Exercise 13A

Q1.

Answer :

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

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

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 :

Time taken by Ravi $= 15$ h

Time taken by Raman $= 12$ h

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

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

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

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

Q3.

Answer :

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

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

Time taken by A alone $= 9$ days

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

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

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

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

Q4.

Answer :

Time taken by Raju $= 15$ h

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

Time taken by Raju and Siraj working together $= 6$ h

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

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

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

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

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

$+\left(\text{work done per hour by B}\right)+\left(\text{work done per hour by C}\right)$

OR

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

$-\left(\text{work done per hour by A}\right)-\left(\text{work done per hour by B}\right)$

$=\frac{1}{8}-\frac{1}{24}-\frac{1}{20}=\frac{1}{30}$

$\therefore$ C alone will take 30 h to complete the work.

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 d 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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