Answer Keys

Term- 1st

Mathematics

of

Syllabus

Class : 8th

Contents:

1) Squares & Square roots

2) Cubes & Cube roots

3) Comparing Quantities

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Chapter 6

Squares And Square Roots

Introduction

Square: If a number is multiplied with itself, then the result of this multiplication is called the square of that number.

e.g.

i) Square of $6 = 6 \times 6 = 36$

ii) Square of $9 = 9 \times 9 = 81$

Square root: The square root of a no. is that no., the square of which is equal to the given number. It is denoted by the sign '$\sqrt{}$'.

e.g. $\sqrt{49} = 7$ {as $7 \times 7 = 49$

Methods to find the Square root

There are two methods to find the square root of a number

i) Prime factorisation Method

ii) Division Method

Prime factorisation Method

Following steps are used in this method

Step I: Express the given no. as the product of prime factors.

Step II: Arrange the factors in pairs of same prime numbers.

Step III: Take the product of these prime factors taking one out of every pair of the same primes. This product gives us the square root of the given number.

Eg. Find the square root of 729

Prime factors of $729 = \underbrace{3\times3}\times\underbrace{3\times3}\times\underbrace{3\times3}$

$\sqrt{729} = 3\times3\times3$

$= 27$

3	729
3	243
3	81
3	27
3	9
3	1
	1

Division Method

This method can be understood with the help of following example $\longrightarrow$ 18769

Step I: In the given no., mark off the digits in pairs starting from the unit digit. Each pair and the remaining one digit (if any) is called a period.

Step II: Choose a no. whose square is less than or equal to 1. Here, $1^2=1$, on subtracting, we get '0' as remainder

Step III: Bring down the next period, i.e, 87. Now, the trial divisor is $1\times2=2$ and trial dividend is 87. So, we take 23 as divisor and put 3 as quotient. The remainder is 18 now.

Step IV: Bring down the next period, which is 69. Now, trial divisor is $13\times2=26$ and trial dividend is 1869. So, we take 267 as dividend and 7 as quotient. The remainder is 0.

Step V: The process goes on till all the periods come to an end and we get remainder zero. Hence $\sqrt{18769}=137$

	137
1	1 87 69
	1
23	87
	69
267	1869
	1869
	0

Exercise 6.1

i) 81

The Unit digit of 81 is 1. Therefore the Unit digit of square of 81 is Unit digit of multiplication of $1 \times 1 = 1$

Perfect Squares end with 0, 1, 5, 6 or 9.. In Case of Zero there must be even no. of Zeroes at the end.

) 1057

Unit digit is 7

Perfect Squares do not end with 7

=) 1057 is not a perfect square.

3. 431

The Unit digit of square of 431 is 1

=) Square of 431 is an Odd no.

) $1+3+5+7+9$

We Know that

The sum of first 'n' odd natural no.'s is n^2

Here $n=5$ =) $1+3+5+7+9 = (5)^2 = 25$

) $49 = (7)^2 = 1+3+5+7+9+11+13$

) i) 12 and 13, Here $n=12$ & $n+1=13$

We Know that there are $2n$ no.'s b/w squares of n & $n+1$

∴ no.'s b/w 12 & 13 $= 2 \times n = 2 \times 12 = 24$ no

i) 32

$32)^2 = (30+2)^2$

$= (30+2)(30+2)$

$= 30(30+2) + 2(30+2)$

$= 30\times30 + 30\times2 + 2\times30 + 2\times2$

$= 900 + 60 + 60 + 4$

$= 900 + 124$

$= 1024$

i) 6

Pythagorean triplets can be obtained by using general form $2m, m^2-1, m^2+1$

let $2m = 6$

$m = 6/2 = 3$

i $m^2 - 1 = (3)^2 - 1$

$= 9 - 1$

$= 8$

$m^2+1 = (3)^2 + 1$

$= 9 + 1$

$= 10$

∴ The triplet is 6, 8, 10

i) 9801

Sol:- The possible digit at One's place of the Square root of 9801 Can be 1 or 9

∵ $1 \times 1 = 1$ & $9 \times 9 = 81$

ii) 99856

Sol:- The possible digit at One's place of the Square root of 99856 Can be 4 or 6

∵ $4 \times 4 = 16$ & $6 \times 6 = 36$

∴ The perfect Squares end with 0, 1, 4, 5, 6 or 9

i) 153

No, 153 is not a perfect Square because perfect Squares Can never end with 3.

$\sqrt{100}$

100 - 1 = 99 - (1)
99 - 3 = 96 - (2)
96 - 5 = 91 - (3)
91 - 7 = 84 - (4)
84 - 9 = 75 - (5)
75 - 11 = 64 - (6)
64 - 13 = 51 - (7)
51 - 15 = 36 → (8)
36 - 17 = 19 - (9)
19 - 19 = 0 - (10)

No. of steps involved = 10

∴ $\sqrt{100} = 10$

$\sqrt{169}$

169 - 1 = 168 (0)
168 - 3 = 165 - (2)
165 - 5 = 160 - (3)
160 - 7 = 153 - (4)
153 - 9 = 144 - (5)
144 - 11 = 133 - (6)
133 - 13 = 120 - (7)
120 - 15 = 105 - (8)
105 - 17 = 88 - (9)
88 - 19 = 69 - (10)
69 - 21 = 48 - (11)
48 - 23 = 25 - (12)
25 - 25 =

No. of steps involved

∴ $\sqrt{169} =$

729

3	729
3	243
3	81
3	27
3	9
3	3
	1

$\Rightarrow$ $729 = \underline{3\times3} \times 3 \times \underline{3\times3} \times \underline{3\times3}$

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

$= (3\times3\times3)^2$

$= 27^2$

$\Rightarrow$ $\sqrt{729} = \sqrt{(27)^2} = 27$

ii) 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
	1

$9216 = \underline{2\times2\times2\times2\times2\times2\times2\times2\times2\times3\times3}$

$\sqrt{9216} = 2\times2\times2\times2\times2\times3$

$= 96$

(7)

252

2	252
2	126
3	63
3	21
7	7
	1

$252 = \underline{2 \times 2} \times 3 \underline{\times 3} \times 7$

The prime factor 7 has no pair
⇒ 252 has to be multiplied by 7 to get a perfect square number

$252 \times 7 = 2 \times 2 \times 3 \times 3 \times 7 \times 7$

$1764 = \underline{2 \times 2} \times \underline{3 \times 3} \times \underline{7 \times 7}$
(↓ ↓ ↓)

$\therefore \sqrt{1764} = 2 \times 3 \times 7$

$= 42$

2028

2	2028
2	1014
3	507
13	169
13	13
	1

$2028 = \underline{2 \times 2} \times 3 \times \underline{13 \times 13}$

The prime factor 3 has no pair
⇒ 2028 has to be multiplied by 3 to get a perfect square number

$2028 \times 3 = 2 \times 2 \times 3 \times 3 \times 13 \times 13$

$6084 = \underline{2 \times 2} \times \underline{3 \times 3} \times \underline{13 \times 13}$

$\sqrt{6084} = 2 \times 3 \times 13 = 78$

252

2	252
2	126
3	63
3	21
7	7
	1

$252 = \underline{2 \times 2} \times \underline{3 \times 3} \times \underline{7}$

∴ 252 has to be divided by 7 in order to get a perfect square number.

$252 \div 7 = \frac{2 \times 2 \times 3 \times 3 \times \cancel{7}}{\cancel{7}}$

$36 = \underline{2 \times 2} \times \underline{3 \times 3}$

$\sqrt{36} = 2 \times 3$

$= 6$

2925

3	2925
3	975
5	325
5	65
13	13
	1

$2925 = \underline{3 \times 3} \times \underline{5 \times 5} \times \underline{13}$

∴ 2925 has to be multiplied by 13 to get a perfect square number

$2925 \div 13 = \frac{3 \times 3 \times 5 \times 5 \times \cancel{13}}{\cancel{13}}$

$225 = \underline{3 \times 3} \times \underline{5 \times 5}$

$\sqrt{225} = 3 \times 5 = 15$

(9)

let the total no. of students be x

∴ Money donated by each student = Rs x

Total money donated = Rs 2401

∴ total no. of students × Money donated by each student = Total money donated

$$x \times x = 2401$$

$$x^2 = 2401$$

$$x = \sqrt{2401}$$

$$x = \sqrt{(49)^2}$$

$$x = 49$$

∴ no. of students in Class is 49

let the no. of rows be x

∴ no. of plants in each row = x

Total no. of plants = 2025

Δ no. of rows × no. of plants in each row = Total no. of plants

$$x \times x = 2025$$

$$x^2 = 2025$$

$$x = \sqrt{(45)^2}$$

$$x = 45$$

45 rows & 45 plants

Smallest no. divisible by 4, 9 & 10

= L.C.M of 4, 9 & 10

2	4, 9, 10
2	2, 9, 5
3	1, 9, 5
3	1, 3, 5
5	1, 1, 5
	1, 1, 1

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

which is not a square no.

In order to get a square no. 5 must be paired

Smallest square no. divisible by 4, 9 & 10

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

$= 900$

Smallest no. divisible by 8, 15 & 20

= L.C.M of 8, 15 & 20

2	8, 15, 20
2	4, 15, 10
2	2, 15, 5
3	1, 15, 5
5	1, 5, 5
	1, 1, 1

$= 2 \times 2 \times 2 \times 3 \times 5 = 120$

which is not a square no.

In order to get a square no. 2, 3 & 5 must be paired

∴ Smallest square no. divisible by 8, 15 & 20 $= 2 \times 2 \times 2 \times 2 \times 3 \times 5 \times 5$

2304

```
      48
   ---------
4 | 2304
    16
   ---------
88 | 704
     704
   ---------
      0
```

$\sqrt{2304} = 48$

7921

```
      89
   ---------
8 | 7921
    64
   ---------
169 | 1521
      1521
   ---------
      0
```

$\sqrt{7921} = 89$

576.

```
      24
   ---------
2 | 576
    4
   ---------
44 | 176
     176
   ---------
      0
```

$\sqrt{576} = 24$

Q2.

Note: If a perfect square is of n-digits then its square root will have $n/2$ digits if n is even or $\frac{(n+1)}{2}$ digits if n is odd.

Q2:

i) 64

No. of digits = 2

$\Rightarrow n = 2$

∴ square root of 64 will have $n/2 = 2/2 = 1$ digits

iv) 27225

Here, $n = 5$

∴ square root of 27225 will have $\frac{(n+1)}{2} = \frac{5+1}{2} = 6/2$ digits

i) 2.56

Sol.

$$\begin{array}{r|l} 1 & 2.56 \\ & 1 \\ \hline 26 & 156 \\ & 156 \\ \hline & 0 \end{array}$$

$\sqrt{2.56} = 1.6$

iii) 51.84

Sol.:

$$\begin{array}{r|l} & 7.2 \\ \hline 7 & 51.84 \\ & 49 \\ \hline 142 & 284 \\ & 284 \\ \hline & 0 \end{array}$$

$\sqrt{51.84} = 7.2$

ii)

i) 402

Sol

$$\begin{array}{r|l} & 20 \\ \hline 2 & 402 \\ & 4 \\ \hline 40 & 2 \\ & 0 \\ \hline & 2 \end{array}$$

Since on dividing we get the remainder of 2 ∴ 2 is the least no. which must be subtracted from 402 to get a perfect square

$402 - 2 = 400$

$\sqrt{400} = 20$

iv) 825

$$\begin{array}{r|l} & 28 \\ \hline 2 & 825 \\ & 4 \\ \hline 48 & 425 \\ & 384 \\ \hline & 41 \end{array}$$

∴ The required smallest no. to be subtracted is 41

$825 - 41 = 784$

$\sqrt{784} = 28$

```
    22
  ┌─────
2 | 525
  | 4
  |-----
42| 125
  | 84
  |-----
    41
```

$\Rightarrow 525 > 22^2$

& the next square no. is $(23)^2$

∴ the no. to be added $= (23)^2 - 525$

$= 529 - 525$

$= 4$

$525 + 4 = 529$

& $\sqrt{529} = 23$

iv) 1825

```
    42
  ┌─────
4 | 1825
  | 16
  |-----
81| 225
  | 164
  |-----
    61
```

$\Rightarrow 1825 > (42)^2$

& the next square no. is $(43)^2$

∴ the no. to be added $= (43)^2 - 1825$

$= 1849 - 1825$

$= 24$

$1825 + 24 = 1849$

$\sqrt{1849} = 43$

Q6: Sol- Let the length of a side of a square be x m

Area = 441 m^2

We know that

Side × Side = Area of square

$x \times x = 441\ m^2$

$x^2 = 441\ m^2$

$x = \sqrt{441}\ m$

$x = 21$ m

	21
2	441
	4
41	41
	41
	0

Thus, the required side = 21 m

Q7 a) AB = 6 cm

BC = 8 cm

AC = ?

We know that

Side opposite to right angle is Hypotenuse

Using Pythagoras theorem

$(Hypt.)^2 = (Base)^2 + (Perp.)^2$

$AC^2 = (BC)^2 + (AB)^2$

$AC^2 = 8^2 + 6^2$

$AC^2 = 64 + 36$

$AC^2 = 100$

$AC = \sqrt{100}$

$AC = \sqrt{(10)^2}$

$AC = 10$ cm

Since, no. of rows = no. of Columns

∴ Their product must be a square number

The gardener has 1000 plants but 1000 is not a perfect square

$$\begin{array}{r|l} & 31 \\ \hline 3 & 1000 \\ & 9 \\ \hline 61 & 100 \\ & 61 \\ \hline & 39 \end{array}$$

$1000 > (31)^2$

The next square no. is $(32)^2$

∴ no. of plants needed = $(32)^2 - 1000$

$= 1024 - 1000$

$= 24$

He needs 24 more plants.

Total no. of children = 500

no. of rows = no. of Columns

∴ total no. must be a square no.

$$\begin{array}{r|l} & 22 \\ \hline 2 & 500 \\ & 4 \\ \hline 42 & 100 \\ & -84 \\ \hline & 16 \end{array}$$

We are left with the remainder 16

⇒ 16 Children would be left out of this arrangement.

Cubes And Cube Roots

Introduction

Cube :- If a number is multiplied two times with itself, then the result of this multiplication is called the cube of that number.

e.g,

i) Cube of 2 is $= 2 \times 2 \times 2$
$= 8$

ii) Cube of 11 is $= 11 \times 11 \times 11$
$= 1,331$

Cube Root : The cube root of a given number is the number whose cube is the given number. The cube root is denoted by the sign '$\sqrt[3]{}$'. Cube root of a positive integer is always positive.

e.g,

i) $\sqrt[3]{8} = \sqrt[3]{2 \times 2 \times 2} = 2$

~~ii) $\sqrt[3]{8 \times}$ =~~

Prime factorisation Method to find the Cube root

Following steps are used in this method

Step I : Express the given number as the product of the prime factors.

Step II : Arrange the factors in a group of three of the same prime no.'s

Step III : Take the product of these prime factors picking one out of every group of the same primes. This product gives us the Cube root of given number

Eg: Find the Cube root of 216.

P.F of 216 = $2 \times 2 \times 2 \times 3 \times 3 \times 3$

$\therefore \sqrt[3]{216} = 2 \times 3$

$\sqrt[3]{216} = 6$

2	216
2	108
2	54
3	27
3	9
3	3
	1

Exercise 7.1

Q1.

i) 216

Sol. Prime factorisation of 216 is:

2	216
2	108
2	54
3	27
3	9
3	3
	1

$216 = \underline{2 \times 2 \times 2} \times \underline{3 \times 3 \times 3}$

Here each factor appears in a group of three

$\Rightarrow$ 216 is a perfect Cube.

iv) 100

Sol. P.F of 100 is

2	100
2	50
5	25
5	5
	1

$100 = \underline{2 \times 2} \times \underline{5 \times 5}$

Here 2 & 5 does not appear in a group of three

$\Rightarrow$ 100 is not a perfect Cube.

(8)

243

3	243
3	81
3	27
3	9
3	3
	1

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

There is not a triplet of 3

$\Rightarrow$ 243 is not a perfect cube. To make it a perfect cube, we multiply it by 3

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

$729 = 3 \times 3 \times 3 \times 3 \times 3 \times 3$; which is a perfect cube

$\therefore$ The smallest no. to be multiplied is 3

81

3	81
3	27
3	9
3	3
	1

$81 = 3 \times 3 \times 3 \times 3 \times 3$

There is not a triplet of 3

$\Rightarrow$ 81 is not a perfect cube. To make it a perfect cube, we divide it by $3 \times 3 = 9$

$81 \div 9 = \frac{3 \times 3 \times 3 \times 3 \times 3}{3 \times 3}$

$27 = 3 \times 3 \times 3$; which is a perfect cube

Q4: Here, dimensions of Cuboid are given as

$5 \times 2 \times 5$

Since, factors of 5 & 2 both are not in group of three.

Therefore, the number must be multiplied by $2 \times 5 \times 2$ to make it a perfect Cube

Hence, he needs 20 Cuboids.

Exercise 7.2

Q1 i) 64

2	64
2	32
2	16
2	8
2	4
2	2
	1

P.F of $64 = 2 \times 2 \times 2 \times 2 \times 2 \times 2$

$\Rightarrow \sqrt[3]{64} = 2 \times 2$

$= 4$

vii) 110592

2	110592
2	55296
2	27648
2	13824
2	6912
2	3456
2	1728
2	864
2	432
2	216
2	108
2	54
3	27
3	9
3	3

P.F. of $110592 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3$

$\Rightarrow \sqrt[3]{110592} = 2 \times 2 \times 2 \times 2 \times 3$

$= 48$

1331

(6)

&

Step I: Form groups of three starting from rightmost digit of 1331

$$\overline{1}\ \overline{331}$$

In one group $\overline{331}$ has three digits, 1 has only one digit.

Step II: Taking 331, Digit at Unit place is 1

& $1 \times 1 \times 1 = 1$

$\Rightarrow$ the Unit digit of $\sqrt[3]{1331}$ will be 1

Step III: Taking 1 at Ten's place.

$\Rightarrow$ $\sqrt[3]{1331} = 11$

Do other parts in the same way.

Comparing Quantities

Introduction

Ratio: Ratio of two quantities is the number of times one quantity contains another quantity of same kind.

The ratio between x & y can be represented as x:y, where x is called antecedant and y is called consequent.

i.e., $\frac{x}{y}$ or x:y

Percentage: It is defined as the fraction whose denominator is 100. Percent is denoted by the sign '%'.

Cost Price (C.P) The price at which an article is purchased or manufactured, is called the Cost price.

Selling Price (S.P): The price at which an article is sold, is called Selling price.

Overhead Charges: Such charges are the extra expenditures on purchased goods apart from actual Cost price. These may include labour charges, transportation, amount spent on repairs etc. These expenses have to be included in Cost price.

Profit: When an article is sold at a price more than its Cost price, then profit or gain is earned. i.e. S.P > C.P It is given by

Profit or Gain = S.P − C.P & Profit % = $\frac{\text{Profit}}{C.P}$

Loss: (C.P > S.P) When an article is sold at a price lower than its Cost price, then loss is incurred.

$$\text{Loss} = C.P - SP$$

$$\& \quad \text{Loss}\% = \frac{\text{Loss}}{C.P} \times 100$$

Simple Interest

Principal (P): It is the money borrowed or deposited for a certain time.

Amount (A): The sum of principal and is called Amount

$\therefore$ Amount = Principal + Simple Interest

Rate of Interest (R): It is the rate at which interest is charged on Principal.

Time (T): The period, for which the money is borrowed or deposited, is called time.

Simple Interest (SI): If the interest is Calculated On the Original principal for any length of time, then it is Called Simple Interest.

$$\text{Simple Interest (SI)} = \frac{P \times R \times T}{100}$$

In Case of Simple interest, the principal remains Constant for the whole time but in Case of Compound interest, Principal keeps On Changing every year.

→ If the interest is Compounded annually or yearly, then

$$\text{Amount} = P\left(1+\frac{R}{100}\right)^n \quad \{\text{when } n = T$$

→ If the interest is Compounded half-yearly then

$$A = P\left(1+\frac{R}{100}\right)^n \quad \begin{cases} n = 2 \times T \\ \text{&} \ R = R/2 \end{cases}$$

Also

$$\text{Compound Interest (C.I)} = \text{Amount} - \text{Princi}$$

Discount: It is the reduction given On the marked price of the article.

$$\text{Discount} = \text{Marked Price} - \text{Sale Price}$$

Q1: a) Speed of a cycle = 15 km/hr

Speed of a scooter = 30 km/hr

$\therefore$ Ratio = $\frac{\text{Speed of a cycle}}{\text{Speed of scooter}}$

$= \frac{15 \text{ km/hr}}{30 \text{ km/hr}}$

$= \frac{1}{2}$

Ratio is 1:2

b) 5m to 10 km

1 km = 1000 m

$\therefore$ 10 km = 10 × 1000

= 10,000 m

$\therefore$ Ratio = $\frac{1 \text{ m}}{10000 \text{ m}}$

$= 1:2000$

Q2: a) 3:4

Sol: $\frac{3}{4} \times 100$ %

$= 3 \times 25$ %

$= 75$ %

Total no. of Students = 25

Percentage of students who are good in mathematics =

∴ no. of students who are good in maths = 72% of Tot

$= \frac{72}{100} \times 25$

$= 18$

∴ no. of students who are not good in maths

$= 25 - 18$

$= 7$ students

Let the total money be Rs x

Percentage of money spent = 75%

∴ Money spent = 75% of x

$= \frac{75}{100} \times x = \frac{3}{4}x$

Money left = Rs 600

Money left = Total Money − Money spent

∴ $600 = x - \frac{3x}{4}$

$600 = \frac{4x - 3x}{4}$

$600 \times 4 = 4x - 3x$

$2400 = x$

Or $x = 2400$

∴ Money in the beginning = Rs 2400

Exercise 8.2

Let the Original Salary be Rs x

Increase in Salary = 10%

Actual increase = 10% of x

$= \frac{1}{10} \times x = x/10$

New Salary = Rs 1,54,000

New Salary = Original Salary + Actual Increase

Rs $1,54,000 = x + \frac{x}{10}$

$\Rightarrow 1,54,000 = \frac{10x+x}{10}$

$\Rightarrow 1,54,000 = \frac{11x}{10}$

$\Rightarrow 1,54,000 \times 10 = 11x$

$\Rightarrow \frac{15\,40000}{11} = x$

$\frac{140000}{11}$

Or $x = 1,40,000$

∴ Original Salary = Rs 1,40,000

C.P of 80 articles = Rs 2400

Profit % = 16%

We know that

$P\% = \frac{\text{Profit}}{C.P} \times 100$

$16 = \frac{\text{Profit}}{2400} \times 100$

$16 \times 24 = \text{Profit}$

$384 = \text{Profit}$

$\Rightarrow$ Profit = Rs 384

Now

$S.P = C.P + Profit$

$S.P = 2400 + 384$

$\Rightarrow S.P = Rs\ 2784$

S.P of 80 article = Rs 2784

$\therefore$ S.P of 1 article $= \frac{2784}{80}$

$= Rs\ 34.8$

Cost of an article = Rs 15,500

Overhead Charges = Rs 450

$\therefore C.P = Rs\ 15,500 + Rs\ 450$

$= Rs\ 15,950$

Profit % = 15%

WKT $\quad Profit\ \% = \frac{Profit}{C.P} \times 100$

$\Rightarrow \quad 15 = \frac{Profit \times 100}{15950}$

$\frac{15 \times 319}{2} = Profit$

$\frac{4785}{2} = Profit$

Or $\quad Profit = Rs\ 2392.5$

Now, $\quad S.P = C.P + Profit$

$S.P = 15,950 + 2392.5$

$S.P = Rs\ 18342.5$

Q5
Sol:

C.P of VCR = Rs 8,000

Loss % = 4%

$\text{Loss \%} = \frac{\text{Loss}}{\text{C.P}} \times 100$

$4 = \frac{\text{Loss}}{8,000} \times 100$

$4 = \frac{\text{Loss}}{80}$

$4 \times 80 = \text{Loss}$

$320 = \text{Loss}$

Or Loss = Rs 320

S.P = C.P − Loss

S.P = 8,000 − 320

S.P = Rs 7680

(8)

C.P of T.V = Rs 8,000

Profit % = 8%

$\text{Profit \%} = \frac{\text{Profit}}{\text{C.P}} \times 100$

$8 = \frac{\text{Profit}}{8,000} \times 100$

$8 = \frac{\text{Profit}}{80}$

$8 \times 80 = \text{Profit}$

$640 = \text{Profit}$

Or Profit = Rs 640

S.P = C.P + Profit

S.P = 8,000 + 640

S.P = Rs 8,640

∴ Total S.P = S.P of VCR + S.P of T.V

Total S.P = 7680 + 8640

= Rs 16320

Total C.P = C.P of VCR + C.P of T.V

= 8,000 + 8,000

= Rs 16,000

Since, S.P > C.P

i Then is Profit

Profit = S.P − C.P

= 16320 − 16000

= Rs 320

Now $\text{Profit \%} = \frac{\text{Profit}}{\text{C.P}} \times 100 = \frac{320}{16000} \times 100$

Profit % = 2%

Let C.P of Ist bulb be Rs x

S.P = Rs 20,000

Gain % = 5%

$\text{Gain \%} = \frac{\text{Gain}}{\text{C.P}} \times 100$

$5 = \frac{\text{Gain} \times 100}{x}$

$\frac{5x}{100_{20}} = \text{Gain}$

$\text{Gain} = \frac{x}{20}$

S.P − C.P = Gain

$20,000 - x = \frac{x}{20}$

$20,000 = \frac{x}{20} + x$

$20,000 = \frac{x + 20x}{20}$

$20,000 = \frac{21x}{20}$

$\frac{20,000 \times 20}{21} = x$

$\frac{400000}{21} = x$

$x = 19,047.61$

Let the C.P of 2nd bulb be Rs y

S.P = Rs 20,000

Loss % = 10%

$\text{Loss \%} = \frac{\text{Loss}}{\text{C.P}} \times 100$

$10 = \frac{\text{Loss} \times 100}{y}$

$\frac{10y}{10^{1}} = \text{Loss}$

$\text{Loss} = \frac{y}{10}$

C.P − S.P = Loss

$y - 20,000 = \frac{y}{10}$

$y - \frac{y}{10} = 20,000$

$\frac{10y - y}{10} = 20,000$

$\frac{9y}{10} = 20,000$

$y = \frac{20,000 \times 10}{9}$

$y = \frac{200000}{9}$

$y = 22,222.22$

Total C.P = x + y = 19047.61 + 22,222.22

= Rs 41,269.83

Total S.P = 20,000 + 20,000 = Rs 40,000

C.P > S.P ⇒ Then is loss

Loss = S.P − C.P

= 41,269.83 − 40,000

= Rs 1269.83

Let the Marked Price (M.P) be Rs x

Discount % = 20 %

$$\text{Discount \%} = \frac{\text{Discount}}{\text{M.P}} \times 100$$

$$20 = \frac{\text{Discount}}{x} \times 100$$

$$\frac{20 \times x}{100} = \text{Discount}$$

$$\frac{x}{5} = \text{Discount}$$

Discount = Rs $\frac{x}{5}$

Sales Price = Rs 1600

M.P − Sale Price = Discount

$$x - 1600 = \frac{x}{5}$$

$$x - \frac{x}{5} = 1600$$

$$\frac{5x - x}{5} = 1600$$

$$\frac{4x}{5} = 1600$$

$$4x = 1600 \times 5$$

$$x = \frac{1600 \times 5}{4}$$

$$x = 400 \times 5$$

$$x = 2{,}000$$

$\Rightarrow$ M.P = Rs 2,000

Let the Original price be Rs x

S.P of hair dryer including VAT = Rs 5400

VAT % = 8 %

VAT = 8 % of Original price

$$= \frac{8}{100} \times x$$

$$= \frac{2x}{25}$$

Price including VAT = Original price + VAT

$$5400 = x + \frac{2x}{25}$$

$$5400 = \frac{25x + 2x}{25}$$

$$\Rightarrow 5400 = \frac{27x}{25}$$

$$\frac{5400 \times 25}{27} = x$$

$$\Rightarrow 200 \times 25 = x$$

$$\Rightarrow x = 5000$$

$\therefore$ Original price = Rs 5,000

Exercise 8.3

Rs 10,800 for 3 years at $12\frac{1}{2}$ % per annum Compounded annually.

Here, $P = Rs\ 10,800$

$R = 12\frac{1}{2} = \frac{25}{2}$ %

$T = 3$ years

Since, Principal is to be Compounded annually

$\therefore T = n = 3$

We know that

$$A = P\left(1 + \frac{R}{100}\right)^n$$

$$A = 10,800\left(1 + \frac{25}{2\times 100}\right)^3$$

$$A = 10,800\left(1 + \frac{1}{8}\right)^3$$

$$A = 10,800\left(\frac{8+1}{8}\right)^3$$

$$A = 10,800\left(\frac{9}{8}\right)^3$$

$$A = 10,800 \times \frac{9}{8} \times \frac{9}{8} \times \frac{9}{8}$$

$$A = 15377.34$$

$$C.I = A - P$$
$$= 15377.34 - 10,800$$
$$= Rs\ 4577.34$$

Q2
Sol:-

Here, $P = Rs\ 26,400$

$T = 2$ years and 4 months

$R = 15\%$

First we will find Amount for 2 years ~~months~~ Compounded Yearly

$n = T = 2$

We know that

$$A = P\left(1+\frac{R}{100}\right)^n$$

$$A = 26,400\left(1+\frac{15}{100}\right)^2$$

$$A = 26,400\left(\frac{100+15}{100}\right)^2$$

$$A = 26,400\left(\frac{115}{100}\right)^2$$

$$A = 26,400 \times 1.15 \times 1.15$$

$$A = Rs\ 34,914$$

Now, New Principal $= Rs\ 34,914$

$R = 15\%$

$T = 4$ months $= \frac{4}{12} = \frac{1}{3}$ years

$$S.I = \frac{P \times R \times T}{100} = \frac{34914 \times 15 \times 1}{100 \times 3}$$

$$= Rs\ 1745.70$$

Total Amount $= 34914 + 1745.70$

$= Rs\ 36,659.70$

Case I

$P = Rs\ 12,000$

$R = 6\%$

$T = 2$ years

$$S.I = \frac{P \times R \times T}{100}$$

$$= \frac{12,000 \times 6 \times 2}{100}$$

$$= Rs\ 1440$$

Case II

$$A = P\left[1 + \frac{R}{100}\right]^n$$

{ Compounded Annually
$\therefore n = T = 2$

$$A = 12,000\left[1 + \frac{6}{100}\right]^2$$

$$A = 12,000\left[\frac{100+6}{100}\right]^2$$

$$A = 12,000\left[\frac{106}{100}\right]^2$$

$$A = 12,000\ [1.06]^2$$

$$A = 12,000 \times 1.06 \times 1.06$$

$$A = Rs\ 13,483.20$$

$$C.I = A - P$$

$$= 13483.20 - 12,000$$

$$= 1483.20.$$

Extra amount to be paid $= 1483.20 - 1440$

$= Rs\ 43.20$

Q5
Sol:

$P = Rs\ 60,000$
$R = 12\%$

i) after 6 months

$T = \frac{6}{12} = \frac{1}{2}$ years

Compounded half yearly

$n = 2 \times T = 2 \times \frac{1}{2}$ $\quad R = 12/2 = 6\%$

$n = 1$

$$A = P\left(1+\frac{R}{100}\right)^n$$

$$= 60,000\left(1+\frac{6}{100}\right)^1$$

$$= 60,000\left(\frac{100+6}{100}\right)$$

$$= 60,000 \times \frac{106}{100}$$

$$= 600 \times 106$$

$$= Rs\ 63,600$$

ii) after 1 year

$n = 2 \times T = 2 \times 1$

$n = 2$

$$A = P\left(1+\frac{R}{100}\right)^n$$

$$= 60,000\left(1+\frac{6}{100}\right)^2$$

$$= 60,000\left(\frac{100+6}{100}\right)^2$$

$$= 60,000\left(\frac{106}{100}\right)^2$$

$$= 60,000\ (1.06)^2$$

$$= 60,000 \times 1.06 \times 1.06$$

$$= Rs\ 67,416$$

(17)

Here, $P = ₹4,096$, $R = 12\frac{1}{2}\% = \frac{25}{2}\%$

$T = 18$ months

$= \frac{18}{12}$ years

$= \frac{3}{2} = 1\frac{1}{2}$ years

Compounded half yearly

$n = 2 \times T = 2 \times \frac{3}{2} = 3$

$\Rightarrow n = 3$ & $R = \frac{R}{2} = \frac{25}{2} \div 2 = \frac{25}{2} \times \frac{1}{2}$

$= \frac{25}{4}\%$

$\therefore A = P\left[1 + \frac{R}{100}\right]^n$

$A = 4,096\left[1 + \frac{25}{4 \times 100}\right]^3$

$A = 4,096\left[1 + \frac{1}{16}\right]^3$

$A = 4,096\left[\frac{16+1}{16}\right]^3$

$A = 4,096\left[\frac{17}{16}\right]^3$

$A = 4,096 \times \frac{17}{16} \times \frac{17}{16} \times \frac{17}{16}$

$A = \underline{\text{Rs } 4,913}$

Q10. Population in 2003 (A) = 54,000 (10)

$R = 5\%$

i) Let the Population in 2001 (P) be x

$\therefore T = 2003 - 2001$

$= 2$ years

Now, $A = P\left(1 + \frac{R}{100}\right)^n$

$54,000 = x\left(1 + \frac{5}{100}\right)^2$

$54,000 = x(1 + 0.05)^2$

$54,000 = x(1.05)^2$

$54,000 = x \times 1.05 \times 1.05$

$54,000 = x \times 1.1025$

$x = \frac{54,000}{1.1025}$

$x = 48,980$ (approx.)

∴ Population in 2001 is 48,980

ii) Now, let the Pop. in 2005 be x (Here $A = x$

Time = 2005 - 2003 = 2 yrs

Here $P = 54,000$

Now $A = P\left[1 + \frac{R}{100}\right]^n = 54,000\left(1 + \frac{5}{100}\right)^2$

$A = 54,000(1.05)^2$

$A = 54,000 \times 1.05 \times 1.05$

$A = 59,535$

∴ Pop. in 2005 is 59,535

Here $P = 42,000$

& $R = 8\%$

$T = 1$ year, $n = 1$

Since, the value depreciates

i Value after 1 year $= P\left(1 - \frac{R}{100}\right)^n$

$= 42,000\left(1 - \frac{8}{100}\right)^1$

$= 42,000\,(1 - 0.08)$

$= 42,000 \times 0.92$

$= Rs\ 38,640$