Chapter 10: Direct and Inverse variations

Exercise 10.1

1.Explain the concept of direct variation.

Soln:

When two variables are connected to each other in such a way that if we increase the value of one variable, the value of other variable also increases and vice — versa. Similarly, if we decrease the value of one variable, the value of other variable also decreases and vice — versa. Therefore, if the ratio between two variables remains constant, it is said to be in direct variation.

2.Which of the following quantities vary directly with each other?

(i) Number of articles (x) and their price (y)

(ii) Weight of articles (x) and their cost (y)

(iii) Distance x and time y, speed remaining the same.

(iv) Wages (y) and number of hours (x) of work.

(v) Speed (x) and time (y) (distance covered remaining the same).

(vi) Area of a land (x) and its cost (y).

Soln:

(i) The number of articles is directly related to the price. Therefore, they will vary directly with each other.

(ii) The number of articles is directly related to the weight of the articles. Therefore, they will vary directly with each other.

(iii) Speed is constant. Therefore, distance and time does not vary directly.

(iv) The number of hours is directly related to the wages. Therefore, it is a direct variation.

(v) Distance is constant. Therefore, speed and time does not vary directly.

(vi) If the area of a land is large, its cost will also be high. Thus, it is a direct variation.

Thus, the respective values in (i), (ii), (iv) and (vi) vary directly with each other.

3.In which of the following tables x and y vary directly?

(i)

a	7	9	13	21	25
b	21	27	39	63	75

(ii)

a	10	20	30	40	46
b	5	10	15	20	23

(iii)

A	2	3	4	5	6
B	6	9	12	17	20

(iv)

a	1^2	2^2	3^2	4^2	5^2
b	1^3	2^3	3^3	4^3	5^3

Soln:

If x and y vary directly, the ratio of the corresponding values of x and y remains constant

(i) $\frac{x}{y} = \frac{7}{21} = \frac{1}{3}, \frac{x}{y} = \frac{9}{27} = \frac{1}{3}, \frac{x}{y} = \frac{13}{39} = \frac{1}{3}, \frac{x}{y} = \frac{25}{75} = \frac{1}{3}.$

In all the cases, the ratio is the same. Therefore, x and y vary directly.

(ii) $\frac{x}{y} = \frac{10}{5} = 2, \frac{x}{y} = \frac{20}{10} = 2, \frac{x}{y} = \frac{30}{15} = 2, \frac{x}{y} = \frac{40}{20} = 2, \frac{x}{y} = \frac{46}{23} = 2$

In all the cases, the ratio is the same. Therefore, x and y vary directly.

(iii) $\frac{x}{y} = \frac{2}{6} = \frac{1}{3}, \frac{x}{y} = \frac{3}{9} = \frac{1}{3}, \frac{x}{y} = \frac{4}{12} = \frac{1}{3}, \frac{x}{y} = \frac{5}{17} = \frac{5}{17}, \frac{x}{y} = \frac{6}{20} = \frac{3}{10},$

In all the cases, the ratio is not the same. Therefore, x and y do not vary directly. (iv) $\frac{x}{y} = \frac{1^2}{1^3} = 1, \frac{x}{y} = \frac{2^2}{2^3} = \frac{1}{2}, \frac{x}{y} = \frac{3^2}{3^3} = \frac{1}{3}, \frac{x}{y} = \frac{4^2}{4^3} = \frac{1}{4},$ $\frac{x}{y} = \frac{5^2}{5^3} = \frac{1}{5}$

In all the cases, the ratio is not the same. Therefore, x and y do not vary directly. Thus, in (i) and (ii) x and y vary directly.

4.Fill in the blanks in each of the following so as to make the statement true:

(i) Two quantities are said to vary… with each other if they increase (decrease) together in such a way that the ratio of the corresponding values remains same.

(ii) x and y are said to vary directly with each other if for some positive number k, …. = k

(iii) If u = 3v, then u and v vary … with each other.

Soln:

(i) Directly

(ii) x and y are said to vary directly with each other if $\frac{x}{y}$ = k, where k is a positive number

(iii) Because u = 3v, u and y vary directly with each other

5.Complete the following tables given that x varies directly as y.

(i)

x	**2.5**	**—**	**—**	**15**
y	**5**	**8**	**12**	**—**

(ii)

x	**5**	**—**	**10**	**35**	**25**	**—**
y	**8**	**12**	**—**	**—**	**—**	**32**

(iii)

x	**6**	**8**	**10**	**—**	**20**
y	**15**	**20**	**—**	**40**	**—**

(iv)

x	**4**	**9**	**—**	**—**	**3**	**—**
y	**16**	**—**	**48**	**36**	**—**	**4**

(v)

x	**3**	**5**	**7**	**9**
y	**—**	**20**	**28**	**—**

Soln:

Here, x and y vary directly. ∴ x = ky

(i) x = 2.5 and y = 5 i.e. 2.5 = 5k

=> 2.5/ 5 = 0.5.

For y = 8 and k = 0.5, we have: x = ky

=> x= 8 X 0.5 = 4

For y = 12 and k = 0.5, we have: x = ky

=> x = 12 X 0.5 = 6

For x = 15 and k =0.5, we have: x = ky

=> 15 = 0.5 X y

=> y = $\frac{15}{0.5} = 30$

(ii) x = 5 and y = 8 i.e. 5 = 8 X k

=> k = $\frac{5}{8}$ = 0.625

For y = 12 and k = 0.625, we have; x = ky

=> x = 12 X 0.625 = 7.5

For x = 10 and k = 0.625, we have: x = ky

=> 10 = 0.625 X y

=> y = $\frac{10}{0.625} = 16$

For x = 35 and k = 0.625, we have: x = ky

=> 35 = 0.625 X y

=> y = $\frac{35}{0.625} = 56$

For x = 25 and k = 0.625, we know: x = ky

=> 25 = 0.625 X y

=> y = $\frac{25}{0.625} = 40$

For y = 32 and k = 0.625, we know: x = ky

=> x = 0.625 X 32 = 20

(iii) x = 6 and y = 15 i.e. 6 = 15k

=> k = $\frac{6}{15} = 0.4$

For x = 10 and k = 0.4, we have:

y = $\frac{10}{0.4} = 25$

For y = 40 and k = 0.4, we have:

x = 0.4 X 40 = 16

For x = 20 and k = 0.4, we have: y = $\frac{20}{0.4} = 50$

(iv) x = 4 and y = 16 i.e. 4 = 16k

=> k = $\frac{4}{16} = \frac{1}{4}$

For x = 9 and k = $\frac{1}{4}$, we have: 9 = ky

=> y = 4 X 9 = 36

For y = 48 and k = $\frac{1}{4}$, we have: x = ky

=> $\frac{1}{4} \times 48 = 12$

For y = 36 and k = $\frac{1}{4}$, we have: x = ky

=> $\frac{1}{4} \times 36 = 9$

For x = 3 and k = $\frac{1}{4}$, we have: x = ky

=> 3 = $\frac{1}{4} \times y$

=> y = 12

For y = 4 and k = $\frac{1}{4}$, we have: x = ky

= $\frac{1}{4} \times 4 = 1$

(v) x = 5 and y = 20 i.e. 5 = 20k

=> k = $\frac{5}{20} = \frac{1}{4}$

For x = 3 and k = $\frac{1}{4}$, we have:

3 = $\frac{1}{4} \times y$

=> y = 12

For x = 9, k = $\frac{1}{4}$, we have: x = ky

=> 9 = $\frac{1}{4} \times y$

=> y = 36

6.Find the constant of variation from the table given below:

x	**3**	**5**	**7**	**9**
y	**12**	**20**	**28**	**36**

Set up a table and solve the following problems. Use unitary method to verify the answer.

Soln:

Since it is a direct variation, $\frac{x}{y}$ = k.

For x = 3 and y = 12, we have: k = $\frac{3}{12} = \frac{1}{4}$

Thus, in all cases, k = $\frac{1}{4}$

7. Rohit bought 12 registers for Rs 156; find the cost of 7 such registers.

Soln:

Let the cost of y registers be Rs x.

Register	12	7
Cost (in Rs)	156	x

If he buys less number of registers, the cost will also be less. Therefore, it is a direct variation. We get: 12:7 = 156:x => $\frac{12}{7} = \frac{156}{x}$

Applying cross multiplication, we get: x = $\frac{156\times7}{12} = 91$

Thus, the cost of 7 such registers will be Rs 91.

8.Anupama takes 125 minutes in walking a distance of 100 meters. What distance would she cover in 315 minutes?

Soln:

Let the distance travelled is more, the time needed to cover it will be more. Therefore, it is direct variation. We get: 125: 135 = 100:x

=> $\frac{125}{315} = \frac{100}{x}$

Applying cross multiplication, we get:

x = $\frac{100\times315}{125} = 252$

Thus, Anupama would cover 252 meter in 315 minutes.

9.If the cost of 93 m of a certain kind of plastic sheet is Rs 1395, then what would it cost to buy 105 m of such plastic sheet?

Soln:

Length of plastic sheet (in meter)	**93**	**105**
Cost (in Rs)	**1395**	**x**

Let the cost of the plastic sheet per meter be Rs x

If more sheets are brought, the cost will also be more. Therefore, it is a direct variation. We get: 93: 105 = 1395: x

=> $\frac{93}{105} = \frac{1395}{x}$

Applying cross multiplication, we get: x = $\frac{105\times1395}{93} = 1575.$

Thus, the required cost will be Rs 1,575.

10.Suneeta types 1080 words in one hour. What is her GWAM (gross words a minute rate)?

Soln:

Number of words	**1080**	**x**
Time (in minute)	**60**	**1**

Let x be her GWAM.

If the time taken is less, GWAM will also be less. Therefore, it is a direct = 60: 1

=> $\frac{1080}{x} = \frac{60}{1}$

Applying cross multiplication, we get: x = $\frac{1080\times1}{60} = GWAM$ will be 18.

11.A car is travelling at the average speed of 50 km/hr. How much distance would it travel in 12 minutes?

Soln:

Distance (in km)	**50**	**x**
Time (in minute)	**60**	**12**

Let the distance be x km.

If the time taken is less, the distance covered will also be less. Therefore, it is a direct variation. 50: x = 60: 12 => $\frac{50}{x} = \frac{60}{12}$.

Applying cross multiplication, we get: x = $\frac{50\times12}{60} = 10.$

Thus, the required distance will be 10 km.

12. 68 boxes of a certain commodity require a shelf- length of 13.6 m. How many boxes of the same commodity would occupy a shelf- length of 20.4 m?

Soln:

Number of boxes	**68**	**x**
Shelf- length (in m)	**13.6**	**20.4**

Let x be the number of boxes that occupy a shelf- length of 20.4 m

If the length of the shelf increases, the number of boxes will also increase. Therefore, it a case of direct variation

$\frac{68}{x} = \frac{13.6}{20.4}$.

$68 \times 20.4 = x \times 13.6$

$x = \frac{68 \times 20.4}{13.6} = \frac{1387.2}{13.6} = 102$

Thus, 102 boxes will occupy a shelf- length of 20.4 m.

13.In a library 136 copies of a certain book required a shelf- length of 3.4 meter. How many copies of the same book would occupy a shelf-length og 5.1 meters?

Soln:

Number of copies	136	x
Shelf- length (in m)	3.4	5.1

Let x be the number of copies that would occupy a shelf- length of 5.1 m

Since the number of copies and the length of the shelf are in direct variation, we have: $\frac{136}{x} = \frac{3.4}{5.1}$ => $136 \times 5.1 = x \times 3.4$

=> $x = \frac{136 \times 5.1}{3.4} = 204$

Thus, 204 copies will occupy a shelf of length 5.1 m

14.The second class railway fare for 240 km of journey is Rs 15.00. What would be the fare for a journey of 139.2 km?

Soln:

Let Rs x be the fare for a journey of 139.2 km

Distance (in km)	**240**	**139.2**
Fare (in Rs)	**15**	**x**

Since the distance travelled and the fares are in direct variation, we have: $\frac{240}{139.2} = \frac{15}{x}$

=> $240 \times x = 15 \times 139.2$

=> $x = \frac{15 \times 139.2}{240} = \frac{2008}{240} = 8.7$

Thus, the fare for a journey of 139.2 km will be Rs 8.70

15.If the thickness of a pile of 12 cardboard is 35 mm, find the thickness of a pile of 294 cardboard.

Soln:

Let x cm be the thickness of a pile of 294 cardboard

Thickness (in cm)	**3.5**	**x**
Cardboard	**12**	**294**

Since the pile of the cardboard and its thickness are in direct variation, we have: $x = \frac{3.5}{x} = \frac{12}{294}$ => $3.5 \times 294 = x \times 12$

=> $x = \frac{3.5 \times 294}{12} = \frac{1029}{12} = 85.75cm$

Thus, the thickness of a pile of 294 cardboard will be 85.75 cm (or 857.5 mm).

16. The cost of 97 meter of cloth is Rs 242.50. What length of this can be purchased for Rs. 302.50?

Soln:

Let x meter be the length of the cloth that can be purchased for Rs. 320.50

Length (in m)	**97**	**x**
Cost (in Rs)	**242.50**	**302.50**

Since the length of the cloth and its cost are in direct variation, we have: $\frac{97}{x} = \frac{242.50}{302.50}$

=> $97 \times 302.50 = x \times 242.50$

=> $x = \frac{97 \times 302.50}{242.50} = \frac{29342.50}{242.52} = 121$

Thus, the required length will be 121 meter.

17. 11 men can dig $6\frac{3}{4}$ meter long trench in one day. How many men should be employed for digging 27 meter long trench of the same type in one day?

Soln:

Let x be the number of men required to dig a trench of 27 meter.

Number of men	**11**	**x**
Length (in m)	**27/ 4**	**27**

Since the length of the trench and the number of men are in direct variation, we have: Missing close brace

=> $11 \times 27 = x \times \frac{27}{4}$

=> $x = \frac{11 \times 27 \times 4}{27} = 44$

Thus, 44 men will be required to dig a trench of 27 meter.

18.A worker is paid Rs 210 for 6 days work. If his total income of the month is Rs 875, for how many days did he work?

Soln:

Let x be the number of days for which the worker is paid Rs 875.

Income (In Rs)	**210**	**875**
Number of days	**6**	**x**

Since the income of the worker and the number of working days are in direct variation, we have: $\frac{210}{875} = \frac{6}{x}$

=> $210 \times x = 875 \times 6$

=> $x = \frac{875 \times 6}{210} = \frac{5250}{210} = 25$

Thus, the required number of days is 25.

19.A worker is paid Rs 200 for 8 days work. If he works for 20 days, how much will he get?

Soln:

Let Rx x be the income for 20 days work.

Income (In Rs)	**200**	**x**
Number of days	**8**	**20**

Since the income and the number of working days are in direct variation, we have: $\frac{200}{x} = \frac{8}{20}$

=> $200 \times 20 = 8x$

=> $x = \frac{200 \times 20}{8} = \frac{4000}{8} = 500$

Thus, the worker will get Rs 500 for working 20 days.

20.The amount of extension in an elastic string varies directly as the weight hung on it. If a weight of 150 gm produces an extension of 2.9 cm, then what weight would produce an extension of 17.4 cm?

Soln:

Let x gm be the weight that would produce an extension of 17.4 cm.

Weight (in gm)	**150**	**x**
Length (in cm)	**2.9**	**17.4**

Since the amount of extension in an elastic string and the weight hung on it are in direct variation, we have: $\frac{150}{x} = \frac{2.9}{17.4}$

=> $17.4 \times 150 = 2.9 \times x$

=> $x = \frac{17.4 \times 150}{2.9} = \frac{2610}{2.9} = 900$

Thus, the required weight will be 900 gm.

21.The amount of extension in an elastic spring varies directly with the weight hung on it. If a weight of 250 gm produces an extension of 3.5 cm, find the extension produced by a weight of 700 gm.

Soln:

Let x cm be the extension produced by the weight of 700 gm

Weight (in gm)	250	700
Length (in cm)	3.5	x

Since the amount of extension in an elastic spring varies and the weight hung on it is in direct variation, we have: $\frac{250}{700} = \frac{3.5}{x}$

=> $x \times 250 = 3.5 \times 700$

=> $x = \frac{3.5 \times 700}{250} = \frac{2450}{250} = 9.8$

Thus, the required extension will be 9.8 cm

Q.22: In 10 days, the earth picks up 2.6×10^8 pounds of dust from the atmosphere. How much dust will it pick up in 45 days?

Soln:

Let the amount of dust picked up by the earth in 45 days be x pounds.

Since the amount of dust picked up by the earth and the number of days are in direct variation, we have: Ratio of the dust picked up by the earth in pounds = ratio of the number of days taken

=> $\frac{10}{45} = \frac{2.6 \times 10^8}{x}$

=> $x \times 10 = 45 \times 2.6 \times 10^8$

=> $x = \frac{45 \times 2.6 \times 10^8}{10} = \frac{117 \times 10^8}{10} = 11.7 \times 10^8$

Thus, 11.7×10^8 pounds of dust will be picked up by the earth in 45 days.

Q.23. In 15 days, the earth picks up 1.2×10^8 kg of dust from the atmosphere. In how many days it will pick up 4.8×10^8 kg of dust?

Soln: Let x be the number of days taken by the earth to pick up 4.8×10^8 kg of dust

Since the amount of dust picked up by the earth and the number of days are in direct variation, we get:

$\frac{15}{x} = \frac{1.2 \times 10^8}{4.8 \times 10^8}$

$=> x = 15 \times \frac{4.8}{1.2}$

=> x = 60

Thus, the required number of days will be 60.

Chapter 10: Direct and Inverse variations

Exercise 10.2

Q1. In which of the following tables x and y vary inversely:

(i)

x	4	3	12	1
y	6	8	2	24

(ii)

x	5	20	10	4
y	20	5	10	25

(iii)

x	4	3	6	1
y	9	12	8	36

(iv)

x	9	24	15	3
y	8	3	4	25

Soln:

(i) Since x and y vary inversely, we have: y = kx => xy = k

∴ the product of x and y is constant. In all cases, the product xy is constant (i.e. 24)

Thus, in this case x and y vary inversely.

(ii) In all cases, the product xy is constant for any two pairs of values for x and y. Here, xy = 100 for all cases.

Thus, in this cases, x and y do not vary inversely.

(iii) If x and y vary inversely, the product xy should be constant. Here, in one cases, product = 6×8 = 48 and in the rest, product = 36

Thus, in this case, x and y do not vary inversely.

(iv) If x and y inversely, the product xy should be constant. Here, the product is different for all cases. Thus in this cases, x and y do not vary inversely.

Q2. If x and y vary inversely, fill in the following blanks:

(i)

x	12	16	–	8	–
y	–	6	4	–	0.25

(ii)

x	16	32	8	128
y	4	–	–	0.25

(iii)

x	9	–	81	243
y	27	9	–	1

Soln:

(i) Since x and y vary inversely, we have: xy = k

For x = 16 and y = 6, we have: 16 X 6 = k

=> k = 96

For x = 12 and k =96, we have:

xy = k

=> 12y =96

=> y = 96/ 12 = 8

For y = 4 and k = 96, we have: xy = k

=> 4x = 96

=> x = 24

For x = 8 and k = 96, we have:

xy = k

=> 8y = 96 => y = 96/ 8 = 12

For y = 0.25 and k = 96, we have: xy = k

=> 0.25x = 96

=> x = 96/ 0.25 = 384

(ii) Since x and y vary inversely, we have: xy = k

For x = 16 and y = 4, we have: 16 X 4 = k

=> k = 64

For x = 32 and k = 64, we have: xy = k

=> 32y = 64

=> y = 64/ 32 = 2

For x = 8 and k = 64

=> xy = k

=> 8y = 64

=> y = 8

(iii) Since x and y vary inversely, we have: xy = k

For x = 9 and y = 27

9 X 27 = k

=> k = 243

For y = 9 and k = 243, we have: xy = k

=> 9x = 243

=> x = 243/ 9 = 27

For x = 81 and k = 243, we have:

xy = k

=> 81y = 243

=> y = 243/ 81 = 3

Q3. Which of the following quantities vary inversely as each other?

(i) The number of x men hired to construct a wall and the time y taken to finish the job.

(ii) The length x of a journey by bus and price y of the ticket.

(iii) Journey (x km) undertaken by a car and the petrol (y liters) consumed by it.

Soln:

(i) If the number of men is more, the time taken to construct a wall will be less. Therefore, it is in inverse variation.

(ii) If the length of a journey is more, the price of the ticket will also be more. Therefore, it is not in inverse variation.

(iii) If the length of the journey is more, the amount of petrol consumed by the car will also be more.

Therefore, it is not in inverse variation.

Thus, only (i) is in inverse variation.

Q4. it is known that for a given mass of gas, the volume v varies inversely as the pressure p. fill in the missing entries in the following table:

v (in cm^3)	–	48	60	–	100	–	200
P (in atmospheres)	2	–	3/ 2	1	–	1/ 2	–

Soln:

Since the volume and pressure for the given mass vary inversely, we have: vp = k

For v = 60 and p = 30, we have: k = 60 X 32 = 90

For p = 2 and k = 90, we have: 2v = 90

=> v = 45

For v = 48 and k =90, we have: 48p = 90

=> p = 48/ 90

For p = 1 and k = 90, we have: 1v = 90

=> v = 90

For v = 100 and k = 90, we have: 100p = 90

=> v = 9/ 10

For p = 12 and k = 90, we have: 12v = 90

=> v = 90 / 12 = 15/ 2

For v = 200 and k = 90, we have:

200p = 90

=> p = 9/ 20

Q5. If 63 men can do a piece of work in 25 days, in how many days will 15 men do it?

Soln:

Let x be the number of days in which 15 men can do a piece of work.

Number of men	36	15
Number of days	25	x

Since the number of men hired and the number of days taken to do a piece of work are in inverse variation, we have:

$36 \times 25 = x \times 15 => x = \frac{36 \times 25}{15} = \frac{900}{15} = 60$

Thus, the required number of days is 60.

Q6. A workforce of 50 men with a contractor can finish a piece of work in 5 months. In how many months the same work can be completed by 125 men?

Soln:

Let x be the number of days required to complete a piece of work by 125 men.

Number of men	50	125
Months	5	x

Since the number of men engaged and the number of days taken to do a piece of work are in inverse variation, we have:

$50 \times 5 = 125x$

=> $x = \frac{50 \times 5}{125} = 2$

Thus, the required number of months is 2

Q7. A workforce of 420 men with a contractor can finish a certain piece of work in 9 months. How many extra men must he employ to complete the job in 7 months?

Soln:

Let x be the extra number of men employed to complete the job in 7 months.

Number of men	420	x
Months	9	7

Since the number of men hired and the time required to finish the piece of work are in inverse variation, we have:

$420 \times 9 = 7x$

$x = \frac{420 \times 9}{7} = 540$

Thus, the number of extra men required to complete the job in 7 months = 540 – 420 = 120

Q8. 1200 men can finish a stock of food provisions in 35 days. How many should more men join them so that the same stock may last for 25 days?

Soln:

Number of men	1200	x
Days	35	

Let x be the number of addition men required to finish the stock in 25 days.

Since the number of men and the time taken to finish a stock are in inverse variation, we have: $1200 \times 35 = 25x$

=> x = $\frac{1200 \times 35}{25} = 1680$

∴ Required number of men = 1680 − 1200 = 480.

Thus, an additional 480 men should join the existing 1200 men finish the stock in 25 days.

Q9. In a hostel of 50 girls, there are food provisions for 40 days. If 30 more girls join the hostel, how long will these provisions last?

Soln:

Let x be the number of days with food provisions for 80 (i.e. 50 + 30) girls.

Number of girls	50	80
Number of days	40	x

Soln:Since the number of girls and number of days with food provisions are in inverse variation, we have: $50 \times 40 = 80x$

=> $x = \frac{50 \times 40}{80} = \frac{2000}{80} = 25$

Thus, the required number of days is 25

Q10. A car can finish a certain journey in 10 hours at the speed of 48 km/ hr. by how much should its speed be increased so that it may take only 8 hours to cover the same distance?

Soln:

Let the increased speed be x km/h.

Time (in h)	10	8
Speed (km/h)	48	x + 48

Since speed and time taken are in inverse variation, we get:

$10 \times 48 = 8(x + 48)$

=> $8x = 480 – 384$

=> $8x = 96 = 12$

Thus, the speed should be increased by 12 km/h.

Q11. 1200 soldiers in a fort had enough food for 28 days. After 4 days, some soldiers were transferred to another fort and thus the food lasted now for 32 more days. How many soldiers left the fort?

Soln:

It is given that after 4 days, out of 28 days, the fort had enough food for 1200 soldiers for (28 − 4 = 24)

Let x be the number of soldiers who left the fort.

Number of soldiers	1200	1200-x
Number of days for which food lasts	24	32

Since the number of soldiers and the number of days for which the food lasts are in inverse variation, we have:

$1200 \times 24 = 1200 – x \times 32$

=> $1200 \times 2432 = 1200 – x$

=> 900 = 1200 − x

=> x = 300

Thus, 300 soldiers left the fort

Q12. Three spraying machines working together can finish painting a house in 60 minutes. How long will it take for 5 machines of the same capacity to do the same job?

Soln:

Let the time taken by 5 spraying machines to finish a painting job be x minutes.

Number of machines	3	5
Time (in minutes)	60	x

Since the number of spraying machines and the time taken by them to finish a painting job are in inverse variation, we have:

$3 \times 60 = 5 \times x$

=> 180 = 5x

=> x = 36

Thus, the required time will be 36 minutes.

Q13. A group of 3 friends staying together consume 54 kg of wheat every month. Some more friends join this group and they find that the same amount of wheat lasts for 18 days. How many new members are there in this group now?

Soln:

Let x be the number of new members in group.

Number of members	3	X
Number of days	30	18

Since more members can finish the wheat in less number of days, it is a case of inverse variation. Therefore, we get:

$3 \times 30 = x \times 18$

=> 90 = 18x

=> x = 90/ 18 = 5

Thus, the number of new members in the group = 5 – 3 = 2

Q14. 55 cows can graze a field in 16 days. How many cows will graze the same field in 10 days?

Soln:

Let the number of cows and the number of days taken by them to graze the field is in inverse variation, we have:

$16 \times 55 = 10 \times x$

=> $x = \frac{16\times55}{10} = 88$

The required number of cows is 88

Q15. 18 men can reap a field in 35 days. For reaping the same field in 15 days, how many men are required?

Soln:

Let the number of men required to reap the field in 15 days be x.

Number of days	35	15
Number of men	18	X

Since the number of days and the number of men required to reap the field are in inverse variation, we have:

$35 \times 18 = 15 \times x$

=> $x = \frac{35\times18}{15} = 42$

Thus, the required number of men is 42.

Q16. A person has money to buy 25 cycles worth Rs 500 each. How many cycles will he be able to buy if each cycle is costing Rs 125 more?

Soln:

Let x be the number of cycles bought if each cycle costs Rs 125 more

Cost of a cycle (in Rs)	500	625
Number of cycles	25	x

It is in inverse variation. Therefore, we get:

500 x 25 = 625 x x

=> x = $\frac{500\times256}{25} = 20$

∴ The required number of cycles is 20.

Q17. Raghu has enough money to buy 75 machines worth Rs 200 each. How many machines can he buy if he get a discount of Rs 50 on each machines?

Soln:

Let x be the number of machines he can buy if a discount of Rs. 50 is offered on each machine.

Number of machines	x	
Price of each machine (in Rs)	200	150

Since Raghu is getting a discount of Rs 50 on each machine, the cost of each machine will get decreased by 50.

If the price of a machine is less, he can buy more number of machines. It is a case of inverse variation. Therefore, we have:

$75 \times 200 = x \times 150$

=> $x = \frac{75 \times 200}{150} = \frac{15000}{150} = 100$

∴ The number of machines he can buy is 100.

Q18. If x and y vary inversely as each other and

(i) x = 3 when y = 8, find y when x = 4

(ii) x = 5 when y = 15, find x when y = 12

(iii) x = 30, find y when constant of variation = 900

(iv) y = 35, find x when constant of variation = 7

Soln:

(i) Since x and y vary inversely, we have: xy = k

For x =3 and y = 8, we have:

=> 3 x 8 = k

=> k = 24

For x = 4, we have:

4y = 24

=> y = 6

∴ y = 6

(ii) Since x and y vary inversely, we have: xy = k

For x = 5 and y = 15, we have:

=> 5 x 15 = k

=> k = 75

For y = 12, we have:

12x = 75

=> x = 75/ 12 = 25/ 4

∴ x = 25/ 4

(iii) Given: x = 30 and k = 900

∴ xy = k

=> 30y = 900

=> y = 900/ 30 = 30

=> y = 30

(iv) Given: y = 35 and k = 7 Now, xy = k

=> 35x = 7

=> x = 1/ 5

∴ x = 1/ 5