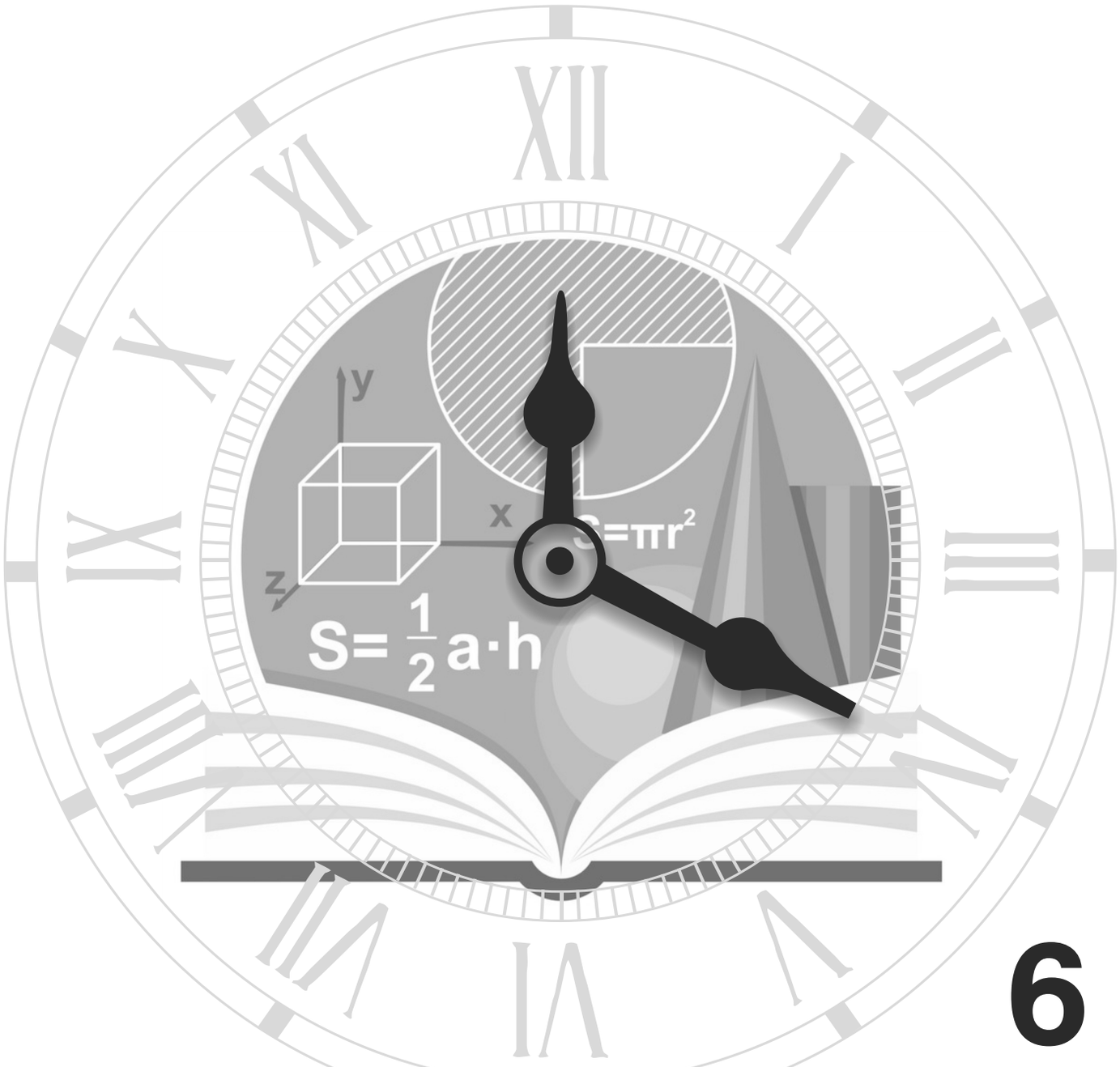


6

MathsTime

A Textbook **of Mathematics**

Unit-I : Number System

1. Knowing Our Numbers : Natural and Whole

Exercise 1.1

1. (i) 10000, 9999 (ii) 99999,100000 (iii) largest (iv) six
(v) 10000 to 99999

2. (i) (a) One lakh sixty three thousand four hundred sixty two
(b) Twenty seven lakh fourteen thousand six hundred fifty
(c) One crore twenty–seven lakh ninety one thousand four hundred fifty eight
(ii) (a) One hundred sixty three thousand four hundred sixty two
(b) Two million seven hundred fourteen thousand six hundred fifty.
(c) Twelve million seven hundred ninety one thousand four hundred fifty eight.

3. Thirty three crore thirty two lakh twenty two thousand one hundred and eleven.

4. 49995

5. (i) (d), (ii) (c), (iii) (a), (iv) (b)

6. (i) Seven lakh twenty six thousand nine hundred thirty four
(ii) Six crore thirty two lakh eleven thousand thirty six.

7. (i) One million six hundred thirty five thousand fifteen
(ii) Ninety one million five hundred thousand seven hundred fifty six.

Exercise 1.2

1. (i) < (ii) < (iii) = (iv) > (v) = (vi) > (vii) < (viii) >

2. (i) > (ii) > (iii) < (iv) = (v) > (vi) < (vii) = (viii) <

3. (i) 98273496, 98273498 (ii) 72373, 72375 (iii) 7354526, 7354528 (iv) 173899, 173901 (v) 99999, 100001

4. (i) 729; 28784; 82878; 92929; 732989; 928398
(ii) 1919373; 8184628; 8215651; 8230409; 8276255; 9377643
(iii) 101; 1010; 10101; 101010; 1010101; 101010101;
(iv) 16716716; 561936362; 818298199; 820028232; 821946228
(v) 1;83993, 715551; 778433487; 91738299; 778434877,

5. (i) 7287816, 7237972, 7166346, 5166353, 863644
(ii) 871636369, 816372941, 749274647, 651443365, 193745274

(iii) 54663533, 54662533, 54162533, 52874696, 52366454
(iv) 371858226, 371828226, 371818226, 371817226, 371808226
(v) 1285712, 1283712, 1282712, 1282710, 1282112, 1280712.

❑

2. Playing with Numbers

Exercise 2.1

1. (i) 1, 19 (ii) 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60 (iii) 1, 29 (iv) 1, 2, 4, 8, 16, 32 (v) 1, 2, 5, 10, 25, 50 (vi) 1, 2, 3, 4, 6, 7, 12, 14, 21, 28, 42, 84 (vii) 1, 2, 4, 19, 38, 76 (viii) 1, 89 (ix) 1, 5, 25, 125 (x) 1, 2, 3, 4, 6, 8, 9, 12, 16, 18, 24, 36, 48, 72, 144 (xi) 1, 11, 23, 253 (xii) 1, 3, 9, 27, 81, 243

2. (i) 15, 30, 45, 60, 75 (ii) 17, 34, 51, 68, 85 (iii) 19, 38, 57, 76, 95 (iv) 35, 70,105, 140, 175 (v) 50, 100, 150, 200, 250

3. (ii); (iii)

4. (i); (iii)

5. (i) 83, 89, 97 (ii) 79, 83, 89, 97, 101, 103, 107, 109, 113, 127, 131, 137, 139, 149, 151, 157 (iii) 103, 107, 109, 113, 127, 131, 137, 139, 149, 151, 157, 163, 167, 173 (iv) 163, 167, 173, 179, 181, 191, 193, 197, 199

6. Yes, 9

7. 90, 91, 92, 93, 94, 95, 96

8. Only one, 2

9. (i), (iii), (v)

10. (i) No (ii) Four namely 4, 9, 25, 49

11. (i) 3 + 31 (ii) 3 + 37 (iii) 3 + 53 (iv) 7 + 73 (v) 3 + 97

12. (i) 3 + 5 + 23 (ii) 3 + 5 + 43 (iii) 3 + 5 + 51 (iv) 3 + 5 + 69 (v) 3 + 5 + 97

13. Composite 14. 1, 3, 7, 9.

Exercise 2.2

1. (i) F (ii) T (iii) T (iv) F (v) T (vi) T

2. Divisible by 2 : (i), (ii), (iii), (iv); Divisible by 3 : (i), (ii), (iv); Divisible by 5 : (ii), (iii); Divisible by 9 : (ii), (iv)

3. (ii), (iii)

4. (i), (ii), (iv).

Exercise 2.3

1. (i)

2	48
2	24
2	12
2	6
3	3
	1

$48 = 2 \times 2 \times 2 \times 2 \times 3$

(ii) 2×17 (iii) $2 \times 7 \times 7$ (iv) $2 \times 2 \times 2 \times 3 \times 3 \times 3$

(v) $2 \times 2 \times 2 \times 3 \times 3 \times 5$

(vi)

2	468
2	234
3	117
3	39
13	13
	1

$468 = 2 \times 2 \times 3 \times 3 \times 13$

(vii) $3 \times 3 \times 7 \times 7$

(viii)

2	540
2	270
3	135
3	45
3	15
5	5
	1

$540 = 2 \times 2 \times 3 \times 3 \times 3 \times 5$

(ix) $2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 5 \times 5$ (x) $2 \times 2 \times 3 \times 3 \times 5 \times 7$

(xi) $3 \times 5 \times 11 \times 13$

(xii)

5	7325
5	1465
293	293
	1

$7325 = 5 \times 5 \times 293$

2. Smallest 5-digit number = 10000

2	10000
2	5000
2	2500
2	1250
5	625
5	125
5	25
5	5
	1

$10000 = 2 \times 2 \times 2 \times 2 \times 5 \times 5 \times 5 \times 5$

3. Do it yourself.

4.

7	1729
13	247
19	19
	1

$1729 = 7 \times 13 \times 19$

Here, difference between two consecutive factors is 6.

Exercise 2.4

1. (i) T (ii) T (iii) F (iv) T (v) F

2. (i)

2	162
3	81
3	27
3	9
	3

2	234
3	117
3	39
	13

HCF = $2 \times 3 \times 3 =$ **18**

(ii) 1

(iii) 13, 39, 273

13	13
	1

3	39
13	13
	1

3	273
7	91
13	13
	1

HCF = **13**

(iv) 10 (v) 12 (vi) 53 (vii) 1

(viii) 625, 3125, 15625

5	625
5	125
5	25
5	5
	1

5	3125
5	625
5	125
5	25
5	5
	1

5	15625
5	3125
5	625
5	125
5	25
5	5
	1

HCF = $5 \times 5 \times 5 \times 5 =$ **625**

3. (i) 252, 576

252) 576 (2
504
72) 252 (3
216
36) 72 (2
72
×

HCF = **36**

(ii) 55

(iii) 516, 1188, 2148

516) 1188 (2
1032
156) 516 (3
468
48) 156 (3
144
12) 48 (4
48
×

12) 2148 (179
12
94
84
108
108
×

HCF = **12**

(iv) 2241, 8217, 747

747) 2241 (3
2241
×

747) 8217 (11
747
747
747
×

HCF = **747**

4. 1

5. Two nearest number = 65610 + 27

= **65637,** 65610 – 27 = **65583**

6. 850, 680

680) 850 (1

680

170) 680 (4

680

×

HCF = **170**

The maximum capacity of the container which can measure the petrol of tanker in exact number of times = 170

7. 1343 – 9 = 1334

8593 – 9 = 8584

1334) 8584 (6

8004

580) 1334 (2

1160

174) 174 (3

174

×

HCF = **58**

8. Length = 2 m 67 cm = 267 cm

Breadth = 4 m 45 cm = 445 cm

Height = 7 m, 12 cm = 712 cm

267, 445, 712

267) 445 (1

267

178) 267 (1

178

89) 178 (2

178

×

89) 712 (8

712

×

HCF = **89**

Thus, the longest tape which can measure the three dimensions of room exactly is **89 cm.**

9. Do it yourself.

Exercise 2.5

1. (i) 18, 77

2	18, 77
3	9, 77
3	3, 77
7	1, 77
	1, 11

LCM = $2 \times 3 \times 3 \times 7 \times 11 =$ **1386**

(ii) 90 (iii) 3465

(iv)

2	6,	15,	18,	30
3	3,	15,	9,	15
3	1,	5,	3,	5
5	1,	5,	1,	5
	1,	1,	1,	1

LCM = $2 \times 3 \times 3 \times 5 =$ **90**

(v) 5760 (vi) 4950 (vii) 1620

(viii) 128, 216, 432

2	128,	216,	432
2	64,	108,	216
2	32,	54,	108
2	16,	27,	54
2	8,	27,	27
2	4,	27,	27
2	2,	27,	27
3	1,	27,	27
3	1,	9,	9
3	1,	3,	3
	1,	1,	1

LCM = $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 =$ **3456**

2.

2	35,	50,	80
2	35,	25,	40
2	35,	25,	20
2	35,	25,	10
5	35,	25,	5
	7,	5,	1

LCM = $2 \times 2 \times 2 \times 2 \times 5 \times 7 \times 5 =$ **2800**

Hence remainder is 9, then the required number

$= 2800 + 9 =$ **2809**

3. No.

4. I number × II number = LCM × HCF

$64 = 16 \times \text{HCF}$

$$\text{HCF} = \frac{64}{16} = \mathbf{4}$$

5. No, because HCF must be a factor of LCM.

6. I number × II number = LCM × HCF

$105 \times$ II number = LCM × HCF

$$\text{II number} = \frac{1575 \times 15}{105} = \mathbf{225}$$

7.

2	220, 300
2	110, 150
3	55, 75
5	55, 25
5	11, 5
11	11, 1
	1, 1

LCM = $2 \times 2 \times 3 \times 5 \times 5 \times 11 =$ **3300**

8.

2	80, 85, 90
2	40, 85, 45
2	20, 85, 45
2	10, 85, 45
3	5, 85, 45
3	5, 85, 15
5	5, 85, 5
17	1, 17, 1
	1, 1, 1

LCM = $2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 17 = 12240$ cm

$=$ **122 m 40 cm**

9. LCM of 2, 5, 7, 8, 10 and 13 = 3640

Now above 10000 it is 10920 and below 10000 it is 7280 which is exactly divide by 2, 5, 7, 8, 10 and 13

10. 100800

11. (i)

2	14, 21
3	7, 21
7	7, 7
	1, 1

14) 21 (1
14
7) 14 (2
14
×

LCM = $2 \times 3 \times 7 =$ **42**
Product = HCF × LCM
$14 \times 21 = 42 \times 7$
$294 = 294$
(ii), (iii), (iv) Do it yourself.

❑

3. Integers

Exercise 3.1

1. (i) F (ii) F (iii) T (iv) F (v) F (vi) F (vii) T
2. (i) Spending money (ii) Going west/Coming East (iii) Rise in temperature (iv) 200 AD (v) Decrease in population (vi) Withdrawing money from bank
3. (i) – 25 (ii) – 100 (iii) +3 (iv) +16 (v) + 3 (vi) – 5
4. (i) 0 (ii) 3 (iii) 4 (iv) – 6
5. (i) – 3 (ii) – 2 (iii)–5 (iv) – 125
6. (i) 1, 2, 3, 4, 5 (ii) –5, –4, –3, –2, – 1, 0 (iii) –2, –1, 0; 1 (iv) 0, 1, 2, 3, 4
7. (i) < (ii) < (iii) < (iv) >
8. (i) 0 (ii) 107 (iii) 11 (iv) 29 (v) 245 (vi) 1024.

Exercise 3.2

1. (i) T (ii) T (iii) F (iv) F (v) F (vi) F
2. (i) – 11 (ii) – 1 (iii) – 3 (iv) – 10
3. (i) – 1 (ii) – 10 (iii) 7 (iv) – 3
4. (i) 10001 + (–2) = **9999** (ii) – 99005 + 360 = **– 98645**
(iii) – 134 (iv) 2564 (v) – 818 (vi) – 8994 vii) 2004 (viii) 0 (ix) – 1
(x) –623, – 5832, 623
$= -(623 + 5832) + 623$
$= -6455 + 623 =$ **– 5832**
(xi) – 982 + 1934 + (–18) + (–2034)
$= -982 + 1934 - 18 - 2034$
$= 1934 - (982 + 18 + 2034) = 1934 - 3034$
$=$ **– 1100**

5. (i) $908 + (-8) + (-1) + 1 + (-300) = 908 - 8 - 1 + 1 - 300$
$= 908 + 1 - (8 + 1 + 300)$
$= 909 - 309 = \mathbf{600}$

(ii) –481

(iii) $100 + (-66) + (-34) = 100 - 66 - 34 = 100 - (66 + 34)$
$= 100 - 100 = \mathbf{0}$

(iv) 500 (v) 2900

(vi) $1 + (-475) + (-475) + (-475) + (-475) + 1900$
$= 1 + 1900 - (475 + 475 + 475 + 475)$
$= 1901 - 1900 = \mathbf{1}$

(vii) –2 (viii) 1216 (ix) 503

(x) $(-1) + (-304) + 304 + 304 + (-304) + 1$
$= -1 - 304 + 304 + 304 - 304 + 1$
$= (304 + 304 + 1) - (304 + 304 + 1)$
$= 609 - 609 = \mathbf{0}$

6. (i) $5 + a = 0$, $a = 0 - 5 = \mathbf{-5}$, (ii) $a + 3 = 0$, $a = 0 - 3 = \mathbf{-3}$, (iii) $-12 + a = 0$, $a = 0 + 12 = \mathbf{12}$, (iv) $a + (-29) = 0$, $a = 0 + 29 = \mathbf{29}$

Exercise 3.3

1. (i) 0 (ii) – 15 (iii) 44 (iv) 17 (v) 488 (vi) 372

2. (i) $4 - 10 = \mathbf{-6}$, (ii) $8 - 3 = \mathbf{5}$,
(iii) $-100 - (-200) = -100 + 200 = \mathbf{100}$,
(iv) $10 - (-15) = 10 + 15 = \mathbf{25}$
(v) – 900 (vi) – 9 (vii) 3938 (viii) – 8656 (ix) – 122 (x) 155
(xi) $40321 - 83241 = \mathbf{-42920}$, (xii) $-1005 - 0 = \mathbf{-1005}$

3. $7 - (-5) = 7 + 5 = \mathbf{12}$; $= -5 - (7) = -5 - 7 = \mathbf{-12}$
So, the result are not same.

4. $-230 + 169 = -61 = -25 - (-61) = -25 + 61 = \mathbf{36}$

5. –70

6. (i) $(-3) + (-7) * (-3) - (-7)$ $-3 - 7 * -3 + 7 \Rightarrow \mathbf{-10} < \mathbf{4}$
(ii) Do it yourself.
(iii) $(-25) - (25) * 25 + (-80) \Rightarrow -25 - 25 * 25 - 80$
$\Rightarrow \mathbf{-50} > \mathbf{-55}$

7. Sum of integers = –396
One of them = 64
Other = $-396 - 64 = \mathbf{-460}$

8. The other integer is $= 48 - (-24) = 48 + 24 = \mathbf{72}$

9. (i) $-17 - (-13) = -17 + 13 = \mathbf{-4}$
(ii) Do it yourself.
(iii) $(2 - 3) + (2 - 3) = (-1) + (-1) = -1 - 1 = \mathbf{-2}$

(iv) $-13 + 32 - 18 - 1 = -13 - 18 - 1 + 32 = 32 + 32 = \mathbf{0}$

(v), (vi), (vii) Do it yourself.

(viii) $-12 - [(-15) + (-2) - 3] = -12 - [-15 - 2 - 3]$

$= -12 - [-20] = -12 + 20 = \mathbf{8}$

10. Do it yourself.

11. Let $y = 3$, $x = 4$

Then $x - y + 2 = 4 - 3 + 2 = \mathbf{3}$

12. $9 + (-9) + 9 + (-9) + (-9) + \ldots$

(i) If number of terms is odd then result is **9**.

(ii) If number of terms is even then result is **0**.

13. Temperature of Delhi is $13°C - 6°C = 7°C$

Temperature of Chennai is $18°C - 10°C = \mathbf{8°C}$

Temperature of Chennai fall is greater, 8°C

14. $1 - 2 + 3 - 4 + 5 - 6 + 7 - 8 + \ldots . 19 - 20$

$(1 - 2) + (3 - 4) + (5 - 6) + (7 - 8) + \ldots (19 - 20)$

$= (-1) + (-1) + (-1) + (-1) + \ldots (-1) = 10 \times (-1) = \mathbf{-10}$

Exercise 3.4

1. (i) F (ii) T (iii) F (iv) T (v) F

2. (i) $(-8) \times 0 \times 37 \times (-37) = \mathbf{0}$

(ii) $(1569 \times 887) - (569 \times 887) = 887 \times (1569 - 569)$

$= 887 \times 1000 = \mathbf{887000}$

(iii), (iv) Do it yourself.

(v) $15625 \times (-2) + (-15625) \times 98 = 15625 \times (-2 - 98)$

$= 15625 \times (-100) = \mathbf{-1562500}$

(vi) $(-80) \times (10 - 5 - 43 + 98) = (-80) \times (108 - 48)$

$= (-80) \times (60) = \mathbf{-4800}$

3. (i) $2 \times (-15) = \mathbf{-30}$, (ii) Do it yourself.

(iii) $(-17) \times (-20) = \mathbf{-340}$, (iv), (v) Do it yourself.

(vi) $(-12) \times (-12) \times (-12) = \mathbf{-1728}$,

(vii) (viii), (ix), (x) Do it yourself.

(xi) $(-1) \times (-2) \times (-3) \times (-4) \times (-5) = \mathbf{-120}$

(xii) Do it yourself.

4. Do it yourself.

5. (i) $(8 + 9) \times 10 = 17 \times 10 = 170$; $8 + 9 \times 10$

$= 8 + 90 = 98$; $170 > 98$

(ii), (iii) Do it yourself.

6. (i) $19 \times [7 + (-3)] = 19 \times 4 = 76$

$19 \times 7 + 19 \times (-3) = 19 \times (7 - 3) = 19 \times 4 = 76$

$76 = 76$

(ii) Do it yourself.

7. $x \times (-3) = 45;\ x = \dfrac{45}{-3} = \mathbf{-15;\ x\ is\ negative.}$

8. $x \times (-7) = -56;\ x = \dfrac{-56}{-7} = \mathbf{8;\ x\ is\ positive.}$

9. (i) Let integer is x then, $x \times (-1) = 10;\ x = \dfrac{10}{-1} = \mathbf{-10}$

(ii) Let integer is x then, $x \times (-1) = -35;\ x = \dfrac{-35}{-1} = \mathbf{35}$

(iii) Do it yourself.

Exercise 3.5

1. (i) F (ii) F (iii) T (iv) T (v) T (vi) F

2. (i) $-18 \div (3) = \dfrac{-18}{3} = \mathbf{-6}$, (ii) $(18) \div (-3) = \dfrac{18}{-3} = \mathbf{-6}$,

(iii) $(-18) \div (-3) = \dfrac{-18}{-3} = \mathbf{6}$, (iv), (v), (vi) Do it yourself.

(vii) $(-15625) \div (-125) = \dfrac{-15625}{-125} = \mathbf{125}$

(viii), (ix) Do it yourself.

(x) $10569 \div (-1) = \dfrac{10569}{-1} = \mathbf{-10569}$,

(xi) $17699 \div (-17699) = \dfrac{17699}{-17699} = \mathbf{-1}$, (xii) $200000 \div (-100)$

$= \dfrac{200000}{-100} = \mathbf{-2000}$

3. Do it yourself.

Exercise 3.6

1. (i) F (ii) T (iii) T (iv) T (v) T (vi) F (vii) F (viii) F

2. (i) –2, 3 (ii) 1,1 (iii) 5, 4 (iv) –6,1 (v) –27, 2 (vi) 10, 5

3. (i) $10 \times 10 \times 10 \times 10 = \mathbf{10^4}$

(ii) $(-13) \times (-13) \times (-13) \times (-13) \times (-13) \times (-13) = \mathbf{(-13)^6}$

4. (i) $50^2 = 50 \times 50 = \mathbf{2500}$ (ii) $(-1)^{47} = \mathbf{-1}$

(iii) $1^{100} = \mathbf{1}$ (iv) $(-1)^{20} = \mathbf{1}$

(v) Do it yourself. (vi) $2^3 \times 3^2 = 8 \times 9 = \mathbf{72}$

(vii) $2^3 \times 2^5 = 2^{3+5} = 2^8 = \mathbf{256}$

(viii) $(-2)^6 \div (-2)^2 = (-2)^{6-2} = (-2)^4 = \mathbf{16}$

(ix) Do it yourself.

(x) $(-2)^4 \times (-3)^3 \times (-1) = 16 \times -27 \times -1 =$ **432**

(xi) Do it yourself.

(xii) $2^3 \times (-3)^2 \times 8 = 8 \times 9 \times 8 =$ **576**

5. (i) $(20)^2 = 20 \times 20 =$ **400**

(ii) $(-100)^2 = (-100 \times -100) =$ **10000**

(iii), (iv) Do it yourself.

(v) $(-150)^2 = -150 \times -150 =$ **22500**

(vi) Do it yourself.

6. (i) $(-12)^3 =$ **-1728**

(ii) $(-13)^3 =$ **-2197** (iii), (iv), (v), (vi) Do it yourself.

7. (i) $(1)^4 =$ **1**

(ii), (iii), (iv) Do it yourself.

(v) $(-2)^4 =$ **16** (vi) $(-3)^4 =$ **81**

8. (i) $(-2)^4 \times (-2)^3 =$ **$(-2)^7$** (ii) $10^2 \times 10^3 =$ **10^5**

(iii) Do it yourself. (iv) $3^7 \div 3^2 = 3^5; 3^{7-2} =$ **3^5**

9. 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, unit's digit are 0, 1, 4, 9, 6, 5

10. 1, 8, 27, 64, 125, 216, 343, 512, 729, 1000

11. (i) $3^2 + 4^2 = 5^2; 9 + 16 = 25 \Rightarrow 25 = 25$, (ii) Do it yourself.

12. (i) $10^2 - 8^2 = 6^2; 100 - 64 = 36 \Rightarrow 36 = 36$, (ii) Do it yourself.

Exercise 3.7

1. (i) $28 - 5 \times 6 + 2 = 28 - 30 + 2 = 28 + 2 - 30 = 30 - 30 =$ **0**

(ii) $120 - 20 \div 2 \quad = 120 - \frac{20}{2} = 120 - 10 =$ **110**

(iii), (iv), (v) Do it yourself.

(vi) $(-5) - (-48) \div (-16) + (-2) \times 6 = (-5) - \frac{(-48)}{(-16)} + (-2) \times 6$

$= (-5) - 3 - 12$

$= -5 - 3 - 12 =$ **-20**

(vii) $(-15) + 4 \div (5 - 3) = (-15) + 4 \div 2 = -15 + 2 =$ **-13**

(viii) Do it yourself.

(ix) $3 - (5 - 6 \div 3) = 3 - \left(5 - \frac{6}{3}\right) = 3 - (5 - 2) = 3 - 3 =$ **0**

(x) $36 \div (5 + 7) = 36 \div 12 = \frac{36}{12} =$ **3**

2. (i) $(-40)\text{ of }(-1)+28\div 7=(-40)\times(-1)+\frac{28}{7}=40+4=\mathbf{44}$

(ii) $28-5\text{ of }2+2=28-5\times 2+2=28-10+2=30-10=\mathbf{20}$

(iii) Do it yourself.

(iv) $81\text{ of }[59-\{7\times 8+(13-2\text{ of }5)\}]$

$=81\text{ of }[59-\{56+(13-10)\}]$

$=81\text{ of }[59-\{56+3\}]$

$=81\text{ of }[59-59]$

$=81\text{ of }0=81\times 0=\mathbf{0}$

3. (i) $7-\{13-2(4\times -4)\}-15\div 3$

$=7-\{13-2\times(-16)\}-15\div 3$

$=7-\{13+32\}-5$

$=7-13-32-5=\mathbf{-43}$

(ii) $20+\{10-5+(7-3)\}=20+\{10-5+4\}=20+9=\mathbf{29}$

(iii) $(-1)\{(-5)+(-25)\}\times(-7)-(8-10)(-4)$

$=(-1)(-30)\times(-7)-(8-10)(-4)$

$=-210-8=\mathbf{-218}$

(iv) Do it yourself.

(v) $(14-7)\times\{8+(3+7-1)\}=(7)\times\{8+9\}=7\times 17=\mathbf{119}$

(vi) $2-[2-\{2-(2-2-2)\}]=2-[2-\{2-(-2)\}]$

$=2-[2-\{2+2\}]=2-[2-4]$

$=2-[-2]=2+2=\mathbf{4}$

(vii) Do it yourself.

(viii) $118-\{121\div(11\times 11)-(-4)-(+3-7)\}$

$=118-\{121\div 121+4-(-4)\}$

$=118-\left\{\frac{121}{121}+4+4\right\}$

$=118-\{1+8\}=118-9=\mathbf{109}$

(ix) $121\div[17-\{15-3(7-4)\}]=121\div[17-\{15-3\times(3)\}]$

$=121\div[17-\{15-9\}]$

$=121\div[17-6]$

$=121\div 11=\frac{121}{11}=\mathbf{11}$

(x) $15-(-3)(4-4)\div 3[5+(-3)\times(-6)]$

$=15-(-3)\times 0\div 3[5+(-3)\times(-6)]$

$=15-0\div[5+18]$

$=15-0\div 3\times(23)=15-0=\mathbf{15}$

❑

4. Fractions

Exercise 4.1

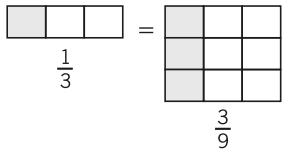
1. (i) $\frac{4}{9}$ (ii) $\frac{7}{15}$ (iii) $\frac{4}{5}$ (iv) $\frac{3}{8}$

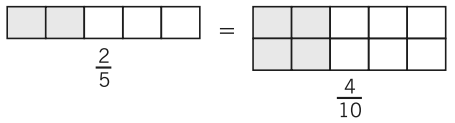
2. (i) $\frac{2}{5}$ (ii) $\frac{1}{4}$ (iii) $\frac{5}{8}$ (iv) $\frac{7}{10}$ (v) $\frac{13}{100}$ (vi) $\frac{4}{9}$

3. (i) Four-fifths (ii) Three-sevenths (iii) Four-nineteenths (iv) Five elevenths.

Exercise 4.2

1. $\frac{1}{4}, \frac{2}{8}, \frac{4}{16}$

2. (i) 

(ii) 

3. (i) $\frac{3}{5} = \frac{12}{20}$ (ii) $\frac{150}{750} = \frac{1}{5}$ (iii) $\frac{7}{9} = \frac{105}{135}$ (iv) $\frac{18}{24} = \frac{3}{4}$

4. (i) $\frac{2}{5} = \frac{8}{20} = \frac{24}{60} = \frac{48}{120}$ (ii) $\frac{75}{100} = \frac{15}{20} = \frac{3}{4}$

5. (i), (iii), (iv)

6. (i) $\frac{2}{3}$ (ii) $\frac{2}{9}$ (iii) $\frac{3}{7}$ (iv) $\frac{5}{6}$ (v) $\frac{3}{2}$ (vi) $\frac{1}{5}$.

Exercise 4.3

1. (i) Mixed number, (ii) Proper fraction, (iii) Improper fraction, (iv) Proper fraction, (v) Improper fraction, (vi) Improper fraction, (i) ;

2. (i) $\frac{41}{7}$ (ii) $\frac{31}{4}$ (iii) $\frac{18}{11}$ (iv) $\frac{23}{5}$ (v) $\frac{76}{9}$ (vi) $\frac{103}{7}$

3. (i) $4\frac{1}{4}$ (ii) $6\frac{2}{3}$ (iii) 5 (iv) $4\frac{6}{7}$ (v) $10\frac{1}{11}$ (vi) $17\frac{5}{7}$

4. (i) $\frac{2}{7}$ (ii) $\frac{1}{5}$ (iii) $\frac{3}{21}$ (iv) $\frac{7}{15}$

5. (i) $\frac{5}{7}$ (ii) $\frac{4}{7}$ (iii) $\frac{5}{12}$ (iv) $\frac{5}{12}$ (v) $\frac{3}{4}$ (vi) $\frac{7}{9}$

6. (i) $\frac{3}{4}, \frac{5}{12}, \frac{3}{8}$ (ii) $\frac{5}{6}, \frac{2}{3}, \frac{4}{9}$ (iii) $\frac{2}{3}, \frac{4}{7}, \frac{1}{2}$

(iv) $\frac{1}{5}, \frac{1}{7}, \frac{1}{9}, \frac{1}{12}, \frac{1}{17}, \frac{1}{23}, \frac{1}{50}$

7. (i) $\frac{5}{9}, \frac{7}{12}, \frac{3}{4}, \frac{5}{6}$ (ii) $\frac{7}{10}, \frac{3}{4}, \frac{4}{5}, \frac{11}{12}$ (iii) $\frac{5}{12}, \frac{1}{2}, \frac{5}{8}, \frac{2}{3}$

(iv) $\frac{3}{17}, \frac{3}{13}, \frac{3}{11}, \frac{3}{7}, \frac{3}{5}, \frac{3}{4}, \frac{3}{2}$.

Exercise 4.4

1. (i) 1 (ii) $\frac{1}{2}$ (iii) $\frac{4}{5}$ (iv) $\frac{11}{7}$

2. (i) $\frac{1}{4}$ (ii) $\frac{1}{3}$ (iii) $\frac{2}{5}$ (iv) $\frac{2}{7}$

3. (i) $\frac{5}{4}$ or $1\frac{1}{4}$ (ii) $\frac{11}{14}$ (iii) $\frac{19}{30}$ (iv) $\frac{11}{60}$

4. (i) $9\frac{1}{6}$ (ii) $3\frac{3}{8}$ (iii) $2\frac{5}{12}$ (iv) $4\frac{1}{15}$.

Exercise 4.5

1. $12 - [9 - \{15 - (12 - \overline{9 - 5})\}]$

$= 12 - [19 - \{15 - (12 - 4)\}]$

$= 12 - [9 - \{15 - 8\}]$

$= 12 - [9 - 7] = 12 - 2 = \mathbf{10}$

2. Do it yourself.

3. $11\frac{3}{4} \div \left[5\frac{1}{6} + \left\{3\frac{1}{2} - \left(1\frac{2}{3} + \frac{3}{2}\right)\right\}\right]$

$= \frac{47}{4} \div \left[\frac{31}{6} + \left\{\frac{7}{2} - \left(\frac{19}{6}\right)\right\}\right] = \frac{47}{4} \div \left[\frac{31}{6} + \left\{\frac{21 - 19}{6}\right\}\right]$

$= \frac{47}{4} \div \left[\frac{31}{6} + \frac{2}{6}\right] = \frac{47}{4} \div \left[\frac{31 + 2}{6}\right]$

$= \frac{47}{4} \div \frac{33}{6} = \frac{47}{4} \times \frac{6}{33} = \frac{47}{4} \times \frac{2}{11} = \frac{47}{2} \times \frac{1}{11} = \frac{47}{22} = \mathbf{2\,\frac{3}{22}}$

4. Do it yourself.

5. Do it yourself.

6. $4\frac{1}{2} - \left[5\frac{1}{4} \div \left\{2\frac{1}{2} - \frac{1}{12} \text{ of } \left(\frac{5}{2}\right)\right\}\right]$

$= \frac{9}{2} - \left[\frac{21}{4} \div \left\{\frac{5}{2} - \frac{1}{12} \times \frac{5}{2}\right\}\right]$

$= \frac{9}{2} - \left[\frac{21}{4} \div \left\{\frac{5}{2} - \frac{5}{24}\right\}\right]$

$= \frac{9}{2} - \left[\frac{21}{4} \div \left\{\frac{60-5}{24}\right\}\right]$

$= \frac{9}{2} - \left[\frac{21}{4} \times \frac{24}{55}\right] = \frac{9}{2} - \left[\frac{21}{1} \times \frac{6}{55}\right] = \frac{9}{2} - \left[\frac{126}{55}\right]$

$= \frac{495-252}{110} = \frac{243}{110} = \mathbf{2\,\frac{23}{110}}$

7. $3\frac{26}{27}$

8. $42\frac{1}{6}$

9. $21\frac{1}{9} \div \left[\frac{5}{9} \text{ of } \left\{3\frac{1}{27} - \left(6 - \overline{\frac{1}{3} - \frac{1}{6}}\right)\right\}\right]$

$= \frac{190}{9} \div \left[\frac{5}{9} \text{ of } \left\{\frac{82}{27} - \left(6 - \frac{2-1}{6}\right)\right\}\right]$

$= \frac{190}{9} \div \left[\frac{5}{9} \text{ of } \left\{\frac{82}{27} - \left(6 - \frac{1}{6}\right)\right\}\right]$

$= \frac{190}{9} \div \left[\frac{5}{9} \text{ of } \left\{\frac{82}{27} - \frac{35}{6}\right\}\right]$

$= \frac{190}{9} \div \left[\frac{5}{9} \text{ of } \left\{\frac{164-315}{54}\right\}\right]$

$= \frac{190}{9} \div \left[\frac{5}{9} \times \left(\frac{-151}{54}\right)\right]$

$= \frac{190}{9} \div \left[\frac{-755}{486}\right] = \frac{190}{9} \times \left(\frac{-486}{755}\right) = \frac{38}{1} \times \left(\frac{-54}{151}\right)$

$= \frac{38 \times (-54)}{151} = -\frac{2052}{151} = \mathbf{-13\,\frac{89}{151}}$

❑

5. Decimals

Exercise 5.1

1. (i) 0.059 (ii) 0.81 (iii) 0.009 (iv) 0.75 (v) 4.25 (vi) 2.3
(vii) 58.12 (viii) 4.62 (ix) 17.15 (x) 101.0011 (xi) 85.12
(xii) 23.24

2. (i) $\frac{63}{100}$ (ii) $\frac{3}{4}$ (iii) $\frac{1}{40}$ (iv) $\frac{3}{500}$ (v) $\frac{21}{200}$ (vi) $3\frac{3}{4}$ (vii) $\frac{1}{80}$
(viii) $15\frac{13}{25}$.

Exercise 5.2

1. (i) 144.750 (ii) 108.4 (iii) 210.35 (iv) 48.144 (v) 473.23
(vi) 120.894

2. (i) 31.753 (ii) 58.302 (iii) 207.45 (iv) 30.432 (v) 14.644
(vi) 0.8754

3. (i) ₹ 7.05 (ii) ₹ 13.50 (iii) 3.750 kg (iv) 3.005 kg (v) 7.725 km
(vi) 0.5 km

4. (i) 82.8 (ii) 91.126 (iii) 165.555 (iv) 64.337 (v) 334.877
(vi) 53.755

5. (i) Weight of purchasing apples = 5 kg and 50 g
Weight of purchasing grapes = 2 kg and 300 g
Weight of purchasing guavas = 2 kg and 10 g
Total Weight of the fruits = 5 kg 50 g
2 kg 300 g
+ 2 kg 10 g
9 kg 360 g
Total Weight of the fruits is 9 kg 360 g.
Difference between 10 kg and total Weight of the fruits.
= 10 kg – 9 kg 360 g
= 10000 g – 9360 g = **640 g**
Remaining Weight of the fruits is 640 g.
(ii) Price of a notebook = ₹ 21.50
Price of a pencil = ₹ 2.75
Price of a book = ₹ 32.05
Then total price = ₹ (21.50 + 2.75 + 32.05) = ₹ 56.30
If the price is paid by a 100 rupee note then change will be
= (100 – 56.30) = ₹ **43.70**

❑

Unit-II : Algebra

6. Algebra

Exercise 6.1

1. (i) $\frac{x+y}{2}$ (ii) $6 + x$ (iii) $x - 7$ (iv) $y + 3$ (v) $7 - y$ (vi) $\frac{x}{y} - 2$

(vii) $2x + 3$ (viii) x^2 (ix) $5z$ (x) $\frac{x}{3}$

2. (i) $x + 3$ (ii) $z - 5$ (iii) $z - 2$ (iv) $z = x + 4$ (v) $z = x - 4$

3. (i) S = C + P, where S = selling price, C = cost price, P = profit

(ii) A= P + I, where A = amount, P = principal,
and I = interest.

❑

Unit-III : Commercial Mathematics

7. Ratio and Proportion and Unitary Method

Exercise 7.1

1. Do it yourself.

2. Do it yourself.

3. (i) 160000 : 12000 ⇒ **40 : 3**

(ii) 12000 : 160000 ⇒ **3 : 40**

4. Lecturer's earning = ₹ 14000

Wife Daizy's earning = ₹ 18000

∴ Total earning = ₹ (14000 + 18000) = ₹ 32000

(i) 14000 : 32000 ⇒ **7 : 16**

(ii) 18000 : 32000 ⇒ **9 : 16**

5. Earning = ₹ 9550

Saving = ₹ 1850

Expenditure = ₹ (9550 – 1850) = ₹ 7700

(i) 1850 : 9550 ⇒ 37 : 191 (ii) 9550 : 7700 ⇒ **191 : 154**

(iii) 1850 : 7700 ⇒ 37 : 154

6. Men = 56

Women = 144 − 56 = 88

(i) Ratio of men to women = 56 : 88 = **7 : 11**

(ii) Ratio of men to total person = 56 : 144 = **7 : 18**

(iii) Ratio of women to total person = 88 : 144 = **11 : 18**

7. $42 : 1.2 \times 100 \Rightarrow 42 : 120 \Rightarrow$ **7 : 20**

8. $\text{Speed} = \dfrac{\text{Distance}}{\text{Time}}$

$\text{Speed of car} = \dfrac{135}{3} = 45\,\text{km/h}$

$\text{Speed of train} = \dfrac{170}{2} = 85\,\text{km/h}$

$\text{Ratio of their speeds} = \dfrac{\mathbf{45}}{\mathbf{85}} = 45 : 85 =$ **9 : 17**

Exercise 7.2

1. (i) 7 : 20 (ii) 13 : 4 (iii) 19 : 10 (iv) 13 : 2

2. (i) 4 : 6 (ii) 9 : 10 (iii) 4 : 6

3. (i) 4 : 3, 5 : 4 and 6 : 7

$$\text{or } \frac{4}{3}, \frac{5}{4} \text{ and } \frac{6}{7}$$

$$\frac{112,\ 105,\ 72}{84}$$

Hence, $72 < 105 < 112$ are in ascending order.

So, $\frac{6}{7}, \frac{5}{4}$ and $\frac{4}{3}$ or 6 : 7, 5 : 4 and 4 : 3 are in ascending order.

(ii) proceed as part (i).

4. According to question $5x + 3x = 968$

$$8x = 968$$

$$x = \frac{968}{8} = 121$$

So, No. of boys = $121 \times 5 =$ **605**

No. of girls = $121 \times 3 =$ **363**

5. Priya = ₹ 450, Meenu = ₹ 1050

6. Rakesh ₹ 2100, Lokesh = ₹ 600, Mukesh = ₹ 900

7. Let Peter's age = x years

Peter's father age = $3x$

The ratio of Peter's and his father's age = $x : 3x =$ **1 : 3**

8. Let Carla's age is $7x$

then, Tina's age is $11x$

According to questions, $11x = 55$

$$x = \frac{55}{11} = 5$$

So, Carla's age $= 7 \times 5 =$ **35 years.**

9. An apple cost $= ₹ \frac{200}{12}$

An orange cost $= ₹ \frac{80}{10}$

Ratio of apple and oranges costs $= \frac{200}{12} : \frac{80}{10}$

$$= \frac{5}{12} : \frac{2}{10} = \frac{50 : 24}{120} = \mathbf{25 : 12}$$

So, ratio in apple and orange cost $= 25 : 12$.

Exercise 7.3

1. (i) $16 : 24 = 20 : 30$

$$\frac{16}{24} = \frac{20}{30}$$

$$\mathbf{\frac{2}{3} = \frac{2}{3}}$$

So, it is **true.**

(ii), (iii), (iv), (v), (vi), (vii), (viii), (ix), (x) proceed as part (i).

2. (i) 2, 3, 4, 5

Now product of extremes $= 2 \times 5 = 10$

Product of means $= 3 \times 4 = 12$

Since the product of extremes are not equal the product of means.

So, 2, 3, 4 and 5 are not in proportion.

(ii), (iii), (iv), (v) (vi) proceed as part (i).

3. Proceed as questions 1.

4. (i) 28, □, 3, 5, 1.5

Let □ $= x$

Now product of extremes $= 28 \times 1.5 = 42$

Product of means $= x \times 3.5$

According to questions $x \times 3.5 = 42$

$$x = \frac{42}{3.5} = \mathbf{12}$$

(ii), (iii), (iv) proceed as part (i).

5. Let fourth term is x.

Now product of extreme $= 7 \times x$

and product of means $= 14 \times 25$

According to questions $7 \times x = 14 \times 25$

$$x = \frac{14 \times 25}{7} = \mathbf{50}$$

So, fourth term = 50

6. (i) 64 m (ii) 220 m (iii) 12 hours (iv) 4 girls (v) 24 girls

7. 15

8. (i) 25, 35, □

Let □ = x

then $25 \times x = 35 \times 35$

$$x = \frac{35 \times 35}{25} = 49$$

(ii), (iii), (iv) proceed as part (i).

9. 361

10. Yes.

Exercise 7.4

1. ∵ 8 water tankers can be filled in $= 7\frac{1}{2}$ hrs $= \frac{15}{2}$ hrs

∵ 1 water tanker can be filled in $= \frac{15}{2 \times 8}$ hrs

∵ 16 water tankers can be filled in $= \frac{15}{16} \times 16 =$ **15 hrs**

2. ₹ 18 **3.** ₹ 1360

4. ₹ 3136 **5.** 3380 kg

6. Cost of 5 kg of rice = ₹ 130

Cost of 1 kg of rice $= \frac{₹\ 130}{5}$

Cost of 24 kg of rice $= \frac{₹\ 130}{5} \times 24 =$ **₹ 624**

7. 8 **8.** 6 hours

9. 96 parts **10.** 10000

11. 280 quintals of wheat yield in = 6 hectares

1 quintal of wheat yield in $= \frac{6}{280}$ hectares

225 quintals of wheat yield in $= \frac{6 \times 225}{280} = \mathbf{\frac{135}{28}}$ **hectares**

12. ₹ 14400 **13.** 2400 km

14. 300 litres **15.** 4.5 kw

16. ₹ 19210 is the price of = 17 chairs

₹ 1 is the price of $= \frac{17}{19210}$ chairs

₹ 113000 is the price of $= \frac{17 \times 113000}{19210} =$ **100 chairs.**

17. ₹ 300 **18.** (i) 10 kg (ii) 48

19. (i) 8 hours (ii) 385km.

❑

Unit-IV : Geometry

8. Basic Geometrical Ideas

Exercise 8.1

1. (i) point (ii) line (iii) plane (iv) intersect (v) collinear (vi) concurrent

2. (i) T (ii) F (iii) F (iv) F (v) T (vi) F (vii) T

3. Do it yourself

4. (i) lines PQ, QR and PR (ii) lines AB, BC, CD, AD, AC and BD

5. Do it youself

6. Yes, infinitely many lines

7. One and only one line 8. Do it yourself

9. (i) lines l and m; lines m and n; lines l and n (ii) lines p and q; lines p and l; lines p and m; lines p and n; lines q and l; lines q and m; lines q and n (iii) lines p and l; (iv) lines m and q (v) lines p and n; (vi) points A, P, Q and R; points A, B, C and D

10. (i) six (ii) lines AB, BC, CD, DA, AC and BD (iii) lines AC, BC and CD.

11. (i) No (ii) No (iii) Yes (iv) No

12. (i) points B, C and D (ii) lines l, m and n; point of concurrence is A

13. (i) Three (ii) None **14.** Yes.

❑

9. Line Segments : Measurement and Construction

Exercise 9.1

1. (i) Ten; line segments AB, BC, CD, DA, AE, EB, EC, ED, AC and BD. (ii) Six; line segments AB, AC, BC, BD, CD and AD (iii) Two; line segments AB and BC (iv) Seven; line segments AB, BC, CD, DE, AC, AD and AE

2. Do it yourself
3. (i) No (ii) Yes (iii) No (iv) No.

Exercise 9.2

Do it yourself.

❑

10. Angles

Exercise 10.1

1. (i) Rays with initial point O are OR, OT, OR, OQ and OS. Rays with initial point P are PT PR, PO, PQ and PS. Rays with initial point Q are QS, QO, QP, QT and QR. Rays with initial point T are TR, TP, TO, TQ and TS. (ii) NO (iii) Yes
2. Eight; rays OA, OB, OC, OD, OE, OF, OG and OH
3. (i) P (ii) C (iii) Y.
4. Do it yourself
5. **Line :** A line is straight and extends infinitely in both directions having no end points.
   Line segment : A line segment is a portion of a line having two end points.
   Ray : A ray is the parts of lines that extend infinitely in only one direction and have only one end point.

Exercise 10.2

1. (i) Vertex Y, Arms YX and YZ; (ii) Vertex M, Arms MN and ML; (iii) Vertex P, Arms PQ and PR (iv) Vertex B, Arms BA and BC
2. Six; angles AOB, BOC, COD, AOC, BOD and AOD
3. Do it yourself
4. Do it youself
5. (i) Angle DAE or EAD (ii) Angle BAC or CAB (iii) Angle ACD or DCA (iv) Angle ADC or CDA (v) Angle AFE or EFA
6. (i) No (ii) Yes (iii) Yes (iv) Yes (v) No
7. Angles BAD, ABD, ADB, BDC, DBC, DCB, ADC and ABC; Two
8. (i) Points A, D and F (ii) Points B and C (iii) Points P, G, Q, E and R.

Exercise 10.3

1. 45°
2. (i) Yes (ii) No (iii) Yes (iv) No
3. (i) Obtuse (ii) Right (iii) Straight (iv) Reflex (v) Acute (vi) Acute
4. (i) South West (ii) North East

5. Right angle
6. (i) Straight (ii) Right (iii) Straight
7. (i) Acute (ii) Obtuse (iii) Acute (iv) Straight (v) Reflex (vi) Complete (vii) Zero (viii) Right
8. Do it yourself.

Exercise 10.4

1. (i) Pairs of angles (1, 2), (2, 3), (3,4), (4, 1), (5, 6) (6, 7), (7, 8), (8, 5) (ii) Pairs of angles (1, 3), (2, 4), (5, 7) and (6, 8)
2. (i) Yes (ii) No (iii) Yes (iv) Yes (v) Yes
3. (i)35° (ii) 17° (iii) 45° (iv) 65° (v) 40°
4. No, because they do not have a common vertex
5. (i) Complementary (ii) Supplementary (iii) Complementary (iv) Complementary (v) Supplementary (vi) Supplementary (vii) Complementary (viii) Complementary
6. (i) 110° (ii) 115° (iii) 135° (iv) 90° (v) 45°
7. Obtuse angle
8. Right angle
9. 45°
10. Increases so that the sum of the two angles remains the same.
11. (i) T (ii) F (iii) T (iv) F (v) T (vi) T
12. (i) No (ii) No (iii) Yes
13. Less than 45°
14. (i) x is 65°, y is 145° and z is 35° (ii) x is 115°, y is 65° and z is 115°.

❑

11. Pairs of Lines and Transversals

Exercise 11.1

1. Only in fig (iii) and (iv) l is a transversal as it intersects two or more given lines in a plane at different points.
2. (a) p is transversal line as it intersects lines l and m at two different points.
   (b) EF is a transversal line as it intersects lines AB and CD at two different points.

Exercise 11.2

1. No, because on extanding they will intersect each other.
2. (i) $AB \parallel ED$, $AF \parallel CD$, $FE \parallel CB$
   (ii) $AB \parallel RP$, $QP \parallel AC$, $QR \parallel BC$

(iii) $PR \parallel BC, PQ \parallel AC, PR \parallel QC, PQ \parallel RC, PR \parallel BQ, PQ \parallel AR$

(iv) $AB \parallel CD, BC \parallel AD, AE \parallel FC, AF \parallel EC, BC \parallel AF, EC \parallel AD, BE \parallel FD, BE \parallel AF, BE \parallel AD, FD \parallel BC, FD \parallel EC$

Exercise 11.3

1. Do it yourself.

2. $\angle b = \angle f$ (Corresponding angles)

$\therefore \quad \angle f = 65°$

$\angle f = \angle d$ (Alternate angles)

$\therefore \quad \angle d = 65°$

$\angle d = \angle h$ (Corresponding angles)

$\therefore \quad \angle h = 65°$

$\angle e + \angle d = 180°$ (Interior supplementary angles)

$\angle e + 65° = 180°$ ($\because \angle d = 65°$)

$\therefore \quad \angle e = 180° - 65° = 115°$

$\angle e = \angle a$ (Corresponding angles)

$\therefore \quad \angle a = \mathbf{115°}$

$\angle g = \angle c$ (Corresponding angles)

$\therefore \quad \angle g = \mathbf{115°}$

Thus, $\angle c = \angle g = \angle a = \angle e = \mathbf{115°}$

and $\angle b = \angle f = \angle d = \angle h = \mathbf{65°}$

3. Proceed as question 2.

4. (i) In figure, we have

$\angle y + 135° = 180°$

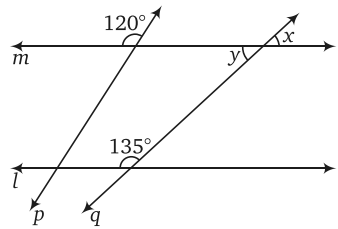
(Interior supplementary angles)

$\angle y = 180° - 135° = 45°$

$\angle y = \angle x$

(Vertically opposite angles)

$\therefore \quad \angle x = \mathbf{45°}$



(ii) $\angle x = \mathbf{60°}$ (Alternate angles)

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12. Polygons

Exercise 12.1

1. Polygon: a closed figure obtained by joining three or more straight line segments

2. Closed Curve: a curve begining and ending at the same place. Open Curve: a curve not ending at the point it began

3. (i) open (ii) open (iii) closed (iv) closed
4. Regular polygons have sides of equal length, whereas in irregular polygons all the sides are not equal
5. (i) equilateral triangle (ii) square (iii) regular pentagon (iv) regular hexagon (v) regular heptagon (vi) regular octagon (vii) regular nonagon (viii) regular decagon
6. Do it yourself.

❑

13. Triangles

Exercise 13.1

1. (i) Three (ii) Three (iii) Three (iv) Six
2. Triangle, ΔLMN
3. (a) ∠N (b) LN (c) M (d) LM
4. No
5. ΔAOD, ΔBOC, ΔCOA, ΔAOD, ΔABD, ΔABC, ΔACD, ΔBCD (i) ΔBOC, ΔBDC, ΔABC (ii) ΔABD, ΔACD, ΔAOD (iii) ΔDOC, ΔBOC, ΔBCD (iv) None (v) None
6. Twelve; ΔADE, ΔABE, ΔADC, ΔABC, ΔBFC, ΔBFD, ΔBDE, ΔCEF, ΔCED, ΔDEF, ΔBCD, ΔBEC
7. (i) ΔADE, ΔABE, ΔADC, ΔABC (ii) ΔBEA, ΔBAC, ΔBFC, ΔBFD, ΔBDE, ΔBDC, ΔBEC (iii) ΔCDA, ΔCBA, ΔCBF, ΔCEF, ΔCED, ΔCBD, ΔCBE (iv) ΔDAE, ΔDAC, ΔDBF, ΔDBE, ΔDEC, ΔDEF, ΔDBC (v) ΔEDA, ΔEBA, ΔEBD, ΔECF, ΔECD, ΔEFD, ΔEBC (vi) ΔFBC, ΔFEC, ΔFED, ΔFDB
8. ΔADE, ΔADC, ΔCEF, ΔCED, ΔDEF; ΔABC, ΔABE, ΔDEA ΔDAC, ΔDBF, ΔDBE, ΔDEC, ΔDEF, ΔDBC
9. Points P, Q, R, G, A, D and C; P, Q, R, G, A and D.

Exercise 13.2

1. (i) Acute Δ (ii) Obtuse Δ (iii) Right Δ (iv) Obtuse Δ (v) Right Δ (vi) Acute Δ
2. (i) Isosceles Δ (ii) Scalene Δ (iii) Scalene Δ (iv) Scalene Δ (v) Scalene Δ
3. (i) Right Δ (ii) Obtuse Δ (iii) Acute Δ (iv) Obtuse Δ (v) Right Δ (vi) Acute Δ
4. (i) Isosceles Δ (ii) Equilateral Δ (iii) Scalene Δ (iv) Scalene Δ (v) Equilateral Δ (vi) Isosceles Δ.

Exercise 13.3

1. A triangle is possible if the sum of its two arms is more than third arm.

$4 + 5 = 9$, which is more than 6. So, the triangle is possible.

(ii), (iii), (iv), (v), (vi) Proceed as part (i).

2. (i) 50°, 95°, 43°

Here, $50° + 95° + 43° = \mathbf{188}°$

$188° \neq 180°$

So, triangle cannot be formed.

(ii), (iii), (iv), (v) and (vi) Proceed as part (i).

3. We know the sum of three angles of a triangle = 180°

(i) $30° + 60° + x = 180°$

$90° + x = 180°$; $x = 180° - 90° = \mathbf{90}°$

(ii), (iii), (iv) Proceed as part (i).

4. $\angle A = \angle B + \angle C$

We know that,

$$\angle A + \angle B + \angle C = 180°$$
$$\angle A + \angle A = 180°$$
$$2\angle A = 180° \Rightarrow \angle A = \mathbf{90}°$$

5. $\angle A = \angle B = \angle C$

We know that the sum of three angles of triangle is 180°

$$\angle A + \angle B + \angle C = 180°$$
$$\angle A + \angle A + \angle A = 180°$$
$$3\angle A = 180°$$
$$\angle A = \frac{180°}{3} \Rightarrow \angle A = \mathbf{60}°$$

Each angle of triangle is 60°.

6. $160° + x + x = 180°$

$2x = 180° - 160°$; $2x = 20°$; $x = \frac{20°}{2}$; $x = \mathbf{10}°$

7. $\angle DAB + \angle ABC + \angle BCD + \angle CDA$

$\angle DAB + \angle ABD + \angle BDA = 180°$

$\angle BDC + \angle DCB + \angle CBD = 180°$

$\angle DAB + \angle ABC + \angle BCD + \angle CDA = 360°$

8. 540°

9. (i) $\angle$ABC (ii) $\angle$ABC + $\angle$ACB (iii) $\angle$BAC + $\angle$ACB

10. $\angle A + \angle B + \angle C = 180°$

$50° + 60° + x = 180°$

$110° + x = 180$

$\Rightarrow \quad x = 180° - 110°$

$x = 70°$

Now, $\angle BCD = 180°$

$\angle BCA + \angle ACD = 180°$

$70° + \angle ACD = 180°$

$\angle ACD = 180° - 70° = \mathbf{110°}$

11. (i) ∠CBA (ii) ∠CAB and ∠BCA

12. Do it yourself.

13. (i) $AP < AB + BP$ (ii) $AP < AC + PC$

(iii) $AP < \frac{1}{2}(AB + AC + BC)$

14. (i) F (ii) F (iii) F (iv) T

15. (i) No (ii) Yes (iii) No (iv) No (v) Yes (vi) Yes (vii) No.

❑

14. Constructions

Exercise 14.1

1. Do it yourself,
2. Do it yourself,
3. Do it yourself,
4. (i) 90° (ii) 30° (iii) 120°.

Exercise 14.2

1. Do it yourself, Yes,
2. Do it yourself,
3. Do it yourself,
4. Do it yourself,
5. Two.

Exercise 14.3

1. Do it yourself, Yes,
2. Do it yourself, Yes
3. At the centre,
4. Do it yourself,
5. Do it yourself.

Exercise 14.4

1. Do it yourself, Yes,
2. Do it yourself,
3. Do it yourself,
4. Do it yourself,
5. to
8. Do it yourself.

Exercise 14.5

1. Do it yourself, Yes,
2. Do it yourself,
3. Do it yourself,
4. Do it yourself, Yes,
5. Do it yourself

❑

Unit-V : Mensuration

15. Perimeter and Area

Exercise 15.1

1. (i) Perimeter of triangle = Sum of three sides
$= (3 + 1.5 + 2)\,\text{cm} = \mathbf{6.5\ cm}$
(ii), (iii) Do it yourself.
(iv) Perimeter of triangle 10 cm + 10 cm + 10 cm = **30 cm**

2. (i) Perimeter of triangle
$= (46 + 23 + 70 + 70)\,\text{m} = \mathbf{209\ m}$
(ii), (iii) Proceed as above.

3. (i) Perimeter of triangle
$= (9 + 9 + 9 + 8.5 + 8.5)\,\text{cm} = \mathbf{44\ cm}$
(ii), (iii) Proceed as above.

4. (i) Perimeter of rectangle
$= (4 + 4 + 2 + 2)\,\text{cm} = \mathbf{12\ cm}$

5. (i) Perimeter of square = $4 \times$ side $= 4 \times 2.5\,\text{m} = \mathbf{10.0\ m}$
(ii), (iii) Do it yourself.

6. (i) Perimeter of rectangle = Sum of four sides
$= (4 + 3.5 + 4 + 3.5)\,\text{cm} = \mathbf{15\ cm}$
(ii), (iii) Do it yourself.

7. (i) Perimeter of rectangle $= 2 \times (l + b) = 2 \times (5 + 4) = 2 \times 9$
$= \mathbf{18\ cm}$
(ii) Do it yourself.
(iii) Perimeter of rectangle
$= 2 \times (l + b) = 2 \times (7 + 1.5) = 2 \times 8.5 = \mathbf{17\ cm}$

8. (i) Perimeter of square = $4 \times$ side
$$100 = 4 \times \text{side} \quad \Rightarrow \quad \frac{100}{4} = \text{side}$$
$$\text{side} = 25\,\text{cm}$$
(ii), (iii), (iv) Do it yourself.

9. Perimeter of triangle = Sum of three sides.
$$50 = 15 + 20 + x \quad \Rightarrow \quad 50 - 35 = x$$
$$\Rightarrow \quad x = 50 - 35 = 15$$
Third side = **15 cm**

10. Do it yourself.

11. Perimeter of rectangle park = $2 \times (l + b)$
$= 2 \times (300 + 200) = 1000$ m
$\therefore$ Cost of fencing a park = $1000 \times 24 =$ ₹ **24000**

12. Distance covered by Sweety = 4×75 m = 300 m
Distance covered by Bulbul = $2 \times (60 + 45)$ m = 2×105 m
= 210 m
Since **300 > 210**
$\therefore$ Bulbul covers smaller distance.

13. Do it yourself.

14. Perimeter of square = $4 \times$ side = $4 \times 75 = 300$ m
Distance covered in three times = $300 \times 3 = 900$ m
Perimeter of rectangle = $2 \times (l + b) = 2 \times (160 + 105)$
$= 2 \times 265 = 530$ m
Distance covered in two times = $2 \times 530 = 1060$ m
Bob covers more distance = 1060 m – 900 m = **160 m**

15. Perimeter of rectangles = Perimeter of square = 36 cm.
$\because$ Every square is also a rectangle.
and perimeter of square = $4 \times$ side
$36 = 4 \times$ side
$$\text{Side} = \frac{36}{4} = \mathbf{9\ cm}$$
Thus, nine rectangles can be drawn with 36 cm as the perimeter.

Exercise 15.2

1. (i) Area of rectangle = length $\times$ breadth = 4 cm $\times$ 1 cm = **4 cm^2**
(ii), (iii) Do it yourself.

2. (i) Area of rectangle = length $\times$ breadth = 24 cm $\times$ 10 cm
= **240 cm^2**
(ii), (iii), (iv) Do it yourself.

3. (i) Area of rectangle = length $\times$ breadth = 11 cm $\times$ 7 cm = **77 cm^2**
(ii) Do it yourself.

4. (i) Area of square = $(\text{side})^2 = (11)^2 =$ **121 cm^2**
(ii) Do it yourself.

5. (i) Area of rectangle = $l \times b = 24 \times 16 = 384$ cm^2
(ii) Area of square = $(\text{Side})^2 = (21)^2 = 441$ cm^2
Square has larger area = 441 – 384 = **57 cm^2**

6. (i) Area of rectangle = length $\times$ breadth = $2l \times b =$ ***2lb* (doubled)**
(ii) $l \times b = lb = l \times 2b =$ ***2lb* (doubled)**
(iii) $l \times b = 2l \times 2b =$ ***4lb* (four times)**

7. (i) Area of square = $(\text{side})^2 = (2x)^2 = \mathbf{4x^2}$

Area will get four times than original area.

(ii) Area of square = $(3x)^2 = 9x^2$

Area will get nine times than original area.

(iii) Area of square = $\left(\frac{1}{2}x\right)^2 = \mathbf{\frac{1}{4}x^2}$

Area will have become one-fourth of the original area.

8. Area of bathroom = $3 \times 3 = 9\,\text{m}^2$

Area of one tile = $\frac{25 \times 25}{100 \times 100}\,\text{m}^2$

Number of tiles = $\frac{3 \times 3 \times 100 \times 100}{25 \times 25} = \mathbf{144}$

9. $1\,\text{cm} = 10\,\text{mm}$, $1\,\text{cm}^2 = 1\,\text{cm} \times 1\,\text{cm} = 10\,\text{mm} \times 10\,\text{mm}$

$= \mathbf{100\,mm^2}$

10. $1\,\text{m} = 100\,\text{cm}$, $1\,\text{m}^2 = 1\,\text{m} \times 1\,\text{m} = 100\,\text{cm} \times 100\,\text{cm}$

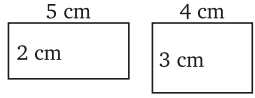
$= \mathbf{10000\,cm^2}$

11. Area of square = Area of rectangle $\Rightarrow 16^2 = 64 \times$ breadth

$\therefore$ breadth = $\frac{16 \times 16}{64} = \frac{16}{4} = \mathbf{4\,cm}$

Note : All units are in centimeters.

12.



Area of rectangle (i) = $5 \times 2 = 10\,\text{cm}^2$

Area of rectangle (ii) = $4 \times 3 = 12\,\text{cm}^2$

So, we have reached the conclusion that it is possible to draw 2 rectangles of same perimeter, but their areas will not be the same. However, in case of squares. It is not possible to draw any 2 squares having same perimeter.

13. Let *ABCD* be a rectangle with length l and breadth b and *PQRS* be a square of side (equal to the length of rectangle given). Now, square *PQRS* will have larger area than that of rectangle *ABCD*, because for *ABCD* to be a rectangle, $b < l$ (Its breadth must be less than its length). So, by comparing areas of both we can clearly see that area of square is larger.

Area of rectangle = $l \times b$, $b < l$

Area of square = $l \times l$

$l \times l > l \times b$ $\quad (\because\ l > b)$

14. Square PQRS. ❑

Unit-VI : Statistics

16. Data Handling

Exercise - 16.1

1. to **4.** Prepare bar graphs and pictograph with the help of examples given in the lesson

5. (i) 53 workers (ii) 10 shops (iii) 10 shops

6. (i) I class (ii) V class (iii) 2 classes (iv) 3 classes. ❑

Half Yearly Model Test Paper

1. (i) 98273496, 98273498 (ii) 72373, 72375
(iii) 7354526, 7354528 (iv) 173899, 173901 (v) 99999, 100001

2. (i), (iii)

3. 100000

4. (i)

2	162, 234
9	81, 117
	9, 13

HCF = 2 × 9 = 18

(ii), (iii) Do it yourself.

5. Given : length = 2 m 67 cm = 267 cm
Breadth = 4 m 45 cm = 445 cm
Height = 7 m 12 cm = 712 cm
HCF of 267, 445, 712

267) 445 (1
267
178) 267 (1
178
89) 178 (2
178
×

89) 712 (8
712
×
HCF = 89

Thus the longest tape which can measure the three dimensions of room exactly is 89 cm.

6.

2	220, 300
2	110, 150
3	55, 75
5	55, 25
5	11, 5
11	11, 1

LCM = $2 \times 2 \times 3 \times 5 \times 5 \times 11 = 3300$

7. Do it yourself.

8. Temperature of Delhi = $13℃ - 6℃ = 7℃$
Temperature of Chennai = $18℃ - 10℃ = 8℃$
Temperature of Chennai fall is greater, 8℃

9. Do it yourself. **10.** Do it yourself.

11. Do it yourself.

12. $42 : 1.2 \times 100 \Rightarrow 42 : 120 \Rightarrow 7 : 20$

13. $7x + 2x + 3x = 3600$

$$x = \frac{3600}{12} \Rightarrow x = 300$$

Rakesh = $7 \times 300 = 2100$
Lokesh = $2 \times 300 = 600$
Mukesh = $3 \times 300 = 900$

14. 400 students Monthly consumption of cereals = 5200 kg
1 student monthly consumption of cereals = $\frac{5200}{400}$ kg
260 students monthly consumption of cereals = $\frac{5200}{400} \times 260$
$= 3380$ kg

15. 4.5 kw

16. Yes, infinitely many lines. ❑

Annual Model Test Paper

1. Do it yourself. **2.** Do it yourself.

3. (i) Vertex Y, Arms YX and YZ; (ii) Vertex M, Arms MN and ML; (iii) Vertex P, Arms PQ and PR (iv) Vertex B, Arms BA and BC

4. Right cicle

5.

$\angle b = \angle f$ (Corresponding angles)
$\therefore \quad \angle f = 65°$
$\angle f = \angle d$ (Alternate angles)
$\therefore \quad \angle d = 65°$
$\angle d = \angle h$ (Corresponding angles)

$\therefore \quad \angle h = 65°$

$\angle e + \angle d = 180°$ (Interior supplementary angles)

$\angle e + 65° = 180°$ ($\because \angle d = 65°$)

$\therefore \quad \angle e = 180° - 65° = 115°$

$\angle e = \angle a$ (Corresponding angles)

$\therefore \quad \angle a = 115°$

$\angle e = \angle c$ (Alternate angles)

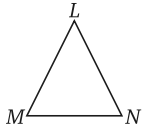
$\therefore \quad \angle c = 115°$

$\angle g = \angle c$ (Corresponding angles)

Thus, $\angle c = \angle g = \angle a = \angle e = 115°$

and $\angle b = \angle f = \angle d = \angle h = 65°$

6.



It is triangle.

7. (i) Right Δ (ii) Obtuse Δ (iii) Acute Δ (iv) Obtuse Δ (v) Right Δ (vi) Acute Δ

8. $\angle A = \angle B = \angle C$

We know that the sum of of three angles of triangles is 180°.

$\angle A + \angle B + \angle C = 180°$

$\angle A + \angle A + \angle A = 180°$

$3\angle A = 180°$

$\angle A = \frac{180°}{3} \Rightarrow \angle A = 60°$

Each angle of triangle is 60°.

9. Do it yourself.

10. Do it yourself.

11. Do it yourself.

12. (i) Perimeter of triangle = Sum of three sides

$= (3 + 1.5 + 2)\,\text{cm} = 6.5\,\text{cm}$

(ii), (iii), (iv) Do it yourself.

13. Distance covered by Sweety $= 4 \times 75\,\text{m} = 300\,\text{m}$

Distance covered by Bulbul $= 2 \times (60 + 45)\,\text{m} = 2 \times 105\,\text{m}$

$= 210\,\text{m}$

Since $300 > 210$

$\therefore$ Bulbul covers smaller distance.

14. square PQRS

15. (i) 53 workers (ii) 10 shops (iii) 10 shops.

❑