Chapter – 06

Squares and Square Roots

Exercises 6.4

Question 1.

Find the square root of each of the following numbers by Division method.

(i) 2304 (ii) 4489

(iii) 3481 (iv) 529

(v) 3249 (vi) 1369

(vii) 5776 (viii) 7921

(ix) 576 (x) 1024

(xi) 3136 (xii) 900

Answer:

(i) The square root of 2304:

	48
4	$\overline{23}$ $\overline{04}$ -16
88	704

	704
	0

$\sqrt{2304} = 48$

(ii) The square root of 4489:

	67
6	$\overline{44}\ \overline{89}$ -36
127	889 889
	0

$\sqrt{4489} = 67$

(iii) The square root of 3481:

	59
5	$\overline{34}\ \overline{81}$

	-25
109	981 981
	0

(iv) The square root of 529:

	23
2	$\overline{5}\ \overline{29}$ -4
43	129 129
	0

$\sqrt{259} = 23$

(v) The square root of 3249

	57
5	$\overline{32}$ $\overline{49}$ -25
107	749 749
	0

$\sqrt{3249} = 57$

(vi) The square root of 1369:

	37
4 3	$\overline{13}$ $\overline{69}$ 9
67 7	469 469

	0

$\sqrt{1369} = 37$

(vii) The square root of 5776:

	76
7 7	$\overline{5}\overline{7}$ $\overline{7}\overline{6}$ 49
146 6	876 876
	0

$\sqrt{5776} = 76$

(viii) The square root of 7921:

	89
8 8	$\overline{7}\overline{9}$ $\overline{2}\overline{1}$ 64

169 9	1521 1521
	0

$\sqrt{7921} = 89$

(ix) The square root of 576:

	24
2 2	$\overline{5}\ \overline{76}$ 4
44 4	176 176
	0

$\sqrt{576} = 24$

(x) The square root of 1024:

	32
3 3	$\overline{10}\ \overline{34}$ 9
62 2	124 124
	0

$\sqrt{1024} = 32$

(xi) The square root of 3136:

	56
5 5	$\overline{31}\ \overline{36}$ 25
106 6	636 636
	0

$\sqrt{3136} = 56$

(xii) The square root of 900:

	30
3 3	$\overline{9}\ \overline{00}$ 9
60 0	000 000
	0

$\sqrt{900} = 30$

Question 2.

Find the number of digits in the square root of each of the following numbers (without any calculation)

(i) 64 (ii) 144

(iii) 4489 (iv) 27225

(v) 390625

Answer:

For calculating the number of digits in the square root of a number steps are as follows.

1. Divide the number in the pair of twos.2. Place a bar on each pair.3. Count the number of bars.4. Number of bars will be the number of digits in the square root.for example. Consider the number - 56251. Divide the number in pair of twos - 56 252. Place bar on each pair. 56 253. There will be two bars and so there will be two digits in the square root of the number. (Square root of 5625 = 75, and it is a two digit number)(i) By placing bars, we get

$64 = \overline{64}$

Since there is only one bar, the square root of 64 will have only one digit in it

(ii) By placing bars, we get

$144 = \overline{1\ 44}$

Since there are two bars, the square root of 144 will have 2 digits in it

(iii) By placing bars, we get

$4489 = \overline{44}\ \overline{89}$

Since there are two bars, the square root of 4489 will have 2 digits in it

(iv) By placing bars, we get

$27225 = \overline{2}\ \overline{72}\ \overline{25}$

Since there are three bars, the square root of 27225 will have three digits in it

(v) By placing the bars, we get

$390625 = \overline{39}\,\overline{06}\,\overline{25}$

Since there are three bars, the square root of 390625 will have 3 digits in it

Question 3.

Find the square root of the following decimal numbers

(i) 2.56 (ii) 7.29

(iii) 51.84

(iv) 42.25

(v) 31.36

Answer:

(i) The square root of 2.56 is an follows:

	1.6
1 1	2.56 1
26 6	156 156
	0

$\sqrt{2.56} = 1.6$

(ii) The square root 7.29 is as follows:

	2.7
2 2	7.29 4
47 7	329 329
	0

$\sqrt{7.29} = 2.7$

(iii) The square root of 51.84 is as follows:

	7.2
7 7	51.84 49
142 2	284 284

	0

$\sqrt{51.84} = 7.2$

(iv) The square root of 42.25 is as follows:

	6.5
6 6	42.25 36
125 5	625 625
	0

$\sqrt{42.25} = 6.5$

(v) The square root of 31.36 is as follows:

	5.6
5 5	31.36 25

106	636
6	636
	0

$\sqrt{31.36} = 5.6$

Question 4.

Find the least number which must be subtracted from each of the following numbers so as to get a perfect square. Also find the square root of the perfect square so obtained

(i) 402 (ii) 1989

(iii) 3250 (iv) 825

(v) 4000

Answer:

(i) The square root of 402 can be calculated by long division method as follows:

	2
2	$\overline{4}\ \overline{02}$
2	4

4	002

The remainder is 2

This represents that the square of 20 is less than 402 by 2.

Hence, a perfect square will be obtained by subtracting 2 from the given number 402

Therefore, required perfect square = 402 – 2

$= 400$

$\sqrt{400} = 20$

(ii) The square root of 1989 can be calculated by long division method as follows:

4 4	1989 16
8	389

Now 84 × 4 = 336 and we have 3895o 389 = 5 Hence,

The remainder is 53

This represents that the square of 44 is less than 1989 by 53

Hence, a perfect square will be obtained by subtracting 53 from the given number 1989.

Therefore, required perfect square = 1989 - 53

= 1936

$\sqrt{1936} = 44$

(iii) The square root of 3250 can be calculated by long division method as follows:

5 5	3250 25
10	750

Now 107 x 7 = 749And 750 - 749 = 1Hence,

The remainder is 1

This represents that the square of 57 is less than 3250 by 1

Hence, a perfect square can be obtained by subtracting 1 from the given number 3250

Therefore, required perfect square = 3250 - 1

= 3249

$\sqrt{3249} = 57$

(iv) The square root of 825can be calculated by long division method as follows: ‘

2 2	825 4
4	425

Now, 48 x 8 = 384And 425 - 384 = 41Hence,

The remainder is 4

This represents that the square of 28 is less than 825 by 41

Hence, a perfect square can be calculated by subtracting 41 from the given number 825

Therefore, required perfect square = 825 – 41

$= 784$

$\sqrt{784} = 28$

(v) The square root of 4000 can be calculated by long division method as follows:

6 6	4000 36

12	400

Now 123 × 3 = 369 and 400 – 369 = 31 Hence,

The remainder is 31

This represents that the square of 63 is less than 4000 by 31

Hence, a perfect square can be calculated by subtracting 31 from the given number 4000

Therefore, required perfect square = 4000 – 31

= 3969

$\sqrt{3969} = 63$

Question 5.

Find the least number which must be added to each of the following numbers so as to get a perfect square. Also find the square root of the perfect square so obtained

(i) 525 (ii) 1750

(iii) 252 (iv) 1825

(v) 6412

Answer:

(i) The square root of 525 can be calculated by long division method as:

	22
2	$\overline{5}\ \overline{25}$

	-4
42	125 84
	41

The remainder is 41

It represents that the square of 22 is less than 525

Next number is 23 and $23^2 = 529$

Hence, number to be added to $525 = 23^3 - 525$

$= 529 - 525$

$= 529 - 525$

$= -4$

The required perfect square is 529 and $\sqrt{529} = 23$

(ii) The square root of 1750 can be calculated by long division method as follows:

	41
4	$\overline{17}\ \overline{50}$ -16

81	150 81
	69

The remainder is 69

It represents that the square of 41 is less than 1750

The next number is 42 and $42^2 = 1764$

Hence, number to be added to 1750 = $42^2 - 1750$

= 1764 - 1750

= 14

The required perfect square is 1764 and $\sqrt{1764} = 42$

(iii) The square root of 252 can be calculated by long division method as follows:

	15
1	$\overline{2}\ \overline{52}$ -1
25	152 125

	27

The remainder is 27. It represents that the square of 15 is less than 252

The next number is 16 and $16^2 = 256$

Hence, number to be added to $252 = 16^2 - 252$

$= 256 - 252$

$= 4$

The required perfect square is 256 and $\sqrt{256} = 16$

(iv) The square root of 1825 can be calculated by long division method as follows:

	42
4	$\overline{18}\ \overline{25}$ -16
82	225 164
	61

The remainder is 61. It represents that the square of 42 is less than 1825

The next number is 43 and $43^2 = 1849$

Hence, number to be added to 1825 = 43^2 - 1825

= 1849- 1825

= 24

Hence, number to be added to 1825 = 24

The required perfect square is 1849 and $\sqrt{1849} = 43$

(v) The square root of 6412 can be calculated by long division method as follows:

	80
8	6412
8	64
16	12

The remainder is 12. It represents that the square of 80 is less than 6412

The next number is 81 and $81^2 = 6561$

Hence, number to be added to $6412 = 81^2 - 6412$

$= 6561 - 6412$

$= 149$

Hence, number to be added to $6412 = 149$

The required perfect square is 6561 and $\sqrt{6561} = 81$

Question 6.

Find the length of the side of a square whose are in 441 m^2

Answer:

Area of square $= (X)^2$

Where × is the side of square.

Area of square = 441 m^2

$x^2 = 441$

$x = \sqrt{441}$

The square root of 441 can be calculated as:

	21
2	$\overline{4}\ \overline{41}$ -4
41	41 41
	0

$x = 21$

Hence, the length of the side of the square is 21 m

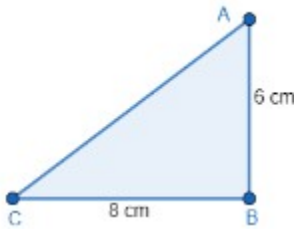
Question 7.

In a right triangle ABC, $\angle B = 90°$

(a) If AB = 6 cm, BC = 8 cm, find AC
(b) If AC = 13 cm, BC = 5 cm, find AB

Answer:

(a) It is given that ΔABC is right-angled at B, hence the side opposite to angle B ie AC will be the hypotenuse.



Pythagoras Theorem: In a right angles triangle, square of the hypotenuse is equal to the sum of squares of other two sides.

Therefore, by using Pythagoras theorem, we get:

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

$AC^2 = (6\text{ cm})^2 + (8\text{ cm})^2$

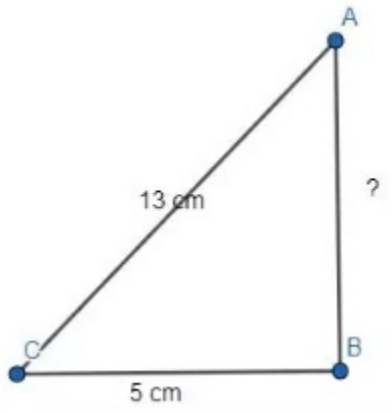
$AC^2 = (36 + 64)\text{cm}^2$

$AC^2 = 100\text{ cm}^2$

or $AC = \sqrt{100}\text{ cm}$

$AC = 10\text{ cm}$

(b)



It is given that Δ ABC is right-angled at BPythagoras Theorem : In a right angles triangle, square of the hypotenuse is equal to the sum of squares of other two sides.

Therefore, by using Pythagoras theorem, we get:

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

$(13\ \text{cm})^2 = (AB)^2 + (5\ \text{cm})^2$

$AB^2 = (13\ \text{cm})^2 - (5\ \text{cm})^2$

$AB^2 = 169\ \text{cm}^2 - 25\text{cm}^2$

$AB^2 = 144\ \text{cm}^2$

or $AB = \sqrt{144}\ \text{cm}$

$AB = 12\ \text{cm}$

Question 8.

A gardener has 1000 plants. He wants to plant these in such a way that the number of rows and the number of columns remain same. Find the minimum number of plants he needs more for this

Answer:

It is mentioned in the question that the gardener has 1000 plants.

And,

The number of rows and the number of columns is the same

We need to find the number of more plants that should be there, such that when the gardener plants them, the number of rows and columns are equal to one another.

For this, the number which should be added to 1000 to make it a perfect square has to be calculated

Now, Perfect square just greater than 1000 is 1024, which is

Hence, number to be added to 1000 to make it a perfect square

= 1024 - 1000

= 24

Thus, the required number of plants is 24.

Question 9.

There are 500 children in a school. For a P.T. drill they have to stand in such a manner that the number of rows is equal to number of columns. How many children would be left out in this arrangement?

Answer: It is given in the question that there are 500 children in the school. They have to stand for a P.T. drill in such a way that the number of rows is equal to the number of columns.

The number of children who will be left out in this arrangement has to be calculated.

For this, the number which should be subtracted from 500 to make it a perfect square has to be calculated.

The square root of 500 can be calculated by long division method as follows:

	22
2	$\overline{5}\ \overline{00}$ -4
42	100 84
	16

The remainder is 16. It shows that the square of 22 is less than 500 by 16

Therefore, if we subtract 16 from 500, we will obtain a perfect square

Required perfect square = 500 - 16

= 484

Hence, the number of children who will be left out is 16