TEXT BOOK EXERCISE 5.2

- 0. 1. Tell the ones place digit of square root following numbers :
- (i) 121
- (ii) 729
- (iii) 676

- (iv) 1936
- (v) 484
- (vi) 2401
- (vii) 1600 (viii) 3025
- Solution.
- (i) Ones place digit of square root of any perfect square number ending with 1 is either 1 or 9.
- (ii) Ones place digit of square root of any perfect square number ending with 9 is either 3 or 7.
- (iii) Ones place digit of square root of any perfect square number ending with 6 is either 4 or 6.
- (iv) Ones place digit of square root of any perfect square number ending with 6 is either 4 or 6.
- (v) Ones place digit of square root of any perfect square number ending with 4 is either 2 or 8.
- (vi) Ones place digit of square root of any perfect square number ending with 1 is either 1 or 9.
- (vii) Ones place digit of square root of any perfect square number ending with two zeroes is 0.
- (viii) Ones place digit of square root of any perfect square number ending with 5 is 5.
- Q. 2. From the following numbers find the number which cannot be a perfect square number.
 - 100, 512, 1728, 529, 1024, 441, 1320, 3617.

Solution. Any number which ends with 2, 3, 7,8 or have odd number of zeroes at its end cannot be a perfect square. Therefore, 512, 1320 and 3617 are not perfect square numbers.

- Q. 3. Find the square root of following numbers by method of repeated subtraction.
 - (i) 64

- (ii) 49
- (iii) 121
- (iv) 100

Solution. (i) The given number is 36. Start subtracting the odd numbers starting from 1.

- (i) 64 1 = 63
- (ii) 63 3 = 60
- (iii) 60 5 = 55
- (iv) 55 7 = 48
- (v) 48 9 = 39
- (vi) 39 11 = 28
- (vii) 28 13 = 15
- (viii) 15 15 = 0

As we have obtained 0 at 8th step.

- So, $\sqrt{64} = 8$ Ans.
- (ii) The given number is 49. Start substracting the odd numbers starting from 1.
 - (i) 49 1 = 48
- (ii) 48 3 = 45
- (iii) 45 5 = 40
- (iv) 40 7 = 33
- (v) 33 9 = 24
- (vi) 24 11 = 13
- (vii) 13 13 = 0

As we have obtained 0 at 7th step.

- So, $\sqrt{49} = 7$ Ans.
- (iii) The given number is 121. Start subtracting the odd numbers starting from 1.
 - (i) 121 1 = 120
- (ii) 120 3 = 117

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- (iii) 117 5 = 112
- (iv) 112 7 = 105
- (v) 105 9 = 96
- (vi) 96 11 = 85
- (vii) 85 13 = 72(ix) 57 - 17 = 40
- (viii) 72 15 = 57(x) 40 – 19 = 21
- (xi) 21 21 = 0

As we have obtained 0 at 11th step.

- So, $\sqrt{121} = 11$ Ans.
- (iv) The given number is 100. Start subtracting the odd numbers starting from 1.
 - (i) 109 1 = 99
- (ii) 99 3 = 96
 - (iii) 96 5 = 91
- (iv) 91 7 = 84
- (v) 84 9 = 75 (vii) 64 - 13 = 51 (viii) 51 - 15 = 36
- (vi) 75 11 = 64
- (ix) 36 17 = 19
- (x) 19 19 = 0

As we have obtained 0 at 10th step

- So, $\sqrt{100} = 10$ Ans.
- Q. 4. Find square root of following numbers using method of prime factorisation:
 - (i) 3600 (ii) 676
- (iii) 9216

- (iv) 2916
- (v) 6400
- (vi) 1764
- (vii) 12100 (viii) 1024.

Solution. (i) Let us find the prime factorisation of 3600

	5	5	3	3	2	2	2	2
1	. 5	25	75	225	450	900	1800	3600

$$3600 = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5$$

i.e.
$$3600 = 2^2 \times 2^2 \times 3^2 \times 5^2$$

i.e.
$$3600 = (2 \times 2 \times 3 \times 5)^2 = (60)^2$$

Hence, $\sqrt{3600} = 60$ Ans.

(ii) Let us find the prime factorisation of 676

2	676
2	338
13	169
13	13
	1

$$\therefore 676 = 2 \times 2 \times 13 \times 13$$

$$\Rightarrow 676 = 2^2 \times 13^2$$

$$\Rightarrow$$
 676 = $(2 \times 13)^2 = (26)^2$

Hence, $\sqrt{676} = 26$ Ans.

(iii) Let us find the prime factorisation of 9216

2	9216
2	4608
2	2304
2	1152
2	576
2	288
2	. 144
2	72
2	36
2	18
3	9
3	/3/
171	7-1-

$$\begin{array}{rcl}
\therefore & 9216 = 2 \times 2 \\
& \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \\
& = 2^2 \times 2^2 \times 2^2 \times 2^2 \times 2^2 \times 3^2 \\
& = (2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3)^2 \\
& = (96)^2
\end{array}$$

Hence, $\sqrt{9216} = 96$ Ans.

(iv) Let us find the prime factorisation of 2916

2	2916
2	1458
3	729
3	243
3	81
3	27
3	9
3	3
	1

Hence, $\sqrt{2916} = 54$ Ans.

(v) Let us find the prime factorisation of 6400

2	6400
$\sqrt{2}$	3200
2	1600
$\overline{2}$	800
$\overline{2}$:	. 400
2	200
2	100
$\overline{2}$.	50
5	25
5	5.
	1

Hence, $\sqrt{6400} = 80$ Ans.

(vi) Let us find the prime factorisation of 1764

	11-11
2	1764
2	882
3	441
3	147
7	49
7	7
	1

$$1764 = 2 \times 2 \times 3 \times 3 \times 7 \times 7$$
$$= 2^{2} \times 3^{2} \times 7^{2}$$
$$1764 = (2 \times 3 \times 7)^{2} = (42)^{2}$$

Hence, $\sqrt{1764} = 42$ Ans.

(viii) Let us find the prime factorisation of

2	12100
2	6050
5	3025
5	605
11	121
11	11
	- 1-
-	

$$12100 = 2 \times 2 \times 5 \times 5 \times 11 \times 11$$

$$= 2^{2} \times 5^{2} \times 11^{2}$$

$$= (2 \times 5 \times 11)^{2}$$

$$= (110)^{2}$$

Hence, $\sqrt{12100} = 110$

(viii) Let us find the prime factorisation of 1024

2	1024	
2	512	
2	256	
2	128	3
2	64	
2	32	
$\overline{2}$	16	
2	8	
2	4	× 100
$\overline{2}$	2	
	1	

Hence, $\sqrt{1024} = 32$ Ans.

Q. 5. Find the smallest number by which following number must be multiplied so that the resultant is a perfect square. Also find square root of that number:

(i) 243

(ii) 240

(iii) 2662

(iv) 972

(v) 3087

(vi) 5000.

Solution. (i) Let us find the prime factorisation of 243

3	243
3	81
3	27
3	9
3	3
	1

$$243 = 3 \times 3 \times 3 \times 3 \times 3$$

Here, one 3 is not in pair

:. Required smallest number = 3 Ans.

If we multiply 243 by 3, then

$$243 \times 3 = \underbrace{3 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3}_{729 = 3^2 \times 3^2 \times 3^2}$$
$$= (3 \times 3 \times 3)^2 = (27)^2$$

which is a perfect square

Hence, $\sqrt{729} = 27$ Ans.

(ii) Let us find the prime factorisation of 240

2	240
2	120
2	60
2	3,0
3	.15
5	5
* 4 - 1	3113

$$240 = 2 \times 2 \times 2 \times 2 \times 3 \times 5$$

Here, 3 and 5 are not in pairs

 \therefore Required smallest number = $3 \times 5 = 15$ Ans. If we multiply 240 by 15, then

$$240 \times 15 = \underbrace{2 \times 2}_{3600} \times \underbrace{2 \times 2}_{3600} \times \underbrace{3 \times 3}_{3600} \times \underbrace{5 \times 5}_{3600} \times$$

which is a perfect square.

Hence, $\sqrt{3600} = 60$ Ans.

(iii) Let us find the prime factorisation of 2662

2	2662
11	1'331
11	121
11	11
74.	1

$$2662 = 2 \times 11 \times 11 \times 11$$

Here, 2 and one 11 are not in pairs

:. Required smallest number

$$= 2 \times 11 = 22$$
 Ans.

If we multiply by 22, then

$$2662 \times 22 = 2 \times 11 \times 11 \times 11 \times 2 \times 11$$
$$= 2 \times 2 \times 11 \times 11 \times 11 \times 11 \times 11$$

$$58564 = 2^{2} \times 11^{2} \times 11^{2}$$
$$= (2 \times 11 \times 11)^{2} = (242)^{2}$$

which is a perfect square

Hence, $\sqrt{58564} = 242$ Ans.

(iv) Let us find the prime factorisation of 972

2	972
2	486
. 3	243
3	81
3	27
3	9
3	3

$$972 = 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3$$

Here, one 3 is not in pair

:. Required smallest number = 3 Ans.

If we multiply 972 by 3, then

$$972 \times 3 = 2 \times 2 \times 3 \times 3 \times 3 \times 3 \times 3 \times 3$$

$$\therefore 2916 = 2^2 \times 3^2 \times 3^2 \times 3^2$$
$$= (2 \times 3 \times 3 \times 3)^2 = (54)^2$$

which is a perfect square

Hence, $\sqrt{2916} = 54$ Ans.

(v) Let us find the prime factorisation of 3087

$$\begin{array}{c|cccc}
3 & 3087 \\
\hline
3 & 1029 \\
\hline
7 & 343 \\
\hline
7 & 49 \\
\hline
7 & 7 \\
\hline
 & 1
\end{array}$$

$$3087 = \underline{3 \times 3} \times \underline{7 \times 7} \times 7$$

Here, one 7 is not in pair

... Required smallest number = 7 Ans.

If we multiply 3087 by 7, then

$$3087 \times 7 = \underbrace{3 \times 3 \times 7 \times 7 \times 7 \times 7}_{21609} \times 7^{2} \times 7^{2} \times 7^{2} = (3 \times 7 \times 7)^{2}$$
$$= (147)^{2}$$

which is a perfect square

Hence, $\sqrt{21609} = 147$ Ans.

(vi) Let us find the prime factorisation of 5000

1.7	
2	5000
2	2500
2	1250
5	625
5	125
5	25
5	5
	1
190	Marie Control of the

$$5000 = 2 \times 2 \times 2 \times 5 \times 5 \times 5 \times 5$$

Here, one 2 is not in pair

:. Required smallest number = 2 Ans.

If we multiply 5000 by 2, then

$$5000 \times 2 = \underbrace{2 \times 2 \times 2 \times 2}_{2} \times \underbrace{5 \times 5}_{5} \times \underbrace{5 \times 5}_{5}$$
$$= 2^{2} \times 2^{2} \times 5^{2} \times 5^{2}$$
$$1000 = (2 \times 2 \times 5 \times 5)^{2} = (100)^{2}$$

which is a perfect square.

Hence, $\sqrt{10000} = 100$ Ans.

Q. 6. Find the smallest number by which	h
following numbers must be divided so that quotient is a perfect square. Also find square	
root of the number obtained.	e

(i) 108

(ii) 3125

(iii) 2400

(iv) 5103

(v) 2205

(vi) 12168.

Solution. (i) Let us find the prime factorisation of 108

$$\begin{array}{c|cccc}
2 & 108 \\
\hline
2 & 54 \\
\hline
3 & 27 \\
\hline
3 & 9 \\
\hline
3 & 3 \\
\hline
1
\end{array}$$

$$108 = 2 \times 2 \times 3 \times 3 \times 3$$

Here, one 3 is not in pair
∴ Required smallest number = 3
So, if we divide 108 by 3, then

$$108 \div 3 = 36 = 2 \times 2 \times 3 \times 3 = 2^{2} \times 3^{2}$$
$$= (2 \times 3)^{2}$$

which is a perfect square

Hence, $\sqrt{36} = 2 \times 3 = 6$ Ans.

(ii) Let us find the prime factorisation of 3125

5	3125
5	625
5	125
5	25
5	5
	1

$$3125 = 5 \times 5 \times 5 \times 5 \times 5$$

Here, one 5 is not in pair

Required smallest number = 5 Ans.

So, if we divide 3125 by 5, then

$$3125 \div 5 = 625 = 5 \times 5 \times 5 \times 5$$
$$= 5^{2} \times 5^{2} = (5 \times 5)^{2} = (25)^{2}$$

which is a perfect square

Hence, $\sqrt{625} = 25$ Ans.

(iii) Let us find the prime factorisation of 2400.

2	2400
2	1200
2	600
2	300
2	150
3	75
5	25
5	3
	1

$$2400 = 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 5 \times 5$$

Here, one 2 and 3 are not in pairs.

:. Required smallest number = $2 \times 3 = 6$ Ans. So, if we divide 2400 by 6, then

$$2400 \div 6 = 400$$

$$= 2 \times 2 \times 2 \times 2 \times 5 \times 5$$

$$= 2^{2} \times 2^{2} \times 5^{2} = (2 \times 2 \times 5)^{2}$$

$$= (20)^{2}$$

which is a perfect square

Hence, $\sqrt{400} = 20 \text{ Ans.}$

(iv) Let us find the prime factorisation of 5103

3	5103
3	1701
3	567
3	189
3	63
3	21
7	7
SH.	1

$$5103 = \underline{3 \times 3} \times 3 \times 3 \times 3 \times 3 \times 7$$

Here, except 7 all factors are in pairs.

:. Required smallest number = 7 Ans. So, if we divide 5103 by 7, then

$$5103 \div 7 = 729$$

$$= 3 \times 3 \times 3 \times 3 \times 3 \times 3$$

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

$$= (3 \times 3 \times 3)^2 = (27)^2$$

which is a perfect square

Hence,
$$\sqrt{729} = 27$$
 Ans.

(v) Let us find the prime factorisation of 2205

3	2205
3	735
5	245
7	49
7	7
	-1

$$2205 = \underline{3 \times 3} \times 5 \times 7 \times 7$$

Here, except 5 all factors are in pairs :. Required smallest number = 5 So, if we divide 2205 by 5, we get . 2205 ÷ 5 = 441

$$= \underbrace{3 \times 3 \times 7 \times 7}_{\text{objudi}} = \underbrace{3^2 \times 7^2}_{\text{objudi}} = \underbrace{3^2 \times 7 \times 7}_{\text{objudi}} = \underbrace{3^2 \times 7 \times$$

which is a perfect number

Hence, $\sqrt{441} = 21$ Ans.

(vi) Let us find the prime factorisation of 12168

2	12168
2	6084
2	3042
3	1521
3	507
13	169
13	13
	1,

$$12168 = 2 \times 2 \times 2 \times 3 \times 3 \times 13 \times 13$$

Here, except 2 all factors are in pairs :. Required smallest number = 2 Ans. So, if we divide 12168 by 2, we get $12168 \div 2 = 6084$

$$= \frac{2 \times 2 \times 3 \times 3 \times 13 \times 13}{2^{2} \times 3^{2} \times 13^{2}}$$
$$= (2 \times 3 \times 13)^{2} = (78)^{2}$$

which is a perfect square

Hence, $\sqrt{6084} = 78 \text{ Ans.}$

Q. 7. Find the smallest perfect square which is divisible by:

(i) 8, 12, 28

(ii) 27, 24, 15

Solution. (i) As required number is divisib by each of 8, 12 and 28.

.. We have to find LCM of 8, 12 and 28

$$\begin{array}{c|cccc}
2 & 8-12-28 \\
\hline
2 & 4-6-14 \\
\hline
2 & 2-3-7 \\
\hline
3 & 1-3-7 \\
\hline
7 & 1-1-7 \\
\hline
1-1-1
\end{array}$$

LCM
$$(8, 12, 28) = 2 \times 2 \times 2 \times 3 \times 7$$

= 168

But 168 is not a perfect square. So, we have to make perfect square. We have

$$168 = 2 \times 2 \times 2 \times 3 \times 7$$

Since, to make 168 a perfect square, we have to multiply it with 2, 3 and 7

i.e.
$$168 \times 2 \times 3 \times 7 = 7056$$

Hence, 7056 is perfect square which is divisible by 8, 12 and 28 Ans.

(ii) As required number is divisible by each of 27, 24 and 15.

.. We have to find LCM of 27, 24 and 15

$$\begin{array}{c|cccc}
2 & 27 - 24 - 15 \\
\hline
2 & 27 - 12 - 15 \\
\hline
2 & 27 - 6 - 15 \\
\hline
3 & 27 - 3 - 15 \\
\hline
3 & 9 - 1 - 5 \\
\hline
5 & 1 - 1 - 5 \\
\hline
1 - 1 - 1 \\
\hline$$

LCM (27, 24, 15) =
$$2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5$$

= 1080

But 1080 is not a perfect square So, we have to make perfect square We have

$$\frac{1080 = 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 5}{\text{ake 1080}}$$

Since, to make 1080 a perfect square, we have to multiply it with 2, 3 and 5.

i.e.
$$1080 \times 2 \times 3 \times 5 = 32400$$

 $\therefore 32400 \text{ is a part}$

:. 32400 is a perfect square which is divisible by 27, 24 and 15 Ans.

Q. 8. During a plantation drive 256 plants were planted in a such a way that each row contains as many plants as number of rows. Find number of rows.

Solution. As we have to plant as many plants in each row as the number of rows.

So number of plants will be a squared number. Let number of plants in each row = Number of rows = x

According to question

$$x \times x = 256$$

i.e.
$$x^2 = 256$$

To find x, we have to find a number whose square is 256

i.e. x is square root of 256

2	256
2	128
2	64
2	32
2	16
2	8
2	4
2	2
	1

i.e.
$$256 = (2 \times 2 \times 2 \times 2)^2$$

So,
$$\sqrt{256} = 2 \times 2 \times 2 \times 2 = 16$$

Hence, number of rows and number of plants in each row are 16 Ans.

Q. 9. Area of a square is equal to the area of rectangle whose sides are 27 cm and 12 cm. Find the side of square.

Solution. Let side of the square = x cm

$$\therefore \text{ Area of square} = \text{side} \times \text{side} = x \times x$$
$$= x^2 \text{ cm}^2$$

Area of the rectangle = length \times breadth = 27 cm \times 12 cm = 324 cm²

According to question

Area of square = Area of rectangle

$$x^2 = 324$$

To find x we have to find a number whose square is 324

i.e. x is a square root of 324

2	324
2	162
3	81
3	27
3	9
3	3
Č,	1

So,
$$\sqrt{324} = 2 \times 3 \times 3 = 18$$

Hence, the side of the square is 18 cm Ans.

Q. 10. Some students raised funds to help an orphange. If total funds collected was 3136 and each student contributed amount equal to number of students. Find amount contributed by each student.

Solution. As each student contributed amount equal to number of students.

So, the amount contributed by each student will be a square number.

Let amount contributed by each student = Number of students = x

According to question

$$x \times x = 3136$$

i.e.
$$x^2 = 3136$$

To find x, we have to find a number whose square is 3136

i.e. x is a square root of 3136

2	3136
2	1568
2	784
2	392
2	196
2	98
7	49
7	7
	1

Now,
$$3136 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 7 \times 7$$

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

i.e.
$$3136 = (2 \times 2 \times 2 \times 7)^2$$

So,
$$\sqrt{3136} = 2 \times 2 \times 2 \times 7 = 56$$

Hence, amount contributed by each student is 56 Ans.

Q. 11. Multiple Choice Questions:	(iv) What will be square root of 144?
 (i) What will be ones place digit of √961? (a) 1 or 7 (b) 1 or 9 (c) 3 or 6 (d) 7 or 8. (ii) Guess ones place digit of square root of 625. (a) 1 (b) 4 (c) 9 (d) 5 (iii) Which of the following cannot be perfect square? (a) 625 (b) 728 (c) 729 (d) 144 	(a) 10 (b) 12 (c) 18 (d) 22. (v) By what number 32 should be multiplied to make it a perfect square? (a) 2 (b) 3 (c) 4 (d) 5 (vi) By what number 288 should be divided to make it a perfect square?
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