2

The Unitary Method

The unitary method is a way of finding the value of the required number of things by first finding the value of one thing (or a unit) from the value of a given number of things.

EXAMPLE **5 bottles of perfume cost Rs 1200. How much would 7 bottles cost?**

Solution 5 bottles of perfume cost Rs 1200.

$\therefore$ 1 bottle of perfume costs Rs $1200 \div 5$ = Rs $\frac{1200}{5}$ = Rs 240.

$\therefore$ 7 bottles of perfume will cost Rs 240×7 = Rs 1680.

Direct variation

In the example we have considered, the more the number of bottles, the more is the cost. Also, the less the number of bottles, the less is the cost. In other words, an increase in one quantity (the number) causes an increase in the other quantity (the cost) and a decrease in one quantity causes a decrease in the other quantity. We express this as the cost of the bottles varies directly as the number of bottles.

In general, two quantities x and y are said to vary directly or be in direct variation or in direct proportion if they change in such a way that the ratio of the two values of x is the same as the ratio of the corresponding two values of y. The quantity x (which causes the quantity y to change) is called the independent variable, while the quantity y is called the dependent variable.

Example If 8 pencils cost Rs 24 then 6 such pencils will cost Rs 18.

Let the number of pencils = x and the cost = y.

So the ratio of the two values of $x = \frac{8}{6}$ and the ratio of the corresponding values of $y = \frac{24}{18}$.

Since $\frac{8}{6} = \frac{24}{18}$, the cost of pencils varies directly with the number of pencils.

Inverse variation

Two quantities x and y are said to vary indirectly or be in inverse variation or in inverse proportion if they change in such a way that the ratio of two values of x is the same as the inverse of the ratio of the corresponding two values of y. To put it more simply, when two quantities x and y are in invese proportion, an increase in x (independent variable) causes a decrease in y (dependent variable), while a decrease in x causes an increase in y.

Example If 8 workers do a piece of work in 12 days then 16 workers will do the work in 6 days, provided they all work at the same rate. Here, the number of workers (x) changes in the ratio 8 : 16, i.e., 1 : 2, while the number of days (y) changes in the ratio 12 : 6, i.e., 2 : 1. So, the two quantities are in inverse variation. More the number of workers, less is the number of days. Similarly, less the number of workers, more will be the number of days. So, when x (number of workers) increases, y (number of days) decreases and vice versa.

Multiplying ratio

Problems related to both direct and inverse variation can be solved by finding what is known as the multiplying ratio.

EXAMPLE **If 5 kg of sugar costs Rs 160, find the cost of 7 kg of sugar.**

Solution Since the cost increases when the weight increases, this is a case of direct variation.

$\therefore$ the ratio of the weights = the ratio of the corresponding costs.

$\therefore$ $\frac{5}{7} = \text{Rs } \frac{160}{x}$, where Rs x is the cost of 7 kg of sugar.

$\therefore$ $x = \frac{7}{5} \times \text{Rs } 160 = \text{Rs } 224.$

Here, $\frac{7}{5}$ is the multiplying ratio.

> So, if two quantities change in the same ratio, the multiplying ratio is the inverse of this ratio.

EXAMPLE **An army camp of 120 soldiers has enough ration to last 50 days. If 40 more soldiers join the camp after 10 days, how long will the remaining ration last?**

Solution At the end of 10 days the camp has enough ration to provide for 120 soldiers for $50 - 10 = 40$ days. Since the number of soldiers increases, the ration will last for less days than planned. In other words, an increase in the number of soldiers will mean a decrease in the number of days. Hence, this is a case of inverse proportion.

Thus, the ratio of the number of soldiers = $\frac{1}{\text{ration of number of days}}$.

$\therefore$ $\frac{120}{160} = \frac{1}{\frac{40}{x}}$, where x is the number of days for which the ration will last.

$\therefore$ $\frac{120}{160} = \frac{x}{40}$ or $x = \frac{120}{160} \times 40 = \frac{3}{4} \times 40 = 30$ days.

Here, $\frac{3}{4}$ is the multiplying ratio.

> In the case of inverse proportion, the multiplying ratio is the same as the ratio in which the first variable (or the independent variable) changes.

Solved Examples

EXAMPLE 1 **Anshuman earns Rs 2160 for a working week of 48 hours. If he did not work for 6 hours in a certain week, how much did he earn in that week?**

Solution This is a problem related to direct variation since an increase in the number of hours means an increase in earnings.

For 48 hours Anshuman's earnings = Rs 2160.

$\therefore$ for 1 hour Anshuman's earnings = Rs $\frac{2160}{48}$

[less hour less earnings $\Rightarrow$ division].

$\therefore$ for 42 hours Anshuman's earnings = Rs $\frac{2160}{48} \times 42$ = Rs 1890

[more hour more earnings $\Rightarrow$ multiplication].

Multiplying ratio

The number of working hours decreases in the ratio 48 : 42, i.e., 8 : 7. Since this is a problem related to direct variation, the earnings decrease in the same ratio. Hence, the multiplying ratio is the inverse of this ratio (8 : 7) = 7 : 8.

$\therefore$ Anshuman's earnings in that week = $\frac{7}{8} \times$ Rs 2160 = Rs 1890.

EXAMPLE 2 **If the wages of 9 labourers for 5 days are Rs 6300, find the wages of 15 labourers for 4 days.**

Solution The wages of 9 labourers for 5 days = Rs 6300.

$\therefore$ the wages of 9 labourers for 1 day = Rs $\frac{6300}{5}$ = Rs 1260.

$\therefore$ the wages of 1 labourer for 1 day = Rs $\frac{1260}{9}$ = Rs 140.

$\therefore$ the wages of 15 labourers for 1 day = Rs 140×15 = Rs 2100.

$\therefore$ the wages of 15 labourers for 4 days = Rs 2100×4 = Rs 8400.

Multiplying ratio

This is a case of direct proportion. First, the number of labourers increases in the ratio 9 : 15. So, the wages increase in the same ratio and the multiplying ratio $= 15 : 9 = \frac{15}{9}$.

Second, the number of days decreases in the ratio 5 : 4, so the wages also decrease in the ratio 5 : 4.

Therefore, the multiplying ratio $= 4 : 5 = \frac{4}{5}$.

$\therefore$ the required wages $= \frac{15}{9} \times \frac{4}{5} \times$ Rs 6300 = Rs 8400.

EXAMPLE 3 **A hostel has 150 students who consume 240 kg of chicken in 8 days. How many students will consume 180 kg of chicken in 9 days.**

Solution 240 kg of chicken is consumed in 8 days by 150 students.

$\therefore$ 240 kg of chicken is consumed in 1 day by 8×150 students.

$\therefore$ 1 kg of chicken is consumed in 1 day by $\frac{8 \times 150}{240}$ students.

∴ 180 kg of chicken will be consumed in 1 day by $\frac{8 \times 150}{240} \times 180$ students.

∴ 180 kg of chicken will be consumed in 9 days by $\frac{8 \times 150}{240} \times \frac{180}{9}$ students

that is, 100 students.

EXAMPLE 4 **If 8 men working 5 hours a day do a job in 15 days, in how many days will 4 men working 6 hours a day do the same job?**

Solution 8 men working 5 hours a day do a job in 15 days.

∴ 8 men working 1 hour a day do the job in 15×5 days = 75 days.

(less hours ⇒ more days)

∴ 1 man working 1 hour a day does the job in 75×8 days.

(less men ⇒ more days)

∴ 1 man working 6 hours a day does the job in $\frac{75 \times 8}{6}$ days.

(more work ⇒ less days)

∴ 4 men working 6 hours a day will do the job in $\frac{75 \times 8}{6 \times 4}$ days = 25 days.

(more men ⇒ less days)

EXAMPLE 5 **If 5 men or 7 women earn Rs 700 in a day, how much will 8 men and 12 women earn in a day?**

Solution 5 men's earnings in a day = Rs 700.

∴ 1 man's earnings in a day = Rs $\frac{700}{5}$ = Rs 140.

∴ 8 men's earnings in a day = Rs 140×8 = Rs 1120.

Again, 7 women's earnings in a day = Rs 700.

∴ 1 woman's earnings in a day = Rs $\frac{700}{7}$ = Rs 100.

∴ 12 women's earnings in a day = Rs 100×12 = Rs 1200.

Hence, the total earnings of 8 men and 12 women in a day

= Rs (1120 + 1200) = Rs 2320.

Remember These

1. When we know the value of a given quantity, we can use the unitary method to find the value of a unit quantity and then find the value of the required quantity.
2. In direct variation, a change in one quantity (independent variable) causes a change in another quantity (dependent variable) such that the ratio of the two values of the first is the same as the ratio of the corresponding two values of the second. The multiplying ratio is the inverse of this ratio.
3. In inverse variation, the ratio of the two values of the first quantity (independent variable) is the inverse of the ratio of the two values of the second quantity (dependent variable). The multiplying ratio is the same as the ratio in which the first quantity changes.

EXERCISE 2A

1. A dozen notebooks cost Rs 186. (i) What is the cost of 8 notebooks? (ii) How many notebooks will cost Rs 356.50?

2. A person earns Rs 5100 in 3 weeks. (i) How long will it take him to earn Rs 6800? (ii) How much does he earn in 5 weeks?

3. If $\frac{3}{5}$ of a plot of land costs Rs 75,120, what will $\frac{7}{20}$ of the plot cost?

4. A truck runs 476 km on 56 L of diesel.
   (i) How many km will it run on 198 L of diesel?
   (ii) How much diesel will it need to cover 408 km?

5. If 8 men can do a job in 5 days, how much time would 10 men take to do the same job?

6. A camp of 1000 soldiers has enough food for 180 days. If 600 more soldiers join the camp after 20 days, how long will the remaining food last?

7. A camp had enough food to last 50 days for 2200 soldiers. After 17 days some more soldiers joined the camp and the remaining food lasted for 20 days. Find the number of soldiers who joined the camp later.

8. If 12 labourers can earn Rs 12240 in 12 days, how many labourers can earn Rs 6800 in 8 days?

9. If the wages of 4 men for 30 days amount to Rs 3900, find the wages of 20 men for 40 days.

10. If 500 kg of food lasts 40 days for 30 men, how many men will consume 675 kg of food in 45 days?

11. 25 men working 8 hours a day do a job in 63 days. How long would 45 men take to finish the job, working 7 hours a day?

12. 19 men working $7\frac{1}{2}$ h a day can finish a job in 21 days. How many hours a day must 45 men work to complete it in 7 days?

13. If 3 men or 4 women can earn Rs 180 in a day, how much will 8 men and 12 women earn in a day?

ANSWERS

1. (i) Rs 124 (ii) 23	**2.** (i) 4 weeks (ii) Rs 8500		**3.** Rs 43,820
4. (i) 1683 km (ii) 48 L	**5.** 4 days	**6.** 100 days	**7.** 1430
8. 10	**9.** Rs 26,000	**10.** 36 men	**11.** 40 days
12. $9\frac{1}{2}$	**13.** Rs 1020		

More complex problems on time and work

While solving problems on the unitary method involving time and work, you would have noticed that the more the number of people the less the time it takes to complete a job. In such problems we assumed that all the people work at the same rate or are equally efficient. In this section, we will solve more complex time–work problems some of which will involve different efficiencies. Remember the following points in such cases.

1. If A completes a job in m days then A does $\frac{1}{m}$ of the work in 1 day.
2. If B does the same job in n days then B does $\frac{1}{n}$ of the work in 1 day.
3. Together A and B do $\frac{1}{m}+\frac{1}{n}$ or $\frac{m+n}{mn}$ of the work in 1 day.
4. Together they can do the whole (= 1) job in $1 \div \frac{m+n}{mn} = \frac{mn}{m+n}$ days.

Solved Examples

EXAMPLE 1 **Anup can do a job in 16 days.**

(i) What part of the job will he do in a day?

(ii) What part of the job will remain unfinished after 12 days?

Solution (i) Anup can complete the job in 16 days.

$\therefore$ in 1 day, he can do $\frac{1}{16}$ of the job.

(ii) $\therefore$ in 12 days, he can do $\frac{12}{16} = \frac{3}{4}$ of the job.

$\therefore$ the part of the job that will be unfinished after 12 days $= 1 - \frac{3}{4} = \frac{1}{4}$.

EXAMPLE 2 **Ram can assemble a computer in 2 hours, while Shyam can do so in 4 hours. If they work together, how much time will they take to assemble (i) one computer (ii) 6 computers? (iii) If they are paid Rs 2400 for their work, find each person's share.**

Solution In 2 hours, Ram can assemble 1 computer.

$\therefore$ in 1 hour he can assemble $\frac{1}{2}$ of a computer.

In 4 hours, Shyam can assemble 1 computer.

$\therefore$ in 1 hour he can assemble $\frac{1}{4}$ of a computer.

(i) $\therefore$ together, they can assemble $\left(\frac{1}{2}+\frac{1}{4}\right) = \frac{3}{4}$ of a computer in 1 h.

$\therefore$ together, they can assemble 1 computer in $1 \div \frac{3}{4} = \frac{4}{3}$ hours

$= 1$ hour 20 min.

(ii) $\therefore$ they can assemble 6 computers in $6 \times \frac{4}{3}$ hours = 8 hours.

(iii) The ratio of Ram's work to Shyam's work $= \frac{1}{2} : \frac{1}{4}$, i.e., 2 : 1.

$\therefore$ they will be paid in the ratio 2 : 1.

$\therefore$ Ram's share $= \frac{2}{2+1} \times \text{Rs } 2400 = \frac{2}{3} \times \text{Rs } 2400 = \text{Rs } 1600$

and Shyam's share $= \frac{1}{2+1} \times \text{Rs } 2400 = \frac{1}{3} \times \text{Rs } 2400 = \text{Rs } 800$.

EXAMPLE 3 **James and Deepak can together paint a house in 15 days. James alone can paint it in 18 days. How much time would Deepak take to paint the house?**

Solution In 15 days, James and Deepak paint the whole house.

$\therefore$ in 1 day, they can paint $\frac{1}{15}$ of the house.

In 18 days, James can paint the whole house.

$\therefore$ in 1 day, he can paint $\frac{1}{18}$ of the house.

Thus, in 1 day, Deepak can paint $\frac{1}{15}-\frac{1}{18}=\frac{1}{90}$ of the house.

$\therefore$ he would take $1 \div \frac{1}{90} = 90$ days to paint the house.

EXAMPLE 4 **Gita can do $\frac{1}{3}$ of a job in 6 days and Salma can do $\frac{1}{2}$ of the job in 3 days. In how many days can they finish the job together?**

Solution In 6 days, Gita can do $\frac{1}{3}$ of the job.

$\therefore$ in 1 day, she can do $\frac{1}{3}\times\frac{1}{6}=\frac{1}{18}$ of the job.

In 3 days, Salma can do $\frac{1}{2}$ of the job.

$\therefore$ in 1 day, she can do $\frac{1}{2}\times\frac{1}{3}=\frac{1}{6}$ of the job.

Thus, in 1 day, Gita and Salma together can do $\left(\frac{1}{18}+\frac{1}{6}\right)=\frac{2}{9}$ of the job.

$\therefore$ together they can do the job in $1 \div \frac{2}{9} = \frac{9}{2}$ days $= 4\frac{1}{2}$ days.

EXAMPLE 5 **Together, A and B can do a job in 16 days. A alone can do the job in 24 days. If they worked together for 6 days and then B went away, how long did A take to complete the unfinished part of the job?**

Solution In 16 days, A and B can do the entire job.

$\therefore$ in 1 day, they can do $\frac{1}{16}$ of the job.

$\therefore$ in 6 days, they finished $6\times\frac{1}{16}$, i.e., $\frac{3}{8}$ of the job.

$\therefore$ the unfinished part of the job $=1-\frac{3}{8}=\frac{5}{8}$.

Since A can do the job in 24 days, he would do $\frac{5}{8}$ of the job in $\frac{5}{8}\times 24$ days, i.e., 15 days.

EXAMPLE 6 **A can do a job in 25 days and B can do it in 20 days. They work together for 5 days and then A falls ill. In how many days will B finish the remaining part of the job?**

Solution Since A takes 25 days to do the job, in 1 day A does $\frac{1}{25}$ of the job.

Also, since B takes 20 days to do the job, in 1 day B can do $\frac{1}{20}$ of the job.

Thus, in 1 day, A and B together do $\left(\frac{1}{25}+\frac{1}{20}\right)$, i.e., $\frac{9}{100}$ of the job.

$\therefore$ in 5 days, A and B do $\frac{9}{100}\times 5$, i.e., $\frac{9}{20}$ of the job.

$\therefore$ the remaining part of the job $= 1-\frac{9}{20}=\frac{11}{20}$.

Since B can do the whole job in 20 days, B can do $\frac{11}{20}$ of the job in $\frac{11}{20}\times 20$ days, i.e., 11 days.

EXAMPLE 7 **If 3 men or 4 women take 27 hours to do a job, how long will 6 men and 10 women take to complete the job?**

Solution Given, 3 men's work = 4 women's work.

$\therefore$ 1 man's work $= \frac{4}{3}$ women's work.

$\therefore$ 6 men's work $= 6\times\frac{4}{3}$, that is, 8 women's work.

$\therefore$ the work done by 6 men and 10 women = the work done by $(8+10) = 18$ women.

Given, 4 women do the work in 27 h.

$\therefore$ 1 woman does the work in 27×4 h.

$\therefore$ 18 women will do the work in $\frac{27\times 4}{18}$ h, i.e., 6 h.

Hence, 6 men and 10 women working together will complete the work in 6 hours.

EXAMPLE 8 **A and B can do a job in 18 days. If A is thrice as efficient as B, in how many days will A finish the job, working alone?**

Solution $\because$ 3 days of work by B = 1 day of work by A.

$\therefore$ 1 day of work by B $= \frac{1}{3}$ day of work by A.

Since A and B can do the job in 18 days, in 1 day they can do $\frac{1}{18}$ of the job.

$\therefore$ 1 day of work by A + 1 day of work by B $= \frac{1}{18}$ of the job.

$\therefore$ 1 day of work by A + $\frac{1}{3}$ day of work by A $= \frac{1}{18}$ of the job.

Thus, A does $\frac{1}{18}$ of the job in $\frac{4}{3}$ days.

$\therefore$ A can complete the job in $\frac{4}{3}\times 18$ days = 24 days.

EXAMPLE 9 **A can do a job in 15 hours, B in 20 hours, and C in 30 hours. If they all work together, how much time would they take to complete the job? Also, if they are paid Rs 7200 for the job, how much would each receive?**

Solution A can do the job in 15 h, so in 1 h, A can do $\frac{1}{15}$ of the job.

B can do the job in 20 h, so in 1 h, B can do $\frac{1}{20}$ of the job.

C can do the job in 30 h, so in 1 h, C can do $\frac{1}{30}$ of the job.

$\therefore$ in 1 h, A, B and C together will do $\left(\frac{1}{15}+\frac{1}{20}+\frac{1}{30}\right)$ of the job, i.e., $\frac{3}{20}$ of the job.

$\therefore$ all three together can do the job in $\frac{20}{3}$ h = 6 h 40 min.

Now, the ratio of work done by A, B and C in 1 h = $\frac{1}{15}:\frac{1}{20}:\frac{1}{30} = 4:3:2$. So, they will receive money in the same ratio.

$\therefore$ A's share = $\frac{4}{4+3+2} \times$ Rs 7200 = Rs 3200,

B's share = $\frac{3}{4+3+2} \times$ Rs 7200 = Rs 2400,

C's share = $\frac{2}{4+3+2} \times$ Rs 7200 = Rs 1600.

EXAMPLE 10 **A and B can do a job in $1\frac{1}{2}$ days, A and C can do it in 2 days, and B and C in 3 days. How long would all three take to complete the job if they worked together? How long would each take to complete the job?**

Solution In $\frac{3}{2}$ days, A and B can finish the job.

$\therefore$ in 1 day, the part of the job A and B do = $\frac{2}{3}$ ... (1)

In 2 days, A and C can complete the job.

$\therefore$ in 1 day, the part of the job A and C do = $\frac{1}{2}$ ... (2)

In 3 days, B and C can complete the job.

$\therefore$ in 1 day, the part of the job of B and C do = $\frac{1}{3}$ ... (3)

Adding equations (1), (2) and (3),

in 1 day, the work done by 2A, 2B and 2C = $\frac{2}{3}+\frac{1}{2}+\frac{1}{3}=\frac{3}{2}$.

$\therefore$ 2(the work done by A, B and C in 1 day) = $\frac{3}{2}$.

$\therefore$ the work done by A, B and C in 1 day = $\frac{3}{2} \div 2 = \frac{3}{4}$ ... (4)

Hence, A, B and C together can complete the job in $1 \div \frac{3}{4}$, that is, $\frac{4}{3}$ days.

Subtracting (1) from (4), in 1 day, the work done by C = $\frac{3}{4}-\frac{2}{3}=\frac{1}{12}$.

$\therefore$ C can do the job in 12 days.

Subtracting (2) from (4), in 1 day, the work done by B = $\frac{3}{4}-\frac{1}{2}=\frac{1}{4}$.

$\therefore$ B can do the job in 4 days.

Subtracting (3) from (4), in 1 day, the work done by A = $\frac{3}{4}-\frac{1}{3}=\frac{5}{12}$.

$\therefore$ A can do the job in $\frac{12}{5}$ days, that is, $2\frac{2}{5}$ days.

EXAMPLE 11 **Two pipes can separately fill a tank in 3 and 2 hours respectively. If both the pipes are used together, how much time would they take to fill the tank?**

Solution The first pipe fills the tank in 3 h, so in 1 h it fills $\frac{1}{3}$ of the tank.

The second pipe fills the tank in 2 h, so in 1 h it fills $\frac{1}{2}$ of the tank.

Thus, in 1 hour both pipes fill $\left(\frac{1}{3}+\frac{1}{2}\right)=\frac{5}{6}$ of the tank.

$\therefore$ the two pipes would fill the tank in $\frac{6}{5}$ h, i.e., 1 h 12 min.

EXAMPLE 12 **Two pipes can separately fill a cistern in 5 h and 6 h respectively, and a third pipe can empty it in 10 h. How long would it take to fill the cistern if all the pipes were used together?**

Solution The first pipe fills the cistern in 5 h, so in 1 h, it fills $\frac{1}{5}$ of the cistern.

The second pipe fills the cistern in 6 h, so in 1 h, it fills $\frac{1}{6}$ of the cistern.

The third pipe empties the cistern in 10 h, so in 1 h it empties $\frac{1}{10}$ of the cistern.

When all the three pipes are used together,

the part of the cistern filled in 1 h $=\frac{1}{5}+\frac{1}{6}-\frac{1}{10}=\frac{4}{15}$.

$\therefore$ if all the three pipes are used, the cistern will fill in $\frac{15}{4}$ h, i.e., 3 h 45 min.

EXERCISE 2B

1. Rajan can do a job in 60 days.

(i) How much of the job will he be able to finish in a day?

(ii) How much of the job will he be able to do in 36 days?

(iii) In how many days will he do $\frac{2}{5}$ of the job?

2. A can do a job in 15 days, and B in 10 days. How many days will they take to finish the job if they work together?

3. A can do a job in $4\frac{1}{2}$ days, and B in 9 days.

(i) How long will they take to complete the job together?

(ii) If they are paid Rs 900 for the job, what will be each person's share?

4. A and B can do a certain job in 5 h and A alone can do it in 8 h. How long will B take to do the job alone?

5. A can dig $\frac{1}{12}$ of a trench in 1 day, while B can dig $\frac{1}{6}$ of the trench in 3 days. If they work together, how long will they take to dig the whole trench?

6. A and B can do a job in 15 days. They work together for 6 days and then B leaves. If A can do the job in 50 days, how long will he take to complete the unfinished job?

7. A and B start on a job which A can complete in 6 days, and B in 8 days. After 2 days, B falls ill. How long will A take to complete the rest of the job?

8. A works twice as fast as B. They work together and complete a job in 8 days. How long would A take to complete the job?

9. A and B can do a job in 25 days. After 15 days of working together, B leaves. If A completed the remaining part of the job in 20 days, how long would each take to complete the job, working separately?

10. 8 men or 12 women can do a job in 25 days. In what time can 6 men and 11 women do it?

11. A, B and C can do a job in 12 h, 20 h and 30 h respectively. If they all work together, how long will they take to complete the job?

12. *A* can do a job in 3 h, *B* in 4 h and *C* in 6 h. If they all work together and receive Rs 360, how much money should each get?

13. A and B can do a job in 6 days, B and C in 9 days and A and C in 12 days. How much time will they take to complete the job if they all work together? How long will each of them take to do the job?

14. Two pipes can separately fill a tank in 3 h and 4 h respectively. If they are both used together, how much time will they take to fill the tank?

15. The cold-water tap can fill a bath in 3 min, the hot-water tap in 4 min, while the waste pipe can empty the bath in 6 min. If all three are used together, how long will it take to fill the bath?

ANSWERS

1. (i) $\frac{1}{60}$ (ii) $\frac{3}{5}$ (iii) 24 days **2.** 6 days **3.** (i) 3 days (ii) Rs 600, Rs 300

4. $13\frac{1}{3}$ h **5.** $7\frac{1}{5}$ days **6.** 30 days **7.** $2\frac{1}{2}$ days **8.** 12 days

9. 50 days, 50 days **10.** 15 days **11.** 6 days **12.** Rs 160, Rs 120, Rs 80

13. $5\frac{7}{13}$ days, $14\frac{2}{5}$ days, $10\frac{2}{7}$ days, 72 days **14.** $1\frac{5}{7}$ h **15.** 2 min 24 s

❖

Revision Exercise 1

1. Fill in the blanks.

(i) The simplest form of the ratio $5\frac{3}{5}$ kg : 1.4 kg is …… .

(ii) The greatest ratio among 3 : 7, 6 : 11 and 4 : 5 is …… .

(iii) The smallest ratio among 2 : 3, 5 : 6, 11 : 12 and 13 : 15 is …… .

(iv) If $a : b = 3 : 5$ and $b : c = 3 : 7$ then $a : b : c =$ …… .

(v) If Rs 1320 is divided between A and B in the ratio 5 : 6, the difference in their shares is …… .

(vi) The mean proportional of 1.5 L and 6 L is …… .

2. Identify the true statements.

(i) The simplest form of the ratio 250 mL : 1.2 L is 5 : 24.

(ii) If $a : b = 2 : 3$ and $b : c = 5 : 7$ then $a : c = 10 : 21$.

(iii) If $3m = 4n = 7p$ then $m : n : p = 28 : 12 : 21$.

(iv) If Rs 210 is divided between A and B in the ratio 3 : 2, the share of A = Rs 126.

(v) The ratios $1\frac{1}{4} : 3\frac{1}{7}$ and $7\frac{1}{2} : 3\frac{2}{5}$ form a proportion.

(vi) The mean proportional between 80 g and 720 g is 450 g.

3. Divide Rs 15041 among A, B and C such that the shares of A and B are in the ratio $3\frac{5}{7} : 2\frac{3}{5}$ and that of B and C are in the ratio $4\frac{2}{3} : 3\frac{1}{2}$.

4. A bag contains equal number of coins of Rs 10, Rs 2 and Rs 1 and the total value of all the coins is Rs 325. How many coins of each kind are there?

5. Two numbers are in the ratio 7 : 11. If 3 is subtracted from the smaller number and 3 is added to the bigger number, the ratio changes to 1 : 2. Find the numbers.

6. A school has 330 students and the ratio of the number of boys to the number of girls is 4 : 7. This ratio changes to 5 : 8 after admission of 60 new students. Find the number of newly admitted boys.

7. A piece of iron rod is cut in the ratio $1\frac{1}{2} : 2\frac{3}{5}$. If the longer piece is 5.2 m long, find the length of the original rod.

8. If 18 men do a piece of work in 7 days, how much time would 21 men take to do the same work?

9. 20 men working 9 hours a day complete a piece of work in 14 days. In how many days will 21 men working 5 hours a day complete the same work?

10. 7 men or 8 women can complete a job in 35 hours. How long will 21 men and 16 women working together take to complete the job?

11. Ajay can do a job in 12 hours, Ajit in 15 hours and Dolly in 20 hours. If all work together, how much time will they take to complete the job. If Rs 3000 is paid to do the job, how much money would each receive?

12. Two pipes can fill a tank in 4 and 6 hours respectively. If both the pipes be opened together, in how much time will the tank be filled?

ANSWERS

1. (i) 4 : 1 (ii) 4 : 5 (iii) 2 : 3 (iv) 9 : 15 : 35 (v) Rs 120 (vi) 3 L
2. (i), (ii), (iv)
3. Shares of A, B and C = Rs 6760, Rs 4732 and Rs 3549 respectively
4. 25
5. 21, 33
6. 30
7. 8.2 m
8. 6 days
9. 24 days
10. 7 hours
11. 5 hours; Ajay, Ajit and Dolly get Rs 1250, Rs 1000 and Rs 750 respectively
12. 2 hours 24 minutes

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