfect square. Also find the square root of the number so obtained.

Answer

We have,

Smallest number of 4 digits = 1000

Using the long division method, we have

	31
3	$\overline{10}\,\overline{00}$
3	9
61	100
1	61
	39

From long division method it is clear that, 1000 is not a perfect square and the obtained square root is between 31 and 32

So, by squaring the next integer we will get the perfect square

$(32)^2 = 1024$

Thus, 1024 is the smallest four digit perfect square

As,

$\sqrt{1024} = 32$

18. Question

Find the greatest number of five digits which is a perfect square. Also find the square root of the number so obtained.

Answer

We have,

Greatest five digit number = 99999

By using long division method, we get

	316
1	$\overline{99}\overline{99}\overline{99}$
1	9
61	99
1	61
626	3899
	3756
	143

From long division method it is clear that 99999 is not a perfect square and the square root obtained is between 316 and 317

Therefore, by squaring the smaller number we will get the perfect square that will be less than 99999

$(316)^2 = 99856$

Hence,

99856 is the required perfect square whose square root is 316

19. Question

The area of a square field is 60025 m^2. A man cycles along its boundary at 18 km/h. In how much time will he return to the starting point?

Answer

Given that,

Area of the square field = 60025 m^2

Length of each side of the square field = $\sqrt{60025}$ = 245 m

We know that,

Perimeter of the square = 4 × sides

= 4 × 245

= 980 m

$= \frac{980}{1000}$ km

It is also given that, the man is cycling at a speed of 18 km/h

Therefore,

Time = $\frac{Distance\ travelled}{Speed}$

$= \frac{\frac{980}{1000}}{18}$

$= \frac{980}{1000 \times 18}$ hr

$= \frac{980 \times 60 \times 60}{18000}$ sec

= 98 × 2 sec

= 196 sec

= 3 min 16 sec

Exercise 3F

1. Question

Evaluate:

$\sqrt{1.69}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	1.3
1	$\overline{1.69}$
1	1
23	69
3	69
	0

Hence,

The square root of number is 1.3

2. Question

Evaluate:

$\sqrt{33.64}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	5.8
5	$\overline{33.64}$
5	25
108	864
8	864
	0

Hence,

The square root of number is 5.8

3. Question

Evaluate:

$\sqrt{156.25}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	12.5
1	$\overline{1}\overline{56}.\overline{25}$
1	1
22	56
2	44
245	1225
	1225
	0

Hence,

The square root of number is 12.5

4. Question

Evaluate:

$\sqrt{75.69}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	8.7
8	$\overline{75}.\overline{69}$
8	64
167	1169
	1169
	0

Hence,

The square root of number is 8.7

5. Question

Evaluate:

$\sqrt{9.8596}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	3.14
3	$\overline{9}.\overline{85}\,\overline{96}$
3	9
61	85
1	61
624	2496
4	2496
	0

Hence,

The square root of number is 3.14

6. Question

Evaluate:

$\sqrt{10.0489}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	3.17
3	$\overline{10.04}\,\overline{89}$
3	9
61	104
1	61
627	4389
7	4389
	0

Hence,

The square root of number is 3.17

7. Question

Evaluate:

$\sqrt{1.0816}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	1.04
1	$\overline{1.08}\,\overline{16}$
1	1
204	0816
4	0816
	0

Hence,

The square root of number is 1.04

8. Question

Evaluate:

$\sqrt{0.2916}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	0.54
5	$\overline{0.29}\,\overline{16}$
5	25
104	416
4	416
	0

Hence,

The square root of number is 0.54

9. Question

Evaluate $\sqrt{3}$ up to two places of decimal.

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	1.732
1	$\overline{3.00}\,\overline{00}\,\overline{00}$
1	1
27	200
7	189
343	1100
3	1029
3462	7100
2	6924
	176

Hence,

The square root of number is 1.732

As,

$\sqrt{3}$ = 1.732

$\sqrt{3}$ = 1.73 (Correct up to two decimal places)

10. Question

Evaluate $\sqrt{2.8}$ correct up to two places of decimal.

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	1.673
1	$\overline{2.80}\,\overline{00}\,\overline{00}$
1	1
26	180
6	156
327	2400
7	2289
3343	11100
3	10029
	1071

Hence,

The square root of number is 1.673

Therefore,

$\sqrt{2.8}$ = 1.673

$\sqrt{2.8}$ = 1.67 (Correct up to two decimal places)

11. Question

Evaluate $\sqrt{0.9}$ correct up to two places of decimal.

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	0.948
9	$\overline{0.90}\,\overline{00}\,\overline{00}$
9	81
184	900
4	736
1888	16400
8	15104
	1296

Hence,

The square root of number is 0.948

Therefore,

$\sqrt{0.9}$ = 0.948

$\sqrt{0.9}$ = 0.95 (Correct up to two decimal places)

12. Question

Find the length of each side of a square whose area is equal to the area of a rectangle of length 13.6 meters and breadth 3.4 meters

Answer

Given that,

Length of rectangle = 13.6 meters

Breadth of rectangle = 3.4 meters

We know that,

Area of rectangle = Length × Breadth

= (13.6 × 3.4)

= 46.24 sq m

Therefore,

Area of the square = 46.25 sq m

Length of each side of the square = $\sqrt{46.25}$

Now, by using long division method we get:

	6.8
6	46.24
6	36
128	1024
8	1024
	0

$\sqrt{46.24}$ = 6.8

Therefore,

The length of a side of the square is 6.8 meters

Exercise 3G

1. Question

Evaluate:

$\sqrt{\frac{16}{81}}$

Answer

We have,

$\sqrt{\frac{16}{81}} = \frac{\sqrt{16}}{\sqrt{81}}$

We know that,

$\sqrt{16}$ = 4

And,

$\sqrt{81}$ = 9

Therefore,

$\sqrt{\frac{16}{81}} = \frac{\sqrt{16}}{\sqrt{81}}$

$= \frac{4}{9}$

2. Question

Evaluate:

$\sqrt{\frac{64}{225}}$

Answer

We have,

$$\sqrt{\frac{64}{225}}$$

Now, using long division method we get:

$$\begin{array}{r|l} & 8 \\ \hline 8 & \overline{64} \\ 8 & 64 \\ \hline & 0 \end{array}$$

Also,

$$\begin{array}{r|l} & 15 \\ \hline 1 & \overline{225} \\ 1 & 1 \\ \hline 26 & 125 \\ 5 & 125 \\ \hline & 0 \end{array}$$

Therefore,

$$\sqrt{\frac{64}{225}}$$

$$= \frac{\sqrt{64}}{\sqrt{225}}$$

$$= \frac{8}{15}$$

3. Question

Evaluate:

$$\sqrt{\frac{121}{256}}$$

Answer

We have,

$$\sqrt{\frac{121}{256}}$$

Now, by using long division method we get:

$$\begin{array}{r|l} & 11 \\ \hline 1 & \overline{121} \\ 1 & 1 \\ \hline 21 & 21 \\ & 21 \\ \hline & 0 \end{array}$$

Also,

$$\begin{array}{r|l} & 16 \\ \hline 1 & \overline{256} \\ 1 & 1 \\ \hline 26 & 156 \\ 5 & 156 \\ \hline & 0 \end{array}$$

Therefore,

$$\sqrt{\frac{121}{256}} = \frac{\sqrt{121}}{\sqrt{256}}$$

$$= \frac{11}{16}$$

4. Question

Evaluate:

$$\sqrt{\frac{625}{729}}$$

Answer

We have,

$$\sqrt{\frac{635}{729}} = \frac{\sqrt{625}}{\sqrt{729}}$$

Now, by using long division method we get:

$\sqrt{625}$ = 25

	25
2	$\overline{6}\,\overline{25}$
2	4
45	225
5	225
	0

Also,

$\sqrt{729}$ = 27

	27
2	$\overline{7}\,\overline{29}$
2	4
47	329
7	329
	0

Therefore,

$$\sqrt{\frac{625}{729}} = \frac{\sqrt{625}}{\sqrt{729}}$$

$$= \frac{25}{27}$$

5. Question

Evaluate:

$$\sqrt{3\frac{13}{36}}$$

Answer

We have,

$$\sqrt{3\frac{13}{36}} = \sqrt{\frac{121}{36}}$$

$$= \frac{\sqrt{121}}{\sqrt{36}}$$

$= \sqrt{\frac{11 \times 11}{6 \times 6}}$

$= \frac{11}{6}$

$= 1\frac{5}{11}$

6. Question

Evaluate:

$\sqrt{4\frac{73}{324}}$

Answer

We have,

$\sqrt{4\frac{73}{324}} = \sqrt{\frac{1369}{324}}$

$= \frac{\sqrt{1369}}{\sqrt{324}}$

Now, using long division method we get:

$\sqrt{1369} = 37$

	37
3	$\overline{1369}$
3	9
67	469
7	469
	0

Also,

$\sqrt{324} = \sqrt{2 \times 2 \times 9 \times 9}$

$= 2 \times 9$

$= 18$

Therefore,

$\sqrt{4\frac{73}{324}} = = \frac{37}{18}$

$= 2\frac{1}{18}$

7. Question

Evaluate:

$\sqrt{3\frac{33}{289}}$

Answer

We have,

$\sqrt{3\frac{33}{289}}$

$= \sqrt{\frac{900}{289}}$

$= \frac{\sqrt{900}}{\sqrt{289}}$

Now, by using long division method we get:

	17
1	289
1	1
27	189
7	189
	0

$\sqrt{289} = 17$

Also,

$\sqrt{900} = \sqrt{2 \times 2 \times 5 \times 5 \times 3 \times 3}$

$= 2 \times 5 \times 3$

$= 30$

Therefore,

$\sqrt{3\frac{33}{289}} = \frac{30}{17}$

$= 1\frac{13}{17}$

8. Question

Evaluate:

$\sqrt{\frac{80}{405}}$

Answer

We have,

$\sqrt{\frac{80}{405}}$

$= \sqrt{\frac{16}{81}}$

$= \frac{\sqrt{16}}{\sqrt{81}}$

$= \frac{4}{9}$

9. Question

Evaluate:

$\frac{\sqrt{1183}}{\sqrt{2023}}$

Answer

We have,

$\frac{\sqrt{1183}}{\sqrt{2023}} = \sqrt{\frac{1183}{2023}}$

$= \sqrt{\frac{169}{289}}$

$= \frac{\sqrt{169}}{\sqrt{289}}$

$= \sqrt{\frac{13\times13}{17\times17}}$

$= \frac{13}{17}$

10. Question

Evaluate: $\sqrt{98} \times \sqrt{162}$

Answer

We have,

$\sqrt{98} \times \sqrt{162}$

$= \sqrt{98 \times 162}$

$= \sqrt{2 \times 7 \times 7 \times 2 \times 9 \times 9}$

$= 2 \times 7 \times 9$

$= 126$

Exercise 3H

1. Question

Which of the following numbers is not a perfect square?

A. 7056

B. 3969

C. 5478

D. 4624

Hint. The number 5478 ends in 8.

Answer

We know that,

As per the properties of square,

All the numbers that end with digits 2, 3, 7 or 8 are not a perfect square

Hence,

Considering the property, we get

The number 5478 is not a perfect square

As the last digit of the number is 8.

Therefore,

Option (C) is the correct option

2. Question

Which of the following numbers is not a perfect square?

A. 1444

B. 3136

C. 961

D. 2222

Hint. The number 2222 ends in 2.

Answer

We know that,

As per the properties of square,

All the numbers that end with digits 2, 3, 7 or 8 are not a perfect square

Hence,

Considering the property, we get

The number 2222 is not a perfect square

As the last digit of the number is 2.

Therefore,

Option (D) is the correct option.

3. Question

Which of the following numbers is not a perfect square?

A. 1843

B. 3721

C. 1024

D. 1296

Hint. The number 1843 ends in 3.

Answer

We know that,

As per the properties of square,

All the numbers that end with digits 2, 3, 7 or 8 are not a perfect square

Hence,

Considering the property, we get

The number 1843 is not a perfect square

As the last digit of the number is 3.

Therefore,

Option (A) is the correct option.

4. Question

Which of the following numbers is not a perfect square?

A. 1156

B. 4787

C. 2704

D. 3969

Hint. The number 4787 ends in 7.

Answer

We know that,

As per the properties of square,

All the numbers that end with digits 2, 3, 7 or 8 are not a perfect square

Hence,

Considering the property, we get

The number 4787 is not a perfect square

As the last digit of the number is 7.

Therefore,

Option (B) is the correct option.

5. Question

Which of the following numbers is not a perfect square?

A. 3600

B. 6400

C. 81000

D. 2500

Hint. The number 81000 ends in an odd number of zeros.

Answer

We know that,

As per the properties of square,

All the numbers that end with odd numbers of zeroes are not a perfect square

Hence,

Considering the property, we get

The number 81000 is not a perfect square

As the number of zeroes of this number is 3.

Therefore,

Option (C) is the correct option.

6. Question

Which of the following cannot be the unit digit of a perfect square number?

A. 6

B. 1

C. 9

D. 8

Answer

We know that,

As per the properties of square,

A number which is a perfect square cannot have 2, 3, 7 or 8 as their unit digit.

Hence,

Considering the property, we get

That 8 cannot be the unit digit of a perfect square number

Therefore,

Option (D) is the correct option.

7. Question

The square of a proper fraction is:

A. Larger than the fraction

B. Smaller than the fraction

C. Equal to the fraction

D. None of these

Answer

We know that,

Proper fraction is a fraction that is less than 1, where the numerator is less than the denominator.

Hence,

We can observe that,

The square of any proper fraction will be smaller than the original fraction.

Therefore,

Option (B) is the correct option.

8. Question

If n is odd, then (1+3 +5 + 7 + ... to n terms) is equal to:

A. $(n^2 +1)$

B. $(n^2 —1)$

C. n^2

D. $(2n^2 +1)$

Answer

We know that,In the given series,a = 1, d = 3 - 1 = 2

Sum of n numbers = $\frac{n}{2}[2(1)+(n-1)d]$

$=\frac{n}{2}[\ 2+(n-1)2]$

$=\frac{n}{2}[2+2n-2]$

$=\frac{n}{2}\times 2n$

$= n^2$

Hence,

Option (C) is the correct option.

9. Question

Which of the following is a Pythagorean triplet?

A. (2, 3, 5)

B. (5, 7, 9)

C. (6, 9, 11)

D. (8, 15, 17)

Answer

We know that,

According to the Pythagorean triplet,

For a natural number m,

$(2m, m^2 - 1, m^2 + 1)$ is a Pythagorean triplet.

Hence,

Considering the Pythagorean triplet,

Let m = 4

2m = 8

$m^2 - 1 = 15$

$m^2 + 1 = 17$

Thus,

(8, 15, 17) is the Pythagorean triplet.

Hence,

Option (D) is the correct option.

10. Question

What least number must be subtracted from 176 to make it a perfect square?

A. 16

B. 10

C. 7

D. 4

Answer

For making 176 a perfect square we have to subtract 7 from it as:

176 – 7 = 169

And, we know that:

$\sqrt{169} = 13$

Therefore, option (C) is correct

11. Question

What least number must be added to 526 to make it a perfect square?

A. 3

B. 2

C. 1

D. 6

Answer

For making 526 a perfect square we have to add 3 on it as:

526 + 3 = 529

And, we know that:

$\sqrt{529}$ = 23

Therefore, option (A) is correct

12. Question

What least number must be added to 15370 to make it a perfect square?

A. 4

B. 6

C. 8

D. 9

Answer

For making 15370 a perfect square we have to add 6 on it as:

15370 + 6 = 15376

And, we know that:

$\sqrt{15376}$ = 124

Therefore, option (B) is correct

13. Question

Choose the correct answer: $\sqrt{0.9}$ =?

A. 0.3

B. 0.03

C. 0.33

D. 0.94

Answer

By using long division method, we have

```
      0.94
   ---------
 9 | 0.9000
 9 |   81
---+------
184|   900
 4 |   736
---+------
   |   164
```

Hence, option (D) is correct

14. Question

Choose the correct answer: $\sqrt{0.1}$ =?

A. 0.1

B. 0.01

C. 0.316

D. None of these

Answer

By using long division method, we have

	0.316
3	$\overline{0.1}\,\overline{00}\,\overline{00}$
3	9
61	100
1	61
626	3900
6	3756
	144

Therefore, option (C) is correct

15. Question

Choose the correct answer: $\sqrt{0.9} \times \sqrt{1.6}$ =?

A. 0.12

B. 1.2

C. 0.75

D. 12

Hint. $\sqrt{0.9} \times \sqrt{1.6} = \sqrt{1.44}$ = 1.2

Answer

We have,

$\sqrt{0.9} \times \sqrt{1.6} = \sqrt{1.44}$

Also,

$\sqrt{1.44}$ = 1.2

Hence, option (B) is correct

16. Question

Choose the correct answer: $\frac{\sqrt{288}}{\sqrt{128}} = ?$

A. $\frac{\sqrt{3}}{2}$

B. $\frac{3}{\sqrt{2}}$

C. $\frac{3}{2}$

D. 1.49

Hint. $\frac{\sqrt{288}}{\sqrt{128}} = \sqrt{\frac{288}{128}} = \sqrt{\frac{9}{4}} = \frac{3}{2}$

Answer

We have,

$\frac{\sqrt{288}}{\sqrt{128}} = \sqrt{\frac{288}{128}}$

$= \sqrt{\frac{2\times2\times2\times2\times2\times3\times3}{2\times2\times2\times2\times2\times2\times2}}$

$= \sqrt{\frac{3\times3}{2\times2}}$

$= \frac{\sqrt{3\times3}}{\sqrt{2\times2}}$

$= \frac{3}{2}$

Therefore, option (C) is correct

17. Question

Choose the correct answer: $\sqrt{2\frac{1}{4}} = ?$

A. $2\frac{1}{2}$

B. $1\frac{1}{2}$

C. $1\frac{1}{4}$

D. None of these

Hint. $\sqrt{2\frac{1}{4}} = \sqrt{\frac{9}{4}} = \frac{3}{2} = 1\frac{1}{2}$

Answer

We can solve the given question as:

$= \sqrt{2\frac{1}{4}}$

$= \sqrt{\frac{9}{4}}$

$= \frac{\sqrt{9}}{\sqrt{4}}$

$= \frac{\sqrt{3\times3}}{\sqrt{2\times2}}$

$= \frac{3}{2}$

$= 1\frac{1}{2}$

Hence,

Option (B) is the correct option

18. Question

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

A. 196

B. 441

C. 625

D. 529

Answer

As we know that,

Square of an even number is always an even number.

Hence,

196 is the square of an even number.

Therefore,

Option (A) is the correct option.

19. Question

Which of the following is the square of an odd number?

A. 2116

B. 3844

C. 1369

D. 2500

Answer

As we know that,

Square of an odd number is always an odd number.

Hence,

1369 is the square of an odd number.

Therefore,

Option (C) is the correct option.

CCE Test Paper-3

1. Question

Evaluate:

$\sqrt{11236}$

Answer

According to question,

In order to find the square root of the given number we will use the long division method.

Hence,

Using long division method,

	106
1	$\overline{1.12}\,\overline{36}$
1	1
206	1236
6	1236
	0

Therefore,

$\sqrt{11236}$ = 106

2. Question

Find the greatest number of five digits which is a perfect square. What is the square root of this number?

Answer

We know that,

Greatest five digit number = 99999

Now, by using long division method we get:

	316
3	$\overline{9.99}\,\overline{99}$
3	9
61	99
1	61
526	3899
6	3756
	143

From above results it is clear that:

316 < $\sqrt{99999}$ < 317

Therefore,

$(316)^2$ = 99856

Hence, 99856 is the least four digit perfect square number having square root 316

3. Question

Find the least number of four digits which is a perfect square. What is the square root of this number?

Answer

We know that,

Least four digit number = 1000

Now, by using long division method we get:

	31
3	$\overline{10}\,\overline{00}$
3	9
61	100
1	61
	39

From above results it is clear that:

31 < $\sqrt{100}$ < 32

Therefore,

$(32)^2 = 1024$

Hence, 1024 is the least four digit perfect square number having square root 32

4. Question

Evaluate:

$\sqrt{0.2809}$

Answer

By using long division method we get:

	0.53
5	$\overline{0.28}\,\overline{09}$
5	25
103	309
3	309
	0

Therefore,

$\sqrt{0.2809} = 0.53$

5. Question

Evaluate $\sqrt{3}$ correct up to two places of decimal.

Answer

We have,

$\sqrt{3}$

Now, by using long division method we get:

	1.732
1	$\overline{3.00}\,\overline{00}\,\overline{00}$
1	1
27	200
7	189
343	1100
3	1029
3462	7100
2	6924
	176

Therefore,

$\sqrt{3} = 1.732$

Hence,

The value of $\sqrt{3}$ up to 2 decimal places is 1.73

6. Question

Evaluate:

$\frac{\sqrt{48}}{\sqrt{243}}$

Answer

We have,

$\frac{\sqrt{48}}{\sqrt{243}} = \sqrt{\frac{48}{243}}$

$= \sqrt{\frac{2\times2\times2\times2\times3}{3\times3\times3\times3\times3}}$

$= \frac{\sqrt{2\times2\times2\times2}}{\sqrt{3\times3\times3\times3}}$

$= \frac{2\times2}{3\times3}$

$= \frac{4}{9}$

7. Question

Which of the following numbers is not a perfect square?

A. 529

B. 961

C. 1024

D. 1222

Answer

We know that,

Any number which is ending with 2, 3, 7 and 8 is not a perfect square

Therefore,

1222 is not a perfect square as it is ending with digit 2

Hence, option (D) is correct

8. Question

Choose the correct answer: $\sqrt{2\frac{1}{4}}$?

A. $2\frac{1}{2}$

B. $1\frac{1}{4}$

C. $1\frac{1}{2}$

D. None of these

Answer

We have,

$\sqrt{2\frac{1}{4}} = \sqrt{\frac{9}{4}}$

$= \frac{\sqrt{9}}{\sqrt{4}}$

$= \frac{\sqrt{3\times3}}{\sqrt{2\times2}}$

$= \frac{3}{2}$

$= 1\frac{1}{2}$

Therefore, option (C) is correct

9. Question

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

A. 529

B. 961

C. 1764

D. 2809

Answer

We know that,

The square of an even number is always number

Hence, 1764 is the square of an even number as it is ending with the digit 4 which is even

Therefore, option (C) is correct

10. Question

What least number must be added to 521 to make it a perfect square?

A. 3

B. 4

C. 5

D. 8

Answer

For making 521 a perfect square, we have to add 8 on it as:

521 + 8 = 529

And we know that,

$\sqrt{529} = 23$

Hence, option (D) is correct

11. Question

What least number must be subtracted from 178 to make it a perfect square?

A. 6

B. 8

C. 9

D. 7

Answer

For making 178 a perfect square we have to subtract 9 from it as:

178 – 9 = 169

And we know that,

$\sqrt{169} = 13$

Therefore, option (C) is correct

12. Question

Choose the correct answer: $\sqrt{72} \times \sqrt{98} = ?$

A. 42

B. 84

C. 9

D. 7

Answer

We have,

$\sqrt{72} \times \sqrt{98} = \sqrt{2 \times 2 \times 2 \times 3 \times 3} \times \sqrt{2 \times 7 \times 7}$

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

= 2 × 2 × 3 × 7

= 84

Hence, option (B) is correct

13. Question

Fill in the blanks:

(i) 1+3 +5 +7+9 +11+13 =(.....)^2

(ii) $\sqrt{1681}$ = ...

(iii) The smallest square number exactly divisible by 2, 4, 6 is

(iv) A given number is a perfect square having n digits, where n is odd. Then, its square root will have ..... digits.

Answer

(i) We have,

1 + 3 + 5 + 7 + 9 + 11 + 13

We know that,

Sum of first n odd numbers = n^2

Therefore,

1 + 3 + 5 + 7 + 9 + 11 + 13 =**(7)^2**

(ii) By using long division method, we have

	41
4	$\overline{16}\,\overline{81}$
4	16
81	81
1	81
	0

Therefore,

$\sqrt{1681}$ = **41**

(iii) We know that,

The smallest square number which is exactly divisible by 2, 4 and 6 is 36

Also,

L.C.M of 2, 4b and 6 is 12

Prime factorization of 12 = 2 × 2 × 3

Now, for making it a perfect square we have to multiply it by 3

Therefore,

12 × 3 = **36**

(iv) We know that,

A given number is a perfect square having n digits, where n is odd. Then, its square root will have $\left(\frac{n+1}{2}\right)$ digits