Section A

Q1. A square of an even number is always

(a) even (b) odd (c) even or odd (d) none of these

Answer:

Square of an even number is always even. (a)

Q2. 1+ 3 + 5 + 7 + ……….. up to n terms is equal to

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

Answer: (c) $n^2 + 1$

1 + 3 + 5 + 7 + ……. up to n terms is equal to $n^2 + 1$ (c)

Q3. The smallest number by which 75 should be divided to make it a perfect square is

(a) 1 (b) 2 (c) 3 (d) 4

Answer: (c) 3

$75 = 3 \times 5 \times 5$

Factor 3 is unpaired

∴ By dividing 75 by 3, we get a perfect square of 5.

Q4. The smallest number by which 162 should be multiplied to make it a perfect square is

(a) 4 (b) 3 (c) 2 (d) 1

Answer: (c) 2

$162 = 2 \times 3 \times 3 \times 3 \times 3$

For 2 is left unpairs. So, by multiplying 162 by 2, we get a perfect square.

∴ Required least number to be multiplied = 2 (c)

Q5. If the area of a square field is 961 $unit^2$, then the length of its side is

(a) 29 units (b) 41 units (c) 31 units (d) 39 units

Answer: (c) 31 units

Area of a square = 961 $unit^2$

∴ It's side = $\sqrt{961}$ unit = 31 unit (c)

	31
3	9 61
	9
61	61
	61
	×

Q6. The smallest number that should be subtracted from 300 to make it a perfect square is

(a) 11 (b) 12 (c) 13 (d) 14

Answer: (a) 11

300

Taking the square root of 300,

we see that 11 is left unpaired.

∴ 11 be subtracted. (a)

	17
1	3 00
	1
27	200
	189
	11

Section B

Q1. Find the square root of:

(i) 4761

Answer:

	69
6	4761
	36
129	1161
	1161
	×

Required square root =69

(ii) 7744

Answer:

	88
8	7744
	64
168	1344
	1344
	×

Required square root =88

Q2. By splitting into prime factors, find the square root of:

(i) 11025

Answer:

$\sqrt{11025}$

$\sqrt{5 \times 5 \times \overline{7 \times 7} \times \overline{3 \times 3}}$

(Splitting the terms)

$= 5 \times 7 \times 3 = 105$

Taking L.C.M.

5	11025
5	2205
7	441
7	63
3	9
	3

(ii) 194481

Answer:

$\sqrt{194481}$

$= \sqrt{\overline{3\times 3}\times\overline{3\times 3}\times\overline{7\times 7}\times\overline{7\times 7}}$
(Splitting the terms)

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

Taking L.C.M.

3	194481
3	64827
3	21609
3	7203
7	2401
7	343
7	49
	7

Q3.
(i) Find the smallest number by which 2592 be multiplied so that the product is a perfect square.
(ii) Find the smallest number by which 12748 be multiplied so that the product is a perfect square?
Answer:

(*i*) $2592 = \overline{2\times 2}\times\overline{2\times 2}\times 2\times\overline{3\times 3}\times\overline{3\times 3}$

On grouping the prime factors of 2592 as shown; on factor i.e. 2 is left which cannot be paired with equal factor.

2	2592
2	1296
2	648
2	324
2	162
3	81

The given number should be multiplied by 2 to make the given number a perfect square.

$12748 = \overline{2\times 2}\times 3187$

On grouping the prime factors of 12748 as shown; one factor i.e. 3187 is left which cannot be paired with equal factor.

2	12748
2	6374
	3187

The given number should be multiplied by 3187.

Section C

Q4. 13 and 31 is a strange pair of numbers such that their squares 169 and 961 are also mirror images of each other. Find two more such pairs.

Answer:

$(13)^2 = 169$ and $(31)^2 = 961$

Similarly, two such number can be 12 and 21

$\therefore$ $(12)^2 = 144$ and $(21)^2 = 441$

and 102, 201

$(102)^2 = 102 \times 102 = 10404$

and $(201)^2 = 201 \times 201 = 40401$

$$\begin{array}{r} 102 \\ \times 102 \\ \hline 204 \\ 1020 \\ \hline 10404 \\ \hline \end{array} \qquad \begin{array}{r} 201 \\ \times 201 \\ \hline 201 \\ 4020 \\ \hline 40401 \\ \hline \end{array}$$

Q5. Find the smallest number by which 1152 must be divided so that it becomes a perfect square. Also, find the number whose square is the resulting number.

Answer:

First, find the prime factors for 1152

$1152 = 2\times2\times2\times2\times2\times2\times2\times3\times3$

By grouping the prime factors in equal pairs we get,

$= (2\times2) \times (2\times2) \times (2\times2) \times (3\times3) \times 2$

$\therefore$ The smallest number by which 1152 must be divided so that the quotient becomes a perfect square is 2.

The number after division, $1152/2 = 576$

prime factors for $576 = 2\times2\times2\times2\times2\times2\times3\times3$

By grouping the prime factors in equal pairs we get,

$= (2\times2) \times (2\times2) \times (2\times2) \times (3\times3)$

$= 2^6 \times 3^2$

$= 24^2$

$\therefore$ The resulting number is the square of 24.

Q6. In an auditorium, the number of rows is equal to a number of chairs in each row. If the capacity of the auditorium is 1764. Find the number of chairs in each row.

Answer:

In an auditorium, there are

Number of rows = Number of chairs in each row

But, capacity is = 1764 persons

∴ Number of chairs = $\sqrt{1764}$ = 42

```
      42
  4 | 17 64
    | 16
 82 |   164
    |   164
    |    ×
```

Q7. Find the least number that must be subtracted from 2311 to make it a perfect square.

Answer:

2311

Taking square root, we see that 7 is left as remainder.

So, 7 is to be subtracted from 2311.

```
      48
  4 | 23 11
    | 16
 88 |   711
    |   704
    |     7
```

Q8. Find the greatest number of 5 digits which is a perfect square.

Answer:

Greatest 5 digits number = 99999

Taking square root we see that 143 is left as remainder.

So, by subtracting 143 from 99999,

we get the greatest 5 digits which is a perfect square.

Required number = 99999 – 143 = 99856

```
        316
    3 | 9 99 99
      | 9
   61 |   99
      |   61
  626 |   3899
      |   3756
      |    143
```

Q9. 4225 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:

Total number of plants = 4225

∵ The number of rows = Number of the plant in each row.

Number of rows = Square root of 4225

5	4225
5	845
13	169
13	13
	1

$= \sqrt{5 \times 5 \times 13 \times 13}$

$= 5 \times 13 = 65$

Number of rows = 65

and number of plants in each row = 65

Section D

Q10.

Evaluate : (i) $\sqrt{3^2 \times 6^3 \times 24}$

(ii) $\sqrt{(0\cdot5)^3 \times 6 \times 3^5}$ (iii) $\sqrt{\left(5+2\frac{21}{25}\right) \times \frac{0\cdot169}{1\cdot6}}$

(iv) $\sqrt{5\left(2\frac{3}{4}-\frac{3}{10}\right)}$ (v) $\sqrt{248+\sqrt{52+\sqrt{144}}}$

Answer:

(i) $\sqrt{3^2 \times 6^3 \times 24}$

$= \sqrt{3^2 \times 6^3 \times 2 \times 2 \times 6} = \sqrt{3^2 \times 6^4 \times 2^2}$

$= 3 \times 6^2 \times 2 = 3 \times 36 \times 2 = 216$

(ii) $\sqrt{(0\cdot5)^3 \times 6 \times 3^5}$

$= \sqrt{(0\cdot5)^2 \times 0\cdot5 \times 3 \times 2 \times 3^5}$

$= \sqrt{(0\cdot5)^2 \times 0\cdot5 \times 2 \times 3 \times 3^5}$

$= \sqrt{(0\cdot5)^2 \times 1\cdot0 \times 3^6}$ $[0\cdot5 \times 2 = 1\cdot0]$

$= \sqrt{(0\cdot5)^2 \times 1 \times 3^6} = 0\cdot5 \times 3^3$

$= 0\cdot5 \times 27 = 13\cdot5$

(*iii*) $\sqrt{\left(5+2\frac{21}{25}\right)\times\frac{0\cdot169}{1\cdot6}}$

$= \sqrt{\left(5+\frac{71}{25}\right)\times\frac{0\cdot169}{1\cdot600}} = \sqrt{\frac{196}{25}\times\frac{169}{1600}}$

$= \sqrt{\frac{14\times14}{5\times5}\times\frac{13\times13}{40\times40}} = \frac{14\times13}{5\times40}$

$= \frac{7\times13}{5\times20} = \frac{91}{100} = 0\cdot91$

(*iv*) $\sqrt{5\left(2\frac{3}{4}-\frac{3}{10}\right)} = \sqrt{5\left(\frac{11}{4}-\frac{3}{10}\right)}$

$= \sqrt{5\left(\frac{55-6}{20}\right)} = \sqrt{5\left(\frac{49}{20}\right)}$

$= \sqrt{\frac{5\times49}{20}} = \sqrt{\frac{49}{4}} = \sqrt{\frac{7\times7}{2\times2}}$

$= \frac{7}{2} = 3\frac{1}{2}$

(*v*) $\sqrt{248+\sqrt{52+\sqrt{144}}}$

$= \sqrt{248+\sqrt{52+12}}$ $(\because \sqrt{144} = 12)$

$= \sqrt{248+\sqrt{64}} = \sqrt{248+8}$ $(\because \sqrt{64} = 8)$

$= \sqrt{256} = 16$ $(\because \sqrt{256} = \sqrt{16\times16} = 16)$

Q11. Find the square root of:

(i) 245 correct to two places of decimal.

Answer:

	15.65
1	245
	1
25	145
	125
306	2000
	1836
3125	16400
	15625
	775

Required square root =15.65 up to two places of decimal.

(ii) 496 correct to three places of decimal.

Answer:

	22.271
2	496
	4
42	96
	84
442	1200
	884
4447	31600
	31129
44541	47100
	44541

Required square root = 22.2708=22.271 up to two places of decimal.

Q12. Find the value of √5 correct to 2 decimal places; then use it to find the square root of $\sqrt{\frac{3-\sqrt{5}}{3+\sqrt{5}}}$ **correct to 2 significant digits.**

Answer:

$$\sqrt{5} = 2.236 = 2.24$$

$$\begin{array}{r|l}
 & 2.236 \\ \hline
2 & 5.00\ 00\ 00 \\
 & 4 \\ \hline
42 & 100 \\
 & \ \ 84 \\ \hline
443 & \ \ 1600 \\
 & \ \ 1329 \\ \hline
4466 & \ \ \ 27100 \\
 & \ \ \ 26796 \\ \hline
 & \ \ \ \ \ \ 304
\end{array}$$

$$\sqrt{\frac{3-\sqrt{5}}{3+\sqrt{5}}} = \sqrt{\frac{(3-\sqrt{5})(3-\sqrt{5})}{(3+\sqrt{5})(3-\sqrt{5})}}$$

$$= \sqrt{\frac{(3-\sqrt{5})^2}{(3)^2-(\sqrt{5})^2}} = \sqrt{\frac{(3-\sqrt{5})^2}{9-5}}$$

$$= \sqrt{\frac{(3-\sqrt{5})^2}{4}} = \frac{(3-2.24)}{2}$$

$$= \frac{(0.76)}{2} = 0.38$$

Q13. Find three positive numbers in the ratio 2 : 3 : 5, the sum of whose squares is 950.

Answer:

Ratio in three numbers = 2 : 3 : 5

Sum of their square = 950

Let first number = 2x

Second number = 3x

and third number = 5x

$\therefore (2x)^2 + (3x)^2 + (5x)^2 = 950$

$\Rightarrow 4x^2 + 9x^2 + 25x^2 = 950$

$\Rightarrow 38x^2 = 950 \Rightarrow x^2 = \frac{950}{38} = 25$

$x = \sqrt{25} = 5$

First number = 2 × 5 = 10

Second number = 3 × 5 = 15

Third number = 5 × 5 = 25

Q14. Find the greatest number of six digits which is a perfect square.

Answer:

Greatest 6-digit number = 999999

```
        999
   9 | 99 99 99
     | 81
 189 | 1899
     | 1701
1989 |  19899
     |  17901
     |   1998
```

Taking square root of 999999, we see that 1998 is left

∴ Subtracting 1998 from 999999 we get 998001 which is a perfect square.

Hence, required 6-digit greatest number = 998001