CLASS : 8.

SUB : MATHEMATICS.

Date
Page 1

IInd TERM SYLLABUS.

3. Squares and Square Roots. (12 m)

4. Cubes and Cube Roots. (10 m)

7. Factorisation (13 m)

10. Simple and Compound Interest. (15 m)

13. Representing Solids on Paper (5 m).

16. Surface Area and Volume. (15 m).

19. Probability. (10 m).

3. Square and Square Roots.

Exercise 3.1

1.

(i)

Sol^n $18^2 = 18 \times 18$

$= 324.$

(6)
18
×18
①
144
+18
324

(v)

Sol^n $215^2 = 215 \times 215.$

$= 46225.$

②
215
×215
①
1075
215
+430
46225

2.

(i) $\frac{3}{8}$.

Sol^n $\left(\frac{3}{8}\right)^2 = \frac{3}{8} \times \frac{3}{8}$

$= \frac{9}{81}$

(vi) $\frac{31}{40}$.

Sol^n $\left(\frac{31}{40}\right)^2 = \frac{31}{40} \times \frac{31}{40}$

$= \frac{961}{1600}.$

31
×31
31
+93
961

3.

(i) $(-3)^2$.

Sol:n -3×-3

$= 9$.

(iv) $\left(-\frac{2}{3}\right)^2$

Sol:n $-\frac{2}{3} \times -\frac{2}{3}$.

$= \frac{4}{9}$.

(vii) $(-0.6)^2$.

$$\begin{array}{r} 6 \\ 6 \\ \hline 0.36 \end{array}$$

Sol:n -0.6×-0.6.

$= 0.36$.

Exercise 3.2.

1.

(i) 4836 - perfect square

(ii) 8343 - Not a perfect square.

(iii) 9867 - Not a perfect square

(iv) 6384 - Perfect square.

(v) 3722 - Not a perfect square.

(vi) 9348 - Not a perfect square.

* Property 1 states that for square numbers, the digits at the unit place are 0, 1, 4, 5, 6 and 9 and not 2, 3, 7 or 8.
refer text pg. 39 for 'properties of Square No.'s'

2.

(i) 78^2
Sol:- Units digit = 4.

(ii) 33^2.
Sol:- Units digit = 9.

(iii) 42^2
Sol:- Units digit = 4.

(iv)
Sol:- Units digit = 5.

(v) 27^2
Sol:- Units digit = 9.

(vi) 41^2
Sol:- Units digit = 1.

* Refer text pg. 39 - Property 2.

3.

(i) 72^2.

Sol^n No. of digits in the square = $2n-1$ or $2n$.

$= 2\times 2 - 1$ or 2×2.

$= 4-1$ or 4.

$= 3$ or 4 digits

NOTE: Here n = no. of digits in the Number

* Refer text pg. ~~40~~.
PROPERTY 5.

(iii) 346^2

Sol^n No. of digits in the square = $2n-1$ or $2n$.

$= 2\times 3 - 1$ or 2×3.

$= 6-1$ or 6.

$= 5$ or 6 digits

(vi) 9^2.

Sol^n No. of digits in the square = $2n-1$ or $2n$.

$= 2\times 1 - 1$ or 2×1

$= 2-1$ or 2.

$= 1$ or 2 digits.

4.

(i)

Sol^n: here, $n = 8$.

$\therefore 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 = 8^2$

$= 64.$

(iii)

Sol^n: here, $n = 4$.

$\therefore 1 + 3 + 5 + 7 = 4^2$

$= 16.$

* Refer PROPERTY 6 on Pg. 40 in Text.

5.

(i)

Sol^n: $7^2 = 1 + 3 + 5 + 7 + 9 + 11 + 13$

(ii) $11^2 = 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 + 17 + 19 + 21.$

6.

(i)

Sol^n: The no. of numbers between 4^2 and $5^2 = 2n$

$= 2 \times 4$

$= 8$

NOTE: Here, n will be the lower number.

* Refer text pg. 40 PROPERTY 7.

(iv)

Soln The no. of numbers between 30^2 and $31^2 = 2n$

$= 2 \times 30$

$= 60.$

7

Soln The 5th and 6th terms of triangular numbers are 15 and 21.

When we add these numbers we get 36. (ie., $15 + 21 = 36$) which is the square of 6.

* Refer PROPERTY 8 in text pg. 40 & 41.

8.

(i)

Soln here, $n = 8$.

$n + 1 = 9$

∴ the square no. when we add 8th and 9th triangular numbers $= (n+1)^2$.

$= 9^2$

$= 9 \times 9$

$= 81.$

9.

(i)

Sol^n If $4^2 + 5^2 = 6^2$ then they form a Pythagorean Triplet

here,

$$4^2 + 5^2 = 16 + 25.$$
$$= 41$$
$$6^2 = 36.$$

$\therefore 4^2 + 5^2 \neq 6^2$; 4, 5, 6 do not form a pythagorean Triplet.

(ii)

Sol^n If $6^2 + 8^2 = 10^2$, then they form a Pythagorean triplet.

here,

$$6^2 + 8^2 = 36 + 64.$$
$$= 100.$$
$$10^2 = 100.$$

$\therefore 6^2 + 8^2 = 10^2$; 6, 8, 10 form a Pythagorean triplet.

* Refer PROPERTY 9 on pg. 41

10.

(i) 10.

Sol: To form a Pythagorean triplet, we need $(2m)$, (m^2-1) and (m^2+1).

here, $2m = 10$.

$$m = \frac{10}{2} = 5$$

$$\therefore \quad m^2 - 1 = 5^2 - 1 = 25 - 1 = 24.$$

$$\text{and} \quad m^2 + 1 = 5^2 + 1 = 25 + 1 = 26.$$

$\therefore$ 10, 24, 26 form a Pythagorean triplet.

11.

(i) 45.

Sol: $45^2 = 2025$.

45 here, $5 \times 5 = 25$.
then, $4 \times 5 = 20$.
* we put $4 \times 5 = 20$ on the left side of 25.

* NOTE: Refer text pg. 42 PROPERTY 13.

(iii)

Sol.n $95^2 = 9025$.

here, one place we have 5.
$\therefore 5 \times 5 = 25$
then $9 \times 10 = 90$, we place 90 on the left of 25.

10.

(i) 961 - Square of odd no.

(ii) 313600 - Square of even no.

(iii) 529 - Square of odd no.

(iv) 6724 - Square of even no.

(v) 1089 - Square of odd no.

(vi) 4225 - Square of odd no.

NOTE: PROPERTY 4 on pg. 40 states that squares of even no.'s are even & squares of odd no.'s are odd.

Exercise 3.3

1

(i) 8.

(ii) 11

(iii) 25.

(iv) 15

(v) 18

(vi) 30.

(vii) 42

(viii) 1001

2.

(i) 529.

Sol^n: $\overline{529}$

It has two bars, ∴ this no. will have two digits in its square root

(ii) 5041.

Sol^n: $\overline{5041}$

It will have 2 digits

(iii) 4.

Sol^n: $\overline{4}$.

It will have 1 digit

3

(i) $2 \times 2 \times 3 \times 3 \times 4 \times 4$.

Sol^n $2 \times 2 \times 3 \times 3 \times 4 \times 4 = \sqrt{2^2 \times 3^2 \times 4^2}$

$= \sqrt{(2 \times 3 \times 4)^2}$

$= 24$.

(iii) $7 \times 7 \times 3 \times 3 \times 2 \times 2 \times 2 \times 2$.

Sol^n $7 \times 7 \times 3 \times 3 \times 2 \times 2 \times 2 \times 2 = \sqrt{7^2 \times 3^2 \times 2^2 \times 2^2}$

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

$= 84$.

(iv) $64 x^2 y^4$.

Sol^n $64 x^2 y^4 = \sqrt{8 \times 8 \times x^2 \times y^2 \times y^2}$

$= \sqrt{(8 \times x \times y^2)^2}$

$= 8xy^2$

(v) $144 a^4 b^2 c^2$

Sol^n $144 a^4 b^2 c^2 = \sqrt{12 \times 12 \times a^2 \times a^2 \times b^2 \times c^2}$

$= \sqrt{(12 \times a^2 \times b \times c)^2}$

$= 12a^2bc$.

4.

(i) 3969.

Sol: $3969 = 3 \times 3 \times 3 \times 3 \times 7 \times 7$.

$\therefore \sqrt{3969} = \sqrt{3^2 \times 3^2 \times 7^2}$

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

$= 63$.

3	3969.
3	1323
3	441
3	147.
7	49
	7.

(iv) 5184.

Sol: $5184 = 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3$.

$\therefore \sqrt{5184} = \sqrt{2^2 \times 2^2 \times 2^2 \times 3^2 \times 3^2}$

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

$= 72$.

2	5184.
2	2592
2	1296.
2	648.
2	324.
2	162
3	81
3	27.
3	9
	3.

(vii) 5625.

Sol: $5625 = 5 \times 5 \times 5 \times 5 \times 3 \times 3$.

$\therefore \sqrt{5625} = \sqrt{5^2 \times 5^2 \times 3^2}$

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

$= 75$.

5	5625.
5	1125.
5	225.
5	45.
3	9.
	3

(x) 108900.

2	108900.
2	54450.
5	27225
5	5445
3	1089.
3	363
11	121
	11

Sol^n $108900 = 2 \times 2 \times 5 \times 5 \times 3 \times 3 \times 11 \times 11$

$\therefore \sqrt{108900} = \sqrt{2^2 \times 5^2 \times 3^2 \times 11^2}$

$= \sqrt{(2 \times 5 \times 3 \times 11)^2}$

$= 330.$

5

(ii) $\sqrt{a^2 \times b^4}$.

Sol^n $\sqrt{a^2 \times (b^2)^2}$

$= \sqrt{(a \times b^2)^2}$

$= ab^2.$

(iii) $\sqrt{2^8 \times 3^4}$.

Sol^n $\sqrt{2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 \times 3}$

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

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

$= 144.$

(iv) $\sqrt{49x^2y^2}$.

Sol^n $= \sqrt{7^2x^2y^2}$

$= \sqrt{(7xy)^2}$

$= 7xy$.

(vi) $\sqrt{a^4b^5}$.

Sol^n $\sqrt{a\times a\times a\times a\times b\times b\times b\times b\times b}$

$= \sqrt{a^2\times a^2\times b^2\times b^2\times b}$

$= \sqrt{(a\times a\times b\times b)^2\times b}$.

$= a^2b^3$ //.

Exercise 3.4.

1.

(i) 3969.

Soln

$$\begin{array}{r|l} & 63 \\ \hline 6 & \overline{39}\,\overline{69} \\ & -36\downarrow \\ \hline 123 & 369 \\ & -369 \\ \hline & \times\times \end{array}$$

$\therefore \sqrt{3969} = 63.$

$$\begin{array}{r} 123 \\ \times 3 \\ \hline 369 \end{array}$$

(iv) 53361.

Soln

$$\begin{array}{r|l} & 231 \\ \hline 2 & \overline{53}\,\overline{36}\,\overline{1} \\ & -4\downarrow \\ \hline 43 & 133 \\ & -129 \\ \hline 461 & 461 \\ & -461 \\ \hline & \times\times \end{array}$$

$\therefore \sqrt{53361} = 231.$

$$\begin{array}{r} 43 \\ \times 3 \\ \hline 129 \end{array}$$

$$\begin{array}{r} \overset{1}{} \\ 44 \\ \times 4 \\ \hline 176 \end{array}$$

(vi) 2116.

Sol^n

```
        46
      ------
   4 | 2116.
     | -16 ↓
     |------
  86 |  516.
     | -516
     |------
     |   xx
```

$\therefore \sqrt{2116} = 46.$

① 84 × 4 = 336

③ 86 × 6 = 516

(vii) 423801.

Sol^n

```
          651
        ------
     6 | 423801
       | -36  ↓
       |------
 125   |  638
       | -625
       |------
1301   |  1301
       | -1301
       |------
       |    xx.
```

$\therefore \sqrt{423801} = 651$

122 × 2 = 244

① ② 125 × 5 = 625

2.

(i) $\frac{4}{9}$.

Sol^n $\sqrt{\frac{4}{9}} = \sqrt{\frac{2 \times 2}{3 \times 3}}$.

$= \sqrt{\frac{2^2}{3^2}}$

$= \sqrt{\left(\frac{2}{3}\right)^2}$

$= \frac{2}{3}$

(iv) $\frac{64}{225}$.

Sol^n $\sqrt{\frac{64}{225}} = \sqrt{\frac{8 \times 8}{15 \times 15}}$.

$= \sqrt{\frac{8^2}{15^2}}$

$= \sqrt{\left(\frac{8}{15}\right)^2}$

$= \frac{8}{15}$

(vii) $\frac{1024}{2401}$

Sol^n $\sqrt{\frac{1024}{2401}} = \sqrt{\frac{32 \times 32}{49 \times 49}}$

$= \sqrt{\frac{32^2}{49^2}}$

$= \sqrt{\left(\frac{32}{49}\right)^2}$

$= \frac{32}{49}$

	49
4	2401
	-16
89	801
	-801
	xx

	32
3	1024
	-9 ↓
62	124
	-124
	xx

$\frac{62}{2}$
$\frac{}{124}$

8
89
×9
801

(viii) $3\frac{1269}{1764}$

Sol^n $\sqrt{\frac{6561}{1764}} = \sqrt{\frac{81 \times 81}{42 \times 42}}$

$= \sqrt{\frac{81^2}{42^2}}$

$= \sqrt{\left(\frac{81}{42}\right)^2}$

$= \frac{81}{42}$

	81
8	6561
	-64 ↓
161	161
	-161
	xx

② ① ①
1764
×3
00
5292
+1269
6561

	42
4	1764
	-16 ↓
82	164
	-164
	xx

$\frac{82}{\times 2}$
$\frac{}{164}$

(ix) $\frac{2\times2\times2\times2}{3\times3\times5\times5}$.

Sol^n $\sqrt{\frac{2\times2\times2\times2}{3\times3\times5\times5}} = \sqrt{\frac{2^2\times2^2}{3^2\times5^2}}$

$= \sqrt{\left(\frac{2\times2}{3\times5}\right)^2}$

$= \frac{4}{15}$

3.

(i) 46.24.

Sol^n

$$\begin{array}{r|l} & 6.8 \\ \hline 6 & \overline{46}.\overline{24}. \\ & -36 \downarrow \\ \hline 128 & 1024. \\ & -1024. \\ \hline & xx. \end{array}$$

$122 \times 2 = 244$

$128 \times 8 = 1024$

$\therefore \sqrt{46.24} = 6.8.$

(iii) 4637.61

Sol^n:

```
          68.1
      ___________
   6 | 46 37 . 61
     | -36 ↓
     |___________
 128 |  1037
     | -1024
_____|___________
1361 |    1361
     |  - 1361
_____|___________
     |     xx
```

$\therefore \sqrt{4637.61} = 68.1$

(vi) 8136.04

Sol^n:

```
          90.2
      ___________
   9 | 81 36 . 04
     | -81 ↓   ↓
     |___________
 182 | x  364
     |  - 364
     |___________
     |     xx
```

$\therefore \sqrt{8136.04} = 90.2$

(7)(6)
188
×8
1504

8 (8)
189
×9
1701

(1)
182
×2
364

4.

(i) 70.

Soln:

$$
\begin{array}{r|l}
 & 8.36 \\
\hline
8 & \overline{70}\cdot\overline{0}\overline{0}\overline{0} \\
 & \underline{64}\cdot \\
\hline
163 & 600\cdot \\
 & \underline{489}\cdot \\
\hline
1666 & 11100\cdot \\
 & \underline{9996}\cdot \\
\hline
 &
\end{array}
$$

$$
\begin{array}{r}
{\scriptstyle 1} \\
163 \\
\times\ 3 \\
\hline
489
\end{array}
\qquad
\begin{array}{r}
{\scriptstyle (3)(2)(1)} \\
1666 \\
\times\ 6 \\
\hline
9996
\end{array}
$$

(iii) 134.

Soln:

$$
\begin{array}{r|l}
 & 11.57 \\
\hline
1 & \overline{134}\cdot\overline{0}\overline{0}\overline{0}\overline{0} \\
 & 1 \downarrow \\
\hline
21 & \times\ 34\cdot \\
 & \underline{-\ 21}\cdot\ \downarrow \\
\hline
225 & 1300\cdot \\
 & \underline{-1125}\cdot\ \downarrow \\
\hline
2307 & 17500\cdot \\
 & \underline{14149} \\
\hline
 &
\end{array}
$$

$$
\begin{array}{r}
{\scriptstyle 22} \\
\times\ 2 \\
\hline
44
\end{array}
\qquad
\begin{array}{r}
{\scriptstyle (1)} \\
2306 \\
\times\ 6 \\
\hline
13836
\end{array}
\qquad
\begin{array}{r}
{\scriptstyle 21} \\
1 \\
\hline
21
\end{array}
$$

$$
\begin{array}{r}
{\scriptstyle (2)} \\
2307 \\
\times\ 7 \\
\hline
14149
\end{array}
\qquad
\begin{array}{r}
223 \\
\times\ 3 \\
\hline
669
\end{array}
$$

$$
\begin{array}{r}
{\scriptstyle (2)} \\
2308 \\
\times\ 8 \\
\hline
18464
\end{array}
\qquad
\begin{array}{r}
{\scriptstyle (1)(2)} \\
226 \\
\times\ 6 \\
\hline
1356
\end{array}
\qquad
\begin{array}{r}
{\scriptstyle (1)} \\
224 \\
\times\ 4 \\
\hline
896
\end{array}
$$

$$
\begin{array}{r}
{\scriptstyle (1)(2)} \\
225 \\
\times\ 5 \\
\hline
1125
\end{array}
$$

5.

(i)

Sol^{n} Side of the field = 63 m.

$$\therefore \text{Area of the field} = s \times s$$
$$= 63\text{ m} \times 63\text{ m}$$
$$= 3969 \text{ sq. m}.$$

$$\begin{array}{r} 63 \\ \times 63 \\ \hline 189 \\ +378 \\ \hline 3969 \end{array}$$

(ii)

Sol^{n} Side of the square room = 12 m.

Area " " " " $= s \times s$
$= 12\text{ m} \times 12\text{ m}$
$= 144 \text{ sq. m}.$

Side of the square tile = 50 cm.

Area " " " " $= s \times s$
$= 50\text{ cm} \times 50\text{ cm}$
$= 2500 \text{ sq. cm}.$

$$\therefore \text{No. of tiles required} = \frac{\text{Area of square room}}{\text{Area of square tile}}$$

$$= \frac{144 \text{ sq. m}}{2500 \text{ sq. cm}}$$

$$= \frac{144 \times 100 \times 100 \text{ sq. cm}}{2500 \text{ sq cm}}$$

$$= \frac{14400 \text{ sq. cm}}{25 \text{ sq cm}}$$

$$= 576 \text{ Tiles.}$$

(iv)

Sol.n By Pythagoras theorem,

$$(\text{Hypotenuse})^2 = (\text{Base})^2 + (\text{Perpendicular})^2$$

$$\Rightarrow H^2 = (12\text{ m})^2 + (5\text{ m})^2$$

$$\Rightarrow H^2 = 144\text{ m}^2 + 25\text{ m}^2$$

$$\Rightarrow H^2 = 169\text{ m}^2$$

$$\Rightarrow H = \sqrt{169\text{ m}^2}$$

$$= \sqrt{13\text{m} \times 13\text{m}}$$

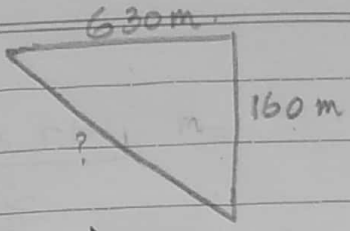
$$= \sqrt{(13\text{m})^2}$$

$$= 13\text{ m}.$$

$\therefore$ Hypotenuse = 13 m.

144
+25
169

(v)



Sol^n : the distance she walked back home from her friend's house forms the hypotenuse of the right Angle formed.

By Pythagoras theorem,

$H^2 = B^2 + P^2$

$\Rightarrow H^2 = (630\ m)^2 + (160\ m)^2$

$\Rightarrow H^2 = 396900\ m^2 + 25600\ m^2$.

$\Rightarrow H^2 = 422500\ m^2$.

$\Rightarrow H = \sqrt{422500\ m^2}$

$= \sqrt{(650\ m)^2}$

$= 650\ m$.

∴ distance she walked back home = 650 m.

63 × 63 = 189 + 378 = 3969

16 × 16 = 96 + 16 = 256

125 × 5 = 625

396900 + 25600 = 422500

650
6 | 422500
−36 ↓
125 | 625.
−625
×

123 × 3 = 369

124 × 4 = 496

126 × 6 = 756

6.

(i) 2916.

Sol:n The units digit of 2916 is 6
So, the units digit of the square root is 4 or 6.

Now, we discard the last two digits 16.
remaining no = 29.

We know 29 is between 5^2 and 6^2
then, the square root is 54^2 or 64^2

$5^2 = 25$
(29).
$6^2 = 36$.

we also know that,
$55^2 = 3025$. and 2916 is smaller than 3025

$\therefore \sqrt{2916} = 54$.

(ii) 9025.

Sol:n Here, units digit = 5
So the units digit of the square root is 5.

Now, we discard the last two digits 25.
remaining no = 90.

We know 90 is between 9^2 and 10^2
then, the square root is 95^2 or 105^2.

$9^2 = 81$
(90)
$10^2 = 100$.

we also know that
$95^2 = 9025$
$\therefore \sqrt{9025} = 95$.

(vi) 4225.

Sol^n There, units digit is 5.
So the units digit of the square root is 5.

Now, we discard the last two digits 25.
remaining no = 42.

$6^2 = 36$
(42)
$7^2 = 49$

We know 42 is between 6^2 and 7^2.
then, the square root is 65^2 or 75^2.

we also know that,
$65^2 = 4225$

$\therefore \sqrt{4225} = 65.$

4. Cubes and Cube Roots.

Date
Page 28 Staller

Exercise 4.1

1

(i) 3^3

Sol^n: $3^3 = 3 \times 3 \times 3$

$= 27$

(iv) $(-9)^3$.

Sol^n: $(-9)^3 = -9 \times -9 \times -9$

$= -729.$

$\begin{array}{r} 81 \\ \times 9 \\ \hline 729 \end{array}$

(vi) $\left(\frac{-2}{3}\right)^3$.

Sol^n: $\left(\frac{-2}{3}\right)^3 = \frac{-2}{3} \times \frac{-2}{3} \times \frac{-2}{3}$.

$= \frac{-8}{27}$.

(viii) $(-0.5)^3$.

Sol^n: $(-0.5)^3 = -0.5 \times -0.5 \times -0.5$.

$= -0.125$

$\begin{array}{r} (2) \\ 25 \\ \times 5 \\ \hline 0.125 \end{array}$

(x) $(-0.4)^3$.

Sol^n: $(-0.4)^3 = -0.4 \times -0.4 \times -0.4$.

$= -0.064$.

$\begin{array}{r} 4 \\ \times 4 \\ \hline 16. \ (2) \\ \times 4 \\ \hline 0.064 \end{array}$

2.

(i) 10000

Sol^n Not a perfect cube

* For multiples of 10, if the no. of zeroes is a multiple of 3 then it is a perfect cube.

(ii) 1000000.

Sol^n Perfect cube.

(iii) 100

Sol^n Not a perfect cube

(iv) 1000.

Sol^n Perfect cube.

3.

(i)

Sol^n 3

(ii)

Sol^n 7

(iii)

Sol^n 1

(iv)

Sol: 0

(v)

Sol: 4.

(vi)

Sol: 5

NOTE: For Q.3 refer PROPERTIES OF CUBES in the text on Pg. 53.

4.

(i) 7^3.

Sol: $43 + 45 + 47 + 49 + 51 + 53 + 55$.

(ii) 12^3.

Sol: $133 + 135 + 137 + 139 + 141 + 143 + 147 + 149 + 151 + 153 + 155$.

Exercise 4.2.

1.

(i)

Sol^{n} $23328 = \underline{2\times2\times2\times2\times2}\times\underline{3\times3\times3}\times\underline{3\times3\times3}$

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

$\therefore$ all the prime factors are not in triples (a factor 2 is left out), thus 23328 is not a perfect cube.

2	23328
2	11664
2	5832
2	2916
2	1458
3	729
3	243
3	81
3	27
3	9
	3

(iii)

Sol^{n} $52488 = \underline{2\times2\times2}\times2\times7\times7\times67.$

$= 2^3 \times 2 \times 7^2 \times 67.$

$\therefore$ 52488 is not a perfect cube.

2	52488
2	26244
2	13122
2	6561
7	3283
7	469
	67

(iv)

Sol^{n} $74088 = \underline{2\times2\times2}\times\underline{3\times3\times3}\times\underline{7\times7\times7}.$

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

$\therefore$ 74088 is a perfect cube.

2	74088
2	37044
2	18522
3	9261
3	3087
3	1029
7	343
7	49

(vi)

5	15625
5	3125
5	625
5	125
5	25
	5.

Sol^n $15625 = \underbrace{5 \times 5 \times 5} \times \underbrace{5 \times 5 \times 5}$.

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

$\therefore$ 15625 is a perfect cube.

2.

(i) 5400.

2	5400
2	2700
2	1350
5	675
5	135
3	27.
3	9
	3

Sol^n $5400 = \underbrace{2 \times 2 \times 2} \times 5 \times 5 \times \underbrace{3 \times 3 \times 3}$.

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

$\therefore$ to make 5400 a perfect cube it must be multiplied by 5.

(iii) 4, 08, 375.

5	408375
5	81675.
5	16335
3	3267.
3	1089
3	363
11	121
	11

Sol^n $4,08,375 = \underbrace{5 \times 5 \times 5} \times \underbrace{3 \times 3 \times 3} \times 11 \times 11$

$= 5^3 \times 3^3 \times 11^2$

$\therefore$ to make 4,08,375 a perfect cube, it must be multiplied by 11.

3

(i)

Soln $370440 = \underbrace{2 \times 2 \times 2}_{} \times 5 \times \underbrace{3 \times 3 \times 3}_{} \times \underbrace{7 \times 7 \times 7}_{}$

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

∴ 370440 has to be divided by 5 to make it a perfect cube.

2	370440
2	185220
2	92610
5	46305
3	9261
3	3087
3	1029
7	343
7	49
	7

(iii)

Soln $2012472 = \underbrace{2 \times 2 \times 2}_{} \times \underbrace{3 \times 3 \times 3}_{} \times \underbrace{7 \times 11 \times 11 \times 11}_{}$

$= 2^3 \times 3^3 \times 7 \times 11^3$.

∴ 2012472 has to be divided by 7 to make it a perfect cube.

2	2012472
2	1006236
2	503118
3	251559
3	83853
3	27951
7	9317
11	1331
11	121
	11

Date
Page 34 Staller

Exercise 4.3.

1

(i) $(9)^3$.

Sol^n $(9)^3 = 9 \times 9 \times 9$

$= 729.$

9
× 9
81
× 9
729

(iii) $\left(-\frac{1}{7}\right)^3$.

Sol^n $\left(-\frac{1}{7}\right)^3 = -\frac{1}{7} \times -\frac{1}{7} \times -\frac{1}{7}$

$= \frac{-1}{343}.$

7
× 7
49
× 7
343

(vi) $(3.7)^3$.

Sol^n $(3.7)^3 = 3.7 \times 3.7 \times 3.7$

$= 50.653.$

37
× 37
259
+ 111
1369
× 37
9583
+ 4107
50.653

(viii) $(-0.3)^3$.

Sol^n $-0.3 \times -0.3 \times -0.3.$

$= -0.027.$

3
× 3
9
× 3
0.027

2.

(i) 343.

7	343
7	49
	7

Sol^{n} $343 = 7 \times 7 \times 7$

$\therefore \sqrt[3]{343} = \sqrt[3]{7^3}$

$= 7$

(iii) 13824.

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

Sol^{n} $13824 = 2\times2\times2\times2\times2\times2\times2\times2\times2\times2 \times 3\times3\times3.$

$\therefore \sqrt[3]{13824} = \sqrt[3]{2^3\times2^3\times2^3\times3^3}$

$= \sqrt[3]{(2\times2\times2\times3)^3}$

$= 24.$

(v) $\frac{1331}{2744}$.

2	2744
2	1372
2	686
7	343
7	49
	7

11	1331
11	121
	11

Sol^{n} $1331 = 11 \times 11 \times 11$

$2744 = 2\times2\times2\times7\times7\times7.$

$\therefore \sqrt[3]{\frac{1331}{2744}} = \sqrt[3]{\frac{11^3}{(2\times7)^3}}.$

$= \sqrt[3]{\left(\frac{11}{2\times7}\right)^3}$

$= \frac{11}{14}$.

(vii) -5832.

Sol^n: $-5832 = -2 \times -2 \times -2 \times -3 \times -3 \times -3 \times -3 \times -3 \times -3$

$\therefore \sqrt[3]{-5832} = \sqrt[3]{(-2)^3 \times (-3)^3 \times (-3)^3}$

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

$= -18$.

2	5832
2	2916
2	1458
3	729
3	243
3	81
3	27
3	9
	3

(viii) -0.001

Sol^n: $-0.001 = \frac{-1}{1000}$

$= \frac{-1}{2 \times 2 \times 2 \times 5 \times 5 \times 5}$.

$\therefore \sqrt[3]{-0.001} = \sqrt[3]{\frac{-1^3}{2^3 \times 5^3}}$.

$= \left(\frac{-1}{2 \times 5}\right)$

$= \frac{-1}{10}$.

$= -0.1$

2	1000
2	500
2	250
5	125
5	25
	5

3.

(i)

Sol?: Units digit of the cube root = 6.

* Refer text Pg. 57 PROPERTIES OF CUBES.

(ii)

Sol?: Units digit of the cube root = 5.

(iii)

Sol?: Units digit of the cube root = 0.

(iv)

Sol?: Units digit of the cube root = 9.

4.

(i) 17576.

Sol?: $\overline{17}\,\overline{576}$.

$1^3 = 1$
$2^3 = 8$
$3^3 = 27$.
$4^3 = 64$.
$5^3 = 125$.

here, the biggest cube number below 17 is 8, i.e., 2^3

∴ the tens digit of the cube root is 5.

(ii) 42875.

Sol?: $\overline{42}\,\overline{875}$

here, the biggest cube number below 42 is 27, i.e., 3^3

∴ the tens digit of the cube root is 3

(iv) 205379.

Sol:- $\overline{205}\,\overline{379}$

here, the biggest cube number below 205 is 125, ie., 5^3

∴ the tens digit of the cube root is 5.

$1^3 = 1$
$2^3 = 8$
$3^3 = 27$
$4^3 = 64$
$5^3 = 125$
$6^3 = 216$
$7^3 = 343$
$8^3 = 512$
$9^3 = 729$

(vi) -103823.

Sol:- $-\overline{103}\,\overline{823}$

here, the biggest cube no. below 103 is 64, ie; 4^3

∴ the tens digit of the cube root is 4.

5.

(i) 592704.

Sol:- $\overline{592}\,\overline{704}$.

∴ the units digit of the cube is 4, the units digit of the cube root is 4.

here, the biggest cube no. below 592 is 512, ie, 8^3.

∴ the tens digit of the cube root is 8.

∴ $\sqrt[3]{592704} = 84$

(iv) -185193.

Sol:n $-\overline{185}\,\overline{193}$

∵ the units digit of the cube is 3, the units digit of the cube root is 7.

here, the biggest cube no. below 185 is 125, i.e., 5^3

∴ the tens digit of the cube root is 5.

$\therefore \sqrt[3]{-185193} = -57$

(vi) 91125.

Sol:n $\overline{91}\,\overline{125}$

∵ the units digit of the cube is 5, the units digit of the cube root is 5.

here, the biggest cube no. below 91 is 64, i.e., 4^3

∴ the tens digit of the cube root is 4.

$\therefore \sqrt[3]{91125} = 45$.

6.

(i) 1728.

Sol^n $\overline{1}\,\overline{728}$.

here, there are two groups, i.e., $\overline{1}$ & $\overline{728}$.

∴ the cube root of 1728 has two digits

(ii) 8.

Sol^n $\overline{8}$

here, there is one group, i.e., $\overline{8}$

∴ the cube root of 8 has one digit

(iii) 729.

Sol^n here there is one group, i.e., $\overline{729}$.

∴ the cube root of 729 has one digit

(vii) 94818816.

Sol^n $\overline{94}\,\overline{818}\,\overline{816}$.

here, there are three groups, i.e., $\overline{94}$, $\overline{818}$, $\overline{816}$

∴ the cube root of 94818816 has three digits

7. Factorisation.

Exercise 7.1

1.

(i) $12x^2$ and $16y^3$.

Sol^n: $12x^2 = 2 \times 2 \times 3 \times x \times x$.

$16y^3 = 2 \times 2 \times 2 \times 2 \times y \times y \times y$.

$\therefore$ HCF of $12x^2$ & $16y^3 = 2 \times 2$
$= 4$.

2	12
2	6
	3

2	16
2	8
2	4
	2

(ii) $15a^2b^2$ and $-24ab$.

Sol^n: $15a^2b^2 = 3 \times 5 \times a \times a \times b \times b$.

$-24ab = -2 \times -2 \times -2 \times 3 \times a \times b$.

$\therefore$ HCF of $15a^2b^2$ and $-24ab$.
$= 3 \times a \times b$.
$= 3ab$.

3	15
	5

2	24
2	12
2	6
	3

$-2 \times -2 \times -2 \times 3$

(iii) $72abc$ and $27a^2bc$.

Sol^n: $72abc = 2 \times 2 \times 2 \times 3 \times 3 \times a \times b \times c$

$27a^2bc = 3 \times 3 \times 3 \times a \times a \times b \times c$.

3	27
3	9
	3

2	72
2	36
2	18
3	9
	3

$\therefore$ HCF of $72abc$ and $27a^2bc = 3 \times 3 \times a \times b \times c$
$= 9abc$.

(vi) $71x^2y^2z^3$ and $81x^2y^2z^3$.

Sol^n $71x^2y^2z^3 = 71 \times 1 \times \underline{x} \times \underline{x} \times y \times y \times z \times z \times z$.

$81x^2y^2z^3 = 81 \times 1 \times \underline{x} \times \underline{x} \times y \times y \times z \times z \times z$.

$\therefore$ HCF of $71x^2y^2z^3$ and $81x^2y^2z^2 = x \times x \times y \times y \times z \times z \times z$

$= x^2y^2z^2$.

(vii) $3xyz$ and 27.

Sol^n $3xyz = \underline{3} \times 1 \times x \times y \times z$.

$27 = \underline{3} \times 3 \times 3$.

3	27
3	9
	3

$\therefore$ HCF of $3xyz$ and 27 = 3.

(ix) $2ab$, $7ac$ and $9bc$.

3	9
	3

Sol^n $2ab = 2 \times 1 \times a \times b$.

$7ac = 7 \times 1 \times a \times c$.

$9bc = 3 \times 3 \times b \times c$.

$\therefore$ HCF of $2ab$, $7ac$ and $9bc = 1$.

2.

(i) $6a + 6b$

Sol:n $6(a + b)$.

(ii) $\frac{1}{2}x + \frac{1}{2}$.

Sol:n $\frac{1}{2}(x + 1)$

(iv) $bm + bn$.

Sol:n $b(m + n)$.

(vi) $cdm + cdt$

Sol:n $cd(m + t)$.

(x) $3x^2 - 6a^6$.

Sol:n $3(x^2 - 2a^6)$.

(xi) $36a^2b^3 - 18a^3b^2$.

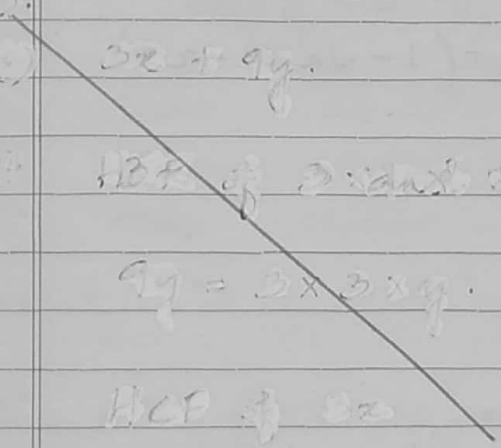
Sol:n $9a^2b^2(4b - 2a)$.
$9a^2b^2 \times 2(2b - a)$.
$= 18a^2b^2(2b - a)$.

(xix) $abc + aby + abz$.

Sol:- $ab(c + y + z)$.

(xx1) $4x - 4y - 4z$.

Sol:- $4(x - y - z)$.



3(i) $3x + 9y$.

Sol:- HCF of $3 + 9 = 3$.

$\therefore$ HCF of $3x$ and $9y = 3$.

$\therefore$ $3x + 9y = 3 \times x + 3 \times 3y$

$= 3(x + 3y)$.

(iii) $5x^2 - 10x^3 + 20x^4$.

Sol^n HCF of 5, 10, 20 = 5

HCF of x^2, x^3 and $x^4 = x^2$

$\therefore$ HCF of $5x^2$, $10x^3$ and $20x^4 = 5x^2$

$\therefore$ $5x^2 - 10x^3 + 20x^4 = 5x^2 \times 1 - 5x^2 \times 2x + 5x^2 \times 4x^2$

$= 5x^2(1 - 2x + 4x^2)$.

(vi) $3x^2y^2 - 12xy + 27x^3y^3$.

Sol^n HCF of 3, 12, 27 = 3

HCF of x^2, x, $x^3 = x$

HCF of y^2, y, $y^3 = y$.

$\therefore$ HCF of $3x^2y^2$, $12xy$ and $27x^3y^3 = 3xy$.

$\therefore$ $3x^2y^2 - 12xy + 27x^3y^3 = 3xy \times 1xy - 3xy \times 4 + 3xy \times 9x^2y^2$.

$= 3xy(xy - 4 + 9x^2y^2)$

(x) $20p^2q^2 - 10pq$.

Sol^n: HCF of 20 and 10 = 10.

HCF of p^2 and $p = p$.

HCF of q^2 and $q = q$.

∴ HCF of $20p^2q^2 - 10pq = 10pq$.

∴ $20p^2q^2 - 10pq = 10pq \times 2pq - 10pq \times 1$

$= 10pq(2pq - 1)$.

(xii) $-10a^3b + 30ab^3 - 20a^3b^3$.

Sol^n: HCF of 10, 30 and 20 = 10.

HCF of a^3, a & $a^3 = a$.

HCF of b, b^3 and $b^3 = b$.

∴ HCF of $-10a^3b + 30ab^3 - 20a^3b^3 = 10ab$.

∴ $-10a^3b + 30ab^3 - 20a^3b^3 = 10ab \times -1a^2 + 10ab \times 3b^2 - 10ab \times 2a^2b^2$.

$= 10ab(-a^2 + 3b^2 - 2a^2b^2)$.

(xiii) $7a^2b - 2a^2$

Sol^n HCF of 7 and 2 = 1

HCF of a^2 and $a^2 = a^2$.

∴ HCF of $7a^2b - 2a^2 = 1a^2$

∴ $7a^2b - 2a^2 = 1a^2(7b - 2)$.

(xv) $x^2yz - 4xy^3 + 20x^3$

Sol^n HCF of x^2, x and $x^3 = x$.

∴ HCF of $x^2yz - 4xy^3 + 20x^3 = x$

∴ $x^2yz - 4xy^3 + 20x^3 = x \times xyz - x \times 4y^3 + x \times 20x^2$

$= x(xyz - 4y^3 + 20x^2)$.

(xvii) $26x^3 - 13x^2y^2$.

Sol^n HCF of 26 and 13 = 13.

HCF of x^3 and $x^2 = x^2$

∴ HCF of $26x^3 - 13x^2y^2 = 13x^2$.

∴ $26x^3 - 13x^2y^2 = 13x^2 \times 2x - 13 \times 1y^2$.

$= 13x^2(2x - 1y^2)$

Exercise 7.2.

1

(i) $x^2 + xy + 9x + 9y$.

Sol^n $x^2 + 9x + xy + 9y$.

$= x(x+9) + y(x+9)$.

$= (x+9)(x+y)$

(ii) $15xy + 6x + 10y + 4$.

Sol^n $15xy + 10y + 6x + 4$.

$= 5y(3x+2) + 2(3x+2)$.

$= (3x+2)(5y+2)$

(iv) $12ab - 8b - 6 + 9a$.

Sol^n $12ab + 9a - 8b - 6$.

$= 3a(4b+3) - 2(4b+3)$.

$= (4b+3)(3a-2)$.

(vii) $9x^2 + 3xy - 12x - 4y$.

Sol^n $9x^2 - 12x + 3xy - 4y$.

$= 3x(3x - 4) + y(3x - 4)$.

$= (3x - 4)(3x + y)$.

Exercise 7.3.

1

(i) $a^2 + 6a + 9$.

Sol^n $a^2 + 2 \times a \times 3 + 3^2$.

$= (a + 3)^2$.

(iii) $4a^2 + 20ab + 25b^2$

Sol^n $(2a)^2 + 2 \times 2a \times 5b + (5b)^2$

$= (2a + 5b)^2$.

here,
$4a^2 = (2a)^2$.
$25b^2 = (5b)^2$
$20ab = 2 \times 2a \times 5b$.

(v) $4x^2 - 12x + 9$.

Sol^n $(2x)^2 - 2 \times 2x \times 3 + (3)^2$.

$= (2x - 3)^2$.

here,
$4x^2 = (2x)^2$
$9 = (3)^2$.
$12x = 2 \times 2x \times 3x$

(vii) $x^2 - y^2$

Sol^n $(x+y)(x-y)$.

(viii) $16a^2 + 88a + 121$

Sol^n $(4a)^2 + 2 \times 4a \times 11 + (11)^2$

$= (4a + 11)^2$.

here,
$16a^2 = (4a)^2$
$121 = (11)^2$
$88a = 2 \times 4a \times 11$

(x) $25x^2 - 49y^2$

Sol^n $(5x)^2 - (7y)^2$

$= (5x + 7y)(5x - 7y)$.

(xii) $x^4 - 81$

Sol^n $(x^2)^2 - (9)^2$

$= (x^2 + 9)(x^2 - 9)$

(xiii) $m^6 - 25$.

Sol^n $(m^3)^2 - (5)^2$

$= (m^3 + 5)(m^3 - 5)$

(xv) $144 - 24x + x^2$

Sol^n $(12)^2 - 2 \times 12 \times x + x^2$

$= (12 - x)^2$

here,
$144 = (12)^2$
$x^2 = (x)^2$
$24x = 2 \times 12 \times x$
$= 24x$

(xx) $\frac{d^2}{100} - \frac{e^2}{9}$

Sol^n $\left(\frac{d}{10}\right)^2 - \left(\frac{e}{3}\right)^2$

$= \left(\frac{d}{10} + \frac{e}{3}\right)\left(\frac{d}{10} - \frac{e}{3}\right)$

Exercise 7.4.

4.

(i) $x^2 - 15x + 56$.

Sol^n $x^2 - 8x - 7x + 56$.

$= x(x - 8) - 7(x - 8)$.

$= (x - 8)(x - 7)$.

(iii) $x^2 + 8x + 15$.

Sol^n $x^2 + 5x + 3x + 15$.

$= x(x + 5) + 3(x + 5)$.

$= (x + 5)(x + 3)$.

(v) $x^2 - 15x + 36$.

Sol^n $x^2 - 12x - 3x + 36$.

$= x(x - 12) - 3(x - 12)$.

$= (x - 12)(x - 3)$.

(viii) $x^2 - 36x + 99$.

Sol^n $x^2 - 33x - 3x + 99$.

$= x(x-33) - 3(x-33)$.

$= (x-33)(x-3)$.

(x) $x^2 + 14x + 45$

Sol^n $x^2 + 9x + 5x + 45$.

$= x(x+9) + 5(x+9)$.

$= (x+9)(x+5)$.

(xii) $x^2 + 4x - 77$.

Sol^n $x^2 + 11x - 7x - 77$.

$= x(x+11) - 7(x+11)$.

$= (x+11)(x-7)$.

Exercise 7.5.

1.

(i) $4x^2 + 17x + 15$.

Sum = 17.
Product = 15×4
$= 60$.

Sol^n $4x^2 + 12x + 5x + 15$.

$= 4x(x+3) + 5(x+3)$.

$= (x+3)(4x+5)$

* here, we find two numbers such that their sum = 17 and their product = 60.
$\therefore 12x + 5x = 17x$
& $12x \times 5x = 60x^2$

(ii) $8x^2 - 22x + 15$

Sol^n $8x^2 - 12x - 10x + 15$.

$= 4x(2x-3) - 5(2x-3)$.

$= (2x-3)(4x-5)$.

Sum = -22.
Product = 8×15
$= 120$

we know:
$2 \times 60 = 120$.
$3 \times 40 = 120$.
$4 \times 30 = 120$.
$5 \times 24 = 120$.
$8 \times 15 = 120$
$10 \times 12 = 120$.

here, $10 \times 12 = 120$
& $10 + 12 = 22$.
$\therefore$ the two no's are 10 & 12

(vi) $6x^2 - 11xy - 10y^2$.

Sum = -11
Product = 10 × 6
= 60.

Sol^n $6x^2 - 15xy + 4xy - 10y^2$.

$= 3x(2x - 5y) + 2y(2x - 5y)$

$= (2x - 5y)(3x + 2y)$.

we know:
2 × 30 = 60.
3 × 20 = 60.
4 × 15 = 60.

here, 4 × 15 = 60 and
15 - 4 = 11.

∴ the no's are 4 & 15

(ix) $6a^2 + 7a - 5$.

Sum = 7
Product = 6 × 5 = 30.

Sol^n $6a^2 + 10a - 3a - 5$.

$= 2a(3a + 5) - 1(3a + 5)$.

$= (3a + 5)(2a - 1)$.

we know:
2 × 15 = 30.
3 × 10 = 30.

here, 3 × 10 = 30 and
10 - 3 = 7.

∴ the no's are 3 & 10.

(xii) $8x^2 + 13x - 6$.

Sum = 13.
Product = 8 × 6
= 48.

Sol^n $8x^2 + 16x - 3x - 6$.

$= 8x(x + 2) - 3(x + 2)$.

$= (x + 2)(8x - 3)$.

we know:
2 × 24 = 48
3 × 16 = 48

here, 3 × 16 = 48 and
16 - 3 = 13.

∴ the no's are 3 & 16.

(xv) $6 + 11x + 4x^2$.

Sol^n $6 + 8x + 3x + 4x^2$.

$= 2(3 + 4x) + x(3 + 4x)$.

$= (3 + 4x)(2 + x)$.

Sum = 11

Product = 6×4.

$= 24$.

we know,

$2 \times 12 = 24$.

$3 \times 8 = 24$.

here, $3 \times 8 = 24$

and $3 + 8 = 11$

∴ the no's are 3 & 8.

(xviii) $9x^2 - 8x - 1$.

Sol^n $9x^2 - 9x + 1x - 1$

$= 9x(x - 1) + 1(x - 1)$.

$= (x - 1)(9x + 1)$

Sum = 8.

Product = 9×1

$= 9$.

we know,

$9 \times 1 = 9$.

and $9 - 1 = 8$.

∴ the no's are 9 & 1.

(xx) $5b^2 + 6b - 11$.

Sol^n $5b^2 + 11b - 5b - 11$.

$= b(5b + 11) - 1(5b + 11)$.

$= (5b + 11)(b - 1)$.

Sum = 6.

Product = 11×5

$= 55$.

we know,

$11 \times 5 = 55$

& $11 - 5 = 6$.

∴ the no's are 11 & 5.

10. Simple and Compound Interest

Exercise 10.1

1.

(i)

Sol^n Amount = P + I

= ₹ 3520 + ₹ 250.

= ₹ 3770.

(ii)

Sol^n Interest = A - P

= ₹ 6240 - ₹ 5780.

= ₹ 460.

```
 6240
-5780.
------
  460
```

(v)

Sol^n Principal = A - I

= ₹ 672 - ₹ 72.

= ₹ 600.

2.

(i)

Sol^n P = ₹ 8500

R = 8.5%

T = 1 yr.

$\therefore SI = \frac{P \times R \times T}{100}$

$= \frac{8500 \times 8.5 \times 1}{100}$

= ₹ 722.5

$\therefore$ Amt = P + S.I

= ₹ 9222.5

```
  (2)
   85
 × 85
------   (4)
 ① 425
+ 680
------
 722.5

  (1)
 8500.0
  722.5
-------
 9222.5
```

(iii)

Sol^{n} $P = ₹\ 160.$

$R = 10\%.$

$T = \frac{1}{2}$ year

$= \frac{6}{12}$ year

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

$= \frac{160 \times 10 \times 6}{100 \times 12}$

$= ₹\ 8.$

$\therefore Amt = P + S.I$

$= ₹\ 160 + ₹\ 8$

$= ₹\ 168.$

3.

(i)

Sol^{n} $S.I = ₹\ 57$

$T = 3$

Rate p.a $= 5\%$

$\therefore P = \frac{SI \times 100}{R \times T}$

$= \frac{57 \times 100}{5 \times 3}$

19
×2
380.

= ₹ 380.

4.

(iii)

Soln P = ₹625.

A = ₹ 641.25.

T = 146 days.

$= \frac{146}{365}$ yrs (∵ Rate is p.a.)

∴ S.I = A − P.

= ₹ 641.25 − ₹ 625.

= ₹ 16.25.

641.25
− 625.00
16.25

$\therefore R = \frac{SI \times 100}{P \times T}$

$= \frac{16.25 \times 100}{\cancel{625}^{125} \times \frac{146}{\cancel{365}^{73}}}$

$= \frac{1625}{125 \times \frac{146}{73}}$

13
65
325

$= \frac{\cancel{1625}^{13} \times 73}{\cancel{125}^{25} \times 146}$

$\cancel{5}_{1}$

73
× 13
219
73
949

$= \frac{949}{146}$.

$= 6.5\%$.

6.5
146 | 949
- 876
730
- 730
xx

5.
(iv)
Sol^n $P = ₹\ 600$.
$S.I = ₹\ 12.60$.
$R = 3.5\%$.

$\therefore T = \frac{SI \times 100}{P \times R}$.

$= \frac{12.60 \times 100}{600 \times 3.5}$.

$= \frac{1260}{2100}$

105
35
5.

$= \frac{3}{5}$ yr

3
35
×6
210

6.

Sol^n Here,

$P = ₹\ 8000.$

$R = 12\%$

$T = 9$ months

$= \frac{9}{12}$ yr. ($\because$ rate is p.a)

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

$= \frac{8000 \times 12 \times 9}{100 \times 12_1}$

$= ₹\ 720.$

$\therefore$ Amount Collected $= P + S.I$

$= ₹\ 8000 + ₹\ 720.$

$= ₹\ 8720.$

9.
Sol.^{n}

$R = 8\%$
$T = 4$ yrs.
$A = ₹\ 9900$.

we know,
$$A = P \times \left(1 + \frac{R \times T}{100}\right)$$

∴ we can write :

Amount = ₹ 9900.

$\Rightarrow P \times \left(1 + \frac{R \times T}{100}\right) = ₹\ 9900.$

$\Rightarrow P \times \left(1 + \frac{8 \times 4}{100}\right) = ₹\ 9900.$

$\Rightarrow P \times \left(1 + \frac{32}{100}\right) = ₹\ 9900.$

$\Rightarrow P \times \left(\frac{100 + 32}{100}\right) = ₹\ 9900.$

$\Rightarrow P \times \frac{132}{100} = ₹\ 9900.$

$\Rightarrow P \times 132 = ₹\ 9900 \times 100.$

$\Rightarrow P = ₹\ \frac{9900 \times 100}{132}$

(cancellations: 9900 → 900 → 300; 100 → 50 → 25; 132 → 66 → 6 → 3 → 1)

25
× 3
7500

= ₹ 7500.

∴ Amount borrowed originally = ₹ 7500.

11.

Soln A = ₹ 6720.

P = ₹ 6000.

T = 1 yr 6 months

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

∴ S.I = A - P

= ₹ 6720 - ₹ 6000.

= ₹ 720.

$\therefore R = \frac{SI \times 100}{P \times T}$

$= \frac{720 \times 100}{6000 \times \frac{18}{12}}$

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

= 8% p.a.

13.

(i)

Sol:- $P = ₹\ 5000$

$R = 10\%$

$T = 3yrs.$

$\therefore A = P \times \left(1 + \frac{R \times T}{100}\right)$.

$= 5000 \times \left(1 + \frac{10 \times 3}{100}\right)$.

$= 5000 \times \left(1 + \frac{30}{100}\right)$

$= 5000 \times \left(\frac{100 + 30}{100}\right)$.

$= 5000 \times \frac{130}{100}$.

$= ₹6500$.

① 13 × 5 = 65

(iv)

Soln

$P = ₹\ 720.$

$R = 8.5\%.$

$T = 3yrs.$

$$\therefore A = P \times \left(1 + \frac{R \times T}{100}\right).$$

$$= 720 \times \left(1 + \frac{8.5 \times 3}{100}\right)$$

$$= 720 \times \left(1 + \frac{25.5}{100}\right)$$

$$= 720 \times \left(\frac{100 + 25.5}{100}\right).$$

$$= 720 \times \frac{125.5}{100}.$$

$$= \frac{9036.}{10}$$

$$= ₹\ 903.6.$$

(1)
85
×3
25.5

(1)(1)
1255
(1)×72
(1)2510
8785
9036.0
(3)

Exercise 10.2.

1.

Sol:ⁿ $P = ₹\ 15,000.$

$R = 10\%\ p.a.$

$T = 3yrs.$

For the 1st yr, $A = P \times \left(1 + \frac{R \times T}{100}\right)$

$= 15000 \times \left(1 + \frac{10 \times 1}{100}\right)$

$= 15000 \times \left(1 + \frac{10}{100}\right)$

$= 15000 \times \left(\frac{100 + 10}{100}\right)$

$= 15000 \times \frac{110}{100}$

$= ₹\ 16500.$

$$\begin{array}{r} 15 \\ \times\ 11 \\ \hline 15 \\ +\ 15 \\ \hline 16500 \end{array}$$

For the 2nd yr, $A = P \times \left(1 + \frac{R \times T}{100}\right)$

$= 16500 \times \left(1 + \frac{10 \times 1}{100}\right)$

$= 16500 \times \left(1 + \frac{10}{100}\right)$

$= 16500 \times \frac{100 + 10}{100}$

$= 16500 \times \frac{110}{100}$.

$= ₹\ 18150$.

For the 3rd yr, $A = P \times \left(1 + \frac{R \times T}{100}\right)$.

$= 18150 \times \left(1 + \frac{10 \times 1}{100}\right)$

$= 18150 \times \left(1 + \frac{10}{100}\right)$

$= 18150 \times \left(\frac{100 + 10}{100}\right)$

$= 18150 \times \frac{110}{100}$.

$= ₹\ 19965$

$19965 - 15000 = 4965$

3.

Sol^n

$P = ₹\ 5000.$

$R = 10\%\ p.a.$

$= \frac{10^5}{2_1}\%\ p.a.$

$= 5\%\ p.a.$

$T = 1\frac{1}{2}$ yrs.

$= \frac{3}{2_1} \times \frac{1}{2}$ yrs.

$= 3$ yrs.

For 1st yr, $A = P \times \left(1 + \frac{R \times T}{100}\right)$

$= 5000 \times \left(1 + \frac{5 \times 1}{100}\right)$

$= 5000 \times \left(1 + \frac{5}{100}\right)$

$= 5000 \times \left(\frac{100 + 5}{100}\right)$

$= 5000 \times \frac{105}{100}$

$= \frac{525000}{100}$

$= ₹\ 5250.$

$\begin{array}{r} 105 \\ \times 5 \\ \hline 525000. \end{array}$

For the 2nd yr, $A = P \times \left(1 + \frac{R \times T}{100}\right)$.

$= 5250 \times \left(1 + \frac{5 \times 1}{100}\right)$.

$= 5250 \times \left(1 + \frac{5}{100}\right)$.

$= 5250 \times \left(\frac{100 + 5}{100}\right)$.

$= 5250 \times \frac{105}{100}$.

$= \frac{11025}{2}$.

$= ₹ 5512.5$.

For the 3rd yr, $A = P \times \left(1 + \frac{R \times T}{100}\right)$.

$= 5512.5 \times \left(1 + \frac{5 \times 1}{100}\right)$

$= 5512.5 \times \left(1 + \frac{5}{100}\right)$.

$= 5512.5 \times \left(\frac{100 + 5}{100}\right)$.

$$= 5512.5 \times \frac{105}{100}$$

$$= \frac{23152.5}{4}$$

$$= ₹\ 5788.125$$

$\therefore$ C.I = A - P

$= ₹\ 5788.125 - ₹\ 5000$

$= ₹\ 788.125$ //

11025
×21
11025
+22050
231525

5788.625
4 | 23152.5
-20
31
-28
35
-32
32
-32
5
-4
10
-8
20

Exercise 10.3.

1.

Soln: $P = ₹\ 20,000.$

$R = 15\ \%.$

$T = 3 yrs.$

For the 1st yr, $A = P \times \left(1 + \frac{R \times T}{100}\right)$

$= 20,000 \times \left(1 + \frac{15 \times 1}{100}\right)$

$= 20,000 \times \left(1 + \frac{15}{100}\right)$

$= 20,000 \times \left(\frac{100 + 15}{100}\right)$

$= 20,000 \times \frac{115}{100}$

$= ₹\ 23000.$

$115 \times 2 = 23000$

For the 2nd yr, $A = P \times \left(1 + \frac{R \times T}{100}\right)$

$= 23000 \times \left(1 + \frac{15 \times 1}{100}\right)$

$= 23000 \times \left(1 + \frac{15}{100}\right)$

$= 23000 \times \left(\frac{100 + 15}{100}\right)$

$= 23000 \times \frac{115}{100}$

$= ₹\ 26450.$

For the 3rd yr, $A = P \times \left(1 + \frac{R \times T}{100}\right)$

$= 26450 \times \left(1 + \frac{15 \times 1}{100}\right)$

$= 26450 \times \left(1 + \frac{15}{100}\right)$

$= 26450 \times \left(\frac{100 + 15}{100}\right)$

$= 26450 \times \frac{115}{100}$

$= \frac{60835}{2}$

$= ₹\ 30417.5$

$\therefore C.I = A - P$

$= ₹\ 30417.5 - ₹\ 20000$

$= ₹\ 10417.5$

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5.

Sol:- $P = ₹\ 4000.$

$R = 10\%\ p.a.$

$T = 2\frac{1}{2}\ yrs$

$= \frac{5}{2}\ yrs.$

$\therefore C.I = P\left(1 + \frac{R}{100}\right)^T - P.$

$= 4000 \times \left(1 + \frac{10}{100}\right)^{3/2} - 4000.$

6.

Sol^n $P = ₹\ 5000$

$R = 6\%\ p.a$

$T = 3yrs.$

For the 1st yr, $A = P \times \left(1 + \frac{R \times T}{100}\right)$

$= 5000 \times \left(1 + \frac{6 \times 1}{100}\right)$

$= 5000 \times \left(\frac{100 + 6}{100}\right)$

$= 5000 \times \frac{106}{100}$

$= ₹\ 5300$

106
×5
5300

For the 2nd yr, $A = P \times \left(1 + \frac{R \times T}{100}\right)$

$= 5300 \times \left(1 + \frac{6 \times 1}{100}\right)$

$= 5300 \times \left(1 + \frac{6}{100}\right)$

$= 5300 \times \left(\frac{100 + 6}{100}\right)$

$= 5300 \times \frac{106}{100}$

$= ₹\ 5618.$

106.
×53
318
+530
5618

For the 3rd yr, $A = P \times \left(1 + \frac{R \times T}{100}\right)$

$= 5618 \times \left(1 + \frac{6 \times 1}{100}\right)$

$= 5618 \times \left(1 + \frac{6}{100}\right)$

$= 5618 \times \left(\frac{100 + 6}{100}\right)$

$= 5618 \times \frac{106}{100}$

$= \frac{595508}{100}$

$= ₹\ 5955.08$

(3)(1)(4)
5618
×106.
0
33708
0000
+5618
5955.08
−5000.00
955.08

$\therefore C.I = A - P$

$= ₹\ 5955.08 - ₹\ 5000$

$= ₹\ 955.08$

10.

Soln: $P = ₹\ 20,000.$

$R = 8\%.$

$T = 3yrs.$

For the 1st yr, $A = P \times \left(1 + \frac{R \times T}{100}\right).$

$= 20,000 \times \left(1 + \frac{8 \times 1}{100}\right)$

$= 20,000 \times \left(\frac{1 + 8}{100}\right)$

$= 20,000 \times \left(\frac{100 + 8}{100}\right)$

$= 20,000 \times \frac{108}{100}$

$108 \times 2 = 21600$

$= ₹\ 21600.$

For the 2nd yr, $A = P \times \left(1 + \frac{R \times T}{100}\right)$

$= 21600 \times \left(1 + \frac{8 \times 1}{100}\right)$

$= 21600 \times \left(1 + \frac{8}{100}\right)$

$= 21600 \times \left(\frac{100 + 8}{100}\right)$

$= 21600 \times \frac{108}{100}$

$= ₹23328$

① ④
216
× 108
1728
000
+ 216
23328

For the 3rd yr, $A = P \times \left(1 + \frac{R \times T}{100}\right)$

$= 23328 \times \left(1 + \frac{8 \times 1}{100}\right)$

$= 23328 \times \left(1 + \frac{8}{100}\right)$

$= 23328 \times \left(\frac{100 + 8}{100}\right)$

$= 23328 \times \frac{108}{100}$

$= \frac{2519424}{100}$

$= ₹ 25194.24$

② ② ② ⑥
23328
① × 108
186624
00000
+ 23328
25194.24
− 20000.00
5194.24

$\therefore C.I = A - P$

$= ₹ 25194.24 - ₹ 20,000.$

$= ₹ 5194.24$

13

Soln: $P = ₹\ 100000$

$R = 8\%\ p.a.$

$= \frac{8}{2_1}\%\ p.a.$

$= 4\%\ p.a.$

$T = 1\frac{1}{2}\ yrs.$

$= \frac{3}{2_1} \times 2^1\ yrs.$

$= 3\ yrs.$

$104 \times 104 = 10816$

$10816 \times 104 = 1124864$

$\therefore CI = P \times \left(1 + \frac{R}{100}\right)^T - P$

$= 100000 \times \left(1 + \frac{4}{100}\right)^3 - 100000.$

$= 100000 \times \left(\frac{100 + 4}{100}\right)^3 - 100000$

$= 100000 \times \left(\frac{104}{100}\right)^3 - 100000.$

$= 100000 \times \frac{104}{100} \times \frac{104}{100} \times \frac{104}{100} - 100000.$

$= \frac{1124864}{10} - 100000.$

$$= \frac{1124864 - 1000000}{10}$$

$$= \frac{124864}{10}$$

$$= ₹\ 12486.4$$

Amount = 112486.4

$$\begin{array}{r} 1124864 \\ -\ 1000000 \\ \hline 124864 \end{array}$$

Exercise 10.4.

1.

Sol:ⁿ $A = ₹\ 7290$

$R = 8\%\ p.a.$

$T = 2\ yrs.$

here,

Amount $= ₹\ 7290.$

$\Rightarrow P \times \left(1 + \frac{R}{100}\right)^T = ₹\ 7290.$

$\Rightarrow P \times \left(1 + \frac{8}{100}\right)^2 = ₹\ 7290.$

$\Rightarrow P \times \left(\frac{100+8}{100}\right)^2 = ₹\ 7290.$

$\Rightarrow P \times \left(\frac{108}{100}\right)^2 = ₹\ 7290.$

$\Rightarrow P \times \frac{108}{100} \times \frac{108}{100} = ₹\ 7290.$

$\Rightarrow P \times \frac{11664}{10000} = ₹\ 7290.$

$\Rightarrow P \times 11664 = ₹\ 7290 \times 10000.$

$\Rightarrow P = ₹\ \frac{7290 \times 10000}{11664}.$

108
×108
①864
000
+108
11664

5
~~75~~
~~185~~
~~465~~ 1250
~~1215~~ ~~2500~~
~~3645~~ ~~5000~~

$\Rightarrow P = ₹ \frac{7290 \times 10000}{11664}$

~~58~~52
~~29~~16
~~14~~58
~~7~~29
~~2~~43
~~8~~1
~~2~~7
9

① ②
125
×5
6250

$= ₹ 6250.$

$\therefore$ Sum invested $= ₹ 6250.$

Q3.

Soln $A = ₹\ 10935.$

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

$T = 3.$

here,

Amount $= ₹\ 10,935.$

$\Rightarrow P \times \left(1 + \frac{R}{100}\right)^T = ₹\ 10,935.$

$\Rightarrow P \times \left(1 + \frac{\frac{25}{2}}{100}\right)^3 = ₹\ 10,935.$

$\Rightarrow P \times \left(1 + \frac{25}{2} \times \frac{1}{100_{4}}\right)^3 = ₹\ 10,935.$

$\Rightarrow P \times \left(1 + \frac{1}{8}\right)^3 = ₹\ 10,935.$

$\Rightarrow P \times \left(\frac{8+1}{8}\right)^3 = ₹\ 10,935.$

$\Rightarrow P \times \left(\frac{9}{8}\right)^3 = ₹\ 10,935.$

$\Rightarrow P \times \frac{9}{8} \times \frac{9}{8} \times \frac{9}{8} = ₹\ 10,935.$

$\Rightarrow P \times \frac{729}{512} = ₹\ 10,935.$

$\Rightarrow P \times 729 = ₹\ 10,935 \times 512$

135 | 15
405
1215
3645

$\Rightarrow P = \dfrac{₹\ 10,935 \times 512}{729}$

729
243
81
27
9
1

① 512 × 15 = 2560 + 512 = 7680

$= ₹\ 7680.$

$\therefore$ Principal $= ₹\ 7680.$

5.

Sol^n

$P = ₹\ 6750.$

$A = ₹\ 8192$

$R = 6\frac{2}{3}\%.$

$= \frac{20}{3}\%.$

here,

Amount $= ₹\ 8192.$

$\Rightarrow P \times \left(1 + \frac{R}{100}\right)^T = ₹\ 8192.$

$\Rightarrow 6750 \times \left(1 + \frac{\frac{20}{3}}{100}\right)^T = ₹\ 8192.$

$\Rightarrow 6750 \times \left(1 + \frac{\overset{1}{\cancel{20}}}{3} \times \frac{1}{\underset{5}{\cancel{100}}}\right)^T = ₹\ 8192.$

$\Rightarrow 6750 \times \left(1 + \frac{1}{15}\right)^T = ₹\ 8192.$

$\Rightarrow 6750 \times \left(\frac{15+1}{15}\right)^T = ₹\ 8192$

$\Rightarrow 6750 \times \left(\frac{16}{15}\right)^T = ₹\ 8192$

$\Rightarrow \left(\frac{16}{15}\right)^T = \frac{\overset{4096}{\cancel{8192}}}{\underset{3375}{\cancel{6750}}}.$

$\Rightarrow \left(\frac{16}{15}\right)^T = \frac{4096}{3375}$.

$\Rightarrow \left(\frac{16}{15}\right)^T = \left(\frac{16}{15}\right)^3$.

$16 \times 16 \times 16 = 4096$

$15 \times 15 \times 15 = 3375$.

$\Rightarrow T = 3$.

$\therefore$ Time = 3 years.

8.

Soln:

$P = ₹\ 6400$.

$R = 6\frac{1}{4}\%$.

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

$T = 2$ yrs.

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

$= ₹\ \frac{6400 \times 25 \times 2}{100 \times 4}$

$= ₹\ 800$.

For the 1st year, $A = P \times \left(1 + \frac{R \times T}{100}\right)$

$= 6400 \times \left(1 + \frac{\frac{25}{4} \times 2}{100}\right)$

$= 6400 \times \left(1 + \frac{25}{2} \times \frac{1}{100}\right)$

$= 6400 \times \left(1 + \frac{1}{8}\right)$.

$= 6400 \times \left(\frac{8+1}{8}\right)$

$$= 6400 \times \frac{9}{8_1}$$

$$= 7200.$$

For the 2nd yr, $A = P \times \left(1 + \frac{R \times T}{100}\right)$.

$$= 7200 \times \left(1 + \frac{25}{4_2} \times \frac{2^1}{100}\right)$$

$$= 7200 \times \left(1 + \frac{25}{2} \times \frac{1}{100_4}\right)$$

$$= 7200 \times \left(1 + \frac{1}{8}\right)$$

$$= 7200 \times \left(\frac{8+1}{8}\right)$$

$$= 7200 \times \frac{9}{8_1}$$

$$= 8100.$$

$\therefore$ C.I $= A - P$

$= ₹\ 8100 - ₹\ 6400.$

$= ₹\ 1700$

$$\begin{array}{r} 8100 \\ 6400 \\ \hline 1700 \end{array}$$

9.

Sol^n Let the Principal be ₹ 100

$R = 10\%$ p.a

$T = 2$ yrs.

We know,

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

$$= 100 \times \left(1 + \frac{10}{100}\right)^2$$

$$= 100 \times \left(\frac{100 + 10}{100}\right)^2$$

$$= 100 \times \left(\frac{110}{100}\right)^2$$

$$= \cancel{100}^{1} \times \frac{110}{\cancel{100}_{1}} \times \frac{110}{\cancel{100}}$$

$$= ₹\ 121.$$

$\therefore C.I = A - P.$

$= ₹\ 121 - ₹\ 100.$

$= ₹\ 21.$

When $C.I = ₹ 21$, $P = ₹ 100$.

If $C.I = ₹ 315$, then $P = \frac{100}{\cancel{21}_{1}} \times \cancel{315}^{\cancel{105}^{15}}$.

$= ₹\ 1500.$

$\therefore$ S.I for ₹ 1500 @ 10% p.a for 2yrs.

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

$$= \frac{1500 \times 10 \times 2}{100}$$

$= ₹\ 300.$

11.

Sol^n $A = ₹\ 6560$

$P = ₹\ 6400$

$R = 5\%\ p.a.$

$= \frac{5}{2}\%\ p.a.$

We know,

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

$$6560 = 6400 \times \left(1+\frac{\frac{5}{2}}{100}\right)^{T}$$

$$\Rightarrow 6560 = 6400 \times \left(1+\frac{\cancel{5}^{1}}{2}\times\frac{1}{\cancel{100}_{20}}\right)^{T}$$

$$\Rightarrow 6560 = 6400 \times \left(1+\frac{1}{40}\right)^{T}$$

$$\Rightarrow 6560 = 6400 \times \left(\frac{40+1}{40}\right)^{T}$$

$$\Rightarrow 6560 = 6400 \times \left(\frac{41}{40}\right)^{T}$$

$$\Rightarrow \frac{\cancel{6560}_{\cancel{82}^{41}}}{\cancel{6400}_{\cancel{80}_{40}}} = \left(\frac{41}{40}\right)^{T}$$

$$\Rightarrow \left(\frac{41}{40}\right)^1 = \left(\frac{41}{40}\right)^T$$

$$\Rightarrow 1 = T$$

$\therefore$ Time = 1 year.

Exercise 10.5.

1.

Sol^n Present Population (P) = 12,50,000.

Rate of increase (R) = 10%.

Time (T) = 4 yrs.

∴ Population after 4 yrs = $P \times \left(1 + \frac{R}{100}\right)^T$

$= 1250000 \times \left(1 + \frac{10}{100}\right)^4$.

$= 1250000 \times \left(\frac{100 + 10}{100}\right)^4$.

$= 1250000 \times \left(\frac{110}{100}\right)^4$.

$= 1250000 \times \frac{110}{100} \times \frac{110}{100} \times \frac{110}{100} \times \frac{110}{100}$.

$= 1830125$.

```
  121
x 121
-----
  121
 242
+121
-----
14641
```

```
  (2)(3)(2)
  14641
x   125
-------
  (1)(1)
 (2)73205
  29282
+14641
-------
1830125
```

2.

Sol: Present Population of Cattle (P) = 30000.
Rate of depletion (R) = 20%
Time (T) = 3yrs.

∴ Population of Cattle after 3 yrs $= P \times \left(1 - \frac{R}{100}\right)^T$.

$= 30000 \times \left(1 - \frac{20}{100}\right)^3$.

$= 30000 \times \left(\frac{100 - 20}{100}\right)^3$.

$= 30000 \times \left(\frac{80}{100}\right)^3$.

$= 30000 \times \frac{80}{100} \times \frac{80}{100} \times \frac{80}{100}$.

$= 15360$.

① ①
24
× 64
096
144
15360

3.

Sol:- Present Population $= 16000 \times \left(1 + \frac{R}{100}\right) \times \left(1 - \frac{R}{100}\right)$.

$= 16000 \times \left(1 + \frac{10}{100}\right) \times \left(1 - \frac{18}{100}\right)$.

$= 16000 \times \left(\frac{100 + 10}{100}\right) \times \frac{(100 - 18)}{100}$.

$= 16000 \times \frac{110}{100} \times \frac{82}{100}$.

$= 14432$.

$$
\begin{array}{r}
16 \\
\times\ 82 \\
\hline
032 \\
+\ 128 \\
\hline
1312 \\
\times\ 11 \\
\hline
1312 \\
+\ 1312 \\
\hline
14432
\end{array}
$$

Exercise 10.6.

1.

Sol:n Present Price of the plot (P) = ₹ 2,00,000.
Rate of appreciation (R) = 5%
Time (T) = 3yrs.

∴ Expected price after 3yrs $= P \times \left(1 + \frac{R}{100}\right)^T$

$= ₹\,2,00,000 \times \left(1 + \frac{5}{100}\right)^3$

$= ₹\,2,00,000 \times \left(\frac{100 + 5}{100}\right)^3$

$= ₹\,2,00,000 \times \left(\frac{105}{100}\right)^3$

$= ₹\,\cancel{2}_{1}\,\cancel{00000} \times \frac{\overset{21}{\cancel{105}}}{\cancel{100}} \times \frac{105}{\cancel{100}} \times \frac{105}{\cancel{100}}$

$= ₹\,2,31,525.$

$$\begin{array}{r} 105 \\ \times\,105 \\ \hline 525 \\ 000 \\ +\,105 \\ \hline 11025 \end{array}$$

$$\begin{array}{r} 11025 \\ \times\,21 \\ \hline 11025 \\ +\,22050 \\ \hline 231525 \end{array}$$

2.

Sol^n Let the price of the land two years ago be P.

Given,

Present Price of land = ₹ 11,881

$\Rightarrow P \times \left(1 + \frac{R}{100}\right)^T = ₹\ 11,881$

$\Rightarrow P \times \left(1 + \frac{9}{100}\right)^2 = ₹\ 11881$

$\Rightarrow P \times \left(\frac{100 + 9}{100}\right)^2 = ₹\ 11881$

$\Rightarrow P \times \left(\frac{109}{100}\right)^2 = ₹\ 11881$

$\Rightarrow P \times \frac{109}{100} \times \frac{109}{100} = ₹\ 11881$

$\Rightarrow P \times 109 \times 109 = ₹\ 11881 \times 100 \times 100$

$\Rightarrow P = ₹\ \frac{11881 \times 100 \times 100}{109 \times 109}$

$= ₹\ 10,000$

$$\begin{array}{r} 8 \\ 109 \\ \times\ 109 \\ \hline 981 \\ 000 \\ +\ 109 \\ \hline 11881 \end{array}$$

16. Surface Area & Volume

Date
Page 97

Exercise 16.1

1.

a).

Sol^n Surfaces in Fig 16.2 (i) are: WXYZ, PQRS, PQXW, RSYZ, QRYX, PSZW.

(b)

Sol^n Twelve edges of the cuboid in Fig 16.2 (i) are: WX, XY, YZ, ZW, PQ, QR, RS, PS, PW, SZ, QX, RY

c).

Sol^n The eight vertices of the cuboid in Fig 16.2 (i) are: W, X, Y, Z, P, Q, R, S.

Exercise 16.2.

1.

(i)

Soln Here, $l = 7cm$

$b = 4cm$

$h = 3cm$.

$\therefore$ TSA of the cuboid $= 2 \times (lb + lh + bh)$.

$= 2 \times \{(7cm \times 4cm) + (7cm \times 3cm) + (4cm \times 3cm)\}$

$= 2 \times \{28 cm^2 + 21 cm^2 + 12 cm^2\}$

$= 2 \times 61 cm^2$

$= 122 cm^2$.

(iv)

Soln Here, $l = 8m$

$b = 4m$

$h = 2m$.

$\therefore$ TSA of the cuboid $= 2 \times (lb + lh + bh)$.

$= 2 \times \{(8m \times 4m) + (8m \times 2m) + (4m \times 2m)\}$.

$= 2 \times \{32 m^2 + 16 m^2 + 8 m^2\}$.

$= 2 \times 56 m^2$

$= 112 m^2$.

2.

Soln Here, $l = 3m$

$b = 2m$

$h = 1.5m$.

6.0
4.5
3.0
13.5

$\therefore$ T.S.A of the tank $= 2 \times (lb + lh + bh)$.

$= 2 \times \{(3m \times 2m) + (3m \times 1.5m) + (2m \times 1.5m)\}$.

$= 2 \times \{6m^2 + 4.5m^2 + 3m^2\}$

$= 2 \times 13.5\ m^2$.

$= 27\ m^2$.

$\therefore$ Cost of painting the tank @ ₹ 20 per sq. m

$= ₹ 20 \times 27$

$= ₹ 540$.

① 27 × 2 = 540

3.

Soln Here,

Side of the cube (a) $= 80\ cm$.

② 64 × 6 = 38400

$\therefore$ Surface area of the box $= 6a^2$

$= 6 \times (80\ cm)^2$.

$= 6 \times 6400\ cm^2$.

$= 38400\ cm^2$.

6.

Sol^n Here, Length of pool (l) = 30 m.
breadth " " (b) = 20 m.
height " " (h) = 1.5 m

① 15 × 2 = 30, 30 × 3 = 90
② 15 × 4 = 600

∴ Area of the pool = $lb + 2lh + 2bh$.

$= 30m \times 20m + 2 \times 30m \times 1.5m + 2 \times 20m \times 1.5m$

$= 600 m^2 + 90 m^2 + 60 m^2$.

$= 750 m^2$.

Area of the Tile = 50 cm × 50 cm.

$= 2500 cm^2$.

① 600 + 90 + 60 = 750

∴ No. of Tiles required = $\frac{\text{Area of pool}}{\text{Area of Tile}}$

$= \frac{750 m^2}{2500 cm^2}$

$= \frac{750 \times 100cm \times 100 cm}{2500 cm^2}$ {∵ 1 m = 100 cm

$= \frac{7500000 cm^2}{2500 cm^2}$ (3000, 15000)

$= 3000$ Tiles

7.

Sol^{n} Given,

TSA of the cube = 150 sq. m.

$\Rightarrow$ $6a^2 = 150$ sq. m.

$\Rightarrow$ $a^2 = \frac{150 \text{ sq. m}}{6}$

$\Rightarrow$ $a^2 = 25$ sq. m.

$\Rightarrow$ $a = \sqrt{25 \text{ sq. m}}$.

$= \sqrt{5m \times 5m}$.

$= \sqrt{(5m)^2}$

$= 5m$.

$\therefore$ Length of its side = 5m.

8.

Sol:n Given,

126.
-60
66

TSA of the cuboid = 126 sq. m.

$\Rightarrow 2 \times (lb + lh + bh) = 126$ sq. m.

$\Rightarrow 2 \times (6m \times 5m + 6m \times h + 5m \times h) = 126$ sq. m.

$\Rightarrow 2 \times \{(30m^2) + (6h)m^2 + (5h\ m^2)\} = 126$ sq. m.

$\Rightarrow 60m^2 + (12h)m^2 + (10h\ m^2) = 126$ sq. m.

$\Rightarrow 60m^2 + (22h)m^2 = 126$ sq. m.

$\Rightarrow (22h)m^2 = 126$ sq. m $- 60m^2$.

$\Rightarrow (22h)m^2 = 66$ sq. m.

$\Rightarrow h = \frac{66 \text{ sq. m}}{22 \text{ sq. m}}$

$= 3m$.

$\therefore$ height of the cuboid $= 3m$.

Pg : 103

Exercise 16.3

1. Fill in the blanks.

(i) 1 litre = 1000 millilitres
= 1000 cm^3

(ii) 5 litres = 5 dm^3

(iii) 10,000 cm^3 = 10 dm^3

(iv) 5 dm^3 = 5000 cm^3

(v) 5 kilolitres = 5000 litres

(vi) 1000 litres = 1 m^3

(vii) 10,00,000 cm^3 = 1 m^3

(viii) 3 m^3 = 3000 litres

(ix) $\frac{1}{2}$ litre = $\frac{1}{2}$ dm^3 = 500 $m\ell$

Exercise 16.4.

1.

(i)

Sol:

$l = 6m.$

$b = 3m.$

$h = 4m.$

$\therefore$ Volume $= l \times b \times h.$

$= 6m \times 3m \times 4m.$

$= 72\ m^3.$ (or) 72 Cu. m.

(3)
18
× 4.
72

(ii)

Sol:

$l = 2.5\ m.$

$b = 1.5\ m$

$h = 1\ m.$

$\therefore$ Volume $= l \times b \times h.$

$= 2.5\ m \times 1.5\ m \times 1\ m.$

$= 3.75\ m^3.$

or

3.75 Cu. m.

(2)
25
× 15
125
+ 25
3.75

2.

(i)

Sol:- $l = 12\ cm.$

$b = 8\ cm.$

Volume $= 576\ cm^2.$

We know,

$$\text{Volume} = 576\ cm^3.$$

$$\Rightarrow l \times b \times h = 576\ cm^3.$$

$$\Rightarrow 12\ cm \times 8\ cm \times h = 576\ cm^3.$$

$$\Rightarrow h = \frac{576\ cm^3}{12\ cm \times 8\ cm}$$

$$= 6\ cm.$$

(ii)

Sol:- $b = 3.2\ m$

$h = 4.5\ m.$

Volume $= 144\ m^3.$

We know,

$$\text{Volume} = 144\ m^3.$$

$$\Rightarrow l \times b \times h = 144\ m^3.$$

$\Rightarrow l \times 3.2\,m \times 4.5\,m = 144\,m^3.$

$\Rightarrow l = \dfrac{144\,m^3}{3.2\,m \times 4.5\,m}$

$= \dfrac{144\,m^3}{14.40\,m^2}.$

$= \dfrac{144 \times 100\,m^3}{14.40 \times 100\,m^2}$

$= \dfrac{14400\,m^3}{1440\,m^2}$ (10.)

$= 10\,m.$

① 32 × ① 45 = 160 + 128 = 1440

4.

Sol:n Here,

$b = 4m$

$h = 2m.$

We can say,

Volume of the tank = 120 kl.

$\Rightarrow l \times b \times h = 120\ m^3 \quad (\because 1\ kL = 1\ m^3)$

$\Rightarrow l \times 4m \times 2m = 120\ m^3.$

$\Rightarrow l \times 8m^2 = 120\ m^3.$

$\Rightarrow l = \frac{120\ m^3}{8m^2}$

$= 15\ m.$

$\therefore$ Length of the pool = 15 m.

5.

Sol:n For the big box,

$l = 1m = 100\ cm.$

$b = 60\ cm$

$h = 40\ cm.$

$\therefore$ Volume $= l \times b \times h.$

$= 100\ cm \times 60\ cm \times 40\ cm.$

$= 240000\ cm^3$

6
×4
240000

For the small rectangular packets:

$l = 5\,cm$
$b = 8\,cm.$
$h = 10\,cm.$

$\therefore$ Volume $= l \times b \times h$
$= 5\,cm \times 8\,cm \times 10\,cm$
$= 400\,cm^3$

$\therefore$ No. of packets that can be placed in the big box $=$ Volume of big box / Volume of packet

$$= \frac{240000\,cm^3}{400\,cm^3}$$

$= 600$ packets.

6
Sol^n Side of the cube $(a) = 8\,cm.$

$\therefore$ Volume of the cube $= a^3.$
$= 8\,cm \times 8\,cm \times 8\,cm.$
$= 512\,cm^3.$

(3)
64
×8
512

8.

Sol:- Area of the floor of the room ($l \times b$) = 67.5 sq.m.

Volume of the room ($l \times b \times h$) = 270 cu.m.

$\therefore$ Height of the room = $\frac{\text{Volume of the room.}}{\text{Area of the floor}}$

$= \frac{270 \text{ cu.m.}}{67.5 \text{ sq.m.}}$

$= \frac{270 \text{ cu.m} \times 10.}{67.5 \text{ sq.m} \times 10.}$

$= \frac{2700 \text{ cu.m.}}{675 \text{ sq.m.}}$

$= 4 \text{ m.}$

10.

Sol^n Here,

$l = 3\,m$.
$= 3 \times 100\,cm \quad (\because 1\,m = 100\,cm)$.
$= 300\,cm$.

$b = 1.5\,m$.
$= 1.5 \times 100\,cm$
$= 150\,cm$.

$h = 3\,cm$.

① 15 ×3 45 ④
② ③ ×3 135000 ×7 945000

Volume of the metal piece $= l \times b \times h$
$= 300\,cm \times 150\,cm \times 3\,cm$
$= 135000\,Cu.cm$

$\therefore$ Weight of the metal piece $= 7 \times 135000\,g$.
$= 945000\,g$.

Exercise 16.5.

1.

Sol:- diameter $= 3\frac{1}{2}$ m.

$= \frac{7}{2}$ m

then, radius $= \frac{\text{diameter}}{2}$.

$= \frac{\frac{7}{2}}{2}$ m.

$= \frac{7}{2} \times \frac{1}{2}$ m

$= \frac{7}{4}$ m.

$h = 6$m

$\therefore$ LSA of the well $= 2\pi rh$.

$= \cancel{2}^{1} \times \frac{\cancel{22}^{11}}{\cancel{7}_{1}} \times \frac{\cancel{7}^{1}}{\cancel{4}_{\cancel{2}_{1}}}$ m $\times$ 6m.

$= 66$ m^2.

and Volume of earth removed $= \pi r^2 h$.

$= \frac{\cancel{22}^{11}}{\cancel{7}_{1}} \times \frac{\cancel{7}^{1}}{\cancel{4}_{\cancel{2}}}$ m $\times \frac{7}{4}$ m $\times$ 6m

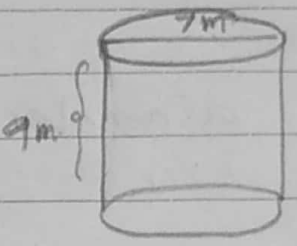
$= 57.75$ m^3.

(2)
77
× 3
231

57.75
4 | 231
-20
31
-28
30
-28
20
-20
xx

2.

Sol^n Here, $d = 7\,m$.



then, $r = \frac{7}{2}\,m$.

$h = 9\,m$.

① 22 × 9 = 198

L.S.A of the oil tank $= 2\pi rh$.

$= \cancel{2}^{1} \times \frac{22}{\cancel{7}_{1}} \times \frac{\cancel{7}^{1}}{\cancel{2}_{1}}\,m \times 9\,m$.

$= 198\,m^2$.

∴ Cost of painting @ ₹ 35 per sq. m.

$= ₹\ 35 \times 198$.

$= ₹\ 6930$

④④ 198 × 35 = ① 990 ② + ① 594 ② = 6930

4.

Sol:ⁿ Here, $d = 4m$

then, $r = \frac{d}{2}$.

$= \frac{4}{2_1}^{2} m.$

$= 2m.$

$h = 10m.$

① 314 × 4 = 125.60

∴ Qty of earth taken out $= \pi r^2 h.$

$= \frac{22}{7} \times 2m \times 2m \times 10m.$

$= 3.14 \times 40 m^3.$

$= 125.6 m^3$

∴ C.S.A of the well $= 2\pi rh$

$= 2\pi rh.$

$= 2 \times 3.14 \times 2m \times 10m.$

$= 125.6 m^2.$

∴ Cost of plastering the curved surface @ ₹ 5.00 per sq.m $= ₹ 5 \times 125.6.$

$= ₹ 628.$

7.

Sol^n Here,

Volume of 1 m iron rod = 1386 cu. cm

$\pi r^2 h$ = 1386 cu. cm.

$\Rightarrow \frac{22}{7} \times r^2 \times 100 \text{ cm} = 1386 \text{ cu. cm.}$

$\Rightarrow r^2 = \frac{1386 \times 7}{22 \times 100} \text{ sq. cm.}$

$\Rightarrow r^2 = \frac{441}{100} \text{ sq. cm.}$

$\Rightarrow r = \sqrt{\frac{441}{100}} \text{ sq. cm.}$

$= \sqrt{\frac{21}{10}} \text{ sq cm}$

$= \frac{21}{10}$

$= 2.1 \text{ cm.}$

$\therefore$ diameter $= 2 \times 2.1 \text{ cm.}$

$= 4.2 \text{ cm.}$

19. Probability.

Exercise 19.1

1.

Sol^n All possible outcomes are : (i) Head (ii) Tail

2.

Sol^n All possible outcomes are : (i) 1 (ii) 2 (iii) 4 (iv) 6

3.

Sol^n All possible outcomes are : (i) Red ball (ii) White ball.

4.

Sol^n All possible outcomes are : (i) Red ball
(ii) Green ball
(iii) Blue ball.

5.

Sol^n All possible outcomes are : (i) 1
(ii) 3
(iii) 5.
(iv) 6.
(v) 10.

6.

Sol^n All possible outcomes are : (i) A
(ii) B.
(iii) C
(iv) D.

7.

Sol.ⁿ All possible outcomes are :

(i) (1, 1) (1, 2) (1, 3) (1, 4).

(ii) (2, 1) (2, 2) (2, 3) (2, 4).

(iii) (3, 1) (3, 2) (3, 3) (3, 4).

(iv) (4, 1) (4, 2) (4, 3) (4, 4).

Exercise 19.2.

1.

Soln All possible outcomes : (i) Blue
(ii) Green
(iii) White
(iv) Red.

Simple events : Blue, green, white, red.

4.

Soln All possible outcomes : (i) Green marble
(ii) Blue marble
(iii) Red marble.

Simple events : Green marble, Blue marble, Red marble.

5.

Soln All simple events are : 1, 2, 3, 4, 5 & 6.

No, (1, 2) is not a possible outcome.

Exercise 19.3.

1.

Sol^n Here,

All Possible outcomes are : (i) Green
(ii) Red
(iii) Blue
(iv) Yellow.

Simple events are : Green, Red, Blue & Yellow.

$$P(\text{Red}) = \frac{\text{No. of favourable outcome.}}{\text{All possible outcomes.}}$$

$$= \frac{1}{4}.$$

2.

Sol^n Here,

All Possible outcomes are : (i) 1
(ii) 2.
(iii) 3.
(iv) 4.
(v) 5.

Simple events are : 1, 2, 3, 4, 5.

$$P(4) = \frac{\text{No. of favourable outcome.}}{\text{All possible outcomes.}}$$

$$= \frac{1}{5}.$$

$$P(\text{even number}) = \frac{\text{No. of favourable outcome}}{\text{All possible outcome.}}$$

$$= \frac{2}{5}.$$

6.

Soln All possible outcomes are : (i) Head, Head
(ii) Tail, Tail
(iii) Head, Tail
(iv) Tail, Head.

Successful events are : (Head, Head);
(Head, Tail);
(Tail, Head).

It is a compound event.

8.

Soln All possible outcomes are : (i) Red, Green, Blue
(ii) Red, Red, Green
(iii) Red, Red, Blue
(iv) Green, Green, Red
(v) Green, Green, Blue
(vi) Blue, Blue, Red
(vii) Blue, Blue, Green
(viii) Red, Red, Red
(ix) Green, Green, Green
(x) Blue, Blue, Blue

Successful events are : (Red, Red, Red);
(Green, Green, Green).
(Blue, Blue, Blue).