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Practice Set 7.1 8th Std Maths Answers Chapter 7 Variation

Question 1.
Write the following statements using the symbol of variation.

1. Circumference (c) of a circle is directly proportional to its radius (r).
2. Consumption of petrol (l) in a car and distance traveled by that car (d) are in direct variation.

Solution:

1. $c \propto r$
2. $l \propto d$

Question 2.
Complete the following table considering that the cost of apples and their number are in direct variation.

Number of apples (x)	1	4	_	12	_
Cost of apples (y)	8	32	56	_	160

Solution:
The cost of apples (y) and their number (x) are in direct variation.
$\therefore y \propto x$
$\therefore y = kx$ ...(i)
where k is the constant of variation

i. When, $x = 1$, $y = 8$
$\therefore$ Substituting, $x = 1$ and $y = 8$ in (i), we get $y = kx$
$\therefore 8 = k \times 1$
$\therefore k = 8$
Substituting $k = 8$ in (i), we get
$y = kx$
$\therefore y = 8x$ ...(ii)
This the equation of variation

ii. When, $y = 56$, $x = ?$
$\therefore$ Substituting $y = 56$ in (ii), we get
$y = 8x$
$\therefore 56 = 8x$
$\therefore x = 568$
$\therefore x = 7$

iii. When, $x = 12$, $y = ?$
$\therefore$ Substituting $x = 12$ in (ii), we get

y = 8x
∴ y = 8 × 12
∴ y = 96

iv. When, y = 160, x = ?
∴ Substituting y = 160 in (ii), we get
y = 8x
∴ 160 = 8x
∴ x = 1608
∴ x = 20

Number of apples (x)	1	4	7	12	20
Cost of apples (y)	8	32	56	96	160

Question 3.
If m ∝ n and when m = 154, n = 7. Find the value of m, when n = 14.
Solution:
Given that,
m ∝ n
∴ m = kn …(i)
where k is constant of variation.
When m = 154, n = 7
∴ Substituting m = 154 and n = 7 in (i), we get
m = kn
∴ 154 = k × 7
∴ k=1547
∴ k = 22
Substituting k = 22 in (i), we get
m = kn
∴ m = 22n …(ii)
This is the equation of variation.
When n = 14, m = ?
∴ Substituting n = 14 in (ii), we get
m = 22n
∴ m = 22 × 14
∴ m = 308

Question 4.
If n varies directly as m, complete the following table.

m	3	5	6.5	__	1.25
n	12	20	__	28	__

Solution:
Given, n varies directly as m
∴ n ∝ m
∴ n = km …(i)
where, k is the constant of variation

i. When m = 3, n = 12
∴ Substituting m = 3 and n = 12 in (i), we get
n = km
∴ 12 = k × 3
∴ k=123
∴ k = 4
Substituting, k = 4 in (i), we get
n = km
∴ n = 4m …(ii)
This is the equation of variation.

ii. When m = 6.5, n = ?
∴ Substituting, m = 6.5 in (ii), we get
n = 4m
∴ n = 4 × 6.5
∴ n = 26

iii. When n = 28, m = ?
∴ Substituting, n = 28 in (ii), we get
n = 4m
∴ 28 = 4m
∴ 28 = 4m
∴ m=284
∴ m = 7

iv. When m = 1.25, n = ?
∴ Substituting m = 1.25 in (ii), we get
n = 4m
∴ n = 4 × 1.25
∴ n = 5

m	3	5	6.5	7	1.25
n	12	20	26	28	5

Question 5.
y varies directly as square root of x. When x = 16, y = 24. Find the constant of variation and equation of variation.
Solution:
Given, y varies directly as square root of x.
∴ y ∝ √4x
∴ y = k √x …(i)

where, k is the constant of variation.
When x = 16 ,y = 24.
∴ Substituting, x = 16 and y = 24 in (i), we get
$y = k\sqrt{x}$
$\therefore 24 = k\sqrt{16}$
$\therefore 24 = 4k$
$\therefore k=244$
$\therefore k = 6$
Substituting k = 6 in (i), we get
$y = k\sqrt{x}$
$\therefore y = 6\sqrt{x}$
This is the equation of variation
∴ The constant of variation is 6 and the equation of variation is $y = 6\sqrt{x}$.

Question 6.
The total remuneration paid to laborers, employed to harvest soybean is in direct variation with the number of laborers. If remuneration of 4 laborers is Rs 1000, find the remuneration of 17 laborers.
Solution:
Let, m represent total remuneration paid to laborers and n represent number of laborers employed to harvest soybean.
Since, the total remuneration paid to laborers, is in direct variation with the number of laborers.
$\therefore m \propto n$
$\therefore m = kn$ ...(i)
where, k = constant of variation
Remuneration of 4 laborers is Rs 1000.
i. e., when n = 4, m = Rs 1000
∴ Substituting, n = 4 and m = 1000 in (i), we get m = kn
$\therefore 1000 = k \times 4$
$\therefore k=10004$
$\therefore k = 250$
Substituting, k = 250 in (i), we get
$m = kn$
$\therefore m = 250\, n$ ...(ii)
This is the equation of variation
Now, we have to find remuneration of 17 laborers.
i. e., when n = 17, m = ?
∴ Substituting n = 17 in (ii), we get
$m = 250\, n$
$\therefore m = 250 \times 17$
$\therefore m = 4250$
∴ The remuneration of 17 laborers is Rs 4250.

Maharashtra Board Class 8 Maths Chapter 7 Variation Practice Set 7.1 Intext Questions and Activities

Question 1.
If the rate of notebooks is Rs 240 per dozen, what is the cost of 3 notebooks?
Also find the cost of 9 notebooks, 24 notebooks and 50 notebooks and complete the following table. (Textbook pg. no. 35)

Number of notebooks (x)	12	3	9	24	50	1
Cost (In Rupees) (y)	240	—	—	—	—	20

Solution:
As the number of notebooks increases their cost also increases.
∴ Number of notebooks and cost of notebooks are in direct proportion.

i.

$$\frac{12}{240} = \frac{3}{y}$$

$$\therefore \quad \frac{12}{12 \times 20} = \frac{3}{y}$$

$$\therefore \quad \frac{1}{20} = \frac{3}{y}$$

∴ y = 3 × 20
∴ y = 60

ii.

$$\frac{12}{240} = \frac{9}{y}$$

$$\therefore \quad \frac{1}{20} = \frac{9}{y}$$

∴ y = 9 × 20
∴ y = 180

iii.

$$\frac{12}{240} = \frac{24}{y}$$

$$\therefore \quad \frac{1}{20} = \frac{24}{y}$$

∴ y = 24 × 20
∴ y = 480

iv.

$$\frac{12}{240} = \frac{50}{y}$$

$$\therefore \quad \frac{1}{20} = \frac{50}{y}$$

$\therefore$ y = 50 × 20
$\therefore$ y = 1000

Number of notebooks (x)	12	3	9	24	50	1
Cost (In Rupees) (y)	240	60	180	480	1000	20

Practice Set 7.2 8th Std Maths Answers Chapter 7 Variation

Question 1.
The information about number of workers and number of days to complete a work is given in the following table. Complete the table.

Number of workers	30	20	_	10	_
Days	6	9	12		36

Solution:
Let, n represent the number of workers and d represent the number of days required to complete a work.
Since, number of workers and number of days to complete a work are in inverse poportion.

$\therefore n \propto \frac{1}{d}$

$\therefore n = k \times \frac{1}{d}$

where k is the constant of variation.
∴ n × d = k ...(i)

i. When n = 30, d = 6
∴ Substituting n = 30 and d = 6 in (i), we get
n × d = k
∴ 30 × 6 = k
∴ k = 180
Substituting k = 180 in (i), we get
∴ n × d = k
∴ n × d = 180 ...(ii)
This is the equation of variation

ii. When d = 12, n = 7
∴ Substituting d = 12 in (ii), we get
n × d = 180
∴ n × 12 = 180
∴ n = $\frac{180}{12}$
∴ n = 15

iii. When n = 10, d = ?
∴ Substituting n = 10 in (ii), we get
n × d = 180
10 × d = 180
∴ d = $\frac{180}{10}$
∴ d = 18

iv. When d = 36, n = ?
∴ Substituting d = 36 in (ii), we get
n × d = 180
∴ n × 36 = 180
∴ n = $\frac{180}{36}$
∴ n = 5

Number of workers	30	20	15	10	5
Days	6	9	12	18	36

Question 2.
Find constant of variation and write equation of variation for every example given below:
i. $p \propto \frac{1}{q}$; if p = 15 then q = 4.
ii. $z \propto \frac{1}{w}$; when z = 2.5 then w = 24.
iii. $s \propto \frac{1}{t^2}$; if s = 4 then t = 5.
iv. $x \propto \frac{1}{\sqrt{y}}$; if x = 15 then y = 9.
Solution:

i. $p \propto \frac{1}{q}$ ...[Given]

$\therefore p = k \times \frac{1}{q}$

where, k is the constant of variation.

$\therefore p \times q = k$ ...(i)

When p = 15, q = 4

∴ Substituting p = 15 and q = 4 in (i), we get

$p \times q = k$

$\therefore 15 \times 4 = k$

$\therefore k = 60$

Substituting k = 60 in (i), we get

$p \times q = k$

$\therefore p \times q = 60$

This is the equation of variation.

∴ The constant of variation is 60 and the equation of variation is pq = 60.

ii. $z \propto \frac{1}{w}$ ...[Given]

$\therefore z = k \times \frac{1}{w}$

where, k is the constant of variation,

$\therefore z \times w = k$ ...(i)

When z = 2.5, w = 24

∴ Substituting z = 2.5 and w = 24 in (i), we get

$z \times w = k$

$\therefore 2.5 \times 24 = k$

$\therefore k = 60$

Substituting k = 60 in (i), we get

$z \times w = k$

$\therefore z \times w = 60$

This is the equation of variation.

∴ The constant of variation is 60 and the equation of variation is zw = 60.

iii. $s \propto \frac{1}{t^2}$ ...[Given]

$\therefore s = k \times \frac{1}{t^2}$

where, k is the constant of variation,

$\therefore s \times t^2 = k$ ...(i)

When s = 4, t = 5

∴ Substituting, s = 4 and t = 5 in (i), we get

$s \times t^2 = k$

$\therefore 4 \times (5)^2 = k$

$\therefore k = 4 \times 25$

$\therefore k = 100$

Substituting k = 100 in (i), we get

$s \times t^2 = k$

$\therefore s \times t^2 = 100$

This is the equation of variation.

∴ The constant of variation is 100 and the equation of variation is $st^2 = 100$.

iv. $x \propto \frac{1}{\sqrt{y}}$ ...[Given]

$\therefore x = k \times \frac{1}{\sqrt{y}}$

where, k is the constant of variation,
∴ x × √y = k ...(i)
When x = 15, y = 9
∴ Substituting x = 15 and y = 9 in (i), we get
x × √y = k
∴ 15 × √9 = k
∴ k = 15 × 3
∴ k = 45
Substituting k = 45 in (i), we get
x × √y = k
∴ x × √y = 45 .
This is the equation of variation.
∴ The constant of variation is k = 45 and the equation of variation is x√y = 45.

Question 3.
The boxes are to be filled with apples in a heap. If 24 apples are put in a box then 27 boxes are needed. If 36 apples are filled in a box how many boxes will be needed?
Solution:
Let x represent the number of apples in each box and y represent the total number of boxes required.
The number of apples in each box are varying inversely with the total number of boxes.

$\therefore x \propto \frac{1}{y}$

$\therefore x = k \times \frac{1}{y}$

where, k is the constant of variation,
∴ x × y = k ...(i)
If 24 apples are put in a box then 27 boxes are needed.
i.e., when x = 24, y = 27
∴ Substituting x = 24 and y = 27 in (i), we get
x × y = k
∴ 24 × 27 = k
∴ k = 648
Substituting k = 648 in (i), we get
x × y = k
∴ x × y = 648 ...(ii)
This is the equation of variation.
Now, we have to find number of boxes needed
when, 36 apples are filled in each box.
i.e., when x = 36,y = ?
∴ Substituting x = 36 in (ii), we get
x × y = 648
∴ 36 × y = 648
∴ y = $\frac{648}{36}$
∴ y = 18
∴ If 36 apples are filled in a box then 18 boxes are required.

Question 4.
Write the following statements using symbol of variation.

1. The wavelength of sound (l) and its frequency (f) are in inverse variation.
2. The intensity (I) of light varies inversely with the square of the distance (d) of a screen from the lamp.

Solution:

1. $l \propto 1f$
2. $I \propto 1d2$

Question 5.
$x \propto 1y√$ and when x = 40 then y = 16. If x = 10, find y.
Solution:
$x \propto 1y√$
∴ $x = k \times 1y√$
where, k is the constant of variation.
∴ x × √y = k …(i)
When x = 40, y = 16
∴ Substituting x = 40 andy = 16 in (i), we get
x × √y = k
∴ 40 × √16 = k
∴ k = 40 × 4
∴ k = 160
Substituting k = 160 in (i), we get
x × √y = k
∴ x × √y = 160 …(ii)
This is the equation of variation.
When x = 10,y = ?
∴ Substituting, x = 10 in (ii), we get
x × √y = 160
∴ 10 × √y = 160
∴ √y = 16010
∴ √y = 16
∴ y = 256 … [Squaring both sides]

Question 6.
x varies inversely as y, when x = 15 then y = 10, if x = 20, then y = ?
Solution:
Given that,
$x \propto 1y√$
∴ $x = k \times 1y√$
where, k is the constant of variation.
∴ x × y = k …(i)
When x = 15, y = 10
∴ Substituting, x = 15 and y = 10 in (i), we get

x × y = k
∴ 15 × 10 = k
∴ k = 150
Substituting, k = 150 in (i), we get
x × y = k
∴ x × y = 150 …(ii)
This is the equation of variation.
When x = 20, y = ?
∴ substituting x = 20 in (ii), we get
x × y = 150
∴ 20 × y = 150
∴ y = $\frac{150}{20}$
∴ y = 7.5

Practice Set 7.3 8th Std Maths Answers Chapter 7 Variation

Question 1.
Which of the following statements are of inverse variation?
i. Number of workers on a job and time taken by them to complete the job.
ii. Number of pipes of same size to fill a tank and the time taken by them to fill the tank.
iii. Petrol filled in the tank of a vehicle and its cost.
iv. Area of circle and its radius.
Solution:
i. Let, x represent number of workers on a job, and y represent time taken by workers to complete the job.
As the number of workers increases, the time required to complete the job decreases.
∴ $x \propto \frac{1}{y}$

ii. Let, n represent number of pipes of same size to fill a tank and t represent time taken by the pipes to fill the tank.
As the number of pipes increases, the time required to fill the tank decreases.
∴ $n \propto \frac{1}{t}$

iii. Let, p represent the quantity of petrol filled in a tank and c represent the cost of the petrol.
As the quantity of petrol in the tank increases, its cost increases.
∴ p ∝ c

iv. Let, A represent the area of the circle and r represent its radius.
As the area of circle increases, its radius increases.

∴ A ∝ r
∴ Statements (i) and (ii) are examples of inverse variation.

Question 2.
If 15 workers can build a wall in 48 hours, how many workers will be required to do the same work in 30 hours?
Solution:
Let, n represent the number of workers building the wall and t represent the time required.
Since, the number of workers varies inversely with the time required to build the wall.
∴ $n \propto \frac{1}{t}$
∴ $n = k \times \frac{1}{t}$
where k is the constant of variation
∴ n × t = k ...(i)
15 workers can build a wall in 48 hours,
i.e., when n = 15, t = 48
∴ Substituting n = 15 and t = 48 in (i), we get
n × t = k
∴ 15 × 48 = k
∴ k = 720
Substituting k = 720 in (i), we get
n × t = k
∴ n × t = 720 ...(ii)
This is the equation of variation.
Now, we have to find number of workers required to do the same work in 30 hours.
i.e., when t = 30, n = ?
∴ Substituting t = 30 in (ii), we get
n × t = 720
∴ n × 30 = 720
∴ n = $\frac{720}{30}$
∴ n = 24
∴ 24 workers will be required to build the wall in 30 hours.

Question 3.
120 bags of half litre milk can be filled by a machine within 3 minutes find the time to fill such 1800 bags?
Solution:
Let b represent the number of bags of half litre milk and t represent the time required to fill the bags.
Since, the number of bags and time required to fill the bags varies directly.
∴ b ∝ t
∴ b = kt ...(i)
where k is the constant of variation.
Since, 120 bags can be filled in 3 minutes
i.e., when b = 120, t = 3
∴ Substituting b = 120 and t = 3 in (i), we get
b = kt
∴ 120 = k × 3

∴ k = 1203
∴ k = 40
Substituting k = 40 in (i), we get
b = kt
∴ b = 40 t …(ii)
This is the equation of variation.
Now, we have to find time required to fill 1800 bags
∴ Substituting b = 1800 in (ii), we get
b = 40 t
∴ 1800 = 40 t
∴ t = 180040
∴ t = 45
∴ 1800 bags of half litre milk can be filled by the machine in 45 minutes.

Question 4.
A car with speed 60 km/hr takes 8 hours to travel some distance. What should be the increase in the speed if the same distance is

to be covered in 712 hours?

Solution:
Let v represent the speed of car in km/hr and t represent the time required.
Since, speed of a car varies inversely as the time required to cover a distance.

∴ $v \propto 1t$

∴ $v = k \times 1t$

where, k is the constant of variation.
∴ v × t = k …(i)
Since, a car with speed 60 km/hr takes 8 hours to travel some distance.
i.e., when v = 60, t = 8
∴ Substituting v = 60 and t = 8 in (i), we get
v × t = k
∴ 60 × 8 = t
∴ k = 480
Substituting k = 480 in (i), we get
v × t = k
∴ v × t = 480 …(ii)
This is the equation of variation.

Now, we have to find speed of car if the same distance is to be covered in 712 hours.

i.e., when t = 712 = 7.5 , v = ?

∴ Substituting, t = 7.5 in (ii), we get
v × t = 480
∴ v × 7.5 = 480

$v = 4807.5 = 480075$

∴ v = 64
The speed of vehicle should be 64 km/hr to cover the same distance in 7.5 hours.
∴ The increase in speed = 64 – 60
= 4km/hr
∴ The increase in speed of the car is 4 km/hr.

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