UNIT – 2

COMMERCIAL ARITHMETIC

CHAPTER 7

UNITARY METHOD

(Including Time and Work)

7.1 REVIEW

1. Unitary method	It is the method in which the value of a unit quantity is first obtained to find the value of any given quantity.

1. If 7 bags weigh 560 kg $\Rightarrow$ 1 bag weighs $\frac{560}{7}$ kg = 80 kg

   And, 14 bags weigh 14 × 80 kg = 1120 kg

2. If 7 men do a certain piece of work in 560 days

   $\Rightarrow$ 1 man will do the same work in 7 × 560 days = 3920 days

   And, 14 men will do the same work in $\frac{3920}{14}$ days = 280 days.

7.2 TYPES OF VARIATIONS

In unitary method, we come across two types of variations :

1. Direct variation 2. Inverse variation

1. **Direct Variation :** Two quantities are said to have direct variation, if the increase in one quantity causes the increase in the other and, the decrease in one quantity causes the decrease in the other.
2. **Inverse Variation :** Two quantities are said to vary inversely, if by increasing one quantity, the second quantity decreases. And, if by decreasing one quantity, the second quantity increases.

Example 1 :

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

Solution :

After 20 days **:**

For 300 men, provisions will last (90 – 20) days = 70 days

$\Rightarrow$ For 1 man, the provisions will last 300 × 70 days

And, for (300 – 50) = 250 men, **the provisions will last** $\frac{300 \times 70}{250}$ days

= **84 days** **(Ans.)**

Example 2 :

A hostel had provisions for 75 students for 30 days. After 6 days, 15 more students come to hostel. How long would the remaining provisions last at the same rate ?

Solution :

After 6 days **:**

For 75 students, provisions are sufficient for (30 – 6) days = 24 days

$\Rightarrow$ For 1 student, the provisions are sufficient for (75×24) days

And, for 90 students, **the provisions are sufficient for** $\left(\frac{75 \times 24}{90}\right)$ days

$=$ **20 days** **(Ans.)**

Example 3 :

6 men or 8 women earn ₹ 960 in one day.

Find : (i) one day's earning of a man.

(ii) one day's earning of a woman.

(iii) one day's earning of 4 men and 5 women.

Solution :

(i) Since, one day's earning of 6 men = ₹ 960

$\Rightarrow$ **One day's earning of a man** = ₹ $\frac{960}{6}$ = **₹ 160** **(Ans.)**

(ii) Since, one day's earning of 8 women = ₹ 960

$\Rightarrow$ **One day's earning of a woman** = ₹ $\frac{960}{8}$ = **₹ 120** **(Ans.)**

(iii) **One day's earning of 4 men and 5 women**

$= 4 \times$ ₹ $160 + 5 \times$ ₹ $120 =$ **₹ 1,240** **(Ans.)**

While applying unitary method, arrange a statement in such a way that, whatever is asked to find in the question, is written at the end of the statement.

Example 4 :

2 men or 3 women can do a piece of work in 45 days. Find, in how many days will 6 men and 1 woman be able to complete the same work ?

Solution :

According to the amount of work done, in the same time, 2 men are equivalent to 3 women

i.e. 2 men $\equiv$ 3 women

1 man $\equiv \frac{3}{2}$ women

and, 6 men $\equiv \frac{3}{2} \times 6$ women $\equiv 9$ women.

$\therefore$ 6 men + 1 woman $\equiv$ 9 women + 1 woman $\equiv$ 10 women

Since, 3 women can do the work in 45 days

$\Rightarrow$ 1 woman will do the work in 45×3 days $= 135$ days

$\Rightarrow$ 10 women will do the work in $\frac{135}{10}$ days $= 13\frac{1}{2}$ days.

$\therefore$ **6 men and 1 woman will complete the work in** $13\frac{1}{2}$ **days** **(Ans.)**

Example 5 :

3 men and 4 boys can complete a certain amount of work in 28 days, whereas 4 men and 6 boys can complete the same work in 20 days.

Find : (i) according to the amount of work done, one man is equivalent to how many boys.

(ii) the number of days required by 7 men and 6 boys to complete the same work.

Solution :

(i) In 28 days, the work can be completed by 3 men and 4 boys

$\therefore$ In 1 day, the work can be completed by 28(3 men + 4 boys)

i.e. by 84 men + 112 boys.

$\because$ In 20 days, the same work can be completed by 4 men + 6 boys

$\therefore$ In 1 day, the same work can be completed by 20(4 men + 6 boys)

i.e. by 80 men + 120 boys.

$\therefore$ According to the amount of work done,

84 men + 112 boys $\equiv$ 80 men + 120 boys

$\Rightarrow$ 4 men $\equiv$ 8 boys and **1 man $\equiv$ 2 boys** **(Ans.)**

(ii) Since, 3 men + 4 boys $\equiv$ 3 × 2 boys + 4 boys [1 man $\equiv$ 2 boys]

$\equiv$ 10 boys

And, 7 men + 6 boys $\equiv$ 7 × 2 boys + 6 boys

$\equiv$ 20 boys

Given, 3 men + 4 boys can complete the work in 28 days

i.e., 10 boys can complete the work in 28 days

$\Rightarrow$ 1 boy will complete the same work in 28 × 10 days = 280 days

$\Rightarrow$ 20 boys will complete the same work in $\frac{280}{20}$ days = 14 days

$\Rightarrow$ **7 men and 6 boys require 14 days to complete the same work** **(Ans.)**

TEST YOURSELF

1. If 18 identical articles cost ₹ 1,530

$\Rightarrow$ Cost of 1 article = ...

And, cost of 13 articles = ... = ...

2. If for ₹ 80, the number of pencils bought = 50

$\Rightarrow$ for ₹ 1, the number of pencils bought = ... = ...

And, for ₹ 96, the number of pencils bought = ... = ...

3. If 4 men can do a piece of work in 30 days

$\Rightarrow$ 1 man will do the same work in ..... days = ... days

And, 10 men will do the same work in ..... days = ... days.

4. If a certain quantity of food is sufficient for 50 men for 20 days

$\Rightarrow$ the same quantity of food is sufficient for 1 man for ..... days = ... days

And, the same quantity of food is sufficient for 40 men for ..... days = ... days

EXERCISE 7 (A)

1. Cost of 24 identical articles is ₹ 108. Find the cost of 40 similar articles.
2. If 15 men can complete a piece of work in 30 days, in how many days will 18 men complete it ?
3. In order to complete a work in 28 days, 60 men are required. How many men will be required if the same work is to be completed in 40 days ?
4. A fort had provisions for 450 soldiers for 40 days. After 10 days, 90 more soldiers come to the fort. Find in how many days will the remaining provisions last at the same rate?

5. A garrison has sufficient provisions for 480 men for 12 days. If the number of men is reduced by 160; find how long will the provisions last.

6. $\frac{3}{5}$ quintal of wheat costs ₹ 210. Find the cost of :

   (i) 1 quintal of wheat (ii) 0·4 quintal of wheat.

7. If $\frac{2}{9}$ of a property costs ₹ 2,52,000; find the cost of $\frac{4}{7}$ of it.

8. 4 men or 6 women earn ₹ 360 in one day. Find, how much will :
   (i) a man earn in one day ?
   (ii) a woman earn in one day ?
   (iii) 6 men and 4 women earn in one day ?

9. 16 boys went to canteen to have tea and snacks together. The bill amounted to ₹ 114.40. What will be the contribution of a boy who pays for himself and 5 others ?

10. 50 labourers can dig a pond in 16 days. How many labourers will be required to dig another pond, double in size, in 20 days ?

11. If 12 men or 18 women can complete a piece of work in 7 days, in how many days can 4 men and 8 women complete the same work ?

12. If 3 men or 6 boys can finish a work in 20 days, how long will 4 men and 12 boys take to finish the same work ?

13. A particular work can be completed by 6 men and 6 women in 24 days; whereas the same work can be completed by 8 men and 12 women in 15 days. Find :
   (i) according to the amount of work done, one man is equivalent to how many women.
   (ii) the time taken by 4 men and 6 women to complete the same work.

14. If 12 men and 16 boys can do a piece of work in 5 days and, 13 men and 24 boys can do it in 4 days, how long will 7 men and 10 boys take to do it ?

7.3 MORE EXAMPLES

Example 6 :

30 men can build a wall in 50 days. How many more men are required to build another wall, double in size, in 75 days ?

Solution :

In order to build the wall in 50 days, no. of men required = 30

$\Rightarrow$ To build the same wall in 1 day, no. of men required = 30×50

$\Rightarrow$ To build the same wall in 75 days, no. of men required = $\frac{30 \times 50}{75} = 20$

$\therefore$ To build the wall double in size, the no. of the men required = 2×20 men = 40 men

Since, 30 men were already at work

$\therefore$ (40 – 30) men = **10 more men are required.** **(Ans.)**

Example 7 :

A camp had sufficient food for 400 soldiers for 20 days. However, some soldiers escaped on the first day only and then the food lasted for 32 days. Find, how many soldiers had escaped ?

Solution :

For 20 days, the food is sufficient for 400 soldiers

$\Rightarrow$ For 1 day, the food will be sufficient for (400×20) soldiers

And, for 32 days, the food will be sufficient for $\frac{400 \times 20}{32}$ soldiers = 250 soldiers

$\therefore$ **The no. of soldiers escaped** = (400 – 250) soldiers = **150 soldiers** **(Ans.)**

Example 8 :

Eight men can dig a field in 14 days, working 6 hours a day. In how many days can 7 men dig the same field, working 8 hours a day ?

Solution :

Since, 8 men working 6 hours a day, dig the field in 14 days.

$\Rightarrow$ 8 men working 1 hour a day, dig the field in 14×6 days

$\Rightarrow$ 1 man working 1 hour a day, digs the field in $14 \times 6 \times 8$ days

$\Rightarrow$ 7 men working 1 hour a day, dig the field in $= \frac{14 \times 6 \times 8}{7}$ days

$\Rightarrow$ **7 men working 8 hours a day, dig the field in** $= \frac{14 \times 6 \times 8}{7 \times 8} =$ **12 days** **(Ans.)**

Example 9 :

108 kg of ration is sufficient for 18 students for 15 days. Find, for how many students will 70 kg of ration be sufficient for 25 days.

Solution :

Given, 108 kg ration is sufficient for 15 days for 18 students

$\Rightarrow$ 108 kg ration is sufficient for 1 day for (18×15) students

$\Rightarrow$ 1 kg ration is sufficient for 1 day for $\left(\frac{18 \times 15}{108}\right)$ students = for $\frac{5}{2}$ students

$\Rightarrow$ 70 kg ration is sufficient for 1 day for $\left(\frac{5}{2} \times 70 = 175\right)$ students

$\Rightarrow$ **70 kg ration is sufficient for 25 days for** $\frac{175}{25}$ student = **7 students** **(Ans.)**

Example 10 :

A contractor undertook to build a road in 200 days. He employed 140 men. After 60 days, he found that only one-fourth of the road could be built. How many additional men should be employed to complete the work in time ?

Solution :

Here, incomplete work $= 1 - \frac{1}{4} = \frac{3}{4}$ and remaining days $= 200 - 60 = 140$

According to the given statement :

$\frac{1}{4}$ of the road is built in 60 days by 140 men

$\Rightarrow$ $\frac{1}{4}$ of the road can be built in 1 day by $140 \times 60 = 8400$ men

$\Rightarrow$ Complete road can be built in 1 day by $8400 \times 4 = 33600$ men

$\Rightarrow$ Complete road can be built in 140 days by $\frac{33600}{140} = 240$ men

$\Rightarrow$ $\frac{3}{4}$ of the road can be built in 140 days by $240 \times \frac{3}{4} = 180$ men

$\therefore$ **Additional men required = 180 – 140 = 40** **(Ans.)**

7.4 ARROW METHOD

In general this method is used to solve the problems based on unitary method.

Example 11 : (*Based on inverse proportion*) :

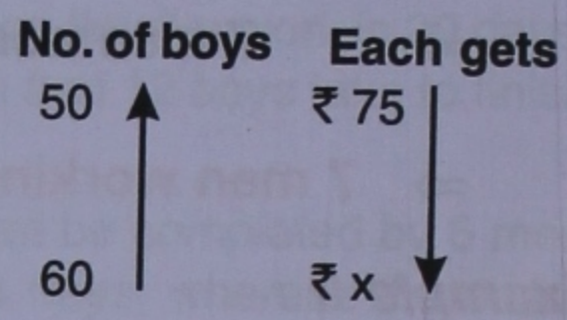
A certain sum is divided equally among 50 boys and each boy gets ₹ 75. If the same sum is divided equally among 60 boys; how much will each get ?

Solution :

Let each boy gets ₹ x

1. Form two columns, as shown alongside, one heading **no. of boys** and other heading **each gets**.

   Since, we are to find the share of each boy ; so, column heading **each gets** must be on the extreme right. Now write the different quantities as shown :



2. Mark an arrow in the downward direction for the column on the extreme right.
3. Since, it is the case of inverse proportion, mark an arrow in the first column in the upward direction (*i.e.* direction opposite to the arrow on the extreme right column).
4. Now according to the arrow take :

$$\frac{\text{Value on head}}{\text{Value on tail}} \text{ for one arrow} = \frac{\text{Value on head}}{\text{Value on tail}} \text{ for another arrow}$$

$$\Rightarrow \quad \frac{x}{75} = \frac{50}{60} \quad \textit{i.e.}\ x = \frac{50 \times 75}{60} = 62{\cdot}5$$

$\therefore$ **Each boy gets ₹ 62·50** **(Ans.)**

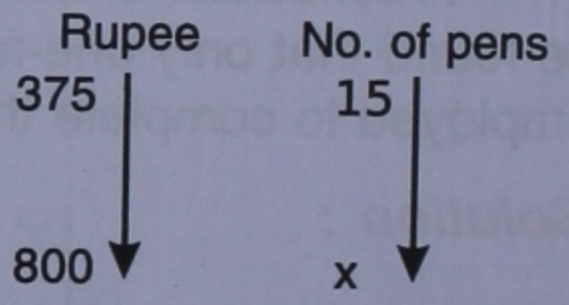
Example 12 : (*Based on direct proportion*) :

The cost of 15 pens is ₹ 375. Find, how many pens can be bought for ₹ 800.

Solution :

Let x pens can be bought for ₹ 800.

Arranging given data and number of pens (x) according to the previous example, we get as shown alongside :



Since, it is the case of direct proportion, arrows must be in the same direction and so :

$$\frac{\text{Value at the head}}{\text{Value at the tail}} \text{ for one arrow} = \frac{\text{Value at the head}}{\text{Value at the tail}} \text{ for another arrow}$$

$$\Rightarrow \quad \frac{x}{15} = \frac{800}{375} \quad \textit{i.e.}\ x = 32$$

$\therefore$ **32 pens can be bought for ₹ 800** **(Ans.)**

When three or more than three types of quantities are taken, then :

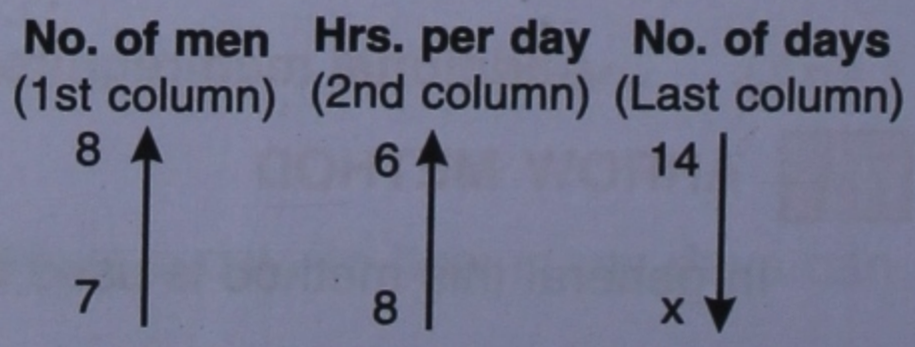
$$\frac{\text{Value on head}}{\text{Value on tail}} \text{ for the column on extreme right}$$

$$= \frac{\text{Value on head}}{\text{Value on tail}} \text{ for 1st column} \times \frac{\text{Value on head}}{\text{Value on tail}} \text{ for 2nd column} \quad \text{and so on.}$$

For example 8, given above :

Let 7 men will dig the field in x days working 8 hours a day.

$\therefore$



Mark arrow for extreme right column in the downward direction, then compare each column with this last column and each time mark arrow **upwards**, if it is the case of **inverse proportion** and **downwards**, if it is the case of **direct proprotion**.

Now use the equation in the box, given above, to get :

$$\frac{x}{14} = \frac{8}{7} \times \frac{6}{8} \Rightarrow x = 12$$

$\therefore$ **The field can be dug in 12 days.** **(Ans.)**

The 1st and the 2nd column can be taken in any order. For example, we can take as :

Hrs. per day	No. of men	No. of days
6 ↑	8 ↑	14 ↓
8	7	x

$$\Rightarrow \frac{x}{14} = \frac{6}{8} \times \frac{8}{7} \quad i.e.\ x = 12.$$

For example 9, given above :

Ration	Days	Students
108 kg ↓	15 ↑	18 ↓
70 kg	25	x

$$\Rightarrow \frac{x}{18} = \frac{15}{25} \times \frac{70}{108} \quad i.e.\ x = 7.$$

$\therefore$ **Required number of students**

$= 7$ **(Ans.)**

For example 10, given above :

Days	Work	Men
60 ↑	$\frac{1}{4}$ ↓	140 ↓
140	$\frac{3}{4}$	x

$$\Rightarrow \frac{x}{140} = \frac{\frac{3}{4}}{\frac{1}{4}} \times \frac{60}{140} \quad i.e.\ x = 180$$

$\Rightarrow$ Total no. of men required = 180

i.e. **Additional no. of men required**

$= 180 - 140 = 40$ **(Ans.)**

EXERCISE 7(B)

1. Eight oranges can be bought for ₹ 10.40. How many more can be bought for ₹ 16.90 ?
2. Fifteen men can build a wall in 60 days. How many more men are required to build another wall of same size in 45 days ?
3. Six taps can fill an empty cistern in 8 hours. How much more time will be taken, if two taps go out of order ? Assume, all the taps supply water at the same rate.
4. A contractor undertakes to dig a canal, 6 kilometre long, in 35 days and employed 90 men. He finds that after 20 days only 2 km of canal have been completed. How many more men must be employed to finish the work in time ?
5. If 10 horses consume 18 bushels in 36 days. How long will 24 bushels last for 30 horses ?
6. A family of 5 persons can be maintained for 20 days with ₹ 2,480. Find, how long ₹ 6,944 maintain a family of 8 persons.
7. 90 men can complete a work in 24 days working 8 hours a day. How many men are required to complete the same work in 18 days working $7\frac{1}{2}$ hours a day?
8. Twelve typists, all working with same speed, type a certain number of pages in 18 days working 8 hours a day. Find, how many hours per day must sixteen typists work in order to type the same number of pages in 9 days ?
9. If 25 horses consume 18 quintal in 36 days, how long will 28 quintal last for 30 horses ?
10. If 70 men dig 15,000 sq. m of a field in 5 days, how many men will dig 22,500 sq. m field in 25 days ?

11. A contractor undertakes to build a wall 1000 m long in 50 days. He empolys 56 men, but at the end of 27 days, he finds that only 448 m of wall is built. How many extra men must the contractor employ so that the wall is completed in time ?

12. A group of labourers promises to do a piece of work in 10 days, but five of them become absent. If the remaining labourers complete the work in 12 days, find their original number in the group.

13. Ten men, working for 6 days of 10 hours each, finish $\frac{5}{21}$ of a piece of work. How many men working at the same rate and for the same number of hours each day, will be required to complete the remaining work in 8 days?

7.4 TIME AND WORK

1. If a man can do a piece of work in 12 days; his one day work = $\frac{1}{12}$

   i.e. one day's work = $\frac{1}{\text{no. of days required to complete the work}}$

2. If a man's 1 day work = $\frac{1}{15}$ then, he can complete the work in 15 days.

   i.e. no. of days required to do a certain work = $\frac{1}{\text{one day's work}}$

3. No. of days required to complete a certain work = $\frac{\text{work to be completed}}{\text{one day's work}}$

Example 13 :

A can do a piece of work in 80 days and B in 100 days. They work together for 20 days and then B goes away. In how many days will A finish the remaining work ?

Solution :

A's 1 day work = $\frac{1}{80}$ and B's 1 day work = $\frac{1}{100}$

$\therefore$ (A + B)'s 1 day work = $\frac{1}{80} + \frac{1}{100} = \frac{5+4}{400} = \frac{9}{400}$

$\therefore$ (A + B)'s 20 days work = $\frac{9}{400} \times 20 = \frac{9}{20}$

Remaining work = $1 - \frac{9}{20} = \frac{20-9}{20} = \frac{11}{20}$

$\therefore$ **No. of days taken by A to finish the remaining work**

$$= \frac{\text{Remaining work}}{\text{A's 1 day work}} = \frac{\frac{11}{20}}{\frac{1}{80}} = \frac{11}{20} \times \frac{80}{1} = \textbf{44 days} \quad \textbf{(Ans.)}$$

Example 14 :

A and B can finish a piece of work in 15 days, B and C in 20 days while C and A in 30 days. How long will they take to finish it together ? How long will each take to finish the work alone ?

Solution :

(A + B)'s 1 day work = $\frac{1}{15}$ I

(B + C)'s 1 day work = $\frac{1}{20}$ II

and, $(C + A)$'s 1 day work $= \frac{1}{30}$ III

$\therefore$ $2(A + B + C)$'s 1 day work $= \frac{1}{15} + \frac{1}{20} + \frac{1}{30}$ [On adding I, II and III]

$= \frac{4+3+2}{60} = \frac{9}{60} = \frac{3}{20}$

$\Rightarrow$ $(A + B + C)$'s 1 day work $= \frac{3}{20\times2} = \frac{3}{40}$ IV

$\therefore$ **They together will complete the work in $\frac{40}{3}$ days $= 13\frac{1}{3}$ days.** **(Ans.)**

Now, A's 1 day work $= \frac{3}{40} - \frac{1}{20}$ [Subtracting II from IV]

$= \frac{3-2}{40} = \frac{1}{40}$

$\therefore$ **A alone will complete the work in 40 days.** **(Ans.)**

B's 1 day work $= \frac{3}{40} - \frac{1}{30}$ [Subtracting III from IV]

$= \frac{9-4}{120} = \frac{5}{120} = \frac{1}{24}$

$\therefore$ **B alone will complete the work in 24 days.** **(Ans.)**

C's 1 day work $= \frac{3}{40} - \frac{1}{15}$ [Subtracting I from IV]

$= \frac{9-8}{120} = \frac{1}{120}$

$\therefore$ **C alone will complete the work in 120 days.** **(Ans.)**

Example 15 :

A can do $\frac{2}{3}$ of a certain work in 12 days and B can do $\frac{1}{6}$ of the same work in 4 days. Find, in how many days will they together complete the work ?

Solution :

Since, A's 12 days work $= \frac{2}{3}$, $\therefore$ A's 1 day work $= \frac{2}{3\times12} = \frac{1}{18}$

Since, B's 4 days work $= \frac{1}{6}$ $\therefore$ B's 1 day work $= \frac{1}{6\times4} = \frac{1}{24}$

$\therefore$ $(A + B)$'s 1 day work $= \frac{1}{18} + \frac{1}{24} = \frac{4+3}{72} = \frac{7}{72}$

$\Rightarrow$ **A and B together can complete the work in $\frac{72}{7}$ days $= 10\frac{2}{7}$ days.** **(Ans.)**

Example 16 :

A and B can do a piece of work in 45 days and 40 days respectively. They began the work together but A leaves after some days and B finishes the remaining work in 23 days. After how many days did A leave ?

Solution :

Since, B's 1 day work $= \frac{1}{40}$

$\Rightarrow$ Work done by B alone in 23 days $= \frac{1}{40} \times 23 = \frac{23}{40}$

$\therefore$ Work done by A and B together $= 1 - \frac{23}{40} = \frac{17}{40}$

$\because$ (A + B)'s 1 day work $= \frac{1}{45} + \frac{1}{40} = \frac{8+9}{360} = \frac{17}{360}$

$\therefore$ No. of days A and B worked together $= \frac{\frac{17}{40}}{\frac{17}{360}} = \frac{17}{40} \times \frac{360}{17} = 9$

Hence, A left after 9 days **(Ans.)**

Alternative method :

Let A left after x days

$\Rightarrow$ A and B worked together for x days

$\Rightarrow$ x days work of A and B + 23 days work of B $= 1$

$\Rightarrow$ $x\left(\frac{1}{45} + \frac{1}{40}\right) + 23 \times \frac{1}{40} = 1$

$\Rightarrow$ $x\left(\frac{8+9}{360}\right) = 1 - \frac{23}{40}$

$\Rightarrow$ $x \times \frac{17}{360} = \frac{17}{40}$

$\Rightarrow$ $x = \frac{17}{40} \times \frac{360}{17} = 9$

$\therefore$ **A left after 9 days** **(Ans.)**

Third method :

Let A left after x days

$\Rightarrow$ A and B worked together for x days

$\Rightarrow$ A worked for x days and B worked for $(x + 23)$ days

$\Rightarrow$ x days work of A + $(x + 23)$ days work of B $= 1$

$\Rightarrow$ $x \times \frac{1}{45} + (x + 23) \times \frac{1}{40} = 1$

$\Rightarrow$ $\frac{8x + 9x + 207}{360} = 1$ *i.e.* $17x + 207 = 360$

$\Rightarrow$ $17x = 360 - 207 = 153$ and $x = \frac{153}{17} = 9$

$\therefore$ **A left after 9 days** **(Ans.)**

Example 17 :

An empty cistern can be filled by two pipes A and B in 12 minutes and 16 minutes respectively and the full cistern can be emptied by a third pipe C in 8 minutes. If all the pipes be turned on at the same time, in how much time will the empty cistern be full ?

Solution :

Since, A fills in 1 minute $= \frac{1}{12}$ of the cistern, B fills in 1 minute $= \frac{1}{16}$ of the cistern and C empties in 1 minute $= \frac{1}{8}$ of the cistern.

$\therefore$ A, B and C together fill in 1 minute $= \left(\frac{1}{12} + \frac{1}{16} - \frac{1}{8}\right)$ of the cistern

$= \frac{4+3-6}{48}$ of the cistern

$= \frac{1}{48}$ of the cistern

$\therefore$ **A, B and C together will take 48 minutes to fill the cistern.** **(Ans.)**

TEST YOURSELF

5. A man can do a piece of work in 20 days; he will do $\frac{3}{5}$ of the same work in = ... days = ... days.

6. A tap can fill an empty tank in 10 hrs and another tap can empty the full tank in 30 hrs. If the tank is initially empty and both the taps are opened simultaneously, the tank filled in 1 hour = ... = ..., and the tank will completely be filled in ..... hrs.

EXERCISE 7(C)

1. A can do a piece of work in 10 days and B in 15 days. How long will they take together to finish it ?
2. A and B together can do a piece of work in $6\frac{2}{3}$ days, but B alone can do it in 10 days. How long will A take to do it alone ?
3. A can do a work in 15 days and B in 20 days. If they together work on it for 4 days, what fraction of the work will be left ?
4. A, B and C can do a piece of work in 6 days, 12 days and 24 days respectively. In what time will they all together do it ?
5. A and B working together can mow a field in 56 days and with the help of C, they could have mowed it in 42 days. How long would C take by himself ?
6. A can do a piece of work in 24 days, A and B can do it in 16 days and A, B and C in $10\frac{2}{3}$ days. In how many days can A and C do it ?
7. A can do a piece of work in 20 days and B in 15 days. They worked together on it for 6 days and then A left. How long will B take to finish the remaining work ?
8. A can finish a piece of work in 15 days and B can do it in 10 days. They worked together for 2 days and then B goes away. In how many days will A finish the remaining work ?
9. A can do a piece of work in 10 days, B in 18 days, and A, B and C together in 4 days. In what time would C alone do it ?
10. A can do $\frac{1}{4}$ of a work in 5 days and B can do $\frac{1}{3}$ of the same work in 10 days. Find the number of days in which both working together will complete the work.
11. One tap can fill a cistern in 3 hours and the waste pipe can empty the full cistern in 5 hours. In what time will the empty cistern be full, if the tap and the waste pipe are kept open together?
12. A and B can do a work in 8 days, B and C in 12 days, and A and C in 16 days. In what time could they do it, all working together ?
13. A and B complete a piece of work in 24 days. B and C do the same work in 36 days; and A, B and C together finish it in 18 days. In how many days will :
    (i) A alone,
    (ii) C alone,
    (iii) A and C together, complete the work ?
14. A and B can do a piece of work in 40 days, B and C in 30 days, and C and A in 24 days.
    (i) How long will it take them to do the work together ?
    (ii) In what time can each finish it working alone ?
15. A can do a piece of work in 10 days, B in 12 days and C in 15 days. All begin together but A leaves the work after 2 days and B leaves 3 days before the work is finished. How long did the work last ?

Let the work lasted in x days.

$\therefore$ A worked for 2 days, B for $(x-3)$ days and C for x days.

$\Rightarrow$ A's 2 days work + B's$(x-3)$ days work + C's x days work = 1

$\Rightarrow 2 \times \frac{1}{10} + (x-3) \times \frac{1}{12} + x \times \frac{1}{15} = 1$

16. Two pipes P and Q would fill an empty cistern in 24 minutes and 32 minutes respectively. Both the pipes being opened together, find when the first pipe must be turned off so that the empty cistern may be just filled in 16 minutes.

ANSWERS

TEST YOURSELF

1. $\frac{₹1,530}{18}$ = ₹ 85, ₹ 85 × 13, ₹ 1,105 **2.** $\frac{50}{80}, \frac{5}{8}, \frac{5}{8}$ × ₹ 96 = ₹ 60 **3.** 4 × 30, 120, $\frac{120}{10}$, 12 **4.** 50 × 20, 1000, $\frac{1000}{40}$, 25 **5.** $\frac{3}{5}$ × 20, 12 **6.** $\frac{1}{10} - \frac{1}{30}, \frac{1}{15}$, 15

EXERCISE 7(A)

1. ₹ 180 **2.** 25 days **3.** 42 men **4.** 25 days **5.** 18 days **6.** (i) ₹ 350 (ii) ₹ 140 **7.** ₹ 6,48,000 **8.** (i) ₹ 90 (ii) ₹ 60 (iii) ₹ 780 **9.** ₹ 42·90 **10.** 80 **11.** 9 days **12.** 6 days **13.** (i) $1\frac{1}{2}$ women (ii) 30 days **14.** $8\frac{1}{3}$ days

EXERCISE 7(B)

1. 5 oranges **2.** 5 men **3.** 4 hours **4.** 150 men **5.** 16 days **6.** 35 days **7.** 128 men **8.** 12 hours/days **9.** $46\frac{2}{3}$ days **10.** 21 men **11.** 25 **12.** 30 **13.** 24

EXERCISE 7(C)

1. 6 days **2.** 20 days **3.** $\frac{8}{15}$ **4.** $3\frac{3}{7}$ days **5.** 168 days **6.** $13\frac{5}{7}$ days **7.** $4\frac{1}{2}$ days **8.** 10 days **9.** $10\frac{10}{17}$ days **10.** 12 days **11.** $7\frac{1}{2}$ hours **12.** $7\frac{5}{13}$ days **13.** (i) 36 days (ii) 72 days (iii) 24 days **14.** (i) 20 days (ii) A in 60 days; B in 120 days and C in 40 days **15.** 7 days **16.** After 12 minutes.