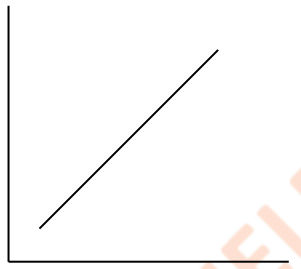
Introduction

Direct proportions: Two Quantities are said to be in direct proportion if whenever the value of one increases or decreases then the value of other increases or decreases in such a way that ratio between them remains constant.

If two quantities are x and y then x/y remains constant

That is, x1/y1 = x2/y2 = x3/y3 ……. = k

where k is a constant



Direct variation or proportion

Examples

Example 1 – Observe the tables given below and find whether x and y are directly proportional:

(a)

x	**3**	**5**	**7**	**9**	**12**
y	**6**	**10**	**14**	**18**	**24**

Solution - Since $\frac{x}{y} = \frac{3}{6} = \frac{5}{10} = \frac{7}{14} = \frac{9}{18} = \frac{12}{24} = \frac{1}{2} = a\ constant$

Thus, x and y are directly proportional.

(b)

x	**4**	**7**	**12**	**15**
y	**12**	**21**	**36**	**60**

Solution - Since $\frac{x}{y} = \frac{4}{12} = \frac{7}{21} = \frac{12}{36} \neq \frac{15}{60}$

Thus, x and y are not directly proportional

Example 2 – If x and y are directly proportional, find the values of x1, x2 and y1 in the table given below.

x	**3**	**x1**	**x2**	**10**
y	**36**	**60**	**96**	**y1**

Solution - It is given that x and y are proportional to each other

Thus, $\frac{3}{36} = \frac{x1}{60} = \frac{x2}{96} = \frac{10}{y1}$

Now, $\frac{3}{36} = \frac{x1}{60}$ => $\frac{1}{12} = \frac{x1}{60}$ => x1 = $\frac{60}{12} = 5$

$\frac{3}{36} = \frac{x2}{96}$ => $\frac{1}{12} = \frac{x2}{96}$ => x2 = $\frac{96}{12} = 8$

$\frac{3}{36} = \frac{10}{y1}$ => $\frac{1}{12} = \frac{10}{y1}$ => y1 = 120

Therefore, x1 = 5, x2 = 8 and y1 = 120

Example 3 – A car covers 432 km in 36 litres of petrol. How much distance would it cover in 25 litres of petrol?

Solution - Let distance covered in 25 liters of petrol be x km

According to given question, we can represent data in terms of table as follows:

Quantity of petrol (in liters)	36	25
Distance (in km)	432	x

Since, less is the quantity of petrol, less is the distance covered so this is a case of direct proportion.

Thus, $\frac{36}{432} = \frac{25}{x} => \frac{1}{12} = \frac{25}{x} => x = 12 \times 25 = 300$

Therefore, distance covered in 25 l of petrol = 300 km

Example 4 – If 50 meters of a cloth costs Rs 3725, how much cloth can be purchased for Rs 1788?

Solution - Let required length of cloth be x m

According to given question, we can represent data in terms of table as follows:

Length of cloth (in meters)	50	x
Cost (in Rs)	3725	1788

Since less is the length of cloth, less is the cost so this is a case of direct proportion.

Thus, $\frac{50}{3725} = \frac{x}{1788} => \frac{2}{149} = \frac{x}{1788} => x = \frac{1788 \times 2}{149} = 24$

Therefore, required length of cloth = 24 m

Example 5 – If the weight of 9 sheets of thick paper is 30 grams, how many sheets of the same paper would weigh $1\frac{1}{4}$ kilograms?

Solution - Let the required number of sheets be x

We will first convert $1\frac{1}{4}$ kg into grams

$$1\frac{1}{4} = \frac{5}{4}kg = \frac{5}{4}(1000) = 1250g$$

According to given question, we can represent data in terms of table as follows:

Number of sheets	9	x
Weight of sheets (in grams)	30	1250

Since more the number of sheets, more is the weight so this is a case of direct proportion.

Thus, $\frac{9}{30} = \frac{x}{1250} => \frac{3}{10} = \frac{x}{1250} => x = \frac{1250 \times 3}{10} = 375$

Therefore, required number of sheets = 375

Example 6 – A train is moving at a uniform speed of 75 km/hr.

(a) How far will it travel in 24 minutes?

(b) In how much time will it cover 175 km?

Solution - Let the distance travelled in 24 minutes be x km

And, let the time taken to cover 175 km be y minutes

Given that uniform speed = 75 km/h

Then, distance = 75 km and time = 60 minutes

According to given question, we can represent data in terms of table as follows:

Distance covered (in km)	75	x	175
Time (in minutes)	60	24	y

Since more the distance, more will be the time taken so this is a case of direct proportion

Thus, $\frac{75}{60} = \frac{x}{24} = \frac{175}{y}$

$=> \frac{5}{4} = \frac{x}{24} => x = 30$

And, $\frac{5}{4} = \frac{175}{y} => y = 140$

Therefore, required distance = 30 km and required time = 140 minutes

Example 7 – A vertical pole 5 m 60 cm high casts a shadow 3 m 20 cm long. Find at the same time (a) the length of shadow cast by another pole 10 m 50 cm high, (b) the height of a pole which casts a shadow 5 m long.

Solution - Let required length of shadow be x cm and height of pole be y cm

According to given question, we can represent data in terms of table as follows:

Height of pole (in cm)	560	1050	y
Length of its shadow (in cm)	320	x	500

Since, more the height of pole, more will be the length of its shadow so this is a case of direct proportion

Thus, $\frac{560}{320} = \frac{1050}{x} = \frac{y}{500}$

$=> \frac{7}{4} = \frac{1050}{x} => x = 600$

And, $\frac{7}{4} = \frac{y}{500} => y = 875$

Therefore, required length of shadow = 600cm = 6 m and required height of pole = 875 cm = 8 m 75 cm

Example 8 – The scale of a map is $1 : 3 \times 10^7$. Two cities are 5 cm apart on the map. Find the actual distance between them in kilometers.

Solution - Let the required distance be x cm

According to given question, we can represent data in terms of table as follows:

Distance on the map (in cm)	1	5
Actual distance (in cm)	3×10^7	x

Since, more is the distance on the map; more will be the actual distance so this is a case of direct proportion.

Thus, $\frac{1}{3\times10^7} = \frac{5}{x} => x = 3 \times 10^7 \times 5 = 15 \times 10^7$

Thus, actual distance between them = 15×10^7 cm

= $\frac{15\times10^7}{10^2\times10^3} = 1500km$

Example 9 – If 5 men or 7 women can earn Rs 875 per day, how much would 10 men and 5 women earn per day?

Solution - It is given that 5 men or 7 women can earn Rs 875

=> 5 men = 7 women

=> 1 man = 7/5 women

Thus, 10 men and 5 women = 10(7/5) + 5 = 14 + 5 = 19 women

Let 10 men and 5 women would earn Rs x per day

Now, we can represent data in terms of table as follows:

Number of women	7	19
Earnings per day	875	x

Thus, $\frac{7}{875} = \frac{19}{x} => 7x = 16625 => x = 2375$

Therefore, 10 men and 5 women would earn Rs 2375 per day

Exercise 12 A

Question 1 – Observe the tables given below and in each one find whether x and y are proportional:

(a)

x	**3**	**5**	**8**	**11**	**26**
y	**9**	**15**	**24**	**33**	**78**

Solution - Since $\frac{x}{y} = \frac{3}{9} = \frac{5}{15} = \frac{8}{24} = \frac{11}{33} = \frac{26}{78} = \frac{1}{3}$= a constant

Thus, x and y are directly proportional.

(b)

x	**2.5**	**4**	**7.5**	**10**	**14**
y	**10**	**16**	**30**	**40**	**42**

Solution - Since $\frac{x}{y} = \frac{2.5}{10} = \frac{4}{16} = \frac{7.5}{30} = \frac{10}{40} \neq \frac{14}{42}$

Thus, x and y are not directly proportional.

(c)

x	**5**	**7**	**9**	**15**	**18**	**25**
y	**15**	**21**	**27**	**60**	**72**	**75**

Solution – Since $\frac{5}{15} = \frac{7}{21} = \frac{9}{27} = \frac{25}{75} = \frac{1}{3} = a\ constant$

And, $\frac{15}{60} = \frac{18}{72} = \frac{1}{4} = a\ constant$

But, $\frac{1}{3} \neq \frac{1}{4}$

Thus, x and y are not directly proportional.

Question 2 – If x and y are directly proportional, find the values of x1, x2 and y1 in the table given below:

x	**3**	**x1**	**x2**	**10**
y	**72**	**120**	**192**	**y1**

Solution - It is given that x and y are proportional to each other

Thus, $\frac{3}{72} = \frac{x1}{120} = \frac{x2}{192} = \frac{10}{y1}$

Now, $\frac{3}{72} = \frac{x1}{120}$ => $\frac{1}{24} = \frac{x1}{120}$ => x1 = $\frac{120}{24} = 5$

$\frac{3}{72} = \frac{x2}{192}$ => $\frac{1}{24} = \frac{x2}{192}$ => x2 = $\frac{192}{24} = 8$

$\frac{3}{72} = \frac{10}{y1}$ => $\frac{1}{24} = \frac{10}{y1}$ => y1 = 240

Therefore, x1 = 5, x2 = 8 and y1 = 240

Question 3 – A truck covers a distance of 510 km in 34 litres of diesel. How much distance would it cover in 20 litres of diesel?

Solution - Let distance covered in 20 liters of diesel be x km

According to given question, we can represent data in terms of table as follows:

Quantity of diesel (in liters)	34	20
Distance (in km)	510	x

Since, less is the quantity of diesel, less is the distance covered so this is a case of direct proportion.

Thus, $\frac{34}{510} = \frac{20}{x} => \frac{1}{15} = \frac{20}{x} => x = 20 \times 15 = 300$

Therefore, distance covered in 20 l of diesel = 300 km

Question 4 – A taxi charges a fare of Rs 2550 for a journey of 150 km. How much would it charge for a journey of 124 km?

Solution - Let the required charges for journey of 124 km be Rs x

According to given question, we can represent data in terms of table as follows:

Distance (in Km)	150	124
Charges (in Rs)	2550	x

Since more is the distance, more is the charges so this is a case of direct proportion

Thus, $\frac{150}{2550} = \frac{124}{x} => \frac{1}{17} = \frac{124}{x} => x = 124 \times 17 = 2108$

Question 5 – a loaded truck covers 16 km in 25 minutes. At the same speed, how far can it travel in 5 hours?

Solution - Let the required distance be x km

According to given question, we can represent data in terms of table as follows:

Time (in minutes)	25	300
Distance (in Km)	16	x

Since more is the distance, more is the charges so this is a case of direct proportion

Thus, $\frac{25}{16} = \frac{300}{x} => x = \frac{300 \times 16}{25} = 192$

Therefore, required distance is 192 km

Question 6 – If 18 dolls cost Rs 630, how many dolls can be bought for Rs 455?

Solution - Let the required number of dolls be x

According to given question, we can represent data in terms of table as follows:

Cost (in Rs)	630	455
Number of dolls	18	x

Since more is the number of dolls, more is the cost so this is a case of direct proportion

Thus, $\frac{630}{18} = \frac{455}{x} => x = \frac{455 \times 18}{630} = 13$

Therefore, required number of dolls is 13

Question 7 – If 9 kg of sugar costs Rs 238.50, how much sugar can be bought for Rs 371?

Solution - Let required quantity of sugar be x

According to given question, we can represent data in terms of table as follows:

Cost (in Rs)	238.50	371
Quantity of sugar (in kg)	9	x

Since more is the quantity of sugar, more is the cost so this is a case of direct proportion

Thus, $\frac{238.50}{9} = \frac{371}{x} => x = \frac{371 \times 9}{238.50} = 14$

Therefore, required quantity of sugar is 14 kg

Question 8 – The cost of 15 meters of a cloth is Rs 981. What length of this cloth can be purchased for Rs 1308?

Solution - Let the required length of cloth be x

According to given question, we can represent data in terms of table as follows:

Cost (in Rs)	981	1308
Length of cloth (in m)	15	x

Since less is the length of cloth, less is the cost so this is a case of direct proportion

Thus, $\frac{981}{15} = \frac{1308}{x} => x = \frac{1308 \times 15}{981} = 20$

Therefore, required length of cloth is 20 m

Question 9 – In a model of a ship, the mast is 9 cm high, while the mast of the actual ship is 15 m high. If the length of the ship is 35 meters, how long is the model ship?

Solution - Let the required length of model ship be Rs x

According to given question, we can represent data in terms of table as follows:

Length of ship (in cm)	1500	3500
Length of modal ship (in cm)	9	x

Since more is the length of ship, more is the length of modal ship so this is a case of direct proportion

Thus, $\frac{1500}{9} = \frac{3500}{x} => x = \frac{3500 \times 9}{1500} = 21$

Therefore, required length of modal ship is 21 cm

Question 10 – In 8 days, the earth picks up (6.4×10^7) kg of dust from the atmosphere. How much dust will it pick up in 15 days?

Solution - Let the required Mass of dust be x kg

According to given question, we can represent data in terms of table as follows:

Days	8	15
Mass of dust	6.4×10^7	x

Since more is the days, more will be the Mass of dust so this is a case of direct proportion.

Thus, $\frac{8}{6.4\times10^7} = \frac{15}{x} => x = \frac{6.4\times10^7\times15}{8} = 12\times10^7 = 1.2\times10^8 kg$

Thus, actual distance between them = 1.2×10^8 kg

Question 11 – A car is travelling at the average speed of 50 km/hr. How much distance would it travel in 1 hour 12 minutes?

Solution - Let the required distance be x km/h

Given speed = 50km/h

=> Distance = 50km and time = 1 hr.

According to given question, we can represent data in terms of table as follows:

Time (in minutes)	60	72
Distance (in Km)	50	x

Since more is the distance, more is the time so this is a case of direct proportion

Thus, $\frac{60}{50} = \frac{72}{x} => x = \frac{72\times50}{60} = 60$

Therefore, required distance is 60 km

Question 12 – Ravi walks at the uniform rate of 5 km/hr. What distance would he cover in 2 hours 24 minutes?

Solution - Let the required distance be x km

Given that speed = 5 km/h

=> Distance = 5 km and time = 1 hr. = 60 minutes

According to given question, we can represent data in terms of table as follows:

Time (in minutes)	60	144
Distance (in Km)	5	x

Since more is the distance, more is the time so this is a case of direct proportion

Thus, $\frac{60}{5} = \frac{144}{x} => x = \frac{144 \times 5}{60} = 12$

Therefore, required distance is 12 km

Question 13 – If the thickness of a pile of 12 cardboards is 65 mm, find the thickness of a pile of 312 such cardboards.

Solution - Let the required thickness of pile of 312 cardboards be x mm

According to given question, we can represent data in terms of table as follows:

Thickness(in mm)	65	x
Number of cardboards	12	312

Since more is the number of cardboards, more is the thickness so this is a case of direct proportion

Thus, $\frac{65}{12} = \frac{x}{312} => x = \frac{65 \times 312}{12} = 1690mm = \frac{1690}{1000}m = 1.69m = 1m69cm$

Therefore, required thickness is 1m 69 cm

Question 14 – 11 men can dig $6\frac{3}{4}$ meter-long trench in one day. How many men should be employed for digging 27-meter-long trench of the same type in one day?

Solution - Let requires men for digging 27 m long trench be x

According to given question, we can represent data in terms of table as follows:

Men	11	x
Length of trench(in m)	27/4	27

Since more is the length, more men is needed so this is a case of direct proportion

Thus, $\frac{11}{27/4} = \frac{x}{27} => x = \frac{11 \times 27 \times 4}{27} = 44$

Therefore, required men will be 44

Question 15 – Reenu types 540 words during half an hour. How many words would she type in 8 minutes?

Solution - Let the required number of words be x

According to given question, we can represent data in terms of table as follows:

Words	540	x
Time taken (in minutes)	30	8

Since more the number of words, more time is needed so this is a case of direct proportion

Thus, $\frac{540}{30} = \frac{x}{8} => x = \frac{540 \times 8}{30} = 144$

Therefore, required number of words will be 144

Inverse proportion: Two quantities x and y are said to be in inverse proportion when they are related to each other in such a way that on increasing the one, the other decreases proportionally and vice versa. That is x y = k, where k is a constant.

Thus, x1y1 = x2y2 = x3y3 = …. = k

Examples:

Example 1 – Observe the tables given below and find whether x and y are inversely proportional:

(a)

x	**6**	**3**	**36**	**72**	**16**
y	**24**	**48**	**4**	**2**	**9**

Solution - Here we will find product x y

$xy = 6 \times 24 = 3 \times 48 = 36 \times 4 = 72 \times 2 = 16 \times 9 = 144$ = constant

Thus, x and y are inversely proportional.

(b)

x	**9**	**12**	**6**	**2**	**1**
y	**4**	**3**	**8**	**18**	**36**

Solution - Here we will find product x y

$xy = 9 \times 4 = 12 \times 3 = 2 \times 18 = 1 \times 36 \neq 6 \times 8$

Thus, x and y are not inversely proportional.

Example 2 – If x and y are inversely proportional, find the values of x1, x2, y1 and y2 in the table given below:

x	**12**	**16**	**x1**	**x2**	**48**
y	**8**	**y1**	**4**	**16**	**y2**

Solution - It is given that x and y are inversely proportional thus we have x y = constant

$\Rightarrow 12 \times 8 = 16 \times y1 = x1 \times 4 = x2 \times 16 = 48 \times y2$

Now, $12 \times 8 = 16 \times y1 \Rightarrow y1 = \frac{96}{16} = 6$

$12 \times 8 = x1 \times 4 \Rightarrow x1 = \frac{96}{4} = 24$

$12 \times 8 = x2 \times 16 \Rightarrow x2 = \frac{96}{16} = 6$

$12 \times 8 = 48 \times y2 \Rightarrow y2 = \frac{96}{48} = 2$

Therefore, x1 = 24, x2 = 6, y1 = 6 and y2 = 2

Example 3 – If 45 men can do a piece of work in 49 days. In how many days will 35 men do it?

Solution - Let the required number of days be x

According to given question, we can represent data in terms of table as follows:

Days	49	x
Number of men	45	35

Since Less men will take more days to complete the work so this is a case of inverse proportion

Thus, $49 \times 45 = x \times 35 \Rightarrow x = \frac{49 \times 45}{35} = 63$

Therefore, required number of days will be 63

Example 4 – If 14 workers can build a wall in 45 hours, how many workers will be required to do the same work in 35 hours?

Solution - Let the required number of workers be x

According to given question, we can represent data in terms of table as follows:

Number of workers	14	x
Number of days	45	35

Since more workers are needed to finish work in fewer hours so this is a case of inverse proportion

Thus, $14 \times 45 = x \times 35 => x = \frac{14 \times 45}{35} = 18$

Therefore, required number of workers is 18

Example 5 – 6 pipes can fill a tank in 1 hour 24 minutes. How long will it take to fill the tank if 7 pipes of the same type are used?

Solution - Let the required time taken to fill tank be x minutes

According to given question, we can represent data in terms of table as follows:

Time taken (in minutes)	84	x
Number of pipes	6	7

Since more pipes will fill tank in less time so this is a case of inverse proportion

Thus, $84 \times 6 = x \times 7 => x = \frac{84 \times 6}{7} = 72$

Therefore, required time to fill the tank is 72 minutes = 1hour 12 minutes

Example 6 – In a fort, 300 men had provisions for 90 days. After 20 days, 50 men left the fort. How long would the food last at the same rate?

Solution - Remaining Days = 90-20 = 70 days

Remaining men = 300 – 50 = 250 men

Let remaining food be sufficient for 250 men for x days

According to given question, we can represent data in terms of table as follows:

Number of days	70	x
Number of men	300	250

Since, less man will have food for more days so this is a case of inverse proportion

Thus, $70 \times 300 = x \times 250 \Rightarrow x = \frac{70 \times 300}{250} = 84$

Therefore, required days is 84

Exercise 12B

Question 1- Observe the tables given below and in each case find whether x and y are inversely proportional:

(a)

x	**6**	**10**	**14**	**16**
y	**9**	**15**	**21**	**24**

Here, we will find product x y

$xy = 6 \times 9 \neq 10 \times 15 \neq 14 \times 21 \neq 16 \times 24$

Thus, x and y are not inversely proportional.

(b)

x	**5**	**9**	**15**	**3**	**45**
y	**18**	**10**	**6**	**30**	**2**

Here, we will find product x y

$xy = 5 \times 18 = 9 \times 10 = 15 \times 6 = 3 \times 30 = 45 \times 2 = 90$ = constant

Thus, x and y are inversely proportional.

(c)

x	**9**	**3**	**6**	**36**
y	**4**	**12**	**9**	**1**

Here, we will find product x y

$xy = 9 \times 4 = 3 \times 12 = 36 \times 1 \neq 6 \times 9$

Thus, x and y are not inversely proportional.

Question 2 – If x and y are inversely proportional, find the values of x1, x2, y1 and y2 in the table given below:

x	**8**	**x1**	**16**	**x2**	**80**
y	**y1**	**4**	**5**	**2**	**y2**

Solution - It is given that x and y are inversely proportional thus we have x y = constant

$=> 8 \times y1 = x1 \times 4 = 16 \times 5 = x2 \times 2 = 80 \times y2$

Now, $8 \times y1 = 16 \times 5 => y1 = \frac{80}{8} = 10$

$x1 \times 4 = 16 \times 5 => x1 = \frac{80}{4} = 20$

$x2 \times 2 = 16 \times 5 => x2 = \frac{80}{2} = 40$

$80 \times y2 = 16 \times 5 => y2 = \frac{80}{80} = 1$

Therefore, x1 = 20, x2 = 40, y1 = 10 and y2 = 1

Question 3 – If 35 men can reap a field in 8 days, in how many days can 20 men reap the same field?

Solution - Let the required number of days be x

According to given question, we can represent data in terms of table as follows:

Days	8	x
Number of men	35	20

Since Less men will take more days to reap a field so this is a case of inverse proportion

Thus, $8 \times 35 = x \times 20 => x = \frac{8 \times 35}{20} = 14$

Therefore, required number of days will be 14 days

Question 4 – 12 men can dig a pond in 8 days. How many men can dig it in 6 days?

Solution - Let the required number of men be x

According to given question, we can represent data in terms of table as follows:

Days	8	6
Number of men	12	x

Since more men will take fewer days to dig a pond so this is a case of inverse proportion

Thus, $8 \times 12 = x \times 6 => x = \frac{8 \times 12}{6} = 16$

Therefore, required number of men will be 16

Question 5 – 6 cows can graze a field in 28 days. How long would 14 cows take to graze the same field?

Solution - Let the required number of days be x

According to given question, we can represent data in terms of table as follows:

Days	28	x
Number of cows	6	14

Since more cows will take fewer days to graze a field so this is a case of inverse proportion

Thus, $28 \times 6 = x \times 14 => x = \frac{28 \times 6}{14} = 12$

Therefore, required number of days will be 12 days

Question 6 – A car takes 5 hours to reach a destination by travelling at the speed of 60 km/hr. How many machines would be required to produce the same number of articles in 48 days?

Solution - Let required time taken be x hours

According to given question, we can represent data in terms of table as follows:

Time taken (in hrs.)	5	x
Speed of car (in km/h)	60	75

Since more speed will lead to less time taken so this is a case of inverse proportion

Thus, $5 \times 60 = x \times 75 => x = \frac{5 \times 60}{75} = 4$

Therefore, time taken when car travels at speed of 75km/h is 4 hours

Question 7 – A factory requires 42 machines to produce a given number of articles in 56 days. How many machines would be required to produce the same number of articles in 48 days?

Solution - Let the required number of machines be x

According to given question, we can represent data in terms of table as follows:

Number of machines	42	x
Number of days	56	48

Since more machines are needed to complete work in less days so this is a case of inverse proportion

Thus, $42 \times 56 = x \times 48 => x = \frac{42 \times 56}{48} = 49$

Therefore, required number of machines is 49

Question 8 – 7 taps of the same size fill a tank in 1 hour 36 minutes. How long will 8 taps of the same size take to fill the tank?

Solution - Let the required time taken to fill tank be x minutes

According to given question, we can represent data in terms of table as follows:

Time taken (in minutes)	96	x
Number of taps	7	8

Since more taps will take less time to fill the tank so this is a case of inverse proportion

Thus, $96 \times 7 = x \times 8 => x = \frac{96 \times 7}{8} = 84$

Therefore, required time taken is 84 minutes = 1 hour 24 minutes

Question 9 – 8 taps of the same size fill a tank in 27 minutes. If two taps go out of order, how long would the remaining taps take to fill the tank?

Solution - Remaining taps = 8-2 = 6

Let the required time taken to fill the tank be x minutes

According to given question, we can represent data in terms of table as follows:

Time taken (in minutes)	27	x
Number of taps	8	6

Since less taps will take more time to fill the tank so this is a case of inverse proportion

Thus, $27 \times 8 = x \times 6 => x = \frac{27 \times 8}{6} = 36$

Therefore, required time taken is 36 minutes

Question 10 – A Farmer has enough food to feed 28 animals in his cattle for 9 days. How long would the food last, if there were 8 more animals in his cattle?

Solution - Let the required number of days be x

According to given question, we can represent data in terms of table as follows:

Number of days	9	x
Number of animals	28	36

Since more animals will have food for fewer days so this is a case of inverse proportion

Thus, $28 \times 9 = x \times 36 => x = \frac{28 \times 9}{36} = 7$

Therefore, required number of days is 7 days

Question 11 – A garrison of 900 men had provisions for 42 days. However, a reinforcement of 500 men arrived. For how many days will the food last now?

Solution - Let the required number of days be x

According to given question, we can represent data in terms of table as follows:

Number of days	42	x
Number of men	900	1400

Since more men will have food for fewer days so this is a case of inverse proportion

Thus, $42 \times 900 = x \times 1400 => x = \frac{42 \times 900}{1400} = 27$

Therefore, required number of days is 27 days

Question 12 – In a hostel, 75 students had food provision for 24 days. If 15 students leave the hostel, for how many days would the food provision last?

Solution - Remaining students = 75 – 15 = 60

Let the required number of days be x

According to given question, we can represent data in terms of table as follows:

Number of days	24	x
Number of men	75	60

Since fewer men will have food for more days so this is a case of inverse proportion

Thus, $24 \times 75 = x \times 60 => x = \frac{24 \times 75}{60} = 30$

Therefore, required number of days is 30 days

Question 13 – A school has 9 periods a day each of 40 minutes duration. How long would each period be, if the school has 8 periods a day, assuming the number of school hours to be the same?

Solution - Let the required duration of period be x minutes

According to given question, we can represent data in terms of table as follows:

Duration (in minutes)	40	x
Number of periods	9	8

Since fewer periods will lead to more duration of a period so this is a case of inverse proportion

Thus, $40 \times 9 = x \times 8 => x = \frac{40 \times 9}{8} = 45$

Therefore, required duration of period is 45 minutes

Question 14 – If x and y vary inversely and x = 15 when y = 6, find y when x = 9.

Solution - Given that x and y vary inversely

$x = 15\ when\ y = 6$

We need to find y when x = 9

We know that product x y will remain constant

Thus, $15 \times 6 = y \times 9 => y = \frac{90}{9} = 10$

Question 15 – If x and y vary inversely and x = 18 when y = 8, find x when y = 16.

Solution - Given that x and y vary inversely

$x = 18\ when\ y = 8$

We need to find x when y = 16

We know that product x y will remain constant

Thus, $18 \times 8 = x \times 16 => x = \frac{144}{16} = 9$

Exercise 12C

Question 1 – If 14 kg of pulses cost Rs 882, what is the cost of 22 kg of pulses?

Solution - Let the required cost be Rs x

According to given question, we can represent data in terms of table as follows:

Cost (in Rs)	882	x
Quantity of pulses (in kg)	14	22

Since more is the quantity more will be the cost so this is a case of direct proportion,

Thus, $\frac{882}{14} = \frac{x}{22} => x = \frac{882 \times 22}{14} = 1386$

Therefore, required cost of 22kg of pulses is Rs 1386

Question 2 – If 8 oranges cost Rs 52, how many oranges can be bought for Rs 169?

Solution - Let the required number of oranges be x

According to given question, we can represent data in terms of table as follows:

Number of oranges	8	x
Cost (in Rs)	52	169

Since more is the number of oranges, more will be the cost so this is a case of direct proportion,

Thus, $\frac{8}{52} = \frac{x}{169} => x = \frac{169 \times 8}{52} = 26$

Therefore, required number of oranges is 26

Question 3 – A machine fills 420 bottles in 3 hours. How many bottles will it fill in 5 hours?

Solution - Let the required number of bottles be x

According to given question, we can represent data in terms of table as follows:

Number of bottles	420	x
Time taken (in hours)	3	5

Since more is the number of bottles more will be the time taken so this is a case of direct proportion,

Thus, $\frac{420}{3} = \frac{x}{5} => x = \frac{420 \times 5}{3} = 700$

Therefore, required number of bottles is 700

Question 4 – A car is travelling at a uniform speed of 75 km/hr. How much distance will it cover in 20 minutes?

Solution - Given speed = 75 km/h

=> Distance = 75 km and time = 1 hr.

Let the required distance be x km

According to given question, we can represent data in terms of table as follows:

Distance (in km)	75	x
Time taken (in minutes)	60	20

Since more is distance, more will be the time taken so this is a case of direct proportion,

Thus, $\frac{75}{60} = \frac{x}{20} => x = \frac{75 \times 20}{60} = 25$

Therefore, required distance is 25 km

Question 5 – The weight of 12 sheets of a thick paper is 40 grams. How many sheets would weigh 1 kg?

Solution - Let the required number of sheets be x

According to given question, we can represent data in terms of table as follows:

Number of sheets	12	x
Weight of sheets (in g)	40	1000

Since more is sheets, more will be the weight so this is a case of direct proportion,

Thus, $\frac{12}{40} = \frac{x}{1000} => x = \frac{12 \times 1000}{40} = 300$

Therefore, required number of sheets is 300

Question 6 – A pole 14 m high casts a shadow of 10 m. At the same time, what will be the height of a tree, the length of whose shadow is 7 meters?

Solution - Let required height of pole be x m

According to given question, we can represent data in terms of table as follows:

Height of pole (in m)	14	x
Length of its shadow (in m)	10	7

Since more the height of pole, more will be the length of its shadow so this is a case of direct proportion

Thus, $\frac{14}{10} = \frac{x}{7}$

=> $x = 9.8m$

Therefore, required height of pole = 9.8 m

Question 7 – A photograph of a bacteria enlarged 50000 times attains a length of 5 cm. The actual length of bacteria is?

Solution - Let the actual length of bacteria be x cm

Thus, $x \times 50000 = 5$

=> $x = \frac{5}{50000} = \frac{1}{10000} = 10^{-4}cm$

Question 8 – 6 pipes fill a tank in 120 minutes, and then 5 pipes can build it in?

Solution - Let the required time taken to fill the tank be x minutes

According to given question, we can represent data in terms of table as follows:

Time taken (in minutes)	120	x
Number of pipes	6	5

Since fewer pipes will take more time to fill tank so this is a case of inverse proportion

Thus, $120 \times 6 = x \times 5 => x = \frac{120 \times 6}{5} = 144$

Therefore, required time taken is 144 minutes

Question 9 – 3 persons can build a wall in 4 days, and then 4 persons can build it in?

Solution - Let the required number of days be x

According to given question, we can represent data in terms of table as follows:

Number of days	4	x
Number of persons	3	4

Since more people will take less time to build a wall so this is a case of inverse proportion

Thus, $4 \times 3 = x \times 4 => x = 3$

Therefore, required number of days is 3

Question 10 – A car takes 2 hours to reach a destination by travelling at 60 km/hr. How long will it take while travelling at 80 km/hr.?

Solution - Let required time taken by car while travelling at 80 km/h be x hours

According to given question, we can represent data in terms of table as follows:

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

Since more speed will lead to less time so this is a case of inverse proportion

Thus, $2 \times 60 = x \times 80 => x = \frac{120}{80} = \frac{3}{2} = 1.5\ hours = 1\ hr\ 30\ minutes$

Therefore, required time taken is 1 hour and 30 minutes