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Sahi Prep Hai Toh Life Set Hai

TIME & WORK

Part-2

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Agenda

Eg 7^{th} — Eg 14

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	A		B
Efficiency	x	:	y
work	x	:	y
wages	x	:	y
Time	$\frac{1}{x}$	:	$\frac{1}{y}$

$$y : x$$

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Eg7 (i). A is three times efficient worker than B and is therefore, able to complete a work in 60 days earlier than B. The number of days that A and B together will take to complete the work, is:

(a) 22½ **(b) 25**

(c) 27½ **(d) 30**

I st

	A	B
Efficiency	3	1
Time	(x-60) days	x days

$3(x-60) = 1 \cdot x$

$2x = 180$

$x = 90$

work = 90

A → 30 days } (3)

B → 90 days } (1)

$\frac{90}{4} = 22\frac{1}{2}$ days

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II nd

	A	B	Gap
	1day	3days	2days
	30days	90days	60days
	(3)	(1)	

work → 90

$$\frac{90}{4} = 22\frac{1}{2} \text{ days}$$

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Ans. (a)

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Eg7 (ii). A does half as much work as B in one sixth of the time. If together they take 10 days to complete a work, how much time will B take to do it alone?

(a) 70 days (b) 30 days

(c) 40 days (d) 50 days

$\frac{1^{th}}{6}$ day × 6 1 day

10 × 4 = 40 units

$\frac{40}{1}$ = 40 days

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Ans. (c)

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Detailed Approach

Eg7 (iii). A is 50% more efficient than B. C does half of the work done by A and B together. If C alone does the work in 20 days, then A, B and C together can do the work in:

(a) $5\frac{2}{3}$ Days (b) $6\frac{2}{3}$ days

(c) 6 days (d) 7 days

Sol^{n}

Let B = 2 units/day

A = 3 units/day

$C = \frac{3+2}{2} = \frac{5}{2}$ units/day

Total work → $\frac{5}{2} \cdot 20 = 50$ units

A+B+C ⟶ $\frac{500}{753}$ 20

PYQ of SSC

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Ans. (b)

A ↑ 50% B ✗

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

$C \rightarrow 20$ days

$A+B+C \rightarrow$??

$\frac{20 \text{ work}}{3}$ ✓

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Eg8. A can do a work in 12 days, whereas B can do the same work in 15 days. With the help of C, they all together can complete the same work in 5 days. If they get Rs.6,000 for some work, find the share of C in that.

A → 12 days, 5 units, Work = 60

B → 15 days, 4 units

A+B+C → 5 days, 12 units

6000 Rs

C → ??

I st

A	B	C
5	4	3

$\frac{3}{12} \times 6000$

= 1500 Rs

II nd

A → 500 Rs/day

B → 400 Rs/day

A+B → 900 × 5

→ 4500

C → 1500

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Ans. Rs.1500

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Eg9. **A → 12 days** (5) → 2 days
B → 15 days (4) → x days
C → 20 days (3) → x days

They all started the work together, but A left after 2 days, in how many days the work will be completed?

Sol^N

Work = 60 units

$5 \cdot 2 + 4 \cdot x + 3 \cdot x = 60$

$7x = 50$

$x = 7\frac{1}{7}$ days

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Ans. $7\frac{1}{7}\ Days$

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Eg10. A → 12 days 5 (x-2) day
B → 15 days 4 x day
C → 20 days 3 x day

They all started working together, but A left 2 days before completion of the work. In how many days the work will be completed?

Sol^n

work = 60 units

$5(x-2) + 4 \cdot x + 3 \cdot x = 60$

$12x = 70$

$x = \frac{70}{12} = \frac{35}{6} = \frac{5\frac{5}{6}}{6}$ day

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Ans. $5\frac{5}{6}\ Days$

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Eg11. A → 12 days 5 (2) They all started working together, but A
B → 15 days 4 (x-3) left after 2 days and B left 3 days before
C → 20 days 3 (x) completion of the work. In how many
D → 30 days 2 (x) days the work will be completed?

Work = 60

$$5 \cdot 2 + 4(x-3) + 3 \cdot x + 2 \cdot x = 60$$

$$9x = 62$$

$$x = \frac{62}{9} = 6\frac{8}{9} \text{ days}$$

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Ans. $6\frac{8}{9}\ Days$

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Eg12 (i). A alone can do a piece of work in 8 days more than the time taken by A and B when they are working together whereas B takes 18 days more than the time taken by A and B when they are working together.

Find in how many days (A & B) together can complete the same work?

$A \rightarrow (x+8)$ days

$B \rightarrow (x+18)$ days

$A+B \rightarrow x$ days

work $\rightarrow$ 1 unit

$$\frac{1}{x+8} + \frac{1}{x+18} = \frac{1}{x}$$

$$\frac{2x+26}{x^2+26x+144} = \frac{1}{x}$$

$$2x^2+26x = x^2+26x+144$$

$$x^2 = 144$$

$$x = 12 \text{ days}$$

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$A+B \longrightarrow x$ days

$A \longrightarrow (x+m)$ days

$B \longrightarrow (x+n)$ days

$$\frac{1}{x+m}+\frac{1}{x+n}=\frac{1}{x}$$

$$\frac{2x+m+n}{x^2+(m+n)x+mx}=\frac{1}{x}$$

$$2x^2+(m+n)x=x^2+(m+n)x+mn$$

$$x^2=mn$$

$$\boxed{x=\sqrt{mn}}$$

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Ans. 12 days

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Shortcut:

eg $A+B \rightarrow x$

$A \rightarrow x+\frac{8}{3}$

$B \rightarrow x+\frac{3}{2}$

$$x = \sqrt{\frac{8}{3} \cdot \frac{3}{2}}$$

$$= \frac{2}{}$$

$A+B \longrightarrow x$ days

$A \longrightarrow (x+m)$ days

$B \longrightarrow (x+n)$ days

$$x = \sqrt{m \cdot n}$$

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Eg12 (ii). A alone would take 27 hours more to complete a work than A and B work together. B takes 3 hours more to complete a work alone than A and B work together. In how many hours A alone can do it?

(a) 27 **(b) 12**
(c) 45 **(d) 36**

$A + B \rightarrow x$

$A \rightarrow x + 27$

$B \rightarrow x + 3$

$x = \sqrt{27 \cdot 3}$

$= 9$ hours

$A \rightarrow 9 + 27$

$= 36$ hours

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Ans. (d)

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CONCEPT OF MAN DAYS

50 Men × 40 days

Painting of Building → 2000 Mandays

$$M_1 D_1 H_1 = M_2 D_2 H_2$$

M → Man (Labour)

D → Days

H → Hours

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eg 12 Men can do a piece of work in 30 days. In how many days 8 men can do the same work ??

Sol^{N}

$M_1 D_1 = M_2 D_2$

$12 \cdot 30 = 8 \cdot D_2$

$D_2 = \frac{12 \cdot 30}{8} = 45$ → 45 days

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Eg. 12 men can do a piece of work in 30 days and find 18 men can do the same work in how many days?

$12 \cdot 30 = 18 \cdot D_2$

$D_2 = 20$ days

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Ans. 20 days

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$M_1 D_1 = M_2 D_2$

$400 \cdot 31 = 120 \cdot D_2$

$D_2 = 10$ days

Eg. There is sufficient food for 400 men for 31 days. After 28 days 280 men leave the place. For how many days will the rest of the food last for the rest of the men?

(a) 5 days (b) 10 days

(c) 12 days (d) 15 days

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Ans. (b)

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Eg. m men, can do m units of work in m days then n men can do n units of work in how many days?

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

$$\frac{m \cdot \cancel{m}}{\cancel{m}} = \frac{\cancel{n} \cdot D_2}{\cancel{n}}$$

$D_2 \rightarrow m$ days

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Ans. m days

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Eg13(i). A contractor undertakes to dig a canal 12 km long in 350 days and employs 45 men. After 200 days he finds that only 4.5 km of the canal has been dig. Find the number of extra men he must employ to finish the work on time.

(a) 45 men **(b) 55 men**

(c) 65 men **(d) 75 men**

Proposed	Actual
12 Km	4.5 Km
350 days	200 days
45 men	

$$\frac{45 \cdot 200}{45} = \frac{M_2 \cdot 150}{75}$$

$$M_2 = 100 \text{ Men}$$

extra $100 - 45 = 55$ men

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Ans. (b)

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$$\frac{M_1 D_1 H_1}{\omega_1} = \frac{M_2 D_2 H_2}{\omega_2}$$

$$\frac{(2M+3\omega+4C)\cdot 10}{10} = \frac{(6M+4\omega+7C)\cdot D_2}{16}$$

$$\frac{36 \cdot 10}{10} = \frac{66 \cdot D_2}{16}$$

$$D_2 = 8 \text{ days}$$

Eg13(ii). A 10 hectare field in reaped by 2 men, 3 women and 4 children together in 10 days. If working capacities of a man, a woman and a child are in the ratio of 5:4:2, then a 16 hectare field will be reaped by 6 men, 4 women and 7 children in:

(a) 5 days **(b) 6 days**

(c) 7 days **(d) 8 days**

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Ans. (d)

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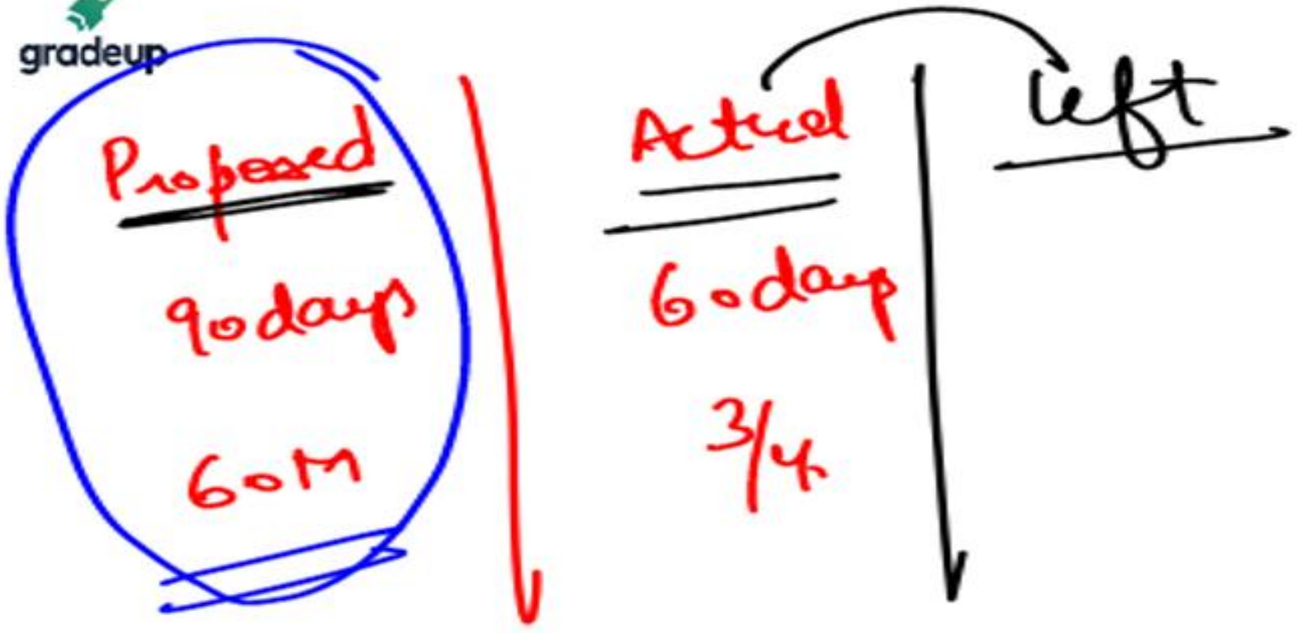

$$\frac{M_1 D_1 H_1}{W_1} = \frac{M_2 D_2 H_2}{W_2}$$

$$\frac{60 \cdot 60^{20}}{3} = \frac{M_2 \cdot 30}{1}$$

$$M_2 = 40$$

Eg13(iii). A contractor undertook to complete a project in 90 days and employed 60 men on it. After 60 days, he found that ¾ of the work has already been completed. How many men can he discharge so that the project may be completed exactly on time?

(a) 40
(b) 20
(c) 30
(d) 15

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Ans. (b)

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(2M+3W) ⟶ 8 days (7)

(3M+2W) ⟶ 7 days (8)

I^st

Work = 56 units

$$\begin{cases} 2M+3W = 7 \quad -(1) \\ 3M+2W = 8 \quad -(2) \end{cases}$$

M = 2, W = 1

Eg14(i). 2 men and 3 women can do a piece of work in 8 days whereas (3 men and 2 women) can do a piece of work in 7 days.

(i) 4 men can do the same work in how many days? ⟶ $\frac{56}{8}$ ⟶ 7 days

(ii) 7 women can do the same work in how many days? $\frac{56}{7}$ ⇒ 8 days

(iii) 5 men & 4 women can do the same work in how many days?

$\frac{56}{14}$ ⟶ 4 days

for 3 variables

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2nd Approach

$2M+3W \rightarrow 8$ days $3M+2W \rightarrow 7$ days

(i) $4M \rightarrow \frac{56}{8} = 7$ day

(ii) $7W \quad \frac{56}{7} = 8$ day

(iii) $5M+4W$

$\frac{56}{14} \rightarrow 4$ day

$(2M+3W)8 = (3M+2W).7$

$16M+24W = 21M+14W$

$10W = 5M$

$\frac{M}{W} = \frac{10}{5} \quad \frac{2}{1}$

56 units

For 2 variable

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Ans. (i) 7 days **(ii) 8 days** **(iii) 4 days**

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eg 1

5M + 10W ⟶ 50 days

8M + 12W ⟶ ??

→ Can't be determined b/c we can't find a relationship b/w eff of M & W

eg 2

5M + 10W ⟶ 50 days

10M + 20W ⟶ ??

25 days

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eg

$1\ 5M + 1\ 0W \longrightarrow 50 \text{ days}$

$2\ 10M + 2\ 20W \longrightarrow ??$

$50 \times \frac{1}{2}$

$= 25 \text{ days}$

eg

$4\ 12M + 4\ 16W \longrightarrow 200 \text{ days}$

$5\ 15M + 5\ 20W \longrightarrow ??$

$200 \times \frac{4}{5}$

$= 160 \text{ days}$

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Eg14(ii). 2 men and 3 women can do a piece of work in 10 days while 3 men and 2 women can do the same work in 8 days. Then, 2 men and 1 woman can do the same work in:

(a) 12 days **(b) 12½ days**

(c) 13 days **(d) 13½ days**

$(2M+3W)\,10 = (3M+2W)\,8$

$20M + 30W = 24M + 16W$

$14W = 4M$

$\frac{M}{W} = \frac{14}{4} \begin{matrix} 7 \\ 2 \end{matrix}$

Total work = 200 units

$2 \cdot 7 + 1 \cdot 2 = 15$ units

$\frac{200}{15} \begin{matrix} 25 \\ 2 \end{matrix}$

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Ans. (b)

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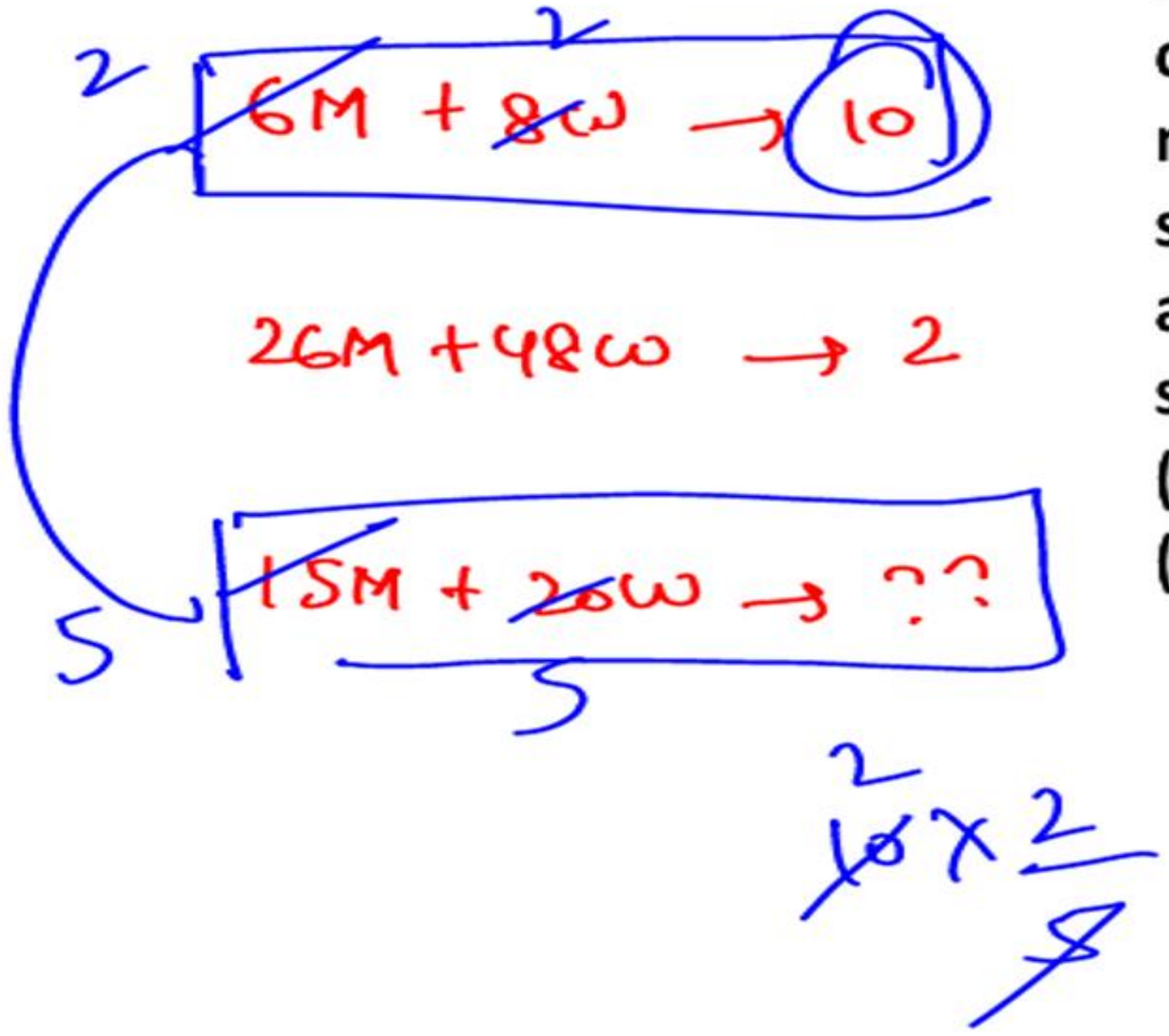

Eg14(iii). 6 men and 8 women can complete a work in 10 days while 26 men and 48 women complete the same work in 2 days. Then 15 men and 20 women can complete the same work in how many days?

(a) 3 days
(b) 4 days
(c) 5 days
(d) 6 days

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Ans. (b)

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Homework

Eg14(iv). 1 man, 3 women and 4 boys can do a work in 96 hours; 2 men and 3 women can do in 120 hours, 2 men and 8 boys in 80 hours. In how many hours can it be done by 5 men and 12 boys?

(a) $41\frac{5}{11}$ **hrs**

(b) $43\frac{7}{11}$ **hrs**

(c) $43\frac{5}{11}$ **hrs**

(d) $42\frac{7}{11}$ **hrs**

Man, Days, Hours, work

$$\frac{M_1 D_1 H_1}{w_1} = \frac{M_2 D_2 H_2}{w_2}$$