

Answers



1. Rational Numbers

Exercise - 1.1

I.

- (i) Additive Identity
(ii) Distributive law
(iv) Multiplicative identity
(vi) Closure law in multiplication
(viii) Multiplicative inverse
- (iii) Multiplicative identity
(v) Commutative law of addition
(vii) Additive inverse law
(ix) Distributive
2. (i) $\frac{3}{5}, \frac{-5}{3}$ (ii) $-1, 1$ (iii) $0, \text{undefined}$ (iv) $\frac{-7}{9}, \frac{9}{7}$
(v) $1, -1$
3. (i) $\frac{-12}{5}$ (ii) 0 (iii) $\frac{9}{11}$ (vi) $\frac{6}{7}$
(v) $\frac{3}{4}, \frac{1}{3}$ (vi) 0 4. $\frac{-28}{55}$
5. Multiplicative Associative, multiplicative inverse, multiplicative identity, closure with addition.
7. $\frac{28}{15}$ 8. (i) $\frac{-5}{12}$ (ii) $\frac{58}{13}$ (iii) $\frac{45}{7}$
9. $\frac{-7}{8}$ 10. $\frac{53}{6}$
11. Not associative Since $\left(\frac{1}{2} - \frac{1}{3}\right) - \frac{1}{4} \neq \frac{1}{2} - \left(\frac{1}{3} - \frac{1}{4}\right)$
13. (i) Natural numbers (ii) 0 (iii) Negative

Exercise - 1.3

1. (i) $\frac{57}{100}$ (ii) $\frac{22}{125}$ (iii) $\frac{100001}{100000}$ (iv) $\frac{201}{8}$
2. (i) 1 (ii) $\frac{19}{33}$ (iii) $\frac{361}{495}$ (vi) $\frac{553}{45}$
3. (i) $\frac{7}{13}$ (ii) $\frac{-7}{5}$
4. -1 5. $\frac{1400}{9}$ 6. $5\frac{1}{10}$ m 7. ₹. 1.66
8. $161\frac{1}{5}$ m² 9. $\frac{3}{4}$ 10. $\frac{16}{9}$ m 11. 15



2. Linear Equations in one variable

Exercise - 2.1

1. (i) 2 (ii) -3 (iii) -6 (iv) 6
- (v) $\frac{-3}{2}$ (vi) -21 (vii) 27 (viii) 5
- (ix) $\frac{7}{3}$ (x) 1 (xi) $\frac{1}{2}$ (xii) 0
- (xiii) $\frac{25}{7}$ (xiv) $\frac{21}{16}$ (xv) $\frac{8}{3}$ (xvi) $\frac{13}{6}$

Exercise - 2.2

1. (i) 67^0 (ii) 17^0 (iii) 125^0 (iv) 19^0
- (v) 20^0
2. 5 3. 43, 15 4. 27, 29
5. 252, 259, 266 6. 20 km 7. 99g, 106g, 95g 8. 113m, 87m
9. 16m, 12m 10. 21m, 21m, 13m
11. 39^0 12. 28 years, 35 years
13. 126 14. 80, 10 15. 60, 40 16. 59 ft, 29.5 ft
17. 186, 187.

Exercise - 2.3

- | | | | |
|-------------------|--------------------|-------------------|-------------------|
| 1. 1 | 2. 2 | 3. $\frac{11}{4}$ | 4. -1 |
| 5. $\frac{-9}{5}$ | 6. 1 | 7. 7 | 8. $\frac{-4}{7}$ |
| 9. $\frac{9}{2}$ | 10. $\frac{11}{3}$ | 11. 1 | 12. -96 |
| 13. 3 | 14. 8 | | |

Exercise - 2.4

- | | | | |
|-------|---------|-------|----------------------|
| 1. 25 | 2. 7 | 3. 63 | 4. 40, 25, 15 |
| 5. 12 | 6. 4, 2 | 7. 16 | 8. 10,000 9. 40 |

Exercise - 2.5

- | | | | |
|------------------------|-----------|--|-----------------------|
| 1.(i) $\frac{145}{21}$ | (ii) 168 | (iii) 12 | (iv) 25 |
| (v) $\frac{127}{12}$ | (vi) 1 | (vii) $\frac{9}{2}$ | (viii) $\frac{5}{12}$ |
| (ix) $\frac{9}{23}$ | (x) -1 | (xi) $\frac{-1}{7}$ | (xii) $\frac{21}{47}$ |
| 2. 30 | 3. 48 | 4. $\frac{3}{7}$ | 5. $\frac{7675}{173}$ |
| 6. 25 | 7. 5 | 8. One Rupee : 30; 50 paise coins = 10 | |
| 9. 30 days | 10. 20 km | 11. 36 | |
| 12. 860 | 13. 16 | | |

**4. Exponents and Powers****Exercise - 4.1**

- | | | | |
|---------------------------------------|--------------------|-----------------------|--------------------------|
| 1.(i) $\frac{1}{64}$ | (ii) -128 | (iii) $\frac{64}{27}$ | (iv) $\frac{1}{81}$ |
| 2.(i) $\left(\frac{1}{2}\right)^{15}$ | (ii) $(-2)^{14}$ | (iii) 5^4 | (iv) 5^5 (v) $(-21)^4$ |
| 3.(i) $2^4 \times 3$ | (ii) $\frac{1}{2}$ | | |

Exercise - 5.2

1. 81.9 crores 2. 2756.25 3. ₹. 27.67 4. $3 \times 6\text{cm}$
 5. ₹ 127.50 6. $6\frac{2}{3}\%$ 7. 17%
 8. ₹.880, 10%, ₹.4,000, 20%, ₹.10,000, 20%, profit, ₹.392, 42%, ₹. 315, ₹.35.
 9. ₹.2244 10. 12.5% 11. 17.647% 12. ₹ 69
 13. ₹.1334 14. (i) ₹ 9,999 (ii) ₹ 2,793 (iii) ₹ 195.80 (approx.)
 15. (i) ₹ 52.50 (ii) ₹ 73.50 16. 13

Exercise - 5.3

1. (a) 6,34,500 (b) ₹10,575 2. ₹.268.75 3. $A = 8820, 820$
 4. ₹.7234.50 5. ₹.1311.12 6. 81,82,199 7. ₹.11080.50
 8. (i) 400 (ii) 610 9. ₹.43.20 10. 5,31,616
 11. ₹. 36659.70 12. ₹.17000, ₹.362.50 13. ₹.9500
 14. 1297920 15. ₹.1103.81

**6. Square Roots, Cube Roots****Exercise - 6.1**

- 1.(i) Unit digit in the square of 39 is 1
 (ii) Unit digit in the square of 297 is 9
 (iii) Unit digit in the square of 5125 is 5
 (iv) Unit digit in the square of 7286 is 6
 (v) Unit digit in the square of 8742 is 4
2. Perfect squares are
 (i) 121 (ii) 256
- 3.(i) 257 unit digit is 7 and hence not a perfect square
 (ii) 4592 unit digit is 2 and hence not a perfect square
 (iii) 2433 unit digit is 3 and hence not a perfect square
 (iv) 5050 unit digit is 0 and number of zeros at the end is only one and hence not a perfect square
 (v) 6098 unit digit is 8 and hence not a perfect square
4. (i) 431^2 - odd (ii) 2826^2 - even (iii) 8204^2 - even
 (iv) 17779^2 - odd (v) 99998^2 - even

5. (i) 50 (ii) 112 (iii) 214
6. (i) 25 (ii) 81 (iii) 169

Excercise - 6.2

1. (i) 21 (ii) 28 (iii) 64 (iv) 84
2. 5 3. 6. 120 4. 6 5. 39
6. 31 7. 144, 9 8. 89 9. 4608 m²

Excercise - 6.3

1. (i) 33 (ii) 48 (iii) 88 (iv) 78
 (v) 95
2. (i) 1.6 (ii) 4.3 (iii) 8.3 (iv) 9.2
3. 31 4. 67 cm 5. 91 6. 1024
7. 149 8. (i) 10 (ii) 16 (iii) 28

Excercise - 6.4

1. (i) 512 (ii) 4096 (iii) 9261 (iv) 27000
2. i) 243 - Not a perfect cube ii) 516 - Not a perfect cube
 iii) 729 - a perfect cube vi) 8000 - a perfect cube
 v) 2700 - Not a perfect cube
3. 2 4. 17 5. 5 6. 6 7. 2

Excercise - 6.5

1. (i) 7 (ii) 9 (iii) 11 (iv) 14
1. (i) 16 (ii) 13 (iii) 15 (iv) 18
3. i) False ii) False iii) True
 vi) False v) False vi) False

**7. Frequency Distribution Tables and Graphs****Exercise 7.1**

1. ₹.11060.83 2. $\bar{x} = 7$ 3. $\bar{x} = 27$ 4. $\bar{x} = 43$
5. $\bar{x} = 30$ years 6. 52 years
7. $\bar{x} = 12$ sum of deviations from $\bar{x} = 0$

8. 5 9. $\bar{x} = 13.67$ same in all cases. 10. 15.5 marks
 11. $\bar{x} = 30$ 12. Median = 3.4 13. $x = 18$
 14. Mode = 10 15. Mode = $x - 3$ 16. Mode = 1
 17. 12, 16, 16, 16 18. 42 19. 8 20. 20

Exercise - 7.2

1. Class Interval 5-14 15-24 25-34 35-44 45-54 55-64
 Frequency 9 9 9 6 7 5
 2. No of Students 15-19 19-23 23-27 27-31 31-35 35-39 39-43
 Frequency 5 6 7 5 5 1 1
 3. Class intervals 4-11 12-19 20-27 28-35 36-43 44-51 52-59
 Boundaries 3.5-11.5 11.5-19.5 19.5-27.5 27.5-35.5 35.5-43.5 43.5-51.5 51.5-59.5

4. Class Marks	Frequency cu.f	Class Intervals cu.f	Less than	Greater than
10	6	4-16	6	75
22	14	16-28	20	69
34	20	28-40	40	55
46	21	40-52	61	35
58	9	52-64	70	14
70	5	64-76	75	5

5. CI (Marks)	0-10	10-20	20-30	30-40	40-50
Fr(Students)	2	10	4	9	10

6. Class Interval (Ages)	Frequency (No.of children)	Class Boundries	LEss than Cu.frequency	Greater than Cu.frequency
1 - 3	10	0.5 - 3.5	10	59
4 - 6	12	3.5 - 6.5	22	49
7 - 9	15	6.5 - 9.5	37	37
10 - 12	13	9.5 - 12.5	50	22
13 - 15	9	12.5 - 15.5	59	9

7. CI	0-10	10-20	20-30	30-40	40-50
Eu fr	3	8	19	25	30
Frequency	3	5	11	6	5

Given frequencies are less than cumulative frequencies.

8. CI	1-10	11-20	21-30	31-40	41-50
G.Cu fr	42	36	23	14	6
Frequency	6	13	9	8	6



8. Exploring Geometrical Figures

Exercise - 8.1

- (a) True (b) False (c) False (d) False
(e) False (f) False (g) False
- (a) Yes; any two congruent figures are always similar.
(b) Yes; the similarity remains.
- $AB = NM$; $\angle A = \angle N$
 $BC = MO$; $\angle B = \angle M$
 $CA = ON$; $\angle C = \angle O$
- (i) True (ii) True (iii) True (iv) False
(v) True
- 1.5 m, 3m, 4.5m, 6m, 7.5m, 9m
- 9m



9. Area of Plane Figures

Exercise 9.1

- (i) 20 sqcm (ii) 424 sqcm (iii) 384 sqcm
- 55 sqcm. 4. 80 sqcm 5. (i) 10700 sqm (ii) 11450 sqm
- (ii) $x = 75$ cm, 45 cm
- 675 cm^2 , 810
- 337.5 sqcm.

Exercise - 9.2

1. (i) 900 sqcm, (ii) 361 sq cm 2. 616 sqcm.
 3. (i) 4536 sqcm. (ii) 259.87 cm²
 4. 5544 cm² 5. 309 cm² 6. 10.5 cm² 7. 6.8 cm²
 8. (i) $\frac{6}{7}a^2$ (ii) 462 cm² 9. 6.125 cm² 10. 346.5 m²

**10. Direct and Inverse Proportion****Exercise 10.1**

1. ₹. 84, ₹. 168, ₹. 420, ₹. 546 2. 32, 56, 96, 160
 3. ₹. 12,600/- 4. ₹. 2,100/- 5. 21 m 6. 6m, 8.75 m
 7. 168 cm 8. 750 9. 25 cm, $\frac{10}{3}$ cm. 10. $\frac{9}{20}$ cm. 11. 2 : 1

Exercise - 10.2

1. (iii) 2. 120, 60, 80, 80

Exercise - 10.3

1. 4 kg 2. 50 days 3. 48 4. 4
 5. 4 6. 15 7. 24

**11. Algebraic Expressions****Excercise - 11.1**

1. (i) 42K (ii) 6lm (iii) 15t⁴ (iv) 18mn
 (v) 10p³
 3. 60a²c
 24m³n
 36 k³l³
 24p²q²r²
 4. i) x⁴y³ ii) a⁶b⁶ iii) k³l³m³ iv) p²q²r²
 v) 72a²bcd

Exercise - 11.2

1. (ii) $3k^2l + 3k/m + 3kmn$ (iii) $a^2b^2 + ab^4 + cb^2c^3$
 (iv) $x^2yz - 2xy^2z + 3xyz^2$ (v) $a^4b^3c^3 + a^2b^4c^3d - a^3b^3c^2d^2$
2. $12y^2 + 16y$
3. i) -2 ii) 0
4. $a^2 + b^2 + c^2 - ab - bc - ca$ 5. $x^2 - y^2 - z^2 + 2xy - yz + zx - xr + yr$
6. $-7x^2 + 8xy$ 7. $-3k^2 + 21kl - 3km$
8. $a^3 + b^3 + c^3 - a^2b + b^2a - b^2c + c^2b + a^2c - c^2a$

Exercise - 11.3

1. (i) $6a^2 - 19a - 36$ (ii) $2x^2 - 5xy + 2y^2$ (iii) $k^2l - kl^2 - 12m + k/m$
 (iv) $m^3 + m^2n - mn^2 - n^3$
2. (i) $2x^2 - 3xy + 3x^2y + 3xy^2 - 5y^2$
 (ii) $3a^2b^2 - a^3b - 2ab^3 - 3a^2bc + 30b^2c$
 (iii) $klmn - lm^2n - k^2l^2 + kl^2m + k^2/m - k/m^2$
 (iv) $p^4 - 5p^3q + 6p^3r + pq^3 + 6q^3p - 5q^4$
3. i) $10x^2 - 14xy$ ii) $m^3 + n^3$ iii) $19ca - 37ab - 19a^2$
 iv) $p^2q^2 - q^2r^2 + pq^2r - pq^2r + p^2qr + pqr^2 - p^2q - pq^2 - p^2r + pr^2$ 4. 8

Exercise - 11.4

1. i) $pk^2 + 24kl + 16l^2$ ii) $a^2x^4 + 2abx^2y^2 + b^2y^4$
 iii) $49d^2 - 126de + 81e^2$ iv) $m^4 - 2m^2n^2 + n^4$
 v) $9t^2 - 81s^2$ vi) $k^2l^2 - m^2n^2$
 vii) $36x^2 + 66x + 30$ viii) $4b^2 - 2ab + 2bc - ca$
2. i) 92416 ii) 259081 iii) 9,84,064 iv) 6,38,401
 v) 89,984 vi) 6391 vii) 11,772 viii) 42,024

**12. Factorisation****Exercise - 12.1**

1. (i) 2, 4, 8 (ii) 3, a (iii) 7, x, y (iv) 2, m
 (v) 5 (vi) 2, x (vii) 2, 3, 6, x, y

2. i) $5x(x-5y)$ (ii) $3a(3a-2x)$ (iii) $7p(p+7q)$
 iv) $12a^2b(3-5c)$ (v) $3abc(a+2b+3c)$
 vi) $p(4p+5q-6q^2)$ (vii) $t(u+at)$
3. (i) $(3x-4b)(a-2y)$
 (ii) $(x^2+5)(x+2)$ (iii) $(m+4)(m-n)$
 (iv) $(a^2-b)(a-b^2)$ (v) $(p-1)(pq-r^2)$

Exercise - 12.2

1. (i) $(a+5)^2$ (ii) $(l-8)^2$ (iii) $(6x+8y)^2$ (iv) $(5x-3y)^2$
 (v) $(5m-4n)^2$ (vi) $(9x-11y)^2$ (vii) $(x-y)^2$ (viii) $(l^2+2m^2)^2$
2. (i) $(x+6)(x-6)$ (ii) $(7x+5y)(7x-5y)$ (iii) $(m+11)(m-11)$
 (iv) $(9+8x)(9-8x)$ (v) $(xy+8)(xy-8)$ (vi) $6(x+3)(x-3)$
 (vii) $(x+9)(x+3)(x-3)$ (viii) $2x(1+4x^2)(1+2x)(1-2x)$
 (ix) $x^2(9x+11)(9x-11)$ (x) $(p-q+r)(p-q-r)$
 (xi) $4xy$
3. (i) $x(lx+m)$ (ii) $7(y^2+5z^2)$ (iii) $3x^2(x^2+2xy+3z)$
 (vi) $(x-a)(x-b)$ (v) $(3a+4b)(x-2y)$ (vi) $(m+1)(n+1)$
 (vii) $(b+2c)(6a-b)$ (viii) $(pq-r^2)(p-1)$ (ix) $(y+z)(x-5)$
4. (i) $(x^2+y^2)(x+y)(x-y)$ (ii) $(a^2+b^2+c^2+2bc)(a+b+c)(a-b-c)$
 (iii) $(1+m-n)(1-m+n)$ (iv) $\left(7x+\frac{4}{5}\right)\left(7x-\frac{4}{5}\right)$
 (v) $(x^2-y^2)^2$ (vi) $(5a-b)(5b-a)$
5. (i) $(a+6)(a+4)$ (ii) $(x+6)(x+3)$ (iii) $(p-7)(p-3)$
 (iv) $(x-8)(x+4)$ 6. 10 7. 0, 12

Exercise - 12.3

1. (i) $8a^2$ (ii) $\frac{1}{3}x$ (iii) $9a^2b^2c^2$ (iv) $\frac{1}{5}yz^2$
 (v) $-6l^2m$
2. (i) $3x-2$ (ii) $5a^2-7b^2$ (iii) $x(5x-3)$ (iv) $l(2l^2-3l+4)$

$$(v) 5abc(a - b + c) \quad (vi) (2q^2 + 3pq - p^2) \quad (vii) \frac{4}{3}(abc + 2bc)$$

$$3. (i) 7x - 9 \quad (ii) 12x \quad (iii) \frac{77}{3}ab \quad (iv) \frac{2}{3}l(m+n)$$

$$(v) 4(x^2 + 7x + 10) \quad (vi) (a + 1)(a + 2)$$

$$4. (i) x + 4 \quad (ii) x - 2 \quad (iii) p + 4 \quad (iv) 5a(a - 5)$$

$$(v) 10m(p - q) \quad (vi) 4z(4z + 3)$$

Exercise - 12.4

$$(i) 3(x - 9) = 3x - 27$$

$$(ii) x(3x + 2) = 3x^2 + 2x$$

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

$$(iv) 2x + x + 3x = 6x$$

$$(v) 4p + 3p + 2p + p - 9p = p$$

$$(vi) 3x \times 2y = 6xy$$

$$(vii) (3x)^2 + 4x + 7 = 9x^2 + 4x + 7$$

$$(viii) (2x)^2 + 5x = 4x^2 + 5x$$

$$(ix) (2a + 3)^2 = 4a^2 + 12a + 9$$

$$(x) (a) 0$$

$$(b) 30$$

$$(c) -6$$

$$(xi) (x - 4)^2 = x^2 - 8x + 16$$

$$(xii) (x + 7)^2 = x^2 + 14x + 49$$

$$(xiii) (3a + 4b)(a - b) = 3a^2 + ab - 4b^2$$

$$(xiv) (x + 4)(x + 2) = x^2 + 6x + 8$$

$$(xv) (x - 4)(x - 2) = x^2 + 6x + 8$$

$$(xvi) 5x^3 \div 5x^3 = 1$$

$$(xvii) (2x^3 + 1) \div 2x^3 = 1 + \frac{1}{2x^3}$$

$$(xviii) (3x + 2) \div 3x = 1 + \frac{2}{3x}$$

$$(xix) (3x + 5) \div 3x = x + \frac{5}{3}$$

$$(xx) \frac{4x + 3}{3} = \frac{4}{3}x + 1$$



13. Visualising 3 - D in 2 - D

Exercise - 13.1

$$3. (i) 5$$

$$(ii) 9$$

$$(iii) 20$$

$$(iv) 14$$

$$4. (i) 3 \text{ sq.units}$$

$$(ii) 9 \text{ sq.units}$$

$$(iii) 12 \text{ sq.units}$$

$$(iv) 9 \text{ sq.units}$$

Exercise -13.2

1.	F	V	E	$V + F = E + 2$
	5	6	9	Satisfied
	7	10	15	„
	8	12	18	„
	6	6	10	„
	5	5	8	„
	8	12	18	„
	8	6	12	„
	6	8	12	„

2. Same. Both base is a square. 3. No 4. Yes
 5. $F = 20$, $V = 6$, $E = 12$, $V + F - E = 2$ 6. No

7.	V	E
	8	12
	5	8
	6	9

8. (i) Hexagonal pyramid (ii) Cuboid (iii) Pentagonal pyramid
 (iv) Cylinder (v) Cube (vi) Hexagonal pyramid
 (vii) Trapezoid
9. (i) a, b, c, e (ii) (a) Tetrahedron (b) sphere
 (c) Cube/cuboid (d) sphere
 (e) Cube is a regular polyhedron where cuboid is not.
 (f) Cube, Cuboid (g) Square Pyramid
3. (a) Octagonal Prism (b) hexagonal prism
 (c) triangular prism (d) Pentagonal prism



14. Surface Areas and Volumes

Exercise - 14.1

1. B 2. 10 3. $9m^2$
 4. ₹.72

Exercise - 14.2

1. (i) 112.996 m^3 (ii) 70 m^3 (iii) 22.5 m^3
2. (i) 13.92 m^3 , 13920 liters. (ii) 5.2 m^3 , 5200 liters
(iii) 36.792 m^3 , 36792 liters.
3. Volume will become $\frac{1}{8}$
4. (i) 262.144 cm^3 (ii) 2.197 m^3 (iii) 4.096 m^3
5. 6400 6. 1096 cm^3 7. 110 cm^3
8. 90 9. 27 10. 6 cm.

**15. Playing with Numbers****Exercise - 15.1**

1. Divisible by 2 1200, 836, 780, 4820, 48630
Divisible by 5 1200, 535, 780, 3005, 4820, 48630
Divisible by 10 1200, 780, 4820, 48630

We observed that, if a number is divisible 10, is also divisible by 2 and 5 also.

2. (a), (b), (c), (e) are divisible by 2
3. (a), (b), (c) (d) are divisible by 5
4. (a), (b), (d), (e) are divisible by 10
5. (a) 1, 2, 3, 6, 9, 18 (b) 1, 2, 3, 4, 6, 8, 12, 24
(c) 1, 3, 5, 9, 15, 45 (d) 1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90.
6. 10, 20, 30, 40, 50, 60,
7. 6

Exercise - 15.2

1. A = 2 or 5 or 8 2. A = 8
3. 90, 180, 270, 360, 450 etc.
4. 0 to 9. We observed that divisibility of 2 does not depends upon other than unit's digit.
5. 0 or 5 6. 4
7. 7 8. '0'

Exercise - 15.3

- (a), (d) are divisible by 6
- (a), (b), (c), (d) are divisible by 4
- (a), (c), (d) are divisible by 8
- (a), (b), (c), (d) are divisible by 7
- (a), (b), (c), (d), (e), (i), (j), (k) are divisible by 11
- All multiples of 8 are multiples of 4
- $A = 1$, $B = 9$, $A + B = 10$

Exercise - 15.4

- divisible by 45
- divisible by 81
- divisible by 36 and by all its factors
- divisible by 42 and by all its factors
- divisible by 11 and 7 and also divisible product of 11 and 7
- divisible by 5 and 7 and also divisible by product of 5 and 7.
- Both numbers and their sum also divisible by 6
- Both the numbers and their difference also divisible by 3
- Divisible by both 2 and 4
- Divisible by both 4 and 8
- $A = 3$, $B = 2$

Exercise - 15.5

- (a) $A = 9$ (b) $B = 5$ (c) $A = 3$ (d) $A = 6$, sum = 2996
(e) $A = 4$, $B = 1$
- (a) $A = 5$ (b) $A = 8$ (c) $A = 4$
- (a) $D = 5$, $E = 0$, $F = 1$ (b) $C = 1$, $G = 2$, $H = 0$
- (a) $K = 6$, $L = 2$ (b) $M = 5$, $N = 0$
- $A = 8$, $B = 7$, $C = 6$

Exercise - 15.6

1. 1050
2. 620
3. 216
4. $n^3 - n = n(n^2 - 1) = (n-1)n(n+1)$ product of three consecutive
5. Sum of n consecutive odd number is $\frac{(2n-1)(2n)}{2} = n(2n-1)$ multiple of ' n '.
6. $(1^{11} + 4^{11}) + (2^{11} - 3^{11})$ is divisible by 5.
7. $1 + 2 + 3 + 4 + 5 + 6 = 21$
8. Rs. 1200
9. 3050
10. $166833 - 18 = 166815$.

SYLLABUS

Number System (50 hrs)

- (i) Playing with numbers
- (ii) Rational Numbers
- (iii) Square numbers, cube numbers, Square roots, Cubes, Cube roots.

(i) Playing with numbers

- Writing and understanding a 2 and 3 digit number in generalized form ($100a + 10b + c$) where a, b, c can be only digits (0-9) and engaging with various puzzles concerning this. (Like finding the missing numerals represented by alphabets in problems involving any of the four operations)
- Number puzzles and games
- Understanding the logic behind the divisibility tests of 2,3,4,5,6,7,8,9, and 11 for a two or three digit number expressed in the general form.

(ii) Rational Numbers

- Properties of rational numbers. (including identities).
- Using general form of expression to describe properties. Appreciation of properties.
- Representation of rational numbers on the number line
- Between any two rational numbers there lies another rational number (Making children see that if we take two rational numbers then unlike for whole numbers, in this case you can keep finding more and more numbers that lie between them.)
- Representation of rational numbers as decimal and vice versa (denominators other than 10, 100, ...)
- Consolidation of operations on rational numbers.
- Word problems on rational numbers (all operations)
- Word problem (higher logic, all operations, including ideas like area)

(iii) Square numbers, cube numbers, Square roots, Cubes, Cube roots.

- Square numbers and square roots.
- Square roots using factor method and division method for numbers containing. no more than 4 digits and b) no more than 2 decimal places

	<ul style="list-style-type: none"> • Pythagorean triplets and verification of Pythagoras theorem • Cube numbers and cube roots (only factor method for numbers containing at most 3 digits). • Estimating square roots and cube roots. Learning the process of moving nearer to the required number. • Uses of brackets • Simplification of brackets using BODMAS rule.
<p>Algebra (20 hrs)</p> <p>(i) Exponents & Powers</p> <p>(ii) Algebraic Expressions</p> <p>(iii) Linear Equations in one variable</p> <p>(iv) Factorisation</p>	<p>(i) Exponents & Powers</p> <ul style="list-style-type: none"> • Integers as exponents. • Laws of exponents with integral powers • Standard form of the numbers <p>(ii) Algebraic Expressions</p> <ul style="list-style-type: none"> • Multiplication algebraic exp. (Coefficient should be integers) • Some common errors (e.g. $2 + x \neq 2x$, $7x + y \neq 7xy$) • Identities $(a \pm b)^2 = a^2 \pm 2ab + b^2$, $a^2 - b^2 = (a - b)(a + b)$ • Geometric verification of identities <p>(iii) Linear Equations in one variable</p> <ul style="list-style-type: none"> • Solving linear equations in one variable in contextual problems involving multiplication and division (word problems) <p>(iv) Factorisation</p> <ul style="list-style-type: none"> • Factorization (simple cases only) • Factorisation by taking out common factor. • Factorisation by grouping the terms. • Factorisation by using identities. • Factors of the form $(x + a)(x + a)$ • Division of algebraic expressions

<p>Arithmetic (20 hrs)</p> <p>(i) Comparing Quantities using proportion</p> <p>(ii) Direct and Inverse proportion</p>	<p>(i) Comparing Quantities using proportion</p> <ul style="list-style-type: none">• Comparing Quantities using proportion• Compound ratio - Word problems.• Problems involving applications on percentages, profit & loss, overhead expenses, Discount, tax. (Multiple transactions)• Difference between simple and compound interest (compounded yearly up to 3 years or half-yearly up to 3 steps only), Arriving at the formula for compound interest through patterns and using it for simple problems. <p>(ii) Direct and Inverse proportion</p> <ul style="list-style-type: none">• Direct variation - Simple and direct word problems. Inverse variation -Simple and direct word problems. Mixed problems on direct, inverse variation• Time & work problems- Simple and direct word problems• Time & distance: Simple and direct word problems
<p>Geometry (40 hrs)</p> <p>(i) Construction of Quadrilaterals</p> <p>(ii) Representing 3-D in 2D</p> <p>(iii) Exploring Geometrical Figures</p>	<p>(i) Construction of Quadrilaterals</p> <ul style="list-style-type: none">• Review of quadrilaterals and their properties.• Construction of quadrilaterals, given with<ul style="list-style-type: none">- Four sides and one angle- Four sides and one diagonal- Two adjacent sides, three angles- Three sides and two diagonals.- Three sides and two angles in between them are given• Construction of special types of quadrilaterals with two diagonals. <p>(ii) Representing 3-D in 2D</p> <ul style="list-style-type: none">• Identify and Match pictures with objects [more complicated e.g. nested, joint 2-D and 3-D shapes (not more than 2)].• Drawing 2-D representation of 3-D objects (Continued and extended) with isometric sketches.• Counting vertices, edges & faces & verifying Euler's relation for 3-D figures with flat faces (cubes, cuboids, tetrahedrons, prisms and pyramids)

	<p>(iii) Exploring Geometrical Figures</p> <ul style="list-style-type: none">• Congruent figures• Similar figures• Symmetry in geometrical figures w.r.t. to triangles, quadrilaterals and circles.
<p>Mensuration (15 hrs)</p> <p>(i) Area of Plane Figures</p> <p>(ii) Surface areas and Volumes</p>	<p>(i) Area of Plane Figures</p> <ul style="list-style-type: none">• Area of a triangle using Heron's formula (without proof) and its application in finding the area of a quadrilateral.• Area of a trapezium• Area of the quadrilateral and other polygons.• Area of the circle & circular paths. <p>(ii) Surface areas and Volumes</p> <ul style="list-style-type: none">• Surface area of a cube, cuboid• Concept of volume, measurement of volume using a basic unit, volume of a cube, cuboid• Volume and capacity.
<p>Data handling (15 hrs)</p> <p>Frequency Distribution Tables and Graphs</p>	<p>Frequency Distribution Tables and Graphs</p> <ul style="list-style-type: none">• Revision of Mean, Median and Mode of ungrouped data.• Determination of mean by deviation method.• Scope and necessity of grouped data.• Preparation of frequency distribution tables• Cumulative frequency distribution tables• Frequency graphs (histogram, frequency polygon, frequency curve, cumulative frequency curves)

Academic Standards

Academic standards are clear statements about what students must know and be able to do.

The following are categories on the basis of which we lay down academic standards

Problem Solving

Using concepts and procedures to solve mathematical problems

(a) Kinds of problems:

Problems can take various forms- puzzles, word problems, pictorial problems, procedural problems, reading data, tables, graphs etc.

(b) Problem Solving

- Reads problems
- Identifies all pieces of information/data
- Separates relevant pieces of information
- Understanding what concept is involved
- Recalling of (synthesis of) concerned procedures, formulae etc.
- Selection of procedure
- Solving the problem
- Verification of answers of raiders, problem based theorems.

(c) Complexity:

The complexity of a problem is dependent on

- Making connections(as defined in the connections section)
- Number of steps
- Number of operations
- Context unraveling
- Nature of procedures

Reasoning Proof

- Reasoning between various steps (involved invariably conjuncture).
- Understanding and making mathematical generalizations and conjectures

- Understands and justifies procedures: Examining logical arguments.
- Understanding the notion of proof
- Uses inductive and deductive logic
- Testing mathematical conjectures

Communication

- Writing and reading, expressing mathematical notations (verbal and symbolic forms)
Ex: $3 + 4 = 7$, $3 < 5$, $n_1 + n_2 = n_2 + n_1$, Sum of angles in a triangle = 180°
- Creating mathematical expressions
- Explaining mathematical ideas in her own words like- a square is closed figure having four equal sides and all equal angles
- Explaining mathematical procedures like adding two digit numbers involves first adding the digits in the units place and then adding the digits at the tens place/ keeping in mind carry over.
- Explaining mathematical logic

Connections

- Connecting concepts within a mathematical domain- for example relating adding to multiplication, parts of a whole to a ratio, to division. Patterns and symmetry, measurements and space
- Making connections with daily life
- Connecting mathematics to different subjects
- Connecting concepts of different mathematical domains like data handling and arithmetic or arithmetic and space
- Connecting concepts to multiple procedures

Visualization & Representation

- Interprets and reads data in a table, number line, pictograph, bar graph, 2-D figures, 3-D figures, pictures
- Making tables, number line, pictograph, bar graph, pictures.
- Mathematical symbols and figures.