



### Exercise 13A

Q1.

Answer :

$$\text{Work done by Rajan in 1 day} = \frac{1}{24}$$

$$\text{Work done by Amit in 1 day} = \frac{1}{30}$$

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

$\therefore$  They can complete the work in  $\frac{40}{3}$  days, i.e.,  $13\frac{1}{3}$  days if they work together.

Q2.

Answer :

$$\text{Time taken by Ravi} = 15 \text{ h}$$

$$\text{Time taken by Raman} = 12 \text{ h}$$

$$\text{Work done per hour by Ravi} = \frac{1}{15}$$

$$\text{Work done per hour by Raman} = \frac{1}{12}$$

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

$$\therefore \text{Time taken by Ravi and Raman together to finish the work} = \frac{20}{3} \text{ h} = 6\frac{2}{3} \text{ h}$$

Q3.

Answer :

$$\text{Time taken by A and B to finish a piece of work} = 6 \text{ days}$$

$$\text{Work done per day by A and B} = \frac{1}{6}$$

$$\text{Time taken by A alone} = 9 \text{ days}$$

$$\text{Work done per day by A alone} = \frac{1}{9}$$

$$\text{Work done per day by B} = (\text{work done by A and B}) - (\text{work done by A})$$

$$= \frac{1}{6} - \frac{1}{9} = \frac{3-2}{18} = \frac{1}{18}$$

$\therefore$  B alone will take 18 days to complete the work.

Q4.

Answer :

$$\text{Time taken by Raju} = 15 \text{ h}$$

$$\text{Work done by Raju in 1 h} = \frac{1}{15}$$

$$\text{Time taken by Raju and Siraj working together} = 6 \text{ h}$$

$$\text{Work done by Raju and Siraj in 1 h} = \frac{1}{6}$$

$$\text{Work done by Siraj in 1 h} = (\text{work done by Raju and Siraj})$$

$$- (\text{work done by Raju})$$

$$= \frac{1}{6} - \frac{1}{15} = \frac{5-2}{30} = \frac{3}{30} = \frac{1}{10}$$

$\therefore$  Siraj will take 10 h to overhaul the scooter by himself.

Q5.

Answer :

Time taken by A to complete the work = 10 days

Time taken by B to complete the work = 12 days

Time taken by C to complete the work = 15 days

Work done per day by A =  $\frac{1}{10}$

Work done per day by B =  $\frac{1}{12}$

Work done per day by C =  $\frac{1}{15}$

Total work done per day =  $\frac{1}{10} + \frac{1}{12} + \frac{1}{15} = \frac{6+5+4}{60} = \frac{15}{60} = \frac{1}{4}$

A, B and C will take 4 days to complete the work if they work together.

Q6.

Answer :

Time taken by A to complete the piece of work = 24 h

Work done per hour by A =  $\frac{1}{24}$

Time taken by B to complete the work = 16 h

Work done per hour by B =  $\frac{1}{16}$

Total time taken when A, B and C work together = 8 h

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

$$\begin{aligned} \text{Work done per hour by A, B and C} &= \left( \text{work done per hour by A} \right) + \\ &\left( \text{work done per hour by B} \right) + \left( \text{work done per hour by C} \right) \\ \left( \text{Work done per hour by C} \right) &= \left( \text{work done per hour by A, B and C} \right) - \\ &\left( \text{work done per hour by A} \right) - \left( \text{work done per hour by B} \right) \\ &= \frac{1}{8} - \frac{1}{24} - \frac{1}{16} = \frac{6-2-3}{48} = \frac{1}{48} \end{aligned}$$

Thus, C alone will take 48 h to complete the work.

Q7.

Answer :

A can complete the work in 20 h.

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

B can complete the work in 24 h.

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

It takes 8 h to complete the work if A, B and C work together.

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

$$\left( \text{Work done per hour by A, B and C} \right) = \left( \text{work done per hour by A} \right) +$$

$$\begin{aligned}
& + (\text{work done per hour by B}) + (\text{work done per hour by C}) \\
& \text{OR} \\
& (\text{Work done per hour by C}) = (\text{work done per hour by A, B and C}) \\
& - (\text{work done per hour by A}) - (\text{work done per hour by B}) \\
& = \frac{1}{8} - \frac{1}{24} - \frac{1}{20} = \frac{1}{30} \\
& \therefore \text{C alone will take 30 h to complete the work.}
\end{aligned}$$

Q8.

Answer :

Time taken by A to complete the work = 16 days

Work done per day by A =  $\frac{1}{16}$

Time taken by B to complete the work = 12 days

Work done per day by B =  $\frac{1}{12}$

Work done per day by A and B =  $\frac{1}{12} + \frac{1}{16} = \frac{4+3}{48} = \frac{7}{48}$

Work done by A in two days =  $\frac{2}{16} = \frac{1}{8}$

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

A and B together can complete  $\frac{7}{48}$  of the work in 1 day.

Then, time taken to complete  $\frac{7}{8}$  of the work =  $\frac{7}{8} \div \frac{7}{48} = \frac{7}{8} \times \frac{48}{7} = 6$  days

$\therefore$  Total time taken =  $6 + 2 = 8$  days.

Q9.

Answer :

Time taken by A to complete the work = 14 days

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

Time taken by B to complete the work = 21 days

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

Work done jointly by A and B in one day =  $\frac{1}{14} + \frac{1}{21} = \frac{3+2}{42} = \frac{5}{42}$

Work done by A and B in 6 days =  $\frac{5}{42} \times 6 = \frac{5}{7}$

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

With B working alone, time required to complete the work =  $\frac{2}{7} \div \frac{1}{21} = \frac{2}{7} \times 21 = 2 \times 3 = 6$  days

So, the total time taken to complete the work =  $6 + 6 = 12$  days

Q10.

Answer :

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

So, work done by A in one day =  $\frac{2}{48} = \frac{1}{24}$

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

So, work done by B in one day =  $\frac{1}{12}$

Work done jointly by A and B in one day =  $\frac{1}{24} + \frac{1}{12} = \frac{1+2}{24} = \frac{3}{24} = \frac{1}{8}$

So, A and B together will take 8 days to complete the work.

Q11.

Answer :

Time taken by A = 15 days

Time taken by B = 12 days

Time taken by C = 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 in one day by A, B and C together =  $\frac{1}{15} + \frac{1}{12} + \frac{1}{20} = \frac{4+5+3}{60} = \frac{12}{60} = \frac{1}{5}$

Work done by A, B and C together in 2 days =  $\frac{2}{5}$

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

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

Time required by A and B to complete the remaining work together =  $\frac{3}{5} \div \frac{3}{20} = \frac{3}{5} \times \frac{20}{3} = 4$  days

Q12.

Answer :

Time needed by A and B to finish the work = 18 days

Time needed by B and C to finish the work = 24 days

Time needed by C and A 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 =  $\frac{1}{36}$

$2 \times$  Work done by A, B and C in one day =  $\frac{1}{18} + \frac{1}{24} + \frac{1}{36} = \frac{4+3+2}{72} = \frac{9}{72} = \frac{1}{8}$

$\therefore$  Work done by A, B and C in one day =  $\frac{1}{16}$

So, A, B and C working together will take 16 days to complete the work.

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