13. Time and Work

Exercise 13A

1. Question

Rajan can do a piece of work in 24 days while Amit can do it in 30 days. In how many days can they complete it, if they work together?

Answer

Number of days Rajan required do a piece of work : 24

Number of days Amit required do a piece of work : 30

Work done by Rajan in one day: $\frac{1}{24}$

Work done by Amit in one day: $\frac{1}{30}$

Work done by Rajan and Amit together in one day: $\frac{1}{24}+\frac{1}{30}=\frac{54}{720}=\frac{3}{40}$

$\therefore$ They can do the work together in $\frac{40}{3}$ days = $13\frac{1}{3}$ days

2. Question

Ravi can do a piece of work in 15 hours while Raman can do it in 12 hours. How long will both take to do it, working together?

Answer

Number of hours Ravi required do a piece of work : 15 hours

Number of hours Raman required do a piece of work : 12 hours

Work done by Ravi in one hour: $\frac{1}{15}$

Work done by Raman in one hour: $\frac{1}{12}$

Work done by Ravi and Raman together in one hour: $\frac{1}{15}+\frac{1}{12}=\frac{9}{60}=\frac{3}{20}$

$\therefore$ They can do the work together in $\frac{20}{3}$ hours = $6\frac{2}{3}$ = 6 hours 40 min

3. Question

A and B, working together can finish a piece of work in 6 days, while A alone can do it in 9 days. How much time will B alone take to finish it?

Answer

Number of days A required do a piece of work : 9 days

Let number of days B required do a piece of work : X days

Number of hours required by A and B together to do a piece of work : 6 days

Work done by A in one day: $\frac{1}{9}$

Work done by B in one day: $\frac{1}{X}$

Work done by A and B together in a day : $\frac{1}{6}$

Work done by A and B together in one day : $\frac{1}{9}+\frac{1}{X}=\frac{X+9}{9X}=\frac{1}{6}$

$\therefore \frac{X+9}{9X} = \frac{1}{6}$

⇒ 6X + 54 = 9X

⇒ 3X = 54

⇒ X = 54/3 = 18

∴ B can do the work 18 days

4. Question

Two motor mechanics, Raju and Siraj, working together can overhaul a scooter in 6 hours. Raju alone can do the job in 15 hours. In how many hours can Siraj alone do it?

Answer

Number of hours Raju required to overhaul a scooter : 15 hours

Let number of hours siraj required to overhaul a scooter : X hours

Number of hours required by Raju and Siraj together to do a piece of work : 6 hours

Work done by Raju in one hour: $\frac{1}{15}$

Work done by Siraj in one hour: $\frac{1}{X}$

Work done by Raju and Siraj together in a one hour : $\frac{1}{6}$

Work done by Raju and Siraj together in one hour : $\frac{1}{15} + \frac{1}{X} = \frac{X+15}{15X} = \frac{1}{6}$

$\therefore \frac{X+15}{15X} = \frac{1}{6}$

⇒ 6X +90 = 15X

⇒ 9X = 90

⇒ X = $\frac{90}{9}$ = 10 hours

∴ Siraj can do the work 10 hours.

5. Question

A, B and C can do a piece of work in 10 days, 12 days and 15 days respectively. How long will they take to finish it if they work together?

Answer

Number of days A required do a piece of work : 10

Number of days B required do a piece of work : 12

Number of days C required do a piece of work : 15

Work done by A in one day: $\frac{1}{10}$

Work done by B in one day: $\frac{1}{12}$

Work done by C in one day: $\frac{1}{15}$

Work done by A, B and C together in one day: $\frac{1}{10} + \frac{1}{12} + \frac{1}{15} = \frac{15}{60} = \frac{1}{4}$

∴ They can do the work together in 4 days .

6. Question

A can do a piece of work in 24 hours while B alone can do it in 16 hours. If A, B and C working together can finish it in 8 hours, in how many hours can C alone finish the work?

Answer

Number of hours A required do a piece of work : 24 hours

Number of hours B required do a piece of work : 16 hours

Let number of hours C required to do a piece of work : X hours

Number of hours required by A, B and C together to do a piece of work : 8 hours

Work done by A in one hour: $\frac{1}{24}$

Work done by B in one hour: $\frac{1}{16}$

Work done by C in one hour: $\frac{1}{X}$

Work done by A, B and C together in a one hour : $\frac{1}{8}$

Work done by A, B and C together in one hour : $\frac{1}{24}+\frac{1}{16}+\frac{1}{X}=\frac{5}{48}+\frac{1}{X}=\frac{5X+48}{48X}=\frac{1}{8}$

$\therefore \frac{5X+48}{48X}=\frac{1}{8}$

⇒ 40X +384 = 48X

⇒ 8X = 384

⇒ X = $\frac{384}{8}$ = 48 hours

∴ Siraj can do the work 48 hours.

7. Question

A, B and C working together can finish a piece of work in 8 hours. A alone can do it in 20 hours and B alone can do it in 24 hours. In how many hours will C alone do the same work?

Answer

Number of hours A required do a piece of work : 20 hours

Number of hours B required do a piece of work : 24 hours

Let number of hours C required to do a piece of work : X hours

Number of hours required by A, B and C together to do a piece of work : 8 hours

Work done by A in one hour: $\frac{1}{20}$

Work done by B in one hour: $\frac{1}{24}$

Work done by C in one hour: $\frac{1}{X}$

Work done by A, B and C together in a one hour : $\frac{1}{8}$

Work done by A, B and C together in one hour : $\frac{1}{20}+\frac{1}{24}+\frac{1}{X}=\frac{11}{120}+\frac{1}{X}=\frac{11X+120}{120X}=\frac{1}{8}$

$\therefore \frac{11X+120}{120X}=\frac{1}{8}$

⇒ 88X +960 = 120X

⇒ 32X = 960

⇒ X = $\frac{960}{32}$ = 30 hours

∴ C can do the work 30 hours.

8. Question

A and B can finish a piece of work in 16 days and 12 days respectively. A started the work and worked at it for 2 days. He was then joined by B. Find the total time taken to finish the work.

Answer

Number of days A required do a piece of work : 16

Number of days B required do a piece of work : 12

Work done by A in one day: $\frac{1}{16}$

Work done by B in one day: $\frac{1}{12}$

A works alone for 2 days, so work completed by A in 2 days : $2\ X \frac{1}{16} = \frac{1}{8}$

Work left = $1 - \frac{1}{8} = \frac{7}{8}$

Work done by A and B together in one day: $\frac{1}{16} + \frac{1}{12} = \frac{7}{48}$

They can do the work together in $\frac{48}{7}$ days .

But $\frac{7}{8}$ th of the work is done by both A and B

∴ Time required to complete $\frac{7}{8}$th of the work together by A and B : $\frac{7}{8}\ X\ \frac{48}{7} = 6$ days

∴ Time taken to finish the work 6 + 2 = 8days (here 2 is added because $\frac{1}{8}$ work is done by A alone).

∴ Total time taken to finish the work: 8days

9. Question

A can do a piece of work in 14 days while B can do it in 21 days. They began together and worked at it for 6 days. Then, A fell ill and B had to complete the remaining work alone. In how many days was the work completed?

Answer

Number of days A required do a piece of work : 14 days

Number of days B required do a piece of work : 21 days

Work done by A in one day: $\frac{1}{14}$

Work done by B in one day: $\frac{1}{21}$

Work done by A and B together in one day: $\frac{1}{14} + \frac{1}{21} = \frac{5}{42}$

They can do the work together in $\frac{42}{5}$ days .

A and B worked together for 6 days, so work completed by A and B in 6 days : $6 \times \frac{5}{42} = \frac{5}{7}$

Work left = $1 - \frac{5}{7} = \frac{2}{7}$

Number of days taken by B to complete the left over work : $\frac{2}{7} \times 21 = 6$ (here 21 is days required by B to complete a piece of work).

∴ Time taken to finish the work: 6 + 6 = 12 days.

∴ Total time taken to finish the work: 12 days

10. Question

A can do $\frac{2}{3}$ of a certain work in 16 days and B can do $\frac{1}{4}$ of the same work in 3 days. In how many days can both finish the work, working together?

Answer

A can do $\frac{2}{3}$ of a work in 16 days

B can do $\frac{1}{4}$ of a work in 3 days

Work done by A in one day: $\frac{2}{3} X \frac{1}{16} = \frac{1}{24}$

Work done by B in one day: $\frac{1}{4} X \frac{1}{3} = \frac{1}{12}$

Work done by A and B together in one day: $\frac{1}{24} + \frac{1}{12} = \frac{3}{24} = \frac{1}{8}$

∴ They can do the work together in 8 days.

11. Question

A, B and C can do a piece of work in 15, 12 and 20 days respectively. They started the work together, but C left after 2 days. In how many days will the remaining work be completed by A and B?

Answer

Number of days A required do a piece of work : 15 days

Number of days B required do a piece of work : 12 days

Number of days C required do a piece of work : 20 days

Work done by A in one day: $\frac{1}{15}$

Work done by B in one day: $\frac{1}{12}$

Work done by C in one day: $\frac{1}{20}$

Work done by A, B and C together in one day: $\frac{1}{15} + \frac{1}{12} + \frac{1}{20} = \frac{1}{5}$

They can do the work together in 5 days.

A, B and C worked together for 2 days, so work completed by A, B and C in 2 days : $2 X \frac{1}{5} = \frac{2}{5}$

Work left = $1 - \frac{2}{5} = \frac{3}{5}$

Work done by A and B together in one day: $\frac{1}{15} + \frac{1}{12} = \frac{3}{20}$

∴ They can do the work together in $\frac{20}{3}$ days.

Number of days taken by A and B to complete the left over work : $\frac{3}{5} X \frac{20}{3} = 4$ (here $\frac{20}{3}$ is days required by A

and B to complete the work).

∴ Time taken to finish the left over work: 4 days.

12. Question

A and B can do a piece of work in 18 days; B and C can do it in 24 days while C and A can finish it in 36 days. In how many days can A, B, C finish it, if they all work together?

Answer

Number of days required by A and B to finish the work : 18 days

Number of days required by A and B to finish the work : 24 days

Number of days required by A and B to finish the work : 36 days

Work done by A and B in one day: $\frac{1}{18}$

Work done by B and C in one day: $\frac{1}{24}$

Work done by C and A in one day: $\frac{1}{36}$

Work done by (A and B) , (B and C) and (C and A) in one day that is work done by

(A +B) + (B + C) + (C + A) = 2(A+B+C) $=\frac{1}{18}+\frac{1}{24}+\frac{1}{36}=\frac{9}{72}=\frac{1}{8}$

Work done by A, B and C $=\frac{1}{2}X\frac{1}{8}=\frac{1}{16}$

∴ They can do the work in 16 days

13. Question

A and B can do a piece of work in 12 days, B and C in 15 days, and C and A in 20 days. How much time will A alone take to finish the job?

Answer

Number of days required by A and B to finish the work : 12 days

Number of days required by A and B to finish the work : 15 days

Number of days required by A and B to finish the work : 20 days

Work done by A and B in one day: $\frac{1}{12}$

Work done by B and C in one day: $\frac{1}{15}$

Work done by C and A in one day: $\frac{1}{20}$

Work done by (A and B) , (B and C) and (C and A) in one day that is work done by

(A +B) + (B + C) + (C + A) = 2(A+B+C) $=\frac{1}{12}+\frac{1}{15}+\frac{1}{20}=\frac{12}{60}=\frac{1}{5}$

∴ Work done by A, B and C $=\frac{1}{2}X\frac{1}{5}=\frac{1}{10}$

A ‘s one day work = (A +B + C) ‘s one day work – (B + C) ‘s one day work $=\frac{1}{10}-\frac{1}{15}=\frac{1}{30}$

∴ A alone can complete the work in 30 days.

14. Question

Pipes A and B can fill an empty tank in 10 hours and 15 hours respectively. If both are opened together in the empty tank, how much time will they take to fill it completely?

Answer

Number of hours Pipe A requires to fill an empty tank : 10 hours

Number of hours Pipe B requires to fill an empty tank : 15 hours

Amount of water filled by Pipe A in empty tank in one hour: $\frac{1}{10}$

Amount of water filled by Pipe B in one hour: $\frac{1}{15}$

Amount of water filled by Pipe A and Pipe B together in one hour: $\frac{1}{10}+\frac{1}{15}=\frac{5}{30}=\frac{1}{6}$

∴ They can fill the tank together in 6 hours.

15. Question

Pipe A can fill an empty tank in 5 hours while pipe B can empty the full tank in 6 hours. If both are opened at the same time in the empty tank, how much time will they take to fill it up completely?

Answer

Number of hours Pipe A requires to fill an empty tank : 5 hours

Number of hours Pipe B requires to empty the full tank : 6 hours

Amount of water filled by Pipe A in empty tank in one hour: $\frac{1}{5}$

Amount of water Pipe B empties in one hour: $\frac{1}{6}$

Amount of water filled by Pipe A and Pipe B together in one hour: $\frac{1}{5}-\frac{1}{6}=\frac{1}{30}=\frac{1}{30}$

∴ They can fill the tank together in 30 hours.

16. Question

Three taps A, B and C can fill an overhead tank in 6 hours, 8 hours and 12 hours respectively. How long would the three taps take to fill the empty tank, if all of them are opened together?

Answer

Number of hours tap A requires to fill the tank : 6

Number of hours tap B requires to fill the tank : 8

Number of hours tap C requires to fill the tank : 12

Amount of water filled by tap A in one hour: $\frac{1}{6}$

Amount of water filled by tap B in one hour: $\frac{1}{8}$

Amount of water filled by tap C in one hour: $\frac{1}{12}$

Amount of water filled by taps A, B and C together in one hour: $\frac{1}{6}+\frac{1}{8}+\frac{1}{12}=\frac{9}{24}=\frac{3}{8}$

∴ They can fill the tank together in $\frac{8}{3}$ hours = $2\frac{2}{3}$ hours = 2 hours 40 min.

17. Question

A cistern has two inlets A and B which can fill it in 12 minutes and 15 minutes respectively. An outlet C can empty the full cistern in 10 minutes. If all the three pipes are opened together in the empty tank, how much time will they take to fill the tank completely?

Answer

Number of hours inlet A requires to fill the cistern : 12 min $= \frac{12}{60} = \frac{1}{5}$ hours

Number of hours inlet B requires to fill the cistern : 15 min $= \frac{15}{60} = \frac{1}{4}$ hours

Number of hours outlet C requires to empty the cistern : 10 min $= \frac{10}{60} = \frac{1}{6}$ hours

Part of the cistern filled by inlet A in one hour: 5

Part of the cistern filled by inlet B in one hour: 4

Part of the cistern emptied by outlet C in one hour: 6

Work done by pipes A, B and C together in one hour: 5 + 4 – 6 = 3

$\therefore$ They can fill the cistern together in $\frac{1}{3}$ hours = 20 min

18. Question

A pipe can fill a cistern in 9 hours. Due to a leak in its bottom, the cistern fills up in 10 hours. If the cistern is full, in how much time will it be emptied by the leak?

Answer

A pipe can fill a cistern in: 9 hours

Let a leak empty the cistern in: X hours

Due to the leak time taken to fill the cistern : 10 hours

Part of the cistern filled by pipe in one hour: $\frac{1}{9}$

Part of the cistern emptied by leak in one hour: $\frac{1}{X}$

$\therefore \frac{1}{9} - \frac{1}{X} = \frac{1}{10}$

$\frac{1}{X} = \frac{1}{9} - \frac{1}{10}$

$\frac{1}{X} = \frac{10-9}{90}$

X = 90 hours

Therefore the leak will empty the cistern in 90 hours.

19. Question

Pipe A can fill a cistern in 6 hours and pipe B can fill it in 8 hours. Both the pipes are opened and after two hours, pipe A is closed. How much time will B take to fill the remaining part of the tank?

Answer

Pipe A can fill the cistern in : 6 hours

Pipe B can fill the cistern in : 8 hours

Part of cistern filled by pipe A in one hour: $\frac{1}{6}$

Part of cistern filled by pipe B in one hour: $\frac{1}{8}$

Part of cistern filled by pipe A and pipe B together in one hour: $\frac{1}{6} + \frac{1}{8} = \frac{7}{24}$

They can fill the cistern together in $\frac{24}{7}$ hours.

Pipes A and B filled cistern together for 2 hours,

So part of the cistern filled pipes by A and B in 2 hours : $2 \times \frac{7}{24} = \frac{7}{12}$

Part of cistern which is empty $= 1 - \frac{7}{12} = \frac{5}{12}$

Number of hours taken by pipe B to fill left over part of cistern : $\frac{5}{12} \times 8 = \frac{10}{3}$ (here 8 is hours required by pipe B to fill the remaining part of the cistern).

∴ Time taken by pipe B to fill the remaining part of the cistern: $\frac{10}{3} = 3\frac{1}{3}$ = 3 hours 20 min

Exercise 13B

1. Question

A alone can do a piece of work in 10 days and B alone can do it in 15 days. In how many days will A and B together do the same work?

A. 5 days

B. 6 days

C. 8 days

D. 9 days

Answer

Number of days A required do a piece of work : 10 days

Number of days B required do a piece of work : 15 days

Work done by A in one day: $\frac{1}{10}$

Work done by B in one day: $\frac{1}{15}$

Work done by A and B together in one day: $\frac{1}{10} + \frac{1}{15} = \frac{10}{60} = \frac{1}{6}$

∴ They can do the work together in 6 days

2. Question

A man can do a piece of work in 5 days. He and his son working together can finish it in 3 days. In how many days can the son do it alone?

A. $6\frac{1}{2}$ days

B. 7 days

C. $7\frac{1}{2}$ days

D. 8 days

Answer

Number of days the man requires to do a piece of work : 5 days

Let Number of days his son requires to do a piece of work : X days

Number of days required by the man and his son together to do a piece of work : 3 days

Work done by the man in one hour: $\frac{1}{5}$

Work done by his son in one hour: $\frac{1}{X}$

Work done by the man and his Son together in a one hour : $\frac{1}{3}$

Work done by the man and his son together in one hour : $\frac{1}{5}+\frac{1}{X}=\frac{X+5}{5X}=\frac{1}{3}$

$\therefore \frac{X+5}{5X}=\frac{1}{3}$

$\Rightarrow$ 3X + 15 = 5X

$\Rightarrow$ 2X = 15

$\Rightarrow$ X = $\frac{15}{2}=7\frac{1}{2}$ days

$\therefore$ Son alone can do the work $7\frac{1}{2}$ days.

3. Question

A can do a job in 16 days and B can do the same job in 12 days. With the help of C. they can finish the job in 6 days only. Then, C alone can finish it in

A. 34 days

B. 22 days

C. 36 days

D. 48 days

Answer

Number of days A required do a piece of work : 16 days

Number of days B required do a piece of work : 12 days

Let number of days C required to do a piece of work : X days

Number of days required by A, B and C together to do a piece of work: 6 days

Work done by A in one day: $\frac{1}{16}$

Work done by B in one day: $\frac{1}{12}$

Work done by C in one day: $\frac{1}{X}$

Work done by A, B and C together in a one day: $\frac{1}{6}$

Work done by A, B and C together in one hour : $\frac{1}{16}+\frac{1}{12}+\frac{1}{X}=\frac{7}{48}+\frac{1}{X}=\frac{7X+48}{48X}=\frac{1}{6}$

$\therefore \frac{7X+48}{48X}=\frac{1}{6}$

$\Rightarrow$ 42X +288 = 48X

$\Rightarrow$ 6X = 288

$\Rightarrow$ X = $\frac{288}{6}$ = 48 days

$\therefore$ C alone can do the work 48 days.

4. Question

To complete a work, A takes 50% more time than B. If together they take 18 days to complete the work, how much time shall B take to do it?

A. 30 days

B. 35 days

C. 40 days

D. 45 days

Answer

Let number of days B required a work be x

Then number of days A takes to complete the work is : $\left(x + \frac{50}{100}x\right)$ = 1.5x

Work done by A in one day: $\frac{1}{1.5x} = \frac{2}{3x}$

Work done by B in one day: $\frac{1}{x}$

Number of days taken by A and B to do the work together: 18 days

Work done by A and B together in one day: $\frac{1}{18}$

That is : $\frac{1}{18} = \frac{2}{3x} + \frac{1}{x}$

$\frac{1}{18} = \frac{5}{3x}$

X = $\frac{5\ X\ 18}{3}$ = 30

∴ B alone will take 30 days to complete the work.

5. Question

A works twice as fast as B. If both of them can together finish a piece of work in 12 days. then B alone can do it in

A. 24 days

B. 27 days

C. 36 days

D. 48 days

Answer

Work done by A in one day: 2x

Work done by B in one day: x

Number of days taken by A and B to do the work together: 12 days

Work done by A and B together in one day: $\frac{1}{12}$

$\frac{1}{12}$ = 2x + x

$\frac{1}{12}$ = 3x

X = $\frac{1}{36}$

Here X is Work done by B in one day

∴ B alone will take 36 days to complete the work.

6. Question

A alone can finish a piece of work in 10 days which B alone can do in 15 days. If they work

together and finish it, then out of total wages of Rs.3000. A will get

A. Rs. 1200

B. Rs.1500

C. Rs.1800

D. Rs.2000

Answer

Number of days A required do a piece of work : 10 days

Number of days B required do a piece of work : 15 days

Work done by A in one day: $\frac{1}{10}$

Work done by B in one day: $\frac{1}{15}$

Work done by A and B together in a one day: $\frac{1}{10}+\frac{1}{15}=\frac{5}{30}=\frac{1}{6}$

∴ A and B together take 6 days to complete the work.

A's share of work is : $\frac{1}{10}$ X 6 = $\frac{3}{5}$

We know that wages are divided on basis of the share of the work

∴ A's wage is $\frac{3}{5}$ X 3000 = 1800

7. Question

The rates of working of A and B are in the ratio 3 : 4. The number of days taken by them to finish the work are in the ratio

A. 3 : 4

B. 9 16

C. 4: 3

D. 16 : 9

Answer

We know that number of days taken to work is reciprocal of the rate of the work.

∴ Work done by A: $\frac{1}{3}$

Work done by B: $\frac{1}{4}$

∴ Ratio of work done is $\frac{1}{3}:\frac{1}{4}=4:3$

8. Question

A and B together can do a piece of work in 12 days; B and C can do it in 20 days while C and A can do it in 15 days. A, B and C all working together can do it in

A. 6 days

B. 9 days

C. 10 days

D. $10\frac{1}{2}$ days

Answer

Number of days required by A and B to finish the work : 12 days

Number of days required by A and B to finish the work : 20 days

Number of days required by A and B to finish the work : 15 days

Work done by A and B in one day: $\frac{1}{12}$

Work done by B and C in one day: $\frac{1}{20}$

Work done by C and A in one day: $\frac{1}{15}$

Work done by (A and B) , (B and C) and (C and A) in one day that is work done by

(A +B) + (B + C) + (C + A) = 2(A+B+C) $=\frac{1}{12}+\frac{1}{20}+\frac{1}{15}=\frac{12}{60}=\frac{1}{5}$

Work done by A, B and C $=\frac{1}{2}X\frac{1}{5}=\frac{1}{10}$

∴ They can do the work in 10 days

9. Question

3 men or 5 women can do a work in 12 days. How long will 6 men and 5 women take to do it?

A. 6 days

B. 5 days

C. 4 days

D. 3 days

Answer

Number of days required by 3 men to finish the work : 12 days

Number of days required by 5 women to finish the work : 12 days

Number of days required by 1 man to finish the work : 3 x 12 = 36 days

Number of days required by 1 woman to finish the work : 5 x 12 = 60 days

Work done by a man in one day: $\frac{1}{36}$

Work done by a woman in one day: $\frac{1}{60}$

Work done by 6 men in one day: 6 x $\frac{1}{36}=\frac{1}{6}$

Work done by 5 women in one day: 5 x $\frac{1}{60}=\frac{1}{12}$

Work done by 6 men and 5 women together in one day: $\frac{1}{6}+\frac{1}{12}=\frac{3}{12}=\frac{1}{4}$

∴ 6 men and 5 women together take 4 days to complete the work.

10. Question

A can do a piece of work in 15 days. B is 50% more efficient than A. B can finish it in

A. 10 days

B. $7\frac{1}{2}$ days

C. 12 days

D. $10\frac{1}{2}$ days

Answer

Number of days required by A to finish the work : 15 days

Work done by A in one day: $\frac{1}{15}$

B can work 50% more efficiently than A,

∴B's one day work = 150% of $\frac{1}{15}$ = $\frac{150}{100}\times\frac{1}{15}=\frac{1}{10}$

∴ B alone can complete the work in 10 days.

11. Question

A does 20% less work than B. If A can finish a piece of work in $7\frac{1}{2}$ hours, then B can finish it in

A. 5 hours

B. $5\frac{1}{2}$ hours

C. 6 hours

D. $6\frac{1}{2}$ hours

Answer

Number of hours taken by A to finish the work = $7\frac{1}{2}$ hours = $\frac{15}{2}$ hours

Work done by A in one hour : $\frac{2}{15}$

Let number of hours taken by B to finish the work : $\frac{1}{x}$

A can work 20% less than B that is $\frac{20}{100}=\frac{4}{5}$ times of B's work.

Here , $\frac{4}{5}:1=\frac{2}{15}:\frac{1}{x}$

$\frac{4}{5}=\frac{2x}{15}$

X = $\frac{15X4}{5X2}$ = 6 hours.

12. Question

A can do a piece of work in 20 days while B alone can do In 12 days. B worked at it for 9 days. A can finish the remaining work in

A. 3 days

B. 5 days

C. 7 days

D. 11 days

Answer

Number of days A required do a piece of work : 20

Number of days B required do a piece of work : 12

Work done by A in one day: $\frac{1}{20}$

Work done by B in one day: $\frac{1}{12}$

B works alone for 9 days, so work completed by B in 9 days : $9 X \frac{1}{12} = \frac{3}{4}$

Work left = $1 - \frac{3}{4} = \frac{1}{4}$

But $\frac{3}{4}$ th of the work is already done by B

∴ Time required to complete the remaining $\frac{1}{4}$th of the work by A : $\frac{1}{4} X 20 = 5$ days

∴ Time taken to finish the work 9 + 5 = 14 days

∴ A can finish the remaining work in : 5 days

13. Question

A can do a piece of work in 25 days. While B alone can do in 20 days. A started the work and was Joined by B after 10 days. The work lasted for

A. $12\frac{1}{2}$ days

B. 15 days

C. $6\frac{2}{3}$ hours

D. 25 hours

Answer

Number of hours A required do a piece of work : 25

Number of hours B required do a piece of work : 20

Work done by A in one hour: $\frac{1}{25}$

Work done by B in one hour: $\frac{1}{20}$

A works alone for 10 hours, so work completed by A in 10 hours : $10 X \frac{1}{25} = \frac{2}{5}$

Work left = $1 - \frac{2}{5} = \frac{3}{5}$

Work done by A and B together in one hour: $\frac{1}{25} + \frac{1}{20} = \frac{9}{100}$

They can do the work together in $\frac{100}{9}$ hours.

But $\frac{3}{5}$ th of the work is done by both A and B

∴ Time required to complete $\frac{3}{5}$th of the work together by A and B : $\frac{3}{5} X \frac{100}{9} = \frac{20}{3}$ hours

∴ Time taken to finish the work: $\frac{20}{3} = \frac{2}{3}$ hours

14. Question

Two pipes can fill a tank in 20 minutes,end 30 minutes respectively. If both the pipes are opened simultaneously then the lank will he filled

A. 10 minutes

B. 12 minutes

C. 15 minutes

D. 25 minutes

Answer

Number of minutes Pipe A requires to fill an empty tank : 20 minutes

Number of minutes Pipe B requires to fill an empty tank : 30 minutes

Amount of water filled by Pipe A in empty tank in one minute: $\frac{1}{20}$

Amount of water filled by Pipe B in one minute: $\frac{1}{30}$

Amount of water filled by Pipe A and Pipe B together in one minute: $\frac{1}{20}+\frac{1}{30}=\frac{5}{60}=\frac{1}{12}$

∴ They can fill the tank together in 12 minutes.

15. Question

A tap can fill a cistern in 8 hours and another tap can empty the full cistern in 16 hours. If both the taps are open then time taken to fill the cistern is

A. $5\frac{1}{3}$ hours

B. 10 hours

C. 16 hours

D. 20 hours

Answer

Number of hours Tap A requires to fill an empty tank : 8 hours

Number of hours Tap B requires to empty the full tank : 16 hours

Amount of water filled by Tap A in empty tank in one hour: $\frac{1}{8}$

Amount of water Tap B empties in one hour: $\frac{1}{16}$

Amount of water filled by Tap A and Tap B together in one hour: $\frac{1}{8}-\frac{1}{16}=\frac{1}{16}$

∴ They can fill the tank together in 16 hours.

16. Question

A pump can fill a tank in 2 hours. Due to a leak in the tank it takes $2\frac{1}{3}$ hours to fill the tank. The leak can empty the full tank in

A. $2\frac{1}{3}$ hours

B. 7 hours

C. 8 hours

D. 14 hours

Answer

A pipe can fill a cistern in: 2 hours

Let a leak empty the cistern in: X hours

Due to the leak time taken to fill the cistern : $2\frac{1}{3} = \frac{7}{3}$ hours

Part of the cistern filled by pipe in one hour: $\frac{1}{2}$

Part of the cistern emptied by leak in one hour: $\frac{1}{X}$

$\therefore \frac{1}{2} - \frac{1}{X} = \frac{3}{7}$

$\frac{1}{X} = \frac{1}{2} - \frac{3}{7}$

$\frac{1}{X} = \frac{7-6}{14}$

X = 14 hours

Therefore the leak will empty the cistern in 14 hours.

17. Question

Two pipes can fill a tank in 10 hours and 12 hours respectively, while a third pipe empties the full tank in 20 hours. If all the three pipes operate simultaneously, in how much time will the tank be full?

A. 7 hrs 15 min

B. 7 hrs 30 min

C. 7 hrs 45 min

D. 8 hrs

Answer

Number of hours inlet A requires to fill the cistern : 10 hours

Number of hours inlet B requires to fill the cistern : 12 hours

Number of hours outlet C requires to empty the cistern : 20 hours

Part of the cistern filled by inlet A in one hour: $\frac{1}{10}$

Part of the cistern filled by inlet B in one hour: $\frac{1}{12}$

Part of the cistern emptied by outlet C in one hour: $\frac{1}{20}$

Work done by pipes A, B and C together in one hour: $\frac{1}{10} + \frac{1}{12} - \frac{1}{20} = \frac{8}{60} = \frac{2}{15}$

$\therefore$ They can fill the cistern together in $\frac{15}{2}$ hours = 7 hrs 30 min

CCE Test Paper-13

1. Question

A can do a piece of work in 10 days while B alone can do it in 15 days. In how many days can both finish the same work?

Answer

Number of days A required do a piece of work : 10

Number of days B required do a piece of work : 15

Work done by A in one day: $\frac{1}{10}$

Work done by B in one day: $\frac{1}{15}$

Work done by A and B together in one day: $\frac{1}{10}+\frac{1}{15}=\frac{5}{30}=\frac{1}{6}$

∴ They can do the work together in 6 days.

2. Question

A and B can do a piece of work in 15 days; B and C in 12 days; C and A in 20 days. How many days will be taken by A, B and C working together to finish the work?

Answer

Number of days required by A and B to finish the work : 15 days

Number of days required by A and B to finish the work : 12 days

Number of days required by A and B to finish the work : 20 days

Work done by A and B in one day: $\frac{1}{15}$

Work done by B and C in one day: $\frac{1}{12}$

Work done by C and A in one day: $\frac{1}{20}$

Work done by (A and B) , (B and C) and (C and A) in one day that is work done by

(A +B) + (B + C) + (C + A) = 2(A+B+C) $=\frac{1}{12}+\frac{1}{12}+\frac{1}{20}=\frac{12}{60}=\frac{1}{5}$

Work done by A, B and C $=\frac{1}{2}\ X\ \frac{1}{5}=\frac{1}{10}$

∴ They can do the work in 10 days

3. Question

Tap A can fill a cistern in 8 hours and tap B can empty it in 12 hours. How long will it take to fill the cistern if both of them are opened together?

Answer

Number of hours Tap A requires to fill an empty tank : 8 hours

Number of hours Tap B requires to empty the full tank : 12 hours

Amount of water filled by Tap A in empty tank in one hour: $\frac{1}{8}$

Amount of water Tap B empties in one hour: $\frac{1}{12}$

Amount of water filled by Tap A and Tap B together in one hour: $\frac{1}{8}-\frac{1}{12}=\frac{1}{24}$

∴ They can fill the tank together in 24 hours.

4. Question

2 men or 3 women can do a piece of work in 16 days. In how many days can 4 men and 6 women do the same work?

Answer

Number of days required by 2 men to finish the work : 16 days

Number of days required by 3 women to finish the work : 16 days

Number of days required by 1 man to finish the work : 2 x 16 = 32 days

Number of days required by 1 woman to finish the work : 3 x 16 = 48 days

Work done by a man in one day: $\frac{1}{32}$

Work done by a woman in one day: $\frac{1}{48}$

Work done by 4 men in one day: $4 \times \frac{1}{32} = \frac{1}{8}$

Work done by 6 women in one day: $6 \times \frac{1}{48} = \frac{1}{8}$

Work done by 4 men and 6 women together in one day: $\frac{1}{8} + \frac{1}{8} = \frac{2}{8} = \frac{1}{4}$

∴ 4 men and 6 women together take 4 days to complete the work.

5. Question

A pipe can fill a cistern in 9 hours. Due to a leak in its bottom, the cistern fills up in 10 hours. If the cistern is full, in how much time will it be emptied by the leak?

Answer

A pipe can fill a cistern in: 9 hours

Let a leak empty the cistern in: X hours

Due to the leak time taken to fill the cistern : 10 hours

Part of the cistern filled by pipe in one hour: $\frac{1}{9}$

Part of the cistern emptied by leak in one hour: $\frac{1}{X}$

$\therefore \frac{1}{9} - \frac{1}{X} = \frac{1}{10}$

$\frac{1}{X} = \frac{1}{9} - \frac{1}{10}$

$\frac{1}{X} = \frac{10-9}{90}$

X = 90 hours

Therefore the leak will empty the cistern in 90 hours.

6. Question

The rates of working of two taps A and B are in the ratio 2:3. The ratio of the time taken by A and B respectively to fill a given cistern is

A. 2 : 3

B. 3 : 2

C. 4 : 9

D. 9 : 4

Answer

We know that number of days taken to work is reciprocal of the rate of the work.

Rates of working of two taps A and B are in the ratio 2:3

∴ Work done by A: $\frac{1}{2}$

Work done by B: $\frac{1}{3}$

∴ Ratio of work done is $\frac{1}{2} : \frac{1}{3}$ = 3:2

7. Question

A can finish a piece of work in 12 hours while B can finish it in 15 hours. How long will both take to finish it, working together?

A. 9 hours

B. $6\frac{2}{3}$ hours

C. $6\frac{3}{4}$ hours

D. $8\frac{1}{3}$ hours

Answer

Number of hours A required do a piece of work: 12

Number of hours B required do a piece of work : 15

Work done by A in one hour: $\frac{1}{12}$

Work done by B in one hour: $\frac{1}{15}$

Work done by A and B together in one hour: $\frac{1}{12} + \frac{1}{15} = \frac{9}{60} = \frac{3}{20}$

∴ They can do the work together in $\frac{20}{3}$ hours = $6\frac{2}{3}$ hours.

8. Question

A can do a piece of work in 14 days and B is 40% more efficient than A. In how many days can B finish it?

A. 10 days

B. $7\frac{1}{2}$ days

C. $5\frac{1}{4}$ days

D. $5\frac{3}{5}$ days

Answer

Number of days required by A to finish the work : 14 days

Work done by A in one day: $\frac{1}{14}$

B can work 40% more efficiently than A,

∴B's one day work = 140% of $\frac{1}{15}$ = $\left(\frac{140}{100} \times \frac{1}{14}\right) = \frac{1}{10}$

∴ B alone can complete the work in 10 days.

9. Question

A pump can fill a cistern in 2 hours. Due to a leak in the tank it takes $2\frac{1}{3}$ hours to fill it. The leak can empty the full tank in

A. 7 hours

B. 14 hours

C. 8 hours

D. 3 hours

Answer

A pipe can fill a cistern in: 2 hours

Let a leak empty the cistern in: X hours

Due to the leak time taken to fill the cistern : $2\frac{1}{3} = \frac{7}{3}$ hours

Part of the cistern filled by pipe in one hour: $\frac{1}{2}$

Part of the cistern emptied by leak in one hour: $\frac{1}{X}$

$\therefore \frac{1}{2} - \frac{1}{X} = \frac{3}{7}$

$\frac{1}{X} = \frac{1}{2} - \frac{3}{7}$

$\frac{1}{X} = \frac{7-6}{14}$

X = 14 hours

Therefore the leak will empty the cistern in 14 hours.

10. Question

A works twice as fast as B. If both of them can together finish a piece of work in 12 hours, then B alone can do it in

A. 24 hours

B. 27 hours

C. 36 hours

D. 18 hours

Answer

Work done by A in one hour: 2x

Work done by B in one hour: x

Number of days taken by A and B to do the work together: 12 hours

Work done by A and B together in one hour: $\frac{1}{12}$

$\frac{1}{12}$ = 2x + x

$\frac{1}{12}$ = 3x

X = $\frac{1}{36}$

Here X is Work done by B in one hour

$\therefore$ B alone will take 36 hours to complete the work.

11. Question

Fill in the blanks.

(i) A tap can fill a tank in 6 hours. The part of the tank filled in 1 hour is.....

(ii) A and B working together can finish a piece of work in 6 hours while A alone can do it in 9 hours. B alone can do it in ..... hours.

(iii) A can do a work in 16 hours and B alone can do it in 24 hours. If A, B and C working together can finish it in 8 hours, then C alone can finish it in ..... hours.

(iv) If A's one day's work is $\frac{3}{20}$, then A can finish the whole work in..... days.

Answer

(i) $\frac{1}{6}$

If A can do a piece of work in n days, then A can do $\frac{1}{n}$ of the work in on day

(ii) 18

Number of hours A required do a piece of work : 9 hours

Let number of hours B required do a piece of work : X hours

Number of hours required by A and B together to do a piece of work : 6 hours

Work done by A in one hour: $\frac{1}{9}$

Work done by B in one hour: $\frac{1}{X}$

Work done by A and B together in a hour: $\frac{1}{6}$

Work done by A and B together in one hour: $\frac{1}{9}+\frac{1}{X}=\frac{X+9}{9X}=\frac{1}{6}$

$\therefore \frac{X+9}{9X}=\frac{1}{6}$

$\Rightarrow 6X+54=9X$

$\Rightarrow 3X=54$

$\Rightarrow X=\frac{54}{3}=18$

$\therefore$ B can do the work 18 hours

(iii) 48

Number of hours A required do a piece of work : 16 hours

Number of hours B required do a piece of work : 24 hours

Let number of hours C required to do a piece of work : X hours

Number of hours required by A, B and C together to do a piece of work : 8 hours

Work done by A in one hour: $\frac{1}{16}$

Work done by B in one hour: $\frac{1}{24}$

Work done by C in one hour: $\frac{1}{X}$

Work done by A, B and C together in a one hour : $\frac{1}{8}$

Work done by A, B and C together in one hour : $\frac{1}{16}+\frac{1}{24}+\frac{1}{X}=\frac{5}{48}+\frac{1}{X}=\frac{5X+48}{48X}=\frac{1}{8}$

$\therefore \frac{5X+48}{48X}=\frac{1}{8}$

$\Rightarrow 40X + 384 = 48X$

$\Rightarrow 8X = 384$

$\Rightarrow X = \frac{384}{8} = 48$ hours

$\therefore$ C can do the work 48 hours.

(iv) $6\frac{2}{3}$

If A can do a piece of work in n days, then A can do $\frac{1}{n}$ of the work in on day

$\therefore \frac{20}{3} = 6\frac{2}{3}$