

## Time & Work

- 1) If A finishes the work in  $x$  days, his 1 day is  $\frac{1}{x}$
- 2) Complete work finished is 100%.
- 3) Part of work remaining = 1 - part of work finished.
- 4) If A can do complete work in  $x$  days  
B →  $y$  days

$$A+B \rightarrow \frac{AB}{A+B}$$

1. If A can do a work in 8 days, B can do it in 10 days. In how many days A+B can complete the work?

Soln:  $\frac{8 \times 10}{8+10} = \frac{80}{18} = \frac{40}{9}$  days

2. A can do  $75\%$  of a job in 9 days. B can do half of the job in 8 days. If they work together, in how many days they finish the job.

Soln:-  $A: \frac{3}{4} - 9 \text{ days}$        $B: \frac{1}{2} - 8 \text{ days}$

$1 \rightarrow 9 \times \frac{4}{3}$        $1 - 16 \text{ days}$

$A \rightarrow 12 \text{ days}$

$B \rightarrow 16 \text{ days}$

$1 \text{ day} \rightarrow \frac{1}{12}$

$1 \text{ day} \rightarrow \frac{1}{16}$

$$A+B = \frac{12 \times 16}{12+16} = \frac{12 \times 16}{28} = \boxed{\frac{48}{7} \text{ days}}$$

3. A can do  $\frac{2}{5}$ th of the work in 12 days while B can do  $66\frac{2}{3}\%$  of the work in 16 days. They work together for 10 days. In how many days B alone can complete the remaining work?

$$\text{Soln: } \frac{2}{5}A \rightarrow 12$$

$$A = \frac{12 \times 5}{2} = 30$$

A  $\rightarrow$  30 days

B  $\rightarrow$  24 days

$$66\frac{2}{3}\% \rightarrow 16$$

$$100\% \rightarrow \frac{16}{\frac{2}{3} \times 100} \times 100 \rightarrow 24$$

$$A+B = \frac{30 \times 24}{30+24} = \frac{180}{54} = \frac{10}{3}$$

$$1 \text{ day work} = \frac{3}{40}$$

$$10 \text{ day work} = \frac{3}{40} \times 10 = \frac{3}{4}$$

~~if~~

4. A and B working together can do a piece of work in 10 days. A alone can do it in 12 days. In how many days B alone can finish the work.

Soln:-

$$A+B \rightarrow 10 \text{ days}$$

$$A \rightarrow 12$$

$$B \rightarrow x$$

$$\frac{12x}{12+x} = 10$$

$$12x = 120 + 10x$$

$$2x = 120$$

$$\boxed{x = 60}$$

B can finish the work alone in 60 days

$$\text{Efficiency} \propto \frac{1}{\text{No. of days}}$$

$$\text{Wages} \propto \text{Efficiency}$$

5. To do a certain work the ratio of efficiencies of A and B is 3:7. Working together they can finish the work in 10.5 days. They worked together for 8 days. In how many days 60% of the remaining work will be finished by A alone.

Soln:- Efficiency  $\rightarrow A:B = 3:7$   
Days  $\rightarrow A:B = 7:3$

$$\frac{7x \times 3x}{10x} = \frac{21}{2}$$

$$\frac{x}{10} = \frac{1}{2}$$

$$\boxed{x=5}$$

$$A+B \xrightarrow{1\text{ day}} \frac{1}{15} + \frac{1}{35}$$

$$A+B \xrightarrow{8\text{ day}} 8 \left( \frac{1}{15} + \frac{1}{35} \right)$$

$$= \frac{8 \times 50}{15 \times 35}$$

$$= \frac{16}{21} \text{ work completed}$$

$$\frac{\frac{8}{1} \cdot \frac{60}{100}}{21} \times \frac{5}{35}$$

$$\frac{1}{7} \xrightarrow{A} ?$$

$$= \frac{1}{7} \times 35$$

$$\boxed{= 5 \text{ days}}$$

A takes 10 days less than B to finish a piece of work. If A & B together can do it in 12 days, then in how many days B alone can finish the work?

Soln:-  $A+B = 12 \text{ days}$

$$A = x - 10$$

$$B = x$$

$$\frac{(x-10)x}{x-10+x} = 12$$

$$\frac{x^2-10x}{2x-10} = 12$$

$$x^2-10x = 24x - 120$$

$$\boxed{B=30 \text{ days}}$$

$$x^2 - 34x + 120 = 0$$

$$x^2 - 30x - 4x + 120 = 0$$

$$x(x-30) - 4(x-30) = 0$$

$$x-30 = 0 \quad x-4 = 0$$

$$x=30$$

$$\boxed{x=4}$$

Not possible.

$$\boxed{x=30}$$

Working together A, B & C can finish a task in 12 days.  
 A & B can do the task in 55 days & 66 days respectively.  
 In how many days C alone can finish the work.

Soln:

$$A + B + C = 12$$

$$\frac{1}{12} = \frac{1}{55} + \frac{1}{66} + \frac{1}{x}$$

$$\frac{1}{12} = \frac{12}{55 \times 66} + \frac{1}{x}$$

$$\frac{1}{12} = \frac{1}{30} + \frac{1}{x}$$

$$\frac{1}{x} = \frac{1}{12} - \frac{1}{30}$$

$$\frac{1}{x} = \frac{5-2}{60} = \frac{3}{60} = \frac{1}{20}$$

$$\frac{1}{x} = \frac{1}{20}$$

$$\boxed{x=20}$$

$$3 | 12, 30$$

$$2 | 4, 10$$

$$2 | 2, 5$$

$$1, 5$$

60

A & B together can finish a work in 5 days. If A works with twice his efficiency, they can finish the work in 3 days only. In how many days A alone can finish the work.

Soln:

$$A + B = 5$$

$$\frac{A}{2} + B = 3$$

$$2A + 3B = 0$$

$$\frac{AB}{A+B} = 5$$

$$\frac{AB}{2(A/2 + B)} = 3$$

$$2A + 3(5 - A) = 0$$

$$AB = 5(A+B)$$

$$\frac{-AB}{2(A+2B)} = 3$$

$$2A + 15 - 3A = 0$$

$$\frac{5(A+B)}{A+2B} = 3$$

$$-A = -15$$

$$\frac{A+2B}{A+B} = \frac{5}{3}$$

$$A = 15$$

$$3A + 2B = 5A + 5B$$

$$\boxed{\frac{A}{2} = 7.5}$$

A can do as much work as B & C together can do.  
 A & B together can do the same work in 9 hrs 36 mins  
 and C can do it 48 hrs. Find the time in which B alone  
 can do the work.

Soln:  $A+B \rightarrow 9\text{ hrs } 36\text{ mins}$   $C \rightarrow 48\text{ hrs}$

$$9 + \frac{36}{60} = \frac{48}{5} \text{ hrs}$$

$B \rightarrow ?$

$A \rightarrow x$  days

$$A+B = \frac{48}{5}$$

$B+C \rightarrow x$  days

$$B+C = \frac{1}{x}$$

$$B \rightarrow \frac{1}{x} - \frac{1}{48}$$

$$B's \text{ 1 day} \rightarrow \frac{48-x}{48x}$$

$$B = \frac{48x}{48-x}$$

$$B \rightarrow \frac{48 \times 16}{48-16}$$

$$= \frac{48 \times 16}{32}$$

$$\boxed{B \rightarrow 24 \text{ days}}$$

$$\frac{x(\frac{48x}{48-x})}{x + \frac{48x}{48-x}} = \frac{48}{5}$$

$$\frac{\frac{48x^2}{48-x}}{48x - x^2 + 48x} = \frac{48}{5}$$

$$\frac{x^2}{96x - x^2} = \frac{1}{5}$$

$$5x^2 = 96x - x^2$$

$$6x^2 = 96x$$

$$x = \frac{96}{6}$$

$$x = 16$$

A is thrice good worker than B, C alone can finish the work in 48 days. Working together all the three can finish the work in 16 days. In how many days B alone

can finish the work?

$$B \rightarrow 16 \text{ days}$$

$$A \rightarrow \frac{2}{3} \text{ days}$$

$$C = 48 \text{ days}$$

Efficiency: A:B = 3:1

No. of days A:B = 1:3

$$\frac{1}{x} + \frac{1}{3x} + \frac{1}{48} = \frac{1}{16}$$

$$\frac{48 \times 3}{144} = 2$$

A can do 40% of the work in 12 days whereas B can do 60% of the same work in 15 days. Both worked together for 10 days and C completes the remaining work alone in 4 days. In how many days A, B & C together completes 28% of the same work.

Soln:

$$A \rightarrow \frac{2}{5} \rightarrow 12 \text{ days}$$

$$1 \rightarrow \frac{12 \times 5}{2} = 30 \text{ days}$$

$$B \rightarrow \frac{3}{5} \rightarrow 15 \text{ days}$$

$$1 \rightarrow \frac{15 \times 5}{3} = 25 \text{ days}$$

$$10[A+B] = 10\left[\frac{1}{25} + \frac{1}{30}\right]$$

$$= 10\left[\frac{56}{25 \times 30}\right]$$

$$\text{work completed} = \frac{11}{15}$$

$$\text{Remaining work} = \frac{4}{15} \rightarrow 4 \text{ days}$$

$$1 \text{ day} = \frac{4 \times 15}{4} = 15 \text{ days}$$

$$A+B+C = \frac{1}{30} + \frac{1}{25} + \frac{1}{15}$$

$$= \frac{5+6+10}{150}$$

$$= \frac{21}{150}$$

$$A+B+C \xrightarrow{100\%} \frac{150}{21}$$

$$28\% = \frac{28}{100} \times \frac{150}{21}$$

$$= 2 \text{ days}$$

A & B can do a piece of work in 72 days, B & C can do it in 120 days, A & C can do it in 90 days. In how many days working together they can finish the work?

Soln:-

$$A+B = 72 \quad \frac{AB}{A+B} = \frac{1}{72} \quad \frac{AC}{A+C} = 90 \quad \frac{BC}{B+C} = 120$$

$$A+C = 90$$

$$B+C = 120$$

$$\frac{1}{A} + \frac{1}{B} + \frac{1}{C}$$

$$A+B + B+C + A+C = \frac{1}{72} + \frac{1}{90} + \frac{1}{120} \quad \underline{\underline{BC + AC + AB}}$$

$$2(A+B+C) = \frac{10+8+6}{720}$$

$$= \frac{24}{720}$$

$$= \frac{1}{30}$$

$$2(A+B+C) = \frac{1}{30}$$

$$A+B+C = \frac{1}{60}$$

1 day  
work

~~A+B+C can complete in 60 days~~

A & B can do a piece of work in 8 days. B & C can do it in 24 days, while C and A can do it in  $8\frac{4}{7}$  days. In how many days C alone can finish the work?

Soln:-  $A+B = 8, B+C = 24, C+A = 8\frac{4}{7}$

$$= \frac{60}{7}$$

$$\frac{48 \times 7}{336} = 5$$

$$2(A+B+C) = \frac{1}{8} + \frac{1}{24} + \frac{7}{60}$$

$$2(A+B+C) = \frac{60+20+56}{480} = \frac{136}{480}$$

$$A+B+C = \frac{136}{960}$$

$$\begin{aligned}
 &= \frac{136}{960} - \frac{1}{8} \\
 &= \frac{136 - 120}{960} \\
 &= \frac{16}{960} \\
 &= \frac{1}{60}
 \end{aligned}$$

e can finish the work in 60 days//

A & B together can complete a work in 8 days. B & e together can 12 days. All working together all the three can complete the work in 6 days. In how many days A & C together can finish the work?

Soln:-

$$2(A+B+C) = (A+B) + (B+C) + (A+C)$$

$$A+C = 2(A+B+C) - ((A+B) + (B+C))$$

$$\begin{aligned}
 &= \frac{2}{6} - \left( \frac{1}{8} + \frac{1}{12} \right) \\
 &= \frac{2}{6} - \left( \frac{3+2}{24} \right) \\
 &= \frac{2}{6} - \frac{5}{24} \\
 &= \frac{8-5}{24} \\
 &= \frac{3}{24} \\
 &= \frac{1}{8}
 \end{aligned}$$

$$\begin{aligned}
 &\text{M=1} \\
 &A \rightarrow \frac{1}{6} - (B+C) \\
 &B \rightarrow \frac{1}{6} - (A+C) \\
 &C \rightarrow \frac{1}{6} - (A+B)
 \end{aligned}$$

$$\begin{aligned}
 &A \rightarrow \frac{1}{6} - \frac{1}{12} = \frac{2-1}{12} = \frac{1}{12} \\
 &C \rightarrow \frac{1}{6} - \frac{1}{8} = \frac{4-3}{24} = \frac{1}{24} \\
 &A+C = \frac{24 \times 12}{12+24} = \frac{24 \times 12}{36} = \frac{8}{3}
 \end{aligned}$$

A+C can complete the work in 8 days.

A & B together can finish a work in 30 days. They worked for 20 days & then B left the work. The remaining work is done by A alone in 20 more days. In how many days A alone can finish the work?

Soln.

$$A+B = 30 \rightarrow \frac{1}{30} \text{ 1 day work} \quad 100\% \rightarrow 30 \text{ days}$$

$$20 \text{ days} \rightarrow \frac{20}{30} \Rightarrow \frac{2}{3}$$

$$\frac{1}{3} \xrightarrow{A} 20$$

$$\text{Remaining work} = \frac{1}{3}$$

$$1 \rightarrow 20 \times 3 = \boxed{60 \text{ days}}$$

A does  $\frac{2}{5}$  th of a work in 9 days then B joined and together they completed the remaining work in 6 days. In how many days B alone can finish the work?

Soln.

$$A+B \Rightarrow \frac{3}{5} \text{ work} \rightarrow 6 \text{ days}$$

$$1 \text{ work} = 6 \times \frac{5}{3}$$

$A+B$  together in 10 days

$$A \rightarrow \frac{2}{5} \rightarrow 9 \text{ days}$$

$$A+B = \frac{AB}{A+B}$$

$$1 \text{ work} = \frac{9 \times 5}{2} = \frac{45}{2} \text{ days}$$

$$10 = \frac{\frac{45}{2}B}{\frac{45}{2} + B} = \frac{\frac{45}{2}B}{\frac{45+2B}{2}}$$

$$45B = 450 + 20B$$

$$25B = 450$$

$$B = \frac{450}{25} = 18$$

If A, B & C can finish a work in 12, 18, 36 days respectively. They all work together for 2 days And then B quits, In how many days A & C can finish the remaining work?

Soln:-

$$A \rightarrow 12 \quad B \rightarrow 18 \quad C \rightarrow 36$$

$$\begin{aligned} A+B+C &= \frac{1}{12} + \frac{1}{18} + \frac{1}{36} \\ &= \frac{3+2+1}{36} = \frac{6}{36} = \frac{1}{6} \end{aligned}$$

$$A+B+C = 6 \text{ days}$$

$$2 \times \frac{1}{6} = \frac{2}{6} = \frac{1}{3} \text{ work completed}$$

$$\text{Remaining} = \frac{2}{3} \text{ work}$$

$$A+C = \frac{AC}{A+C} = \frac{12 \times 36}{12+36} = \frac{12 \times 36}{48} = \frac{36}{12}$$

$$1 \rightarrow A+C \rightarrow 9 \text{ days}$$

$$\frac{2}{3} \Rightarrow 9 \times \frac{2}{3} = 6 \text{ days}$$

A & C can complete remaining work in 6 days

$\frac{30}{20}$   
 $\frac{60}{300}$   
 $\frac{12}{24}$

A can finish  $\frac{1}{3}$  rd of a work in 5 days, B can  $\frac{2}{5}$  work in 10 days & C can ~~can~~ finish 75% of a work in 15 days They worked together for 6 days. In how many days B can finish the remaining work?

$$\text{Soln: } A \rightarrow \frac{1}{3} \rightarrow 5 \text{ days} \quad B \rightarrow \frac{2}{5} \rightarrow 10 \text{ days} \quad C \rightarrow \frac{3}{4} \rightarrow 15 \text{ days}$$

$$\text{15, 25, 20} \quad 1 \rightarrow 15 \text{ days} \quad 1 \rightarrow \frac{10 \times 5}{2} = 25 \text{ days} \quad 1 \rightarrow \frac{15 \times 4}{3} = 20 \text{ days}$$

$$A+B+C = \frac{1}{15} + \frac{1}{25} + \frac{1}{20} = \frac{20+12+15}{300} = \frac{47}{300}$$

$$\frac{75 \times 4}{100}$$

A, B, C →  $\frac{300}{47}$  days

$$A, B, C \text{ 6 day work} = \frac{47}{300} \times 6 = \frac{47}{50}$$

Remaining  $\frac{3}{50} \Rightarrow B,$

$1 - \text{work} \Rightarrow B - 25 \text{ days}$

$$\frac{3}{50} = 25 \times \frac{3}{50}$$

$$= 1.5 \text{ days}$$

A & B can do a piece of work in 45 days & 40 days respectively. They began the work together, but A left after some days. And B finished the remaining work in 23 days. After how many days A left the work?

Soln.  $A \rightarrow 45 \quad B \rightarrow 40$

$$\frac{A+B}{AB} = \frac{45+40}{45 \times 40} = \frac{85}{45 \times 40} = \frac{17}{360}$$

$A+B$  can complete in  $\frac{360}{17}$  days.

B can complete in 40 days

1 - 40 days

$\frac{23}{40} \leftarrow 23 \text{ days}$

Remaining work =  $\frac{1}{40}$

$A+B \rightarrow 1 \text{ work} \rightarrow \frac{360}{17}$

$$\frac{1}{40} \text{ work} = \frac{360}{17} \times \frac{1}{40}$$

$$= 9 \text{ days} //$$

$$x \left( \frac{1}{45} + \frac{1}{40} \right) + 23 \left( \frac{1}{40} \right) = 1$$

$$x \left( \frac{17}{360} \right) + 23 \left( \frac{1}{40} \right) = 1$$

$$x \left( \frac{17}{360} \right) + \frac{23}{40} = 1$$

$$x \left( \frac{17}{360} \right) = 1 - \frac{23}{40} = \frac{40-23}{40}$$

$$x = \frac{17}{40} \times \frac{360}{17} = \underline{\underline{9 \text{ days}}}$$

A started a work and left after 9 days, now B finished the remaining work in 24 days. Had A left the work after working for 13 days, then B would have finished the remaining work in another 18 days. In how many days A & B working together can finish the work?

Soln:-

$$\frac{9}{a} + \frac{24}{y} = 1 \times 13$$

$$\frac{13}{a} + \frac{18}{y} = 1 \times 9$$

$$\begin{array}{r} 24 \times 13 \\ \hline 72 \\ \hline 24 * \\ \hline 312 \end{array}$$

$$\frac{27}{a} + \frac{72}{y} = 3$$

$$(-) \frac{52}{a} + \frac{72}{y} = 4$$

$$180$$

$$18$$

$$13$$

$$9$$

$$(-) \frac{25}{a} = -1$$

$$2811$$

$$16$$

$$15$$

$$\boxed{x = 25}$$

$$\frac{9}{25} + \frac{24}{y} = 1$$

$$\frac{24}{y} = 1 - \frac{9}{25} = \frac{16}{25}$$

$$\frac{25 \times 6}{150}$$

$$y = \frac{\frac{6}{24} \times 25}{18} = \frac{150}{18} = \frac{75}{2}$$

$$A+B = \frac{\frac{25 \times 75}{2}}{\frac{25+75}{2}} = \frac{25 \times 75/2}{50+75} = \frac{1}{\frac{25 \times 75}{125}}$$

$$= 15 \text{ days} //$$

A can do a work in 16 days. B can do it in 36 days and C can do it in 46 days. A, B & C started working together. After working for 4 days A left and after another 5 days B also left the work. In how many days C can finish the remaining work?

Soln:-

$$4\left(\frac{1}{16} + \frac{1}{36} + \frac{1}{46}\right) + 5\left(\frac{1}{36} + \frac{1}{46}\right) + x\left(\frac{1}{46}\right) = 1$$

$$\begin{array}{r} 16, 36, 46 \\ 2 \overline{)16, 18, 23} \\ 2 \overline{)8, 9, 23} \\ 4, 9, 23 \end{array}$$

$$\frac{4(207+92+72)}{3312} + \frac{5(46+36)}{36 \times 46} + \frac{x}{46} = 1$$

$$\frac{\cancel{4}(371)}{\cancel{3312}} + \frac{\cancel{5}(82)}{\cancel{1656}} + \frac{x}{46} = 1$$

$$\begin{array}{r} 41 \\ 1656 \\ + 828 \\ \hline 828 \end{array}$$

$$\frac{371}{828} + \frac{205}{828} \neq \frac{x}{46} = 1$$

$$\begin{array}{r} 371 \\ 205 \\ \hline 576 \end{array}$$

$$\frac{x}{46} = 1 - \frac{371+205}{828}$$

$$\begin{array}{r} 92 \\ 276 \\ 828 \\ \hline 3312 \end{array}$$

$$\frac{x}{46} = 1 - \frac{576}{828} = \frac{828-576}{828}$$

$$\begin{array}{r} 828 \\ - 576 \\ \hline 252 \end{array}$$

$$\frac{x}{46} = \frac{252}{828} \times 46 = 15 \text{ days} //$$

$$\begin{array}{r} 18 \\ 252 \\ \hline 828 \end{array}$$

$\frac{576}{252}$

$$\frac{A+B}{AB} = \frac{10+12}{10 \times 12} = \frac{\frac{22}{11}}{120} = \frac{1}{60}$$

A & B can do a work in  $\frac{60}{11}$  days

$$3\left(\frac{11}{60}\right) + 2\left(\frac{1}{10}\right) + 2\left(\frac{1}{10} + \frac{1}{C}\right) = 1$$

$$\frac{11}{20} + \frac{1}{5} + \frac{1}{5} + \frac{2}{C} = 1$$

$$\frac{11+4+4}{20} + \frac{2}{C} = 1$$

$$\frac{2}{C} = 1 - \frac{19}{20}$$

$$\frac{2}{C} = \frac{1}{20}$$

$C = 40 \text{ days}$

$$A+C = \frac{10 \times 40}{10+40} = \frac{400}{50} = 8 \text{ days}$$

A & B can do a piece of work in 20 days & 12 days.

A started the work alone and after 4 days B joined him till the completion of the work. How long did the work last?

Soln:

$$4\left(\frac{1}{20}\right) + x\left(\frac{1}{20} + \frac{1}{12}\right) = 1$$

$$\frac{1}{5} + x\left(\frac{8+5}{60}\right) = 1$$

$$\frac{1}{5} + \frac{8x}{60} = 1$$

$$\frac{8x}{60} = 1 - \frac{1}{5}$$

$$\frac{8x}{60} = \frac{4}{5}$$

$$x = \frac{4 \times 60}{5 \times 8}$$

$$x = 6$$

$$\begin{aligned} \text{total} &= 4+6 \\ &= 10 \text{ days} \end{aligned}$$

A, B & C can do work in 20 days, 24 days & 30 days.  
 A & B left the work 4 days before the completion. In  
 how many days the total work is finished?

Soln:-

$$A \rightarrow 20$$

$$B \rightarrow 24$$

$$C \rightarrow 30$$

$$\text{Total work} = \left( \frac{1}{20} + \frac{1}{24} + \frac{1}{30} \right) + 4 \left( \frac{1}{30} \right) = 1$$

$$\begin{array}{r} 5 \\ 6 \\ \hline 4, 24, 6 \\ 4, 4, 1 \end{array}$$

$$\alpha \left( \frac{12+10+8}{240} \right) + \frac{4}{30} = 1$$

$$\frac{240}{20}$$

$$\frac{300}{240} = 1 - \frac{4}{20} = \frac{26}{30}$$

$$\alpha = \frac{26}{30} \times \frac{240}{30} = \frac{104}{15}$$

$$\text{Total} = \frac{104}{15} + 4$$

$$= \frac{164}{15} = 10 \frac{14}{15} \text{ days}$$

A, B & C can do work separately in 24, 36, 48 days.  
 B leaves 7 days before completion. A leaves 3 days  
 before completion. In how many days the total work  
 will be finished?

Soln:-

$$\text{Total work} = \left[ \frac{1}{24} + \frac{1}{36} + \frac{1}{48} \right] + 3 \left[ \frac{1}{48} \right] = 1$$

$$\alpha \left[ \frac{12+8+6}{288} \right] + 4 \left[ \frac{3}{48} \right] + \frac{3}{48} = 1$$

$$\frac{26\alpha}{288} + \frac{12}{48} + \frac{3}{48} = 1$$

$$\frac{26x}{288} = 1 - \left[ \frac{12}{48} + \frac{3}{48} \right]$$

$$1 - \frac{24}{48}$$

$$\frac{26x}{288} = \frac{33}{48}$$

$$x = \frac{33}{48} \times \frac{288}{26}$$

$$= \frac{99}{13}$$

Total

$$\frac{48-24}{48} = \frac{24}{48}$$

$$\frac{36}{144}$$

202

$$\frac{48}{15}$$

$$x+7 = \frac{99}{13} + 7$$

$$= \frac{99+91}{13} = \frac{190}{13}$$

$$= 14\frac{8}{13}$$

$$\frac{13 \times 7}{91} = 2$$

130

143

156

169

182

A can do a certain work in 12 days. B is 60% more efficient than A. In how many days A & B can finish the work together?

Soln:-

$$A \propto \frac{1}{D}$$

$$\frac{E_A}{E_B} = \frac{D_B}{D_A}$$

$$\frac{100}{160} = \frac{D_B}{12}$$

$$D_B = \frac{100 \times 12}{160} = \frac{15}{2} \text{ days}$$

A & B can do it in  $\frac{60}{13}$  days

$$A+B = \frac{12 \times 15/2}{12 + 15/2} = \frac{12 \times 15}{24 + 15} = \frac{60}{13} \text{ days}$$

The efficiencies of A, B & C are in the ratio 5:3:2. Working together they can finish a task in 21 hrs. In how many hours B can complete 40% of the task.

$$A:B:C = \left(\frac{1}{5} : \frac{1}{3} : \frac{1}{2}\right) \times 30$$

$$= 6:10:15$$

$$\frac{1}{6x} + \frac{1}{10x} + \frac{1}{15x} = \frac{1}{21}$$

$$\frac{1}{x} \left[ \frac{1}{6} + \frac{1}{10} + \frac{1}{15} \right] = \frac{1}{21} \quad \frac{31 \times 5}{155}$$

$$\frac{1}{x} \left[ \frac{5+3+2}{30} \right] = \frac{1}{21}$$

$$\frac{1}{x} \left[ \frac{10}{30} \right] = \frac{1}{21}$$

$$x = \frac{10 \times 21}{30} = 7$$

$$100\% = 70 \text{ days}$$

$$40\% = 28 \text{ days}$$

$$\frac{10 \times 40}{100}$$

A is twice as efficient as B and C is thrice as efficient as B. Working together they can finish a certain work in 5 days. A & C worked together for 5 days. In how many days B alone can finish the remaining work?

Sol:

$$A:B:C \quad A = \frac{6}{2} \times 5 = 15 \text{ days}$$

$$2:1:1 \quad B = 6 \times 5 = 30 \text{ days}$$

$$\frac{1}{1}: \frac{1}{1}: \frac{3}{1} \quad C = \frac{6}{3} \times 5 = 10 \text{ days}$$

$$A+B+C = 5 \left( \frac{1}{15} + \frac{1}{30} + \frac{1}{10} \right) = 5 \times \frac{5}{30} = \frac{5}{6}$$

$$\frac{1}{6} B \rightarrow ?$$

$$1B \rightarrow 30$$

$$1B = 30 \times \frac{1}{6} = 5 \text{ days}$$

A & B working separately can do a piece of work in 9 days & 15 days respectively. If they work for a day alternately with A beginning the work. In how many days work will be completed?

Soln:-

$$A \rightarrow \frac{1}{9} \quad B \rightarrow \frac{1}{15}$$

$$2 \text{ days } \xrightarrow{\times 5} \frac{1}{9} + \frac{1}{15} = \frac{24}{9 \times 15} = \frac{8}{45}$$

$$10 \text{ days } \longrightarrow \frac{40}{45} \quad (1)$$

$$\Rightarrow \frac{8}{9} \text{ work completed}$$

$$\text{Remaining } - \frac{1}{9}$$

$$A \rightarrow \frac{1}{9}$$

$$A \rightarrow 1 \text{ day.}$$

$$\text{Total} = 10 + 1$$

$$= 11 \text{ days}$$

A is 1.5 times more efficient than B therefore takes 8 days less than B to finish a work. If A & B work alternate days with A starting the work, then in how many days work will be completed?

Soln:-

$$A = 1.5B$$

$$\text{No. of days} \quad A : B \quad 2P = 3P - 8$$

$$2 : 3$$

$$1P = 8$$

$$\frac{A}{B} = \frac{3}{2} \quad A : B = 3 : 2$$

$$A = 16 \text{ days} \quad B = 24 \text{ days}$$

$$2 \text{ days } \rightarrow A+B \longrightarrow \frac{1}{16} + \frac{1}{24} = \frac{24+16}{16 \times 24} = \frac{40}{16 \times 24} = \frac{5}{48} \times 9$$

$$\times 9$$

$$18 \text{ days } \longrightarrow \frac{45}{48} = \frac{15}{16}$$

$$\text{Remaining } \rightarrow \frac{1}{16} \rightarrow 19^{\text{th}} \text{ day (odd)} \rightarrow \frac{1}{16} \Rightarrow 1 \text{ day}$$

$$\text{Total} = 18 + 1 = 19 \text{ days}$$

A, B, C can do a piece of work in 30, 20, 10 days.  
 A is assisted by B on one day and C on next day alternately. Find the no. of days work will be finished completely?

- a)  $9\frac{3}{8}$  b)  $4\frac{5}{8}$  c)  $8\frac{4}{13}$  d)  $3\frac{9}{13}$

$$2 \text{ days} \xrightarrow{2A+B+C} 2\left(\frac{1}{30}\right) + \frac{1}{20} + \frac{1}{10}$$

$$\downarrow \times 4$$

8 days

$$\frac{4+3+6}{60} = \frac{13}{60}$$

$$\frac{52}{60}$$

$$1 \text{ day} \rightarrow \frac{8}{60}$$

$$\frac{3}{60} = \frac{3}{8} \text{ day}$$

$$9 \text{ day} \xrightarrow{A+B} \frac{1}{30} + \frac{1}{20} = \frac{5}{60}$$

$$1 \text{ day} \xrightarrow{A+C} \frac{1}{30} + \frac{1}{10} = \frac{40}{300} =$$

$$= 9\frac{3}{8} \text{ days}$$

Three men or four women can do a piece of work in 43 days. In how many days 7 men & 5 women will take to complete the same work.

Soln:  $3M = 43 \text{ days}$   $4W \rightarrow 43 \text{ days}$

$$3M \rightarrow \frac{1}{43} \Rightarrow 1 \text{ day} \quad 4W \rightarrow \frac{1}{43}$$

$$1M \rightarrow \frac{1}{3 \times 43} \quad 1W \rightarrow \frac{1}{4 \times 43}$$

$$7M + 5W \Rightarrow 7 \times \frac{1}{3 \times 43} + 5 \times \frac{1}{4 \times 43}$$

$$= \frac{1}{43} \left[ \frac{7}{3} + \frac{5}{4} \right]$$

$$= \frac{1}{43} \times \frac{43}{12}$$

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

$$7M + 5W = 12 \text{ days}$$

If 1 men or 2 women or 3 boys can do a piece of work in 44 days. Then in how many days 1M, 1W & 1B can finish the same work:

Soln:

$$1M = 44 \quad 2W = 44 \quad 3B = 44$$

$$1M = \frac{1}{44}, \quad W = \frac{1}{2 \times 44} \quad B = \frac{1}{3 \times 44}$$

$$= \frac{1}{44} + \frac{1}{2 \times 44} + \frac{1}{3 \times 44}$$

$$= \frac{1}{44} \left[ 1 + \frac{1}{2} + \frac{1}{3} \right] = \frac{1}{44} \left[ \frac{6+3+2}{6} \right]$$

$$= \frac{1}{44} \times \frac{11}{6} = \frac{1}{24} \text{ (1 day)}$$

$$(1M + 1W + 1B = 24 \text{ days})$$

12 Men and 16 boys can finish a work in 5 days,  
 12 Men and 24 boys can finish the same work in 4 days  
 Find the ratio of work done by man to that of boy?

Soln:

$$12M + 16B = 5 \text{ days} \quad 13M + 24B = 4 \text{ days}$$

$$12M + 16B = \frac{1}{5} \text{ (1 day)} \quad 13M + 24B = \frac{1}{4} \text{ (1 day)}$$

$$(12M + 16B = \frac{1}{5}) \times 3$$

$$(13M + 24B = \frac{1}{4}) \times 2$$

$$36M + 48B = \frac{3}{5}$$

$$\underline{12M + 16B = \frac{1}{5}}$$

$$10M = \frac{12 - 10}{20}$$

$$12\left(\frac{1}{100}\right) + 16B = \frac{1}{5} \quad 10M = \frac{3}{5} - \frac{2}{4}$$

$$10M = \frac{2}{20}$$

$$16B = \frac{1}{5} - \frac{12}{100} = \frac{20-12}{100}$$

$$M = \frac{2}{200} \quad 10M = 100 \text{ day}$$

$$16B = \frac{8}{100}$$

$$= \frac{1}{200}$$

$B \rightarrow 200 \text{ days}$

$$\text{Efficiency} \Rightarrow \left[ \frac{1}{100} : \frac{1}{200} \right] \times 200$$

$$\boxed{\text{Efficiency} \Rightarrow 2:1}$$

A & B can complete a piece of work in 15 days and 10 days respectively. They contracted to complete the work for ₹30000. Find the share of A in the contracted money.

Soln:

$$A \rightarrow \frac{1}{15} \quad B \rightarrow \frac{1}{10}$$

$$\text{Efficiency} = \left[ \frac{1}{15} : \frac{1}{10} \right] \times 30$$

$$= 2:3 \quad 5P = 30000$$

$$1P = 6000$$

$$A's \text{ share} = 2 \times 6000$$

$$\boxed{= ₹12000}$$

Two men undertake a job for ₹960. They can complete it in 16 days & 24 days respectively working alone. They worked along with a third man and took 8 days to finish it. Find the share of 3rd man in the contracted money.

Soln:

$$A = 16 \quad B = 24 \quad A+B+C = 8$$

$$A+B+C = \frac{1}{8}$$

$$A = \frac{1}{16} \quad B = \frac{1}{24}$$

$$\frac{1}{8} = \frac{1}{16} + \frac{1}{24} + C$$

$$C = \frac{1}{8} - \left[ \frac{1}{16} + \frac{1}{24} \right]$$

$$= \frac{1}{8} - \left[ \frac{3+2}{48} \right]$$

$$= \frac{6+5}{48} = \frac{1}{48}$$

$$\begin{array}{c} [16:24:48] \\ 4 \quad 6 \quad 12 \\ 2 \quad 3 \quad 6 \end{array}$$

$$\underline{2:3:6}$$

$$\text{Efficiency ratio} = \left[ \frac{1}{2} : \frac{1}{3} : \frac{1}{6} \right] \times 6$$

$$= 3 : 2 : 1$$

$$6P = 960$$

$$1P = 160$$

C's share = ₹ 160

A, B & C are given with a contract of ₹ 750 for doing a piece of work. All together they finished the work in 8 days. A & C together can do it in 12 days while A & B together can do it in  $13\frac{1}{3}$  days. Find the ratio in which money is divided.

Soln:

$$A+B+C = 8 \text{ days} \quad A+B+C = \frac{1}{8}$$

$$A+C = 12 \quad A+C = \frac{1}{12}$$

$$A+B = \frac{40}{3} \quad A+B = \frac{3}{40}$$

$$B = A+B+C - (A+C) = \frac{1}{8} - \frac{1}{12} = \frac{1}{24}$$

$$A = \frac{3}{40} - \frac{1}{24} = \frac{9-5}{120} = \frac{4}{120} = \frac{1}{30}$$

$$C = \frac{1}{12} - \frac{1}{30} = \frac{5-2}{60} = \frac{3}{60} = \frac{1}{20}$$

Days: 30 : 24 : 20

$$\text{Efficiency} = \left[ \frac{1}{30} : \frac{1}{24} : \frac{1}{20} \right] \times 120$$

= 4 : 5 : 6

A & B took a work for ₹ 880. A got ₹ 240 more than B when they are working together. B takes 12 days more than A when they work individually. In how many days A & B working together can finish the whole work?

$$A = x$$

$$B = x + 12$$

Money:

$$A = 240 + y$$

$$B = y$$

$$240 + y + y = 880$$

$$240 + 2y = 880$$

$$\begin{array}{l} 2y = 640 \\ \boxed{y = 320} \end{array}$$

$$\text{Money/Efficiency Ratio} = 560 : 320$$

$$= 7 : 4$$

$$\frac{880 \times 2}{1760}$$

$$\frac{880 \times 12}{1760}$$

$$\frac{880}{1760}$$

$$\frac{880}{10560}$$

$$\frac{880}{240}$$

$$\text{Days Ratio} = \frac{4}{16} : \frac{7}{28}$$

$$3P = 12$$

$$1D = 4$$

$$A = 16, B = 28$$

$$A+B = \frac{16 \times 28}{16+28} = \frac{16 \times 28}{44} = \frac{112}{44} = \frac{28}{11}$$

$$= 10 \frac{2}{11}$$