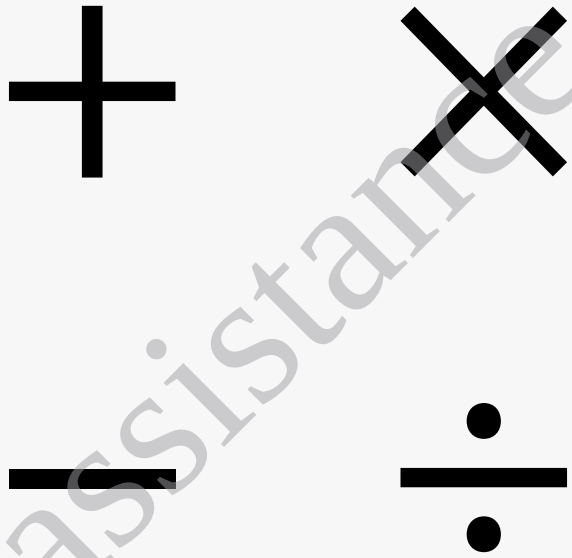
Square And Square Roots
Ex. 5.2



Ex. 5.2

1. $\sqrt{3\times3\times5\times5\times7\times7} = 3\times5\times7 = 105$ (B)

2.
$$\begin{array}{r|l} 7 & 2401 \\ 7 & 343 \\ 7 & 49 \\ & 7 \end{array}$$

$\sqrt{2401} = \sqrt{7\times7\times7\times7} = 7\times7 = 49$ (C)

3.
$$\begin{array}{r|l} 2 & 1296 \\ 2 & 648 \\ 2 & 324 \\ 2 & 162 \\ 3 & 81 \\ 3 & 27 \\ 3 & 9 \\ & 3 \end{array}$$

$\sqrt{1296} = \sqrt{2\times2\times2\times2\times3\times3\times3\times3}$

$= 2\times2\times3\times3$

$= 36$ (A)

4.
$$\begin{array}{r|l} 2 & 2, 3, 4 \\ & 1, 3, 2 \end{array}$$

L.C.M. $= 2\times3\times2$

$= 12$

$12 = 2\times2\times3$

2 does not occur in a pair

∴ We multiply 12 by 3 to get a perfect square

∴ Least square number exactly divisible by 2, 3 and 4 $= 12\times3 = 36$ (D)

5a. The possible unit's digit in the square root of 5781 is 1 or 9 as $1^2=1$ and $9^2=81$.

b. The possible unit's digit in the square root of 310025 is 5 as $5^2=25$.

c. The possible unit's digit in the square root of 4164 is 2 or 8 as $2^2=4$ and $8^2=64$.

d. The possible unit's digit in the square root of 3296 is 4 or 6 as $4^2=16$ and $6^2=36$.

6 a.
$$3\overline{)201}$$
$$67$$
$201 = 3 \times 67$

Since 3 and 67 do not occur in a pair.

$\therefore$ 201 is not a perfect square.

b.
$$5\overline{)625}$$
$$5\overline{)125}$$
$$5\overline{)25}$$
$$5$$
$625 = \underline{5\times5} \times \underline{5\times5}$

Since 5 occurs in a pair.

$\therefore$ 625 is a perfect square.

c. $149 = 149 \times 1$

Since 149 is a prime number.

$\therefore$ 149 is not a perfect square.

d.

3 | 8181
3 | 2727
3 | 909
3 | 303
101

$8181 = \underline{3\times3} \times \underline{3\times3} \times 101$

Since 101 does not occur in a pair.

$\therefore$ 8181 is not a perfect square.

7a.

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

$\sqrt{1024} = \sqrt{\underline{2\times2} \times \underline{2\times2} \times \underline{2\times2} \times \underline{2\times2} \times \underline{2\times2}}$

$= 2\times2\times2\times2\times2$

$= 32$

b.

2 | 400
2 | 200
2 | 100
2 | 50
5 | 25
5

$\sqrt{400} = \sqrt{2\times2\times2\times2\times5\times5}$

$= 2\times2\times5$

$= 20$

c.

2	4096
2	2048
2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
	2

$\sqrt{4096} = \sqrt{2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2\times2}$

$= 2\times2\times2\times2\times2\times2$

$= 64$

d.

5	4225
5	845
13	169
	13

$\sqrt{4225} = \sqrt{5\times5\times13\times13}$

$= 5\times13$

$= 65$

e.

2	7744
2	3872
2	1936
2	968
2	484
2	242
11	121
	11

$\sqrt{7744} = \sqrt{2\times2\times2\times2\times2\times2\times11\times11}$

$= 2\times2\times2\times11$

$= 88$

f.

2	90000
2	45000
2	22500
2	11250
3	5625
3	1875
5	625
5	125
5	25
	5

$\sqrt{90000} = \sqrt{2\times2\times2\times2\times3\times3\times5\times5\times5\times5}$

$= 2\times2\times3\times5\times5$

$= 300$

8.a.

2	1210
5	605
11	121
	11

$1210 = 2 \times 5 \times \underline{11 \times 11}$

Since 2 and 5 do not occur in a pair.

∴ We multiply 1210 by $2 \times 5 = 10$ to get a perfect square number.

∴ Required smallest number = 10

$1210 \times 10 = 12100$

$\sqrt{12100} = \sqrt{\underline{2 \times 2} \times \underline{5 \times 5} \times \underline{11 \times 11}}$

$= 2 \times 5 \times 11$

$= 110$

b.

2	2048
2	1024
2	512
2	256
2	128
2	64
2	32
2	16
2	8
2	4
	2

$2048 = \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times 2$

Since 2 does not occur in a pair.

∴ We multiply 2048 by 2 to get a perfect square number.

∴ Required smallest number = 2

$2048 \times 2 = 4096$

$\sqrt{4096} = \sqrt{\underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2} \times \underline{2 \times 2}}$

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

$= 64$

c.

2	1008
2	504
2	252
2	126
3	63
3	21
	7

$1008 = \underline{2\times2}\times\underline{2\times2}\times\underline{3\times3}\times7$

Since 7 does not occur in a pair.

∴ We multiply 1008 by 7 to get a perfect square number.

∴ Required smallest number = 7

$1008\times7 = 7056$

$\sqrt{7056} = \sqrt{\underline{2\times2}\times\underline{2\times2}\times\underline{3\times3}\times\underline{7\times7}}$

$= 2\times2\times3\times7$

$= 84$

d.

2	768
2	384
2	192
2	96
2	48
2	24
2	12
2	6
	3

$768 = \underline{2\times2}\times\underline{2\times2}\times\underline{2\times2}\times\underline{2\times2}\times3$

Since 3 does not occur in a pair.

∴ We multiply 768 by 3 to get a perfect square number.

∴ Required smallest number = 3

$768 \times 3 = 2304$

$\sqrt{2304} = \sqrt{2\times2\times2\times2\times2\times2\times2\times2\times3\times3}$

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

$= 48$

9a.

5	3125
5	625
5	125
5	25
	5

$3125 = 5\times5\times5\times5\times5$

Since 5 does not occur in a pair.

∴ We divide 3125 by 5 to get a perfect square number.

∴ Required smallest number = 5

$3125 \div 5 = 625$

$\sqrt{625} = \sqrt{5\times5\times5\times5}$

$= 5\times5$

$= 25$

b.

2	2700
2	1350
3	675
3	225
3	75
5	25
	5

$2700 = 2\times2\times3\times3\times3\times5\times5$

Since 3 does not occur in a pair.
We divide 2700 by 3 to get a perfect square number.
∴ Required smallest number = 3

$2700 \div 3 = 900$

$\sqrt{900} = \sqrt{2\times2\times3\times3\times5\times5}$

$= 2\times3\times5$

$= 30$

c.

$$\begin{array}{r|l} 7 & 343 \\ 7 & 49 \\ & 7 \end{array}$$

$343 = 7\times7\times7$

Since 7 does not occur in a pair.
∴ We divide 343 by 7 to get a perfect square number.
∴ Required smallest number = 7

$343 \div 7 = 49$

$\sqrt{49} = \sqrt{7\times7}$

$= 7$

d.

$$\begin{array}{r|l} 2 & 3240 \\ 2 & 1620 \\ 2 & 810 \\ 3 & 405 \\ 3 & 135 \\ 3 & 45 \\ 3 & 15 \\ & 5 \end{array}$$

$3240 = \underline{2\times2}\times2\times\underline{3\times3}\times\underline{3\times3}\times5$

Since 2 and 5 do not occur in a pair.

∴ We divide 2340 by $2\times5=10$

∴ Required smallest number $=10$

$3240 \div 10 = 324$

$\sqrt{324} = \sqrt{\underline{2\times2}\times\underline{3\times3}\times\underline{3\times3}}$

$= 2\times3\times3$

$= 18$

10.

2	4, 6, 8, 12
2	2, 3, 4, 6
3	1, 3, 2, 3
	1, 1, 2, 1

L.C.M. $= 2\times2\times3\times2$

$= 24$

$24 = \underline{2\times2}\times2\times3$

Since 2 and 3 do not occur in a pair.

∴ We multiply 24 by $2\times3=6$ to get a perfect square number.

∴ Required smallest square number $= 24\times6$

$= 144$

11. Let number of rows $= x$

∴ Number of plants in each row $= x$

Total number of plants $= 3844$

According to the question

$x \times x = 3844$

or $x^2 = 3844$

or $x = \sqrt{3844}$

$$\begin{array}{r|l} 2 & 3844 \\ \hline 2 & 1922 \\ \hline 31 & 961 \\ \hline & 31 \end{array}$$

$x = \sqrt{2 \times 2 \times 31 \times 31}$

or $x = 2 \times 31$

or $x = 62$

$\therefore$ Number of rows of plants $= 62$

12. Let number of cadets in each row $= x$

$\therefore$ Number of rows $= x$

Total number of cadets $= 841$

According to the question

$x \times x = 841$

or $x^2 = 841$

or $x = \sqrt{841}$

$$\begin{array}{r|l} 29 & 841 \\ \hline & 29 \end{array}$$

$x = \sqrt{29 \times 29}$

or $x = 29$

$\therefore$ Number of cadets in each row $= 29$