

## CHAPTER 13

# DIRECT AND INVERSE PROPORTION

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### Key Facts

(i) In direct proportion

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

(ii) In inverse proportion

$$x_1 y_1 = x_2 y_2$$

or

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

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## QUESTIONS

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1. What is Ratio?
2. In the table state whether  $x$  and  $y$  vary directly.

$x$	3	6	13	18	20	24	36
$y$	12	24	39	54	60	96	144

3. In the table state whether  $x$  and  $y$  vary directly.

$x$	4	6	8	11	13	17
$y$	20	30	40	55	65	85

4. In the table state whether  $x$  and  $y$  vary directly.

$x$	1	2	3	4	5	6
$y$	6	5	4	3	2	1

5. Which of the following quantities do not vary directly with each other.

(i) Distance travelled (at constant speed) and petrol used.

- (ii) Ages of boys and their weight
  - (iii) Area of land and its price.
  - (iv) Number of pages of a book and its price.
  - (v) Number of men available and time taken to do a job.
6. Which of the following quantities do not vary directly with each other.
- (i) Time  $x$  to cover a fixed distance with speed  $y$ .
  - (ii) Number of Pens and their cost.
  - (iii) Weight of articles  $x$  and their cost  $y$ .
  - (iv) Wages  $y$  and hours of work  $x$ .
  - (v) Distance  $x$  and time  $y$ , speed remaining the same.
  - (vi) The length  $x$  of a journey by bus and the price of the ticket.
7. The cost of one dozen copies is Rs. 36. What is the cost of :
- (i) 2 copies
  - (ii) 5 copies
  - (iii) 10 copies
  - (iv) 6 copies
8. The cost of mailing 20 parcels is Rs. 160. What is cost of mailing :
- (i) 8 parcels
  - (ii) 15 parcels
  - (iii) 70 parcels
  - (iv) 200 parcels
9. 15 men can dig a 20 meters long trench in one day. How many men should be employed for digging 140 meters long trench of the same type in one day.
10. Twenty-seven tons of Iron cost Rs. 540.00. Find the cost of 120 tons of Iron.
11. The weekly consumption of rice of a hostel with 480 students is 160 kg. Find the consumption if the number of students becomes 720.
12. The shadow of Qutab Minar, which is 72 m high is 80m at a particular time on a day. Find the height of an electric pole which cast a shadow of 10m under similar condition.
13. If the weight of 6 sheets of paper be 45gms. How many sheets would weigh  $1\frac{1}{2}$  kg ?
14. A man whose height is 165 cm casts a shadow of 55 cm at a particular time of the day. Find the length of shadow of a tree 33m high under similar weather conditions.
15. Raghav takes 75 steps to cover a distance of 50 m. How much distance will he cover in 375 steps.
16. The minimum speed for passing a typing test is 40 words per minute. How many words should an examinee type in half an hour so as to pass the typing test?
17. If 15 stamps of a denomination occupy an area of 60 sq. cm. How much area of paper is required for putting 120 stamps assuming that no area is wasted in between the stamps.

18. A machine takes 5 hours in cutting 120 tools. How many tools will it cut in 20 hours.
19. 20 pumps can empty a reservoir in 12 hours. In how many hours can 45 such pumps do the same work?
20. 36 books are packed in 2 carton of the same size. How many such cartons will it require to pack 144 books?

**Fill in the blanks : (Q. 21 to Q. 24)**

21. Ratio  $\frac{a}{b}$  remain \_\_\_\_\_ in direct Variation.
22. In direct Variation  $\frac{a_1}{b_1} \square \frac{a_2}{b_2}$ .
23.  $ab$  is constant in \_\_\_\_\_ variation.
24. In Inverse Variation  $\frac{a_1}{\square} = \frac{b_2}{\square}$ .
25. Which of the following vary inversely to each other?
  - (i) The number of labourers engaged to dig a trench and time to complete the digging.
  - (ii) The length of journey by train and price paid for the ticket.
  - (iii) The number of subjects and time to do the home work in each subject.
  - (iv) Speed of vehicles and time taken to cover a fixed distance.
26. Shabnam takes 20 minutes to reach her school at an average speed of 6 Km/hour. If she is required to reach school in 24 minutes, what should be her speed?
27. If 6 men can complete the wiring of a house in 7 days. In how many days 21 men can do this work.
28. A vegetable vender has Rs. 2000 to buy potatoes which are available at the rate of Rs. 8 per kg. If the price of potatoes increases by 25%, find how much potatoes he can purchase with same amount?
29. If the 45 men can do a work in 20 days. Then how many men can do the same work in 75 days.
30.  $x$  and  $y$  are inverse quantities. If the value of  $x$  is 15 and value of  $y$  is 5 then which pair is not corresponding to  $x$  and  $y$ .
 

(i) 25 and 3	(ii) 14 and 5
(iii) 16 and 6	(iv) 18.75 and 4.
31. In a military camp there is a food for 30 days for 50 soldiers. Assuming that average meal of every soldier is same. If 25 more soldiers join them then how many days this food will last.

32. A contractor employs a work force of 500 persons to complete construction of a bridge in six months. If he is asked to complete the work in 4 months then how many extra persons will he have to employ.
33. A train of length 315m is travelling at a speed of 54 km/hour. In what time will it pass a pole?
34. A group of 100 masons can make a road in 3 months while another group of 60 masons can build the same length of road in 4 months. Which group is more efficient in the construction of the road.

35. Fill in the blanks in the following table :

Time (in second)	1	4	15	30	$x$
Speed	150	37.5	10	$y$	3

36. If there is indirect variation between  $x$  and  $y$  then find the value of  $l$ ,  $m$  and  $n$ .

$x$	1	2	3	$l$
$y$	$m$	$n$	$\frac{4}{3}$	$\frac{1}{3}$

37. If 721 men construct a bridge in 48 days then in how many days 1442 men can do this work.
38. If 10 men can do a work in 8 days then in how many days 2 men can do this work.
39. Rita can finish a work in 9 days. How much work she do in 2 days.
40. Seema and Riya can do a piece of work in 9 days but Seema alone can do it in 12 days. How long will Riya take to finish this work alone.
41. The speed of a car is 90km/hour. What is its speed in m/sec.?
42. A train is running at a speed of 18 km/hr. If it crosses a pole in 35 seconds find the length of the train.
43. The speed of a train 200 m long is 50 km per hour. How much time will it take to pass a platform 550m long?
44. A Hero Honda motor bike is running at 72km/hr. How much distance will it cover in 5 sec.?
45. A person cycles at a distance of 64 km. at a speed of 12 km/hr. How much time does he take to cover the distance?
46. Two trains 500m and 700m long are going with speeds 70km/hr. and 50km/hr. respectively in opposite direction. How long will it take to pass each other.
47. How long will a boy take to run around a square field of side 35m, if he runs at a speed of 9km/hr?
48. A train 154 m long is running at 60km/hr. It takes 30 seconds to cross a bridge, find the length of the bridge.

49. A gun is fixed at a distance of 1.75 km away from a watch point. The watchman hears the sound of the gun fire after 5 seconds. Find the speed at which sound travels.
50. Arnav weaves 35 seats of chairs in 7 days. How many days will he take to weave 140 similar seats of chairs.

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## ANSWERS

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|---|--------------|---|---------------|
| 1. It is comparison of two quantities of same kind in terms of magnitude. |              |   |               |
| 2. No.  |              |   |               |
| 3. Yes  |              | 4. No.                                  |               |
| 5. (ii) and (v)   |              | 6. (i)                                  |               |
| 7. (i) 6  | (ii) 15      | (iii) 30                                | (iv) 18       |
| 8. (i) Rs. 64   | (ii) Rs. 120 | (iii) Rs. 560                           | (iv) Rs. 1600 |
| 9. 105 men  |              | 10. Rs. 2400                            |               |
| 11. 240 kg  |              | 12. 9 meters                            |               |
| 13. 200 sheets  |              | 14. 11 m                                |               |
| 15. 250 m   |              | 16. 1200                                |               |
| 17. 480 cm <sup>2</sup>   |              | 18. 480                                 |               |
| 19. $5\frac{1}{3}$ Hours  |              | 20. 8 cartoons                          |               |
| 21. Constant  |              | 22. Equal                               |               |
| 23. Inverse Variation   |              | 24. $\frac{a_1}{a_2} = \frac{b_1}{b_2}$ |               |
| 25. (i) and (iv)  |              | 26. 5 km/h                              |               |
| 27. 2 days  |              | 28. 200kg                               |               |
| 29. 12 Days   |              | 30. (ii), (iii)                         |               |
| 31. 20 Days   |              | 32. 250                                 |               |
| 33. 21sec.  |              | 34. Second Group                        |               |
| 35. $x = 50, y = 5$   |              | 36. $l = 12, m = 4, n = 2.$             |               |
| 37. 24 Days   |              | 38. 40 Days                             |               |
| 39. $\frac{2}{9}$   |              | 40. 36 Days                             |               |
| 41. 25 m/sec.   |              | 42. 175m                                |               |
| 43. 54 sec.   |              | 44. 100 m                               |               |

45. 5 Hours 20 Minutes

46. 36 sec.

47. 56 sec.

48. 346 m

49. 350 m/sec.

50. 28 Days

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### TEST YOUR KNOWLEDGE

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1. In the following table  $a$  and  $b$  are in direct proportion. Find the value of  $p$ .

$a$	2	$p$	100
$b$	$\frac{1}{2}$	$\frac{3}{4}$	$q$

2. In the above table (Q. 1) find the value of  $q$ .

In the following table  $l$  and  $m$  vary inversely. Study the table and answer question 3 and 4.

$l$	4	$x$	.001
$m$	.25	$\frac{1}{7}$	$y$

3. Find the value of  $x$ .  
4. Find the value of  $y$ .

Read the following statements in which two quantities are inter-related. Then answer question 5 to 7.

- (i) Speed and distance covered
  - (ii) Speed and time taken
  - (iii) Distance covered and time taken
  - (iv) Age and height of a person.
5. In which statements the quantities vary directly.  
6. In which statements the quantities vary inversely.  
7. In which statement quantities neither vary directly nor inversely.  
8. Mahesh goes 5 km with a speed of 10 km/hr. If he doubles his speed, find the time taken to cover the same distance.  
9. If a minute hand in a clock makes an angle of  $30^\circ$  in 5 minutes. Find the angle covered by it between 4:10 p.m. and 4:30 p.m.  
10. In one day Ramesh completes  $\frac{1}{6}$  part of a work. In how many days he can finish the whole work.

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## ANSWERS

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|----------------|---------------|
| 1. 3           | 2. 25         |
| 3. 7           | 4. 1000       |
| 5. (i), (iii)  | 6. (ii)       |
| 7. (iv)        | 8. 15 Minutes |
| 9. $120^\circ$ | 10. 6 Days.   |