

## Squares And Square Roots Ex 3.1

### EXERCISE - 3.1

I which of the following numbers are perfect squares?

i) 484

Resolving 484 into prime factors, we get

$$484 = 2 \times 2 \times 11 \times 11$$

$$\begin{array}{r} 2 \overline{)484} \\ \underline{242} \phantom{0} \\ 242 \\ \underline{242} \\ 0 \end{array}$$

Now grouping the factors into pairs of equal factors, we get.

$$484 = (2 \times 2) \times (11 \times 11)$$

we observe that all are paired, so

484 is a perfect square.

ii) 625

Resolving 625 into prime factors, we get

$$625 = 5 \times 5 \times 5 \times 5$$

$$\begin{array}{r} 5 \overline{)625} \\ \underline{500} \phantom{0} \\ 125 \\ \underline{125} \\ 0 \end{array}$$

Now grouping the factors into pairs of equal factors, we get.

$$625 = (5 \times 5) \times (5 \times 5)$$

we observe that all are paired, so

625 is a perfect square.

iii) 576

Resolving 576 into prime factors, we get

$$576 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3$$

$$\begin{array}{r} 2 \overline{)576} \\ \underline{288} \phantom{0} \\ 288 \\ \underline{288} \\ 0 \end{array}$$

Now grouping the factors into pairs of equal factors, we get

$$576 = (2 \times 2) \times (2 \times 2) \times (2 \times 2) \times (3 \times 3)$$

we observe that all are paired, so 576 is a perfect square.

v) 941

Resolving 941 into prime factors, we get

As 941 itself a prime number  
it does not have a perfect square

$$941 \overline{) 941}$$

v) 961

Resolving 961 into prime factors, we get.

$$961 = (31 \times 31) = 31^2$$

$$31 \overline{) 961}$$

$\therefore$  961 is a perfect square.

vi) 2500

Resolving 2500 into prime factors, we get

$$2500 = 5 \times 5 \times 5 \times 5 \times 2 \times 2.$$

Now grouping the factors into pairs of equal factors, we get.

$$2500 = (5 \times 5) \times (5 \times 5) \times (2 \times 2)$$

we observe that all are paired, so

2500 is a perfect square.

$$\begin{array}{r} 2500 \\ 5 \overline{) 2500} \\ \underline{500} \\ 5 \overline{) 100} \\ \underline{20} \\ 2 \overline{) 4} \\ \underline{4} \\ 0 \end{array}$$

3  
② Show that each number is a perfect square. Also, find the number whose square is given number.

① 1156

Resolving 1156 into prime factors, we get.

$$1156 = 2 \times 2 \times 17 \times 17.$$

Now, grouping factors into pairs of equal factors, we get.

$$\begin{array}{r} 2 \overline{) 1156} \\ \underline{2312} \\ 578 \\ 2 \overline{) 578} \\ \underline{1156} \\ 289 \\ 17 \overline{) 289} \\ \underline{289} \\ 0 \end{array}$$

$$1156 = (2 \times 2) \times (17 \times 17)$$

As all factors are paired, 1156 is a perfect square.

$$\text{Again, } 1156 = (2 \times 17) \times (2 \times 17) \\ = 34 \times 34 = 34^2$$

Thus, 1156 is the square of 34.

② 2025

Resolving 2025 into prime factors, we get

$$2025 = 5 \times 5 \times 3 \times 3 \times 3 \times 3.$$

Now, grouping factors into pairs of equal factors, we get

$$\begin{array}{r} 3 \overline{) 2025} \\ \underline{6075} \\ 81 \\ 3 \overline{) 81} \\ \underline{27} \\ 54 \\ 3 \overline{) 54} \\ \underline{18} \\ 36 \\ 3 \overline{) 36} \\ \underline{12} \\ 24 \\ 3 \overline{) 24} \\ \underline{8} \\ 16 \\ 3 \overline{) 16} \\ \underline{5} \\ 11 \end{array}$$

$$2025 = (5 \times 5) \times (3 \times 3) \times (3 \times 3)$$

As all factors are paired, 2025 is a perfect square.

$$\text{Again, } 2025 = (3 \times 3 \times 5) \times (3 \times 3 \times 5) \\ = 45^2$$

Thus 2025 is the square of 45.

iii)

14641

Resolving 14641 into prime factors, we get

$$14641 = (11 \times 11) \times (11 \times 11)$$

As the factors can be paired into equal factors, we get to know that

14641 is a perfect square

$$\text{Again } 14641 = (121) \times (121) = 121^2$$

$\therefore$  14641 is the square of 121

$$\begin{array}{r} 11 \overline{) 14641} \\ \underline{1331} \phantom{00} \\ 1121 \\ \underline{11} \phantom{00} \\ 0 \end{array}$$

iv)

4761

Resolving 4761 into prime factors, we get

$$4761 = (3 \times 3) \times (23 \times 23)$$

As the factors, can be paired into

equal factors, 4761 is a perfect square.

$$\text{Again } 4761 = 69 \times 69 = 69^2$$

$\therefore$  4761 is the square of 69.

$$\begin{array}{r} 3 \overline{) 4761} \\ \underline{1587} \phantom{00} \\ 529 \\ \underline{23} \phantom{00} \\ 0 \end{array}$$

v) Find the smallest number by which given number must be multiplied so that product is a perfect square.

i) 23805

Resolving 23805 into prime factors, we get

$$23805 = (3 \times 3) \times (5) \times (23 \times 23) \times 5$$

Given obtained factors can be

paired into equal factors, except for 5.

$$\begin{array}{r} 5 \overline{) 23805} \\ \underline{4761} \phantom{00} \\ 3 \overline{) 1587} \\ \underline{529} \phantom{00} \\ 23 \end{array}$$

To pair it equally multiply the number 5 with 5.

$$23805 \times 5 = (3 \times 3) (23 \times 23) \times (5 \times 5)$$

$$\begin{aligned} \text{Again } 23805 \times 5 &= (3 \times 23 \times 5) \times (3 \times 23 \times 5) \\ &= 315^2 \end{aligned}$$

$\therefore$  Product is the square of 315.

(ii) 12150

Resolving 12150 into prime factors, we get

$$12150 = (5 \times 5) \times (3 \times 3) \times (2 \times 2) \times (2 \times 2) \times 2$$

obtained factors can be paired into equal factors, 12150 is a except for 2.

so multiply given number with 2 to pair it.

$$12150 \times 2 = (5 \times 5) \times (3 \times 3) \times (2 \times 2) \times (2 \times 2) \times (2 \times 2)$$

$$\begin{aligned} \text{Again } 12150 \times 2 &= (5 \times 3 \times 2 \times 2 \times 2) \times (5 \times 3 \times 2 \times 2 \times 2) \\ &= 120^2 \end{aligned}$$

$\therefore$  Product is the square of 120

$$\begin{array}{r} 12150 \\ 2430 \\ 3486 \\ 3192 \\ 264 \\ 232 \\ 216 \\ 28 \\ 24 \end{array}$$

(iii) 7688

Resolving 7688 into prime factors, we get

$$7688 = (2 \times 2) \times (21 \times 31) \times 2$$

obtained factors can be paired into equal factors except for 2.

$$\begin{array}{r} 7688 \\ 3844 \\ 2192 \\ 31961 \\ 31 \end{array}$$

So multiply given number with 2 to 6

Pair it.

$$768 \times 2 = (2 \times 2) \times (3 \times 3) \times (2 \times 2)$$

$$\text{Again } 768 \times 2 = (2 \times 3 \times 2) \times (2 \times 3 \times 2) \\ = 12 \times 12$$

$\therefore$  The product is the square of 12.

⑤ Find the smallest number by which given number must be divided so that resulting number is perfect square.

① 14283

Resolving 14283 into prime factors, we get

$$14283 = (3 \times 3) \times (23 \times 23) \times 3$$

Obtained factors can be paired into equal factors, except for 3

so eliminate 3 by dividing the number with 3.

$$\frac{14283}{3} = (3 \times 3) \times (23 \times 23)$$

$$\text{Again } \frac{14283}{3} = (3 \times 23) \times (3 \times 23) \\ = 69^2$$

$\therefore$  The resultant is square of 69.

② 1800

Resolving 1800 into prime factors, we get

$$1800 = (2 \times 2) \times (5 \times 5) \times (3 \times 3) \times 2$$

$$\begin{array}{r} 2 \overline{)1800} \\ \underline{2 \ 900} \\ 2 \overline{)900} \\ \underline{5 \ 450} \\ 5 \overline{)450} \\ \underline{5 \ 90} \\ 9 \overline{)90} \\ \underline{3 \ 30} \\ 3 \overline{)30} \\ \underline{10} \end{array}$$

Obtained factors can be paired into equal factors except for 2.

So, eliminate 2 by dividing the number with 2.

$$\frac{1800}{2} = (2 \times 2) \times (5 \times 5) \times (3 \times 3)$$

$$\begin{aligned} \text{Again } \frac{1800}{2} &= (2 \times 5 \times 3) \times (2 \times 5 \times 3) \\ &= 30^2 \end{aligned}$$

$\therefore$  The resultant is square of 30

(ii) 2904.

Resolving 2904 into prime factors, we get

$$2904 = (2 \times 2) \times (11 \times 11) \times 2 \times 3.$$

Obtained factors can be paired into equal factors except for 2 and 3.

So eliminate it by dividing the number with 6.

$$\frac{2904}{6} = (2 \times 2) \times (11 \times 11)$$

$$\begin{aligned} \text{Again } \frac{2904}{6} &= (2 \times 11) \times (2 \times 11) \\ &= 22^2 \end{aligned}$$

$\therefore$  Resultant is square of 22

$$\begin{array}{r} 2 \overline{) 2904} \\ \underline{21452} \\ 2 \overline{) 726} \\ \underline{363} \\ 11 \overline{) 121} \\ \underline{11} \end{array}$$

⑤ which of the following numbers are perfect squares

11  $\rightarrow$  prime number, not a perfect square

12  $\rightarrow$  Ending with 2, not a perfect square

16  $\rightarrow 4^2 \rightarrow$  perfect square

32  $\rightarrow$  Ending with 2, not a perfect square

36  $\rightarrow 6^2 \rightarrow$  perfect square

50  $\rightarrow 5^2 \times 2 \rightarrow$  not a perfect square

64  $\rightarrow 8^2 \rightarrow$  perfect square

79  $\rightarrow$  prime number, cannot be a perfect square

81  $\rightarrow 9^2 \rightarrow$  perfect square

111  $\rightarrow$  prime number, cannot be a perfect square

121  $\rightarrow 11^2 \rightarrow$  perfect square

⑥ using prime factorization method, find which of the following numbers are perfect squares.

Ⓐ 189

$$\therefore 189 = 3^2 \times 3 \times 7$$

Cannot be written as pair of two equal factors, so 189 is not a perfect square

$$\begin{array}{r} 3 \overline{)189} \\ \underline{3} \phantom{0} \\ 63 \\ \underline{3} \phantom{0} \\ 21 \\ \underline{3} \\ 0 \end{array}$$

225

$$\therefore 225 = (3 \times 5)^2 \times (3 \times 5)$$

Can be written as pair of two equal factors, so 225 is a perfect square

$$\begin{array}{r} 5 \overline{)225} \\ \underline{5} \phantom{0} \\ 15 \\ \underline{5} \phantom{0} \\ 15 \\ \underline{5} \\ 0 \end{array}$$



2048

$$2048 = (2 \times 2) \times (2 \times 2) \times (2 \times 2) \times (2 \times 2) \times (2 \times 2) \times 2$$

All the factors cannot be written as pair of equal factors, so 2048 is not a perfect square

$$\begin{array}{r} 2 \overline{) 2048} \\ \underline{20} \phantom{48} \\ 4 \phantom{8} \\ \underline{4} \phantom{8} \\ 0 \phantom{8} \\ \underline{0} \phantom{8} \\ 8 \\ \underline{8} \\ 0 \end{array}$$

343

$$343 = (7 \times 7) \times 7$$

All the factors cannot be written as pair of equal factors, so 343 is not perfect square

$$\begin{array}{r} 7 \overline{) 343} \\ \underline{28} \phantom{3} \\ 63 \\ \underline{63} \\ 0 \end{array}$$

441

$$441 = (7 \times 7) \times (3 \times 3)$$

All the prime factors can be written as pair of equal factors, so 441 is a perfect square

$$\begin{array}{r} 7 \overline{) 441} \\ \underline{49} \phantom{1} \\ 9 \\ \underline{9} \\ 0 \end{array}$$

2916

$$2916 = (3 \times 3) \times (3 \times 3) \times (3 \times 3) \times (2 \times 2)$$

All the prime factors can be written as pair of equal factors, so 2916 is a perfect square

$$\begin{array}{r} 3 \overline{) 2916} \\ \underline{27} \phantom{16} \\ 9 \phantom{16} \\ \underline{9} \phantom{16} \\ 0 \phantom{16} \\ \underline{0} \phantom{16} \\ 16 \\ \underline{15} \\ 1 \\ \underline{1} \\ 0 \end{array}$$

11025

$$11025 = (5 \times 5) \times (3 \times 3) \times (7 \times 7)$$

All the prime factors can be written as pair of two equal factors so 11025 is a perfect square.

$$\begin{array}{r} 5 \overline{)11025} \\ \underline{2205} \\ 3 \overline{)441} \\ \underline{147} \\ 7 \overline{)49} \\ \underline{49} \\ 0 \end{array}$$

3549

$$3549 = (13 \times 13) \times 3 \times 7$$

All the factors obtained cannot be written as pair of two equal numbers, so 3549 is not a perfect square.

$$\begin{array}{r} 3 \overline{)3549} \\ \underline{1183} \\ 13 \overline{)169} \\ \underline{13} \\ 0 \end{array}$$

- 7) By what number should each of the following numbers be multiplied to get a perfect square in each case? Also, find the number whose square is new number.

(i) 8820

$$8820 = (2 \times 2) \times (3 \times 3) \times (7 \times 7) \times 5$$

only 5 in obtained factors is unpaired, so multiply the number with 5, to make it paired

$$\begin{aligned} \text{Again } (8820 \times 5) &= (2 \times 3 \times 7 \times 5) \times (2 \times 3 \times 7 \times 5) \\ &= (210)^2 \end{aligned}$$

So the product is the square of 210.

$$\begin{array}{r} 2 \overline{)8820} \\ \underline{4410} \\ 5 \overline{)2205} \\ \underline{441} \\ 3 \overline{)147} \\ \underline{49} \\ 7 \overline{)49} \\ \underline{49} \\ 0 \end{array}$$

(ii) 3675

$$3675 = (5 \times 5) \times (7 \times 7) \times 3$$

only 3 in obtained factor is unpaired, so multiply the number with 3, to make it paired.

$$\begin{aligned} \text{Again } (3675) \times 3 &= (5 \times 5) \times (7 \times 7) \times (3 \times 3) \\ &= (5 \times 7 \times 3) \times (5 \times 7 \times 3) \\ &= (105)^2 \end{aligned}$$

Product is square of 105.

$$\begin{array}{r} 5 \overline{) 3675} \\ \underline{5 \phantom{0} 735} \\ 3 \phantom{0} 147 \\ \underline{3 \phantom{0} 09} \\ 7 \phantom{0} 49 \\ \underline{7 \phantom{0} 0} \\ 0 \end{array}$$

(iii) 605

$$605 = 5 \times (11 \times 11)$$

$$\begin{aligned} 5 \times (605) &= (5 \times 5) \times (11 \times 11) \\ &= (5 \times 11) \times (5 \times 11) \end{aligned}$$

$$5 \times 605 = 55^2$$

Product is the square of 55.

$$\begin{array}{r} 5 \overline{) 605} \\ \underline{5 \phantom{0} 05} \\ 11 \phantom{0} 21 \\ \underline{11 \phantom{0} 0} \\ 0 \end{array}$$

(iv) 2880

$$2880 = 5 \times (3 \times 3) \times (2 \times 2) \times (2 \times 2) \times (2 \times 2)$$

$$\begin{aligned} 2880 \times 5 &= (5 \times 5) \times (3 \times 3) \times (2 \times 2) \times (2 \times 2) \times (2 \times 2) \\ &= (5 \times 3 \times 2 \times 2 \times 2) \times (5 \times 3 \times 2 \times 2 \times 2) \\ &= 120^2 \end{aligned}$$

Product is square of 120.

$$\begin{array}{r} 5 \overline{) 2880} \\ \underline{3 \phantom{0} 576} \\ 3 \phantom{0} 192 \\ \underline{3 \phantom{0} 064} \\ 2 \phantom{0} 64 \\ \underline{2 \phantom{0} 32} \\ 2 \phantom{0} 16 \\ \underline{2 \phantom{0} 8} \\ 2 \phantom{0} 0 \\ 0 \end{array}$$

(v) (i) 4056

$$4056 = (2 \times 2) \times (13 \times 13) \times 2 \times 3$$

$$(4056) \times 2 \times 3 = (2 \times 2) \times (13 \times 13) \times (2 \times 2) \times (3 \times 3)$$

$$4056 \times 6 = (2 \times 13 \times 2 \times 3) \times (2 \times 13 \times 2 \times 3) \\ = 156^2$$

Product is square of 156.

$$\begin{array}{r} 2 \overline{)4056} \\ \underline{2028} \\ 2 \overline{)1014} \\ \underline{1014} \\ 3 \overline{)507} \\ \underline{1521} \\ 13 \overline{)169} \\ \underline{169} \\ 13 \end{array}$$

(vi) 7776

$$7776 = (2 \times 2) \times (2 \times 2) \times (3 \times 3) \times (3 \times 3) \times 2 \times 3$$

$$(7776) \times 2 \times 3 = (2 \times 2) \times (2 \times 2) \times (3 \times 3) \times (3 \times 3) \times (2 \times 2) \times (3 \times 3)$$

$$(7776) \times 6 = (2 \times 2 \times 3 \times 3 \times 2 \times 3) \times (2 \times 2 \times 3 \times 3 \times 2 \times 3) \\ = 216^2$$

Product is the square of 216

$$\begin{array}{r} 2 \overline{)7776} \\ \underline{3888} \\ 3 \overline{)1296} \\ \underline{432} \\ 3 \overline{)432} \\ \underline{144} \\ 2 \overline{)144} \\ \underline{72} \\ 2 \overline{)72} \\ \underline{36} \\ 3 \overline{)36} \\ \underline{12} \\ 3 \overline{)12} \\ \underline{6} \\ 2 \end{array}$$

(8) By what number should each of the following numbers be divided to get a perfect square, find the number.

(i) 16562

$$16562 = (7 \times 7) \times (13 \times 13) \times 2$$

$$\frac{16562}{2} = (7 \times 7) \times (13 \times 13)$$

$$\frac{16562}{2} = (7 \times 13) \times (7 \times 13) \\ = 91^2$$

Resultant is the square of the 91.

$$\begin{array}{r} 2 \overline{)16562} \\ \underline{8281} \\ 7 \overline{)1183} \\ \underline{169} \\ 13 \end{array}$$

(ii) 3698

$$3698 = 2 \times (43 \times 43)$$

$$\frac{3698}{2} = 43^2$$

$$\begin{array}{r} 2 \overline{) 3698} \\ \underline{7396} \\ 43 \end{array}$$

number must be divided by 2 and resultant is square of 43.

(iii) 5103

$$5103 = (3 \times 3) \times (3 \times 3) \times (3 \times 3) \times 7$$

$$\frac{5103}{9} = (3 \times 3 \times 3) \times (3 \times 3 \times 3)$$

$$= 27^2$$

$$\begin{array}{r} 3 \overline{) 5103} \\ \underline{1530} \\ 3 \overline{) 567} \\ \underline{189} \\ 3 \overline{) 189} \\ \underline{63} \\ 3 \overline{) 63} \\ \underline{21} \\ 7 \end{array}$$

number must be divided by 9 and resultant is square of 27.

(iv) 3174

$$3174 = 2 \times 3 \times (23 \times 23)$$

$$\frac{3174}{6} = 23 \times 23 = 23^2$$

$$\begin{array}{r} 2 \overline{) 3174} \\ \underline{1587} \\ 3 \overline{) 1587} \\ \underline{529} \\ 23 \end{array}$$

number must be divided by 6 and the resultant is square of 23.

## Squares And Square Roots Ex 3.2

### EXERCISE - 3.2.

14

Q1) The following numbers are not perfect squares  
Give reason.

Numbers ending with 2, 3, 7 or 8 are  
not perfect squares, so

(i) 1567

(ii) 45743

(iii) 8948

(iv) 333333

are not perfect squares

Q2) Show that following numbers are not perfect squares.

As the numbers

① 9327    ② 4058    ③ 22453    ④ 743522

have 7, 8, 3, 2 as ending numbers respectively

As mentioned above, numbers ending with 2, 3, 7, 8  
are not perfect squares, These given numbers  
are also not perfect squares.

Q3) The square of which of the following numbers  
would be an odd number.

square of an odd number is an odd number

square of an even number is an even number

(i) 731  $\rightarrow$  odd number  $\rightarrow$  square is odd number.

(ii) 3656  $\rightarrow$  Even number  $\rightarrow$  so square is even number. 15

(iii) 5559  $\rightarrow$  odd number  $\rightarrow$  so square is odd number

(iv) 4208  $\rightarrow$  Even number  $\rightarrow$  so square is even number.

(4) What will be the units digit of squares of the following numbers.

(i) 52

units digit of  $(52)^2 =$  units digit of  $(2)^2 = 4$ .

(ii) 977

units digit of  $(977)^2 =$  units digit of  $(7)^2 = 9$ .

(iii) 4583

units digit of  $(4583)^2 =$  units digit of  $(3)^2 = 9$ .

(iv) 78367

units digit of  $(78367)^2 =$  units digit of  $(7)^2 = 9$ .

(v) 52698

units digit of  $(52698)^2 =$  units digit of  $(8)^2 = 4$

(vi) 99880

units digit of  $(99880)^2 =$  units digit of  $(0)^2 = 0$

(vii) 12796

units digit of  $(12796)^2 =$  units digit of  $6^2 = 6$

(viii) 55555

units digit of  $(55555)^2 =$  units digit of  $(5)^2 = 5$

(ix) 53924

units digit of  $(53924)^2 =$  units digit of  $4^2 = 6$ .

⑤ In every line value of R.H.S is the <sup>12</sup>  
square of number of terms in L.H.S

$$\therefore 1+3+5+\dots+n \text{ terms} = n^2 \quad \left[ \because \text{As there are } n \text{ terms} \right]$$

⑥ (i)  $100^2 - 99^2$

$$= 100 + 99 = 199$$

(ii)  $11^2 - 10^2$

$$= 11^2 - 110^2 + 110^2 - 10^2$$

$$= (11+110) + (110+10)$$

$$= 240$$

(iii)  $99^2 - 96^2$

$$= 99^2 - 98^2 + 98^2 - 97^2 + 97^2 - 96^2$$

$$= (99+98) + (98+97) + (97+96)$$

$$= 585$$

⑦ which of the following triplets are pythagorean?

⑧ (8, 15, 17) If  $(m, n, p)$  form tripythagorean, then  $m^2 + n^2 = p^2$ .

(i)  $(8, 15, 17)$

$$\text{L.H.S} = 8^2 + 15^2 = 289$$

$$\text{R.H.S} = 17^2 = 289$$

L.H.S = R.H.S, so it is pythagorean.



(i) 18, 80, 82.

$$\text{L.H.S} = 18^2 + 80^2 = 6724$$

$$\text{R.H.S} = 82^2 = 6724.$$

L.H.S = R.H.S, It is Pythagorean

(ii) 14, 48, 51

$$\text{L.H.S} = 14^2 + 48^2 = 2500$$

$$\text{R.H.S} = 51^2 = 2601$$

L.H.S  $\neq$  R.H.S, It is not Pythagorean.

(iv) (10, 24, 26)

$$\text{L.H.S} = 10^2 + 24^2 = 676$$

$$\text{R.H.S} = 26^2 = 676$$

L.H.S = R.H.S It is Pythagorean

(v) (16, 63, 65)

$$\text{L.H.S} = 16^2 + 63^2 = 4225$$

$$\text{R.H.S} = 65^2 = 4225$$

L.H.S = R.H.S, It is Pythagorean.

(vi) (12, 35, 38)

$$\text{L.H.S} = 12^2 + 35^2 = 1369$$

$$\text{R.H.S} = 38^2 = 1444$$

L.H.S  $\neq$  R.H.S, It is not Pythagorean.

8) From observation

$$(1 \times 2) + (2 \times 3) + (3 \times 4) + (4 \times 5) + (5 \times 6) = \frac{5 \times 6 \times 7}{3} \\ = 70.$$

9) R.H.S =  $\frac{1}{2} [\text{no. of terms in L.H.S} \times (\text{no. of terms} + 1)]$   
 $\therefore$  only when L.H.S starts with 1

$$\therefore \text{(i)} \quad 1 + 2 + 3 + \dots + 50 = \frac{1}{2} [50 \times (50 + 1)]$$

$$\text{(ii)} \quad = \frac{1}{2} 25 \times 51 = 1275$$

$$\text{(iii)} \quad 3432 + \dots + 50$$

$$= (1 + 2 + 3 + \dots + 50) - (1 + 2 + \dots + 30)$$

$$= 1275 - \left( \frac{1}{2} (30 \times (30 + 1)) \right)$$

$$= 1275 - 465 = 810.$$

10) R.H.S =  $\frac{1}{6} [\text{no. of terms in L.H.S} \times (\text{no.} + 1) \times (2 \times \text{no.} + 1)]$

$$\text{(i)} \quad 1^2 + 2^2 + 3^2 + 4^2 + \dots + 10^2 = \frac{1}{6} [10 \times (10 + 1) \times (2 \times 10 + 1)] \\ = \frac{1}{6} [2310] = 385$$

$$\text{(ii)} \quad 5^2 + 6^2 + \dots + 12^2 = 1 + 2^2 + \dots + 12^2 - (1^2 + 2^2 + 3^2 + 4^2) \\ = \frac{1}{6} (12 \times (12 + 1) \times (2 \times 12 + 1)) - \frac{1}{6} (4 \times (4 + 1) \times (2 \times 4 + 1))$$

$$= 650 - 30 = 620.$$

- (11) which of the following numbers are squares of even numbers:

only even numbers be the squares of even numbers

so, 256, 324, 1296, 5184, 373758 <sup>Can be</sup> ~~are~~ squares of even numbers, but 373758 is not a perfect square  
so, 256, 324, 1296, 5184 are answers.

- (12) Numbers ending with 2, 3, 7, 8 can not be perfect squares, so

i) 1028, ii) 1022, iii) 1023, iv) 1027 cannot be whole squares

- (13) i) F, because 169 is square number with odd digits

ii) F, square of 3 (prime) is 9 (not prime)

iii) F, sum of  $2^2$  and  $3^2$  is 13 which is not square no.

iv) F, Difference of  $3^2$  and  $2^2$  is 5, which is not square number.

~~Sol~~ All remaining (7) are verified.

## Squares And Square Roots Ex 3.3

### EXERCISE-3.3.

20

I find squares of following numbers using column method. verify it by multiplication.

(i) 25.

Here  $a=2$ ,  $b=5$ .

Column I	Column II	Column-III
$a^2$	$2ab$	$b^2$
4	20	<u>25</u>
+ 2	+ 2	
<u>6</u>	<u>22</u>	
6	2	5

$$25^2 = 625.$$

$$\text{and } 25^2 = 25 \times 25 = 625.$$

(ii) 37.

Here  $a=3$ ,  $b=7$ .

Column I	Column II	Column-III
$a^2$	$2a \cdot b$	$b^2$
9	42	<u>49</u>
+ 4	+ 4	
<u>13</u>	<u>46</u>	
13	6	9

$$37^2 = 1369$$

$$\text{and } 37^2 = 37 \times 37 = 1369.$$

(14) 54.

21

Here  $a=5, b=4$ .

Column I	Column II	Column III
$a^2$	$2ab$	$b^2$
25	40	16
4	1	
<u>29</u>	<u>41</u>	<u>        </u>
29	1	6

$$54^2 = 2916$$

$$54^2 = 54 \times 54 = 2916$$

(15) 71

Here  $a=7, b=1$

Column I	Column II	Column III
$a^2$	$2ab$	$b^2$
49	14	01
1	0	
<u>49</u>	<u>14</u>	<u>        </u>
49	4	1

$$71^2 = 4941$$

$$71^2 = 71 \times 71 = 4941$$

① 96.

Here  $a=9, b=6$ .

Column I	Column II	Column III
$a^2$	$2ab$	$b^2$
81	108	36
11	3	
<u>92</u>	<u>11</u>	
92	1	6

$96^2 = 9216$

and  $96 \times 96 = 9216$ .

② Find squares of following numbers using diagonal method

① 98.

$\therefore 98^2 = 9604$

② 273

$(273)^2 = 74529$

(iii) 368

23

	3	6	8	
3	0	1	2	2
14	1	2	1	6
18	2	3	2	6
108	4	2	6	4
	14	10	04	

$368^2 = 120704$

(iv) 295

	2	9	5	
2	0	1	1	0
0	1	8	4	5
9	8	1	2	5
085	0	4	5	5
27	12	12	05	

$(295)^2 = 87025$

(v) 171

	1	7	1	
01	0	0	0	1
7	0	4	0	1
07	7	9	0	7
07	0	0	0	1
12	12	14	01	

$(171)^2 = 29241$

③ Find the squares of following numbers.

24

①  $(127)^2 = 127 \times 127 = 16129$

②  $(503)^2 = 503 \times 503 = 253009$

③  $(451)^2 = 451 \times 451 = 203401$

④  $(862)^2 = 862 \times 862 = 743044$

⑤  $(265)^2 = 265 \times 265 = 70225$

④ Find squares of following numbers using

Identity  $(a+b)^2 = a^2 + 2ab + b^2$ .

① 405.

$$\begin{aligned} \text{we have } (405)^2 &= (400+5)^2 = (400)^2 + 5^2 + 2(400)(5) \\ &= 160000 + 25 + 4000 \\ &= 164025. \end{aligned}$$

② 510

$$\begin{aligned} \text{we have } (510)^2 &= (500+10)^2 = (500)^2 + 10^2 + 2(500)(10) \\ &= 250000 + 100 + 10000 \\ &= 260100. \end{aligned}$$

③ 1001

$$\begin{aligned} \text{we have } (1000+1)^2 &= (1000)^2 + 1 + 2(1000) \\ &= 1000000 + 1 + 2000 \\ &= 1002001. \end{aligned}$$



(1) 209.

25

$$\begin{aligned}(209)^2 &= (200+9)^2 = (200)^2 + 9^2 + 2(200)(9) \\ &= 40000 + 81 + 3600 \\ &= 43681.\end{aligned}$$

(2) 605

$$\begin{aligned}(605)^2 &= (600+5)^2 = (600)^2 + 5^2 + 2(600)(5) \\ &= 360000 + 25 + 6000 \\ &= 366025.\end{aligned}$$

(3) Find squares of following using  $(a-b)^2 = a^2 - 2ab + b^2$ .

$$\begin{aligned}(1) 395 &= (400-5)^2 = (400)^2 + 5^2 - 2(400)(5) \\ &= 160000 + 25 - 4000 \\ &= 156025.\end{aligned}$$

$$\begin{aligned}(2) 995 &= (1000-5)^2 = (1000)^2 + 5^2 - 2(1000)(5) \\ &= 1000000 + 25 - 10000 \\ &= 990025.\end{aligned}$$

$$\begin{aligned}(3) 495 &= (500-5)^2 = (500)^2 + 5^2 - 2(500)(5) \\ &= 250000 + 25 - 5000 \\ &= 245025.\end{aligned}$$

$$\begin{aligned}(4) 498 &= (500-2)^2 = (500)^2 + 2^2 - 2(500)(2) \\ &= 250000 + 4 - 2000 \\ &= 248004.\end{aligned}$$

$$\begin{aligned}
 99^2 &= (100-1)^2 = (100)^2 - 1^2 - 2(100) \\
 &= 10000 - 1 - 200 \\
 &= 9799.
 \end{aligned}$$

7. Find squares of following numbers by visual method.

$$\begin{aligned}
 \textcircled{1} \quad 52, \quad (52)^2 &= (50+2)^2 = 50^2 + 2^2 + 2(50 \times 2) \\
 &= 2500 + 4 + 200 \\
 &= 2704.
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{2} \quad 95, \quad (95)^2 &= (100-5)^2 = 100^2 + 5^2 - 2(5)(100) \\
 &= 10000 + 25 - 1000 \\
 &= 9025.
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{3} \quad 505, \quad (505)^2 &= (500+5)^2 = (500)^2 + 5^2 + 2(500)(5) \\
 &= 250000 + 25 + 5000 \\
 &= 255025.
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{4} \quad 702, \quad (702)^2 &= (700+2)^2 = (700)^2 + 2^2 + 2(700)(2) \\
 &= 490000 + 4 + 2800 \\
 &= 492804.
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{5} \quad 99, \quad (99)^2 &= (100-1)^2 = (100)^2 + 1 - 2(100) \\
 &= 10000 + 1 - 200 \\
 &= 9801.
 \end{aligned}$$

## Squares And Square Roots Ex 3.4

### EXERCISE 3.4.

12

(i) write the possible unit's digits of square root of following numbers. which of these are odd square roots.

(i) 9801

units digit = 1

units digit of square root = 1 or 9.

As no. is odd, square root is also odd.

(ii) 99856.

units digit = 6

units digit of square root = 4 or 6

As no. is even, square root is also even.

(iii) 998001

units digit = 1

units digit of square root is 1 or 9.

As no. is odd, square root is also odd.

(iv) 657466025.

units digit = 5.

units digit of square root = 5.

As no. is odd, square root is also odd.

② Find square root of each of the following by prime factorization 28

(i) 441

$$441 = 3^2 \times 7^2$$

$$\sqrt{441} = 3 \times 7 = 21$$

$$\begin{array}{r} 3 \overline{)441} \\ \underline{3} \phantom{0} \\ 149 \\ \underline{147} \\ 2 \end{array}$$

(ii) 196

$$196 = 2^2 \times 7^2$$

$$\sqrt{196} = 2 \times 7 = 14$$

$$\begin{array}{r} 2 \overline{)196} \\ \underline{2} \phantom{0} \\ 98 \\ \underline{98} \\ 0 \end{array}$$

(iii) 529

$$529 = 23^2$$

$$\sqrt{529} = 23$$

$$\begin{array}{r} 23 \overline{)529} \\ \underline{23} \phantom{0} \\ 29 \phantom{0} \\ \underline{23} \\ 69 \\ \underline{69} \\ 0 \end{array}$$

(iv) 1264

$$1264 = 2^2 \times 3^2 \times 7^2$$

$$\sqrt{1264} = 2 \times 3 \times 7 = 42$$

$$\begin{array}{r} 2 \overline{)1264} \\ \underline{2} \phantom{0} \\ 882 \\ \underline{882} \\ 0 \end{array}$$

(v) 1156

$$1156 = 2^2 \times 17^2$$

$$\sqrt{1156} = 2 \times 17 = 34$$

$$\begin{array}{r} 2 \overline{)1156} \\ \underline{2} \phantom{0} \\ 578 \\ \underline{578} \\ 0 \end{array}$$

(vi) 4096

$$4096 = 2^{12}$$

$$\sqrt{4096} = 2^6 = 64.$$

$$\begin{array}{r} 2 \overline{)4096} \\ \underline{2048} \\ 2 \overline{)1024} \\ \underline{512} \\ 2 \overline{)256} \\ \underline{128} \\ 2 \overline{)64} \\ \underline{32} \\ 2 \overline{)16} \\ \underline{8} \\ 2 \overline{)4} \\ \underline{2} \\ 2 \overline{)2} \\ \underline{2} \\ 0 \end{array}$$

(vii) 7056

$$7056 = 2^2 \times 2^2 \times 21^2$$

$$\sqrt{7056} = 2 \times 2 \times 21 = 84.$$

$$\begin{array}{r} 2 \overline{)7056} \\ \underline{3528} \\ 2 \overline{)1764} \\ \underline{882} \\ 2 \overline{)441} \\ \underline{21} \\ 21 \end{array}$$

(viii) 8281

$$8281 = 91^2$$

$$\sqrt{8281} = 91$$

$$\begin{array}{r} 91 \overline{)8281} \\ \underline{91} \\ 91 \end{array}$$

(ix) 11664

$$11664 = 2^2 \times 2^2 \times 3^2 \times 3^2 \times 3^2$$

$$\sqrt{11664} = 2 \times 2 \times 3 \times 3 \times 3 = 108.$$

$$\begin{array}{r} 2 \overline{)11664} \\ \underline{5832} \\ 2 \overline{)2916} \\ \underline{1458} \\ 2 \overline{)729} \\ \underline{3645} \\ 3 \overline{)243} \\ \underline{81} \\ 2 \overline{)27} \\ \underline{9} \\ 2 \overline{)9} \\ \underline{9} \\ 0 \end{array}$$

(x) 49089

$49089 = (213)^2$

$\sqrt{49089} = 213$

213 | 49089  
      2354  
      213

(xi)

24336

$24336 = 2^2 \times 2^2 \times 3^2 \times 13^2$

$\sqrt{24336} = 2 \times 2 \times 3 \times 13$   
 $= 156$

2 | 24336  
2 | 12168  
2 | 6084  
2 | 3042  
3 | 1014  
3 | 338  
13 | 26  
   2

(xii)

190969

$190969 = 23^2 \times 19^2$

$\sqrt{190969} = 23 \times 19$   
 $= 437$

23 | 190969  
23 | 8303  
19 | 361  
   19

(xiii)

586756

$586756 = 2^2 \times 383^2$

$\sqrt{586756} = 2 \times 383$   
 $= 766$

2 | 586756  
2 | 293378  
383 | 146689  
   4889  
   14669  
   383

(xiv)

3013696

$3013696 = 2^2 \times 2^2 \times 2^2 \times 217^2$

$\sqrt{3013696} = 1736$

2 | 3013696  
2 | 1506848  
2 | 753424  
2 | 376712  
2 | 188356  
2 | 94178  
217 | 47089  
   217

③

$$180 = 2^2 \times 3^2 \times 5$$

$$= (2 \times 2) \times (3 \times 3) \times (5)$$

$$\begin{array}{r} 2 \overline{)180} \\ \underline{36} \\ 40 \\ \underline{36} \\ 4 \\ \underline{3} \\ 1 \end{array}$$

To make the unpaired 5 into paired, multiply the number with 5.

$$\therefore 180 \times 5 = 2^2 \times 3^2 \times 5^2$$

$$\therefore \text{square root of number} = \sqrt{180 \times 5} = 2 \times 3 \times 5 = 30$$

④

$$147$$

$$147 = 7^2 \times 3$$

$$\begin{array}{r} 3 \overline{)147} \\ \underline{42} \\ 7 \\ \underline{7} \\ 0 \end{array}$$

To make the unpaired 3 into paired, multiply the number with 3.

$$\therefore 147 \times 3 = 7^2 \times 3^2$$

$$\therefore \text{square root of number} = \sqrt{147 \times 3} = 7 \times 3 = 21$$

⑤

$$3645$$

$$3645 = 5 \times (3 \times 3) \times (3 \times 3) \times (3)$$

Here 5 and 3 are unpaired to eliminate them we have to divide 3645 with 5x3, i.e 15

$$\therefore \frac{3645}{15} = 3^2 \times 3^2$$

$$\therefore \text{square root of number} = \sqrt{\frac{3645}{15}} = 3 \times 3 = 9$$

$$\begin{array}{r} 5 \overline{)3645} \\ \underline{729} \\ 243 \\ \underline{243} \\ 0 \end{array}$$

⑥ 1152

$$1152 = (2 \times 2) \times (2 \times 2) \times (2 \times 2) \times 2 \times (3 \times 3)$$

All factors are paired except 2,  
to eliminate it we have to divide  
the no. with 2.

$$\therefore \frac{1152}{2} = 2 \times 2 \times 2 \times 2 \times 3^2$$

$$\sqrt{\frac{1152}{2}} = 2 \times 2 \times 2 \times 3 = 24$$

$$\begin{array}{r} 2 \overline{)1152} \\ \underline{2276} \\ 2 \overline{)288} \\ \underline{2144} \\ 2 \overline{)72} \\ \underline{236} \\ 2 \overline{)18} \\ \underline{29} \\ 0 \end{array}$$

⑦ Let a and b be two numbers

$$a \times b = 1296$$

$$a = 16b \Rightarrow 16b \times b = 1296$$

$$b^2 = 81$$

$$b = \sqrt{81}$$

$$b = 9$$

$$\therefore a = 144, b = 9$$

$$\begin{array}{r} 3 \overline{)81} \\ \underline{327} \\ 3 \overline{)9} \\ \underline{33} \\ 0 \end{array}$$

⑧ Let total residents be a.

$\therefore$  Each paid a. Rs.

$$\therefore \text{Total collection} = a(a) = a^2 = 202500$$

$$a = \sqrt{202500}$$

$$a = 5 \times 5 \times 6 = 150$$

$\therefore$  Total residents = 150

$$\begin{array}{r} 5 \overline{)202500} \\ \underline{51500} \\ 5 \overline{)900} \\ \underline{5180} \\ 6 \overline{)36} \\ \underline{66} \\ 0 \end{array}$$



⑨ Let there were  $a$  members.

33

$\therefore$  Each attributed a paise.

$\therefore a(a)$ , i.e. total amt collected = 9216 paise

$$a^2 = 9216$$

$$a = \sqrt{9216}$$

$$a = 2 \times 2 \times 2 \times 12$$

$$= 96.$$

$\therefore$  There were 96 members, each contributed 96 paise.

$$\begin{array}{r} 2 \overline{) 9216} \\ \underline{4608} \phantom{00} \\ 2 \overline{) 2304} \\ \underline{1152} \phantom{00} \\ 2 \overline{) 576} \\ \underline{288} \phantom{00} \\ 2 \overline{) 288} \\ \underline{144} \phantom{00} \\ 2 \overline{) 144} \\ \underline{72} \phantom{00} \\ 2 \overline{) 72} \\ \underline{36} \phantom{00} \\ 2 \overline{) 36} \\ \underline{18} \phantom{00} \\ 2 \overline{) 18} \\ \underline{9} \phantom{00} \\ 2 \overline{) 9} \\ \underline{4.5} \phantom{00} \\ 2 \overline{) 4.5} \\ \underline{2.25} \phantom{00} \\ 2 \overline{) 2.25} \\ \underline{1.125} \phantom{00} \\ 2 \overline{) 1.125} \\ \underline{0.5625} \phantom{00} \\ 2 \overline{) 0.5625} \\ \underline{0.28125} \phantom{00} \\ 2 \overline{) 0.28125} \\ \underline{0.140625} \phantom{00} \\ 2 \overline{) 0.140625} \\ \underline{0.0703125} \phantom{00} \\ 2 \overline{) 0.0703125} \\ \underline{0.03515625} \phantom{00} \\ 2 \overline{) 0.03515625} \\ \underline{0.017578125} \phantom{00} \\ 2 \overline{) 0.017578125} \\ \underline{0.0087890625} \phantom{00} \\ 2 \overline{) 0.0087890625} \\ \underline{0.00439453125} \phantom{00} \\ 2 \overline{) 0.00439453125} \\ \underline{0.002197265625} \phantom{00} \\ 2 \overline{) 0.002197265625} \\ \underline{0.0010986328125} \phantom{00} \\ 2 \overline{) 0.0010986328125} \\ \underline{0.00054931640625} \phantom{00} \\ 2 \overline{) 0.00054931640625} \\ \underline{0.000274658203125} \phantom{00} \\ 2 \overline{) 0.000274658203125} \\ \underline{0.0001373291015625} \phantom{00} \\ 2 \overline{) 0.0001373291015625} \\ \underline{0.00006866455078125} \phantom{00} \\ 2 \overline{) 0.00006866455078125} \\ \underline{0.000034332275390625} \phantom{00} \\ 2 \overline{) 0.000034332275390625} \\ \underline{0.0000171661376953125} \phantom{00} \\ 2 \overline{) 0.0000171661376953125} \\ \underline{0.00000858306884765625} \phantom{00} \\ 2 \overline{) 0.00000858306884765625} \\ \underline{0.000004291534423828125} \phantom{00} \\ 2 \overline{) 0.000004291534423828125} \\ \underline{0.0000021457672119140625} \phantom{00} \\ 2 \overline{) 0.0000021457672119140625} \\ \underline{0.00000107288360595703125} \phantom{00} \\ 2 \overline{) 0.00000107288360595703125} \\ \underline{0.000000536441802978515625} \phantom{00} \\ 2 \overline{) 0.000000536441802978515625} \\ \underline{0.0000002682209014892578125} \phantom{00} \\ 2 \overline{) 0.0000002682209014892578125} \\ \underline{0.00000013411045074462890625} \phantom{00} \\ 2 \overline{) 0.00000013411045074462890625} \\ \underline{0.000000067055225372314453125} \phantom{00} \\ 2 \overline{) 0.000000067055225372314453125} \\ \underline{0.0000000335276126861572265625} \phantom{00} \\ 2 \overline{) 0.0000000335276126861572265625} \\ \underline{0.00000001676380634307861328125} \phantom{00} \\ 2 \overline{) 0.00000001676380634307861328125} \\ \underline{0.000000008381903171539306640625} \phantom{00} \\ 2 \overline{) 0.000000008381903171539306640625} \\ \underline{0.0000000041909515857696533203125} \phantom{00} \\ 2 \overline{) 0.0000000041909515857696533203125} \\ \underline{0.00000000209547579288482666015625} \phantom{00} \\ 2 \overline{) 0.00000000209547579288482666015625} \\ \underline{0.000000001047737896442413330078125} \phantom{00} \\ 2 \overline{) 0.000000001047737896442413330078125} \\ \underline{0.0000000005238689482212066650390625} \phantom{00} \\ 2 \overline{) 0.0000000005238689482212066650390625} \\ \underline{0.00000000026193447411060333251953125} \phantom{00} \\ 2 \overline{) 0.00000000026193447411060333251953125} \\ \underline{0.000000000130967237055301666259765625} \phantom{00} \\ 2 \overline{) 0.000000000130967237055301666259765625} \\ \underline{0.0000000000654836185276508331298828125} \phantom{00} \\ 2 \overline{) 0.0000000000654836185276508331298828125} \\ \underline{0.00000000003274180926382541656494140625} \phantom{00} \\ 2 \overline{) 0.00000000003274180926382541656494140625} \\ \underline{0.000000000016370904631912707282470703125} \phantom{00} \\ 2 \overline{) 0.000000000016370904631912707282470703125} \\ \underline{0.0000000000081854523159563536412353515625} \phantom{00} \\ 2 \overline{) 0.0000000000081854523159563536412353515625} \\ \underline{0.00000000000409272615797817682061767578125} \phantom{00} \\ 2 \overline{) 0.00000000000409272615797817682061767578125} \\ \underline{0.000000000002046363078989088410308837890625} \phantom{00} \\ 2 \overline{) 0.000000000002046363078989088410308837890625} \\ \underline{0.0000000000010231815394945442051544189453125} \phantom{00} \\ 2 \overline{) 0.0000000000010231815394945442051544189453125} \\ \underline{0.00000000000051159076974727210257720947265625} \phantom{00} \\ 2 \overline{) 0.00000000000051159076974727210257720947265625} \\ \underline{0.000000000000255795384873636051288604736328125} \phantom{00} \\ 2 \overline{) 0.000000000000255795384873636051288604736328125} \\ \underline{0.0000000000001278976924368180256443023681640625} \phantom{00} \\ 2 \overline{) 0.0000000000001278976924368180256443023681640625} \\ \underline{0.00000000000006394884622184401282215118408203125} \phantom{00} \\ 2 \overline{) 0.00000000000006394884622184401282215118408203125} \\ \underline{0.000000000000031974423110922006411075592041015625} \phantom{00} \\ 2 \overline{) 0.000000000000031974423110922006411075592041015625} \\ \underline{0.0000000000000159872115554610032055377960205078125} \phantom{00} \\ 2 \overline{) 0.0000000000000159872115554610032055377960205078125} \\ \underline{0.00000000000000799360577773050160276889801025390625} \phantom{00} \\ 2 \overline{) 0.00000000000000799360577773050160276889801025390625} \\ \underline{0.000000000000003996802888865250801384449005126953125} \phantom{00} \\ 2 \overline{) 0.000000000000003996802888865250801384449005126953125} \\ \underline{0.0000000000000019984014444326254006922245025634765625} \phantom{00} \\ 2 \overline{) 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\phantom{00} \\ 2 \overline{) 0.00000000000000000048789097764468401857158622220888916015625} \\ \underline{0.000000000000000000243945488822342009285793111104444580078125} \phantom{00} \\ 2 \overline{) 0.000000000000000000243945488822342009285793111104444580078125} \\ \underline{0.0000000000000000001219727444111710046428965555502222900390625} \phantom{00} \\ 2 \overline{) 0.0000000000000000001219727444111710046428965555502222900390625} \\ \underline{0.00000000000000000006098637220558550232144827777511114501953125} \phantom{00} \\ 2 \overline{) 0.00000000000000000006098637220558550232144827777511114501953125} \\ \underline{0.000000000000000000030493186102792751160724138887555572509765625} \phantom{00} \\ 2 \overline{) 0.000000000000000000030493186102792751160724138887555572509765625} \\ \underline{0.000000000000000000015246593051396375580362069443777862548828125} \phantom{00} \\ 2 \overline{) 0.000000000000000000015246593051396375580362069443777862548828125} \\ \underline{0.0000000000000000000076232965256981877901810347218889312744140625} \phantom{00} \\ 2 \overline{) 0.0000000000000000000076232965256981877901810347218889312744140625} \\ \underline{0.00000000000000000000381164826284909389509051736094446563720703125} \phantom{00} \\ 2 \overline{) 0.00000000000000000000381164826284909389509051736094446563720703125} \\ \underline{0.000000000000000000001905824131424546947545258680472232816353515625} \phantom{00} \\ 2 \overline{) 0.000000000000000000001905824131424546947545258680472232816353515625} \\ \underline{0.0000000000000000000009529120657122727473772643402361164081676953125} \phantom{00} \\ 2 \overline{) 0.0000000000000000000009529120657122727473772643402361164081676953125} \\ \underline{0.00000000000000000000047645603285613637368863217011805820408384765625} \phantom{00} \\ 2 \overline{) 0.00000000000000000000047645603285613637368863217011805820408384765625} \\ \underline{0.000000000000000000000238228016428068186844431085059029102041923828125} \phantom{00} \\ 2 \overline{) 0.000000000000000000000238228016428068186844431085059029102041923828125} \\ \underline{0.0000000000000000000001191140082140340934222205425295145510209619140625} \phantom{00} \\ 2 \overline{) 0.0000000000000000000001191140082140340934222205425295145510209619140625} \\ \underline{0.0000000000000000000000595570041070170467111102712614775750510480595703125} \phantom{00} \\ 2 \overline{) 0.0000000000000000000000595570041070170467111102712614775750510480595703125} \\ \underline{0.000000000000000000000029778502053508523355555135607388787525240297890625} \phantom{00} \\ 2 \overline{) 0.000000000000000000000029778502053508523355555135607388787525240297890625} \\ \underline{0.0000000000000000000000148892510267542616777777678036943937612621489453125} \phantom{00} \\ 2 \overline{) 0.0000000000000000000000148892510267542616777777678036943937612621489453125} \\ \underline{0.00000000000000000000000744462551337713083888888390184719688063107447265625} \phantom{00} \\ 2 \overline{) 0.0000000000000000000000074446255133771308388888390184719688063107447265625} \\ \underline{0.0000000000000000000000037223127566885654194444419509235984403153723828125} \phantom{00} \\ 2 \overline{) 0.000000000000000000000003722312756688565419444419509235984403153723828125} \\ \underline{0.0000000000000000000000018611563783442827097222209754617972201568619140625} \phantom{00} \\ 2 \overline{) 0.0000000000000000000000018611563783442827097222209754617972201568619140625} \\ \underline{0.000000000000000000000000930578189172141354861111048773089860078430703125} \phantom{00} \\ 2 \overline{) 0.000000000000000000000000930578189172141354861111048773089860078430703125} \\ \underline{0.0000000000000000000000004652890945860706774305555243864447003921537015625} \phantom{00} \\ 2 \overline{) 0.0000000000000000000000004652890945860706774305555243864447003921537015625} \\ \underline{0.00000000000000000000000023264454729303533871527776219322235019607687578125} \phantom{00} \\ 2 \overline{) 0.00000000000000000000000023264454729303533871527776219322235019607687578125} \\ \underline{0.0000000000000000000000001163222736465176693576388810966117509803937890625} \phantom{00} \\ 2 \overline{) 0.0000000000000000000000001163222736465176693576388810966117509803937890625} \\ \underline{0.0000000000000000000000000581611368232588346788194405483058754940196953125} \phantom{00} \\ 2 \overline{) 0.0000000000000000000000000581611368232588346788194405483058754940196953125} \\ \underline{0.00000000000000000000000002908056841162941733940972027415293774700984765625} \phantom{00} \\ 2 \overline{) 0.00000000000000000000000002908056841162941733940972027415293774700984765625} \\ \underline{0.00000000000000000000000001454028420581470866970486013707618873504923828125} \phantom{00} \\ 2 \overline{) 0.00000000000000000000000001454028420581470866970486013707618873504923828125} \\ \underline{0.0000000000000000000000000072701421029073543348524300685380943937619140625} \phantom{00} \\ 2 \overline{) 0.0000000000000000000000000072701421029073543348524300685380943937619140625} \\ \underline{0.00000000000000000000000000363507105145367716724261503426904719688095703125} \phantom{00} \\ 2 \overline{) 0.00000000000000000000000000363507105145367716724261503426904719688095703125} \\ \underline{0.00000000000000000000000000181753552572683858362130751713452359844047890625} \phantom{00} \\ 2 \overline{) 0.00000000000000000000000000181753552572683858362130751713452359844047890625} \\ \underline{0.0000000000000000000000000009087677628634192917811537558567261976194453125} \phantom{00} \\ 2 \overline{) 0.0000000000000000000000000009087677628634192917811537558567261976194453125} \\ \underline{0.000000000000000000000000000454383881431709645890576877928309859722265625} \phantom{00} \\ 2 \overline{) 0.000000000000000000000000000454383881431709645890576877928309859722265625} \\ \underline{0.0000000000000000000000000002271919407158548229454478439641549296119140625} \phantom{00} \\ 2 \overline{) 0.0000000000000000000000000002271919407158548229454478439641549296119140625} \\ \underline{0.0000000000000000000000000001135959703579274114727239219820746480595703125} \phantom{00} \\ 2 \overline{) 0.0000000000000000000000000001135959703579274114727239219820746480595703125} \\ \underline{0.0000000000000000000000000000567979851789637057363619609910373240297890625} \phantom{00} \\ 2 \overline{) 0.0000000000000000000000000000567979851789637057363619609910373240297890625} \\ \underline{0.00000000000000000000000000002839899258948185286818098049551671621489453125} \phantom{00} \\ 2 \overline{) 0.00000000000000000000000000002839899258948185286818098049551671621489453125} \\ \underline{0.000000000000000000000000000014199496294740926434090490247758358107447265625} \phantom{00} \\ 2 \overline{) 0.000000000000000000000000000014199496294740926434090490247758358107447265625} \\ \underline{0.00000000000000000000000000000709974814737046321704$$

$$2(2b+b) = 288$$

$$b = 48, l = 96.$$

$$\begin{aligned} \text{area of rectangle} &= 96 \times 48 \text{ m}^2 \\ &= 4608 \text{ m}^2. \end{aligned}$$

(12) (i) 6, 9, 15 and 20

LCM of given 4 numbers is 180

$$180 = 2^2 \times 3^2 \times 5$$

To make it a perfect square, we have to multiply the number with 5.

$$\therefore 180 \times 5 = 2^2 \times 3^2 \times 5^2$$

900 is the least square number, divisible

by 6, 9, 15 and 20.

(ii) 8, 12, 15 and 20

LCM of given 4 numbers is 360.

$$360 = 2^3 \times 3^2 \times 5.$$

To make it a perfect square, multiply it with  $2 \times 5$ , i.e. 10

$$3600 = 2^4 \times 3^2 \times 2 \times 5^2.$$

$\therefore 3600$  is the least square number, divisible

by 8, 12, 15 and 20.

$$\begin{array}{r} 2 \overline{)180} \\ \underline{2 \ 90} \\ 5 \overline{)45} \\ \underline{3 \ 9} \\ 3 \end{array}$$

$$\begin{array}{r} 2 \overline{)360} \\ \underline{2 \ 80} \\ 2 \overline{)90} \\ \underline{5 \ 45} \\ 3 \overline{)9} \\ 3 \end{array}$$

(13)

$$121 - 1 = 120$$

$$120 - 3 = 117$$

$$117 - 5 = 112$$

$$112 - 7 = 105$$

$$105 - 9 = 96$$

$$96 - 11 = 85$$

$$85 - 13 = 72$$

$$72 - 15 = 57$$

$$57 - 17 = 40$$

$$40 - 19 = 21$$

$$21 - 21 = 0$$

clearly we have performed operation 11 times

$$\therefore \sqrt{121} = 11$$

$$169 - 1 = 168$$

$$168 - 3 = 165$$

$$165 - 5 = 160$$

$$160 - 7 = 153$$

$$153 - 9 = 144$$

$$144 - 11 = 133$$

$$133 - 13 = 120$$

$$120 - 15 = 105$$

$$105 - 17 = 88$$

$$88 - 19 = 69$$

$$69 - 21 = 48$$

$$48 - 23 = 25$$

$$25 - 25 = 0$$

clearly we have performed subtraction 13 times

$$\therefore \sqrt{169} = 13$$

(14) ① 7744

$$7744 = 2^2 \times 2^2 \times 2^2 \times 11^2$$

$$\sqrt{7744} = 2 \times 2 \times 2 \times 11 \\ = 88$$

$$\begin{array}{r} 2 \overline{) 7744} \\ \underline{23872} \\ 2 \overline{) 1936} \\ \underline{2968} \\ 2 \overline{) 484} \\ \underline{242} \\ 2 \overline{) 242} \\ \underline{121} \\ 11 \end{array}$$

② 9604

$$9604 = 2^2 \times 7^2 \times 7^2$$

$$\sqrt{9604} = 2 \times 7 \times 7 \\ = 98$$

$$\begin{array}{r} 2 \overline{) 9604} \\ \underline{24802} \\ 7 \overline{) 2401} \\ \underline{7343} \\ 7 \overline{) 49} \\ 7 \end{array}$$

③ 5929

$$5929 = 11^2 \times 7^2$$

$$\sqrt{5929} = 11 \times 7 \\ = 77$$

$$\begin{array}{r} 11 \overline{) 5929} \\ \underline{11539} \\ 7 \overline{) 49} \\ 7 \end{array}$$

④ 7056

$$7056 = 2^2 \times 2^2 \times 7^2 \times 3^2$$

$$\sqrt{7056} = 2 \times 2 \times 7 \times 3 \\ = 84$$

$$\begin{array}{r} 2 \overline{) 7056} \\ \underline{23528} \\ 2 \overline{) 1764} \\ \underline{2882} \\ 7 \overline{) 441} \\ \underline{763} \\ 7 \overline{) 63} \\ \underline{39} \\ 3 \end{array}$$

(15) Let 'a' be number of students.

37

∴ each student donated a rupees.

∴ Total amount collected = a × a rupees = 2401

$$a^2 = 2401$$

$$a = \sqrt{2401}$$

$$a = 49$$

∴ There are 49 students in the class.

$$\begin{array}{r} 7 \overline{) 2401} \\ \underline{7343} \\ 7 \overline{) 49} \\ 7 \end{array}$$

(16) Let a be no. of rows

∴ no. of columns = a.

Total no. of students who sat in field = a<sup>2</sup>Total students = a<sup>2</sup> + 71 = 6000

$$a^2 = 5929$$

$$a = \sqrt{5929}$$

$$a = 11 \times 7 = 77$$

∴ no. of rows = 77.

$$\begin{array}{r} 11 \overline{) 5929} \\ \underline{11539} \\ 7 \overline{) 49} \\ 7 \end{array} \quad \begin{array}{r} 2 \overline{) 5928} \\ \underline{2964} \\ 2 \overline{) 1482} \\ \underline{3241} \\ 3 \overline{) 247} \end{array}$$

## Squares And Square Roots Ex 3.6

### EXERCISE - 3.6.

38

① Find the square root of

(i)  $\frac{441}{961}$

$$\Rightarrow \sqrt{\frac{441}{961}} = \frac{\sqrt{441}}{\sqrt{961}} = \frac{21}{31}$$

$$\left[ \because \sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}} \right]$$

(ii)  $\sqrt{\frac{324}{841}} = \frac{\sqrt{324}}{\sqrt{841}} = \frac{18}{29}$

(iii)  $4 \cdot \frac{29}{49} = \frac{225}{49}$

$$\sqrt{4 \cdot \frac{29}{49}} = \sqrt{\frac{225}{49}} = \frac{\sqrt{225}}{\sqrt{49}} = \frac{15}{7}$$

(iv)  $2 \cdot \frac{14}{25} = \frac{64}{25}$

$$\sqrt{2 \cdot \frac{14}{25}} = \sqrt{\frac{64}{25}} = \frac{\sqrt{64}}{\sqrt{25}} = \frac{8}{5}$$

(v)  $2 \cdot \frac{137}{196} = \frac{529}{196}$

$$\sqrt{2 \cdot \frac{137}{196}} = \sqrt{\frac{529}{196}} = \frac{\sqrt{529}}{\sqrt{196}} = \frac{23}{14}$$

(vi)  $23 \cdot \frac{26}{121} = \frac{2809}{121}$

$$\sqrt{23 \cdot \frac{26}{121}} = \sqrt{\frac{2809}{121}} = \frac{\sqrt{2809}}{\sqrt{121}} = \frac{53}{11}$$

(vii)  $25 \cdot \frac{544}{729} = \frac{18769}{729}$

$$\sqrt{25 \cdot \frac{544}{729}} = \sqrt{\frac{18769}{729}} = \frac{\sqrt{18769}}{\sqrt{729}} = \frac{137}{27}$$

$$\textcircled{\text{viii}} 75 \cdot \frac{46}{49} = \frac{3721}{49}$$

$$\sqrt{75 \cdot \frac{46}{49}} = \sqrt{\frac{3721}{49}} = \frac{61}{7}$$

$$\textcircled{\text{ix}} 3 \cdot \frac{942}{2209} = \frac{7569}{2209}$$

$$\sqrt{3 \cdot \frac{942}{2209}} = \sqrt{\frac{7569}{2209}} = \frac{\sqrt{7569}}{\sqrt{2209}} = \frac{87}{47}$$

$$\textcircled{\text{x}} 3 \cdot \frac{834}{3025} = \frac{9609}{3025}$$

$$\sqrt{3 \cdot \frac{834}{3025}} = \sqrt{\frac{9609}{3025}} = \frac{\sqrt{9609}}{\sqrt{3025}} = \frac{97}{55}$$

$$\textcircled{\text{xi}} 21 \cdot \frac{2797}{3364} = \frac{73041}{3364}$$

$$\sqrt{21 \cdot \frac{2797}{3364}} = \sqrt{\frac{73041}{3364}} = \frac{\sqrt{73041}}{\sqrt{3364}} = \frac{271}{58}$$

$$\textcircled{\text{xii}} 38 \cdot \frac{11}{25} = \frac{961}{25}$$

$$\sqrt{38 \cdot \frac{11}{25}} = \sqrt{\frac{961}{25}} = \frac{\sqrt{961}}{\sqrt{25}} = \frac{31}{5}$$

$$\textcircled{\text{xiii}} 23 \cdot \frac{394}{729} = \frac{17161}{729}$$

$$\sqrt{23 \cdot \frac{394}{729}} = \sqrt{\frac{17161}{729}} = \frac{\sqrt{17161}}{\sqrt{729}} = \frac{131}{27}$$

$$\textcircled{\text{xiv}} 21 \cdot \frac{51}{169} = \frac{3600}{169}$$

$$\sqrt{21 \cdot \frac{51}{169}} = \sqrt{\frac{3600}{169}} = \frac{\sqrt{3600}}{\sqrt{169}} = \frac{60}{13}$$

$$\textcircled{\text{xv}} 10 \cdot \frac{151}{225} = \frac{2401}{225}$$

$$\sqrt{10 \cdot \frac{151}{225}} = \sqrt{\frac{2401}{225}} = \frac{\sqrt{2401}}{\sqrt{225}} = \frac{49}{15}$$

② Find the value of

(i)  $\frac{\sqrt{80}}{\sqrt{405}}$

we know that  $\frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}$

$$\Rightarrow \frac{\sqrt{80}}{\sqrt{405}} = \sqrt{\frac{80}{405}} = \sqrt{\frac{16}{81}} \quad (\because \text{cancelling numerator and denominator with } 5)$$

$$= \frac{\sqrt{16}}{\sqrt{81}} = \frac{4}{9} \quad (\because \sqrt{16} = 4, \sqrt{81} = 9)$$

(ii)  $\frac{\sqrt{441}}{\sqrt{625}}$

$$= \frac{\sqrt{441}}{\sqrt{625}} = \frac{21}{25} \quad (\because \sqrt{441} = 21, \sqrt{625} = 25)$$

(iii)  $\frac{\sqrt{1587}}{\sqrt{1228}} = \frac{\sqrt{1587}}{\sqrt{1228}} = \sqrt{\frac{529}{576}}$  ( $\because$  cancelling numerator and denominator with 3)

$$= \frac{\sqrt{529}}{\sqrt{576}} = \frac{23}{24} \quad (\because \sqrt{529} = 23, \sqrt{576} = 24)$$

(iv)  $\sqrt{72} \times \sqrt{338}$

$$= \sqrt{72 \times 338}$$

(v)  $\sqrt{72} \times \sqrt{338}$

$$= \sqrt{2^3 \times 3^2} \times \sqrt{2 \times 13^2}$$

we know that  $\sqrt{a} \times \sqrt{b} = \sqrt{a \times b}$

$$\Rightarrow \sqrt{2^4 \times 3^2 \times 13^2} = 2^2 \times 3 \times 13 = 156$$

$$\textcircled{1} \sqrt{45} \times \sqrt{20}$$

$$= \sqrt{5 \times 9} \times \sqrt{5 \times 2^2}$$

$$= \sqrt{5^2 \times 9 \times 2^2} = 5 \times 9 \times 2 \\ = 90$$

(4)

$$\textcircled{3} \text{ Given area} = 80 \cdot \frac{240}{729} \text{ m}^2$$

$$= \frac{58560}{729} \text{ m}^2$$

If  $L$  is length of each side

$$\therefore L^2 = \frac{58560}{729}$$

$$L = \frac{\sqrt{58560}}{\sqrt{729}} \quad \left[ \because \sqrt{\frac{a}{b}} = \frac{\sqrt{a}}{\sqrt{b}} \right]$$

$$= \frac{242}{27}$$

$$\textcircled{4} \text{ Given, area} = 30 \cdot \frac{1}{4} \text{ m}^2$$

$$= \frac{121}{4} \text{ m}^2$$

If  $L$  is length of each side

$$\text{then } L^2 = \frac{121}{4}$$

$$L = \sqrt{\frac{121}{4}} = \frac{\sqrt{121}}{\sqrt{4}} = \frac{11}{2} \quad \left[ \because \sqrt{121} = 11 \right]$$

$$\therefore \text{length} = \frac{11}{2}$$

---

$$\textcircled{5} \text{ Area of rectangular field} = l \times b$$

$$= 72 \times 338 \text{ m}^2$$

$$= 24336 \text{ m}^2$$

$$\text{Area of square} = L^2 = 24336 \text{ m}^2$$

$$L = \sqrt{24336} = 156 \text{ m. is the}$$

length of side of square play ground.



# Squares And Square Roots Ex 3.7

## EXERCISE - 3.7

43

Find the square root of the following.

①  $84.8241$

$$\begin{array}{r}
 9.21 \\
 \hline
 9 \overline{)84.8241} \\
 \underline{81} \phantom{00} \\
 382 \phantom{00} \\
 \underline{364} \phantom{00} \\
 184 \phantom{00} \\
 \underline{184} \phantom{00} \\
 0
 \end{array}$$

$$\therefore \sqrt{84.8241} = 9.21$$

②  $0.7225$

$$\begin{array}{r}
 .85 \\
 \hline
 \overline{)0.7225} \\
 \underline{0} \phantom{00} \\
 72 \phantom{00} \\
 \underline{64} \phantom{00} \\
 825 \phantom{00} \\
 \underline{825} \phantom{00} \\
 0
 \end{array}$$

$$\sqrt{0.7225} = 0.85$$

③  $0.813604$

$$\begin{array}{r}
 0.902 \\
 \hline
 \overline{)0.813604} \\
 \underline{0} \phantom{00} \\
 81 \phantom{00} \\
 \underline{81} \phantom{00} \\
 36 \phantom{00} \\
 \underline{36} \phantom{00} \\
 0 \phantom{00} \\
 3604 \phantom{00} \\
 \underline{3604} \phantom{00} \\
 0
 \end{array}$$

$$\sqrt{0.813604} = 0.902$$

④  $0.00002025$

$$\begin{array}{r}
 0.0045 \\
 \hline
 0.00002025 \\
 \hline
 0 \\
 \hline
 20 \\
 16 \\
 \hline
 95 \\
 425 \\
 425 \\
 \hline
 0
 \end{array}$$

$= 0.0045$

⑤  $150.0625$

$$\begin{array}{r}
 12.25 \\
 \hline
 150.0625 \\
 \hline
 1 \\
 \hline
 22 \\
 050 \\
 44 \\
 \hline
 242 \\
 606 \\
 484 \\
 \hline
 2445 \\
 12225 \\
 0
 \end{array}$$

$= 12.25$

⑥  $225.6004$

$$\begin{array}{r}
 15.02 \\
 \hline
 225.6004 \\
 \hline
 1 \\
 \hline
 25 \\
 125 \\
 125 \\
 \hline
 300 \\
 060 \\
 0 \\
 \hline
 3002 \\
 6004 \\
 6004 \\
 \hline
 0
 \end{array}$$

$= 15.02$

⑦ 3600.720036

215

	60.006
6	3600.720036
	36
120	000
	0
1200	072
	<del>00</del>
1240	<del>000</del>
	7200
	0000
12006	720036
	720036
	0

= 60.006.

⑧ 236.144689

	15.367
*	236.144689
	1
25	136
	125
303	1114
	969
366	205468
	18396
3927	2150907
	2015097
	0

= 15.367.

⑨ 0.00059049

46

	0.0243
0	0.00059049
	0
0	000
	0
2	005
	4
44	190
	176
483	1449
	1449
	0

= 0.0243.

⑩ 176.252176

	13.276
1	176.252176
	1
136	076
	69
262	125
	725
2647	20121
	18529
26546	159276
	159276
	0

= 13.276





(16) (i)

$$\frac{\sqrt{59.29} - \sqrt{5.29}}{\sqrt{59.29} + \sqrt{5.29}}$$

first we find  $\sqrt{5929}$  and  $\sqrt{529}$

$$\begin{array}{r} 77 \\ 7 \overline{) 5929} \\ \underline{49} \phantom{00} \\ 1029 \\ 1029 \\ \hline 0 \end{array} = 77$$

$$\begin{array}{r} 23 \\ 23 \overline{) 529} \\ \underline{48} \phantom{00} \\ 49129 \\ 46129 \\ \hline 0 \end{array} = 23$$

$$\therefore \sqrt{59.29} = \sqrt{\frac{5929}{100}} = \frac{77}{10}, \quad \sqrt{5.29} = \sqrt{\frac{529}{100}} = \frac{23}{10}$$

$$\therefore \frac{\frac{77}{10} - \frac{23}{10}}{\frac{77}{10} + \frac{23}{10}} = 0.54$$

(ii)  $\frac{\sqrt{0.2304} + \sqrt{0.1764}}{\sqrt{0.2304} - \sqrt{0.1764}}$

$$\begin{array}{r} 48 \\ 4 \overline{) 2304} \\ \underline{16} \phantom{00} \\ 88704 \\ 88704 \\ \hline 0 \end{array} = 48$$

$$\begin{array}{r} 42 \\ 4 \overline{) 1764} \\ \underline{16} \phantom{00} \\ 82164 \\ 82164 \\ \hline 0 \end{array} = 42$$

$$\therefore \text{Given } \frac{\sqrt{\frac{2304}{10000}} + \sqrt{\frac{1764}{10000}}}{\sqrt{\frac{2304}{10000}} - \sqrt{\frac{1764}{10000}}} = \frac{48+42}{48-42} = \frac{90}{6} = 15$$

(12)  $\sqrt{50625} =$

	225	
50	625	
2	4	
42	106	= 225
445	84	
	2225	
	2225	
	0	

$\sqrt{506.25} = \sqrt{\frac{50625}{100}} = \frac{\sqrt{50625}}{10} = \frac{225}{10}$

$\sqrt{5.0625} = \sqrt{\frac{50625}{10000}} = \frac{\sqrt{50625}}{100} = \frac{225}{100}$

$\sqrt{506.25} + \sqrt{5.0625} = \frac{225}{10} + \frac{225}{100} = \frac{2475}{100} = 24.75$

(13)  $\sqrt{103.0225} =$

	10.15	
103	0225	
1	0	
20	003	= 10.15
201	0	
	302	
	287	
	145025	
	145025	
	0	

(i)  $\sqrt{10302.25} = \sqrt{103.0225 \times 100} = 10 \times 10.15 = 101.5$

(ii)  $\sqrt{1.030225} = \sqrt{\frac{103.0225}{100}} = \frac{10.15}{10} = 1.015$

# Squares And Square Roots Ex 3.8

## EXERCISE - 3.8

51

I find the square root of following correct to three places of decimal.

(i) 5

$$\begin{array}{r} 2.236 \\ \hline 5.00000000 \\ \underline{4} \phantom{00000000} \\ 100 \phantom{0000000} \\ \underline{84} \phantom{0000000} \\ 1600 \phantom{000000} \\ \underline{1329} \phantom{000000} \\ 27100 \phantom{00000} \\ \underline{26796} \phantom{00000} \\ 304 \phantom{00000} \end{array} \approx 2.236$$

(ii) 7

$$\begin{array}{r} 2.646 \\ \hline 7.000000 \\ \underline{4} \phantom{000000} \\ 300 \phantom{00000} \\ \underline{276} \phantom{00000} \\ 2400 \phantom{0000} \\ \underline{2096} \phantom{0000} \\ 30400 \phantom{000} \\ \underline{30316} \phantom{000} \\ 84 \phantom{000} \end{array} \approx 2.646$$

(iii) 17

$$\begin{array}{r} 4.123 \\ \hline 17.000000 \\ \underline{16} \phantom{000000} \\ 100 \phantom{00000} \\ \underline{81} \phantom{00000} \\ 1900 \phantom{0000} \\ \underline{1644} \phantom{0000} \\ 26600 \phantom{000} \\ \underline{24729} \phantom{000} \\ 1871 \phantom{000} \end{array} \approx 4.123$$



20

$$\begin{array}{r}
 4472 \\
 \hline
 20 \overline{) 00 \ 00 \ 00} \\
 \underline{16} \\
 100 \\
 \underline{336} \\
 6400 \\
 \underline{6209} \\
 19100 \\
 \underline{17834} \\
 1266
 \end{array}$$

= 4.492

66

$$\begin{array}{r}
 8.124 \\
 \hline
 66 \overline{) 00 \ 00 \ 00} \\
 \underline{66} \\
 000 \\
 \underline{161} \\
 3900 \\
 \underline{3244} \\
 65600 \\
 \underline{64976} \\
 624
 \end{array}$$

= 8.124

427

$$\begin{array}{r}
 20.664 \\
 \hline
 427 \overline{) 00 \ 00 \ 00 \ 00} \\
 \underline{4} \\
 027 \\
 \underline{0} \\
 2700 \\
 \underline{2436} \\
 26400 \\
 \underline{24756} \\
 166400 \\
 \underline{164296} \\
 104
 \end{array}$$

= 20.664

(vii) 1.7

$$\begin{array}{r}
 1.304 \\
 \hline
 1.70 \overline{00} \overline{00} \\
 \hline
 1 \\
 \hline
 23 \quad 0.70 \\
 \quad \quad 69 \\
 \hline
 260 \quad 100 \\
 \quad \quad \quad 0 \\
 \hline
 2604 \quad 10000 \\
 \quad \quad \quad 10016 \\
 \hline
 \quad \quad \quad \quad -416.
 \end{array}$$

= 1.304.

(viii) 2.3.1

$$\begin{array}{r}
 4.806 \\
 \hline
 23.10 \overline{00} \overline{00} \\
 \hline
 4 \\
 \hline
 23 \quad 710 \\
 \quad \quad 704 \\
 \hline
 960 \quad 600 \\
 \quad \quad \quad 0 \\
 \hline
 9606 \quad 60000 \\
 \quad \quad \quad 57636 \\
 \hline
 \quad \quad \quad \quad 2364
 \end{array}$$

= 4.806.

(ix) 2.5

(x) 2.5

$$\begin{array}{r}
 1.581 \\
 \hline
 2.50 \overline{00} \overline{00} \\
 \hline
 1 \\
 \hline
 25 \quad 1250 \\
 \quad \quad 125 \\
 \hline
 308 \quad 2500 \\
 \quad \quad 2464 \\
 \hline
 3161 \quad 3600 \\
 \quad \quad 3464 \\
 \hline
 \quad \quad \quad \quad 136
 \end{array}$$

= 1.581

(x)

237.615

$$\begin{array}{r}
 15.415 \\
 \hline
 237.615 \overline{) 237.615000} \\
 \underline{237} \phantom{.615000} \\
 1 \\
 \hline
 25 \phantom{.} \phantom{.615000} \\
 \underline{137} \phantom{.615000} \\
 125 \phantom{.615000} \\
 \hline
 304 \phantom{.615000} \\
 \underline{1261} \phantom{.615000} \\
 1216 \phantom{.615000} \\
 \hline
 381 \phantom{.615000} \\
 \underline{4550} \phantom{.615000} \\
 3081 \phantom{.615000} \\
 \hline
 3825 \phantom{.615000} \\
 \underline{146900} \phantom{.615000} \\
 151125 \phantom{.615000} \\
 \underline{7225} \phantom{.615000} \\
 \hline
 \phantom{.615000} 7225
 \end{array}$$

= 15.415

(xi)

15.3215

$$\begin{array}{r}
 3.914 \\
 \hline
 15.3215 \overline{) 15.321500} \\
 \underline{15} \phantom{.321500} \\
 83 \\
 \hline
 69 \phantom{.} \phantom{.321500} \\
 \underline{682} \phantom{.321500} \\
 621 \phantom{.321500} \\
 \hline
 781 \phantom{.321500} \\
 \underline{1115} \phantom{.321500} \\
 721 \phantom{.321500} \\
 \hline
 7824 \phantom{.321500} \\
 \underline{33400} \phantom{.321500} \\
 31296 \phantom{.321500} \\
 \hline
 \phantom{.321500} 2104
 \end{array}$$

= 3.914

(xii)

0.9

$$\begin{array}{r}
 0.949 \\
 \hline
 0 \phantom{.} \overline{) 0.900000} \\
 \underline{0} \phantom{.900000} \\
 9 \\
 \hline
 9 \phantom{.} \phantom{.900000} \\
 \underline{090} \phantom{.900000} \\
 81 \phantom{.900000} \\
 \hline
 184 \phantom{.900000} \\
 \underline{900} \phantom{.900000} \\
 736 \phantom{.900000} \\
 \hline
 1889 \phantom{.900000} \\
 \underline{18400} \phantom{.900000} \\
 12001 \phantom{.900000} \\
 \hline
 \phantom{.900000} 601
 \end{array}$$

= 0.949

(XIII) 0.1

0	0.316
0	0.10 00 00
0	0
3	10
9	9
61	100
61	61
626	39 00
626	3756
	144

= 0.316

(XIV) 0.016

0	0.126
0	0.0160 00
0	0
1	001
1	1
22	060
22	44
246	16 00
246	1496
	124

= 0.126

(XV) 0.00064

0	0.025
0	0.00064 00
0	0
0	0.00
0	0
2	006
2	4
45	240
45	225
	15

= 0.025

(xvi)  $0.019$

$$\begin{array}{r} 0.138 \\ \hline 0.019000 \\ 0 \\ \hline 1 \quad 01 \\ 1 \\ \hline 23 \quad 090 \\ 69 \\ \hline 268 \quad 2100 \\ 2144 \\ \hline \quad \quad 64 \end{array}$$

last digit is approximated.  
 $= 0.138$

(xvii)  $\frac{7}{8} = 0.875$

$$\begin{array}{r} 0.935 \\ \hline 0.875000 \\ 0 \\ \hline 9 \quad 087 \\ 81 \\ \hline 182 \quad 650 \\ 549 \\ \hline 1865 \quad 10100 \\ 9325 \\ \hline \quad \quad 775 \end{array}$$

$= 0.935$

(xviii)  $\frac{5}{12} = 0.6\overline{416666}$

$$\begin{array}{r} 0.641666 \\ \hline 0.416666 \\ 6 \\ \hline 6 \quad 41 \\ 36 \\ \hline 124 \quad 566 \\ 496 \\ \hline 1285 \quad 7066 \\ 6245 \\ \hline \quad \quad 641 \end{array}$$

$= 0.6\overline{416666}$

(xix)  $2\frac{1}{2} = 2.5$

$$\begin{array}{r} 1.521 \\ \hline 2.500000 \\ 1 \\ \hline 25 \quad 150 \\ 125 \\ \hline 308 \quad 2500 \\ 2464 \\ \hline 3161 \quad 3600 \\ 2161 \\ \hline \quad \quad 439 \end{array}$$

$= 1.521$