Name : _____

Grade : **VIII**

Subject : **Mathematics**

Chapter : 6. Squares and Square Roots

Objective Type Questions **1 Marks.**

I. Multiple choice questions

1. A number ending with 9 will have the units place of its square as:

   a. 3 b. 9 c. 1 d. 6

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

   a. 144 b. 169 c. 441 d. 625

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

   a. 14^2 b. 62^2 c. 27^2 d. 35^2

4. The sum of the n odd natural numbers is:

   a. $2n + 1$ b. n^2 c. $n^2 - 1$ d. $n^2 + 1$

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

   a. 841 b. 529 c. 198 d. All of the above

6. The hypotenuse of a right triangle with its legs of lengths $3x$ and $4x$ is:

   a. $5x$ b. $7x$ c. $16x$ d. $25x$

7. Which of the following is the square root of 7056.

   a. 86 b. 34 c. 54 d. 84

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

9. Which of the following square number is divisible by each of the numbers 6, 9, 15?

   a. 400 b. 500 c. 600 d. 900

10. Which of the following number must be subtracted from 5607 to get a perfect square?

    a. 121 b. 131 c. 141 d. 151

11. Which letter best represents the location of 5 on a number line?

a. A b. B c. C d. D

12. If a number has 1 or 9 at its unit's place, then it's square ends with:

a. 0 b. 1 c. 2 d. 3

13. The smallest whole number by which 44 should be multiplied so as to make it a perfect square is:

a. 4 b. 5 c. 6 d. 11

14. The least number that must be added to 1400 to make it a perfect square is:

a. 31 b. 44 c. 56 d. 121

15. Which of the following number is not a perfect cube?

a. 216 b. 567 c. 125 d. 343

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

a. $n+1$ digit b. $\frac{n}{2}$ digit c. $\frac{n}{3}$ digit d. $\frac{n+1}{2}$ digit

17. 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

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

a. 14 b. 12 c. 16 d. 13

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

a. 74 b. 60.4 c. 64.4 d. 70.4

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

a. 196 b. 441 c. 625 d. 529

1. (c)	2. (a)	3. (b)	4. (b)	5. (c)	6. (a)	7. (d)	8. (b)	9. (d)	10. (b)
11. (c)	12. (b)	13. (d)	14. (b)	15. (b)	16. (b)	17. (d)	18. (c)	19. (d)	20. (a)

II. Multiple choice questions

1. A perfect square can never have he following digit at ones place. **[NCERT Exemplar]**

a. 1 b. 6 c. 5 d. 3

2. The value of $\sqrt{176 + \sqrt{2401}}$ *is* **[NCERT Exemplar]**

a. 14 b. 15 c. 16 d. 17

3. Which of the following is a square of an even number? **[NCERT Exemplar]**

a. 144 b. 169 c. 441 d. 625

4. If one member of a Pythagorean triplet is 2m, then the other two members are **[NCERT Exemplar]**

a. $m, m^2 + 1$ b... $m^2 + 1, m^2 - 1$ c. $m^2, m^2 - 1$ d. $m^2, m^2 + 11$

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

a. 81 b. 64 c. 49 d. 36

6. 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

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

a. 74 b. 60.4 c. 64.4 d.. 70.4

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

a. the square of m b. greater than m

c. equal to m d. $\sqrt{m}$

9. 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

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

a. 841 b. 529 c. 198 d. 100

1. d	2. b	3. a	4. b	5. b	6. b	7. d	8. d	9. b	10. c

I. Fill in the blanks

1. There are _____ perfect squares between 1 and 100.
2. The units digit in the square of 1294 is _____.
3. The square root of 24025 will have _____ digits.
4. The sum of first six odd natural numbers is _____.

1. 8	2. 6	3. 3	4. 36

I. True or False

1. The product of two perfect squares is a perfect square.
2. The square of every natural number is always greater than the number itself.
3. A number having 7 at its one place will have 3 at the unit place of its square.
4. The sum of two perfect squares is a perfect square.
5. The sum of first n odd natural numbers is n^2.

1. True	2. False	3. False	4. False	5. True

I. Very Short Answer Type Questions.

1. Write the first five square numbers.

Sol. 1,4, 9, 16, 25.

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

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

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

Sol. 2 m = 4 or m = 2

$m^2 + 1 = 2^2 + 1 = 4 + 1 = 5$

$m^2 - 1 = 2^2 - 1 = 4 - 1 = 3$

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

4. A king wanted to reward his advisor, a wiseman 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?

Sol. Since, the sum of first n natural number = n^2

The number of coins the advisor will get for 30 day = 30^2 = 900

5. Show that 500 is not a perfect square.

Sol. Prime factorization of 500 is

2	500
2	250
5	125
5	25
5	5
	1

$500 = 2 \times 2 \times 5 \times 5 \times 5$

The prime factor 5 does not occur in pair. Therefore, 500 is not a perfect square.

6. Using distributive law, find the square of 43.

Sol. $43 = 40 + 3$

So, $43^2 = (40 + 3)^2$

$= (40 + 3)(40 + 3)$

$= 40(40 + 3) + 3(40 + 3)$

$= 40 \times 40 + 40 \times 3 + 3 \times 40 + 3 \times 3$

$= 1600 + 240 + 9$

$= 1849$

So, $43^2 = 1849$

7. Find the number of digits in the square root of 4489. (Without any calculation).

Sol. For 4489, $n = 4$ $[Even\ number]$

Number of digits in its square root $= \frac{n}{2} = \frac{4}{2} = 2$

II. Very Short Answer Type Questions.

1. Express 25 as the sum of 5 odd numbers.

Since sum of first n odd numbers is n^2 and $25 = 5^2$.

2. Which of the following numbers are perfect squares?

11, 12, 16, 32, 36, 50, 64, 79, 81, 111, 121.

16, 36, 64, 81, 121 are perfect squares of 4, 6, 8, 9 and 11 respectively.

3. Check if 8, 15, 17 is a Pythagorean triplet or not.

Here, $(17)^2 = 17 \times 17 = 289$

. $(15)^2 = 15 \times 15 = 225$

$(8)^2 = 8 \times 8 = 64$

Since, $289 = 225 + 64$ i.e.,

$(17)^2 = (15)^2 + (8)^2$

Hence, the numbers form a Pythagorean triplet.

4. What will be the possible number of digits in the square root of the following.

(i) 275625, we can put bars as $\overline{275625}$, since there are three bars, numbers of digits in its square root is 3.

(ii) For 841 we can put bars as $\overline{841}$, since there are two bars, number of digits in its square root is 2.

(iii) For 1521, we can put bars as $\overline{1521}$,since there are two bars, number of digits in the square root is 2.

5. Guess the units digit in the squares of the following.

(i) 599 (ii) 2783

Sol. (i) For 599,

Since 9 x 9 = 81 (one's digit x ones digit)

the unit's digit for square of 599 is 1.

(ii) For 2783

Since 3 x 3 = 9

the units digit for square of 2783 is 9.

I. Short Answer Type Questions.

1. Check whether 90 is a perfect square or not by using prime factorization.

Sol. Prime factorization of 90 is

2	90
3	45
3	15
5	5
	1

$$90 = 2 \times 3 \times 3 \times 5$$

The prime factors 2 and 5 do not occur in pairs. Therefore, 90 is not perfect square.

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

Sol, Given $4a = 96$

$a = 24$

Area of square = a^2

$= (24)^2 = 576\ m^2$

3. $\{(6^2 + 8^2)1/_2\}^2$

Sol. $\{(6^2 + 8^2)1/_2\}^2$

$\{(36 + 64)\ ^1/_2\}^2$

$\{(100)\ ^1/_2\}^2 = (10)^2 = 100$

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

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

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

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

$38\ x^2 = 608$

$x^2 = \frac{608}{38} = 16$

$x = 4$

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

Sol. Given, Area of square = Area of rectangle

$a^2 = l \times b$

$a^2 = 6.3 \times 2.5$

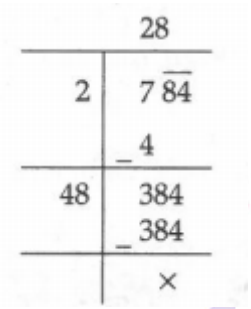
$a^2 = 16$

$a = 4$

So, the side of square is 4 m.

6. Find the square root of 784 by the long division method.

Sol. Using division method.



	28
2	7 84
	− 4
48	384
	− 384
	×

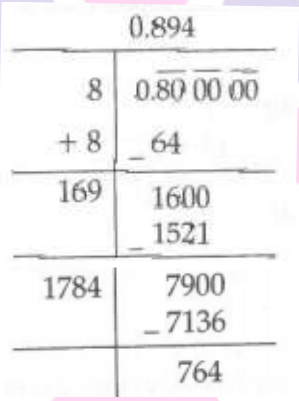
Therefore, $\sqrt{784} = 28$

7. Evaluate: $\sqrt{\frac{441}{961}}$

Sol. $\sqrt{\frac{441}{961}} = \sqrt{\frac{3\times3\times7\times7}{31\times31}} = \frac{3\times7}{31} = \frac{21}{31}$

8. Evaluate $\sqrt{0.8}$ correct upto two places of decimal.

Sol. Using division method

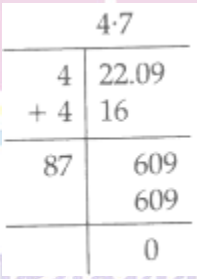


	0.894
8	0.80 00 00
+ 8	− 64
169	1600
	− 1521
1784	7900
	− 7136
	764

Therefore, $\sqrt{22.09} = 0.894 = \sqrt{0.8 = 0.80}$

9. Evaluate the square root of 22.09 by long division method.

Sol.



	4·7
4	22.09
+ 4	16
87	609
	609
	0

Therefore, $\sqrt{22.09} = 4.7$

II. Short Answer Type Questions.

1. 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? [NCERT Exemplar]

Sol. Total number of unit square is 256.

That is, the are of graph paper = 256 square unit.

Let number of unit square on each side be x

Area $= x \times x = x^2$

$x^2 = 256$

$x = \sqrt{256} = \sqrt{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2}$

= 2 x 2 x 2 x 2 = 16.

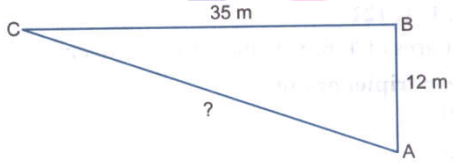
The number of unit squares on each side = 16.

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

2. Rahul walks 12 m North from his house and turns West to walk 35 m to reach his friend's house. While returning, he walks diagonally from his friend's house to reach back to his house. What distance di he walk while returning?

[NCERT Exemplar]

Sol. Applying Pythagoras in ΔABC we have



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

$AC^2 = 35^2 + 12^2$

$AC^2 = 1225 + 144$

$AC^2 = 1369$

$AC = \sqrt{1369} = 37$

∴ Rahul walked 37 m while returning.

	37
3	13 69
	9
67	469
	469
	0

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

[NCERT Exemplar]

Sol. Let three numbers be $2x, 3x \text{ and } 5x$

According to question,

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

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

$$38x^2 = 608$$

$$x^2 = 16$$

$$x = \sqrt{16}$$

$$x = \sqrt{2 \times 2 \times 2 \times 2} = 4$$

Numbers are 8, 12 and 20.

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

[NCERT Exemplar]

Sol. Let the length of one side be x m

Then area of square $= x^2$

$\therefore$ $x^2 = 101\frac{1}{400}$

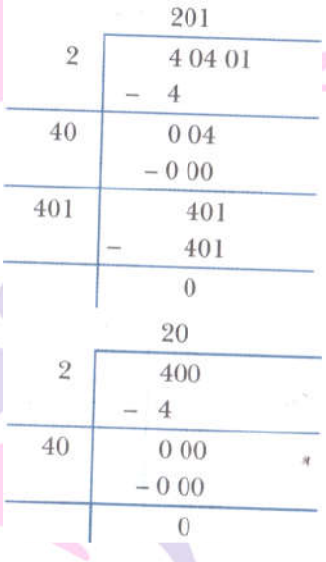
$$x^2 = \frac{40401}{400}$$

$$x = \sqrt{\frac{40401}{400}}$$

$$x = \frac{201}{20}$$

$$x = 10\frac{1}{20}$$

So, length of each side $= 10\frac{1}{20}\ m$



5. Find the squares of the following numbers using the identity

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

i) 491 ii) 189

Ans. (i) $491^2 = (500 - 9)^2 = (500)^2 - 2 \times 500 \times 9 \times 9^2$ $[\because (a - b)^2 = a^2 - 2ab + b^2)$

$= 250000 - 9000 + 81 = 241081$

(ii) $189^2 = (200 - 11)^2 = 2002 - 2 \times 200 \times 11 \times 11^2$

$= 40000 - 4400 + 121 = 35721$

6. 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 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?

[NCERT Exemplar]

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

The number of coins the advisor will get for 30 days = 30^2 = 900.

I. Long Answer Type Questions.

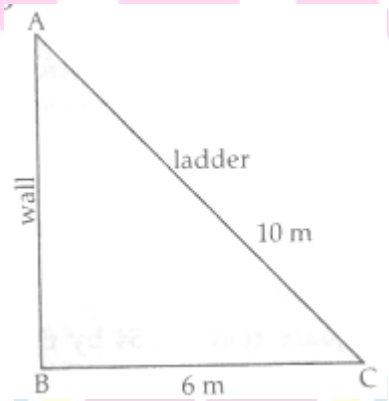
1. **Find the smallest perfect square number which is divisible by 3, 4, 5 and 6.**

Sol. The least number divisible by 3, 4, 5 and 6 is their LCM. The LCM of 3, 4, 5 and 6 is 60. Now, 60 = 2 × 2 × 5 × 3.

We see that prime factors 5 and 3 are not in pairs. Therefore, 60 is not a perfect square. So, 60 should be multiplied by 5 × 3 = 15 to get a perfect square.

Thus, the required least square number = 60 × 15 = 900.

2. **A leader 10 m long rests against a vertical well. If the foot of the ladder is 6 m away the wall and the ladder just reaches the top of the wall. How high is the wall?**



Sol. Let AC be the length of the ladder.

Therefore, AC = 10 m

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

Therefore, BC = 6 m

ΔABC forms a right angled triangle, right angled at B. By Pythagoras's theorem,

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

$10^2 = AB^2 + 6^2$

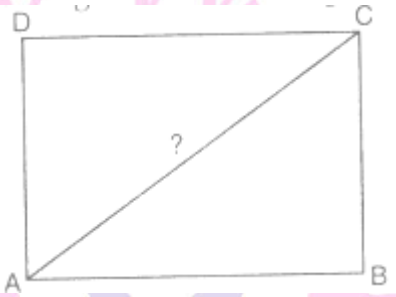
or $AB^2 = 10^2 - 6^2 = 100 - 36 = 64$

or $AB = \sqrt{64}$ = 8 m.

Hence, the wall is 8m high.

3. Find the length of a diagonal of a rectangle with dimensions 20 m by 15 m.

Sol. Using Pythagoras's theorem, we have Length of diagonal of the rectangle



$= \sqrt{(l^2 + b^2)}$ units

$= \sqrt{(20^2 + 15^2)}$ m

$= \sqrt{(400 + 225)}$ m

$= \sqrt{625}$ m

= 25 m

Hence, the length of diagonal is 25 m.

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

Sol. Let the length of one side of square be a m.

Then, area of square = a^2

$\therefore\ a^2 = 101\frac{1}{400}$

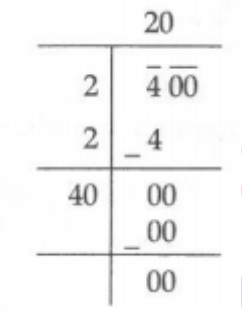
$a^2 = \frac{40401}{400}$

$a = \sqrt{\frac{40401}{400}}$

	201
2	4 $\overline{04}$ $\overline{01}$
2	_ 4
401	401
	_ 401
	00

$a = \frac{201}{20}$

$a = 10\frac{1}{20}$



So, length of each side of square = $10\frac{1}{20}$m

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

Sol. Let the number of rows = x

$\therefore$ Number of plants in a row = x

So, the number of plants to be planted = $x.\ x = x^2$

$x^2 = 1024$

2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

$x = \sqrt{1024}$

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

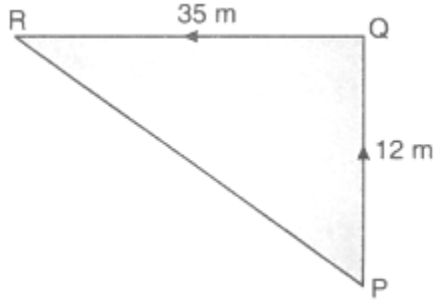
$= 2 \times 2 \times 2 \times 2 \times 2$

$= 32$

So, no. of plants in each row = 32

6. Rahul walks 12m north from his house and turns west to walk 35 m 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?

Sol. Applying Pythagoras's theorem, in ΔPQR, we have



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

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

$= 144 + 1225$

$= 1369$ $PR = \sqrt{1369}$

$PR = 37$ m

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

Sol. Since,

$$\begin{array}{r|l} & 37 \\ \hline 3 & 1385 \\ & \underline{-9} \\ \hline 67 & 485 \\ & \underline{-469} \\ \hline & 16 \end{array}$$

Then, the required number to be subtracted = 16

Now, 1385 – 16 = 1369

So, the square root $\sqrt{1369}$ = 37

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

Sol. Let the sides of two squares are a and b respectively.

$4a = 40$ and $4b = 96$

$\therefore$ $a = 10$ m and $b = 24$ m

Given,

The perimeter of another square

= Sum of area of two squares.

= Area of 1st square + Area of 2nd square

= $a^2 + b^2$

= $(10)^2 + (24)^2$

= 100 + 576

= 676 m^2

Hence, the perimeter of another square = 676m.

9. Find the least number that must be added to 1500 so as to get a perfect square. Also find the square root of the perfect square.

Sol.

	38
3	1500
	9
68	600
	544
	56

We observe that $38^2 < 1500 < 39^2$

Hence, the number to be added

= 39^2 – 1500

= 1521 – 1500

= 21

Therefore, the perfect square is 1500 + 21 = 1521

$\sqrt{1521}$ = 39

Hence, the required number is 21 and the square root is 39.

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

Sol. Since,

	78
7	6200
	49
148	1300
	–1184
	116

Here, $(78)^2 < 6200 < (79)^2$

Then, the required number to be added = $(79)^2 - 6200$

$= 6241 - 6200$

$= 41$

II. Long Answer Type Questions.

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

[NCERT Exemplar]

Sol. The greatest number of three digits = 999

The square root of 999 can be calculated as shown.

	31
3	$\overline{9}\,\overline{99}$
	$-\ 9$
61	$0\,99$
	$-\ 61$
	38

The remainder is 38. It shows that $312^2 < 999$ by 38.

Therefore, we subtract 38 from 999 to make it a perfect square.

Required perfect square = 999 – 38 = 961.

2. Find the value of $\sqrt{\frac{3}{7}}$ upto three decimal places.

Now, to evaluate $\sqrt{\frac{3}{7}} = \sqrt{\frac{3 \times 7}{7 \times 7}} = \sqrt{\frac{21}{7 \times 7}} = \sqrt{\frac{21}{7}}$

Now, to evaluate $\sqrt{\frac{3}{7}}$ upto three places of decimal, we will find $\sqrt{21}$ upto four places of decimal.

	4.5825
4	$\overline{21.00}\ \overline{00}\ \overline{00}\ \overline{00}$
	16
85	500
	425
908	7500
	7264
9162	23600
	18324
91645	527600
	458225
	69375

So, $\sqrt{21}$ = 4.5825 = 4.58

Thus, $\sqrt{\frac{3}{7}} = \sqrt{\frac{21}{7}} = \frac{4.583}{7} = 0.6547 = 0.655$ (upto three places of decimal)

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

Sol. The greatest number of seven digits = 9999999

Now, we must find the least number which when subtracted from 9999999 gives a perfect square.

Thus, $(3162)^2 < 9999999$ *by* 1755.

So, 1755 must be subtracted from 9999999 to get a perfect s

∴ Required perfect square number

= (9999999 – 1755) = 9998244, and $\sqrt{9998244} = 3162$.

	3162
3	9 99 99 99
	− 9
61	99
	− 61
626	3899
	− 3756
6322	14399
	− 12644
	1755

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

Sol. Length of side of first square $= \frac{Perimeter}{4} = \frac{40}{4} = 10\ m.$

Length of side of second square $= \frac{Perimeter}{4} = \frac{96}{4} = 24\ m$

Therefore, area of fist square = (sie)^2 = 102 = 100 m^2

Area of second square = (side)^2 = 242 = 576 m^2

Area of new square = (100 + 576) m^2 = 676 m^2

Let the side of new square be x m.

$\therefore \quad x^2 = 676$

$\Rightarrow \quad \sqrt{x^2} = \sqrt{676} \qquad [\sqrt{x^2} = x, if\ x\ is\ natural\ number]$

$\Rightarrow \quad x = \sqrt{676}$

$\Rightarrow \quad x = \sqrt{(2 \times 2) \times (13 \times 13)}$ [By prime factorisation]

$\Rightarrow \quad x = 2 \times 13 = 26\ m$

∴ Perimeter of new square = 26 x 4 = 104 m.

5. Find the square of following numbers by using identities.

(a) 203 (b) 197

Sol. (a) Given number is 203.

$203^2 = (200 + 3)^2$

$= 200^2 + 2 \times 200 \times 3 + 3^2$ [Here, a = 200, b = 3]

$= 40000 + 1200 + 9 = 41,209$

Hence, $203^2 = 41209$

(b) Given number is 197.

$197^2 = (200 - 3)^2$

$= 200^2 - 2 \times 200 \times 3 + 3^2$ [Here, a = 200, b = 3]

$= 40000 - 1200 + 9 = 38,809$

Hence, $197^2 = 38,809$

I. High Order Thinking Skills (HOTS) Questions

1. Evaluate $\sqrt{2}$ correct upto two places of decimal.

Sol. Using division method

	1.414
1	2.00 00 00
	_ 1
24	100
	_ 96
281	400
	_ 281
2824	11900
	_ 11296
	604

Therefore, $\sqrt{2} = 1.414 \Rightarrow \sqrt{2}\ 1.41$

2. The area of a rectangular field whose length is twice its breadth is 2450 m^2. Find the perimeter of the field.

Sol. Let the breadth of the field be x metres. Then, length of the field is $2x$ metres.

Therefore, area of the rectangular field

= length × breadth

$= (2x)(x) = (2x^2)\ m^2$

Given that area is 2450 m^2

Therefore, $2x^2 = 2450$

$x^2 = \frac{2450}{2}$

$x = \sqrt{1225}$

or x = 35 m

Hence, breadth = 35 m and length 35 × 2

= 70 m

Perimeter to the field = 2 $(l + b)$

= 2 (70 + 35) m

= 2 × 105 m

= 210 m

3. During a mass drill exercise, 6250 students of different schools are arranged in rows such that the number of students in each row is equal to the number of rows. In doing so, the instructor finds out that 9 children are left out. Find the number of children in each row of the square.

Sol. Total number of students = 6250

Number of students forming a square = 6250 × 9

= 6241

Thus, 6241 students form a big square which has number of rows equal to the number of students in each row.

Let the number of students in each row be x, then the number of rows = x

Therefore, $x + x$ = 6241

or $x = \sqrt{6241}$ = 79

Hence, there are 79 students in each row of the square formed.

II. High Order Thinking Skills (HOTS) Questions

1. There area of a rectangular field whose length is twice its breath is 2,450 m^2. Find the perimeter of the field.

Sol. Let the breadth of the field be x metres. Then length of the field is $2x$ metres.

Therefore, area of the rectangular field = length x breadth

$= (2x)(x) = (2x)^2 m^2$

Given that area is 2450 m^2

Therefore, $2x^2 = 2450$

$$x^2 = \frac{2450}{2} = 1225$$

$$\Rightarrow \quad x = \sqrt{1225} \text{ or } x = 35\ m$$

	35
3	$\overline{12}\ \overline{25}$
	9
65	325
	325
	0

Hence, breadth = 35 m and length 35 x 2 = 70 m

Perimeter of the field $= 2\ (l + b)$

$$= 2(70 + 35)m$$

$$= 2 \times 105\ m = 210\ m$$

2. During a mass drill exercise, 6,250 students of different schools are arranged in rows such that the number of students in each row is equal to the number of rows. In doing so, the instructor finds out that 9 children are left out. Find the number of children in each row of the square.

Sol. Total number of students = 6,250

Number of students forming a square = 6,250 – 9 = 6,241

Thus, 6241 students form a big square which has number of rows equal to the number of students in each row.

Let the number of students in each row be x, then the

Number of rows $= x$

Therefore, $x \times x = 6241$

Or $x = \sqrt{6241} = 79$

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

Hence, there are 79 students in each row of the

Square formed.

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

[NCERT Exemplar]

Sol. As per the question, 13 and 331 are palindrome and similarly its square will also be a palindrome

Now if I take 12 and 21 then

their square will be 144 and 441.

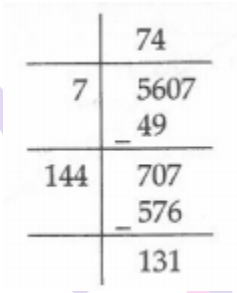
Hence, 12 and 21 is one such pair. Another pair will be 102 and 201.

I. Value Based Questions.

1. (a) What least number must be added to 5607 to make the sum a perfect square? Find this perfect square.

(b) If a number contains 3 zeros at the end, how many zeros will its square have?

Sol. (a) Since,



Here, $(74)^2 < 5607 < (75)^2$

Then, the required number to be added = $(75)^2 - 5607 = (5625 - 5607) = 18$.

(b) If a number contains 3 zeros at the end, then its square will have 6 zeros at the end.

2. (a) The product of two numbers is 1575 and their quotients is $\frac{9}{7}$. Find the numbers.

(b) What do you notice about the number of zeros at the end of the number in taking out square root and the number of zeros at the end of its square?

Sol. (a) Let, the 1st number = x

Since, product of two numbers = 1575

Then, 2nd number = $\frac{1575}{x}$

According to problem,

$$\frac{x}{\frac{1575}{x}} = \frac{9}{7}$$

or $$\frac{x^2}{1575} = \frac{9}{7}$$

or $$x^2 = \frac{9}{7} \times 1575$$

or $$x^2 = 2025$$

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

or $$x = \sqrt{5 \times 5 \times 3 \times 3 \times 3 \times 3}$$

or $x = 5 \times 3 \times 3 = 45$

Hence, 1st number = 45

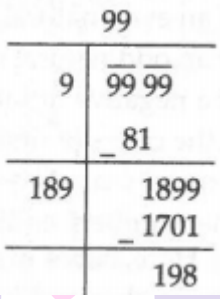
And 2nd number = $\frac{1575}{45}$ = 35

(b) The number of zeros at the end of a number while taking square root = $\frac{1}{2}\times$ The number of zeros at the end of its square.

3. (a) Find the greatest number of four digits which is perfect square.

(b) Can we say that square numbers can only have even number of zeros at the end?

Sol. (a) Since, greatest four digits number = 9999



Since, $(99)^2 <$ 9999 by 198

Then, required number = (9999 – 198) = 9801

(b) Yes, we can say that square numbers can only have even number of zeros at the end.