CHRIST KING HR. SEC. SCHOOL KOHIMA.

Class : VIII.

Sub : Mathematics

Syllabus : 3rd Term.

→ Ch. 8 Linear Equations in One Variable.

→ Ch 11. Direct and Inverse Variation

→ Ch 17. Bar Graphs, Histograms and Pie Chart.

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8. Linear Equations in One Variable

Exercise 8.1.

1.

(i) $x - 5 = 6$.

Soln $x = 6 + 5$.

$= 11$

* negative will be changed to positive on shifting from L.H.S to R.H.S and vice versa.

(v) $x - 23 = -143$.

Soln $x = -143 + 23$.

$= -120$.

* Here 143 is negative and 23 is positive, so we subtract & keep the sign of the greater no.

$$\begin{array}{r} \ominus 143 \\ (-)\ +\ 23 \\ \hline -120 \end{array}$$

(viii) $c - \frac{1}{2} = -4$.

Soln $c = -4 + \frac{1}{2}$

$= \frac{-4 \times 2 + \frac{1}{\cancel{2}_1} \times \cancel{2}^1}{2}$

$= \frac{-8 + 1}{2}$

$= \frac{-7}{2}$.

(xii) $k - 64 = 164$.

Soln $k = 164 + 64$.

$= 228$.

2.

(i) $8x = 6x + 10$.

Soln $8x - 6x = 10$.

$\Rightarrow 2x = 10$.

$\Rightarrow x = \frac{10}{2}^{5}$

$= 5$.

(iii) $13y = -12y + 100$.

Soln $13y + 12y = 100$.

$\Rightarrow 25y = 100$.

$\Rightarrow y = \frac{100}{25}^{4}$

$= 4$.

(v) $5x - 3 = 12$.

Sol^n: $5x = 12 + 3$.

$\Rightarrow 5x = 15$.

$\Rightarrow x = \frac{15}{5_1}^{3}$

$= 3$

(vi) $3(x + 1) = 6$.

Sol^n: $3x + 3 = 6$.

$\Rightarrow 3x = 6 - 3$.

$\Rightarrow 3x = 3$.

$\Rightarrow x = \frac{3^{1}}{3_1}$

$= 1$

(ix) $16 - 3(x - 7) = -14$.

Sol^n: $16 - 3x + 21 = -14$.

$\Rightarrow -3x = -14 - 16 - 21$.

$\Rightarrow -3x = -51$

$\Rightarrow x = \frac{+51}{+3_1}^{17}$

$= 17$.

(xvi) $\frac{x}{6} = 5$.

Sol:- By cross multiplication,

$x = 5 \times 6$

$= 30$.

(xvi) $\frac{x}{4} = \frac{1}{2}$.

Sol:- By cross multiplication,

$x \times 2 = 1 \times 4$.

$\Rightarrow 2x = 4$.

$\Rightarrow x = \frac{4}{2_1} 2$

$= 2$

(xviii) $\frac{x}{0.03} = 0.03$.

Sol:- By cross multiplication,

$x = 0.03 \times 0.03$.

$= 0.0009$

(xxii) $\frac{x}{-4} = \frac{1}{8}$.

Sol^n: By cross multiplication,

$x \times 8 = 1 \times -4$.

$\Rightarrow 8x = -4$.

$\Rightarrow x = \frac{-4^{1}}{8 \cdot 2}$

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

3.

(i)

Sol^n: Let the required no. be x.

A. P. 8.

$2x = 40$.

$\Rightarrow x = \frac{40^{20}}{2_{1}}$

$= 20$.

$\therefore$ the no. $= 20$.

(iii) Let the required no. be x.

A. P. Q.

$\frac{1}{2}x = 16$.

$\Rightarrow 1x = 16 \times 2$

$$x = \frac{32}{1}$$

$$= 32.$$

$\therefore$ the no. $= 32.$

(v)

Sol^n Let the required no. be x.

A. P. Q.

$$x \times 9 = 117$$

$$\Rightarrow x = \frac{117}{9_1}\ 13$$

$$= 13.$$

$\therefore$ the no. $= 13.$

(vii)

Sol^n Let the required amount be x.

A. P. Q.

$$30\% \text{ of } x = 300.$$

$$\Rightarrow \frac{30}{100} \times x = 300.$$

$$\Rightarrow \frac{30x}{100} = 300.$$

By cross multiplication,

$30x = 300 \times 100$.

$\Rightarrow x = \frac{30000}{30}$

$= 1000$

$\therefore$ the amount = ₹ 1000.

4.

(i)

Sol^n Let the required no. be x.

A. P. Q.

$\frac{1}{5}$ of $x = 60$.

$\Rightarrow \frac{1}{5} \times x = 60$

$\Rightarrow \frac{1x}{5} = 60$.

By cross multiplication,

$1x = 60 \times 5$.

$\Rightarrow 1x = 300$.

$\Rightarrow x = 300$.

$\therefore$ the no. = 300.

(iii)

Soln

Let the required no. be x.

A. P. Q.

10% of x = 63.

$\Rightarrow \frac{10}{100} \times x = 63.$

$\Rightarrow \frac{10x}{100} = 63$

By cross multiplication,

$10x = 63 \times 100.$

$\Rightarrow 10x = 6300.$

$\Rightarrow x = \frac{6300}{10}.$

$= 630.$

$\therefore$ the no. = 630.

5.

(iv) $\frac{y+3}{5} = 14.$

Sol^n By cross multiplication,

$y + 3 = 14 \times 5.$

$\Rightarrow y + 3 = 70$

$\Rightarrow y = 70 - 3$

$= 67.$

(v) $\frac{36}{x+2} = 12.$

Sol^n By cross multiplication,

$(x+2) \times 12 = 36.$

$\Rightarrow 12x + 24 = 36.$

$\Rightarrow 12x = 36 - 24.$

$\Rightarrow 12x = 12.$

$\Rightarrow x = \frac{12^{1}}{12_{1}}$

$= 1$

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

Sol:

$$\frac{3x - 21}{3} = \frac{2x + 6}{3}$$

By cross multiplication,

$$(3x - 21) \times 3 = 3 \times (2x + 6)$$

$$\Rightarrow 9x - 63 = 6x + 18$$

$$\Rightarrow 9x - 6x = 18 + 63$$

$$\Rightarrow 3x = 81$$

$$\Rightarrow x = \frac{81}{3_1}^{27}$$

$$= 27$$

(ix) $\frac{3}{2x} + \frac{7}{2x} = 5$

Sol:

$$\frac{3 + 7}{2x} = 5$$

$$\Rightarrow \frac{10}{2x} = 5$$

By cross multiplication,

$5 \times 2x = 10$.

$\Rightarrow 10x = 10$.

$\Rightarrow x = \frac{10}{10_1}^{1}$

$= 1$.

(xiii) $\frac{m - 17}{2} = 2m - 7$.

Sol:- By cross multiplication,

$2x(2m - 7) = m - 17$

$\Rightarrow 4m - 14 = m - 17$

$\Rightarrow 4m - m = -17 + 14$.

$\Rightarrow 3m = -3$.

$\Rightarrow m = \frac{-3^{1}}{3_1}$

$= -1$

6.

(i)

Sol:ⁿ Let the required no. be x.

A. P. Q.

$$x - 60 = 48$$

$$\Rightarrow x = 48 + 60$$

$$= 108$$

$\therefore$ the no. $= 108$.

(iii)

Sol:ⁿ Let the required no. be x.

A. P. Q.

$$x - 20 = 80$$

$$\Rightarrow x = 80 + 20$$

$$= 100$$

$\therefore$ the no. $= 100$.

v.

Sol:ⁿ Let the total no. of students be x.

A. P. 8.

$x - 4 = 32.$

$\Rightarrow x = 32 + 4.$

$= 36.$

∴ the total no. of students = 36.

7.

(i)

Sol:ⁿ Let the required no. be x.

A. P. 9.

$x + 50 = 78.$

$\Rightarrow x = 78 - 50.$

$= 28.$

∴ the no. = 28.

(iv)

Soln: Let the amount of money Hari had in the beginning be x.

A. P. Q.

$$x + 70 = 130.$$

$$\Rightarrow x = 130 - 70.$$

$$= 60.$$

∴ amount of money Hari had in the beginning = ₹ 60.

Exercise 8.2.

1

(i) $4a = 6a + 1$.

Sol^n $4a - 6a = 1$

$\Rightarrow -2a = 1$

$\Rightarrow a = \frac{1}{-2}$

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

(iii) $11m = 42 + 4m$.

Sol^n $11m - 4m = 42$.

$\Rightarrow 7m = 42$

$\Rightarrow m = \frac{42^{6}}{7_{1}}$

$= 6$.

(vi) $10m - 28 = 6 - 7m$.

Sol^n $10m + 7m = 6 + 28$.

$\Rightarrow 17m = 34$.

$\Rightarrow m = \frac{34^{2}}{17_{1}}$

$= 2$

(ix) $3 \cdot 3x + 22 = -11 - 7 \cdot 7x$.

$$\begin{array}{r} 3 \cdot 3 \\ +\ 7 \cdot 7 \\ \hline 11 \cdot 0 \end{array}$$

Soln $3 \cdot 3x + 7 \cdot 7x = -11 - 22$

$\Rightarrow 11x = -33$.

$\Rightarrow x = \frac{-33}{11_1}^{3}$

$= -3$.

(xi) $-16 = -a - 2$

Soln $-16 + 2 = -a$

$\Rightarrow -14 = -a$

$\Rightarrow 14 = a$.

(xii) $7(x - 9) = 35$.

Soln $7x - 63 = 35$.

$\Rightarrow 7x = 35 + 63$.

$\Rightarrow 7x = 98$

$\Rightarrow x = \frac{98}{7_1}^{14}$

$= 14$.

(xx) $5(x + 43) = 2(3x + 4)$.

Sol:

$5x + 215 = 6x + 6$.

$\Rightarrow 5x - 6x = 6 - 215$.

$215 - 6 = 209$

$\Rightarrow +1x = +209$

$\Rightarrow x = \frac{209}{1}$

$= 209$.

2.

(i) $(x - 6)(x + 7) = (x + 3)(x - 11)$.

Sol:

$x \times (x + 7) - 6 \times (x + 7) = x(x - 11) + 3 \times (x - 11)$.

$\Rightarrow x^2 + 7x - 6x - 42 = x^2 - 11x + 3x - 33$.

$\Rightarrow x^2 - x^2 + 7x - 6x + 11x - 3x = -33 + 42$.

$\Rightarrow 18x - 9x = 9$

$\Rightarrow 9x = 9$.

$\Rightarrow x = \frac{9}{9} \frac{1}{1}$

$= 1$

(iv) $\frac{x+2}{x+5} = \frac{x}{x+6}$.

Sol^n By cross multiplication,

$(x+2) \times (x+6) = x \times (x+5)$.

$\Rightarrow x \times (x+6) + 2 \times (x+6) = x^2 + 5x$.

$\Rightarrow x^2 + 6x + 2x + 12 = x^2 + 5x$.

$\Rightarrow x^2 - x^2 + 6x + 2x - 5x = -12$.

$\Rightarrow 8x - 5x = -12$

$\Rightarrow 3x = -12$

$\Rightarrow x = \frac{-12}{3_1}$ 4.

$= -4$

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

Sol^n $\frac{3x(x-2) - 2x(x-1)}{(x-1)(x-2)} = \frac{1}{x-3}$

$\Rightarrow \frac{3x-6-2x+2}{(x-1)(x-2)} = \frac{1}{x-3}$

$\Rightarrow \frac{x-4}{(x-1)(x-2)} = \frac{1}{x-3}$.

By cross multiplication,

$(x-4) \times (x-3) = 1 \times (x-1)(x-2)$.

$\Rightarrow x(x-3) - 4 \times (x-3) = x \times (x-2) - 1 \times (x-2)$

$\Rightarrow x^2 - 3x - 4x + 12 = x^2 - 2x - x + 2$.

$\Rightarrow x^2 - x^2 - 3x - 4x + 2x + x = 2 - 12$.

$\Rightarrow -7x + 3x = -10$.

$\Rightarrow -4x = -10$.

$\Rightarrow x = \frac{\cancel{+10}^{5}}{\cancel{+4}_{2}}$

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

Exercise : 8.3.

1.

Sol^n Let the smaller no. be x.

and the bigger no be $2x$.

A.P.Q.

$$x + 2x = 96.$$

$$\Rightarrow 3x = 96.$$

$$\Rightarrow x = \frac{96}{3_1}^{32}$$

$$= 32.$$

∴ The numbers are : $x = 32$

and $2x = 2 \times 32$

$= 64.$

2

Sol^n Let the smaller no. be x

and the bigger no. be $x + 18$.

then,

A.P.Q.

$$x + x + 18 = 86.$$

$$\Rightarrow 2x + 18 = 86.$$

$\Rightarrow 2x = 86 - 18$

$\Rightarrow 2x = 68$

$\Rightarrow x = \frac{68}{2}^{34}_{1}$

$= 34.$

$\therefore$ The numbers are : $x = 34.$

and $x + 18$

$= 34 + 18.$

$= 52.$

4.

Sol:- Let the required no. be x.

A. P. Q.

$x \times 4 - 7 = 65.$

$\Rightarrow 4x - 7 = 65.$

$\Rightarrow 4x = 65 + 7$

$\Rightarrow 4x = 72$

$\Rightarrow x = \frac{72}{4}^{18}_{1}$

$= 18.$

$\therefore$ the no. $= 18$ //.

5.

Sol^n Let the smaller no. be x

and the bigger no. be $2x$.

When larger no. subtracted from

$50 = 50 - 2x$

When the smaller no. subtracted

from $40 = 40 - x$

Then, A.P. 8.

$$50 - 2x = 40 - x + 2.$$

$$\Rightarrow -2x + x = 40 + 2 - 50.$$

$$\Rightarrow -1x = 42 - 50.$$

$$\Rightarrow +1x = +8.$$

$$\Rightarrow x = \frac{8}{1}$$

$$= 8.$$

$\therefore$ the numbers are : $x = 8$.

and $2x = 2 \times 8$

$= 16$.

7.

Sol^{n} Let Binu's age be x.

then, Banu's age $= x + 20$.

After 5 years,

Binus age $= x + 5$.

Banus age $= x + 20 + 5$.

$= x + 25$.

A.P.Q.

$(x + 25) = 2(x + 5)$.

$\Rightarrow x + 25 = 2x + 10$.

$\Rightarrow x - 2x = 10 - 25$.

$\Rightarrow -x = -15$.

$\Rightarrow x = 15$.

$\therefore$ Binus age $= x$

$= 15$ yrs.

and Banus age $= x + 20$.

$= 15 + 20$.

$= 35$ yrs.

8.

Soln Let us suppose Manjit will be thrice as old as Mala.

then, Manjits' age = $(12 + x)$ yrs.

and Mala's age = $(2 + x)$ yrs.

At that time,

$$12 + x = 3(2 + x)$$

$$\Rightarrow 12 + x = 6 + 3x$$

$$\Rightarrow x - 3x = 6 - 12$$

$$\Rightarrow -2x = -6$$

$$\Rightarrow x = \frac{+6^{3}}{+2_{1}}$$

$$= 3.$$

∴ after 3 years Manjit will be

$12 + 3 = 15$ yrs

and Mala will be $2 + 3 = 5$ yrs.

12 (i)

Sol:- Let the three consecutive numbers be x, $(x+1)$ and $(x+2)$.

A.P.S.

$$x + x + 1 + x + 2 = 48$$

$$\Rightarrow 3x + 3 = 48$$

$$\Rightarrow 3x = 48 - 3$$

$$\Rightarrow 3x = 45$$

$$\Rightarrow x = \frac{45}{3}^{15}_{1}$$

$$= 15$$

$\therefore$ the three numbers are : $x = 15$.

$$x + 1 = 15 + 1$$
$$= 16.$$

and $$x + 2 = 15 + 2$$
$$= 17.$$

13 (i)

Sol^n Let the weight of sweets worth ₹ 110 per kg to be mixed be x.

ie., x kg sweets = ₹ $110x$.

Also,

30 kg of sweets worth ₹ 80/kg

$= ₹\ 80 \times 30$

$= ₹\ 2400$.

then,

A.P.Q.

$$110x + 2400 = 100(x + 30).$$

$$\Rightarrow 110x + 2400 = 100x + 3000.$$

$$\Rightarrow 110x - 100x = 3000 - 2400.$$

$$\Rightarrow 10x = 600.$$

$$\Rightarrow x = \frac{600^{60}}{10_{1}}$$

$$= 60$$

$\therefore$ required weight of sweets

$= 60$ kg.

Exercise 8.4.

1.

Sol^n Let the required quantity of alcohol to be added be x.

then,

volume of solution $= 60 + x$.

$\because$ 50% of this is alcohol,

i.e., $(60 + x)\frac{50}{100}$.

then, A.P.Q.

$$(60 + x)\frac{50}{100} = 20 \text{ litres}.$$

$$\Rightarrow \frac{3000 + 50x}{100} = 20.$$

$$\Rightarrow 3000 + 50x = 20 \times 100.$$

$$\Rightarrow 50x = 2000 - 3000.$$

$$\Rightarrow 50x = -1000.$$

$$\Rightarrow x = \frac{1000}{50}.$$

3.

Sol^n Let the width of the rectangle be x.

then, Length $= x + 4$

Given,

Perimeter of the rectangle $= 40$ m.

$\Rightarrow 2 \times (l + b) = 40$ m.

$\Rightarrow 2 \times \{(x+4) + x\} = 40$ m.

$\Rightarrow 2 \times (2x + 4) = 40$ m.

$\Rightarrow 4x + 8 = 40$ m.

$\Rightarrow 4x = (40 - 8)$ m

$\Rightarrow 4x = 32$ m.

$\Rightarrow x = \frac{32}{4}$ m

$= 8$ m.

$\therefore$ width $= x$

$= 8$ m

and height $= (x + 4)$ m

$= 8m + 4$

$= 12$ m.

4.

Sol^{n} We can say,

$$4x - 7 = 3x + 5.$$

$$\Rightarrow 4x - 3x = 5 + 7$$

$$\Rightarrow x = 12.$$

$\therefore$ length of the square $= 4x - 7$

$= 4 \times 12 - 7$

$= 48 - 7$

$= 41$

5.

Sol^{n} Let the original side of the square be x.

One side increased by 2 $= x + 2$.

One side reduced by 2 $= x - 2$.

Let length of rectangle formed be $(x+2)$m and breadth of rectangle formed be $(x-2)$ m.

Given,

Perimeter of the rectangle = 48 m

$\Rightarrow 2 \times (l + b) = 48 \text{ m}$

$\Rightarrow 2 \times \{(x+2) + (x-2)\} = 48 \text{ m}.$

$\Rightarrow 2 \times (x + 2 + x - 2) = 48 \text{ m}.$

$\Rightarrow 2 \times 2x = 48 \text{ m}.$

$\Rightarrow 4x = 48 \text{ m}.$

$\Rightarrow x = \frac{48}{4_1}^{12} \text{ m}$

$= 12 \text{ m}.$

$\therefore$ Side of the original square $= x$

$= 12 \text{ m}.$

7.

Sol^n Let the width of the rectangle be x m

then, length " " " $= (x + 3)$ m

Area of the rectangle $= l \times b$

$= (x + 3) \times x$

$= x^2 + 3x.$

Now,

length of the altered angle = $x + 3 - 6$
$= x - 3$

width of the altered angle = $x + 4$.

Area of the altered rectangle = $l \times b$.

$= (x - 3) \times (x + 4)$.

$= x \times (x + 4) - 3x(x + 4)$

$= x^2 + 4x - 3x - 12$

$= x^2 + x - 12$.

we can say,

$x^2 + 3x = x^2 + x - 12 + 22$

$\Rightarrow x^2 - x^2 + 3x - x = -12 + 22$

$\Rightarrow 2x = 10$

$\Rightarrow x = \frac{10}{2}^{5}$

$= 5$

$\therefore$ width of the rectangle = x
$= 5m$.

and length of the rectangle $= (x + 3)m$
$= (5 + 3)m$
$= 8m$.

11. Direct and Inverse Variation

Exercise 11.1

1

(i) 6, 9.

Soln:

$$\frac{6}{9} \quad \begin{matrix} 2 \\ 3 \end{matrix}$$

$= 2 : 3$

(iv) 88, 28.

Soln:

$$\frac{88}{28} \quad \begin{matrix} 22 \\ 7 \end{matrix}$$

$= 22 : 7$

(vi) 108, 64.

Soln:

$$\frac{108}{64} \quad \begin{matrix} 54 \\ 32 \\ 16 \end{matrix} \quad \begin{matrix} 27 \\ \\ \\ \end{matrix}$$

$= 27 : 16.$

2 (i) 5 m to 7 m.

Sol:ⁿ 5 m : 7 m.

(iii) 4 h to 80 min

Sol:ⁿ 4 h = 4 × 60 min

= 240 min

$\therefore \frac{240 \text{ min}}{80 \text{ min}}$

$= 3 \text{ min} : 1 \text{ min}.$

(iv) 1 m to 20 cm

Sol:ⁿ $\frac{1 \text{ m}}{20 \text{ cm}}$

$= \frac{1 \times 100 \text{ cm}}{20 \text{ cm}}$

$= \frac{100 \text{ cm}}{20 \text{ cm}}$

$= 5 \text{ cm} : 1 \text{ cm}.$

3.

Sol:

∵ collection of Indian stamps to foreign stamps is in the ratio 4 : 7

let Indian stamps be $4x$ and foreign stamps be $7x$.

then, A. P. Q.

$$4x = 68$$

$$\Rightarrow x = \frac{68}{4} \quad (17)$$

$$= 17$$

∴ No. of foreign stamps $= 7x$

$$= 7 \times 17$$

$$= 119$$

5.

Sol:

Sonu's monthly income = ₹ 14400.

Raj's monthly income = ₹ 12,800.

∴ the required ratio $= \frac{14400}{12800}$

$$\begin{array}{r} 7200 \quad 3600 \quad 1800 \\ 14400 \\ \hline 12800 \\ 6400 \\ 3200 \\ 1600 \end{array}$$

225 45 9

450

900

= 1800

1600

800

400

200

40

8

= 9 : 8

6.

(i)

Sol:

126 3

20

10 5

= 3 : 5

(vi)

Sol:

2 1

20 10

= 1 : 10

(ix)

Sol:

35 5

49 7 = 5 : 7

7.

(i)

Sol^n ∵ they are in proportion,

$3 \times x = 6 \times 8$

$x = \frac{6 \times 8}{3_1}^{2}$

$= 16.$

(iii)

Sol^n ∵ they are in proportion

$x \times 2 = 4 \times 5$

$x = \frac{4 \times 5}{2_1}^{2}$

$= 10.$

(vi)

Sol^n ∵ they are in proportion

$6 \times (x+1) = 2 \times 9.$

$\Rightarrow 6x + 6 = 18$

$\Rightarrow 6x = 18 - 6.$

$\Rightarrow 6x = 12.$

$\Rightarrow x = \frac{12^{2}}{6_{1}}$

$= 2.$

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* DIRECT VARIATION ?

- When an increase or decrease in one variable (or quantity) results in in a proportional increase or decrease in the second variable (or quantity), we say that the two variables have direct variation or are in direct proportion.

Eg:

No of books (x)	Cost (y)
2	100
↑ 5	↑ ?

* Here, no. of books is increased from 2 to 5 which will result in an increase in the cost.

Exercise 11.2.

1

(i) Directly proportional

(ii) Directly proportional

(iii) Directly proportional

(iv) Directly proportional

(v) Directly proportional

(vi) Directly proportional

(vii) Directly proportional

(viii) Directly proportional.

(ix)

(x)

(xi)

(xii)

(xiii)

(xiv)

Home-work.

2. Yes, they represent the same value

$\therefore$ 5 to 7 = 5 : 7 = $\frac{5}{7}$

3.

(i)

Sol^n : $\because$ x and y vary directly, we can say

$$\frac{10}{6} = \frac{35}{y}$$

$$\Rightarrow 10 \times y = 35 \times 6$$

$$\Rightarrow y = \frac{35 \times 6}{10}$$

$$= 21$$

(ii)

Sol^n : $\because$ x and y vary directly, we can say

$$\frac{9}{15} = \frac{x}{45}$$

$$\Rightarrow x \times 15 = 9 \times 45$$

$$\Rightarrow x = \frac{9 \times 45}{15}$$

$$= 27.$$

4

(i)

Soln: $\because$ x varies directly as $2y$.

then, when $y = 18$, $x = 2 \times 18$

$= 36$.

ie., $\frac{x}{2y} = \frac{4}{2 \times 18} = \frac{4}{36}$.

Now, we need to find x when $y = 36$.

Here, x varies as $2y$ and $y = 36$.

ie., $2y = 2 \times 36$

$= 72$.

$\therefore$ the ratio is $\frac{4}{36} = \frac{x}{72}$

$\Rightarrow x \times 36 = 4 \times 72$

$\Rightarrow x = \frac{4 \times 72}{36}$

$= 8$.

Exercise 11.3.

1.

Soln: Let Alice's weight be $8x$
and Joan's weight be $9x$.

A.P.8.

$$8x = 40 \text{ kg}$$

$$\Rightarrow x = \frac{\overset{5}{\cancel{40}} \text{ kg}}{\underset{1}{\cancel{8}}}$$

$$= 5 \text{ kg}$$

$\therefore$ Joan's weight $= 9x$

$= 9 \times 5 \text{ kg}$

$= 45 \text{ kg}$.

3.

Soln: Let the speed of first train be $4x$
and the speed of second train be $5x$.

A.P.8.

$$4x = 48 \text{ km/h}$$

$$x = \frac{\overset{12}{\cancel{48}} \text{ km/h}}{\underset{1}{\cancel{4}}}$$

$= 12 \text{ km/h}$

$\therefore$ Speed of second train $= 5x$

$= 5 \times 12 \text{ km/h}$

$= 60 \text{ km/h}.$

4.

Soln

Time (x)	Distance (y)
$2\frac{1}{2}$ hrs	120 km.
$= \frac{5}{2}$ hrs.	
↓	↓
1 hr	?

It is a case of direct proportion

$$\therefore \frac{\frac{5}{2}}{120} = \frac{1}{y}$$

$$\Rightarrow \frac{5}{2} \times \frac{1}{120_{24}} = \frac{1}{y}$$

$$\Rightarrow \frac{1}{48} = \frac{1}{y}$$

$$\Rightarrow y = 48 \times 1$$

$$= 48$$

$\therefore$ Distance travelled in 1 hr $= 48$ km.

6.

Soln

Time (x)	Distance (y)
1 hr	3.5 km
↑ 3 hrs	↑ ?

It is a case of direct variation because when time is increased, distance will increase

$$\therefore \frac{1}{3.5} = \frac{3}{y}$$

$$\Rightarrow 1 \times y = 3 \times 3.5$$

$$\Rightarrow y = 10.5$$

① 3.5 × 3 = 10.5

∴ in 3 hrs, she can jog a distance of 10.5 km.

8.

Soln

Days of work (x)	Days of holidays (y)
5	2
↑ 20	↑ ?

It is a case of direct variation because when no of working days is increased, the no of holidays will increase.

$$\therefore \frac{5}{2} = \frac{20}{y}$$

$$\Rightarrow 5 \times y = 20 \times 2.$$

$$\Rightarrow y = \frac{\cancel{20}^{4} \times 2}{\cancel{5}_{1}}$$

$$= 8.$$

$\therefore$ He will get 8 days of holiday when worked for 20 days.

Exercise 11.4.

1(i)

Soln: Here, if all the values of $\frac{x}{y} = k$ then it is a case of direct variation.

$$\frac{x_1}{y_1} = \frac{3^1}{9_3} = \frac{1}{3}$$

$$\frac{x_2}{y^2} = \frac{4^1}{12_3} = \frac{1}{3}$$

$$\frac{x_3}{y_3} = \frac{8^1}{24_3} = \frac{1}{3}$$

$$\frac{x_4}{y_4} = \frac{1}{3}$$

$$\frac{x_5}{y_5} = \frac{6^1}{18_3} = \frac{1}{3}$$

$$\frac{x_6}{y_6} = \frac{7^1}{21_3} = \frac{1}{3}.$$

$\therefore$ all values of $\frac{x}{y} = \frac{1}{3}$, it is a case of direct variation.

The proportion = $3 : 4 :: 9 : 12$

(iii)

Sol^n / If all the values of $x \times y = k$, then it is a case of inverse variation.

$x_1 \times y_1 = 10 \times 12 = 120.$

$x_2 \times y_2 = 5 \times 24 = 120$

$x_3 \times y_3 = 8 \times 15 = 120.$

$x_4 \times y_4 = 4 \times 30 = 120.$

$x_5 \times y_5 = 20 \times 6 = 120.$

$x_6 \times y_6 = 40 \times 3 = 120.$

$x_7 \times y_7 = 1 \times 120 = 120.$

It is a case of inverse variation.

The proportion = $10 : 5 :: 12 : 24.$

2

(i)

Soln

$\therefore$ x varies inversely as y. We can say,

$$10 \times 8 = 4 \times y.$$

$$\Rightarrow \frac{10 \times 8^{2}}{4_{1}} = y$$

$$\Rightarrow 20 = y.$$

(iv)

Soln

$\therefore$ x varies inversely as the square of y. We can say,

$$2 \times (1)^{2} = x \times (2)^{2}$$

$$\Rightarrow 2 \times 1 = x \times 4$$

$$\Rightarrow \frac{2^{1} \times 1}{4_{2}} = x$$

$$\Rightarrow \frac{1}{2} = x.$$

v)

Sol:- $\because$ x varies inversely as y. We can say,

$$\frac{1}{2} \times 16^{8} = 4 \times y.$$

$$\Rightarrow 1 \times 8 = 4 \times y$$

$$\Rightarrow \frac{1 \times 8^{2}}{4_{1}} = y$$

$$\Rightarrow 2 = y.$$

Exercise 11.5

1.

Soln

No. of men (x)	No. of days (y)
45	90
↓ 30	↑ ?

It is a case of inverse variation

$$45 \times 90 = 30 \times y$$

$$\Rightarrow \frac{45 \times 90}{30} = y$$

$$\Rightarrow 135 = y$$

∴ 30 men will take 135 days to complete the same work.

4.

Sol:n

No. of tractors (x)	No. of days (y)
5	8
↓ 4	↑ ?

∵ it is a case of inverse variation.

$$5 \times 8 = 4 \times y$$

$$\Rightarrow \frac{5 \times 8^{2}}{\cancel{4}_{1}} = y$$

$$\Rightarrow 10 = y.$$

∴ 4 tractors will take 10 days to mow the field.

6.

Soln

No. of people (x)	No. of days (y)
8	30.
? ↑	↓ 20.

It is a case of inverse variation

$$8 \times 30 = x \times 20.$$

$$\Rightarrow \frac{\overset{4}{\cancel{8}} \times \overset{3}{\cancel{30}}}{\cancel{20}_{\cancel{2}_{1}}} = x$$

$$\Rightarrow 12 = x.$$

$\therefore$ No. of guests who joined

$= 12 - 8$

$= 4.$

8.

Sol:n

Time taken (x)	Speed (y)
10	56
↓ 8	↑ ?

It is a case of inverse variation

$$10 \times 56 = 8 \times y$$

$$\Rightarrow \frac{10 \times 56^{7}}{8_{1}} = y$$

$$\Rightarrow 70 = y$$

∴ Average speed of the new train should be 70 km/h

9.

Soln

Hours. (x)	No of days. (y).
5.	21.
7	?

$$5 \times 21 = 7 \times y$$

$$\Rightarrow \frac{5 \times \overset{3}{\cancel{21}}}{\cancel{7}_1} = y$$

$$\Rightarrow 15 = y.$$

$\therefore$ No. of days taken to embroider

6 sarees $= 15 \times 2$

$= 30$ days.

Exercise 11.6.

2.

Sol^n Time taken by Jaya and Seema to complete a work = 10 hrs.

then, Jaya and Seema's 1 hour work = $\frac{1}{10}$.

Time taken by Seema to complete the work alone = 15 hrs.

then, Seema's 1 hour work = $\frac{1}{15}$.

5	10, 15
	2, 3.

LCM = $5 \times 2 \times 3 = 30$.

$\therefore$ Jaya's one hour work = $\frac{1}{10} - \frac{1}{15}$.

$$= \frac{\frac{1}{10_1} \times 30^{3} - \frac{1}{15_1} \times 30^{2}}{30}$$

$$= \frac{3 - 2}{30}$$

$$= \frac{1}{30}.$$

$\therefore$ Time taken by Jaya to complete the work alone = 30 hrs.

3.

Sol^n

No. of pumps (x)	Time taken (y)
3	15
↑ 5	↓ ?

it is a case of inverse variation

$$3 \times 15 = 5 \times y$$

$$\Rightarrow \frac{3 \times 15^{3}}{5_{1}} = y$$

$$\Rightarrow 9 = y$$

∴ 5 pumps will take 9 hours.

7.

Sol:n Time taken by A to finish the work = 8 days.

then, A's 1 day work = $\frac{1}{8}$.

Time taken by A and B together to finish the work = 6 days.

then, A + B's 1 day work = $\frac{1}{6}$.

$\therefore$ B's 1 day work = $\frac{1}{6} - \frac{1}{8}$.

$= \frac{\frac{1}{\cancel{6}_1} \times \cancel{24}^{4} - \frac{1}{\cancel{8}_1} \times \cancel{24}^{3}}{24}$

$= \frac{4 - 3}{24}$

$= \frac{1}{24}$

$\therefore$ B can finish the work alone in 24 days.

2	6, 8
	3, 4.

LCM = 2 × 3 × 4 = 24.

Exercise 11.7

1.

Sol^n Time taken by car = Covered time − Previous time.

= 10.30 pm − 2 pm

= 8 hour 30 minutes.

$= 8 \text{ hr } \frac{30}{60}$

$= 8.5$ hr.

Distance = 425 km.

$\therefore$ Speed $= \frac{\text{Distance}}{\text{Time}}$

$= \frac{425 \text{ km}}{8.5 \text{ hr.}}$

$= \frac{425 \times 10 \text{ km}}{8.5 \times 10 \text{ hr.}}$

$= \frac{4250}{85} \text{ km/hr.}$

$= 50 \text{ km/hr.}$

$17 \overline{)850}\ (50$

-85

$\overline{xx}$

2.

Sol^n

∵ Speed is asked in km/hr. Time & distance has to be converted into km and hr.

Here,

Time = 8 mins

∵ 1 hr = 60 mins

$$8 \text{ mins} = \frac{\cancel{8}^{\cancel{4}^{2}}}{\cancel{60}_{\cancel{30}_{15}}} \text{ hr}$$

$$= \frac{2}{15} \text{ hr.}$$

Distance = 800 m.

∵ 1 km = 1000 m.

$$800 \text{ m} = \frac{\overset{4}{\cancel{800}}}{\underset{5}{\cancel{1000}}} \text{ km}$$

$$= \frac{4}{5} \text{ km.}$$

$$\therefore \text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$= \frac{\frac{4}{5} \text{ km.}}{\frac{2}{5} \text{ hr}}$$

$$= \frac{\cancel{4}^{2}}{\cancel{5}_{1}} \times \frac{\cancel{15}^{3}}{\cancel{4}_{1}} \text{ km/hr.}$$

$$= 6 \text{ km/hr.}$$

4.

Sol^{n} Here,

Distance = 420 km

Speed = 60 km/h.

∴ Time taken to complete the journey = $\frac{\text{Distance}}{\text{Speed.}}$

$$= \frac{\cancel{420}^{7} \text{ km}}{\cancel{60}_{1} \text{ km/hr.}}$$

= 7 hours.

6.

Sol:

First distance travelled = 540 km.

Time Taken = 9 hours.

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

$$= \frac{\overset{60}{\cancel{540}}\ \text{km}}{\underset{1}{\cancel{9}}\ \text{hrs}}$$

$$= 60\ \text{km/hr}.$$

$\therefore$ Time taken to travel a distance of 330 km $= \dfrac{\text{Distance}}{\text{Speed}}$.

$$= \frac{\overset{11}{\cancel{330}}\ \text{km}}{\underset{2}{\cancel{60}}\ \text{km/hr}}$$

$$= 5\frac{1}{2}\ \text{hrs}.$$

$$2\overline{)11}\ 5,\ 10,\ 1$$