VIDYA
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ADVANCE MATHEMATICS

Teacher's Resource Book

Class 6

Advance Mathematics-6

Revision

12. Greatest 8-digit number $= 99999999$
Smallest 8-digit number $= 10000000$
Difference of these two $= 99999999 - 10000000 = \mathbf{89999999}$

13. The difference of two number $= 1245754$
The smaller number $= 1139658$
The larger number $= 1245754 + 1139658$
$= \mathbf{2385412}$

20. The Students in the school $= 2385$
Each one them pays $=$ ₹ 5172 yearly
Money collected in one year $= 2385 \times$ ₹ $5172 =$ ₹ $\mathbf{12335220}$

21. The ball-point pens packed in packets $= 3698640$
Each packet contains the ball-point pens $= 144$
Number of packets $= 3698640 \div 144$
$= \mathbf{25685}$ packets are made and 80 pens are left.

25. Hence numbers give remainders 7 and 8 respectively.
So, we subtract them $227 - 7 = 220$ and $272 - 8 = 264$
Now HCF of 220 and 264 is 44.
So, required number is **44**.

29. LCM of 42, 56 and 35

2	42, 56, 35
2	21, 28, 35
2	21, 14, 35
3	21, 7, 35
5	7, 7, 35
7	7, 7, 7
	1, 1, 1

So, LCM of 42, 56 and 35 $= 2 \times 2 \times 2 \times 3 \times 5 \times 7 = 840$
Hence 5 is left as remainder so the required number $= 840 + 5$
$= \mathbf{845}$

41. Length of carpet $= 2.33$ m
Breadth of carpet $= 1.15$ m
Area of carpet $= 2.33 \times 1.15$ m $= 2.6795$ m^2
Accurate to second place of decimal $\Rightarrow 2.6795 = \mathbf{2.68 \ m^2}$

42. Price of 1 metre of cloth $=$ ₹ $17.50 = 1750$ paise
Price of 2.65 metre of cloth $= 1750 \times 2.65$ paise $= 4637.50$ paise
$=$ ₹ $\mathbf{46.375}$ **or** ₹ $\mathbf{46.38}$

43. The average price of three chairs = ₹ 130
Total price of three chairs = ₹ 130 × 3 = ₹ 390
Total price of two chair = ₹ 125 + ₹ 140 = ₹ 265
Price of third chairs = ₹ 390 − ₹ 265 = ₹ **125**

44. The rebate = ₹ 125
The costing of cooler = ₹ 2000
Percentage of rebate $= \dfrac{125 \times 100}{2000} = \mathbf{6.25\%}$

45. Students of *ABC* planted = 600 plants
Plants that grow up = 420 plants
Percentage of growing plants $= \dfrac{420 \times 100}{600} = \mathbf{70\%}$

46. Sania bought 20 Oranges for = ₹ 5.00
Sania bought 60 Oranges for = ₹ 5.00 × 3 = ₹ 15.00
Sania sold 15 Oranges for = ₹ 6.00
Sania sold 60 Oranges for = ₹ 6.00 × 4 = ₹ 24.00
Hence SP > CP. So there is profit.
$$\text{Profit percent} = \dfrac{\text{profit}}{\text{CP}} \times 100$$
Here   profit = ₹ 24.00 − ₹ 15.00 = ₹ 9.00
and   CP = ₹ 15
So,   profit percent $= \dfrac{9}{15} \times 100 = \mathbf{60\%}$

47. Pari purchased a watch = ₹ 570
Pari spend on its repair = ₹ 30
Now cost price (CP) = ₹ 570 + ₹ 30 = ₹ 600
and selling price = ₹ 630
So profit = ₹ 630 − ₹ 600 = ₹ 30
Profit percent $= \dfrac{30}{600} \times 100 = \mathbf{5\%}$

48. Interest after Ist year $= \dfrac{₹\ 5000 \times 10 \times 1}{100} = ₹\ 500$
Amount after Ist year = ₹ 5000 + ₹ 500 = ₹ 5500
Interest after 2nd year $= \dfrac{₹\ 5500 \times 10 \times 1}{100} = ₹\ 550$
Amount after 2nd year = ₹ 5500 + ₹ 550 = ₹ 6050
Interest after 3rd year $= \dfrac{₹\ 6050 \times 10 \times 1}{100} = ₹\ 605$
Amount after 3rd year = ₹ 6050 + ₹ 605 = ₹ **6655**

49. $P = ₹\ 500, R = 15\%$ per annum, $T = 3\dfrac{1}{3}$ years or $\dfrac{10}{3}$ years

$$SI = \frac{P \times R \times T}{100} = \frac{500 \times 15 \times 10}{3 \times 100} = ₹\, 250$$

Amount = $P + SI$ = ₹ 500 + ₹ 250 = ₹ 750

He paid = ₹ 450 and a Radio.

So, ₹ 450 + a Radio = ₹ 750

a Radio = ₹ 750 − ₹ 450 = ₹ 300

So, the cost of Radio = ₹ **300**

62. Length of the path = 250 m = 25000 cm

Breadth of the path = 6.3 m = 630 cm

Area of the path = $25000 \times 630 \text{ cm}^2$

Area of one block = $25 \times 20 \text{ cm}^2$

Required blocks = $\dfrac{25000 \times 630}{25 \times 20}$ = **31500**

Unit-I : Number System

1. Knowing Our Numbers : Natural and Whole

EXERCISE 1.4

1. Amount of steel used by Mr. Sharma = 3715 kg 400 g

Amount of steel used by Mr. Verma = 4825 kg 250 g

Total amount of steel used by both of them = 3715 kg 400 g

$$\begin{array}{r} 4825 \text{ kg } 250 \text{ g} \\ \hline 8540 \text{ kg } 650 \text{ g} \\ \hline \end{array}$$

Thus, total amount of steel used by both of them is **8540 kg 650 g**

and in g = **8540650 g**

2. From question 1

Difference amount of steel used by Mr. Sharma and Mr. Verma

$$\begin{array}{r} = 4825 \text{ kg } 250 \text{ g} \\ - 3715 \text{ kg } 400 \text{ g} \\ \hline 1109 \text{ kg } 850 \text{ g} \\ \hline \end{array}$$

Thus, Difference amount of steel is **1109 kg 850 g.**

3. Total weight of wheat carried by a cart = 1745 kg 700 g

Number of carts = 15

Weight of wheat carried by 15 carts = (1745 kg 700 g) $\times 15$

$$= 1745 \text{ kg } 700 \text{ g}$$

$$\begin{array}{r} \times\ 15 \\ \hline 8728\quad 500 \\ 17457\quad 00\times \\ \hline 26185 \text{ kg } 500 \text{ g} \\ \hline \end{array}$$

Thus, 15 carts will carry **26185 kg 500g** wheat.

And in g = **26185500 g** [∵ 1 kg = 1000 g]

5. Total Length of ribbon Sita had = 254 m 25 cm

Number of friends in which is to be divided = 15

Length of ribbon that each one will get

= (254 m 25 cm) ÷ 15

Thus, the Length of ribbon that each one will get is **16 m 95 cm**

And in cm = **1695 cm**

```
      1695
15)25425
     15↓
     104
      90↓
     142
     135↓
      75
      75
       0
```

6. The Perimeter of park = 475 m 50 cm or 47550 cm

Distance will cover in 5 rounds = 47550 cm × 5 = **237750 cm** or **2377 m 50 cm**

7. Total amount of sugar with shopkeeper = 65 kg 520 g

Number of customer in which it is to be divided = 9

Amount of sugar that each customer will get

= (65 kg 520 g) ÷ 9

Thus, amount of sugar given to each customer by the shopkeeper is **7 kg 280 g**.

And in g = **7280 g**

```
     7280
9)65520
    63↓
    25
    18↓
    72
    72
     0
```

2. Playing With Numbers

EXERCISE 2.3

1. (i)

2	48
2	24
2	12
2	6
3	3
	1

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

(vi)

2	468
2	234
3	117
3	39
13	13
	1

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

(viii)

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

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

(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

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

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

2. (i)

2	162
3	81
3	27
3	7
	3

2	234
3	117
3	39
	13

HCF $= 2 \times 3 \times 3 = \mathbf{18}$

(iii) 13, 39, 273

13	13
	1

3	39
13	13
	1

3	273
7	91
13	13
	1

HCF = **13**

(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**

(iii) 516, 1118, 2148

```
    516)1188(2                 12)2148(179
        1032                       12
      156)516(3                    94
          468                      84
       48)156(3                    108
          144                      108
        12)48(4                     ×
           48
            ×
```

HCF = **12**

(iv) 2241, 8217, 747

```
    747)2241(3                 747)8217(11
        2241                       747
          ×                        747
                                   747
                                    ×
```

HCF = **747**

5. Two nearest number $= 65610 + 27 = \textbf{65637}, 65610 - 27 = \textbf{65583}$

6. 850, 680   **7.** $1343 - 9 = 1334$

$$8593 - 9 = 8584$$

```
680)850(1
    680
    170)680(4
        680
         ×
```

HCF $= \textbf{170}$

```
1334)8584(6
     8004
     580)1334(2
         1160
         174)580(3
             522
             58)174(3
                174
                 ×
```

HCF $= \textbf{58}$

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

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 $= \textbf{89}$

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

EXERCISE 2.5

1. (i) 18, 77

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

LCM $= 2 \times 3 \times 3 \times 7 \times 11 = \textbf{1386}$

(ii), (iii) Do yourself.

(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 $= 2 \times 3 \times 3 \times 5 = \mathbf{90}$

(v), (vi), (vii) Proceed as above.

(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 $= 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 3 = \mathbf{3456}$

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 $= 2 \times 2 \times 2 \times 2 \times 5 \times 7 \times 5 = \mathbf{2800}$

Hence remainder is 9 then the required number $= 2800 + 9$
$= \mathbf{2809}$

11. (i)

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

$$14\overline{)21}(1$$
$$\overline{14)}\overline{14}(2$$
$$\underline{14}$$
$$\times$$

LCM $= 2 \times 3 \times 7 = \mathbf{42}$

$$\text{Product} = \text{HCF} \times \text{LCM}$$
$$14 \times 21 = 42 \times 7$$
$$294 = 294$$

3. No.

4. I number $\times$ II number $= \text{LCM} \times \text{HCF}$
$$64 = 16 \times \text{HCF}$$
$$\text{HCF} = \frac{64}{16} = \textbf{4}$$

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

6. I number $\times$ II number $= \text{LCM} \times \text{HCF}$
$$105 \times \text{II number} = \text{LCM} \times \text{HCF}$$
$$\text{II Number} = \frac{1575 \times 15}{105} = \textbf{225}$$

7.

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

$$\text{LCM} = 2 \times 2 \times 3 \times 5 \times 5 \times 11 = \textbf{3300}$$

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

$$\text{LCM} = 2 \times 2 \times 2 \times 2 \times 3 \times 3 \times 5 \times 17$$
$$= 12240 \, \text{cm}$$
$$= \textbf{122 m 40 cm}$$

9. LCM of 2, 5, 7, 8, 10 and 18 $= 3640$
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. Proceed as question 9.

Let's Recall

4. (a) HCF of 144, 180 and 192

$$144\overline{)180}(1$$
$$\underline{144}$$
$$36\overline{)144}(4$$
$$\underline{144}$$
$$\underline{\times}$$

$$36\overline{)192}(5$$
$$\underline{180}$$
$$12\overline{)36}(3$$
$$\underline{14}$$
$$\underline{\times}$$

Thus, HCF of 144, 180 and 192 is **12**.

5. (b) Given, HCF = 145 and LCM = 2175

First number = 725

$$\text{Other number} = \frac{\text{HCF} \times \text{LCM}}{\text{(first) number}}$$

$$= \frac{145 \times 2175}{725}$$

$$= \mathbf{435}$$

3. Operations on Whole Numbers

EXERCISE 3.1

2. (i) $300507 + 0 = \mathbf{300507}$

(ii) $1005 + 283 = \mathbf{283} + \mathbf{1005}$

(iii) Do yourself.

7. The largest eight digit number = 99999999

The smallest nine digit number = 100000000

Difference = $100000000 - 99999999 = \mathbf{1}$

8. Total population of a village = 1500

Number of men = 489

Number of women = 472

Then, Number of children = $1500 - (489 + 472)$

$$= 1500 - 961$$

$$= \mathbf{539}$$

9. Total amount of money Gorang had = ₹ 61000

Given to Ashok = ₹ 8750

Given to Akbar = ₹ 12638

Given to Anthony = ₹ 35000

Left Money = ₹ 61000 − ₹ (8750 + 12638 + 35000)

$$= 61000 - 56388 = ₹ \mathbf{4612}$$

11. The sum of the numbers along the diagonal is $12 + 13 + 14 = 39$

Hence the unknown number is first horizontal line $= 39 - (14 + 7)$
$$= 18$$

The unknown number in first vartical line $= 39 - (18 + 12) = 9$

The unknown number in second horizontal line
$$= 39 - (9 + 13) = 17$$

The unknown number in second vertical line $= 39 - (7 + 13) = 19$

The unknown number in third horizontal line $= 39 - (12 + 19) = 8$

18	17	14
9	13	17
12	19	8

12. Proceed as question 11.

EXERCISE 3.2

1. (i) $45 \times 36 = 45 \times (30 + 6) = 45 \times 30 + 45 \times 6$

(ii) $27 \times 18 = 27 \times (9 + 5 + 4) = 27 \times 9 + 27 \times 5 + 27 \times 4$

(iii) $12 \times 45 = 12 \times (50 - 5) = 12 \times 50 - 12 \times 5$

(iv) $66 \times 85 = 66 \times (90 - 5) = 66 \times 90 - 66 \times 5$

2. (i) $15379 \times 0 = 0$ (ii) $675 \times 47 = 47 \times 675$

(iii) $3709 \times 1 = 3709$ (iv) $42 \times 18 \times 15 = 18 \times 15 \times 42$

3. (i) $4 \times 25 \times 761 = 100 \times 761 = \mathbf{76100}$

(ii), (iii) Do yourself.

(iv) $341 \times 625 \times 16 = 341 \times 10000 = \mathbf{3410000}$

(v), (vi) Do yourself.

9. (i) $542 \times 105 = 542 \times (100 + 5)$
$$= 542 \times 100 + 542 \times 5 = 54200 + 2710 = \mathbf{56910}$$

(ii), (iii) Do yourself.

(iv) $1006 \times 167 = (1006 + 6) \times 167$
$$= 1000 \times 167 + 6 \times 167$$
$$= 167000 + 1002 = \mathbf{168002}$$

10. (i) $8165 \times 169 - 8165 \times 69 = 8165 \times (169 - 69)$
$$= 8165 \times 100 = \mathbf{816500}$$

(ii) Do yourself.

(iii) $672 \times 999 + 672 = 672 \times 999 + 672 \times 1 = 672 \times (999 + 1)$
$$= 672 \times 1000 = \mathbf{672000}$$

(iv) $431 \times 10 \times 578 - 491 \times 4310$
$$= 4310 \times 578 - 491 \times 4310$$
$$= 4310 \times (578 - 491)$$
$$= 4310 \times 87$$

$$= 4310 \times (100 - 13)$$
$$= 4310 \times 100 - 4310 \times 13$$
$$= 4310 \times 100 - 4310 \times 10 - 4310 \times 3$$
$$= 431000 - 43100 - 12930 = \mathbf{374970}$$

(v) $3125 \times 5 \times 421 + 125 \times 25 \times 123$
$$= 3125 \times 5 \times 421 + 125 \times 5 \times 5 \times 123$$
$$= 3125 \times 5 \times 421 + 625 \times 5 \times 123$$
$$= 3125 \times 5 \times 421 + 3125 \times 123$$
$$= 3125 \times (5 \times 421 + 123)$$
$$= 3125 \times (2105 + 123)$$
$$= 3125 \times (2228) = 3125 \times (2000 + 200 + 20 + 8)$$
$$= 3125 \times 2000 + 3125 \times 200 + 3125 \times 200$$
$$\qquad\qquad\qquad + 3125 \times 20 + 3125 \times 8$$
$$= \mathbf{6962500}$$

(vi) Do yourself.

11. (i) $816 \times 355 = 816 \times (300 + 55) = 816 \times 300 + 816 \times (50 + 5)$
$$= 816 \times 300 + 816 \times 50 + 816 \times 5$$
$$= 244800 + 40800 + 4080 = \mathbf{289680}$$

(ii) $1042 \times 415 = (100 + 42) \times 415 = 1000 \times 415 + (50 - 8)\,415$
$$= 415000 + 50 \times 415 - 8 \times 415$$
$$= 415000 + 20750 - 3320 = \mathbf{432430}$$

(iii), (iv) Do yourself.

12. LHS $= 1 + 2 + 3 + \ldots\ldots + n$

If $n = 15$ then,

$1 + 2 + 3 + 4 + 5 + 6 + 7 + 8 + 9 + 10 + 11 + 12 + 13 + 14 + 15$
$$= 120$$

$$\text{RHS} = \frac{n(n+1)}{2}$$

If $n = 15$, then $\qquad \dfrac{15(15+1)}{2} = \dfrac{15 \times 16}{2} = \mathbf{120}$

13. LHS $= (a + b) \times (a - b)$

If $a = 45$, $b = 2$ then, $(48 + 2) \times (48 - 2) = 50 \times 46 = 2300$

RHS $= (a \times a) - (b \times b) = (48 \times 48) - (2 \times 2) = 204 - 1 = 2300$

14. Proceed as question 13.

EXERCISE 3.3

2. (i), (ii) Do yourself.

(iii) $476 + (430 \div 43) = 476 + 10 = \mathbf{486}$

(iv) $682 - (8866 \div 13) = 682 - 682 = \mathbf{0}$

(v) $(1465 \div 1465) - (1465 \div 1465) = 1 - 1 = \mathbf{0}$

(vi) $(15625 \div 125) \div 125 = 125 \div 125 = \mathbf{1}$

3. (i) $3772 \div 23$ (ii), (iii), (iv) Do yourself.
                                (v) $16025 \div 1000$

```
23)3772(164
   23
   ‾‾‾
   147
   138
   ‾‾‾
    92
    92
    ‾‾‾
     ×
    ‾‾‾
```

```
1000)16025(16
     1000
     ‾‾‾‾
      6025
      6000
      ‾‾‾‾
        25
       ‾‾‾
```

          Quotient $= 164$ Quotient $= 16$
          Remainder $=$ Zero   Remainder $= 25$
      (vi) Do yourself.
4. 5-digit greatest number $= 99999$
     then

```
50) 99999(1999
    50
    ‾‾‾
    499
    450
    ‾‾‾
     499
     450
     ‾‾‾
      499
      450
      ‾‾‾
       49
```

to make 5-digit greatest number which is exactly divisible by 50
we will have to subtract 49 to the dividend to make it divisible
exactly. So the greatest 5 digit number would be 99666 – 49
= **99950**

5. 6-digit least number $= 100000$

```
75)100000(1333
   75
   ‾‾‾
   250
   225
   ‾‾‾
    250
    250
    ‾‾‾
     250
     225
     ‾‾‾
      25
```

To make 6-digit least number exactly divisible, we will have to
add 50 to the divided to make it divisible exactly. So, the least
6-digit number would be $100000 + 50 =$ **100050.**

6. Total persons $= 600$
     Seat in one row $= 36$
     Required row $= 600 \div 36 = 16.666$ or **17**.

7. Do yourself.

8. Dividend $= $ Divisor $\times$ Quotient $+$ Remainder

$$= 25 \times 25 + 16$$
$$= 625 + 16 = \mathbf{641}$$

9. Total trees $= 570$;   total rows $= 19$

Then the number of trees in each row $= \dfrac{570}{19} = \mathbf{30\ trees.}$

10. **11.**, **12.**, **13.** Do yourself.

14. $(a \times a \times a - 1) \div (a - 1) = a \times a + a + 1$

Taking $a = 5$, then

LHS $= (5 \times 5 \times 5 - 1) \div (5 - 1) = (125 - 1) \div 4 = 124 \div 4 = 31$

RHS $= 5 \times 5 + 5 + 1 = 25 + 5 + 1 = 30 + 1 = 31$

So,   LHS $=$ RHS

Taking $a = 10$, then

LHS $= (10 \times 10 \times 10 - 1) \div (10 - 1)$
$= (1000 - 1) \div 9$
$= 999 \div 9 = 111$

RHS $= 10 \times 10 + 10 + 1$
$= 100 + 10 + 1 = 111$

So,   LHS $=$ RHS

Taking $a = 100$, then

LHS $= (100 \times 100 \times 100 - 1) \div (100 - 1)$
$= (1000000 - 1) \div 99$
$= 999999 \div 99 = 10101$

RHS $= 100 \times 100 + 100 + 1 = 10000 + 101 = 10101$

So,   LHS $=$ RHS

15. Do yourself.

Let's Recall

3. (c)   The largest five digit number $= 99999$

The smallest six digit number $= 100000$

Difference $= 100000 - 99999$
$$= \mathbf{1}$$

4. (a) Divisor $= 170$

Quotient $= 2500$

Remainder $= 60$

Dividend $=$ Divisor $\times$ Quotient $+$ Remainder
$$= 170 \times 2500 + 60$$
$$= 425000 + 60 = \mathbf{425060}$$

4. Integers

EXERCISE 4.2

4. (i) $10001 + (-2) = \mathbf{9999}$ (ii) $-99005 + 360 = \mathbf{-98645}$

(iii), (iv), (v), (vi), (vii), (viii), (ix) Do yourself.

(x) $-623, -5832, 623$

$$= -(623 + 5832) + 623$$
$$= -6455 + 623 = \mathbf{-5832}$$

(xi) $-982 + 1934 + (-18) + (-2034) = -982 + 1934 - 18 - 2034$
$$= 1934 - (982 + 18 + 2034) = 1934 - 3034$$
$$= \mathbf{-1100}$$

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

(ii) Do yourself.

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

(iv), (v) Do yourself.

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

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

(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 4.3

2. (i) $4 - 10 = \mathbf{-6}$

(ii) $8 - 3 = \mathbf{5}$

(iii) $-200, -100 = -100 - (-200) = -100 + 200 = \mathbf{100}$

(iv) $10 - (-15) = 10 + 15 = \mathbf{25}$

(v), (vi), (vii), (viii), (ix), (x) Do yourself.

(xi) $40321 - 83241 = \mathbf{-42920}$

(xii) $-1005 - 0 = \mathbf{-1005}$

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

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

5. Do yourself.

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

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

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

9. (i) $-17 - (-13) = -17 + 13 = -\mathbf{4}$
(ii) Do 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 yourself.
(viii) $-12 - [(-15) + (-2) - 3] = -12 - [-15 - 2 - 3]$
$\qquad\qquad\qquad\qquad\qquad = -12 - [-20] = -12 + 20 = \mathbf{8}$

10. Do yourself.

11. Let $y = 3, x = 4$
Then $x - y + 2 = 4 - 3 + 2 = \mathbf{3}$

12. $9 + (-9) + 9 + (-9) + 9 + (-9) + \ldots..$
(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 $13\,°C - 6\,°C = 7\,°C$
Temperature of Chennai $18\,°C - 10\,°C = \mathbf{8\,°C}$
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 4.4

2. (i) $(-8) \times 0 \times 37 \times (-37) = \mathbf{0}$
(ii) $(1569 \times 887) - (569 \times 887) = 887 \times (1569 - 569)$
$\qquad\qquad\qquad\qquad\qquad\qquad = 887 \times 1000 = \mathbf{887000}$
(iii), (iv) Do 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 yourself.
(iii) $(-17) \times (-20) = \mathbf{340}$
(iv), (v) Do yourself.
(vi) $(-12) \times (-12) \times (-12) = \mathbf{-1728}$
(vii), (viii), (ix), (x) Do yourself
(xi) $(-1) \times (-2) \times (-3) \times (-4) \times (-5) = \mathbf{-120}$
(xii) Do yourself.

4., **5.** Do yourself.

6. (i) $(8 + 9) \times 10 = 17 \times 10 = 170;\ 8 + 9 \times 10$
$$= 8 + 90 = 98,\ 170 > 98$$
(ii), (iii) Do yourself.

7. (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 yourself.

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

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

10. (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 yourself.

EXERCISE 4.5

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

(viii), (ix). Do yourself.

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

(xi) $17699 \div (-17699) = \dfrac{17699}{-17699} = \mathbf{-1}$

(xii) $200000 \div (-100) = \dfrac{200000}{-100} = \mathbf{-2000}$

EXERCISE 4.6

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 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 yourself.

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

(xi) Do yourself.

(xii) $2^3 \times (-3)^2 \times 8 = 8 \times 9 \times 8 = \mathbf{576}$

5. (i) $(20)^2 = 20 \times 20 = \mathbf{400}$

(ii) $(-100)^2 = 100 \times -100 = \mathbf{1000}$

(iii), (iv) Do yourself.

(v) $(-160)^2 = -150 \times -150 = \mathbf{22500}$

(vi) Do yourself.

6. (i) $(-12)^3 = -1728$ (ii) $(-13)^3 = \mathbf{-2197}$

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

7. (i) $(1)^4 = \mathbf{1}$ (ii), (iii), (iv) Do yourself.

(v) $(-2)^4 = \mathbf{16}$ (vi) $(-3)^4 = \mathbf{81}$

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

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

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 yourself.

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

EXERCISE 4.7

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

(ii) $120 - 20 \div 2 = 120 - \dfrac{20}{2} = 120 - 10 = \mathbf{110}$

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

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

$$= (-5) - 3 - 12$$
$$= -5 - 3 - 12 = \mathbf{-20}$$

(vii) $(-15) + 4 \div (5 - 3) = (-15) + 4 \div 2 = -15 + 2 = \mathbf{-13}$

(viii) Do yourself.

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

(x) $36 \div (5 + 7) = 36 \div 12 = \dfrac{36}{12} = \mathbf{3}$

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

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

(iii) Do yourself.

(iv) 81 of $\{59 - 7 \times 8 + (13 - 2 \text{ of } 5)\} = 81$ of $[59 - (13 - 10)\}]$

$$= 81 \text{ of } [59 - \{56 + 3\}]$$
$$= 81 \text{ of } [59 - 59]$$
$$= 81 \text{ of } 0 = 81 \times 0 = \mathbf{0}$$

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 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 yourself.

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

$$= 118 - \{121 \div 121 + 4 - (-4)\}$$
$$= 118 - \left\{\dfrac{121}{121} + 4 + 4\right\}$$
$$= 118 - \{1 + 8\} = 118 - 9 = \mathbf{109}$$

(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) $15 - (-3)(4 - 4) \div 3[5 + (-3) \times (-6)]$
$$= 15 - (-3) \times 0 \div 3 \ [5 + (-3) \times (-6)]$$
$$= 15 - 0 \div 3 \ [5 + 18]$$
$$= 15 - 0 \div 3 \times (23) = 15 - 0 = \mathbf{15}$$

Let's Recall

5. **(a)** Let two integers x and y

Then, $x + y = 20$

$x = -5$ (Given)

$-5 + y = 20$

$y = 20 + 5 = 25$

So other integer is **25**.

5.   Fractions

EXERCISE 5.5

1. $12 - [9 - \{15 - (12 - \overline{9 - 5})\}]$
$$= 12 - [9 - \{15 - (12 - 4)\}]$$
$$= 12 - [9 - \{15 - 8\}]$$
$$= 12 - [9 - 7] = 12 - 2 = \mathbf{10}$$

2. Do yourself.

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

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

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

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

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

4., **5.** Do yourself.

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

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

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

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

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

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

7., **8.** Do yourself.

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

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

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

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

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

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

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

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

Let's Recall

5. (b)   Length of telegraph post $= 5\frac{1}{2}$ m

Length of post that set into the ground $= 1\frac{1}{5}$ m

Length of the post above the ground $= 5\frac{1}{2}$ m $- 1\frac{1}{5}$ m

$$= \frac{11}{2} \text{ m} - \frac{6}{5} \text{ m}$$

LCM of 2, 5 is 10

$$\frac{11}{2}\,m - \frac{6}{5} = \frac{11}{2} \times \frac{5}{5}\,m - \frac{6}{5} \times \frac{2}{2}\,m$$

$$= \frac{55}{10}\,m - \frac{12}{10}\,m$$

$$\frac{55m - 12m}{10} = \frac{43}{10}\,m = \mathbf{4\frac{3}{10}\,m}$$

6. Decimals

EXERCISE 6.2

5. (i) Amount of purchasing apples = 5 kg and 50 g
Amount of purchasing grapes = 2 kg and 300 g
Amount of purchasing guavas = 2 kg and 10 g
Total amount of the fruits = 5 kg   50 g
2 kg 300 g
+2 kg   10 g
9 kg 360 g

Total amount of the fruits is 9 kg 360 g.
Difference between 10 kg and total amount of the fruits.
= 10 kg − 9 kg 360 g
= 10000 g − 9360 g = **640 g**
Remaining amount 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

7. Algebraic Expressions

EXERCISE 7.3

1. (i) $12b - 7b - 3b = b\,(12 - 7 - 3) = b\,(12 - 10) = \mathbf{2b}$
(ii) Do yourself.
(iii) $2a - (b - a) - b - (a - b) = 2a - b + a - b - a + b = \mathbf{2a - b}$
(iv) Do yourself.

(v) $10m^2 - 9m + 7m - 3m^2 - 5m - 8$

$\qquad = 10m^2 - 3m^2 - 9m + 7m - 5m - 8$

$\qquad = m^2(10 - 3) + m(-9 + 7 - 5) - 8$

$\qquad = \mathbf{7m^2 - 7m - 8}$

(vi), (vii) Do yourself.

(viii) $xy^2 - y^2 + x^2 + xy^2 - 4y^2 - x^2 - 7$

$\qquad = xy^2 + xy^2 - y^2 - 4y^2 + x^2 - x^2 - 7$

$\qquad = \mathbf{2xy^2 - 5y^2 - 7}$

2. (i) $y^3, -2y^3, -3y^3, 4y^3$;

On adding $\Rightarrow y^3 - 2y^3 - 3y^3 + 4y^3 = y^3(1 - 2 - 3 + 4)$

$\qquad\qquad\qquad = y^3(5 - 5) = y^3 \times 0 = \mathbf{0}$

(ii), (iii) Do yourself.

(iv) $x^2y - 3x + 4, -8x^2y + 3x - 4$;

$\quad$ On adding $\Rightarrow x^2y - 3x + 4 + (-8x^2y + 3x - 4)$

$\qquad\qquad = x^2y - 3x + 4 - 8x^2y + 3x - 4$

$\qquad\qquad = x^2y - 8x^2y - 3x + 3x - 4 + 4$

$\qquad\qquad = x^2y(1 - 8) - 3x + 3x - 4 + 4 = \mathbf{-7x^2y}$

(v) Do yourself.

3. (i) $(a + b - c) + (b + c - a) + (c + a - b)$

$\qquad = a + b - c + b + c - a + c + a - b$

$\qquad = \mathbf{a + b + c}$

(ii), (iii) Do yourself.

(iv) $15a + 11b - 13c - 17, 18 - 12c - 7b - 3a$

$\qquad = 15a + 11b - 13c - 17 + 18 - 12c - 7b - 3a$

$\qquad = 15a - 3a + 11b - 7b - 13c - 12c - 17 + 18$

$\qquad = \mathbf{12a + 4b - 25c + 1}$

(v) $x - 8xy, 3xy - y, y + 1$;

$\quad$ On adding $\Rightarrow x - 8xy + 3xy - y + y + 1$

$\qquad = \mathbf{x - 5xy + 1}$

(vi) Do yourself.

4. (i) $3y^2 - 18y^2 = y^2(3 - 18) = \mathbf{-15y^2}$

(ii) Do yourself.

(iii) $23a^2 - 17a^2 = a^2(23 - 17) = \mathbf{6a^2}$

(iv), (v) Do yourself.

(vi) $(c^2 + 2a^2 - b^2 + abc) - (3abc - a^2 - b^2)$

$\qquad = c^2 + 2a^2 - b^2 + abc - 3abc + a^2 + b^2$

$\qquad = 2a^2 + a^2 + b^2 - b^2 + c^2 + abc - 3abc$

$\qquad = \mathbf{3a^2 + c^2 - 2abc}$

(vii), (viii) Do yourself.

(ix) $(-2x^2 + 4x + 10) - (-2x + 1) = (-2x^2 + 4x + 10 + 2x - 1)$
$$= -2x^2 + 6x + 9$$

5. We should added $2x^2 + 3xy - (x^2 + xy + y^2)$
$$= 2x^2 - x^2 + 3xy - xy - y^2$$
$$= x^2 + 2xy - y^2$$

6. Do yourself.

7. $2a^2 + 3b^2 + 5a^2 - 2b^2 + ab + (-6a^2 - 5ab + b^2)$
$$= 2a^2 + 3b^2 + 5a^2 - 2b^2 + ab - 6a^2 - 5ab + b^2$$
$$= 2a^2 + 5a^2 - 6a^2 + 3b^2 - 2b^2 + b^2 + ab - 5ab$$
$$= a^2(2 + 5 - 6) + b^2(3 - 2 + 1) + ab \, (1 - 5)$$
$$= a^2 + 2b^2 - 4ab$$

8. , **9.**, **10.**, **11.**, **12.** Do yourself.

13. $A = 3x^2 - 7x + 8, B = x^2 + 8x - 3, C = -5x^2 - 3x + 2$

$B - C - A = (x^2 + 8x - 3) - (-5x^2 - 3x + 2) - (3x^2 - 7x + 8)$
$$= x^2 + 8x - 3 + 5x^2 + 3x - 2 - 3x^2 + 7x - 8$$
$$= x^2 + 5x^2 - 3x^2 + 8x + 3x + 7x - 3 - 2 - 8$$
$$= 3x^2 + 18x - 13$$

14. , **15.** Do yourself.

16. $(x^2 - y^2 - 2xy + y - 7) - (2x^2 + 3y^2 - 7y + 1)$
$$= x^2 - y^2 - 2xy + y - 7 - 2x^2 - 3y^2 + 7y - 1$$
$$= -x^2 - 4y^2 - 2xy + 8y - 8$$

17. Do yourself.

18. $(3p - 2q + 2r) + (5p + 3q - 2r) + (-4p + 2q - 3r)$
$$= 3p - 2q + 2r + 5p + 3q - 2r - 4p + 2q - 3r$$
$$= 3p + 5p - 4p - 2q + 3q + 2q + 2r - 2r - 3r$$
$$= 4p + 3q - 3r.$$
$$(2p - 3q - 3r) + (4p - q - r) + (3p - 2q - 3r)$$
$$= 2p - 3q - 3r + 4p - q - r + 3p - 2q - 3r$$
$$= 2p + 4p + 3p - 3q - q - 2q - 3r - r - 3r$$
$$= 9p - 6q - 7r$$
$(9p - 6q - 7r) - (4p + 3q - 3r) = 9p - 6q - 7r - 4p - 3q + 3r$
$$= 5p - 9q - 4r$$

EXERCISE 7.4

1. If $a = 1, b = 0$ and $c = -1$

(i) $c^2 - 2ab(b - c) = c^2 - 2ab^2 + 2a^2b$
$$= (-1)^2 - 2 \times 1 \times 0 + 2 \times 1 \times 0 = 1 - 0 + 0 = 1$$

(ii) $(a^2 - 3ca + a - 3)(b - a - b^2 - 2ab)$
$$= (1 + 3 + 1 - 3)(0 - 1 - 0 - 0)$$
$$= 2 \times (-1) = \textbf{-2}$$

2. If $x = 0$ and $y = -1$
(i) $x^2 - y + 2 = 0 - (-1) + 2 = 1 + 2 = \textbf{3}$
(ii), (iii), (iv) Do yourself.
(v) $xy^2 - x^2y + x = 0 - 0 + 0 = \textbf{0}$
(vi) $x^2 - 2y^2 - 5 = 0 - 2 - 5 = \textbf{-7}$

3. If $x = 1, y = 2$
(i) $x + y = 1 + 2 = \textbf{3}$ (ii), (iii) Do yourself.
(iv) $x - 3y + 2 = 1 - 3 \times 2 + 2 = 1 - 6 + 2 = \textbf{-3}$
(v), (vi) Do yourself.

4. If $a = 18, b = 10, c = 6$, then
$abc = a \times b \times c = 18 \times 10 \times 6 = \textbf{1080}$

5., **6.** Do yourself.

7. $3x^3 - 4x^2 + 6x - 3x - 3 + x = 3x^3 - 4x^2 + 3x - 3 + x$
$$= 3x^3 - 4x^2 + 4x - 3$$

If $x = -2$ then
$3x^3 - 4x^2 + 4x - 3 = 3(-2)^3 - 4(-2)^2 + 4(-2) - 3$
$$= 3 \times (-8) - 4\,(4) - 8 - 3$$
$$= -24 - 16 - 8 - 3 = \textbf{-51}$$

8. If $x = 1, y = 2, z = -1$
(i) $x^2 - y^2 = (1)^2 - (2)^2 = 1 - 4 = \textbf{-3}$
(ii), (iii) Do yourself.
(iv) $2xy^2 - 3x^2y + z^2 = 2 \times 1 \times 4 - 3 \times 1 \times 2 + (-1)^2$
$$= 8 - 6 + 1 = \textbf{3}$$
(v), (vi) Do yourself.
(vii) $(z + x)^2 - 2y;\ (-1 + 1)^2 - 2 \times 2;\ 0 - 4 = \textbf{-4}$
(viii) $(x^2 - y^2)(3y - 2z) = (1 - 4)(3 \times 2 + 2)$
$$= -3(6 + 2) = -3 \times 8 = \textbf{-24}$$

Let's Recall

3. **(c)** $x^2 + 2x - 3$
Substituting the value of $x = 2$ in the given expression; we get;
$x^2 + 2x - 3 = (2)^2 + 2(2) - 3 = 4 + 4 - 3 = \textbf{5}$

4. **(b)** The required expression
$$= (x^3 - 2x^2 + x - 6) - (-x^3 + x^2 - 2x + 7)$$
$$= x^3 - 2x^2 + x - 6 + x^3 - x^2 + 2x - 7$$

$$= 2x^3 - 3x^2 + 3x - 13$$

5. (c) The required expression $= (-x^2 + 4x - 6 - (x^2 - x - 3)$
$$= -x^2 + 4x - 6 - x^2 + x + 3$$
$$= -2x^2 + 5x - 3$$

8. Linear Equations in One Variable

EXERCISE 8.2

1. (i) $7 + 4y = -5 \Rightarrow 4y = -5 - 7, \ y = \dfrac{-12}{4} = -3$

(ii) $12x + 12 = 72 \Rightarrow 12(x + 1) = 72 \Rightarrow x + 1 = \dfrac{72}{12} \Rightarrow x + 1 = 6$

$$\Rightarrow x = 5$$

(iii) $5y + 10 = 4y - 10 \Rightarrow 5y - 4y = -10 - 10 \Rightarrow y = -20$

(iv) $\dfrac{m}{12} = 9 \Rightarrow m = 9 \times 12 = 108$

(v), (vi), (vii), (viii), (ix) Do yourself.

2. (i) $\dfrac{7u + 3}{2} = 19$

$7u + 3 = 38 \Rightarrow 7u = 38 - 3 \Rightarrow 7u = 35 \Rightarrow u = \dfrac{35}{7} \Rightarrow u = 5$

(ii) Do yourself.

(iii) $\dfrac{x}{7} - 2 = 5; \ \dfrac{x}{7} = 5 + 2; \ \dfrac{x}{7} = 7 \Rightarrow x = 49$

(iv), (v) Do yourself.

(vi) $\quad 12y - 3 = 5(2y + 1); 12y - 3 = 10y + 5;$
$\quad 12y - 10y = 5 + 3; 2y = 8;$
$$y = \dfrac{8}{2} = 4$$

EXERCISE 8.3

1. (i) $x - 5 = 7 \Rightarrow x = 5 + 7 = 12$
(ii), (iii), (iv) Do yourself.

(v) $2x + 3 = 5 \Rightarrow 2x = 5 - 3 \Rightarrow x = \dfrac{2}{2} = 1$

(vi), (vii), (viii), (ix) Do yourself.
(x) $3(x + 5) = 2(3 - x) \Rightarrow 3x + 15 = 6 - 2x \Rightarrow 3x + 2x = 6 - 15$
$\Rightarrow \qquad\qquad\qquad 5x = -9$

$$x = \frac{-9}{5}$$

(xi), (xii), (xiii), (xiv), Do yourself.

(xv) $\dfrac{x-3}{5} - \dfrac{x-2}{7} = \dfrac{13}{2}$

$$\dfrac{14(x-3) - 10(x-2)}{70} = 13 \times 35$$

$$= 14x - 42 - 10x + 20 = 455$$
$$= 14x - 10x = 455 + 42 - 20$$
$$4x = 477$$
$$x = 119\frac{1}{4}$$

(xvi) $\dfrac{2x-5}{4} - 2 = \dfrac{7-x}{3} + 1$

$\Rightarrow \quad \dfrac{2x-5}{4} - \dfrac{7-x}{3} = 2+1$

$\Rightarrow \quad \dfrac{6x-15-28+4x}{12} = 3$

$\Rightarrow \quad 10x - 43 = 3 \times 12$

$\Rightarrow \quad 10x = 36 + 43$

$\Rightarrow \quad x = \dfrac{79}{10} = \mathbf{7}\dfrac{\mathbf{9}}{\mathbf{10}}$

2. Let the number = x.

Then, 5 times of $x = 5x$ and 68 less than 5 times that number is $5x - 68$

And according to question it is equal to x

$\Rightarrow 5x - 68 = x$ or $5x - x = 68$

$$4x = 68 \Rightarrow x = \frac{68}{4} = \mathbf{17}$$

3. Let the number = x.

We add 142 that number = $x + 142$

Result is 64 more than 3 times that number $= 3x + 64$

According to question $3x + 64 = x + 142$

$\Rightarrow \qquad 3x - x = 142 - 64 \Rightarrow 2x = 78$

$\Rightarrow \qquad x = \dfrac{78}{2} = \mathbf{39}$

4. Let the number = x

Other number is 12 less than that number = $x - 12$

Sum of both numbers = $x + x - 12$

According to question $x + x - 12 = 48$

$\Rightarrow \qquad 2x = 48 + 12 = 60$

$$x = \frac{60}{2} = \mathbf{30}$$

and the other number $= 30 - 12 = 18$

Thus, number are 18, 30.

5. Let the number $= x$.

$$\frac{4}{5} \text{ of that number} = \frac{4x}{5}$$

$$\frac{3}{4} \text{ of that number} = \frac{3x}{4}$$

According to question $= \frac{3x}{4} + 5 = \frac{4x}{5}$

$\Rightarrow$ $\qquad \frac{4x}{5} - \frac{3x}{4} = 5$

$$\frac{16x - 15x}{20} = 5$$

$\Rightarrow$ $\qquad\qquad\qquad x = \mathbf{100}$

6. Let one number is x. Then other is $x + 2$

According to question $= x + x + 2 = 38$

$\Rightarrow$ $\qquad\qquad 2x = 38 - 2 = 36$

$$x = \frac{36}{2} = 18$$

So numbers are 18 and $18 + 2 = \mathbf{20}$

7. Let one number is x. then other are $x + 2$ and $x + 4$

According to question $x + x + 2 + x + 4 = 51$

$\Rightarrow$ $\qquad\qquad 3x + 6 = 51$

$\Rightarrow$ $\qquad\qquad 3x = 51 - 6$

$\Rightarrow$ $\qquad\qquad x = \frac{45}{3} = 15$

So numbers are 15, $15 + 2 = \mathbf{17}$ and $15 + 4 = \mathbf{19}$

8. Let the age of Rohan's younger brother $= x$ years.

Then the age of Rohan $= x + 6$ Years.

and after ten years with ages are $(x + 10)$ years and $x + 6 + 10$ years

Sum of their ages $= x + 10 + x + 6 + 10$

$\Rightarrow 2x + 26$ years.

According to questions $2x + 26 = 50$ years

$$x = \frac{24}{2} = 12 \text{ years}$$

So, age of Rohan's younger brother = **12 years**.

Age of Rohan $= 12 + 6 = \mathbf{18\ years}$

9. Let the breadth of the rectangle $= x$ m

$$\text{Length of the rectangle} = (x + 10) \text{ m}$$
$$\text{Perimeter of rectangle} = 2\,(x + x + 10) = 2\,(2x + 10)$$
$$= 4x + 20$$
$$\text{According to question} = 4x + 20 = 80 \text{ m}$$
$$\Rightarrow \qquad 4x = 80 - 20 = 60 \text{ m}$$
$$x = \frac{60}{4} = 15 \text{ m}$$

So the breadth of rectangle $= \mathbf{15\ m}$

and the length of rectangle $= 15 + 10 = \mathbf{25\ m}$

10. Let the number of girls in class $= x$

Then the number of boys in class $= \dfrac{2}{5}\,x$

Acording to question

$$\Rightarrow \qquad x + \frac{2}{5}\,x = 42$$
$$\Rightarrow \qquad \frac{5x + 2x}{5} = 42$$
$$\Rightarrow \qquad 7x = 42 \times 5$$
$$\Rightarrow \qquad x = \frac{42 \times 5}{7} = \mathbf{30}$$
$$\text{Number of boys} = \frac{2}{5}\,x = \frac{2}{5} \times 30 = \mathbf{12}$$

Thus number of boys in the class 12 and number of girls are 30.

11. Let the base angle $= x°$

$$\text{Now} \qquad x° + x° + 80° = 2x° + 80°$$
$$2x° + 80° = 180°$$
$$\Rightarrow \qquad 2x° = 180° - 80° = 100°$$
$$\Rightarrow \qquad x = \frac{100°}{2} = 50°$$

So, measure of base angle $= \mathbf{50°}$

12. Let one part is $x°$, then other is $36° - x°$

$$\text{Now} \qquad \frac{1}{5} \times x° = \frac{1}{7}\,(36° - x°)$$
$$\text{or} \qquad \frac{x°}{5} = \frac{36°}{7} - \frac{x°}{7}$$
$$\Rightarrow \qquad \frac{x°}{5} + \frac{x°}{7} = \frac{36°}{7}$$
$$\frac{7x° + 5x°}{35} = 180°$$
$$\Rightarrow \qquad 12x° = 180°$$

$$x° = \frac{180°}{12} = \mathbf{15°}$$

So one part is $15°$ and other is $36 - 15 = \mathbf{21°}$

13. Let the breadth $= x$ cm

Then the length $= (x + 3)$ cm

and area of the reactangle $= x(x + 3) \, \text{cm}^2$

Now length and breadth are increased by 2 cm

then the breadth $= (x + 2)$ cm

and   the length $= (x + 3 + 2) = (x + 5)$ cm

The area of the reactangle $= (x + 2)(x + 5) \, \text{cm}^2$

Now according to question

$$(x + 2)(x + 5) = 70 + x(x + 3)$$
$$x^2 + 7x + 10 = 70 + x^2 + 3x$$
$$4x + 10 = 70$$
$$x = \frac{60}{4} = \mathbf{15 \ cm}$$

and length $= x + 3 = 15 + 3 = \mathbf{18 \ cm}$

14. Let the smallest angle $= x°$

Then second angle $= x° + 45°$

Third angle $= 3x°$

$$x° + x° + 45° + 3x° = 180°$$
$$5x° + 45° = 180°$$
$$5x° = 180° - 45° = 135°$$
$$x° = \frac{135°}{5} = \mathbf{27°}$$

Now measures of angle is $27°$, $27° + 45° = \mathbf{72°}$ and $27° \times 3 = \mathbf{81°}$

Let's Recall

2. (c) $x \times 3 + (-7) = 14$
$$3x - 7 = 14$$
$$3x = 21$$
$$x = \mathbf{7}$$

3. (b) Let odd numbers are $x + 1, x + 2, x + 3$

According to question
$$x + 1 + x + 2 + x + 3 = 21$$
$$3x + 6 = 21$$
$$3x = 21 - 6$$
$$3x = 15$$
$$x = 5$$

Then middle term is $x + 2 = 5 + 2 = 7$

4. (c) Let Reema's age before 8 years = x

Her present age = $x + 8$

Her age after six years = $x + 8 + 6 = x + 14$

According to question

$$x + 14 = 2x$$
$$2x - x = 14$$
$$x = 14$$

Thus,　　　　her present age = $x + 8$

$$= 14 + 8$$
$$= \mathbf{22\,years}$$

5. (d) $\dfrac{4}{5} \times x = 10 + \dfrac{2}{3} \times x$

$$\frac{4x}{5} - \frac{2}{3} x = 10$$

$$x \left[\frac{12 - 10}{15} \right] = 10$$

$$2x = 15 \times 10$$

$$x = \frac{15 \times 10}{2}$$

$$x = 5 \times 15$$

$$x = \mathbf{75}$$

Unit-III : Commercial Mathematics

9.   Ratios and Proportions and Unitary Method

EXERCISE 9.1

3. (i) $160000 : 12000 \Rightarrow \mathbf{40 : 3}$　　(ii) $12000 : 160000 \Rightarrow \mathbf{3 : 40}$

4. Lecturer's earning = ₹ 14000

       Wife Daizy's earning = ₹ 18000

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

(i) $14000 : 32000 \Rightarrow \mathbf{7 : 16}$

(ii) $18000 : 32000 \Rightarrow \mathbf{9 : 16}$

5. Earning = ₹ 9550

Saving = ₹ 1850

Expenditure = ₹ $(9550 - 1850)$ = ₹ 7700

(i) $1850 : 9550 \Rightarrow \mathbf{37 : 191}$　　(ii) $9550 : 7700 \Rightarrow \mathbf{191 : 154}$

(iii) $1850 : 7700 \Rightarrow \mathbf{37 : 154}$

6. Men = 56

Women = 144 − 56 = 88

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

$$= \mathbf{7 : 11}$$

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

$$= \mathbf{7 : 18}$$

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

$$= \mathbf{11 : 18}$$

7. $42 : 1.2 \times 100 \Rightarrow 42 : 120 \Rightarrow \mathbf{7 : 20}$

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

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

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

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

EXERCISE 9.2

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

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

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

Hence 72 < 105 < 112 are in ascending order.

So $\frac{4}{3}, \frac{6}{7}$ and $\frac{5}{4}$ or 4 : 3, 6 : 7 and 5 : 4 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 = $121 \times 5 = \mathbf{605}$

No. of girls = $121 \times 3 = \mathbf{363}$

5., **6.** Do yourself.

7. Let Peter's age = x years

Peter's father age = $3x$

The ratio of Peter's and his father's age = $x : 3x = \mathbf{1 : 3}$

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 $= ₹ \dfrac{200}{12}$

An orange cost $= ₹ \dfrac{80}{10}$

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

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

$$= \mathbf{25 : 12}$$

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

EXERCISE 9.3

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) proceed as part (i).

3. Proceed as questions 1.

4. (i) $28, \square, 3.5, 1.5$

Let $\square = x$

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. Proceed as question 4.
7. Proceed as question 5.
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., 10. proceed as question 8 (i).

EXERCISE 9.4

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

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

$\because$ 16 water tankers can be filled in $= \dfrac{15}{16} \times 16 = \mathbf{15\ hrs}$

2., 3., 4., 5. proceed as question 1.

6. Cost of 5 kg of rice $= ₹\ 130$

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

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

7., 8., 9., 10. proceed as question 6.

11. 280 quintals of wheat yield in $= 6$ hectares

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

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

12., 13., 14. and 15. proceed as question 11.

16. $₹\ 19210$ is the price of $= 17$ chairs

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

$$₹\ 113000 \text{ is the price of} = \frac{17 \times 113000}{19210}$$

$$= \mathbf{100\ chairs.}$$

17., **18.**, **19.** proceed as question 16.

Let's Recall

1. **(c)** Let the income be ₹ x

Ratio of the income to saving $= x : 2800$

$$15 : 4 :: x : 2800$$

$$15 \times 2800 = 4 \times x$$

$$x = \frac{15 \times 2800}{4}$$

$$= 10500$$

$$\text{Expenditure} = ₹\, 10500 - ₹\, 2800$$

$$= ₹\, \textbf{7700}$$

4. **(a)** $45 : x :: 25 : 35$

$$45 \times 35 = x \times 25$$

$$x = \frac{45 \times 35}{25}$$

$$x = \textbf{63}$$

Thus, value of x is 63.

5. **(a)** Men   No. of days

550   28

700   x

$$700 : 550 :: 28 : x$$

$$700 \times x = 28 \times 550$$

$$x = \frac{28 \times 550}{700}$$

$$x = \frac{28 \times 55}{70}$$

$$x = \textbf{22}$$

Thus, number of days will it last long for 700 men for 22 days.

6. **(a)** No. of days   Men

26   40

20   x

$$20 : 26 :: 40 : x$$

$$20 \times x = 26 \times 40$$

$$x = \frac{26 \times 40}{20}$$

$$x = \textbf{52}$$

Thus, The number of men will be required to finish in 20 days is 52.

7. (b) Workers   No. of days

$\uparrow$ 24   15

8   x $\downarrow$

$$8 : 24 :: 15 : x$$
$$8 \times x = 24 \times 15$$
$$x = \frac{24 \times 15}{8} = \textbf{45}$$

Thus, 8 workers will build the wall in 45 days.

Unit-IV : Geometry

12.   Angles

EXERCISE 12.1

5. **A 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.

13.   Pairs of Lines and Transversals

EXERCISE 13.1

1. Only in fig (i) and (iii), (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 13.2

1. No, because on extanding they will intersect each other.
2. (i) $AB \parallel ED$, $AF \parallel CD$, $DF \parallel CB$
   (ii) $AB \parallel RP$, $BP \parallel AC$, $QR \parallel BC$
   (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
   $\parallel AD$, $BE \parallel FD$, $BE \parallel AF$, $BE \parallel AD$, $FD \parallel BC$, $FD \parallel EC$

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

$\therefore \qquad \angle f = 65°$

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

$\therefore \qquad \angle d = 65$

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

$\therefore \qquad \angle h = 65°$

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

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

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

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

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

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

$\therefore \qquad \angle c = \mathbf{115°}$

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

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

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

and $\qquad \angle b = \angle f = \angle d = \angle h = \mathbf{65°}$
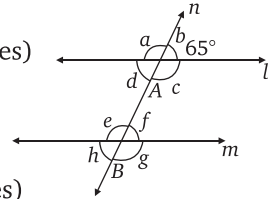
3. Proceed as question 2.

4. (i) In figure, we have

$\qquad \angle 1 + 135° = 180°$

$\qquad$ (Interior supplementary angles)

$\qquad \angle 1 = 180° - 135° = 45°$

$\qquad \angle 1 = \angle x$ (Vertically opposite angles)

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

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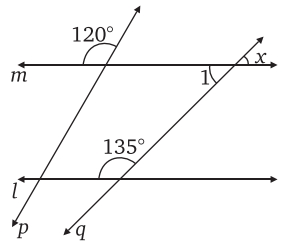
15. Triangles

1. 1 triangle is possible if the sum of its two arms is

(i) more than third angle.

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

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

2. (i) $50°, 95°, 43°$

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

$\qquad\qquad\qquad\qquad 188° \neq 180°$

$\qquad$ So triangle cannot be formed.

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

3. (i) 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,

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

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

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

$$\angle A + \angle B + \angle C = 180°$$
$$\angle A + \angle A + \angle A = 180°$$
$$3\angle A = 180°$$
$$\angle A = \frac{180°}{3}$$
$$\angle A = \mathbf{60°}$$
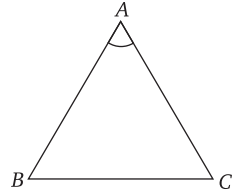
Each angle of triangle is $60°$.

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., **9.** proceed as question 7.

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

$$50° + 60° + x = 180°$$
$$110° + x = 180$$
$$\Rightarrow \qquad x = 180°-110°$$
$$x = 70°$$

Now, $\angle BCD = 180°$
$$\angle BCA + \angle ACD = 180°$$
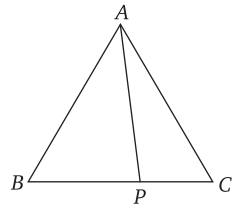$$70° + \angle ACD = 180°$$
$$\angle ACD = 180° - 70° = \mathbf{110°}$$
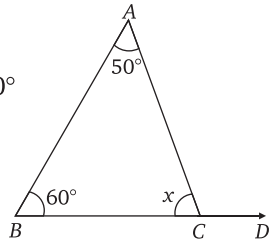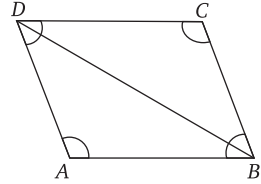
13. (i) $AP < AB + BP$

(ii) $AP < AC + PC$

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

16.   Constructions

EXERCISE 16.3

1. (i) one the circle (ii) the centre, on the circle (iii) passes through the (iv) an arc
2. Do yourself.
   Here the figure *ABCD* is a square.
3. Diameter = 12 cm

   $\because$ Radius $= \dfrac{\text{Diameter}}{2} = \dfrac{12}{2} = $ **6 cm.**
4. Radius = 5 cm

   $\because$ Radius $= \dfrac{\text{Diameter}}{2}$

        Diameter $= 2 \times$ Radius $= 2 \times 5$ cm = **10 cm**
5. Do yourself.
   Yes, all the points of the line segment P_1 P_2 lie in the interior of the circle.
6. Do yourself.
   Yes, the point *P* lie in the interior of the circle with radius 4 cm.

EXERCISE 16.4

1. Do yourself.
   Yes, the perpendicular bisector of *AB* passes through the centre of the circle.
2. Do yourself.
   Yes, the perpendicular bisector of the line segment *PQ* passes through the centre of the circle.
3. (i) Do yourself.   (ii) They intersect at the centre.
5. (i), (ii) Do yourself.

EXERCISE 16.6

3. Do yourself. Yes the lines *l* and *m* are parallel to each other.
4. Do yourself.
   Yes, *AE* and *EC* are equal.

Unit-V : Mensuration
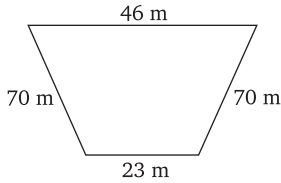
17.   Perimeter and Area

EXERCISE 17.1

1. (i) Perimeter of triangle = Sum of three sides
                        = (3 + 1.5 + 2) cm = **6.5 cm**

(iii), (iii) Do yourself.

(iv) 10 cm + 10 cm +10 cm = **30 cm**

2. (i)

$= (46 + 23 + 70 + 70)$ m

$= \textbf{209 m}$

(ii), (iii) Proceed as above.

3. (i)

$= (9 + 9 + 9 + 8.5 + 8.5)$ cm

$= \textbf{44 cm}$

(ii) proceed as above.

3. (iii)

$= (8 + 8 + 8 + 7 + 7)$ cm

$= \textbf{38 cm}$

(ii), (iii) Proceed as above.

4. (i)
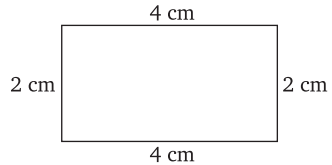
Perimeter of rectangle

= Sum of four side.

$= (4 + 4 + 2 + 2)\,\text{cm} = \textbf{12 cm}$

5. (i) Perimeter of square $= 4 \times \text{side} = 4 \times 2.5\,\text{m} = \textbf{10.0 m}$

(ii), (iii) Do yourself.

6. (i) Perimeter of rectangle = Sum of four sides

$= (4 + 3.5 + 4 + 3.5)\,\text{cm} = \textbf{15 cm}$

(ii), (iii) Do yourself.

7. (i) Perimeter of rectangle $= 2 \times (l + b) = 2 \times (5 + 4) = 2 \times 9$

$= \textbf{18 cm}$

(ii) Do yourself.

(iii) $2 \times (l + b) = 2 \times (7 + 1.5) = 2 \times 8.5 = \textbf{17 cm}$

8. (i) Perimeter of square $= 4 \times \text{side}$

$$100 = 4 \times \text{side} \;\Rightarrow\; \frac{100}{4} = \text{side}$$

$$\text{side} = 25\,\text{cm}$$
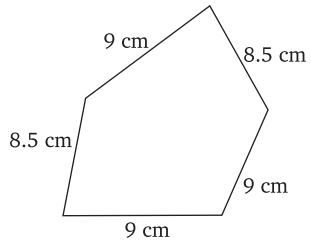
(ii), (iii), (iv) Do yourself.

9. Perimeter of triangle = Sum of three sides.

$$50 = 15 + 20 + x \,;\, 50 - 35 = x$$

$\Rightarrow \qquad\qquad x = 50 - 35 = 15$

Third side = **15 cm**

11. Perimeter of rectangular park $= 2 \times (l + b)$
$$= 2 \times (300 + 200) = 1000\,\text{m}$$
$\therefore$ Cost of fencing a park $= ₹\,1000 \times 24 = ₹\,\textbf{24000}$

12. 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 $\qquad\qquad \textbf{300} > \textbf{210}$
$\therefore$ Bulbul covered smaller distance.

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

15. Perimeter of rectangles $=$ Perimeter of square $= 36\,\text{cm}$.
$\because$ Every square is also a rectangle.
and Perimeter of square $= 4 \times \text{side}$
$$36 = 4 \times \text{side}$$
$$\text{Side} = \frac{36}{4} = \textbf{9 cm}$$

Thus, nine rectangles can be drawn with 36 cm as the perimeter.

EXERCISE 17.2

1. (i) Area of rectangle $=$ length $\times$ breadth $= 4\,\text{cm} \times 1\,\text{cm} = \textbf{4 cm}^{\textbf{2}}$
(ii), (iii) Do yourself.

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

3. (i) Area of rectangle $=$ length $\times$ breadth $= 11\,\text{cm} \times 7\,\text{cm} = \textbf{77 cm}^{\textbf{2}}$
(ii) Do yourself.

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

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

6. (i) Area of rectangle $=$ length $\times$ breadth $= 2l \times b = \textbf{2}\textbf{\textit{lb}}\,\textbf{(doubled)}$
(ii) $l \times b = lb = 1 \times 2b = \textbf{2}\textbf{\textit{lb}}\,\textbf{(doubled)}$
(iii) $l \times b = 2l \times 2b = \textbf{4}\textbf{\textit{lb}}\,\textbf{(four times)}$

7. (i) Area of square $= (\text{side})^2 = (2x)^2 = \textbf{4}\textbf{\textit{x}}^{\textbf{2}}$
Area will get four times than original area.
(ii) Area of square $= (3x)^2 = 9x^2$
Area will get nine times than origional area.

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

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

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

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

$$\text{Number of tiles} = \dfrac{3 \times 3 \times 100 \times 100}{25 \times 25} = \boldsymbol{144}$$

9. $1\,\text{cm} = 10\,\text{mm},\ 1\,\text{cm}^2 = 1\,\text{cm} \times 1\,\text{cm} = 10\,\text{mm} \times 10\,\text{mm} = \boldsymbol{100\,\text{mm}^2}$

10. $1\,\text{m} = 100\,\text{cm},\ 1\,\text{m}^2 = 1\,\text{m} \times 1\,\text{m} = 100\,\text{cm} \times 100\,\text{cm} = \boldsymbol{10000\,\text{cm}^2}$

11. Area of square $=$ Area of rectangle $= 16^2 = 64 \times \text{breadth}$
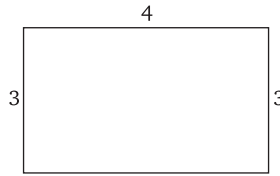
$\therefore$ breadth $= \dfrac{16 \times 16}{64} = \dfrac{16}{4} = \boldsymbol{4\ \text{cm}}$

Note : All units are in centimeters.

**12.**
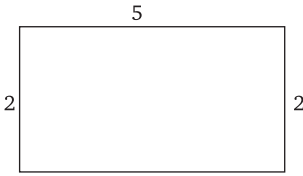
(i)   (ii)

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 rectangle 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.

14. Let *ABCD* be a rectangle with length l and breadth b and *PQRS* be a square of side l (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.
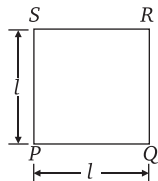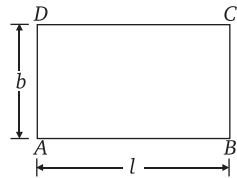
Area of rectangle $= l \times b,\ b < l$

Area of square $= l \times l$

$l \times l > l \times b$

$l > b$

Let's Recall

1. (b)   Perimeter of square $= 28$ cm

$$4 \times \text{side} = 28 \text{ cm}$$
$$\text{side} = \frac{28}{4} = 7 \text{ cm.}$$

Then, the area of square $= (\text{side})^2$
$$= (7\text{cm})^2 = 49 \text{ cm}^2$$

2. (a) The perimeter of given figure $= [8 \text{ cm} + 8 \text{ cm} + 8 \text{ cm} + 8 \text{ cm} + 8 \text{ cm}] = \textbf{40 cm}$

3. (c) Let the sides of a rectangle in ratio $= 5x : 4x$

Perimeter of a rectangle $= 72$ cm
$$2(l + b) = 72 \text{ cm}$$
$$2[5x + 4x] = 72$$
$$9x = \frac{72}{2}$$
$$9x = 36$$
$$x = 4$$

Length of the rectangle $= 5x$
$$= 5 \times 4 = \textbf{20 cm}$$

4. (c) According to question.

Clearly, the perimeter of a square field.
$$= \frac{₹\ 2000}{₹\ 25} = 80$$

$$4 \times \text{side} = 80$$
$$\text{side} = \frac{80}{4} = 20$$
$$\text{side} = \textbf{20 m}$$

Thus, the Length of each side of the field is 20 cm.