

## 10. Direct and Inverse Variable

### Exercise 10.1

#### 1. Question

Explain the concept of direct variation.

#### Answer

In case of direct variation both the quantities vary in the ratio i.e if one quantity is doubled then other will also get double. If one quantity gets half the other will also get half.

#### 2. Question

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).

#### Answer

- (i) If number of articles is increasing then cost will also increase. So it is a case of direct proportion
- (ii) Cost will also increase when weight of the article is increasing. So it is a case of direct proportion
- (iii) Time will increase when distance will increase, if speed remaining constant. So it is a case of direct proportion
- (iv) Wages will increase if the number of working hours is increasing. So it is a case of direct proportion
- (v) For same distance time taken will reduce if speed is increased. So it is **not** a case of direct proportion
- (vi) Cost for the land will increase if its area will increase. So it is a case of direct proportion

#### 3. Question

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	$1^3$	$2^3$	$3^3$	$4^3$	$3^3$

**Answer**

(i) Directly proportional.

Eplanation: In this table value of 'b' is thrice the value of 'a' in all the columns. Therefore 'a' and 'b' are directly proportional.

(ii) Directly proportional.

Eplanation: In this table value of 'b' is half of the value of 'a' in all the the columns. Therefore 'a' and 'b' are directly proportional.

(iii) Not directly proportional.

Eplanation: In this table value of 'b' is not thrice the value of 'a' in all the columns. Therefore 'a' and 'b' are not directly proportional.

(iv) Not directly proportional.

Eplanation: In this table value of 'b' is not varying in the same ratio as the value of 'a' in all the columns. Therefore 'a' and 'b' are not directly proportional.

#### 4. Question

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

(i) Two quantites are said to vary \_\_\_\_\_ with each other if they increase (decrease) together in such a way that the raio of the corresopnding values remains same

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

#### Answer

(i) Two quantites are said to vary **directly** with each other if they increase (decrease) together in such a way that the raio of the corresopnding values remains same

(ii) x and y are said to vary directly with each if for some positive number **k**, **wher  $kR = k$** .

#### 5. Question

Complite 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
2	.....	20	28	.....

**Answer**

(i)

X	2.5	<b>4</b>	<b>6</b>	15
Y	5	8	12	<b>30</b>

$$\frac{2.5}{5} = \frac{x_1}{8}$$

On cross multiplication, we get

$$2.5 \times 8 = x_1 \times 5$$

$$x_1 = \frac{2.5 \times 8}{5} = 4$$

$$\frac{4}{8} = \frac{x_2}{12}$$

On cross multiplication, we get

$$4 \times 12 = 8 \times x_2$$

$$\frac{48}{8} = x_2$$

$$6 = x_2$$

$$\frac{6}{12} = \frac{15}{x_3}$$

On cross multiplication, we get

$$15 \times 12 = 6 \times x_3$$

$$\frac{180}{6} = x_3$$

$$30 = x_3$$

(ii)

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X	5	<b>7.5</b>	10	35	25	<b>20</b>
Y	8	12	<b>16</b>	<b>56</b>	<b>40</b>	32

$$\frac{5}{8} = \frac{x_1}{12}$$

On cross multiplication, we get

$$5 \times 12 = x_1 \times 8$$

$$x_1 = \frac{5 \times 12}{8} = 7.5$$

$$\frac{7.5}{12} = \frac{10}{x_2}$$

On cross multiplication, we get

$$10 \times 12 = 7.5 \times x_2$$

$$\frac{120}{7.5} = x_2$$

$$16 = x_2$$

$$\frac{10}{16} = \frac{35}{x_3}$$

On cross multiplication, we get

$$16 \times 35 = 10 \times x_3$$

$$\frac{16 \times 35}{10} = x_3$$

$$56 = x_3$$

$$\frac{35}{56} = \frac{25}{x_4}$$

On cross multiplication, we get

$$56 \times 25 = 35 \times x_4$$

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$$\frac{56 \times 25}{35} = x_4$$

$$40 = x_4$$

$$\frac{25}{40} = \frac{x_5}{32}$$

On cross multiplication, we get

$$25 \times 32 = 40 \times x_5$$

$$\frac{25 \times 32}{40} = x_5$$

$$20 = x_5$$

(iii)

X	6	8	10	<b>16</b>	20
Y	15	20	<b>25</b>	40	<b>50</b>

$$\frac{8}{20} = \frac{10}{x_1}$$

On cross multiplication, we get

$$10 \times 20 = x_1 \times 8$$

$$x_1 = \frac{10 \times 20}{8} = 25$$

$$\frac{10}{25} = \frac{x_2}{40}$$

On cross multiplication, we get

$$10 \times 40 = 25 \times x_2$$

$$\frac{400}{25} = x_2$$

$$16 = x_2$$

$$\frac{16}{40} = \frac{20}{x_3}$$

On cross multiplication, we get

$$20 \times 40 = 16 \times x_3$$

$$\frac{20 \times 40}{16} = x_3$$

$$50 = x_3$$

(iv)

X	4	9	<b>12</b>	<b>9</b>	3	<b>1</b>
Y	16	<b>36</b>	48	36	<b>12</b>	4

$$\frac{4}{16} = \frac{9}{x_1}$$

On cross multiplication, we get

$$9 \times 16 = x_1 \times 4$$

$$x_1 = \frac{9 \times 16}{4} = 36$$

$$\frac{9}{36} = \frac{x_2}{48}$$

On cross multiplication, we get

$$9 \times 48 = 36 \times x_2$$

$$\frac{9 \times 48}{36} = x_2$$

$$12 = x_2$$

$$\frac{12}{48} = \frac{x_3}{36}$$

On cross multiplication, we get

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$$12 \times 36 = 48 \times x_3$$

$$\frac{12 \times 36}{48} = x_3$$

$$9 = x_3$$

$$\frac{9}{36} = \frac{3}{x_4}$$

On cross multiplication, we get

$$36 \times 3 = 9 \times x_4$$

$$\frac{36 \times 3}{9} = x_4$$

$$12 = x_4$$

$$\frac{3}{12} = \frac{x_5}{4}$$

On cross multiplication, we get

$$3 \times 4 = 12 \times x_5$$

$$\frac{12}{12} = x_5$$

$$1 = x_5$$

(v)

X	3	5	7	9
2	<b>12</b>	20	28	<b>36</b>

$$\frac{5}{20} = \frac{3}{x_1}$$

On cross multiplication, we get

$$20 \times 3 = x_1 \times 5$$

$$x_1 = \frac{20 \times 3}{5} = 12$$

$$\frac{7}{28} = \frac{9}{x_2}$$

On cross multiplication, we get

$$9 \times 28 = 7 \times x_2$$

$$\frac{9 \times 28}{7} = x_2$$

$$36 = x_2$$

### 6. Question

Find the constant of variation from the table given below:

x	3	5	7	9
y	12	20	28	36

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

### Answer

The constant of variation in the given table is 4.

Explanation: For First Column:  $\frac{y}{x} = \frac{12}{3} = 4$

For Second Column:  $\frac{y}{x} = \frac{20}{5} = 4$

Similarly for other columns also y is four times x.

### 7. Question

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

### Answer

Let the cost of 7 registers is Rs  $x$

No of registers	12	7
Cost (Rs)	156	$x$

$$\frac{12}{156} = \frac{7}{x}$$

On cross multiplication, we get

$$12x = 7 \times 156$$

$$x = \frac{7 \times 156}{12} = 91$$

Therefore cost of 7 registers is Rs 91

### 8. Question

Anupama takes 125 minutes in walding a distance of 100 metre. What distance would she cover in 315 minutes?

### Answer

Let the distance covered in 315 Min be  $x$  Meter

Time (Min)	125	315
Distance (m)	100	$x$

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

On cross multiplication, we get

$$125x = 100 \times 315$$

$$x = \frac{100 \times 315}{125} = 252$$

Therefore distance covered is 252 meter.

### 9. Question

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

### Answer

Let the cost of 105 m plastic sheet be Rs  $x$

Plastic sheet (M)	93	105
Cost (Rs)	1395	$x$

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

On cross multiplication, we get

$$93x = 105 \times 1395$$

$$x = \frac{105 \times 1395}{93} = 1575$$

Therefore cost is Rs 1575

### 10. Question

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

### Answer

Let the number of words typed in one minute be  $x$

No of words	1080	$x$
Time (min)	60	1

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

On cross multiplication, we get

$$60x = 1080 \times 1$$

$$x = \frac{1080}{60} = 18$$

Therefore No of words typed in one minute are 18

### 11. Question

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

### Answer

One hour = 60 minutes

Let the the distance travelled be  $x$  meter

Distance (M)	50	$x$
Time (Min)	60	12

$$\frac{50}{60} = \frac{x}{12}$$

On cross multiplication, we get

$$60x = 50 \times 12$$

$$x = \frac{50 \times 12}{60} = 10$$

Therefore the distance covered is 10 km

### 12. Question

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

### Answer

Let the number of boxes be  $x$

Self - length (m)	13.6	20.4
No of boxes	68	$x$

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

On cross multiplication, we get

$$13.6x = 20.4 \times 68$$

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

Therefore number of boxes is 102

### 13. Question

In a library 136 copies of a certain book require a shelf-length of 3.4 metre. How many copies of the same book would occupy a shelf length of 5.1 metres?

### Answer

Let the number of copies be  $x$

Self - length (m)	3.4	5.1
No of copies	136	$x$

$$\frac{3.4}{136} = \frac{5.1}{x}$$

On cross multiplication, we get

$$3.4x = 5.1 \times 136$$

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

Therefore number of copies is 204

#### 14. Question

The second class railway fare for 240 km of Journey is Rs 1500. What would be the fare for a Journey of 139.2 km?

#### Answer

Let the fare be Rs  $x$

Distance (km)	240	139.2
Fare (Rs)	1500	$x$

$$\frac{240}{1500} = \frac{139.2}{x}$$

On cross multiplication, we get

$$240x = 139.2 \times 1500$$

$$x = \frac{139.2 \times 1500}{240} = 870$$

Therefore fare is Rs 870

#### 15. Question

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

#### Answer

Let the fare be Rs  $x$

No of cardboard	12	294
Thickness (mm)	35	$x$

$$\frac{12}{35} = \frac{294}{x}$$

On cross multiplication, we get

$$12x = 35 \times 294$$

$$x = \frac{35 \times 294}{12} = 857.5$$

Therefore thickness of the cardboard is 857.5 mm

### 16. Question

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

### Answer

Let the length of the cloth be  $x$  meter

Cost (Rs)	242.50	302.50
Length of cloth (m)	97	$x$

$$\frac{242.50}{97} = \frac{302.50}{x}$$

On cross multiplication, we get

$$242.50x = 97 \times 302.50$$

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

Therefore length of the cloth is 121 M

### 17. Question

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

### Answer

Let the number of men required is  $x$

Length of trench (m)	$\frac{27}{4}$	27
Number of men	11	$x$

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

On cross multiplication, we get

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

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

Therefore number of men required is 44

### 18. Question

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?

### Answer

Let the number of working days are  $x$

Income (Rs)	210	875
Number of working days	6	$x$

$$\frac{210}{6} = \frac{875}{x}$$

On cross multiplication, we get

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

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

Therefore number of days of work is 25 days

### 19. Question

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

### Answer

Let the income is Rs  $x$

Number of working days	8	20
Income (Rs)	200	$x$

$$\frac{8}{200} = \frac{20}{x}$$

On cross multiplication, we get

$$8 \times x = 20 \times 200$$

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

Therefore amount paid is Rs 500

### 20. Question

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?

### Answer

Let the weight required is  $x$  gm

Extension (cm)	2.9	17.4
Weight (gm)	150	$x$

$$\frac{2.9}{150} = \frac{17.4}{x}$$

On cross multiplication, we get

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

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

Therefore weight is 900 gm

### 21. Question

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 the weight of 700 gm.

### Answer

Let the extension produced is  $x$  cm

Weight (gm)	250	700
Extension (cm)	3.5	$x$

$$\frac{250}{3.5} = \frac{700}{x}$$

On cross multiplication, we get

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

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

Therefore extension produced is 9.8 cm

## 22. Question

In 10 days, the earth picks up  $2.6 \times 10^8$  pounds of dust from the atmosphere. How much dust will it pick up in 45 days?

### Answer

Let the weight of dust picked up is  $x$  pounds

Time (days)	10	45
Weight of dust (pounds)	$2.6 \times 10^8$	$x$

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

On cross multiplication, we get

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

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

Therefore the weight of dust picked up is  $11.7 \times 10^8$  pounds

## 23. Question

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

### Answer

Let the number of days is  $x$

Weight of dust (pounds)	$1.2 \times 10^8$	$4.8 \times 10^8$
Time (days)	15	$x$

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

On cross multiplication, we get

$$1.2 \times 10^8 \times x = 15 \times 4.8 \times 10^8$$

$$x = \frac{15 \times 4.8 \times 10^8}{1.2 \times 10^8} = 60$$

Therefore the number of days required to pick up the dust is 60 days

### Exercise 10.2

#### 1. Question

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

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### Answer

(i) x varies inversely as y since one quantity is increasing and other is decreasing in the same proportion.

(ii) x varies inversely as y since one quantity is increasing and other is decreasing in the same proportion.

(iii) x doesn't vary inversely as y since the quantities are not varying in same proportion

(iv) x doesn't vary inversely as y since the quantities are not varying in same proportion

### 2. Question

It 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

**Answer**

(i)

X	12	16	<b>24</b>	8	<b>324</b>
Y	<b>8</b>	6	4	<b>12</b>	0.25

$$12 \times p = 16 \times 6$$

$$p = \frac{16 \times 6}{12} = 8$$

$$6 \times 16 = q \times 4$$

$$p = \frac{16 \times 6}{4} = 24$$

$$4 \times 24 = q \times 8$$

$$q = \frac{24 \times 4}{8} = 12$$

(ii)

X	16	32	8	128
Y	4	<b>2</b>	<b>8</b>	0.25

$$16 \times 4 = x_1 \times 32$$

$$2 = x_1$$

$$32 \times 2 = x_2 \times 8$$

$$4 = x_2$$

(iii)

x	9	<b>27</b>	81	243
y	27	9	<b>3</b>	1

$$9 \times 27 = x_1 \times 9$$

$$27 = x_1$$

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$$9 \times 27 = x_2 \times 81$$

$$3 = x_2$$

### 3. Question

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 litres) consumed by it.

### Answer

(i) **Varies inversely.**

Since the time taken to construct the wall varies with the number of men hired. If the number of men hired is increased then time required for constructing wall shall decrease and vice-versa.

(ii) **Varies directly.**

Since the cost of bus journey will vary with distance. If the distance of journey will increase then cost of ticket will increase and vice-versa.

(iii) **Varies directly.**

Since the quantity of petrol required varies with the distance. If the distance of journey will increase then petrol required will also increase and vice-versa.

### 4. Question

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) <sup>3</sup>	...	48	60	...	100	...	200
p (in atmospheres)	2	...	3/2	1	...	1/2	...

### Answer

V (in cm) <sup>3</sup>	<b>45</b>	48	60	<b>90</b>	100	<b>180</b>	200
P (in atmosphere)	2	<b>15/8</b>	3/2	1	<b>0.9</b>	1/2	<b>9/20</b>

Explanation:

$$60 \times \frac{3}{2} = x_1 \times 48$$

$$60 \times \frac{3}{2 \times 48} = x_1$$

$$\frac{15}{8} = x_1$$

$$48 \times \frac{15}{8} = x_2 \times 2$$

$$48 \times \frac{15}{8 \times 2} = x_2$$

$$45 = x_2$$

$$60 \times \frac{3}{2} = x_3 \times 1$$

$$90 = x_3$$

$$90 \times 1 = x_4 \times 100$$

$$\frac{90}{100} = x_4$$

$$0.9 = x_4$$

$$100 \times 0.9 = x_5 \times \frac{1}{2}$$

$$90 \times 2 = x_5$$

$$180 = x_5$$

$$180 \times \frac{1}{2} = x_6 \times 200$$

$$\frac{90}{200} = x_6$$

$$\frac{9}{20} = x_6$$

### 5. Question

If 36 men can do a piece of work in 25 days, in how many days will 15 men do it?

### Answer

Let the number of days required is  $x$

Men	36	15
Time (days)	25	$x$

$$36 \times 25 = 15 \times x$$

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

Therefore the number of days required to complete the work is 60 days

### 6. Question

A work force 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?

### Answer

Let the number of months required is  $x$ . As number of men increases the days to complete the work decreases. Hence it is an inverse proportion.

Men	50	125
Time (months)	5	$x$

$$50 \times 5 = 125 \times x$$

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

Therefore the number of months required to complete the work is 2 months

### 7. Question

A work-force 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?

### Answer

Let the number of men required is  $x$

Men	420	$x$
Time (months)	9	7

$$420 \times 9 = 7 \times x$$

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

Therefore the number of extra men required to complete the work =  $540 - 420 = 120$  Men

### 8. Question

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

### Answer

Let the number of men joined is  $x$

Men	1200	$x$
Time (days)	35	25

$$1200 \times 35 = 25 \times x$$

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

Therefore the number of extra men required to finish the stock =  $1680 - 1200 = 480$  Men

### 9. Question

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?

### Answer

Let the number of days is  $x$

Total number of girls =  $50 + 30 = 80$

Girls	50	80
Time (days)	40	$x$

$$50 \times 40 = 80 \times x$$

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

Therefore the number of days the food will last is 25 days

### 10. Question

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?

### Answer

Let the speed of car be  $x$  km/hr

Time (hrs)	10	8
Speed (km/hr)	48	$x$

$$10 \times 48 = 8 \times x$$

$$x = \frac{10 \times 48}{8} = 60$$

Therefore increased speed =  $60 - 48 = 12$  km/hr

### 11. Question

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?

### Answer

Let the number of soldiers transferred to another fort be  $x$

After four days number of soldiers left in the fort =  $1200 - x$

And for remaining soldiers ( $1200 - x$ ) the food lasted for 32 more days

Time (days)	24	32
No of soldiers	1200	$1200 - x$

$$24 \times 1200 = 32(1200 - x)$$

$$32 \times 1200 - 32x = 24 \times 1200$$

$$38400 - 32x = 28800$$

$$-32x = 28800 - 38400$$

$$-32x = -9600$$

$$x = \frac{9600}{32} = 300$$

Therefore 300 soldiers left for another fort.

## 12. Question

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?

## Answer

Let the time required be  $x$  minutes

Time (min)	60	$x$
No of spraying machines	3	5

$$60 \times 3 = x \times 5$$

$$x = \frac{60 \times 3}{5}$$

$$x = 36$$

Therefore the time taken by five spraying machines is 36 Minutes.

### 13. Question

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?

### Answer

Let the number of friends joined be  $x$

No of friends	3	$x$
Time (days)	30	18

$$3 \times 30 = x \times 18$$

$$x = \frac{3 \times 30}{18} = 5$$

$$x = 5$$

Therefore the number of friends joined the group is  $5 - 3 = 2$ .

### 14. Question

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

### Answer

Let the number of cows be  $x$

Time (days)	16	10
Number of cows	55	$x$

$$16 \times 55 = x \times 10$$

$$x = \frac{16 \times 55}{10} = 88$$

$$x = 88$$

Therefore the number of cows is 88

### 15. Question

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

### Answer

Let the number of men be  $x$

Time (days)	35	15
Number of men	18	$x$

$$35 \times 18 = x \times 15$$

$$x = \frac{35 \times 18}{15} = 42$$

$$x = 42$$

Therefore the number of men is 42

### 16. Question

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

**Answer**

Let the number of cycles be  $x$

Increased cost of one cycles is =  $500 + 125 = \text{Rs } 625$

Cost (Rs)	500	625
Number of cycles	25	$x$

$$500 \times 25 = 625 \times x$$

$$x = \frac{500 \times 25}{625} = 20$$

$$x = 20$$

Therefore the number of cycles is 20

**17. Question**

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

**Answer**

Let the number of machines be  $x$ .

Decreased cost of one machines is =  $200 - 50 = \text{Rs } 150$

Cost (Rs)	200	150
Number of Machines	75	$x$

$$200 \times 75 = 150 \times x$$

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

$$x = 100$$

Therefore the number of machines is 100.

### 18. Question

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

### Answer

(i) Let  $y$  is  $p$

$x$	3	4
$y$	8	$p$

$$3 \times 8 = 4 \times p$$

$$p = \frac{3 \times 8}{4} = 6$$

$$x = 6$$

Therefore  $y$  is 6

(ii) Let  $x$  is  $p$

$x$	5	$p$
$y$	15	12

$$5 \times 15 = p \times 12$$

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$$p = \frac{5 \times 15}{12} = \frac{25}{4}$$

$$x = \frac{25}{4}$$

Therefore x is  $\frac{25}{4}$

(iii) Let y is p

Constant of variation is 900

$$30 \times p = 900$$

$$p = \frac{900}{30} = 30$$

$$p = 30$$

Therefore p is 30

(iv) Let x is p

Constant of variation is 7

$$35 \times p = 7$$

$$p = \frac{7}{35} = \frac{1}{5}$$

$$p = \frac{1}{5}$$

Therefore x is  $\frac{1}{5}$

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