Variation

Exercise 17:

Solution 1:

As the weight of jaggery increases, its cost will also increase.

Hence, this is an example of direct variation.

Given, weight of jaggery = 4 kg

Cost of 4 kg jaggery = Rs. 80

$\therefore \dfrac{\text{Weight of jaggery}}{\text{Cost}} = \dfrac{4}{80}$ ...(1)

Now, weight of jaggery = 15 kg

Let x be the cost of 15 kg of jaggery.

$\therefore \dfrac{\text{Weight of jaggery}}{\text{Cost}} = \dfrac{15}{x}$ ...(2)

In direct variation, the ratio of the weight of jaggery to its cost remains constant.

From (1) and (2), we get

$\dfrac{4}{80} = \dfrac{15}{x}$

$\therefore 4x = 15 \times 80$

$\therefore x = \dfrac{15 \times 80}{4}$

$\therefore x = 300$

Thus, the cost of 15 kg of jaggery is Rs. 300.

Solution 2:

As the number of labourers increase, the total of their wages will also increase. Hence, this is an example of direct variation.

Given, the number of labourers = 8

Wages = Rs. 1760

$\therefore \dfrac{\text{Number of labourers}}{\text{Wages}} = \dfrac{8}{1760}$ ...(1)

Now, the number of labourers = 20

Let the wages of 20 labourers be Rs. x.

$\therefore \dfrac{\text{Number of labourers}}{\text{Wages}} = \dfrac{20}{x}$ ...(2)

In direct variation, the ratio of the number of labourers to their wages remains constant.

From (1) and (2),

$\dfrac{8}{1760} = \dfrac{20}{x}$

$\therefore \dfrac{1}{220} = \dfrac{20}{x}$

$\therefore x = 220 \times 20 = 4400$

Thus, the wages of 20 labourers is Rs. 4400.

Solution 3:

As the number of students increases, the total expenditure of the trip will also increase. Hence, this is an example of direct variation.

Given, the number of students = 25

The expenditure of the trip = Rs. 625

$\therefore \dfrac{\text{Number of students}}{\text{Expenditure}} = \dfrac{25}{625}$ ...(1)

Now, the number of students = 40

Let the expenditure of taking 40 students on the trip be Rs. x.

$\therefore \dfrac{\text{Number of students}}{\text{Expenditure}} = \dfrac{40}{x}$ ...(2)

From (1) and (2),

$\dfrac{25}{625} = \dfrac{40}{x}$

$\therefore \dfrac{1}{25} = \dfrac{40}{x}$

$\therefore x = 40 \times 25 = 1000$

Thus, the expenditure of 40 students for the picnic is Rs. 1000.

Solution 4:

As the number of notebooks decreases, the number of children will also decrease.

Hence, this is an exmaple of direct variation.

Given, the number of notebooks = 42

The number of children = 6

$\therefore \dfrac{\text{Number of notebooks}}{\text{Number of children}} = \dfrac{42}{6}$ ...(1)

Now, thenumber of notebooks = 28

Let the number of children be x.

$\therefore \dfrac{\text{Number of notebooks}}{\text{Number of children}} = \dfrac{28}{x}$ ...(2)

In direct variation, the ratio of the number of notebooks to the number of children remains constant.

From (1) and (2),

$\dfrac{42}{6} = \dfrac{28}{x}$

$\therefore \dfrac{7}{1} = \dfrac{28}{x}$

$\therefore x = \dfrac{28}{7} = 4$

Thus, 28 notesbooks can be distributed equally among 4 children.

Exercise 17:

Solution 1(1):

No. of chalks	10	5	30	25
Cost of chalks (Rs.)	4	2	12	10
Ratio of no. of chalks and cost	$\dfrac{10}{4} = \dfrac{5}{2}$	$\dfrac{5}{2}$	$\dfrac{30}{12} = \dfrac{5}{2}$	$\dfrac{25}{10} = \dfrac{5}{2}$
Product of no.of chalks and cost	40	10	360	250

The ratio of the number of chalks to the cost remains constant.

Hence, this is an example of direct variation.

Solution 1(2):

No. of workers	12	4	6	30
Days	20	60	40	8
Ratio of no. of workers and days	$\dfrac{12}{20} = \dfrac{3}{5}$	$\dfrac{4}{60} = \dfrac{1}{15}$	$\dfrac{6}{40} = \dfrac{3}{20}$	$\dfrac{30}{8} = \dfrac{15}{4}$
Product of no. of workers and days	240	240	240	240

The product of the number of workers and the days remains constant.
Hence, this is an example of inverse variation.

Solution 2:

As the number of bicycles decreases, the cost also will decrease.
Hence, this is an example of direct variation.
Given, number of bicycles = 16 and Cost = Rs. 17,600

$\therefore \dfrac{\text{Number of bicycles}}{\text{cost}} = \dfrac{16}{17600}$

Now, number of bicycles = 9
Let the cost of 9 bicycles be Rs. x.

$\therefore \dfrac{\text{Number of bicycles}}{\text{Cost}} = \dfrac{9}{x}$

Now, in direct variation, the ratio of the number of bicycles to the cost remains constant.

$\therefore \dfrac{16}{17600} = \dfrac{9}{x}$

$\therefore 16 \times x = 17600 \times 9$

$\therefore x = \dfrac{17600 \times 9}{16}$

$\therefore x = 1100 \times 9$

$\therefore x = 9900$

Thus, the cost of 9 bicycles is Rs. 9900.

Solution 3:

As the number of labourers is increased, the work will be completed in less number of days.

Thus, this is an example of inverse variation.

Given, the number of labourers = 12

Number of days required to complete the task by 12 labourers = 70

Now, number of labourers = 21

Let 21 labourers complete the task in x days.

The product of the number of labourers and the number of days required to complete the task remains constant.

$\therefore 12 \times 70 = 21 \times x$

$\therefore x = \dfrac{12 \times 70}{21}$

$\therefore x = 40$

Thus, 21 labourers will complete the task in 40 days.