

11. Time and Work

Exercise 11.1

1. Question

Rakesh can do a piece of work in 20 days. How much work can he do in 4 days.

Answer

Given,

Time taken by Rakesh to do a piece of work = 20 day

$$\therefore \text{Work done by Rakesh in 1 day} = \frac{1}{20}$$

$$\therefore \text{work done by him in 4 days} = 4 \times \frac{1}{20} = \frac{1}{5} \text{th}$$

2. Question

Rohan can paint $\frac{1}{3}$ of a painting in 6 days. How many days will he take to complete painting?

Answer

Given,

Number of days taken by Rohan for painting $\frac{1}{3}$ of painting = 6 days

$$\therefore \text{Number of days taken by him to complete the painting} = \frac{6}{\frac{1}{3}} = 6 \times 3 = 18 \text{ days.}$$

3. Question

Anil can do a piece of work in 5 days and Ankur in 4 days. How long will they will do the same work, if they work together?

Answer

Given,

Anil can do a piece of work in 5 days

$$\text{Work done by him in 1 day} = \frac{1}{5}$$

Ankur can do same work in 4 days

$$\text{Work done by Ankur in 1 day} = \frac{1}{4}$$

$$\therefore \text{Work done by both in 1 day} = \frac{1}{5} + \frac{1}{4} = \frac{9}{20}$$

$$\therefore \text{Total work done in} = \frac{20}{9} = 2 \frac{2}{9} \text{ days.}$$

4. Question

Mohan takes 9 hours to mow a large lawn. He and Sohan together can mow in 4 hours. How long will Sohan take to mow the lawn if he works alone?

Answer

Given,

Mohan can mow a lawn in 9 hours.

$$\text{Work done by Mohan in 1 hour} = \frac{1}{9}.$$

Mohan and Sohan can mow it together in = 4 hours

Work done by them together in 1 hour = $\frac{1}{4}$

Work done by Sohan in 1 hour = (work done by both in 1 hour) - (work done by Mohan in 1 hr)

$$= \frac{1}{4} - \frac{1}{9} = \frac{9-4}{36} = \frac{5}{36}$$

$\therefore$ Time taken by Sohan to complete the work = $\frac{1}{\frac{5}{36}} = \frac{36}{5} \text{ hours}$.

5. Question

Sita can finish typing a 100 page document in 9 hours, Mita in 6 hours and Rita in 12 hours. How long will they take to type a 100 page document if they work together?

Answer

Work done by Sita in 1 hour = $\frac{1}{9}$

Work done by Mita in 1 hour = $\frac{1}{6}$

Work done by Rita in 1 hour = $\frac{1}{12}$

Work done by them together in 1 hour = $\frac{1}{9} + \frac{1}{6} + \frac{1}{12} = \frac{4+6+3}{36} = \frac{13}{36}$

$\therefore$ Time taken by them to complete the work together = $\frac{1}{\frac{13}{36}} = \frac{36}{13} \text{ hours}$

6. Question

A, B and C working together can do 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

Given,

A can do a piece of work in 20 hours

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

B can do same work in = 24 hours

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

A, B and C working together can do that work in = 8 hours

Work done by A, B, C together in 1 hour = $\frac{1}{8}$

$\therefore$ work done by C in 1 hour = (work done by A, B, C in 1 hour) - (work done by A and B in 1 hr)

$$= \frac{1}{8} - \left(\frac{1}{20} + \frac{1}{24} \right) = \frac{1}{8} - \frac{11}{120} = \frac{15-11}{120} = \frac{4}{120} = \frac{1}{30}$$

$\therefore$ Time taken by C to complete the work = $\frac{1}{\frac{1}{30}} = 30 \text{ hours}$.

7. Question

A and B can do a piece of work in 18 days, B and C in 24 days and A and C in 36 days. In what time can they do it, all working together?

Answer

Given,

A and B can do a piece of work in = 18 days

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

B and C can do a piece of work in = 24 days

$$\text{Work done by C and B in 1 day} = \frac{1}{24}$$

A and c can do a piece of work in = 36 days

$$\text{Work done by A and C in 1 day} = \frac{1}{36}$$

Now adding, we get,

$$2(A+B+C)'s \text{ 1 day work} = \frac{1}{18} + \frac{1}{24} + \frac{1}{36} = \frac{4+3+2}{72} = \frac{9}{72} = \frac{1}{8}$$

$$A+B+C \text{ one day work} = \frac{1}{8 \times 2} = \frac{1}{16}$$

$$\therefore A, B \text{ and } C \text{ can finish the work in} = \frac{1}{\frac{1}{16}} = 16 \text{ days.}$$

8. Question

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

Answer

A and B can do a piece of work in = 12 days

$$\text{Work done by A and B in 1 day} = \frac{1}{12}$$

B and C can do a piece of work in = 15 days

$$\text{Work done by C and B in 1 day} = \frac{1}{15}$$

A and c can do a piece of work in = 20 days

$$\text{Work done by A and C in 1 day} = \frac{1}{20}$$

Now adding, we get,

$$2(A+B+C)'s \text{ 1 day work} = \frac{1}{12} + \frac{1}{15} + \frac{1}{20} = \frac{5+4+3}{60} = \frac{12}{60} = \frac{1}{5}$$

$$A+B+C \text{ one day work} = \frac{1}{5 \times 2} = \frac{1}{10}$$

$$\therefore A's \text{ 1 day work} = (A+B+C)'s \text{ 1 day work} - (B+C)'s \text{ 1 day work}$$

$$= \frac{1}{10} - \frac{1}{15} = \frac{3-2}{30} = \frac{1}{30}$$

$$\therefore A \text{ can finish the work in} = \frac{1}{\frac{1}{30}} = 30 \text{ days}$$

9. Question

A, B and C can reap a field in $15\frac{3}{4}$ days; B, C and D in 14 days; C, D and A in 18 days; D, A and B in 21 days. In what time can A, B, C and D together reap it?

Answer

Given,

$$A, B \text{ and } C \text{ can reap the field in} = 15\frac{3}{4} \text{ days}$$

B, C and D can reap it in = 14 days

C, D and A can reap it in = 18 days

D, A and B can reap it in = 21 days

So,

$$A, B \text{ and } C's \text{ 1 day work} = \frac{1}{15} + \frac{1}{63} = \frac{4}{63}$$

$$B, C \text{ and } D's \text{ 1 day work} = \frac{1}{14}$$

$$C, D \text{ and } A's \text{ 1 day work} = \frac{1}{18}$$

$$D, A \text{ and } B's \text{ 1 day work} = \frac{1}{21}$$

Now, adding up,

$$3[A+B+C+D] = \frac{4}{63} + \frac{1}{14} + \frac{1}{18} + \frac{1}{21} = \frac{5}{21}$$

$$A+B+C+D = \frac{5}{21 \times 3} = \frac{5}{63}$$

$$\text{Thus } A, B, C, D \text{ can finish the work in} = \frac{1}{\frac{5}{63}} = \frac{63}{5} = 12 \frac{3}{5} \text{ days.}$$

10. Question

A and B can polish the floors of a building in 10 days. A alone can do $\frac{1}{4}$ th of it in 12 days. In how many days can B alone polish the floor?

Answer

Given,

A and B can polish a building in = 10 days

A alone can do $\frac{1}{4}$ th of it in 12 days

$$(A+B)'s \text{ 1 day work} = \frac{1}{10}$$

$$A's \text{ 1 day work} = \frac{1}{4 \times 12} = \frac{1}{48}$$

$$B's \text{ 1 day work} = (A+B)'s \text{ 1 day work} - A's \text{ 1 day work} = \frac{1}{10} - \frac{1}{48} = \frac{38}{480} = \frac{19}{240}$$

$$\text{Thus } B \text{ can finish the work in} = \frac{1}{\frac{19}{240}} = \frac{240}{19} = 12 \frac{12}{19} \text{ days.}$$

11. Question

A and B can finish a work in 20 days. A alone can do $\frac{1}{5}$ th of the work in 12 days. In how many days can B alone do it?

Answer

Given,

A and B can finish a work in = 20 days

A can $\frac{1}{5}$ th work in = 12 days

$$\therefore A+B's \text{ 1 day work} = \frac{1}{20}$$

$$\therefore A's \text{ 1 day work} = \frac{1}{5 \times 12} = \frac{1}{60}$$

B's 1 day work = (A+B)'s 1 day work - A's 1 day work

$$= \frac{1}{20} - \frac{1}{60} = \frac{3-1}{60} = \frac{2}{60} = \frac{1}{30}$$

Thus B can finish the work in $= \frac{1}{\frac{1}{30}} = 30 \text{ days}$.

12. Question

A and B can do a piece of work in 20 days and B in 15 days. They work together for 2 days and then A goes away. In how many days will B finish the remaining work?

Answer

Given,

A and B can do a piece of work in = 20 days

B can do it in = 15 days

$\therefore$ A and B's 1 day work = $\frac{1}{20}$

B's 1 day work = $\frac{1}{15}$

$\therefore$ A and B work for 2 days, hence work done by them in 2 days = $2 \times \frac{1}{20} = \frac{1}{10}$

Remaining work = $1 - \frac{1}{10} = \frac{9}{10}$

$\therefore$ B do $\frac{1}{15}$ work in = 1 day

B do 1 complete work in = $\frac{1}{\frac{1}{15}} = 15 \text{ days}$

$\therefore$ B will do $\frac{9}{10}$ work in = $\frac{9}{10} \times \frac{15}{1} = \frac{135}{10} = 13\frac{1}{2}$ days

13. Question

A can do a piece of work in 40 days and B in 45 days. They work together for 10 days and then B goes away. In how many days will A finish the remaining work?

Answer

Given,

A can do a piece of work in 40 days

B can do it in = 45 days

A's 1 day work = $\frac{1}{40}$

B's 1 day work = $\frac{1}{45}$

(A+B)'s 1 day work together = $\left(\frac{1}{40} + \frac{1}{45}\right)$

A+B's 10 day work = $10 \left(\frac{1}{40} + \frac{1}{45}\right) = \frac{17}{36}$

Remaining work = $1 - \frac{17}{36} = \frac{19}{36}$

$\therefore$ Remaining work will be done by A = $\frac{\frac{19}{36}}{\frac{1}{40}} = \frac{19}{36} \times 40 = \frac{190}{9} = 21\frac{1}{9}$ days.

14. Question

Aasheesh can paint his doll in 20 minutes and his sister Chinki can do so in 25 minutes. They paint the doll together for five minutes. At this juncture, they have a quarrel and Chinki withdraws from painting. In how many minutes will Aasheesh finish the painting of the remaining doll?

Answer

Given,

Aasheesh can paint his doll in = 20 minutes

Chinki can paint the same in = 25 minutes

$\therefore$ Aasheesh can paint in 1 minute = $\frac{1}{20}$ *part*

Chinki can paint in 1 minute = $\frac{1}{25}$ *part*

$\therefore$ They both can paint in 1 minute = $\frac{1}{20} + \frac{1}{25} = \frac{5+4}{100} = \frac{9}{100}$ *part*

Work done by them in 5 minute = $5 \times \frac{9}{100} = \frac{9}{20}$ *part*

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

So, Aasheesh can paint remaining doll in = $\frac{\frac{11}{20}}{\frac{1}{20}} = 11$ *minutes*

15. Question

A and B can do a piece of work in 6 days and 4 days respectively. A started the work, worked at it for 2 days and then was joined by B. Find the total time taken to complete the work.

Answer

Given,

A can do a piece of work in = 6 days

B can do same piece of work in = 4 days

$\therefore$ Work done by A in 1 day = $\frac{1}{6}$

$\therefore$ In 2 Days he finished = $2 \times \frac{1}{6} = \frac{1}{3}$ part of work

Remaining work = $1 - \frac{1}{3} = \frac{2}{3}$

So, Remaining work will be finished by A and B in = $\frac{\frac{2}{3}}{\left(\frac{1}{6} + \frac{1}{4}\right)} = \frac{\frac{2}{3}}{\frac{5}{12}} = \frac{2 \times 12}{5 \times 3} = \frac{8}{5} = 1\frac{3}{5}$ days

$\therefore$ Total time taken to complete the work = $2 + 1\frac{3}{5} = 3\frac{3}{5}$ days

16. Question

6 men can complete the electric fitting in a building in 7 days. How many days will it take if 21 men do the job?

Answer

Given,

6 men can complete the work in = 7 days

$\therefore$ 1 man can complete it in = $6 \times 7 = 42$ days

$\therefore$ 21 man will complete it in = $\frac{42}{21} = 2$ *days*

17. Question

8 men can do a piece of work in 9 days. In how many days will 6 men do it?

Answer

Given,

8 men can do a piece of work = 9 days

$\therefore$ 1 man can complete it in = $8 \times 9 = 72$ days

$\therefore$ 6 men will do it in = $\frac{72}{6} = 12$ days

18. Question

Reema weaves 35 baskets in 25 days. In how many days will she weave 55 baskets?

Answer

Given,

Reema weaves 35 baskets in = 25 days

$\therefore$ Time taken by her to weave 1 basket = $\frac{25}{35}$ day

$\therefore$ Time taken by her to weave 55 baskets = $\frac{25}{35} \times 55 = \frac{5}{7} \times 55 = \frac{275}{7} = 39\frac{2}{7}$ days

19. Question

Neha types 75 pages in 14 hours. How many pages will she type in 20 hours?

Answer

Given,

Neha types 75 pages in = 14 hours

$\therefore$ Number of pages typed by Neha in 14 hour = 75 pages

$\therefore$ Number of pages typed by her in 1 hour = $\frac{75}{14}$

$\therefore$ Number of pages she typed in 20 hour = $20 \times \frac{75}{14} = \frac{750}{7} = 107\frac{1}{7}$ pages

20. Question

If 12 boys earn Rs 840 in 7 days, what will 15 boys earn in 6 days?

Answer

Given,

$\therefore$ Earning of 12 boys in 7 days = Rs.840

$\therefore$ Earning of 12 boys in 1 day = $Rs. \frac{840}{7} = Rs. 120$

$\therefore$ Earning of 1 boy in 1 day = $\frac{120}{12} = Rs. 10$

$\therefore$ Earning of 1 boy in 6 days = $10 \times 6 = Rs. 60$

Hence, Earning of 15 boys in 6 days = $60 \times 15 = Rs. 900$

21. Question

If 25 men earn Rs 1000 in 10 days, how much will 15 men earn in 15 days?

Answer

$\therefore$ 25 men in 10 days can earn = Rs.1000

$\therefore$ 25 men can earn in 1 day = $\frac{1000}{10} = Rs. 100$

$\therefore$ 1 man can earn in 1 day = $\frac{100}{25} = Rs. 4$

$\therefore$ 1 man can earn in 15 days = $15 \times 4 = Rs.60$

∴ 15 man can earn in 15 days = $60 \times 15 = \text{Rs.}900$

22. Question

Working 8 hours a day, Ashu can copy a book in 18 days. How many hours a day should he work so as to finish the work in 12 days?

Answer

∴ Working 8 hours a day Ashu can complete a work in = 18 days

∴ Working 1 hours a day he can complete it in = $18 \times 8 = 144$ days

∴ Number of hours he should work to complete the work in 12 days = $\frac{144}{12} = 12$ hours/day

23. Question

If 9 girls can prepare 135 garlands in 3 hours, how many girls are needed to prepare 270 garlands in 1 hour?

Answer

∴ 9 Girls in 3 hours can prepare = 135 garlands

∴ 9 girls in 1 hour can prepare = $\frac{135}{3} = 45$ *grlands*

∴ 1 girl in 1 hour can prepare = $\frac{45}{9} = 5$ garland

∴ Number of girl needed to make 270 garlands in 1 hour = $\frac{270}{5} = 54$ girls

24. Question

A cistern can be filled by one tap in 8 hours, and by another in 4 hours. How long will it take to fill the cistern if both taps are opened together?

Answer

Given,

A cistern can filled by one tap = 8 hours

Another can filled it in = 4 hours

∴ Cistern filled by first tap in 1 hour = $\frac{1}{8}$ *part*

Cistern filled by another tap in 1 hour = $\frac{1}{4}$ *part*

∴ Net cistern filled in 1 hour = $\frac{1}{4} + \frac{1}{8} = \frac{2+1}{8} = \frac{3}{8}$ *part*

Thus, both cistern can fill the cistern in = $\frac{8}{3} = 2\frac{2}{3}$ hours

25. Question

Two taps A and B can fill an overhead tank in 10 hours and 15 hours respectively. Both the taps are opened for 4 hours and then B is turned off. How much time will A take to fill the remaining tank?

Answer

Given,

Tap A can fill a tank in = 10 hours

Tap B can fill the tank in = 15 hours

Work done by Tap A in 1 hour = $\frac{1}{10}$

Work done by tap B in 1 hour = $\frac{1}{15}$

$$\therefore \text{Work done by both tap in 1 hour} = \frac{1}{10} + \frac{1}{15} = \frac{3+2}{30} = \frac{5}{30} = \frac{1}{6} \text{ part}$$

$$\text{Work done by both tap in 4 hours} = 4 \times \frac{1}{6} = \frac{2}{3} \text{ part}$$

$$\text{Remaining part} = 1 - \frac{2}{3} = \frac{1}{3} \text{ part}$$

$$\text{Hence, time taken by A to fill remaining part} = \frac{\frac{1}{3}}{\frac{1}{10}} = \frac{10}{3} = 3\frac{1}{3} \text{ hours}$$

26. Question

A pipe can fill a cistern in 10 hours. Due to a leak in the bottom it is filled in 12 hours. When the cistern is full, in how much time will it be emptied by the leak?

Answer

Given,

A pipe can fill a cistern in = 10 hours

Due to leakage it get filled in = 12 hours

$$\therefore \text{Without leakage work done by pipe in 1 hour} = \frac{1}{10} \text{ part}$$

$$\therefore \text{With leakage work done by pipe in 1 hour} = \frac{1}{12} \text{ part}$$

$$\therefore \text{Work done by leakage in 1 hour} = \frac{1}{10} - \frac{1}{12} = \frac{12-10}{120} = \frac{2}{120} = \frac{1}{60} \text{ part}$$

$$\text{Hence, the cistern will be emptied by leakage in} = \frac{1}{\frac{1}{60}} = 60 \text{ hours.}$$

27. Question

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

Answer

Given,

Inlet A can fill the cistern in = 12 hours

Inlet B can fill it in = 15 hours

Outlet pipe can empty it in = 10 hours

$$\therefore \text{Work done by pipe A in 1 hour} = \frac{1}{12}$$

$$\therefore \text{Work done by pipe B in 1 hour} = \frac{1}{15}$$

$$\therefore \text{work done by outlet pipe in 1 hour} = \frac{1}{10}$$

$$\therefore \text{Net work done by 3 pipe in 1 hour} = \left(\frac{1}{12} + \frac{1}{15}\right) - \frac{1}{10} = \frac{9}{60} - \frac{1}{10} = \frac{9-6}{60} = \frac{3}{60} = \frac{1}{20} \text{ part}$$

$$\text{Hence, time taken by 3 pipes to fill the tank} = \frac{1}{\frac{1}{20}} = 20 \text{ hours.}$$

28. Question

A cistern can be filled by a tap in 4 hours and emptied by an outlet pipe in 6 hours. How long will it take to fill the cistern if both the tap and the pipe are opened together?

Answer

Given,

Inlet tap can fill a cistern in = 4 hours

Outlet tap can emptied it in = 6 hours

$$\therefore \text{Work done by inlet tap in 1 hour} = \frac{1}{4}$$

$$\therefore \text{Work done by outlet pipe in 1 hour} = \frac{1}{6}$$

$$\therefore \text{Work done by both pipe in 1 hour} = \left(\frac{1}{4} - \frac{1}{6} \right) = \frac{3-2}{12} = \frac{1}{12}$$

$$\text{Hence, both the tap can filled it in} = \frac{1}{\frac{1}{12}} = 12 \text{ hours.}$$