

TIME AND WORK

A $\rightarrow$ x days, 1 day of work = $\frac{1}{x}$

B $\rightarrow$ y days, 1 day of work = $\frac{1}{y}$

$$1 \text{ day } (A+B) = \frac{1}{x} + \frac{1}{y} = \frac{x+y}{xy} \text{ th}$$

$$(A+B) = \frac{xy}{x+y} \text{ days} < x \text{ days} < y \text{ days}$$

$$(A+B) = x \text{ days}$$

$$A = y \text{ days}$$

$$B = ?$$

$$y > x$$

$$B = \frac{xy}{y-x} \text{ days}$$

A $\rightarrow$ x days, 1 day = $\frac{1}{x}$

B $\rightarrow$ y days, 1 day = $\frac{1}{y}$

C $\rightarrow$ z days, 1 day = $\frac{1}{z}$

$$1 \text{ day } (A+B+C) = \frac{1}{x} + \frac{1}{y} + \frac{1}{z} = \frac{xy + yz + zx}{xyz} \text{ th}$$

$$\therefore (A+B+C) = \frac{xyz}{xy + yz + zx} \text{ days}$$

P.9 No: 70

1. Given $x = 9 \text{ min}$ $y = 6 \text{ min}$

$$\frac{xy}{x+y} = \frac{9(6)}{9+6} = 3\frac{3}{5} \text{ min}$$

2. Given

$$4 \text{ hrs } (P+Q+R) = 216 \text{ pages}$$

$$1 \text{ hr } (P+Q+R) = 54 \text{ pages}$$

$$1 \text{ hour : } R - Q = Q - P$$

$$2Q = R + P$$

$$Q = \frac{R+P}{2}$$

$$/ \quad \boxed{5R = 7P} \rightarrow \text{Another condition given.}$$

$$Q = \frac{\frac{7P}{5} + P}{2}$$

$$\boxed{Q = \frac{12P}{10}}$$

$$/ \quad \boxed{R = \frac{7P}{5}}$$

$$P + \frac{12P}{10} + \frac{7P}{5} = 54$$

$$P = 15 \text{ pages}$$

$$/ \quad R = \frac{7(15)}{5} = 21 \text{ pages}$$

$$Q = \frac{12(15)}{10} = 18 \text{ pages}$$

$$\therefore P : Q : R = 15 : 18 : 21$$

3. $(A+B) = x \text{ hours} \Rightarrow \text{For } 1 \text{ hour} \rightarrow \frac{1}{x}$

$$A = x+8 \text{ hours} \Rightarrow \text{for } 1 \text{ hour} \rightarrow \frac{1}{x+8}$$

$$B = x + \frac{9}{2} \text{ hours} \Rightarrow \text{for } 1 \text{ hour} \rightarrow \frac{2}{2x+9}$$

$$\frac{1}{x+8} + \frac{2}{2x+9} = \frac{1}{x}$$

$$x(2x+9) + 2x(x+8) = 2x^2 + 9x + 16x + 18$$

$$2x^2 + 9x + 2x^2 + 16x = 2x^2 + 9x + 16x + 18$$

$$2x^2 = 7 \times 2$$

$$x = \sqrt{36}$$

$$x = 6 \text{ hours}$$

4. P $\rightarrow$ 12 days or 96 hours, 8 hours/day, For 1 hr $\rightarrow \frac{1}{96}$

Q $\rightarrow$ 8 days (or) 80 hours, 10 hours/day, For 1 hr $\rightarrow \frac{1}{80}$

(P+Q) $\rightarrow$? , 8 hours/day, For 1 hr $\rightarrow \frac{1}{x \times 8}$

$$\frac{1}{96} + \frac{1}{80} = \frac{1}{8x}$$

$$x = \frac{60}{11}$$

$$= 5 \frac{5}{11}$$

$$\begin{array}{r} 1) 60(5) \\ \underline{55} \\ 5 \end{array}$$

5. Given A = B + C

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

$$C = 50 \text{ days}$$

$$B = ?$$

$$A + B + C = 10 + 50 = 60, \text{ For 1 day } \rightarrow \frac{1}{60}$$

$$1 \text{ day } (A + \frac{B+C}{A}) = \frac{1}{10} + \frac{1}{50} = \frac{3}{25}$$

$$1 \text{ day } (2A) = \frac{3}{25}$$

$$1 \text{ day } A = \frac{3}{50}$$

$$1 \text{ day } B = \frac{1}{10} - \frac{3}{50}$$

$$1 \text{ day } B = \frac{1}{25} \text{ th}$$

$$B = 25 \text{ days}$$

6. A $\rightarrow$ 15 days

B $\rightarrow$ 10 days

After 2 days, B had to leave

$$1 \text{ day } (A+B) = \frac{1}{15} + \frac{1}{10} = \frac{1}{6} \text{ th}$$

$$2 \text{ day } (A+B) = \frac{1}{6} \times 2 = \frac{1}{3} \text{ th}$$

Remaining work = $1 - \frac{1}{3} = \frac{2}{3}$ th by A alone

$$A = \frac{2}{3} \times 15 = 10 \text{ days}$$

$$\begin{array}{ccc} \frac{1}{3} + \frac{2}{3} & = & \text{whole work} \\ \downarrow & & \downarrow \\ (A+B) & & A \text{ alone} \\ \downarrow & & \downarrow \\ 2 \text{ days} + 10 \text{ days} & = & 12 \text{ days} \end{array}$$

Level - 2

1. Given P → 8 hours
Q → 10 hours
R → 12 hours

$$\left. \begin{array}{l} Q \\ R \end{array} \right\} (Q+R) = \frac{xy}{x+y} = \frac{10 \times 12}{22} = \frac{60}{11} \text{ hrs}$$

@ 9 A.M, P is closed @ 11 A.M

$$\downarrow \frac{60}{11} \times \frac{23}{60} \approx 2 \text{ hrs}$$

$$\begin{aligned} 1 \text{ hr } (P+Q+R) &= \frac{1}{8} + \frac{1}{10} + \frac{1}{12} \\ &= \frac{37}{120} \text{ th} \end{aligned}$$

$$2 \text{ hr } (P+Q+R) = \frac{37}{60} \text{ th}$$

Remaining = $\frac{23}{60}$ th by (Q+R) only

∴ 9 A.M, P is closed @ 11 A.M + 2 hrs
= 1 P.M.

3.

	<u>First</u>	<u>Second</u>
No. of garments	3	1
Only 1 garment	1	3
	x 40	x 40
	= 40 days	120 days

1 G → 80 days
2 parts = 80 days
1 part = 40 days

$$\frac{1 \times y}{x+y} = \frac{40 \times 120}{160} = 30 \text{ days}$$

4.

<u>A</u>	<u>B</u>
10 days	15 days

5 parts = 225
1 part = 45

2 : 3 → working performance is more in 'A'
3 : 2 → taking more wage A compare to B
3 x 45 = 135 Rs

P.9 No:- 72

7. 5 skilled workers = 20 days $\rightarrow$ 1 skilled worker = $20 \times 5 = 100$ days

$$\text{For 1 day} = \frac{1}{100} \text{th}$$

8 semi skilled worker = 25 days $\rightarrow$ 1 semi skilled = $8 \times 25 = 200$ da

$$\text{For 1 day} = \frac{1}{200} \text{th}$$

10 Unskilled worker = 30 days $\rightarrow$ 1 unskilled worker = $10 \times 30 = 30$

$$\text{For 1 day} = \frac{1}{300} \text{th}$$

$$2 \text{ skilled} + 6 \text{ semi skilled} + 5 \text{ Unskilled}$$

$$= 2 \left(\frac{1}{100} \right) + 6 \left(\frac{1}{200} \right) + 5 \left(\frac{1}{300} \right)$$

$$= \frac{6 + 9 + 5}{300}$$

$$= \frac{20}{300} = \frac{1}{15}$$

$\therefore$ 15 days

GROUP (or) COMBINED WORK

$$\frac{N_1 \times D_1 \times R_1 \times E_1}{W_1} = \frac{N_2 \times D_2 \times R_2 \times E_2}{W_2}$$

N_1, N_2 = NO. of workers (or) NO. of machines

D_1, D_2 = Time of work

R_1, R_2 = Rate of work of worker or machines

E_1, E_2 = Efficiencies of machines

W_1, W_2 = Amount of work

P.9 No:- 71

$$5. \quad \frac{104 \times 30 \times 5}{\frac{2}{5}} = \frac{N_2 \times 26 \times 9}{\frac{83}{5}}$$

$$N_2 = 160$$

$$\therefore 160 - 104$$

$$= 56 \text{ days}$$

56 days

104 mens, 8 hrs/day

30 days

6.

$$\frac{2 \times 8 \times 12 \times 90}{9000} = \frac{3 \times 6 \times R_2 \times 80}{12000}$$

$$R_2 = 16 \text{ hrs/day}$$