Question

A → can write 20-pages ⟶ 1 hr

B → can write 10-pages ⟶ 1 hr

(A+B) ⟶ In 1 hr ⇒ 20+10 = 30 p → 1 hr.

then 150 pages by (A&B) in how many hours?

30p ⟶ 1 hr

150p ⟶ ? 2

$\frac{150}{30} = 5$ hrs

01. A can write 32 pages in 8 hours and B can write 40 pages in 5 hours. If they write together, in how many hours they can write 120 pages?

(a) 9 hrs (b) 13 hrs

(c) 10 hrs (d) 12 hrs

A → 4 pages – 1 hr

B → 8 pages → 1 hr

A + B = 12 p → 1 hr

12 p – 1 hr

12 cp – x

$\frac{120 \times 1}{12} = 10$

02. A can copy 100 pages in 5 hrs. A and B together can copy 100 pages in 4 hrs. In what time can B copy 20 pages?

(a) 5 hrs (b) 4 hrs

(c) 8 hrs (d) 2 hrs

A + B = 25 p — 1 hr

A → 20 p – 1 hr

B → 5 p – 1 hr

5 p – 1 hr

2 cp – ?

$\frac{20 \times 1}{5} = 4$ hr

Time & work

[16- Times] [In- GATE]

- Time & work [12]
- Pipes & cistern [4]

The relation between Time & work in

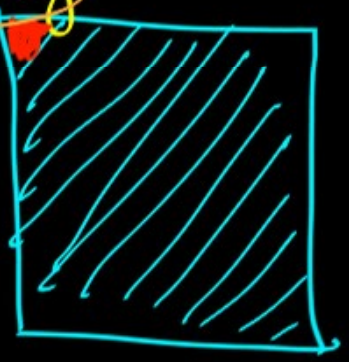
$$T \propto \frac{1}{w}$$

or

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

A = 20 day

work $\frac{1}{20}$



Model 1:- chain Rule :- [6-Times]

$$\frac{M_1 D_1 H_1 x\%}{w_1} = \frac{m_2 D_2 H_2 y\%}{w_2}$$

M → Men

D – days

h : hours

x, y → efficiency %.

20 members can do piece of work in 60 days and they are working 10 hrs per day. Find no of days To complete the same work by 25 mem and They are working 15 hours per day?

$$20 \times 60 \times 10 = 25 \times 15 \times x$$

$$4 \quad 4 \quad 2 \qquad 5$$

$x = 32$ days

14. Seven machines take 7 minutes to make 7 identical toys. At the same rate, how many minutes would it take for 100 machines to make 100 toys?

$$\frac{7(7)}{7(\text{toys})} = \frac{100(x)}{100}$$

$x = 7$

(GATE)

(a) 1 (b) 7

(c) 100 (d) 700

8. It was estimated that 52 men can complete a strip in a newly constructed highway connecting cities P and Q in 10 days. Due to an emergency, 12 men were sent to another project. How many number of days, more that the original estimate, will be required to complete the strip? **(GATE-2020)**

$52[10] = 40[x]$

$x = 13$ days

ie 3 days more

(a) 3 days

(b) 13 days

(c) 10 days

(d) 5 days

15. Two coal loading machines each working 12 hours per day for 8 days handles 9000 tones of coal with an efficiency of 90%. While 3 other coal loading machines at an efficiency of 80% set to handle 12,000 tonnes of coal in 6 days. Find how many hours per day each should work.

(a) 16 hr/day
(b) 14 hr/day
(c) 15 hr/day
(d) None

$$\frac{2[12]\,8\,[90]}{9000} = \frac{3[6](x)\,8}{12000}$$

$$x = 16 \text{ hr/days}$$

16. A contract is to be completed in 56 days and 104 men were set to work, each working 8 hours a day. After 30 days, 2/5 of the work is finished. How many additional men may be employed so that work may be completed on time each man now working 9 hours per day?

(a) 46 men
(b) 48 men
(c) 52 men
(d) 56 men

$$\frac{30[104][8]}{2/5} = \frac{26[104+x]9}{3/5}$$

$$160 = 104 + x$$

$$x = 56$$

56 men added

Model 2 :-

A → x days

B → y days

A & B → ? $\frac{1}{x}+\frac{1}{y}$ (1 day)

(or)

$\frac{xy}{x+y}$ days

(or)

$\frac{\text{product}}{\text{sum}}$

(or) $\frac{\text{L.C.M of (given)}}{\frac{\text{L.C.M}}{x}+\frac{\text{L.C.M}}{y}+\cdots}$

proof

A → x → $\frac{1}{x}$

B → y → $\frac{1}{y}$

$A+B=\frac{1}{x}+\frac{1}{y}$

$\frac{x+y}{xy}$ (1 day)

$\frac{xy}{x+y}$ days

A → 20

B → 30

A & B → ?

$\frac{120(3\phi)}{5\phi}$

= 12 day

A → 10

B – 20

A & B = ?

$\frac{10(2\phi)}{3\phi}$

$= \frac{20}{3} = 6\frac{2}{3}$ day.

Model 3

(1) A ⟶ x days

(2) A & B ⟶ y days

B ⟶ ?

$\frac{1}{y} - \frac{1}{x}$ (1 day)

(or)

$\frac{xy}{x-y}$ days

(or)

product / difference

Model : 4 :

A ⟶ x

B ⟶ y

C ⟶ z

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

(or)

$\frac{xyz}{xy + yz + xz}$ days

(or)

$\frac{\text{L.C.M of (given)}}{\frac{\text{L.C.M}}{x} + \frac{\text{L.C.M}}{y} + \frac{\text{L.C.M}}{z}}$

A → 10

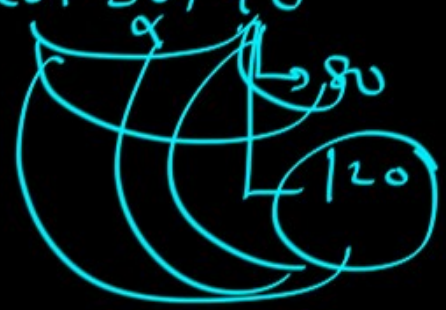
B – 20

C – 30

(A, B, C) – ?

L.C.M of (10, 20, 30)

20, 30, 40



$$\frac{60}{\frac{60}{10}+\frac{60}{20}+\frac{60}{30}}$$

$$\frac{60}{6+3+2} = \frac{60}{11} = 5\frac{5}{11}$$

Method 5:-

$A \& B \to x$

$B \& C \to y$

$A \& C \to z$

$(A, B, C) \to ?$ $\frac{1}{2}\left[\frac{1}{x}+\frac{1}{y}+\frac{1}{z}\right]$

(or)

$2\left[\frac{xyz}{xy+yz+xz}\right]$ days.

(or)

$2\left[\frac{\text{L.C.M of (given)}}{\frac{\text{L.C.M}}{x}+\frac{\text{L.C.M}}{y}+\frac{\text{L.C.M}}{z}}\right]$

Proof

$A \& B \to x \longrightarrow \frac{1}{x}$

$B \& C \to y \longrightarrow \frac{1}{y}$

$A \& C \to z \longrightarrow \frac{1}{z}$

$\begin{pmatrix} A+B \\ B+C \\ A+C \end{pmatrix} = 2(A+B+C)$

$2(A+B+C) = \frac{1}{x}+\frac{1}{y}+\frac{1}{z}$

$(A+B+C) = \frac{1}{2}\left(\frac{1}{x}+\frac{1}{y}+\frac{1}{z}\right)$

07. A and B can do a work in 12 days, B and C can do the same work in 15 days. A and C together in 20 days. How long it takes A, B and C together to finish it:

(a) 10 days
(b) 9 days
(c) 5 days
(d) None

$$2\left[\frac{60}{\frac{60}{12}+\frac{60}{15}+\frac{60}{20}}\right]$$

$$2\left[\frac{60}{5+4+3}\right]$$

$$2\left[\frac{60}{12}\right]$$

$$2[5]$$

$$= 10 \text{ days}$$

Code 6:- 'A' Taken 16 days more to complete the work by A&B Together, 'B' Taken '4' days more To complete the work by A&B Together. Find no of days To complete the work by A&B Together?

A&B → x say

A → x+16

B → x+4

$A\&B = \frac{(x+16)(x+4)}{x+16+x+4}$

$x = \frac{x^2+16x+4x+64}{2x+20}$

$2x^2+20x = x^2+20x+64$

$x^2 = 64$

$x = 8$

(ii) S.C

(For Together)

$\Rightarrow \sqrt{xy}$

$= \sqrt{16(4)} = 8$

Model 7:- wages concept :- → Aman

M → 20 days

B → 30 days

(M & B) → $\frac{20(30)}{50}$ = 12 days

1000/-

2 : 3

$\frac{1}{20} \times \frac{1}{30}$

30 : 20

3 : 2

A → x days

B → y days

work completed by A & B Together. @ end of work They Recieved z/- then Their Amounts Shares will be ?

- Days Ratio = $x : y$
- Amt (work) Ratio = $\frac{1}{x} : \frac{1}{y}$

(or)

$y : x$

then A's Share $= \frac{y}{x+y} \times z/-$

B's Share $= \frac{x}{x+y} \times z/-$

A → 10 days
B → 15 days
work completed by A & B Together @ the end of the work They Recieved 225/-. Find share of "A" ?

wages 15 : 10

A's share: $\frac{15}{25} \times 225^{9}$

$= 135/-$

11. A, B and C are employed to do a piece of work for Rs. 575. A and C are supposed to finish 19/23 of the work together. Amount shall be paid to B (in Rs) is

A & C = 19/23

then B = $\frac{4}{23}$

$\frac{4}{23} \times 575^{25} \Rightarrow 100/-$

Model :-8 Efficiency concept :-

1) A is working Twice fast as 'B' then $B = 2x$, $A = x$

2) A is working Thrice Fast as 'B'

then $B = 3x$, $A = x$ } ex.

a tailor is able to finish a consignment of garment fabrication in 80 days less than second tailor. if first tailor is thrice as fast as second tailor,in how many days both of them can finish the consignment together

$A = x$, $B = 3x$

$3x - x = 80$

$2x = 80$

$x = 40$

$A = 40$

$B = 120$

$A \& B = \frac{40(120)}{160}$

$= 30$ days

Model Q:- **Work done by group:-** (GATE → 4 Times)

2 Men & 6 women can do piece of work in 60 days.

Find no of days To complete the work by 4men & 3 women?

$2M = 60$ | $6w \rightarrow 60$

$1M = 120$ | $1w \rightarrow 360$

$\frac{1}{120}$ | $\frac{1}{360}$

$4m + 3w \rightarrow 4\left(\frac{1}{120}\right) + 3\left(\frac{1}{360}\right)$

$\frac{12 + 3}{360} = \frac{15}{360} = \frac{1}{24}$

→ 24 days

06. 5 skilled workers can build a wall in 20 days: 8 semi-skilled workers can build a wall in 25 days; 10 unskilled workers can build a wall in 30 days. If a team has 2 skilled, 6 semi-skilled and 5 unskilled workers, how long will it take to build the wall?

$\frac{1}{100}$ $\frac{1}{200}$ $\frac{1}{300}$

$2\left[\frac{1}{100}\right] + 6\left[\frac{1}{200}\right] + 5\left[\frac{1}{300}\right]$

=>

(GATE)

(a) 20 days (b) 10 days

(c) 16 days (d) 15 days

Code

10:- A & B → x

B & C → y

A & C → z

A- alone → ?

$\frac{1}{2}\left(\frac{1}{x}+\frac{1}{z}-\frac{1}{y}\right)$ (one day)

B- alone → ?

$\frac{1}{2}\left[\frac{1}{x}+\frac{1}{y}-\frac{1}{z}\right]$

C- alone → ?

$\frac{1}{2}\left(\frac{1}{y}+\frac{1}{z}-\frac{1}{x}\right)$

Prod

(A+B) → x → 1/x

(B+C) → y → 1/y

(A+C) → z → 1/z

① + ③ − 2

~~A+B~~

~~A+C~~

~~B+C~~

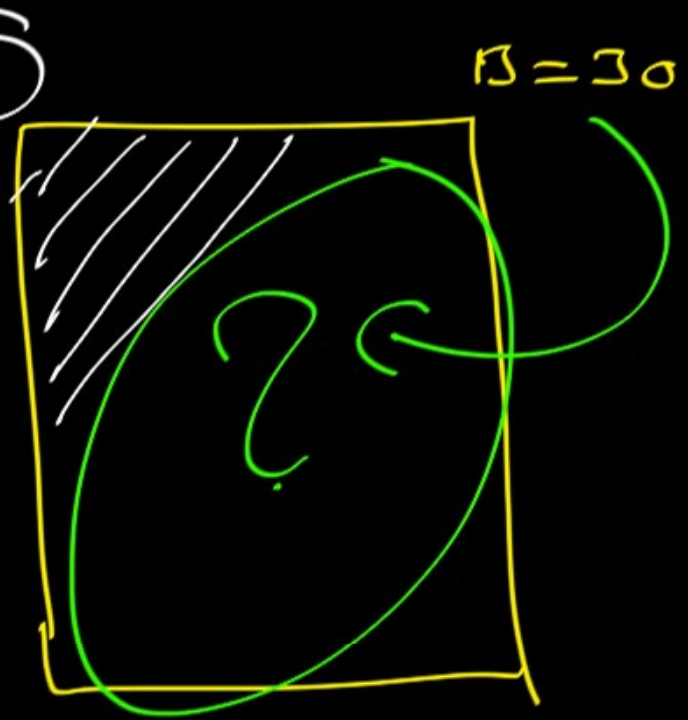
$2A = \frac{1}{x}+\frac{1}{z}-\frac{1}{y}$

$A = \frac{1}{2}\left(\frac{1}{x}+\frac{1}{z}-\frac{1}{y}\right)$

Model 11:- Based on Remaining work

(Equation method

$$5\left(\frac{1}{20}\right)+x\left(\frac{1}{30}\right)=1$$



10. A, B and C alone can do piece of work in 12, 15 and 30 days respectively. A start the work and B join him after 3 days. A leaves and C joins 3 days before the work is completed. In total how many days the work was completed?

(a) 7 days
(b) 9 days
(c) 10 days
(d) 12 days

$3 + 3 + 3 = 9$

$3\left[\frac{1}{12}\right] + x\left[\frac{1}{12} + \frac{1}{15}\right] + 3\left[\frac{1}{15} + \frac{1}{30}\right] = 1$

$$\frac{15 + x[5+4] + 3[4+2]}{60} = 1$$

$9x = 60 - 33$

$9x = 27$

$x = 3$

Model 2 ALTERNATIVE days

A = 20 days

B = 30 days

work start with (A) & completed as Alternatively. Find no of days To completed work:

$$A \rightarrow 20 \longrightarrow \frac{1}{20}$$

$$B \rightarrow 30 - \frac{1}{30}$$

$$\frac{1}{20} + \frac{1}{30} = [A^{1st} + B^{2nd}] \Rightarrow 2 \text{ days}$$

$$2 \text{ days} : \frac{3+2}{60}$$

$$12 \times 2 \text{ days} = 5/60 \times 12$$

$$\boxed{24 \text{ day}} = \frac{60}{60}$$

[here Both sides multiplications by some fixed number, the multiplication result is End to denominator (60) less than The denominator]

A → 9 day
B → 12 day

$\frac{1}{9} + \frac{1}{12} = (A+B)$ 1st 2nd $= 2$ days

$2 \text{ days} = \frac{4+3}{36}$

$5 \times 2 \text{ days} = \frac{7}{36} \times 5$

$10 \text{ days} = \frac{35}{36}$

$R.W = \frac{1}{36}$

11th day start with (A)

$\frac{9}{1} = \frac{?\ (x)}{1/36}$

$\frac{D_1}{W_1} = \frac{D_2}{W_2}$

$9 \times \frac{1}{36} = \frac{1}{4}$

10 days → 1/4 = 10 1/4 days