

## TEXT BOOK EXERCISE 11.2

Q. 1. Which of the following are in inverse proportion ?

(i) 

x	8	6
y	9	12

(ii) 

x	15	5
y	18	56

(iii) 

x	24	8
y	20	60

(iv) 

x	12	18
y	24	20

(v) 

x	25	10
y	20	50

**Solution.** We know if  $x$  and  $y$  are in inverse proportion then  $x_1y_1 = x_2y_2$

(i) Here,  $x_1 = 8, x_2 = 6, y_1 = 9, y_2 = 12$

$$\therefore x_1y_1 = 8 \times 9 = 72$$

$$\text{and } x_2y_2 = 6 \times 12 = 72$$

$$\Rightarrow x_1y_1 = x_2y_2 = 72$$

Thus,  $x$  and  $y$  are in inverse proportion.

(ii) Here,  $x_1 = 15, x_2 = 5, y_1 = 18, y_2 = 56$

$$\therefore x_1y_1 = 15 \times 18 = 270$$

$$\text{and } x_2y_2 = 5 \times 56 = 280$$

$$\Rightarrow x_1y_1 \neq x_2y_2$$

Thus,  $x$  and  $y$  are not in inverse proportion.

(iii) Here,  $x_1 = 24, x_2 = 8, y_1 = 20, y_2 = 60$

$$\therefore x_1y_1 = 24 \times 20 = 480$$

$$\text{and } x_2y_2 = 8 \times 60 = 480$$

$$\Rightarrow x_1y_1 = x_2y_2$$

Thus,  $x$  and  $y$  are in inverse proportion.

(iv) Here,  $x_1 = 12, x_2 = 18, y_1 = 24, y_2 = 20$

$$\therefore x_1y_1 = 12 \times 24 = 288$$

$$\text{and } x_2y_2 = 18 \times 20 = 360$$

$$\Rightarrow x_1y_1 \neq x_2y_2$$

Thus,  $x$  and  $y$  are not in inverse proportion.

(v) Here,  $x_1 = 25, x_2 = 10, y_1 = 20, y_2 = 50$

$$\therefore x_1 y_1 = 25 \times 20 = 500$$

$$\text{and } x_2 y_2 = 10 \times 50 = 500.$$

$$\Rightarrow x_1 y_1 = x_2 y_2$$

Thus,  $x$  and  $y$  are in inverse proportion.

**Q. 2.** Find the value of 'a' if  $x$  and  $y$  are in inverse proportion.

$$(i) \begin{array}{|c|c|c|} \hline x & 16 & 8 \\ \hline y & 9 & a \\ \hline \end{array} \quad (ii) \begin{array}{|c|c|c|} \hline x & 12 & 27 \\ \hline y & a & 4 \\ \hline \end{array}$$

$$(iii) \begin{array}{|c|c|c|} \hline x & 25 & a \\ \hline y & 8 & 20 \\ \hline \end{array}$$

**Solution.** Given  $x$  and  $y$  are in inverse proportion.

$$(i) \quad x_1 y_1 = x_2 y_2 \Rightarrow 16 \times 9 = 8 \times a$$

$$\Rightarrow a = \frac{16 \times 9}{8} = 18$$

$$(ii) \quad x_1 y_1 = x_2 y_2 \Rightarrow 12 \times a = 27 \times 4$$

$$\Rightarrow a = \frac{27 \times 4}{12} = 9$$

$$(iii) \quad x_1 y_1 = x_2 y_2 \Rightarrow 25 \times 8 = a \times 20$$

$$\Rightarrow a = \frac{25 \times 8}{20} = 10$$

**Q. 3.** If a box of pens is given to 25 children, they will get 3 pens each. How many pens would each child get, if the number of children is reduced by 10 ?

**Solution.** Let each student would get  $y$  pens when number of children remains  $25 - 10 = 15$ .

We form the table as given below :

Number of children	25	15
Number of pens	3	$y$

Note that it is a case of inverse proportion.

$$\text{So, } 25 \times 3 = 15 \times y$$

$$\Rightarrow y = \frac{25 \times 3}{15} = 5$$

Thus, each remaining student will get 5 pens each. **Ans.**

**Q. 4.** A batch of tablets were packed in 10 boxes with 6 tablets in each box. If the same batch is packed using 12 tablets in each box. How many boxes would be needed ?

**Solution.** Let  $x$  boxes would be needed by packing 12 tablets in each box.

Number of boxes	10	$x$
Number of tablets	6	12

Clearly, as the number of tablets increases in each box, the number of boxes decreases. Therefore, it is a case of inverse proportion

$$\therefore 10 \times 6 = x \times 12 \Rightarrow x = \frac{10 \times 6}{12} = 5$$

Thus, 5 boxes are packed using 12 tablets in each box. **Ans.**

**Q. 5.** A company requires 36 machines to make a product in 54 days. How many machines would be required to make the same product in 81 days ?

**Solution.** Let the number of machines would required to produce a given number of production in 81 days be  $y$ . We form the following table :

Number of days	54	81
Number of machines	36	$y$

We note that lesser the number of days more will be the number of machines. Therefore, it is inverse proportion.

$$\therefore 54 \times 36 = 81 \times y$$

$$\Rightarrow y = \frac{54 \times 36}{81} = 24$$

Hence, the required number of machines

$$= 24 \text{ Ans.}$$

**Q. 6.** 6 pipes are required to fill a tank in 1 h 20 min. How long will it take if only 5 pipes of the same type are used ?

**Solution.** Let the desired time to fill the tank be  $y$  minutes.

Thus, we have the following table :

Number of pipes	6	5
Time in minutes	80	$y$

Lesser the number of pipes, more will be the time required by it to fill the tank. So, this is a case of inverse proportion.

$$\therefore 80 \times 6 = 5 \times y \Rightarrow y = \frac{80 \times 6}{5} = 96$$

Hence, time taken to fill the tank by 5 pipes is 96 minutes or 1 hour 36 minutes. Ans.

**Q. 7. A train takes 2 hours to reach a destination at speed of 60 km/h. How long will it take to reach the destination at 80 km/h ?**

**Solution.** Let the time taken to travel at the speed of 80 km/h be  $x$  hours. We have the following table :

Time (in hours)	2	$x$
Speed (in km/h)	60	80

Clearly, as the speed increases, the time decreases. Therefore, it is a case of inverse proportion.

$$\therefore 2 \times 60 = 80 \times x$$

$$\text{or } x = \frac{2 \times 60}{80} = \frac{3}{2} = 1\frac{1}{2}$$

Hence, the required time is  $1\frac{1}{2}$  hours or 1 hour 30 minutes. Ans.

**Q. 8. A car can finish a certain journey in 10 hours at the speed of 32 km/h. By how much should its speed be increased so that it may take only 8 hours to cover the same distance ?**

**Solution.** Let increased speed of the car be  $y$  km/h.

We have the following table :

Time (in hours)	10	8
Speed (in km/h)	32	$y$

Clearly, as time decreases, the speed increases. Therefore, it is a case of inverse proportion.

$$\therefore 10 \times 32 = 8 \times y$$

$$\Rightarrow y = \frac{10 \times 32}{8} = 40$$

$\therefore$  Increased speed of the car = 40 km/h  
Hence, the speed of car is increased by  $(40 - 32)$  km/h i.e. 8 km/h. Ans.

**Q. 9. Two persons could fit the AC unit in a house in 2 hours. One person fell ill before the work started, how long would the job take now ?**

**Solution.** Let remaining one person take  $y$  hours to do the job.

We have the following table :

Number of persons	2	1
Time taken (in hours)	2	$y$

Obviously, lesser the number of persons, more is the time taken.

So, it is a case of inverse proportion

$$\therefore 2 \times 2 = 1 \times y$$

$$\Rightarrow y = 4$$

Thus, one person will take 4 hours to finish the job. Ans.

**Q. 10. Arrangement of tables & chairs in an exam hall is done by 10 workers in 2 hours. How many workers will be required to do the same work in 4 hours ?**

**Solution.** Let  $x$  workers will be required to do the same work in 4 hours.

We have the following table :

Number of workers	10	$x$
Time taken	2	4

As the time increases the number of worker decreases.

Therefore, this is case of inverse proportion.

$$\therefore 10 \times 2 = x \times 4 \Rightarrow x = \frac{10 \times 2}{4} = 5$$

Hence, 5 workers are required. Ans.

**Q. 11. A factory requires 42 machines to produce a given number of articles in 63 days ? How many more machines would be required to produce the same number of articles in 54 days ?**

**Solution.** Let the number of machines required to produce given number of articles in 54 days be  $x$ . We have the following table :

Number of machines	42	$x$
Number of days	63	54

Clearly, as the number of days decreases, the number of machines increases. Therefore, it is a case of inverse proportion.

$$\therefore 42 \times 63 = x \times 54$$

$$\text{or } x = \frac{42 \times 63}{54} = 49$$

Hence, the number of machines required is 49. **Ans.**

**Q. 12.** There are 200 students in a hostel. Food provision for them lasts for 10 days. How long will these provision last, if 50 more students join the hostel ?

**Solution.** Suppose the provisions last for  $y$  days when the number of students is 250.

We have the following table :

Number of students	200	250
Number of days	10	$y$

Note that more the number of students, the sooner would the provisions last.

Therefore, this is case of inverse proportion.

$$\text{So, } 200 \times 10 = 250 \times y$$

$$\Rightarrow y = \frac{200 \times 10}{250} = 8$$

Thus, the provision will last for 8 days. **Ans.**

**Q. 13.** If a box of sweets is divided among 24 children, they will get 4 sweets each. How many would each get, if the number of children is reduced by 8 ?

**Solution.** Number of children after reduction =  $24 - 8 = 16$

Let the number of sweets be  $x$  for 16 children

We have the following table :

Number of children	24	16
Number of sweets	4	$x$

With lesser children the number of sweets will increase. Therefore, it is a case of inverse proportion.

$$\therefore 24 \times 4 = 16 \times x$$

$$\text{or } \frac{24 \times 4}{16} = x$$

$$\text{or } x = 6$$

Thus, the required number of sweets is 6. **Ans.**

**Q. 14.** In a television game show, the prize money of ₹ 1,00,000 is to be divided equally among winners. Complete the following table and find whether the prize money given to an individual winner is directly or inversely proportion to the numbers of winners.

No. of winners	1	2	4	5	8	10
Prize money of each winner	100000	50000	-	-	-	-

**Solution.** Let  $y_3, y_4, y_5$  and  $y_6$  are the prize money given.

Here,  $x_1 = 1, x_2 = 2, x_3 = 4, x_4 = 5, x_5 = 8$  and  $x_6 = 10$ .

$y_1 = 1,00,000, y_2 = 50,000, y_3 = ?, y_4 = ?, y_5 = ?$  and  $y_6 = ?$

$$x_1 \times y_1 = 1 \times 1,00,000 = 1,00,000$$

$$\text{and } x_2 \times y_2 = 2 \times 50,000 = 1,00,000$$

$$\text{Since, } x_1 y_1 = x_2 \times y_2$$

Therefore, it is a case of inverse proportion.

$$(i) \text{ Here, } x_1 \times y_1 = x_3 \times y_3$$

$$1 \times 1,00,000 = 4 \times y_3$$

$$\Rightarrow y_3 = \frac{100000}{4} = 25,000 \text{ Ans.}$$

$$(ii) \text{ Here, } x_1 \times y_1 = x_4 \times y_4$$

$$1 \times 1,00,000 = 5 \times y_4$$

$$y_4 = \frac{100000}{5} = 20,000 \text{ Ans.}$$

$$(iii) \text{ Here, } x_1 \times y_1 = x_5 \times y_5$$

$$1 \times 1,00,000 = 8 \times y_5$$

$$y_5 = \frac{100000}{8} = 12,500 \text{ Ans.}$$

$$(iv) \text{ Here, } x_1 \times y_1 = x_6 \times y_6$$

$$1 \times 1,00,000 = 10 \times y_6$$

$$\Rightarrow y_6 = \frac{100000}{10} = 10,000 \text{ Ans.}$$

**Q. 15. Multiple Choice Questions :**

(i) If  $x$  and  $y$  are in inverse proportion then which of the following is true ?

$$(a) xy = k \quad (b) \frac{x}{y} = k$$

$$(c) x + y = k \quad (d) x - y = k$$

(ii) Find  $a$  if  $x$  and  $y$  are in inverse proportion :

$x$	30	24
$y$	12	$a$

- (a) 18  
(c) 15
- (b) 20  
(d) 16.

(iii) 10 men complete a work in 20 days. In how many days 25 men will complete the work ?

- (a) 4  
(c) 12
- (b) 16  
(d) 8.
- (iv) A farmer has enough food to feed 20 animals in his cattle for 6 days ? How long would the food last if there were 10 more animals in his cattle ?

- (a) 2  
(c) 4
- (b) 8  
(d) 10.
- Ans. (i) (a)  $xy = k$  (ii) (c) 15  
(iii) (d) 8 (iv) (c) 4.

## Objective Type Questions

### 1. Multiple Choice Questions :

(i) If by decreasing one quantity the other also decrease then they are in :

- (a) Inverse proportion  
(b) Direct proportion  
(c) Zero proportion  
(d) None.

Ans. (b) Direct proportion.

(ii) Which of the following is an example of inverse variation ?

- (a) Area of the field and yield of the crop  
(b) Cost of the apples and quantity of apples bought  
(c) The time taken with uniform speed and distance travelled  
(d) The population of a country and per capita area.

Ans. (d) The population of a country and per capita area.

(iii) If on increasing one quantity, the other quantity also increases then they are :

- (a) Inversely proportional  
(b) Directly proportional  
(c) Equally proportional  
(d) None.

Ans. (b) Directly proportional.

(iv) If on increasing one quantity, the other quantity decreases then they are :

- (a) Inversely proportional  
(b) Directly proportional  
(c) Equally proportional  
(d) None.

Ans. (a) Inversely proportional.

(v) If the two quantities are in direct proportion, then on increasing one quantity the other will :

- (a) Decrease (b) Remain equal  
(c) Increase (d) No relation.

Ans. (c) Increase.

(vi) If the two quantities are in inverse proportion, then on increasing one quantity other will :

- (a) Decrease  
(b) Increase  
(c) Will remain same  
(d) No relation.

Ans. (a) Decrease.

(vii) If the speed remains the same, then on increasing the distance, time taken to complete the journey will :

- (a) Decrease (b) Remains the same  
(c) Increase (d) None.

Ans. (c) Increase.

(viii) If the rate of interest remains the same, then on depositing more amount, interest received will :

- (a) Decrease  
(b) Increase  
(c) Remains the same  
(d) Does not know.

Ans. (b) Increase.

(ix) If the work is same, then on increasing the number of persons, time taken to complete the work will :

- (a) Increase  
(b) Remains the same

- (c) Decrease
- (d) None.

**Ans.** (c) Decrease.

(x) The relation between height of the tree and length of its shadow (time being the same) is :

- (a) Directly proportional
- (b) Inversely proportional
- (c) Equal proportional
- (d) None.

**Ans.** (a) Directly proportional.

## 2. Choose True/False for the following questions :

(i) Area of the field and yield of crop is an example of inverse proportion. (True/False)

**Ans.** False.

(ii) If by decreasing one quantity the other also decreases then they are in direct proportion. (True/False)

**Ans.** True.

(iii) If on increasing one quantity, the other quantity decreases they are inversely proportional. (True/False)

**Ans.** True.

(iv) A loaded truck travels 14 km in 25 minutes. If the speed remains the same, how far it can travel in 5 hours. It is an example of inverse proportion. (True/False)

**Ans.** False.

(v) The relation between height of the tree and length of its shadow (time being the same) is directly proportion. (True/False)

**Ans.** True.

## 3. Fill in the blanks :

(i) If the two quantities are in direct proportion, then on increasing one quantity the other will .....

**Ans.** increase.

(ii) If the two quantities are in inverse proportion, then on increasing one quantity the other will .....

**Ans.** decrease.

(iii) If the work is same, then on increasing the number of persons, time taken to complete the work will .....

**Ans.** decrease.

(iv) If the rate of interest remains the same, then on depositing more amount, interest received will .....

**Ans.** increase.

(v) A farmer has enough food to feed 20 animals in his cattle for 6 days. How long would the food last if there were 10 more animals in his cattle. This is an example of .....

**Ans.** inverse proportion.