Important Questions Class 8 Maths Chapter 11 - Direct and Inverse Proportions

Very Short Answer Type Questions

1. If two quantities x and y are in direct proportion with each other, then:

(a) $\frac{x}{y}$ remains constant

(b) $x \times y$ remains constant

(c) $x - y$ remains constant

(d) None of these

Ans: (a) $\frac{x}{y}$ remains constant.

2. The cost of 5 metres of a particular quality of cloth is Rs.210. Find the cost of 2 metres of cloth of the same type.

(a) Rs. 84

(b) Rs. 60

(c) Rs. 90

(d) Rs. 100

Ans: Cost of 5 metre cloth = Rs. 210

Thus, cost of 2 metre cloth = $2 \times 2105 = \text{Rs.}84 \frac{2 \times 210}{5} = \text{Rs.}84$

3. If X = 5Y, then X and Y vary _____ with each other.

Ans: They are directly proportional.

X = 5Y

$X \propto Y$

$XY=5 \frac{X}{Y}=5$

4. If XY = 10 then X and Y vary _____ with each other.

Ans: Indirectly proportional.

5. Time taken to cover a distance by car and speed of the car are said to be in _____ variation.

Ans: Inversely

Speed = distancetime $\text{Speed} = \frac{\text{distance}}{\text{time}}$

speed $\propto$1time $\text{speed} \propto \frac{1}{\text{time}}$

6. In the table state whether x and y vary directly or indirectly.

X	4	6	8	11
Y	20	30	40	55

Ans: Since, as ‘x’ increases, ‘y’ also increases.

Therefore, ‘x’ and ‘y’ vary directly.

7. If a car covers 80km in 5 litres of petrol, how much distance will it cover in 3 litres of petrol?

Ans: Given: In 5 litres of petrol, distance covered = 80km

Thus, in 1 litre of petrol, distance covered = 805= 16km$\frac{80}{5} = 16\text{km}$

In, 13 litres of petrol, distance covered = 16×13=208km$16 \times 13 = 208\text{km}$

Short Answer Type Questions 2 Mark

8. If 32 men can reap a field in 15 days. In how many days can 40 men reap the same field?

Ans: This situation is inverse variation (less men, more days)

Let x=$x =$ men,y=$y =$ no. of days x1=32,y1=15$x_1 = 32$, $y_1 = 15$ x2=40,y2=?
$x_2 = 40$, $y_2 =$?

Formula is x1y1=x2y2$x_1 y_1 = x_2 y_2$

(32)(15)=(40)y2 $(32)(15) = (40)y2$

y2=32×1540$y_2 = \frac{32 \times 15}{40}$

y2=12$y_2 = 12$

Therefore, number of days =$12 = 12$

9. If 4 kg potatoes cost Rs. 60. What is the cost of 12kg of potatoes?

Ans: Given: cost of 4 kg potatoes = Rs. 60

Therefore, 1 kg potatoes cost Rs = 604=15$\frac{60}{4} = 15$

Thus, 12kg potatoes cost = 15×12=Rs.180$15 \times 12 = \text{Rs.}180$

10. Find the value of x and y if x : y = 2 : 3 and 2 : x = 1 : 2.

Ans: Given: 2 : x = 1 : 2

$\Rightarrow 2x=12 \Rightarrow \frac{2}{x}=\frac{1}{2}$

$\Rightarrow x = 2\times2 \Rightarrow x = 2 \times 2$

$\Rightarrow x = 4 \Rightarrow x = 4$

$x : y = 2 : 3 x : y = 2 : 3$

$4 : y = 2 : 3 4 : y = 2 : 3$

$4y=23 \frac{4}{y}=\frac{2}{3}$

$y = 4\times32 y = \frac{4 \times 3}{2}$

$y = 6 y = 6$

11. If 2 : 3 = x : 51. Find 'x'.

Ans: $23=x51 \frac{2}{3}=\frac{x}{51}$

$\Rightarrow x = 2\times513 \Rightarrow x = \frac{2 \times 51}{3}$

$\Rightarrow x = 34 \Rightarrow x = 34$

Short Answer Type Questions 3 Mark

12. If x and y are in inverse proportion. Find the value of a, b and c in the table.

X	25	15	B	10
Y	3	A	4	c

Ans:

$x \propto 1y \Rightarrow x1y1 = x2y2 x \propto \frac{1}{y} \Rightarrow x_1 y_1 = x_2 y_2$

1. $25 \times 3 = 15 \times a \Rightarrow a = 7515 = 525 \times 3 = 15 \times a \Rightarrow a = \frac{75}{15} = 5$
2. $25 \times 3 = b \times 4 \Rightarrow b = 754 = 18.7525 \times 3 = b \times 4 \Rightarrow b = \frac{75}{4} = 18.75$
3. $25 \times 3 = 10 \times c \Rightarrow c = 7510 = 7.525 \times 3 = 10 \times c \Rightarrow c = \frac{75}{10} = 7.5$

13. The scale of a map is given as 1 : 80000000. Two places A and B on the map are 3 cm apart. What is the actual distance between A and B? If C and D are at a distance of 3200 km, then find the distance between them on map?

Ans: Given: scale of map = 1 : 80000000

Thus, 1 unit on map shows 80000000 units in the real world.

If A and B are 3 cm apart on map,

Actual distance =

3cm × 80000000$3\text{cm} \times 80000000$

= 240000000 $= 240000000$

= 2400 km $= 2400\ \text{km}$

If C and D are at a distance of 32km apart, then

3200km = 3200 × 1000 × 100cm$3200\text{km} = 3200 \times 1000 \times 100\text{cm}$

= 320000000 cm $= 320000000\ \text{cm}$

Therefore, on the map it should be $= 32000000080000000 = 4\text{cm} = \frac{320000000}{80000000} = 4\text{cm}$

14. There are 50 students in a hostel. The food provision for them is for 15 days. How long will their provision last if 5 students leave the group?

Ans: It is inverse variation since no. of students increases as no. of days food provision provided increases.

Let ' xx ' be the no. of students And ' yy ' be the number of days

Given: x1=50,y1=15$x_1 = 50$, $y_1 = 15$

x2=50−5=45,y2=?$x_2 = 50 - 5 = 45$, $y_2 = \ ?$

x1y1=x2y2$x_1 y_1 = x_2 y_2$

50×15=45×y2$50 \times 15 = 45 \times y_2$

y2=50×1545$y_2 = \frac{50 \times 15}{45}$

y2=16.66=17$y_2 = 16.66 = 17$ days

15. A workforce of 210 men with a supervisor can finish a certain piece of work in 5 months. How many extra men must he employ if he want to complete job in just 2 months?

Ans: Let the extra men employed be ‘x’

Number of men(x): 210 x

Months(y): 5 2

Since, men hired and time required are inversely proportional, we have

x1y1=x2y2$x_1 y_1 = x_2 y_2$

210×5=x×2$210 \times 5 = x \times 2$

x=210×52=525$x = \frac{210 \times 5}{2} = 525$

Thus, extra men needed =525−210=315$= 525 - 210 = 315$.

16. Ranjith 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 machines?

Ans: Let the no. of machines he can buy if a discount of Rs. 50 is offered on each machine be ‘x’.

Number of Machines(x): 75 x

Price of Each Machine(y): 200 150

Since the discount is Rs.50, the cost of each machine will be 200 – 50 = 150.

It is the inverse proportion as if the price of a machine is less, the more machines he can buy.

75×200=x× 15075 × 200 = x × 150

⇒x = 75×200150=15000150 ⇒ $x = \frac{75 \times 200}{150} = \frac{15000}{150}$

⇒x = 100 ⇒ $x = 100$

17. A worker is paid Rs. 420 for 2 days work. If his total income of the month is Rs. 1750, For how many days did he work?

Ans: It is direct variation. More wages, more days of work.

Let ‘x’ be the amount paid and ‘y’ be the number of days.

Amount paid(x) : Rs.420 Rs.1750

Number of days(y): 12 ?

x1y1=x2y2$\frac{x_1}{y_1} = \frac{x_2}{y_2}$

42012=1750y2$\frac{420}{12} = \frac{1750}{y_2}$

y2=1750×12420$y_2 = \frac{1750 \times 12}{420}$

y2=50 days $y_2 = 50 \text{ days}$

18. Abdul takes 75 steps to cover a distance of 50m. How much distance will it cover in 375 steps?

Ans: It is direct variation as the number of steps increases, the distance covered will be more.

Let ‘x’ be the number of steps and ‘y’ be the distance covered.

Number of steps(x): 75 375

Distance covered(y): 50m ?

x1y1=x2y2$\frac{x_1}{y_1} = \frac{x_2}{y_2}$

7550=375y2$\frac{75}{50} = \frac{375}{y_2}$

y2=375×5075$y_2 = \frac{375 \times 50}{75}$

y2=250 m$y_2 = 250\text{m}$

19. If the weights of 8 sheets of paper be 45 grams. How many sheets would weigh $1121\frac{1}{2}$ kg?

Ans: It is direct variation as more number of sheets implies more weight.

Number of sheets(x): 6 ?

Number of hours(y): 45 $1121\frac{1}{2}$kg = 1500g 1Kg=1000g,1.5Kg=1500g

$1Kg = 1000g$, $1.5Kg = 1500g$

x1y1=x2y2$\frac{x_1}{y_1} = \frac{x_2}{y_2}$

645=x21500$\frac{6}{45} = \frac{x_2}{1500}$

x2=6×150045$x_2 = \frac{6 \times 1500}{45}$

x2=200$x_2 = 200$

20. 20 pumps can empty a reservoir is 12 hours. In how many hours can 45 such pumps do the same work?

Ans: It is inverse variation as it takes less hours if the number of pumps are more.

Number of pumps(x): 20 45

Number of hours(y): 12 ?

x1y1=x2y2$x_1 y_1 = x_2 y_2$

20×12=45×y2$20 \times 12 = 45 \times y_2$

y2=20×1245$y_2 = \frac{20 \times 12}{45}$

y2=5.33=513 hours $y_2 = 5.33 = 5\frac{1}{3}\,\text{hours}$

Long Answer Type Questions

5 Mark

21. A water tanker can finish a certain journey in 10 hours at the speed of 38 km/hr. By how much should its speed be increased so that it may take only 8 hours to cover the same distance?

Ans: Given: speed = 38 km/hr, time = 10 hours.

Distance covered = speed × × time = 38×10=380km$38 \times 10 = 380\text{km}$

Speed(x) : 38km/hr ?

Time taken(y) : 10 hours 8 hours

It is an inverse variation.

x1y1=x2y2$x_1y_1 = x_2y_2$

38×10=x2×8$38 \times 10 = x_2 \times 8$

x2=38×108$x_2 = \frac{38 \times 10}{8}$

x2=47.5 km/hr$x_2 = 47.5\text{km / hr}$

Thus, the speed is increased by 47.5−38=9.5 km/hr$47.5 - 38 = 9.5\text{km / hr}.$

22. 1000 children in a hostel had enough food for 28 days. After 4 days, some children were shifted to other hostel. As a result, the food now lasted for 32 days. How many students were shifted?

Ans: Given: 1000 students in a hostel had enough food for 28 days.

Let ‘x’ be the number of students shifted.

Number of students(x): 1000 1000-x

Number of days: 28 32

It is an inverse variation: as the number of students increases, food remains for less number of days.

x1y1=x2y2$x_1y_1 = x_2y_2$

1000×28=(1000−x)×32$1000 \times 28 = (1000 - x) \times 32$

1000−x=1000×2832=875$1000 - x = \frac{1000 \times 28}{32} = 875$

x=1000−875=125$x = 1000 - 875 = 125$

Therefore, the number of students shifted = 125.

23. The amount of extension in the length of the elastic string directly varies as the weight hung on it. If a weight of 500 gm produces an extension of 3 cm, then what weight would produce an extension of 36.2 cm. Write the solution in Kg.

Ans: Weight(x) : 200gm 7

Extension in length(y) : 3 cm 36.2 cm

It is a direct variation.

x1y1=x2y2$\frac{x_1}{y_1} = \frac{x_2}{y_2}$

2003=x236.2$\frac{200}{3} = \frac{x2}{36.2}$

x2=200×36.23$x_2 = \frac{200 \times 36.2}{3}$

x2=72403$x_2 = \frac{7240}{3}$

x2=2.41kg$x_2 = 2.41kg$

24. Find ‘a’ in the following table when

X	2	5
Y	10	a

1. x, y vary directly

(b) x, y vary inversely.

Ans:

1. when x and y vary directly.

x1y1=x2y2$\frac{x_1}{y_1} = \frac{x_2}{y_2}$

210=5a$\frac{2}{10} = \frac{5}{a}$

a = 502=25a $= \frac{50}{2} = 25$

2. When x and y vary inversely

x1y1=x2y2$x_1 y_1 = x_2 y_2$

2×10=5×a$2 \times 10 = 5 \times a$

a = 205a $= \frac{20}{5}$

a = 4a $= 4$

25. Which of the following quantities vary directly or indirectly with each other

1. Number of pens and their cost
2. Distance travelled (at constant speed) and petrol used.
3. Number of men available and time taken to do a job.
4. Area of land and its price.
5. wages y and hours of work x.

Ans:

1. As pens increase, cost increases – direct variation.
2. As distance travelled increases, the amount of petrol increases – direct variation.
3. Number of men decreases, time taken increases – Inverse variation.
4. Direct variation.
5. Direct variation.