

Squares and Square Roots

Exercise 3E

Q1

Answer :

Using the long division method:

$$\begin{array}{r} 24 \\ 2 \overline{) 576} \\ \underline{24} \\ 44 \\ 4 \overline{) 176} \\ \underline{16} \\ 16 \\ 4 \overline{) 160} \\ \underline{16} \\ 0 \end{array}$$

$$\therefore \sqrt{576} = 24$$

Q2

Answer :

Using the long division method:

$$\begin{array}{r} 38 \\ 3 \overline{) 1444} \\ \underline{9} \\ 68 \\ 8 \overline{) 544} \\ \underline{48} \\ 64 \\ 8 \overline{) 640} \\ \underline{64} \\ 0 \end{array}$$

$$\therefore \sqrt{1444} = 38$$

Q3

Answer :

Using the long division method:

$$\begin{array}{r} 67 \\ 6 \overline{) 4489} \\ \underline{636} \\ 12789 \\ \underline{7889} \\ 0 \end{array}$$

$$\therefore \sqrt{4489} = 67$$

Q4

Answer :

Using the long division method:

$$\begin{array}{r} 79 \\ 7 \overline{) 6241} \\ \underline{749} \\ 1491341 \\ \underline{91341} \\ 0 \end{array}$$

$$\therefore \sqrt{6241} = 79$$

Q5

Answer :

Using the long division method:

$$\begin{array}{r} 84 \\ 8 \overline{) 7056} \\ \underline{864} \\ 164656 \\ \underline{4656} \\ 0 \end{array}$$

$$\therefore \sqrt{7056} = 84$$

Q6

Answer :

Using the long division method:

$$\begin{array}{r} 95 \\ 9 \overline{) 9025} \\ \underline{981} \\ 185925 \\ \underline{5925} \\ 0 \end{array}$$

$$\therefore \sqrt{9025} = 95$$

Q7

Answer :

Using the long division method:

$$\begin{array}{r} 107 \\ 1 \overline{) 11449} \\ \underline{11} \\ 2071449 \\ \underline{71449} \\ 0 \end{array}$$

$$\therefore \sqrt{11449} = 107$$

Q8

Answer :

Using the long division method:

$$\begin{array}{r} 119 \\ 1 \overline{) 14161} \\ \underline{1} \\ 21 \\ \underline{21} \\ 0 \\ 229 \\ \underline{229} \\ 0 \end{array}$$

$$\therefore \sqrt{14161} = 119$$

Q9

Answer :

Using the long division method:

$$\begin{array}{r} 102 \\ 1 \overline{) 10404} \\ \underline{1} \\ 202 \\ \underline{202} \\ 0 \end{array}$$

$$\therefore \sqrt{10404} = 102$$

Q10

Answer :

Using the long division method:

$$\begin{array}{r} 134 \\ 1 \overline{) 17956} \\ \underline{1} \\ 23 \\ \underline{23} \\ 264 \\ \underline{264} \\ 0 \end{array}$$

$$\therefore \sqrt{17956} = 134$$

Q11

Answer :

Using the long division method:

$$\begin{array}{r} 140 \\ 1 \overline{) 19600} \\ \underline{1} \\ 24 \\ \underline{24} \\ 280 \\ \underline{280} \\ 0 \end{array}$$

$$\therefore \sqrt{19600} = 140$$

Q12

Answer :

Using the long division method:

$$\begin{array}{r} 304 \\ 3 \overline{) 92416} \\ \underline{31} \\ 604 \\ \underline{4} \\ 2416 \\ \underline{24} \\ 16 \\ \underline{16} \\ 0 \end{array}$$

$$\therefore \sqrt{92416} = 304$$

Q13

Answer :

Using the long division method:

$$\begin{array}{r} 50 \\ 5 \overline{) 2509} \\ \underline{5} \\ 100 \\ \underline{0} \\ 9 \end{array}$$

Therefore, the number that should be subtracted from the given number to make it a perfect square is 9.

Q14

Answer :

Using the long division method:

$$\begin{array}{r} 87 \\ 8 \overline{) 7581} \\ \underline{8} \\ 167 \\ \underline{7} \\ 1169 \\ \underline{11} \\ 12 \end{array}$$

Therefore, the number that should be subtracted from the given number to make it a perfect square is 12.

$$\begin{aligned} \text{Perfect square} &= 7581 - 12 \\ &= 7569 \end{aligned}$$

Its square root is 87.

Q15

Answer :

Using the long division method:

$$\begin{array}{r} 78 \\ 7 \overline{) 6203} \\ \underline{7} \\ 148 \\ \underline{8} \\ 119 \end{array}$$

Thus, to get a perfect square greater than the given number, we take the square of the next natural number of the quotient, i.e. 78.

$$78^2 = 6241$$

$$\text{Number that should be added to the given number to make it a perfect square} = 6241 - 6203 = 38$$

The perfect square thus obtained is 6241 and its square root is 79.

Q16

Answer :

Using the long division method:

$$\begin{array}{r} 91 \\ 9 \overline{) 8400} \\ \underline{981} \\ 181 \\ \underline{181} \\ 0 \\ 119 \end{array}$$

The next natural number that is a perfect square can be obtained by squaring the next natural number of the obtained quotient, i.e. 91.

Therefore square of $(91+1) = 92^2 = 8464$

Number that should be added to the given number to make it a perfect square $= 8464 - 8400 = 64$

The perfect square thus obtained is 8464 and its square root is 92.

Q17

Answer :

Smallest number of four digits $= 1000$

Using the long division method:

$$\begin{array}{r} 31 \\ 3 \overline{) 1000} \\ \underline{9} \\ 61 \\ \underline{61} \\ 0 \\ 39 \end{array}$$

1000 is not a perfect square.

By the long division method, the obtained square root is between 31 and 32.

Squaring the next integer (32) will give us the next perfect square.

$$32^2 = 1024$$

Thus, 1024 is the smallest four digit perfect square.

$$\text{Also, } \sqrt{1024} = 32$$

Q18

Answer :

Greatest number of five digits $= 99999$

Using the long division method:

$$\begin{array}{r} 316 \\ 1 \overline{) 99999} \\ \underline{19} \\ 61 \\ \underline{61} \\ 0 \\ 626 \\ \underline{626} \\ 0 \\ 143 \end{array}$$

99999 is not a perfect square.

According to the long division method, the obtained square root is between 316 and 317.

Squaring the smaller number, i.e. 316, will give us the perfect square that would be less than 99999.

$$316^2 = 99856$$

99856 is the required number.

Its square root is 316.

Q19

Answer :

Area of the square field = 60025 m^2

Length of each side of the square field = $\sqrt{60025} = 245 \text{ m}$

Perimeter of the field = $4 \times 245 = 980 \text{ m}$

$$= \frac{980}{1000} \text{ km}$$

The man is cycling at a speed of 18 km/h.

$$\text{Time} = \frac{\text{Distance travelled}}{\text{Speed}}$$

$$= \frac{980 / 1000}{18}$$

$$= \frac{980}{1000 \times 18} \text{ hr}$$

$$= \frac{980 \times 60 \times 60}{18000} \text{ sec}$$

$$= 98 \times 2 \text{ sec}$$

$$= 196 \text{ sec}$$

$$= 3 \text{ min } 16 \text{ sec}$$