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11. Time and work

Time \rightarrow day/hrwork \rightarrow unit

$$1m \rightarrow 1w \rightarrow 10d$$

$$2m \rightarrow 1w \rightarrow 5d$$

$$4m \rightarrow 1w \rightarrow 2.5d$$

$$5m \rightarrow 1w \rightarrow 2d$$

$$10m \rightarrow 1w \rightarrow 1d$$

$$BFF \propto \frac{1}{T}$$

A . B

eff \rightarrow 2 : 3 (salary)T \rightarrow 3 : 2

$$\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$$

M \rightarrow menD \rightarrow dayH \rightarrow HrW \rightarrow work

$$A \rightarrow x$$

$$B \rightarrow y$$

$$A+B \xrightarrow{\text{Together}} \frac{xy}{x+y}$$

$$A+B \rightarrow x$$

$$B \rightarrow y$$

$$A \xrightarrow{\text{Alone}} \frac{xy}{x-y}$$

- D) A can do a work in 15 days and B in 20 days. If they work on it together for 4 days, then the fraction of the work that is left is:



$$\begin{aligned}
 4w A &\rightarrow 15d \\
 3w B &\rightarrow 20d \\
 7w (A+B) &\rightarrow 28d
 \end{aligned}$$

1cm \rightarrow 60w
 $\frac{32w}{60} = \frac{8}{15}$

2) A can lay railway track between two given stations in 16 days and B can do the same job in 12 days. With help of C, they did the job in 4 days only. Then, C alone can do the job in:



$$\begin{array}{l} 3w \ A \longrightarrow 16d \\ 4w \ B \longrightarrow 12d \\ 12w \ A+B+C \longrightarrow 4d \end{array}$$

$$(12w - 7w) = \frac{5w}{5} \ C \longrightarrow \frac{48}{5} \Rightarrow \boxed{\frac{9}{5} d}$$

3) A, B and C can do a piece of work in 20, 30 and 60 days respectively. In how many days can A do the work if he is assisted by B and C on every third day?



$$\begin{array}{l} 3w \ A \longrightarrow 20d \\ 2w \ B \longrightarrow 30d \\ 1w \ C \longrightarrow 60d \end{array}$$

$$\begin{array}{c} 12 \times 5 \\ \boxed{3|3|6} \\ A|A|ABC \\ 3 \times 5 \end{array}$$

60w

(1sd)

ans

4) A is thrice as good as workman as B and therefore is able to finish a job in 60 days less than B. Working together, they can do it in:



$$\begin{array}{r} A \qquad B \\ \text{EFF} \rightarrow 3 : 1 \end{array}$$

$$\begin{array}{r} T \rightarrow 1 : 3 \\ (30d) \xrightarrow{x30} 2 \xrightarrow{30d} 60d \xrightarrow{30} (90d) \end{array}$$

$$\frac{xy}{x+y} = \frac{30 \times 90}{30+90} = \frac{30 \times 45}{120} = \frac{45}{2} = \underline{\underline{22.50}}$$

- 5) A alone can do a piece of work in 6 days and B alone in 8 days. A and B undertook to do it for Rs. 3200. with the help of C, they completed the work in 3 days. How much is to be paid to C?



A	B	A+B+C	C	
T → 6	:	8	:	3

EFF → 4 : 3 : 8 1

Efficiency Time के increase and
inverse obरत time chya ratio
में divide hoئी असा No. रखिए
and ratio में divide obरत कर
Efficiency ratio असती

* 400
↓
3200
X 400
↓
400 ₹ → Paid to C

24) $\left[\frac{24}{6} = 4, \frac{24}{8} = 3, \frac{24}{3} = 8 \right]$

- 6) If 6 men and 8 boys can do a piece of work in 10 days while 26 men and 48 boys can do the same in 2 days, the time taken by 15 men and 20 boys in doing the same type of work will be.



$$(6m + 8B) \times 10 = (26m + 48B) \times 2$$

(3) $\cancel{(6m + 4m)}$
 $6m + 8B = 52m + 96B$

$8m = 16B$

① $[1m = 2B] *$

④ $10 \times 10 = 25 \times D_2$
 $D_2 = 4 \text{ day}$

15m + 20B according to these

② $15m + 10m = \boxed{25m}$

7) A can do a piece of work in 4 hours, B and C together can do it in 3 hours, while A and C together can do it in 2 hours. How long will B alone take to do it?



$$3w \quad A \rightarrow 4 \text{ hr}$$

$$\begin{array}{l} 4w \quad B+C \rightarrow 3 \text{ hr} \\ 6w \quad A+C \rightarrow 2 \text{ hr} \\ \hline 3w \quad C \end{array}$$

$$1w \quad B \rightarrow \frac{12}{7} = \underline{\underline{12 \text{ hr}}}$$

8) A can do a certain work in the same time in which B and C together can do it. If A and B together could do it in 10 days and C alone in 50 days, then B alone could do it in:



$$A = B+C$$

$$5w \quad A+B \rightarrow 10d$$

$$1w \quad C \rightarrow 50d$$

$$6w \quad \underbrace{A+B+C}_{3} \rightarrow \underbrace{C \rightarrow 50d}_{3}$$

$$2w \quad B \rightarrow \frac{500}{2} = \underline{\underline{250d}}$$

9) A does 80% of a work in 20 days. He then calls in B and they together finish the remaining work in 3 days. How long B alone would take to do the whole work?

$$\Rightarrow \begin{array}{l} 80\% \xrightarrow{\frac{1}{4}} 2 \text{d} \\ 100\% \xrightarrow{\frac{1}{4}} 2.5 \text{d} \end{array} A \rightarrow 2.5 \text{d}$$

$$\begin{array}{l} 20\% \xrightarrow{\frac{1}{5}} 2 \text{d} \\ 100\% \xrightarrow{\frac{1}{5}} 5 \text{d} \end{array} A+B \rightarrow 1.5 \text{d}$$

$$B \xrightarrow{\frac{xy}{x-y}} \frac{2.5 \times 1.5}{1.5 - 2} = \frac{7.5}{2} = 3.75 \text{d}$$

- 10) A machine P can print one lakh books in 8 hours, machine Q can print the same number of books in 10 hours while machine R can print them in 12 hours. All the machines are started at 9 A.M. while machine P is closed at 11 A.M. and the remaining two machines complete work. Approximately at what time will the work (to print one lakh books) be finished?

$$\Rightarrow P \xrightarrow{\frac{100000}{8 \text{hr}}} 12500 \text{/hr}$$

$$Q \xrightarrow{\frac{100000}{10 \text{hr}}} 10000 \text{/hr}$$

$$R \xrightarrow{\frac{100000}{12 \text{hr}}} 2500 \text{hr} \xrightarrow{\frac{2500}{3}} 833.33 \text{hr} \quad \text{approx}$$

$$(P+Q+R) \xrightarrow{(12500+10000+833.33)} 30833 \times 2 \xrightarrow{=} 61666$$

$$\begin{array}{r} 100000 \\ 61666 \\ \hline 38334 \end{array}$$

$$(Q+R) \xrightarrow{18333} \frac{38334}{18333} \xrightarrow{=} 2 \text{hr}$$

Approximately
1:00 PM

- 11) A can finish a work in 18 days and B can do the same work in 15 days. B worked for 10 days and left the job. In how many days, A alone can finish the remaining work?

$$\begin{array}{ccc} 5w & A & \xrightarrow{\text{Lcm}} 18d \\ 6w & B & \xrightarrow{\text{Lcm}} 15d \end{array} \Rightarrow 90$$

60w	<u>30w</u>
B	A
10d	<u>6 days</u>

- (12) 4 men and 6 women can complete a work in 8 days, while 3 men and 7 women can complete it in 10 days. In how many days will 10 women complete it?



$$\begin{aligned} (4m + 6w) \times 8 &= (3m + 7w) \times 10 \\ (4mw + 6w) &= 50w \\ 32m + 48w &= 30m + 70w \\ 2m &= 22w \\ (1) \quad [1m &= 11w] \end{aligned}$$

$$50w \times 8 = 10w \times D_2$$

$$D_2 = 40 \text{ days}$$

- (13) A and B can together finish a work 30 days. They worked together for 20 days and then B left. After another 20 days, A finished the remaining work. In how many days A alone can finish the work?



$$\begin{array}{ccccc} A+B & \xrightarrow{\text{Lcm}} & 60w & & \\ \xrightarrow{\text{Lcm}} 30d & \xleftarrow{20} & 40w & & \\ \xrightarrow{\text{Lcm}} 20d & \xrightarrow{20w} & & & \\ \text{Total work: } 60w & \xrightarrow{\frac{1}{2}} & 60 \Rightarrow & 60 \text{ days} & \end{array}$$

14) P can complete a work in 12 days working 8 hours a day. Q can complete the same work in 8 days working 10 hours a day. If both P and Q work together, working 8 hours a day, in how many days can they complete the work?

\Rightarrow hrs:-

$$\begin{array}{l} 5w \text{ } P \xrightarrow{12 \times 8} 96 \text{ hr} \\ 6w \text{ } Q \xrightarrow{10 \times 8} 80 \text{ hr} \end{array} \quad \text{Lcm} \rightarrow 480$$

$$11 \times 8 \quad (P+Q) \xrightarrow{480} \frac{480}{11 \times 8} = \boxed{\frac{5}{11} \text{ day}}$$

15) 10 women can complete a work in 7 days and 10 children take 14 days to complete the work. How many days will 5 women and 10 children take to complete the work?

\Rightarrow

$$10w \times 7 = 10CH \times 14$$

$$70w = 140CH$$

$$\boxed{1w = 2CH}$$

$$\begin{aligned} & 5w + 10CH \\ & @ 10CH + 10CH = (20CH) \end{aligned}$$

$$10 \times 14 = 20 \times D_2$$

$$\boxed{D_2 = 7 \text{ day}} \quad \text{ans}$$

16) X and Y can do a piece of work in 20 days and 12 days respectively. X started the work alone and then after 4 days Y joined him till the completion of the work. How long did the work last?



$$\begin{array}{l} 3w \text{ X} \longrightarrow 20 \\ 5w \text{ Y} \longrightarrow 12 \end{array} \quad \text{LCM} \rightarrow 60 \text{ w}$$

$$\begin{array}{c|c} 12w & 48 \\ \hline x & 8x \text{ X+Y} \\ \hline 4d & 6d \end{array} \longrightarrow \boxed{\text{Today}}$$

17) A is 30% more efficient than B. How much time will they, working together, take to complete a job which A alone could have done in 23 days?



$$\begin{array}{l} \text{Eff} \rightarrow 130 \\ \text{Eff} \Rightarrow 13 : 10 \longrightarrow 23 \\ \text{A} \leftarrow \text{H} \text{ H} \text{ B} \rightarrow \text{H} \text{ H} \text{ H} \end{array}$$

18) Ravi and Kumar are working on an assignment. Ravi takes 6 hours to type 32 pages on a computer, while Kumar takes 5 hours to type 40 pages. How much time will they take, working together on two different computers to type an assignment of 110 pages?



$$\begin{array}{l} R \frac{30 \text{ p}}{6 \text{ hr}} \rightarrow \frac{16 \text{ p/hr}}{3} \\ K \frac{40 \text{ p}}{5 \text{ hr}} \rightarrow 8 \text{ p/hr} \end{array} \quad \begin{array}{l} \text{R+K} \frac{1 \text{ hr}}{\left(\frac{16}{3} + 8\right)} \Rightarrow \frac{40}{5} \text{ p/hr} \\ \frac{110 \times 3}{40} = \frac{33}{4} \text{ hr} = 8 \text{ hr } \frac{1}{3} \times 60 = \boxed{8 \text{ hr } 20 \text{ min}} \end{array}$$