(iv) 0.006 = decimal zero zero six

(v) 0.007 = decimal zero zero seven

(vi) 12.314 = Twelve decimal three one four

(vii) 1.728 = One decimal seven two eight

(viii) 245.48 = Two hundred and forty five decimal four eight

2. (i) 0.76 (ii) 0.008 (iii) 12.86 (iv) 0.09

3. (i) $0.5 = \frac{5}{10} = \frac{1}{2}$

(ii) $0.27 = \frac{27}{100}$

(iii) $0.03 = \frac{03}{100} = \frac{3}{100}$

(iv) $0.79 = \frac{79}{100}$

(v) $10.7 = 10 + 0.7 = 10 + \frac{7}{10} = 10\frac{7}{10}$

(vi) $0.705 = \frac{705}{1000} = \frac{141}{200}$

(vii) $65.81 = 65 + 0.81 = 65 + \frac{81}{100}$

$= 65\frac{81}{100}$

(viii) $0.089 = \frac{89}{1000}$

(ix) $131.731 = 131 + 0.731 = 131 + \frac{721}{1000}$

$= 131\frac{731}{1000}$

(x) $0.001 = \frac{1}{1000}$

4.

	Hun.	Ten.	One.	Dec.	Tenth.	Hundr.	Thou.
(i)			8	.	2	5	
(ii)		5	6	.	3	0	8
(iii)			7	.	0	8	5
(iv)	1	3	5	.	4	8	1

5. (i) 331.02

$= 3 \times 100 + 3 \times 10 + 1 + \frac{0}{10} + \frac{2}{100}$

(ii) 27.639

$= 2 \times 10 + 7 + \frac{6}{10} + \frac{3}{100} + \frac{9}{1000}$

(iii) $685.321 = 6 \times 100 + 8 \times 10 + 5 + \frac{3}{10} + \frac{2}{100} + \frac{1}{1000}$

(iv) $9.837 = 9 + \frac{8}{10} + \frac{3}{100} + \frac{7}{1000}$

6. (i) $3.69 = 3 + \frac{6}{\mathbf{10}} + \frac{9}{\mathbf{100}}$

(ii) $\mathbf{25.39} = 20 + 5 + \frac{3}{10} + \frac{9}{100}$

(iii) $47.906 = 40 + \mathbf{7} + \frac{9}{10} + \frac{6}{\mathbf{1000}}$

(iv) $83.708 = 80 + 3 + \frac{7}{\mathbf{10}} + \frac{\mathbf{8}}{1000}$

(v) $123.658 = 100 + \mathbf{20} + 3 + \frac{6}{10} + \frac{\mathbf{5}}{100} + \frac{\mathbf{8}}{1000}$

7. (i) $6 + \frac{3}{10} + \frac{5}{100} + \frac{7}{1000} = 6.357$

(ii) $39 + \frac{4}{1000} = 39.004$

(iii) $47 + \frac{7}{100} + \frac{9}{1000} = 47.079$

(iv) $10 + 3 + \frac{4}{10} + \frac{7}{1000} = 13.407$

8. (i) $0.4 = \frac{4}{10} = \frac{2}{5}$

(ii) $2.5 = \frac{25}{10} = \frac{5}{2}$

(iii) $0.75 = \frac{75}{100} = \frac{3}{4}$

(iv) $6.4 = \frac{64}{10} = \frac{32}{5}$

(v) $8.25 = \frac{825}{100} = \frac{33}{4}$

9. Ascending order is

(i) $0.465 < 0.613 < 0.722 < 0.812$

(ii) $0.033 < 0.303 < 30.03 < 30.3$

(iii) $0.552 < 5.52 < 55.20 < 522.1$

10. Descending order

(i) $88.71 > 8.721 > 6.81 > 0.812$

(ii) $64.7 > 8.31 > 0.647 > 0.064$

(iii) $20.01 > 2.001 > 0.102 > 0.021$

11. (i) 4.1, 4.2, 4.3, **4.4**, **4.5**, **4.6**

(ii) 6.123, 6.124, 6.125, **6.126**, **6.127**, **6.128**

(iii) 21.8, 21.9, 22.0, **22.1**, **22.2**, **22.3**

(iv) 9.001, 9.002, 9.003, **9.004**, **9.005**, **9.004**

(v) 57.14, 57.15, 57.16, **57.17**, **57.18**, **57.19**

12. (i) (e) (ii) (f) (iii) (d)
(iv) (c) (v) (a) (vi) (b)

Exercise 6.2

1. (i)

```
  27.08
  32.87
  27.88
+ 29.90
 117.73
```

(ii)

```
  234.700
  325.860
   25.360
   21.015
+   4.007
  610.942
```

(iii)

```
   13.189
  145.660
  156.614
   12.005
+ 10.5641
  338.0321
```

(iv)

```
  187.403
  155.555
  166.560
  118.190
+ 15.067
  642.775
```

(v)

```
  121.210
  125.670
  136.090
   10.184
   15.607
+ 123.897
  532.658
```

2. (i)

```
  105.84
– 78.92
   26.92
```

(ii)

```
  ₹ 20.75
– ₹ 18.25
  ₹  2.50
```

(iii)

```
  250.00 M
– 202.54 M
   47.46 M
```

(iv)

```
  5.206 KM
– 2.051 KM
  3.155 KM
```

3. (i) 63.4 – 8.545 – 6.33
= 63.4 – 14.875
= 48.525

```
∵  63.400
  – 14.875
   48.525
```

(ii) 73.6 – 37.88 – 4 + 8.6
82.2 – 41.88
= 40.32

```
∵  73.6        ∵  37.88
  + 8.6          + 4.00
   82.2           41.88
```

(iii) 85.5 – 105.765 + 213.76 – 118.9
= 85.5 + 213.76 – 105.765 – 118.9
= 299.26 – 224.665
= 74.595

```
∵   85.50      ∵  105.765
  + 213.76       + 118.900
   299.26        224.665

∴  299.260
  – 224.665
   74.595
```

(iv) 45.72 + 82.77 – 16.551 – 3
= 128.49 – 19.551
= 108.939

```
∵   45.72      ∵  16.551
  + 82.77        + 3.00
   128.49        19.551
```

4. Milk took by Mohan = 7.5 *l*
Milk took by Sohan = 8.25 *l*
Milk took my Ashok = + 6.75 *l*
Total Milk taken 22.50 *l*

5. Purchased books for ₹ 69.75
Purchased Notebook for ₹ 10.25
Purchased Pencil box for ₹ 12.30
Money spent ₹ 92. 30

6. Cloth purchased for Shirt = 2.10 m
Cloth purchased for Pant = 1.25 m
Cloth purchased for other purpose = 1.65 m
Total Cloth purchased = 2.10 m
1.25 m
+ 1.65 m
5.00 m

7. Vegetables bought = 5.50 kg
Vegetables given to brothers
= (1.25 + 2.50) kg
= 3.75 kg

Vegetable left with man 5.50 kg
− 3.75 kg
1.75 kg

8. Money in the bank = ₹ 545.50
Money withdrawn = ₹ 295.00
Money remain = ₹ 250.50

9. Height of Father = 140.80 cm
Height of Shalini = 110.35 cm
Mother taller by 30.45 cm

10. Total distance travelled by Ashish = 68 km.

Distance travelled by bus and rickshaw
52.50 km
+ 8.75 km
61.25 km

∴ Distance travelled on foot
68.00 km
− 61.25 km
6.75 km

MCQs

1. (c) **2.** (a) **3.** (c) **4.** (d)

7 Algebraic Expressions

Exercise 7.1

1. (i) $3(30-a)$ (ii) $2(x+y)-30$
(iii) $x-(a+b)$ (iv) $y+xz$
(v) $85-7z$ (vi) $-3u+40$
(vii) $y\times(x+3)$ (viii) $\frac{3\times(x+y)}{z}$
(ix) $yz-(3+x)$

2. (i) $5\times 2\times x\times x\times x\times x=10x^4$
(ii) $(-x)\times(-x)\times(-x)\times y\times y$
$=(-x)^3y^2$
(iii) $2\times a\times a\times(-b)\times(-b)\times(-b)$
$\times(-b)=2a^2(-b)^4$
(iv) $m\times m\times m\times n\times n\times p\times p\times p\times p$
$\times p$
$=m^3n^2p^5$
(v) $\frac{3}{7}\times p\times p\times p(-q)\times(-q)\times r\times s$
$=\frac{3}{7}P^3(-q)^2rs$

3. (i) $x^2y^3=x\times x\times y\times y\times y$
(ii) $5y^2=5\times y\times y$
(iii) $3xy^2+5xy=3\times x\times y\times y+5\times x\times y$
(iv) $-2p^3\times q^5=-2\times p\times p\times p\times q\times q$
$\times q\times q\times q$
(v) $12x^2+3xyz^2 = 2\times 2\times 3\times x\times x+$
$3\times x\times y\times z\times z$
(vi) $-x^4y^3 = -1\times x\times x\times x\times x\times y\times y$
$\times y$
(vii) $10a^2b^3c^5 = 2\times 5\times a\times a\times b\times b\times$
$b\times c\times c\times c\times c\times c$
(viii) $x^2y^3+5y= x\times x\times y\times y\times y+ 5$
$\times y$

4. Marks in English
$=\frac{2}{3}$(Marks in Hindi) + 15
$=\frac{2}{3}(x)+15$
$=\left(\frac{2}{3}x+15\right)$marks

5. Total number of trees $=(2x\times x^2)=2x^3$

6. length = 4 (breadth) – 2
$=4b-2=(4b-2)\,m$

7. Meenakshi Marks
$=\frac{1}{2}$(Beena marks + Nidhi Marks)
$=\frac{1}{2}(x+y)$marks

Exercise 7.2

1. (i) $7a^2-6b^2$ binomials
(ii) -1Monomials
(iii) $2x^4-7x^3+4x^2+1$
Quadrinomials
(iv) x^3 Monomials
(v) $4x^3+x^2-x$ Trinomials
(vi) $17x^4+11y$ Binomials
(vii) $15x^2y^2z^2$ Monomials

(viii) $3x^2 - y + z$ Trinomials

(ix) $4x^2 - 3xyz + 4z$ Trinomials

2. (i) like terms are $(x^2, -5x^2), (xy, -7xy, xy)$

(ii) like terms are $(2a^2b, -4ba^2)$

(iii) like terms are $(a^2, -2a^2)$

(iv) like terms are $(4x^2y, 7yx^2)$

(v) like terms are $(6x^2y,\ 2yx^2)$

(vi) like terms are $(a^2, -9a^2), (-3b^2, 7b^2)$

3. (i) Coefficient of a in $15ab = 15b$

(ii) Coefficient of x in $-8x = -8$

(iii) Coefficient of x in $8xyz^2 = 8yz^2$

(iv) Coefficient of a in $-8ab = -8b$

(v) Coefficient of x^2 in $8x^2yz = 8yz$

(vi) Coefficient of a^2 in $-a^2 = -1$

(vii) Coefficient of x^2 in $\frac{-5}{7}x^2y = \frac{-5}{7}y$

(viii) Coefficient of x^3 in $x^3 + 1 = 1$

4. Given $x = 3\ y = -2\ z = 5$

(i) $3x + 2y + 3$

$= 3(3) + 2(-2) + 3$

$= 9 - 4 + 3$

$= 12 - 4$

$= 8$

(ii) $5x - 3y + 7$

$= 5(3) - 3(-2) + 7$

$= 15 + 6 + 7$

$= 28$

(iii) $3x^2 - 3xy - z$

$= 3(3)^2 - 3(3)(-2) - (5)$

$= 3(9) + 18 - 5$

$= 27 + 18 - 5$

$= 45 - 5$

$= 40$

(iv) $4x^2y^3 + 3xy^2z + 7z$

$= 4(3)^2(-2)^3 + 3(3)(-2)^2 \times (5) + 7(5)$

$= 4(9)(-8) + 3(3)(4)(5) + 35$

$= -288 + 180 + 35$

$= -288 + 215$

$= -73$

(v) $x^3 + y^3 + z^3 - 3xyz$

$= (3)^3 + (-2)^3 + (5)^3 - 3(3)(-2)(5)$

$= 27 - 8 + 125 + 90$

$= 242 - 8$

$= 234$

5. (i) Terms are $6x^2, 2xy, -7y^2, 3xy^2, -9$

(ii) Terms are $a^4, -5a^2b^2, 3a^3b, -3ab^3, -6$

(iii) Terms are $p^4, -q^4, 2pq$

(iv) Terms are $xy^2, 4x^2y, -7x^2y, -3xy^2, 3$

6. Given $x = 1, y = 3$

put in $= \frac{x^3 + y^3}{x^2 - xy + y^2} = \frac{1^3 + 3^3}{1^2 - 1 \times 3 + 3^2}$

$= \frac{1 + 27}{1 - 3 + 9}$

$= \frac{28}{7} = 4$

7. Fill in the blanks :

(i) The literal factor in $(-3xy)$ is ***xy***.

(ii) $(-6x)$ and $(-6y)$ are **unlike** terms.

(iii) The coefficient of b is **1**

(iv) $8xy$ is a **monomials** (monomials, binomial, trinomial).

(v) Three times P increased by 7 is $\mathbf{3p + 7}$

Exercise 7.3

1. (i) $(4x^2) + (-5x^2) + (-2x^2) + (-9x^2)$

$= (4 - 5 - 2 - 9)x^2$

$= (4 - 16)x^2 = -12x^2$

(ii) $(3a^2b) + (-6a^2b) + (-3a^2b) + (-11a^2b)$

$= (3 - 6 - 3 - 11)a^2b$

$= (3 - 20)a^2b$

$= -17a^2b$

(iii) $(-9xy) + (4xy) + (-13xy) + (8xy)$

$= (-9 + 4 - 13 + 8)xy$
$= (-22 + 12)xy$
$= -10xy$

(iv) $(6a^3) + (-4a^3) + (10a^3) + (-8a^3)$
$= (6 - 4 + 10 - 8)a^3$
$= (16 - 12)a^3 = 4a^3$

(v) $(x^2 - a^2) + (-5x^2 + 2a^2) + (-4x^2 + 4a^2)$
$= (x^2 - 5x^2 - 4x^2) + (-a^2 + 2a^2 + 4a^2)$
Collecting like terms
$= -8x^2 + 5a^2$

(vi) $(2xy) + (5xy) + (-5xy) + (xy)$
$= (2 + 5 - 5 + 1)xy$
$= (8 - 5)xy = 3xy$

2. (i) $x^3 - 2x^2 + 5x + 10 - 6x^3 + 3x^2 - 10x - 5 + 7$
$= (x^3 - 6x^3) + (3x^2 - 2x^2) + (5x - 10x) + (10 - 5 + 7)$
$= -5x^3 + x^2 - 5x + 12$

(ii) $5x^2 + 10xy + 7y^2 - 7 + 3x^2 - 5xy + 8$
$= (5x^2 + 3x^2) + (7y^2) + (10xy - 5xy) + (-7 + 8)$
$= 8x^2 + 7y^2 - 5xy + 1$

(iii) $4x^5 + 3x^2 + 5x + x^5 - 7x^2 + 2x$
$= (4x^5 + x^5) + (3x^2 - 7x^2) + (5x + 2x)$
$= 5x^5 - 4x^2 + 7x$

(iv) $x + y - 3x + 4y$
$= (x - 3x) + (y + 4y)$
$= -2x + 5y$

3. (i)
$$\begin{array}{rrrr} 3x & +4y & -a & +1 \\ & -6y & -2a & +3 \\ -5x & -2y & & -9 \\ \hline -2x & -4y & -3a & -5 \end{array}$$

(ii)
$$\begin{array}{rrrrr} 5a^2b & -6ab^2 & +4a & & \\ -7a^2b & & -6a & & \\ & +9ab^2 & & +9y & \\ \hline -2a^2b & +3ab^2 & -2a & +9y & \end{array}$$

(iii)
$$\begin{array}{rrr} 8p^2 & +4pq & -q^2 \\ -3p^2 & -7pq & \\ & +2pq & +3q^2 \\ \hline 5p^2 & -pq & +2q^2 \end{array}$$

(iv)
$$\begin{array}{rrrrr} x^2 & +y^2 & -xy & -x & +y \\ -2x^2 & & +3xy & & -2y \\ & -3y^2 & & -4x & \\ \hline -x^2 & -2xy^2 & +2xy & -5x & -y \end{array}$$

4. (i) $3y^2 - 8y^2 = (3 - 8)y^2 = -5y^2$

(ii) $-12ab - 6ab$
$= (-12 - 6)ab$
$= -18ab$

(iii) $23a^2 - 17a^2 = (23 - 17)a^2 = 6a^2$

(iv)
$$\begin{array}{rrr} a & -b & -c \\ a & +b & +c \\ (-) & (-) & (-) \\ \hline -2b & -2c & \end{array}$$

(v)
$$\begin{array}{rrr} y^2x & -x^2 & +z \\ -y^2x & +x^2 & +z \\ (+) & (-) & (-) \\ \hline 2y^2x & -2x^2 & +0 \end{array}$$

(vi)
$$\begin{array}{rrrr} c^2 & +2a^2 & -b^2 & +abc \\ & -a^2 & +b^2 & +3abc \\ & (+) & (-) & (-) \\ \hline c^2 & +3a^2 & -2b^2 & -2abc \end{array}$$

(vii)
$$\begin{array}{rrr} 2x^2 & +4xy & -5y^2 \\ x^2 & -3xy & -2y^2 \\ (-) & (+) & (+) \\ \hline x^2 & +7xy & -3y^2 \end{array}$$

(viii)
$$\begin{array}{rrr} 3m^2 & -3mn & +8 \\ -m^2 & +3mn & \\ (+) & (-) & \\ \hline 4m^2 & -6mn & +8 \end{array}$$

(ix)
$$\begin{array}{rr} & xy - yz - zx \\ & 2x^2 \quad + yz \\ & (-) \quad (-) \\ \hline & -2x^2 + xy - 2yz - zx \\ \hline \end{array}$$

(x)
$$\begin{array}{rr} & xy + y^2 - x^2 + 1 \\ & -y^2 - x^2 \quad 1 \\ & (+) \quad (-) \quad (-) \\ \hline & xy + 2y^2 \\ \hline \end{array}$$

5.
$$\begin{array}{r} 2a^2 + 3b^2 \\ 5a^2 - 2b^2 + ab \\ -6a^2 + b^2 - 5ab \\ \hline a^2 + 2b^2 - 4ab \\ \hline \end{array}$$

6.
$$\begin{array}{r} 11x^2 - 5y^2 - 4xy \\ -4x^2 + 3y^2 + 5xy \\ (+) \quad (-) \quad (-) \\ \hline 15x^2 - 8y^2 - 9xy \\ \hline \end{array}$$

7. Let A should be added

$\therefore \quad (a^2 + 2ab + b^2) + A = 4ab + b^2$

$\therefore \quad A = (4ab + b^2) - (a^2 + 2ab + b^2)$

$\therefore$
$$\begin{array}{r} 4ab + b^2 \\ a^2 + 2ab + b^2 \\ (-) \quad (-) \quad (-) \\ \hline -a^2 + 2ab \\ \hline \end{array}$$

$\therefore \; -a^2 + 2ab$ should be added to $a^2 + 2ab + b^2$ to get $4ab + b^2$

8.
$$\begin{array}{r} x + y + z \\ +2x - 2y - 2z \\ \hline 3x - y - z \\ \hline \end{array}$$

$$\begin{array}{r} 10x + 5y + 3z \\ +2x + 2y + 4z \\ \hline 12x + 7y + 7z \\ \hline \end{array}$$

given
$$\begin{array}{r} 12x + 7y + 7z \\ 3x - y - z \\ (-) \quad (+) \quad (+) \\ \hline 9x + 8y + 8z \\ \hline \end{array}$$

9. $0 - (8a^3 + 5a^2 + 3a - 6)$

$-8a^3 - 5a^2 - 3a + 6$

10. Let A should be added

$(3x^3 - 2x^2 + 5x + 1) + A$

$= (x^3 - 2x^2 + 4x - 1)$

$A = (x^3 - 2x^2 + 4x - 1)$

$- (3x^3 - 2x^2 + 5x + 1)$

$\therefore$
$$\begin{array}{r} x^3 - 2x^2 + 4x - 1 \\ 3x^3 - 2x^2 + 5x + 1 \\ (-) \quad (+) \quad (-) \quad (-) \\ \hline -2x^3 \qquad -x \quad -2 \\ \hline \end{array}$$

$\therefore \; -2x^3 - x - 2$ should be added to $3x^3 - 2x^2 + 5x + 1$ to get $x^3 - 2x^2 + 4x - 1$

11. Sum
$$\begin{array}{r} 3x - y + z \\ -y - z \\ \hline 3x - 2y \\ \hline \end{array}$$

Subtract
$$\begin{array}{r} 3x - y - z \\ (-) \quad (+) \quad (+) \\ \hline 0x - y + z \\ \hline \end{array}$$

Coefficient of x in result = 0.

12. $(2x^2 + 3y^2 - 7y + 1)$ + (other expression)

$= x^2 - y^2 - 2xy + y - 7$

$\therefore$ Other expression

$$\begin{array}{rr} = & x^2 - y^2 - 2xy + y - 7 \\ & 2x^2 + 3y^2 \qquad -7y + 1 \\ & (-) \quad (-) \qquad (+) \quad (-) \\ \hline = & -x^2 - 4y^2 - 2xy + 8y - 8 \\ \hline \end{array}$$

13. To find $A + B + C$
$$\begin{array}{r} 7x^2 + 5xy - 9y^2 \\ -4x^2 + xy + 5y^2 \\ -3x^2 - 6xy + 4y^2 \\ \hline 0 + 0 + 0 \\ \hline \end{array}$$

$\therefore \quad A + B + C = 0$

14. 1 exceed $2x - 3y - 4$ by

$1 - (2x - 3y - 4)$

$1 - 2x + 3y + 4$

$5 - 2x + 3y$

15. $2x - 3y + 4z$ Greater than $2x + 5y - 6z + 2$ by

$= (2x - 3y + 4z) - (2x + 5y - 6z + 2)$

$= 2x - 3y + 4z - 2x - 5y + 6z - 2$
$= (2-2)x + y(-3-5) + z(4+6) - 2$
$= 0 - 8y + 10z - 2$

16. $a + 2b - 3c$ is greater than $2a - 3b + c$ by
$= (a + 2b - 3c) - (2a - 3b + c)$
$= a + 2b - 3c - 2a + 3b - c$
$= a(1-2) + b(2+3) + (-3-1)c$
$= -a + 5b - 4c$

MCQs

1. (c) **2.** (a) **3.** (a) **4.** (b) **5.** (a) **6.** (c)

Mental Maths

1. Cost of 1 pen is ₹ y, find the cost of 50 such pens. ₹ **50*y***
2. The rules of **arithmetic** apply to algebra.
3. Letter which are used to denote numbers in algebra are called **literal** or **algebraic** numbers.
4. 3 added to the sum of x and y is written as $(x + y)\ 3$.

8 Linear Equations in One Variable

Exercise 8.1

1.

	Expression	Value	Does it Satisfy?
(i)	$2x + 5 = 7$	$x = 1$	Yes
(ii)	$4x - 3 = 5$	$x = 1$	**No**
(iii)	$2x - 5 = 7$	$x = 1$	**No**
(iv)	$7x - 2 = 5$	$x = 1$	**Yes**
(v)	$9 - 3x = 3$	$x = 2$	**Yes**
(vi)	$9 + 2x = -11$	$x = -10$	**Yes**
(vii)	$2x - 9 = 7$	$x = 5$	**No**
(viii)	$b + 5 = 7$	$b = 4$	**No**
(ix)	$4l = 32$	$l = 5$	**No**
(x)	$4l + 3 = 7$	$l = 2$	**No**
(xi)	$2q + 4 = 10$	$q = 3$	**Yes**
(xii)	$7y + 4 = 15$	$y = 1$	**No**
(xiii)	$3x - 7 = 5$	$x = 4$	**Yes**
(xiv)	$2y - 3 = 8$	$y = 4$	**No**
(xv)	$9 - 8y = 9$	$y = 0$	**Yes**
(xvi)	$14 + 2y = 20$	$y = 3$	**Yes**

(ii) $8x + 2 = 10$

x	LHS	RHS
2	18	10
0	2	10
1	10	10

$\therefore$ when $x = 1$ LHS = RHS
$\therefore$ $x = 1$ is the solution of $8x + 2 = 10$

(ii) $10 - x = 6$

x	LHS	RHS
2	8	6
3	7	6
4	6	6

$\therefore$ when $x = 4$ LHS = RHS
$\therefore$ $x = 4$ is the solution of $10 - x = 6$

(iii) $x - 7 = 10$

x	LHS	RHS
4	-3	10
5	-2	10
7	0	10
17	10	10

$\therefore$ when $x = 17$ LHS = RHS
$\therefore$ $x = 17$ is the solution.

(iv) $4z + 2 = 6$

z	LHS	RHS
0	2	6
-1	-2	6
1	6	6

$\therefore$ for $z = 1$ LHS = RHS
$\therefore$ $z = +1$ is the solution of $4z + 2 = 6$

(v) $2x + 9 = 5x - 12$

x	LHS	RHS
2	13	-2
5	19	13
7	23	23

$\therefore$ for $x = 7$ LHS = RHS

$\therefore$ $x = 7$ is the solutions of $2x + 9 = 5x - 12$

(vi) $2(a-1) = a + 1$

a	LHS	RHS
1	0	2
2	2	3
3	4	4

$\therefore$ when $a = 3$ LHS = RHS

$\therefore$ $a = 3$ is the solution of $2(a-1) = a + 1$

(vii) $5 - x = 7$

x	LHS	RHS
0	5	7
-1	6	7
-2	7	7

$\therefore$ for $x = -2$ LHS = RHS

$\therefore$ $x = -2$ is the solution by $5 - x = 7$.

(viii) $x - 3 = 4x + 3$

x	LHS	RHS
0	-3	3
-1	-4	-1
-2	-5	-5

$\therefore$ when $x = -2$ LHS = RHS

$\therefore$ $x = -2$ is solution of $x - 3 = 4x + 3$

(ix) $\frac{x+7}{2} = 5$

x	LHS	RHS
1	4	5
2	4.5	5
3	5	5

$\therefore$ when $x = 3$ LHS = RHS

$\therefore$ $x = 3$ is solution of $\frac{x+7}{2} = 5$

3. (i) $3x - 5 = 7, x = 4$

putting $x = 4$ in LHS

$3(4) - 5 = 7$

$2 - 5 = 7$

$7 = 7$

$\therefore$ $x = 4$ is solution of $3x - 5 = 7$

(ii) putting $x = 3$ in LHS

$3 + 2(3) = 9$

$3 + 6 = 9$

$9 = 9$

$\therefore$ $x = 3$ is the solution of $2 + 3x = 9$.

(iii) Putting $x = 2$ in LHS and RHS

$= 5(2) - 8 = 2(2) - 2$

$= 10 - 8 = 4 - 2$

$2 = 2$

$\therefore$ $x = 2$ is the solution of $5x - 8 = 2x - 2$

(iv) putting $x = 6$ in LHS

$= \frac{6}{2} + 5 = 8$

$= 3 + 5 = 8$

$= 8 = 8$

$\therefore$ $x = 6$ is the solution of $\frac{x}{2} + 5 = 8$.

(v) Putting $y = 10$ in LHS

$= \frac{10}{4} + \frac{1}{2} = 3$

$= \frac{10 + 1 \times 2}{4} = 3$

$= \frac{10+2}{4} = 3 = \frac{12}{4} = 3$

$3 = 3$

$\therefore$ $y = 10$ is the solution of $\frac{y}{4} + \frac{1}{2} = 3$.

(vi) Putting $x = 5$ in LHS

$= 2(5) + \frac{3}{2} = \frac{23}{2}$

$= 10 + \frac{3}{2} = \frac{23}{2}$

$= \frac{20+3}{2} = \frac{23}{2}$

$= \frac{23}{2} = \frac{23}{2}$

$\therefore$ $x = 5$ is the solution of $2x + \frac{3}{2} = \frac{23}{2}$

Exercise 8.2

1. (i) $x + 7 = 49$

$x = 49 - 7$

$x = 42$

Checking : putting $x = 42$ in LHS in $x + 7 = 49$

$42 + 7 = 49$

$49 = 49$ verified

(ii) $7x = 49$

$x = \frac{49}{7}$

$x = 7$

putting $x = 7$ in LHS of $7x = 49$

$7(7) = 49$

$49 = 49$ verified

(iii) $3x - 5 = 13$

$3x = 13 + 5$

$3x = 18$

$x = 18 \div 3$

Checking : putting $x = 6$ in LHS of $3x - 5 = 13$

$\therefore \quad 3(6) - 5 = 13$

$18 - 5 = 13$

$13 = 13$ verified

(iv) $4x + 7 = 15$

$4x = 15 - 7$

$4x = 8$

$x = 8 \div 4$

$x = 2$

Checking : putting $x = 2$ in $4x + 7 = 15$

$\therefore \quad 4(2) + 7 = 15$

$8 + 7 = 15$

$15 = 15$ verified

(v) $5x - 3 = x + 17$

$5x - x = 17 + 3$

$4x = 20$

$x = 5$

Checking : putting $x = 5$ in

$5x - 3 = x + 17$

$5(5) - 3 = 5 + 17$

$25 - 3 = 22$

$22 = 22$ verified

(vi) $\frac{x}{5} = 12$

$x = 12 \times 5$

$x = 60$

Checking : putting $x = 60$ in $\frac{x}{5} = 12$

$\therefore \quad \frac{60}{5} = 12$

$12 = 12$ verified

(vii) $\frac{3x}{5} = 15$

$3x = 15 \times 5$

$3x = 75$

$x = 25$

Checking: putting $x = 25$ in $\frac{3x}{5} = 15$

$\therefore \quad \frac{3(25)}{5} = 15$

$3 \times 5 = 15$

$15 = 15$ verified

(viii) $x - \frac{3}{2} = \frac{7}{2}$

$x = \frac{7}{2} + \frac{3}{2}$

$x = \frac{7+3}{2}$

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

$x = 5$

putting $x = 5$ in LHS of $x - \frac{3}{2} = \frac{7}{2}$

$= 5 - \frac{3}{2} = \frac{7}{2} = \frac{10-3}{2} = \frac{7}{2}$

$\frac{7}{2} = \frac{7}{2}$ verified

(ix) $2x - \frac{1}{2} = 3$

$2x = 3 + \frac{1}{2}$

$2x = \frac{3 \times 2 + 1}{2}$

$2x = \frac{6+1}{2}$

$2x = \frac{7}{2}$

$x = \frac{7}{4}$

Checking : putting $x = \frac{7}{4}$ in $2x - \frac{1}{2} = 3$

$\therefore \quad 2 \times \frac{7}{4} - \frac{1}{2} = 3$

$\frac{7}{2} - \frac{1}{2} = 3$

$\frac{7-1}{2} = 3$

$\frac{6}{2} = 3$

$3 = 3$ verified

2. (i) $7 + 3(x + 5) = 3$

$7 + 3x + 15 = 3$

$3x + 22 = 3$

$3x = -19$

$x = \frac{-19}{3}$

Checking : putting $x = \frac{-19}{3}$ in

$7 + 3(x + 5) = 3$

$\therefore \quad 7 + 3\left(\frac{-19}{3} + 5\right) = 3$

$7 + 3\left(\frac{-19 + 15}{3}\right) = 3$

$7 + (-19 + 15) = 3$

$7 + (-4) = 3$

$7 - 4 = 3$

$3 = 3$ verified

(ii) $5x - 7 = 2x + 5$

$5x - 2x = 5 + 7$

$3x = 12$

$x = 4$

Checking : putting $x = 4$ in

$5x - 7 = 2x + 5$

$5(4) - 7 = 2(4) + 5$

$20 - 7 = 8 + 5$

$13 = 13$ verified

(iii) $3x + 4 = x + 8$

$3x - x = 8 - 4$

$2x = 4$

$x = 2$

Checking : putting $x = 2$ in

$3x + 4 = x + 8$

$3(2) + 4 = 2 + 8$

$6 + 4 = 10$

$10 = 10$ verified

(iv) $4x + 8(x - 3) + 3x = 36$

$4x + 8x - 24 + 3x = 36$

$15x - 24 = 36$

$15x = 36 + 24$

$15x = 60$

$x = 4$

Checking :

putting $x = 4$ in

$4x + 8(x - 3) + 3x = 36$

$4(4) + 8(4 - 3) + 3(4) = 36$

$16 + 8 \times 1 + 12 = 36$

$36 = 36$ verified

(v) $8x + 2(x - 2) + 3x = 35$

$8x + 2x - 4 + 3x = 35$

$13x = 35 + 4$

$13x = 39$

$x = 3$

Checking : putting $x = 3$ in

$8x + 2(x - 2) + 3x = 35$

$8(3) + 2(3 - 2) + 3(3) = 35$

$24 + 2(1) + 9 = 35$

$35 = 35$ verified

(vi) $7(x - 2) - 2(3 - x) = 5(x + 4) - 8$

$7x - 14 - 6 + 2x = 5x + 20 - 8$

$9x - 20 = 5x + 12$

$4x - 5x = 12 + 20$

$4x = 32$

$x = 8$

Checking :

putting $x = 8$ in LHS and RHS

$7(8 - 2) - 2(3 - 8) = 5(8 + 4) - 8$

$7 \times 6 + 10 = 60 - 8$

$42 + 10 = 52$

$52 = 52$

verified

(vii) $5x - 7 = 2x + 15$

$5x - 2x = 7 + 15$

$3x = 22$

$x = \frac{22}{3}$

Checking :

putting $x = \frac{22}{3}$ in L.H.S. and R.H.S

$5 \times \frac{22}{3} - 7 = 2 \times \frac{22}{3} + 15$

$\frac{110}{3} - 7 = \frac{44}{3} + 15$

$\frac{110 - 21}{3} = \frac{44 + 45}{3}$

$\frac{89}{3} = \frac{89}{3}$ Verified

(viii) $\frac{x}{2} + \frac{x}{3} + \frac{x}{4} = 5$

$\frac{6x + 4x + 3x}{12} = 5$

$\frac{13x}{12} = 5$

$$13x = 5 \times 12$$
$$13x = 60$$
$$x = \frac{60}{13}$$

Checking : putting $x = \frac{60}{13}$ in LHS

$$\therefore \quad \frac{60}{13 \times 2} + \frac{60}{13 \times 3} + \frac{60}{13 \times 4} = 5$$
$$\frac{60 \times 6 + 60 \times 4 + 60 \times 3}{13 \times 12} = 5$$
$$\frac{360 + 240 + 180}{156} = 5$$
$$5 = 5 \text{ verified}$$

(ix) $\frac{6x}{2} - 9 - \frac{2x}{2} = x + 1$

$$3x - 9 - x = x + 1$$
$$3x - x - x = 1 + 9$$
$$3x - 2x = 10$$
$$x = 10$$

Checking :

putting $x = 10$ in LHS and RHS

$$\frac{6 \times 10}{2} - 9 - \frac{2 \times 10}{2} = 10 + 1$$
$$3 \times 10 - 9 - 10 = 11$$
$$30 - 19 = 11$$
$$11 = 11 \quad \text{verified}$$

(x) $\frac{x}{8} - \frac{1}{2} = \frac{x}{6} - 2$

$$\frac{x}{8} - \frac{x}{6} = -2 + \frac{1}{2}$$
$$\frac{3x - 4x}{24} = \frac{-4 + 1}{2}$$
$$\frac{-x}{24} = \frac{-3}{2}$$
$$x = \frac{3}{2} \times \overset{12}{24}$$
$$x = 36$$

Checking :

putting $x = 36$ in LHS and RHS

$$\frac{36}{8} - \frac{1}{2} = \frac{36}{6} - 2$$
$$\frac{9}{2} - \frac{1}{2} = 6 - 2$$
$$\frac{8}{2} = 4$$
$$4 = 4 \text{ verified}$$

(xi) $\frac{n}{4} - 5 = \frac{n}{6} + \frac{1}{2}$

$$\frac{n}{4} - \frac{n}{6} = \frac{1}{2} + 5$$
$$\frac{3n - 2n}{12} = \frac{1 + 10}{2}$$
$$\frac{n}{12} = \frac{11}{2} \times \overset{6}{12}$$
$$n = 66$$

Checking :

putting $n = 66$ in LHS and RHS

$$\frac{66}{4} - 5 = \frac{66}{6} + \frac{1}{2}$$
$$\frac{66 - 20}{4} = 11 + \frac{1}{2}$$
$$\frac{46}{4} = \frac{22 + 1}{2}$$
$$\frac{23}{2} = \frac{23}{2} \quad \text{verified}$$

3. Let number $= x$

According to Question :

$$x + 7 = 11$$
$$x = 11 - 7 = 4$$

Thus required number is 4.

4. Cost of 6 pens = ₹ 90

Cost of 1 pen = ₹ 90 ÷ 6 = ₹ 15

5. Required number is x

Then consecutive integers $(x+1)$, $(x+2)$ according to questions ;

Sum of three consecutive integers = 45

$$x + x + 1 + x + 2 = 45$$
$$3x + 3 = 45$$
$$3x = 45 - 3$$
$$x = \frac{42}{3} = 14$$

Consecutive integers are 14, 15, 16.

7. Krishan's age $= x$

Ram's age $= 3x$

Sum of their ages = 56 years

Thus, $x + 3x = 56$

$$4x = 56$$
$$x = \frac{56}{4} = 14$$

Krishan's age is 14 years, his father age $= 14 \times 3 = 42$ years.

8. Let breadth of a rectangle $= x$ cm
Length of a rectangle $= (x+2)$ cm
Perimeter of rectangle = 24 cm
Then, $2\,[x+(x+2)] = 24$ cm

$$2\,[2x+2] = 24$$
$$4x = 24-4$$
$$x = \frac{20}{4} = 5$$

Breadth of rectangle is 5 cm.
length of rectangle is 7 cm.

9. One number = 32
According to question,
92 exceed another number by 32.

$$x+32 = 92$$
$$x = 92-32$$
$$x = 60$$

Required number = 60.

10. Cost of 8 chairs = ₹ 2000
Cost of 1 chair = ₹ (2000 ÷ 8)
= ₹ 250
Cost of one chair is ₹ 250.

MCQs

1. (c) **2.** (b) **3.** (a) **4.** (d)

9 Ratio, Proportion and Unitary Method

Exercise 9.1

1. (i) Number of triangles = 5
Number of circles = 4
Ratio = 5 : 4

(ii) Number of squares = 6
Number of triangles = 5
Ratio = 6 : 5

(iii) Number of circles = 4
Total number = 15
Ratio = 4 : 15

(iv) Number of circles = 4
Number of squares = 6
Ratio = 4 : 6 or 2 : 3

2. (i) Number of shaded parts = 8
Number of unshared parts = 16
Ratio = 8 : 16 or 1 : 2

(ii) Number of shaded parts = 8
Total number of parts = 24
Ratio = 8 : 24 or 1 : 3

3. (i) Ratio of villages and school = 5 : 1.

(ii) Ratio of Marks of Gaurav and Raman $= \frac{80}{75} = \frac{16}{15} = 16:15$

(iii) Ratio of Income of Mr. Sandhu and Mr. Lal = 2 : 1.

(iv) Ratio of girls and boys $= \frac{3}{4} = 3:4.$

(v) $\frac{10}{6} = \frac{5}{3} = 5:3$ Ratio of matches played and won.

4. (i) 65 : 39 or $\frac{\overset{5}{\cancel{65}}}{\underset{3}{\cancel{39}}} = \frac{5}{3}$ or 5 : 3

(ii) 350 : 725 or $\frac{\overset{14}{\cancel{350}}}{\underset{29}{\cancel{725}}} = \frac{14}{9}$ or 14 : 29

(iii) 900 : 1500 or $\frac{900}{1500} = \frac{\overset{3}{\cancel{9}}}{\underset{5}{\cancel{15}}} = 3:5$

(iv) $\frac{250}{3000} = \frac{\overset{1}{\cancel{25}}}{\underset{12}{\cancel{300}}} = \frac{1}{12}$ or 1 : 12.

(v) 186 : 403
$\because$ HCF of 186 and 403 is 31.
or $\frac{186 \div 31}{403 \div 31} = \frac{6}{13}$ or 6 :13

(vi) 384 : 480 or $\frac{384 \div 96}{480 \div 96}$
$\because$ HCF of 384 and 480 is 96
$= \frac{4}{5}$ or 4 : 5

5. (i) 20 *P* and ₹ or 20 *P* and 100 *P*
$\therefore$ Ratio is $\frac{20}{100} = \frac{1}{5}$ or 1 : 5

(ii) 3 kg to 200 g or 3000 g to 200 g
$\therefore$ Ratio is $\frac{3000}{200} = \frac{15}{1}$ or 15 : 1

(iii) 30 min to 40 sec. or 30×60 sec to 40 sec

or 1800 sec to 40 sec

$\therefore$ Ratio is $\frac{1800}{40} = \frac{90}{2} = \frac{45}{1}$ or 45 : 1

(iv) 1 hr. to 45 min or 60 min to 45 min

$\therefore$ Ratio is $\frac{60}{45} = \frac{4}{3}$ or 4 :3

(v) 15 cm to 1 m or 15 cm to 100 cm

$\therefore$ Ratio $\frac{15}{100} = \frac{3}{20}$ or 3 : 20

(vi) 21 days to 2 weeks

21 days to 14 days

$\therefore$ Ratio $\frac{\overset{3}{\cancel{21}}}{\underset{2}{\cancel{14}}} = \frac{3}{2}$ or 3 : 2

(vii) 2 years to 8 months

24 months to 8 months

$\therefore$ Ratio $\frac{24}{8} = \frac{3}{1} = 3:1$

(viii) 5 lit to 15 lit

$\therefore$ Ratio $\frac{\overset{1}{\cancel{5}}}{\underset{3}{\cancel{15}}} = \frac{1}{3}$ or 1 :3

6. (i) 1 : 7 and 5 : 22 or $\frac{1}{7}$ and $\frac{5}{22}$

LCM of 7, 22 =

2	7, 22
7	7, 11
11	1, 11
	1, 1

$= 2 \times 7 \times 11 = 154$

$= \frac{1 \times 22 \text{ and } 5 \times 7}{154} = \frac{22, 35}{154}$

$\because$ $22 < 35$

$\therefore$ $5 : 22 > 1 : 7$

(ii) 11 : 14 or 2 : 5

$\frac{11}{14}$ or $\frac{2}{5}$ LCM of 14 and 5

2	14, 5
5	7, 5
7	7, 1
	1, 1

$\text{LCM} = 2 \times 5 \times 7 = 70$

$\frac{11 \times 5, 2 \times 14}{70} = \frac{55, 28}{70}$

$\because$ $55 > 28$

$\therefore$ $11 : 14 > 2 : 5$

(iii) 3 : 11 and 2 : 15

$\frac{3}{11}$ and $\frac{2}{15}$

LCM of 11 and 15 is 165

$\therefore$ $\frac{3 \times 15, 2 \times 11}{165} = \frac{45, 22}{165}$

$\because$ $45 > 22$

$\therefore$ $3 : 11 > 2 : 15$

(iv) 10 : 5 and 14 : 9

$\frac{10}{5}$ and $\frac{14}{9}$

LCM of 5 and 9 = 45

$= \frac{10 \times 9 \text{ and } 14 \times 5}{45}$

$= \frac{90, 70}{45}$

$\therefore$ $90 > 70$

$\therefore$ $10 : 5 > 14 : 9$

7. (i) $\frac{2}{7} = \frac{\mathbf{4}}{14} = \frac{\mathbf{6}}{21} = \frac{\mathbf{8}}{28} = \frac{10}{\mathbf{35}}$

(ii) $\frac{1}{3} = \frac{2}{\mathbf{6}} = \frac{\mathbf{3}}{9} = \frac{4}{\mathbf{12}} = \frac{\mathbf{5}}{15}$

(iii) $\frac{5}{4} = \frac{\mathbf{10}}{8} = \frac{15}{\mathbf{12}} = \frac{\mathbf{20}}{16} = \frac{25}{\mathbf{20}}$

(iv) $\frac{8}{10} = \frac{16}{\mathbf{20}} = \frac{\mathbf{24}}{30} = \frac{32}{\mathbf{40}} = \frac{\mathbf{40}}{50}$

(v) $\frac{12}{25} = \frac{24}{\mathbf{50}} = \frac{36}{\mathbf{75}} = \frac{\mathbf{40}}{100} = \frac{60}{\mathbf{125}}$

8. 3 : 5 or 5 : 4

$\frac{3}{5}$ or $\frac{5}{4}$ LCM of 5 and 4 = 20

$= \frac{3 \times 4, 5 \times 5}{20}$

$= \frac{12, 25}{20}$

$\because$ $12 < 25$

$\therefore$ $5 : 4 > 3 : 5$

9. Income = ₹ 9500, spends = ₹ 7600

Savings = ₹ 1900

(i) Ratio to income and expenditure

$$= \frac{\overset{45}{\cancel{9500}}}{\underset{4}{\cancel{7600}}} = \frac{\overset{5}{\cancel{45}}}{\cancel{76}} = 5:4$$

(ii) Ratio to saving and income

$$= \frac{1900}{9500} = \frac{19}{15} = \frac{1}{5} \text{ or } 1:5$$

10. Speed of Car $= \frac{d}{t} = \frac{120}{3} = 40\,\text{km/hr}$

Speed of train $= \frac{d}{t} = \frac{100}{2} = 50\,\text{km/hr}$

Ratio of Speed $= \frac{40}{50} = \frac{4}{5}$ or 4 : 5

11. Earning of Mr. Das = ₹ 1350

Earning of Mr. Rao = ₹ 1200

Ratio of earnings $= \frac{1350}{1200} = \frac{135}{120} = \frac{9}{8}$

or 9 : 8

12. Ratio of marks of Rakesh and Rajesh

$$= \frac{560}{480}$$

$$= \frac{56}{48} = \frac{7}{6}$$

or 7 : 6

13. Stopage time = 1 hr

total journey time = 10 hr 30 min

$$= 10\frac{1}{2}\text{ hr}$$

Ratio $= \frac{1}{10\frac{1}{2}} = \frac{1}{\left(\frac{21}{2}\right)} = \frac{2}{21}$ or 2 : 2

14. Milk to water = 2 : 5

Sugar to water = 2 : 3

Salt to water = 2 : 7

We have to find which ratio is greatest

$\frac{2}{5}\ \frac{2}{3}\ \frac{2}{7}$ $\because$ Numerator is same

$\therefore$ $\frac{2}{3}$ is greatest because its denominator is least.

ratio of sugar to water is greatest.

Exercise 9.2

1. (i) 16, 4, 32, 8

Product of Extremes $= 16 \times 8 = 128$

Product of Means $= 4 \times 32 = 128$

$\because$ Product of Extremes = Product of means

$\therefore$ 16, 4, 32, 8 are in proportion

(ii) 4, 6, 8, 10

product of extremes $= 4 \times 10 = 40$

product of means $= 6 \times 8 = 48$

$\because$ Product of extremes $\neq$ product of means

$\therefore$ 4, 6, 8, 10 are not in proportion.

(iii) 4, 6, 8, 12

Product of extremes $= 4 \times 12 = 48$

Product of means $= 6 \times 8 = 48$

$\because$ Product of Extremes = Product of means

$\therefore$ 4, 6, 8, 12 are in proportion

(iv) 20, 45, 70, 95

Product of Extremes

$= 20 \times 95 = 1900$

Product of means $= 45 \times 70 = 3150$

$\because$ Product of means

$\neq$ Product of Extremes

$\therefore$ 20, 45, 70, 95 are not in proportions.

(v) 16, 32, 24, 48

Product of Extremes

$= 16 \times 48 = 768$

Product of means $= 32 \times 24 = 3375$

$\because$ Product of extremes $\neq$ product of means

$\therefore$ 16, 32, 24, 48 are in proportions.

(vi) 33, 44, 75, 150

Product of Extremes

$= 33 \times 150 = 4950$

Product of means $= 44 \times 75 = 3300$

$\because$ Product of Extremes $\neq$ Product of means

$\therefore$ 33, 44, 75, 150 are not in proportion.

(vii) 6, 24, 18, 72

Product of Extremes $= 6 \times 72 = 432$

Product of means $= 24 \times 18 = 432$

$\because$ Product of Extremes

= Product of means

$\therefore$ 6, 24, 18, 72 are in proportion.

(viii) 150, 200, 250, 300

Product of Extremes

$= 150 \times 300 = 45000$

Product of Means

$= 200 \times 250 = 50000$

$\because$ Product of Extremes
$\neq$ Product of means

$\therefore$ 150, 200, 250, 300 are not in proportion.

(ix) 16, 30, 24, 45

Product of Extremes
$= 16 \times 45 = 720$

Product of means $= 30 \times 24 = 720$

$\because$ Product of Extreme = Product of means

$\therefore$ 40, 10, 50, 200 are in proportion.

2. (i) 3 : 4 = 75 : 100 or $\frac{3}{4}, \frac{75}{100}$

or $\frac{3 \times 25, 75 \times 1}{100}$

or $\frac{75, 75}{100}$

Yes 3 : 4 = 75 : 100 (True)

(ii) 18 : 81 = 2 : 9 or $\frac{18}{81}, \frac{2}{9}$

or $\frac{18 \times 1, 2 \times 9}{81}$

or $\frac{18, 18}{81}$ $\quad \because$ 18 = 18

Yes 18 : 81 = 2 : 9 (true)

(iii) 9 : 11 = 13 : 15 or $\frac{9}{11}, \frac{13}{15}$

or $\frac{9 \times 15, 13 \times 11}{165}$

or $\frac{135, 143}{165}$ $\quad \because 135 \neq 143$

$\therefore$ 9 : 1 = 13 : 15 $\quad \therefore$ (false)

(iv) 20 : 100 = 5 : 25 or $\frac{20}{100}, \frac{5}{25}$

or $\frac{20 \times 1, 5 \times 4}{100}$

or $\frac{20, 20}{100}$ $\quad \because$ 20 = 20

$\therefore$ 20 : 100 = 5 : 25 (true)

(v) 4 : 8 = 32 : 64 or $\frac{4}{8}, \frac{32}{64}$

or $\frac{4 \times 8, 32 \times 1}{64}$

or $\frac{32, 32}{64}$ $\quad \because$ 32 = 32

$\therefore$ 4 : 8 = 32 : 64 (true)

(vi) 16 : 9 = 14 : 7 or $\frac{16}{9}, \frac{14}{7}$

$= \frac{16 \times 7, 14 \times 9}{63}$

$= \frac{112, 126}{63}$ $\quad \because 112 \neq 126$

$\therefore 16 : 9 \neq 14 : 7$ $\quad \therefore$ (false)

3. (i) $40 : x :: 80 : 32$

$\therefore x \times 80 = 40 \times 32$

[$\because$ product of means = product of extremes]

$x = \frac{\cancel{40}^{16} \times \cancel{32}}{\cancel{80}_{2}}$

$x = 16$

(ii) $4 : 10 :: x : 70$

$10 \times x = 4 \times 70$

[$\because$ product of means = product of extremes]

$x = \frac{4 \times 70}{10}$

$x = \frac{4 \times \cancel{70}^{7}}{\cancel{10}}$

$x = 28$

(iii) 18 : 24 :: 3 : x

$18 \times x = 24 \times 3$

[$\because$ product of means = product of extremes]

$x = \frac{\cancel{24}^{4} \times 3}{\cancel{18}_{3}} = 4$

$x = 4$

(iv) $x : 210 :: 20 : 280$

$x \times 280 = 210 \times 20$

[$\because$ product of means = product of extremes]

$x = \frac{210 \times \cancel{20}}{\cancel{280}_{14}}$

$x = 15$

(v) $x : 7 :: 11 : 77$

$x \times 77 = 7 \times 11$

[$\because$ product of means = product of extremes]

$x = \frac{7 \times 11}{77}$

$x = 1$

(vi) $8 : x :: 104 : 117$

$x \times 104 = 117 \times 8$

[$\because$ product of means = product of extremes]

$$x = \frac{\overset{9}{\cancel{117}} \times \cancel{8}}{\underset{13}{\cancel{104}}} = 9$$

$x = 9$

4. If b is mean proportion

than $b^2 = a \times c$

$\Rightarrow$ $8^2 = 4 \times c$

$\Rightarrow$ $\frac{64}{4} = c$

$\Rightarrow$ $168 = c$

5. Let the mean proportion be x

(i) $\therefore$ $16 : x = x : 25$

$\Rightarrow$ $x \times x = 16 \times 25$

[$\because$ product of means = product of extremes]

$x^2 = 400$

$x^2 = 20^2$

$\therefore$ $x = 20$

$\therefore$ Mean proportion is 20.

(ii) Let mean proportion be x

$\therefore$ $49 : x = x : 100$

$x \times x = 100 \times 49$

[$\because$ product of means = product of extremes]

$x^2 = 4900$

$x^2 = 70^2$

$\therefore$ $x = 70$

$\therefore$ Mean proportion = 70

(iii) Let mean proportion be x

$\therefore$ $36 : x = x : 225$

$\Rightarrow$ $x \times x = 225 \times 36$

[$\because$ product of means = product of extremes]

$x^2 = 15^2 \times 6^2$

$x^2 = (15 \times 6)^2$

$x^2 = (90)^2$

$x = 90$

$\therefore$ Mean proportion is 90.

6. Let fourth proportion be x

$\therefore$ $7 : 14 = 25 : x$

$\Rightarrow$ $7 \times x = 14 \times 25$

[$\because$ product of extremes = product of means]

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

$x = 50$

$\because$ fourth proportion is 50.

7. Let third proportion be x

$\therefore$ $18 : 27 = x : 3$

$\Rightarrow$ $27 \times x = 18 \times 3$

[$\because$ product of extremes = product of means]

$$x = \frac{18 \times \cancel{3}}{\underset{9}{\cancel{27}}}$$

$x = 2$

$\therefore$ third proportion is 2.

8. Let income be ₹ x

Income : savings = Income : savings

$12 : 1 = x : 15000$

$\Rightarrow$ $1 \times x = 15000 \times 12$

$x = 180000$

$\therefore$ Income = ₹ 1,80,000.

9. Let the length be x

$\therefore$ length : breadth = length : breadth

$3 : 2 = x : 28$

$\Rightarrow$ $2 \times x = 3 \times 28$

[$\because$ product of means = product of extremes]

$$x = \frac{3 \times 28}{2}$$

$x = 42$

$\therefore$ length is 42 metres.

10. Let English books be x

$\therefore$ $3 : 2 = 3801 : x$

$\Rightarrow$ $3 \times x = 3801 \times 2$

$$x = \frac{3801 \times 2}{3}$$

$x = 1267 \times 2$

$x = 2534$

$\therefore$ Number of English books = 2534.

Exercise 9.3

1. 24 apples cost = ₹ 80

1 apple cost = ₹ $\frac{80}{24}$

15 apples cost = ₹ $\frac{80}{24} \times 15$

15 apples cost = ₹ 50

2. 5 kg of Jam cost = ₹ 260

1 kg of Jam cost = ₹ $\frac{260}{5}$

2 kg of Jam cost = ₹ $\frac{260}{5} \times 2$

= ₹ 52×2

= ₹ 104

3. For 4 days work labourer paid = ₹ 114

for 1 days work labourer paid = ₹ $\frac{114}{4}$

for 30 days work labourer paid

= ₹ $\frac{114}{4} \times 30$

= ₹ $\frac{3420}{4}$

for 30 days work labourer paid = ₹ 855

4. (i) Car travel 180 km in 4 hours

Car travel1 km in = $\frac{4}{180}$ hours

Car travel 400 km in

$= \frac{4}{180} \times 400$ hours

$= \frac{80}{9}$ hours

$= 8\frac{8}{9}$ hours

(ii) In 4 hours car travels = 180 km.

In 1 hours car travels = $\frac{180}{4}$ km

In $7\frac{1}{2}$ car travels = $\frac{180}{4} \times 7\frac{1}{2}$

$= \frac{180}{4} \times 7\frac{1}{2}$ km

$= \frac{180}{4} \times \frac{15}{2}$ km

$= \frac{2700}{8}$

$= 337\frac{1}{2}$ km

In $7\frac{1}{2}$ hours car travels $337\frac{1}{2}$ km

5. (i) Weight of 15 bags of rice = 112.5 kg

Weight of 1 bag of rice = $\frac{112.5}{15}$ kg

Weight of 10 bags = $\frac{112.5}{15} \times 10$ kg

$= \frac{1125}{15}$ kg

= 75 kg

(ii) For 112.5 kg of rice number of bags = 15

For 1 kg of rice number of bags

$= \frac{15}{112.5}$

For 750 kg of rice number of bags

$= \frac{15}{112.5} \times 750$

$= \frac{11250}{112.5}$

Number of bags = 100

6. 5 bars of soaps costs = ₹ 31

1 bars of soaps costs = ₹ $\frac{31}{5}$

24 bars of soaps costs = ₹ $\frac{31}{5} \times 24$

24 bars of soaps costs = ₹ 148.80

7. Price of $2\frac{1}{2}$ metres of cloth is ₹ 200

Price of 1 metres of cloth is = ₹ $\frac{200}{2\frac{1}{2}}$

Price of 1 metres of cloth is ₹ = $\frac{200}{\frac{5}{2}}$

= ₹ $\frac{200 \times 2}{5}$

Price of 15 metres of cloth is

= ₹ $\frac{200 \times 2 \times 15}{5}$

Price of 15 metres of cloth is = ₹ 1200

8. Cost of 25 metres of cloth is ₹ 912.50

Cost of 1 metres of cloth is = ₹ $\frac{912.50}{25}$

Cost of 8 metres of cloth is = ₹ $\frac{912.50}{25} \times 8$

Cost of 25 metres of cloth is = ₹ $\frac{7300}{25}$

Cost of 25 metres of cloth is = ₹ 292