13. Time and Work

Exercise 13A

1. Question

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: $\frac{1}{24} + \frac{1}{30} = \frac{54}{720} = \frac{3}{40}$

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

2. Question

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: $\frac{1}{15} + \frac{1}{12} = \frac{9}{60} = \frac{3}{20}$

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

3. Question

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 : $\frac{1}{9} + \frac{1}{x} = \frac{x+9}{9x} = \frac{1}{6}$

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

$$\Rightarrow 6X + 54 = 9X$$

$$\Rightarrow 3X = 54$$

$$\Rightarrow X = 54/3 = 18$$

$\therefore$ B can do the work 18 days

4. Question

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

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

$$\Rightarrow 6X + 90 = 15X$$

$$\Rightarrow 9X = 90$$

$$\Rightarrow X = \frac{90}{9} = 10 \text{ hours}$$

$\therefore$ Siraj can do the work 10 hours.

5. Question

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: $\frac{1}{10} + \frac{1}{12} + \frac{1}{15} = \frac{15}{60} = \frac{1}{4}$

$\therefore$ They can do the work together in 4 days .

6. Question

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 : $\frac{1}{24} + \frac{1}{16} + \frac{1}{X} = \frac{5}{48} + \frac{1}{X} = \frac{5X+48}{48X} = \frac{1}{8}$

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

$\Rightarrow 40X + 384 = 48X$

$\Rightarrow 8X = 384$

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

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

7. Question

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 : $\frac{1}{20} + \frac{1}{24} + \frac{1}{X} = \frac{11}{120} + \frac{1}{X} = \frac{11X+120}{120X} = \frac{1}{8}$

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

$\Rightarrow 88X + 960 = 120X$

$\Rightarrow 32X = 960$

$\Rightarrow X = \frac{960}{32} = 30$ hours

$\therefore$ C can do the work 30 hours.

8. Question

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

$\therefore$ 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

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

$\therefore$ Total time taken to finish the work: 8days

9. Question

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 day 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

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

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

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

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

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

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

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

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

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

18. Question

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: $\frac{1}{x}$

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

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

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

X = 90 hours

Therefore the leak will empty the cistern in 90 hours.

19. Question

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

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

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

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

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

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

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

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

5. Question

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

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

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

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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

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: $6 \times \frac{1}{36}=\frac{1}{6}$

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

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

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

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

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

$X = \frac{15 \times 4}{5 \times 2} = 6$ hours.

12. Question

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 : $9 \times \frac{1}{12} = \frac{3}{4}$

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 : $\frac{1}{4} \times 20 = 5$ days

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

∴ A can finish the remaining work in : 5 days

13. Question

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 : $10 \times \frac{1}{25} = \frac{2}{5}$

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 : $\frac{3}{5} \times \frac{100}{9} = \frac{20}{3}$ hours

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

14. Question

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

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

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

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

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

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

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

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

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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

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: $\frac{1}{X}$

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

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

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

X = 90 hours

Therefore the leak will empty the cistern in 90 hours.

6. Question

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

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

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 $\frac{1}{15}$ = $\left(\frac{140}{100} \cdot \frac{1}{14}\right) = \frac{1}{10}$

∴ B alone can complete the work in 10 days.

9. Question

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

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

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

11. Question

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

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