

EXERCISE 3(A)

Question 1.

Find the square of:

(i) 59

(ii) 6.3

(iii) 15

Solution:

(i) Square of 59 = $59 \times 59 = 3481$

(ii) Square of 6.3 = $6.3 \times 6.3 = 39.69$

(iii) Square of 15 = $15 \times 15 = 225$

Question 2. By splitting into prime factors, find the square root of:

(i) 11025

Solution:

$$\sqrt{11025}$$

$$\sqrt{5 \times 5 \times 7 \times 7 \times 3 \times 3} \text{ (Splitting the terms)}$$

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

Taking L.C.M.

| | |
|---|-------|
| 5 | 11025 |
| 5 | 2205 |
| 7 | 441 |
| 7 | 63 |
| 3 | 9 |
| | 3 |

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(ii) 396900

Solution:

$$\sqrt{396900}$$

$$= \sqrt{2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 5 \times 5 \times 7 \times 7} \text{ (Splitting the terms)}$$

$$= 2 \times 3 \times 3 \times 5 \times 7 = 630$$

Taking L.C.M.

| | |
|---|--------|
| 2 | 396900 |
| 2 | 198450 |
| 3 | 99225 |
| 3 | 33075 |
| 3 | 11025 |
| 3 | 3675 |
| 5 | 1225 |
| 5 | 245 |
| 7 | 49 |
| | 7 |

(iii) 194481

Solution:

$$\begin{aligned} & \sqrt{194481} \\ &= \sqrt{\overline{3 \times 3} \times \overline{3 \times 3} \times \overline{7 \times 7} \times \overline{7 \times 7}} \text{ (Splitting the terms)} \\ &= 3 \times 3 \times 7 \times 7 = 441 \end{aligned}$$

Taking L.C.M.

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

Question 3.

(i) Find the smallest number by which 2592 be multiplied so that the product is a perfect square.

Solution:

(i) $2592 = 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3$

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

Taking L.C.M.

| | |
|---|------|
| 2 | 2592 |
| 2 | 1296 |
| 2 | 648 |
| 2 | 324 |
| 2 | 162 |
| 3 | 81 |
| 3 | 27 |
| 3 | 9 |
| | 3 |

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

(ii) Find the smallest number by which 12748 be multiplied so that the product is a perfect square?

Solution:

$12748 = 2 \times 2 \times 3187$ On grouping the prime factors of 12748; one factor i.e. 3187 is left which cannot be paired with equal factor.

Taking L.C.M.

| | |
|---|-------|
| 2 | 12748 |
| 2 | 6374 |
| | 3187 |

The given number should be multiplied by 3187.

Question 4.

Find the smallest number by which 10368 be divided so that the result is a perfect square. Also, find the square root of the resulting numbers.

Solution:

$$10368 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3$$

On grouping the prime factors of 10368; one factor i.e.2 is left which cannot be paired with equal factor.

Taking L.C.M.

| | |
|---|-------|
| 2 | 10368 |
| 2 | 5184 |
| 2 | 2592 |
| 2 | 1296 |
| 2 | 648 |
| 2 | 324 |
| 2 | 162 |
| 3 | 81 |
| 3 | 27 |
| 3 | 9 |
| | 3 |

∴ The given number should be divided by 2

$$\text{Now } \sqrt{\frac{10368}{2}} = \sqrt{\frac{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3}{2}} \text{ (Splitting the terms)}$$

$$= 2 \times 2 \times 2 \times 3 \times 3 = 72$$

Question 5. Find the square root of:

(i) 0.1764

(ii) $96\frac{1}{25}$

(iii) 0.0169

Solution:

$$(i) \sqrt{0.1764} = \sqrt{\frac{01764}{10000}} = 0.42$$

$$(ii) \sqrt{96\frac{1}{25}} = \sqrt{96 + 0.04} = \sqrt{96.04} = 9.8$$

$$(iii) 0.0169 = \sqrt{\frac{169}{10000}} = 0.13$$

Question 6. Evaluate

(i) $\sqrt{\frac{14.4}{22.5}}$

Solution:

$$\sqrt{\frac{14.4}{22.5}} = \sqrt{\frac{144}{225}}$$

$$= \sqrt{\frac{12 \times 12}{15 \times 15}} \text{ (Splitting the terms)}$$

$$= \frac{12}{15} = 0.8$$

(ii) $\sqrt{\frac{0.225}{28.9}}$

Solution:

$$\sqrt{\frac{0.225}{28.9}} = \sqrt{\frac{0.225}{28.900}}$$

Taking L.C.M.

| | |
|----|-------|
| 17 | 28900 |
| 17 | 1700 |
| 10 | 100 |
| | 10 |

$$= \sqrt{\frac{225}{28900}} = \sqrt{\frac{15 \times 15}{17 \times 17 \times 10 \times 10}} \text{ (Splitting the terms)}$$

$$= \frac{15}{17 \times 10} = \frac{15}{170} = \frac{3 \times 5}{5 \times 34} = \frac{3}{34}$$

(iii) $\sqrt{\frac{25}{32} \times 2\frac{13}{18} \times 0.25}$

Solution:

$$= \sqrt{\frac{25}{32} \times \frac{49}{18} \times 0.25} = \sqrt{\frac{25}{32} \times \frac{49}{18} \times \frac{25}{100}} \text{ (Simplifying)}$$

$$= \sqrt{\frac{25 \times 49 \times 25^1}{32 \times 18 \times 100^4}} = \sqrt{\frac{25 \times 49}{32 \times 18 \times 4}}$$

$$= \sqrt{\frac{5 \times 5 \times 7 \times 7}{(2 \times 2 \times 2 \times 2 \times 2) \times (2 \times 3 \times 3) \times (2 \times 2)}} \text{ (Splitting the terms)}$$

$$= \sqrt{\frac{5 \times 5 \times 7 \times 7}{2 \times 2 \times 2 \times 2} \times \frac{2 \times 2 \times 3 \times 3 \times 2 \times 2}{2 \times 2 \times 2 \times 2}}$$

$$= \frac{5 \times 7}{2 \times 2 \times 2 \times 3 \times 2} = \frac{35}{48}$$

(iv) $\sqrt{1\frac{4}{5} \times 14\frac{21}{44} \times 2\frac{7}{55}}$

Solution:

$$= \sqrt{\frac{9}{5} \times \frac{637}{44} \times \frac{117}{55}} = \sqrt{\frac{9 \times 637 \times 117}{5 \times 44 \times 55}}$$

$$= \sqrt{\frac{9 \times 7 \times 7 \times 13 \times 13 \times 9}{5 \times 11 \times 2 \times 2 \times 11 \times 5}} \text{ (Splitting the terms)}$$

Taking L.C.M.

$$\begin{array}{r|l} 7 & 637 \\ \hline 7 & 91 \\ \hline & 13 \end{array}$$

$$\begin{array}{r|l} 9 & 117 \\ \hline & 13 \end{array}$$

$$= (9 \times 7 \times 13) / (5 \times 11 \times 2) = 819/110$$

$$= 7 \frac{49}{110} \text{ (Expressing the answer in mixed fraction)}$$

Question 7. Evaluate:

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

Solution:

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

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

(ii) $\sqrt{(0.5)^3 \times 6 \times 3^5}$

Solution:

$$= \sqrt{(0.5)^2 \times 0.5 \times 3 \times 2 \times 3^5}$$

$$= \sqrt{(0.5)^2 \times 0.5 \times 2 \times 3 \times 3^5}$$

$$= \sqrt{(0.5)^2 \times 1.0 \times 3^6} [0.5 \times 2 = 1.0]$$

$$= \sqrt{(0.5)^2 \times 1 \times 3^6} = 0.5 \times 3^3$$

$$= 0.5 \times 27 = 13.5$$

(iii) $\sqrt{\left(5 + 2\frac{21}{25}\right) \times \frac{0.69}{16}}$

Solution:

$$= \sqrt{\left(5 + \frac{71}{25}\right) \times \frac{0.69}{1600}} = \sqrt{\frac{196}{25} \times \frac{169}{1600}}$$

$$= \sqrt{\frac{14 \times 14}{5 \times 5} \times \frac{13 \times 13}{40 \times 40}} = \frac{14 \times 13}{5 \times 40}$$

$$= \frac{7 \times 13}{5 \times 20} = \frac{91}{100} = 0.91$$

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

Solution :

$$\begin{aligned} \sqrt{5 \left(2\frac{3}{4} - \frac{3}{10}\right)} &= \sqrt{5 \left(\frac{11}{4} - \frac{3}{10}\right)} \\ &= \sqrt{5 \left(\frac{55-6}{20}\right)} = \sqrt{5 \left(\frac{49}{20}\right)} \\ &= \sqrt{\frac{5 \times 49}{20}} = \sqrt{\frac{49}{4}} = \sqrt{\frac{7 \times 7}{2 \times 2}} \\ &= \frac{7}{2} = 3\frac{1}{2} \end{aligned}$$

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

Solution:

$$\begin{aligned} &= \sqrt{248 + \sqrt{52} + 12} \quad (\sqrt{144} = 12) \\ &= \sqrt{248 + \sqrt{64}} = (\sqrt{248 + 8} \quad (\sqrt{64} = 8)) \\ &= \sqrt{256} = 16 \quad (\sqrt{256} = \sqrt{16 \times 16} = 16) \end{aligned}$$

Question 8. A man, after a tour, finds that he had spent day as many rupees as the number of days he had been on tour. How long did his tour last, if he had spent in all 1,296?

Solution:

Let the number of days he had spent = x

Number of rupees spent in each day = x

Total money spent = x × x = x² = 1,296 (given)

x = √1296

| | |
|---|------|
| 4 | 1296 |
| 4 | 324 |
| 9 | 81 |
| | 9 |

$$\Rightarrow x = \sqrt{4 \times 4 \times 9 \times 9}$$

$$x = 4 \times 9 = 36$$

Hence required number of days = 36

Question 9. Out of 745 students, maximum is to be arranged in the school field for a PT. display, such that the number of rows is equal to the number of columns. Find the number of rows if 16 students were left out after the arrangement.

Solution:

Total number of students = 745

Students left after standing in arrangement = 16

No. of students who were to be arranged = $745 - 16 = 729$

The number of rows = Number of students in each row

Number of rows = $\sqrt{729}$

| | |
|---|-----|
| 3 | 729 |
| 3 | 243 |
| 3 | 81 |
| 3 | 27 |
| 3 | 9 |
| 3 | 3 |
| | 1 |

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

Question 10. 13 and 31 is a strange pair of numbers such that squares 169 and 961 also mirror images of each other. Find two more such pairs.

Solution:

$$(13)^2 = 169 \text{ and } (31)^2 = 961$$

Similarly, two such number can be 12 and 21

$$(12)^2 = 144 \text{ and } (21)^2 = 441 \text{ and } 102, 201$$

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

$$\text{And, } (201)^2 = 201 \times 201 = 40401$$

Question 11. Find the smallest perfect square divisible by 3, 4, 5 and 6.

Solution:

$$\text{L.C.M. of } 3, 4, 5, 6 = 2 \times 2 \times 3 \times 5 = 60$$

| | |
|---|---------|
| 2 | 3,4,5,6 |
| 3 | 3,2,5,3 |
| | 1,2,5,1 |

In which 3 and 5 are not in pairs L.C.M = $2 \times 3 \times 2 \times 5 = 60$, we should multiple it by 3×5 i.e. by 15
Required perfect square = $60 \times 15 = 900$

Question 12. If $\sqrt{784} = 28$, find the value of:

(i) $\sqrt{784} = 28$

Solution:

$$\sqrt{7.84} = \sqrt{\frac{784}{100}} = \frac{28}{10} = 2.8$$

$$\sqrt{78400} = \sqrt{28 \times 28 \times 10 \times 10}$$

$$= 28 \times 10 = 280$$

$$\sqrt{7.84} + \sqrt{78400} = 2.8 + 280 = 282.8$$

$$(ii) \sqrt{0.0784} = \sqrt{\frac{784}{10000}} = \frac{28}{100} = 0.28$$

Solution:

$$\sqrt{0.000784} = \sqrt{\frac{784}{100000}}$$

$$= \sqrt{\frac{28 \times 28}{10 \times 10 \times 10 \times 10 \times 10 \times 10}}$$

$$= \frac{28}{10 \times 10 \times 10} = \frac{28}{1000} = 0.028$$

$$\sqrt{0.0784} + \sqrt{0.000784} = 0.28 + 0.028 = 0.308$$



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