# TIME AND WORK

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

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

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

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

$(A+B) = x$ days

$A = y$ days

$B = ?$ $\quad y > x$

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

A → $x$ days, 1 day = $\frac{1}{x}$

B → $y$ days, 1 day = $\frac{1}{y}$

C → $z$ days, 1 day = $\frac{1}{z}$

1 day $(A+B+C) = \frac{1}{x} + \frac{1}{y} + \frac{1}{z}$

$= \frac{xy+yz+zx}{xyz}$ th

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

P.9 NO:- 70

1. Given $x = 9$ min $\quad y = 6$ min

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

2. Given

4 hrs $(P+Q+R) = 216$ pages

1 hr $(P+Q+R) = 54$ pages

1 hour : $R - Q = Q - P$

$$2Q = R + P$$

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

$\boxed{5R = 7P}$ → Another condition given

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

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

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

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

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

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

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

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

3. $(A+B) = x$ hours ⇒ For 1 hour → $\frac{1}{x}$

$A = x+8$ hours ⇒ for 1 hour → $\frac{1}{x+8}$

$B = x + \frac{9}{2}$ hours ⇒ for 1 hour → $\frac{2}{2x+9}$

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

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

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

$$2x^2 = 72$$

$$x = \sqrt{36}$$

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

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

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

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

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

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

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

11) 60 (5
55
5

5. Given $A = B + C$

$A + B = 10$ days

$C = 50$ days

$B = ?$

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

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

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

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

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

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

$B = 25$ days

6. A → 15 days

B → 10 days

After 2 days, B had to leave

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

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

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

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

$\frac{1}{3} + \frac{2}{3}$ = whole work

↓ ↓

(A+B) A alone

↓ ↓

2 days + 10 days = 12 days

Level - 2

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

$(Q+R) = \frac{xy}{x+y} = \frac{10 \times 12}{22} = \frac{60}{11}$ hrs

$\frac{60}{11} \times \frac{23}{60} \cong 2$ hrs

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

1 hr $(P+Q+R) = \frac{1}{8} + \frac{1}{10} + \frac{1}{12}$

$= \frac{37}{120}$ th

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

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

∴ 9. A.M, P is closed @ 11. AM + 2hrs

= 1. P.M.

3. First ir second

No. of garments 3 : 1

Only 1 garment 1 : 3

(2) parts

× 40 × 40

= 40 days 120 days

1 G → 80 days

2 parts = 80 days

1 part = 40 days

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

4. A B

16 days 18 days

2 : 3 → working performance is more in 'A'

3 × 45 ← 3 : 2 → taking more wage A compare to B

= 135 Rs

5 parts = 225

1 part = 45

P·9 NO:- 72

7. 5 skilled workers = 20 days → 1 skilled worker = 20×5 = 100 days

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

8 semi skilled worker = 25 days → 1 semi skilled = 8×25 = 200 da

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

10 unskilled worker = 30 days → 1 unskilled worker = 10×30 = 30

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

2 skilled + 6 semi skilled + 5 Unskilled

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

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

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

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

56 days

104 mens, 8 hrs/da

30 days

$N_2 = 160$

∴ 160 − 104

= 56 days

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

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