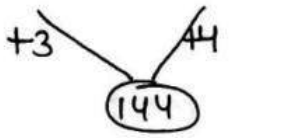
CLASS 5, 6

PIPE AND CISTERNS.

(1) Two taps A & B can fill a tank in 48 min and 36 min. if both taps are opened together after how much time tap A is closed so that the whole tank fill in 25 min 30 sec.

A — 48 m, B — 36 m



A + B

$\frac{42}{3}$

14 min Ans

B → $25\frac{1}{2}$ m → 102

$\frac{4 \times 51}{2} = 102$

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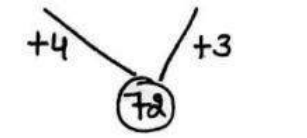
(2) Two fill pipes A & B can fill a cistern in 18 and 24 min respectively. Both fill pipes are opened together, but 6 minutes before the cistern will fill pipe A is closed. In how much time will the cistern take to fill?

A — 18 min, B — 24 min



A+B → $\frac{54}{7}$

$7\frac{5}{7}$ min + 6 min

$13\frac{5}{7}$ min Ans

B → 6 min → $6 \times 3 = 18$ unit

OR $72 + 24 = \frac{96}{7}$

$= 13\frac{5}{7}$ min.

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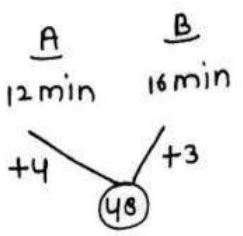
(3) Two fill pipes A & B can fill a cistern in 18 & 24 min. respectively. Both fill pipes are opened together but 4 min before the cistern is full, pipe A is closed. How much time will the cistern take to fill.



A+B → $\frac{36}{7}$

$5\frac{1}{7}$ min + 4 min

$= 9\frac{1}{7}$ min

B → 4×3=12

OR

48
+ 16
$\frac{64}{7} = 9\frac{1}{7}$ min

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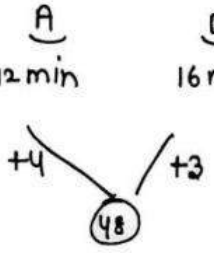
(4) A cistern can be filled by two pipes filling separately in 12 & 16 min respectively. Both pipes are opened together, for a certain time out being clogged only 7/8 of quantity of water flows through the former and only 5/6 through the latter pipe. The obstruction is removed, the cistern is filled in 3 min from that moment. How long was it before the full flow began.



A+B → 48-21 = $\frac{27}{6}$ = $4\frac{1}{2}$ min Ans. ($4\frac{1}{2}$ min तक खराब रहे)

A+B → 3 min → 7×3=21

$A = \frac{4 \times 7}{8_2} = 3.5$

$B = \frac{3 \times 5}{6_2} = 2.5$

& (~~Total time~~ to fill tank) = $4\frac{1}{2} + 3 = 7\frac{1}{2}$ min.

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(5) A cistern can be filled by two pipes in 15 & 25 min respectively. Both pipes are opened together, for a certain time out being clogged, only 5/6 of quantity of water flows through the former and 5/8 through the latter pipe. The obstruction is removed, the

cistern is filled in 5 min. from that moment. How long was it before the full flow begans.

A	B	A+B	A+B
15	25		↓
+5	+3	75−40	5 min
(75)		= 35 unit	↓
			5×8 = 40 unit

$A = 5 \times \frac{5}{6} = \frac{25}{6}$

$B = 3 \times \frac{5}{8} = \frac{15}{8}$

decreased efficiency

$\frac{25}{6} + \frac{15}{8} = \frac{145}{24}$

$\Rightarrow \frac{35 \times 24}{145}$ ($\frac{7 \times 24}{29}$)

$\Rightarrow \frac{168}{29}$ min **Ans**

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(6) A cistern can be filled by two pipes in 30 & 36 min respectively. Both pipes are opened together for a certain time but being particularly clogged only 5/6 of the full quantity of water flows through the former and only 9/10 through the latter. The obstruction is removed, the cistern is filled in $15\frac{1}{2}$ min from that moment. How long was it before full flow began?

A	B	A+B	A+B
30	36	↓	↓
(5) +6	+5 ($4\frac{1}{2}$)	180−170.5	$15\frac{1}{2}$ min
(180)		= 9.5	↓
			$\frac{31}{2} \times 11$
			$= \frac{341}{2} = 170.5$ unit

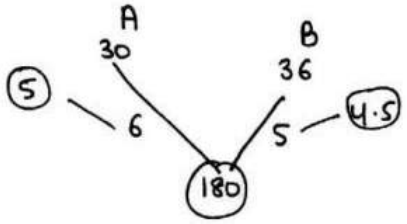
$A = 6 \times \frac{5}{6} = 5$

$B = 5 \times \frac{9}{10} = 4.5$

$\frac{9.5}{9.5}$

= 1 min **Ans**

⑦ Two taps A and B can fill a tank in 30 min & 36 min respectively. Both taps are opened together but due to some problem they work 5/6 and 9/10 of their efficiency, after some time the problem was removed and the whole tank will fill in $16\frac{1}{2}$ min. Then after how much time the problem is removed.



	clogged Eff.	full Eff
	A+B	A+B
	x min	$\left(\frac{33}{2}-x\right)$ min
	↓	
	9.5x unit	$11\left(\frac{33}{2}-x\right)$ unit

$16\frac{1}{2} = \frac{33}{2}$

$$9.5x + 11\left(\frac{33}{2}-x\right) = 180$$

$$9.5x + 181.5 - 11x = 180$$

$$x = 1 \text{ min}$$

∴ Problem was fixed after 1 min. Ans.

OR

$16\frac{1}{2}$ min

9.5 | 9.5 + 1.5

$\frac{95}{10} \times \frac{33}{2} = 156.75$

180 − 156.75 = 23.25

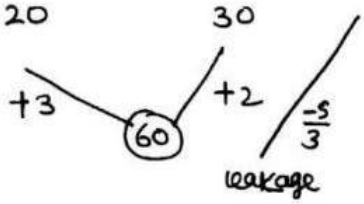
1.5 → 23.25

1 → $\frac{23.25}{1.5} = 15\frac{1}{2}$

$15\frac{1}{2}$ min → full efficiency से करते हैं.

1 min clogged efficiency से.

(8) Taps A & B can fill a cistern in 20 Hr & 30 Hr resp. Both the pipes are opened to fill the tank but when the tank is 1/3rd full a leak develops in the bottom of the tank, through which 1/3rd of water supply by both pipes leak out. find in how much time the tank will full?



A+B | A+B−C

$60 \times \frac{1}{3} = 20$ | $\frac{40}{10} \times 3$

$\frac{20}{5} = 4$ min | $= 12$ min

$A+B = 5$

Leakage $= -\frac{5}{3}$

Hence eff $= 5 - \frac{5}{3} = \frac{10}{3}$

$12 + 4 = 16$ min Ans.

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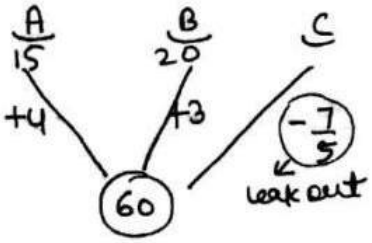
(9) A & B can fill a tank in 15 & 20 Hr respectively. Both the taps are opened together, when the tank was 1/4th full a leak develop in the bottom of the tank. through which 1/5th of the water supply by both the pipes leak out. find in how many hours tank will full.



A+B | A+B−C

$60 \times \frac{1}{4} = 15$ | $\frac{45}{\frac{28}{5}}$

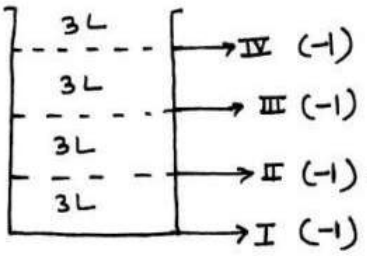
$\frac{15}{7} = 2\frac{1}{7}$ Hr | $= \frac{45 \times 5}{28} = \frac{225}{28}$

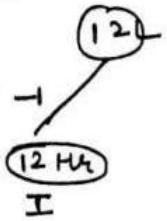
Leak out $= (4+3) \times \frac{1}{5} = -\frac{7}{5}$

$A+B-C = 4+3-\frac{7}{5} = \frac{28}{5}$

Total time $= \frac{15}{7} + \frac{225}{28} = 10\frac{5}{28}$ Hrs.

(10) In a tank four taps of equal efficiency are fitted on equal height intervals. The 1st pipe is at the base of the tank and the 4th pipe is at 3/4th of height of the tank. Then calculate in how much time the whole tank will empty if the 1st pipe can empty the tank in 12 Hours.





$\frac{3}{4} + \frac{3}{3} + \frac{3}{2} + \frac{3}{1}$ → only 1st pipe is working.

(3) → 3 pipe working; (2) → Two pipe working

All 4 pipes are working

$$\frac{9+12+18+36}{12} = \frac{75}{12} = 6\frac{1}{4} \text{ Hrs.}$$

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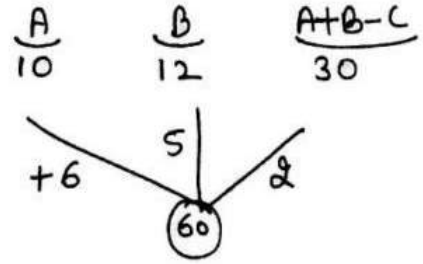
(11) Two taps A & B can fill a tank in 10 Hrs & 12 Hrs respectively. There is an outlet tap C. If all the taps are opened together the tank will fill in 30 Hrs. In how many hours tap C alone can empty the tank?

∴



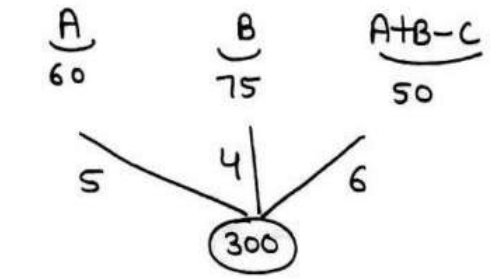
$A + B - C = 2$

6 5 (9)

C will empty the tank =

$$\frac{60}{9} = 6\frac{2}{3} \text{ Hrs.}$$

(12) Two pipe A & B can fill a cistern in 1 Hr & 75 min respectively. There is also an outlet pipe C. If all the three pipes are opened together, the tank is full in 50 min. How much time will be taken by C to empty the full tank.



$A + B - C = 6$

$\downarrow \quad \downarrow \quad \downarrow$

$5 \quad 4 \quad (3)$

C will empty the tank

in $= \frac{300}{3} = 100$ min.

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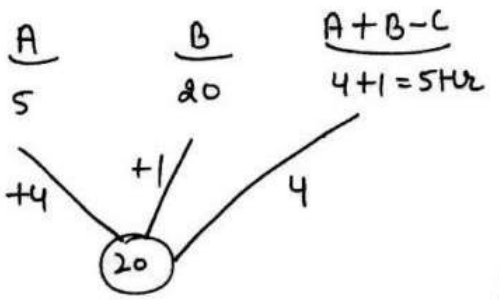
(13) Two pipes are running continuously to fill the tank. The 1st pipe could have filled it in 5 Hrs by itself & 2nd one in 20 Hrs. But a 3rd pipe was there to empty it but the operator did not notice it due to which it caused a delay of 1 Hr in filling the tank. Find the time in which the 3rd pipe would empty the filled tank?



~~A+B = $\frac{20}{5}$~~

$= 4$ Hrs

$A + B - C = 4$

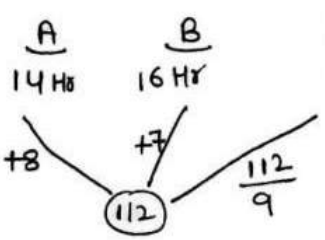
$\downarrow \quad \downarrow \quad \downarrow$

$4 \quad 1 \quad (-1)$

C will empty $= \frac{20}{1}$

$= 20$ Hrs.

(14) Two pipes can fill a cistern in 14 & 16 Hrs respectively. The pipes are opened simultaneously and it is found that due to leakage in the bottom, it took 92 min more to fill the cistern. When the cistern is full, in what time will the leak empty it?



$A+B = \frac{112}{15} \times 60^{4}$

$= 448$ min

$A+B-C = 92$ min more

$448+92 = 540$ min

$\frac{540}{60} = 9$ Hrs.

$A+B-C = \frac{112}{9}$

$8 + 7$

$15 - C = \frac{112}{9}$

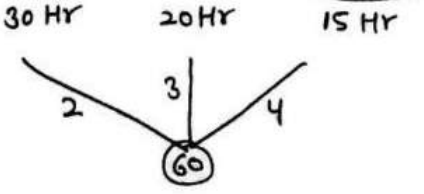
$C = 15 - \frac{112}{9} = \frac{23}{9}$

C will empty $= \frac{112}{23/9}$

$= \frac{112 \times 9}{23} = \frac{1008}{23}$

$= 43\frac{19}{23}$ Hrs Ans.

(15) Three pipes A, B and C are attached to a cistern. A & B can fill it in 30 Hrs and 20 Hrs respectively & 3rd pipe C leaks out 45 L water per minute. If all the three pipes are opened simultaneously the tank will fill in 15 Hr. find the capacity of the tank.



$A+B-C = 4$

2 3 (1) $C = 1$

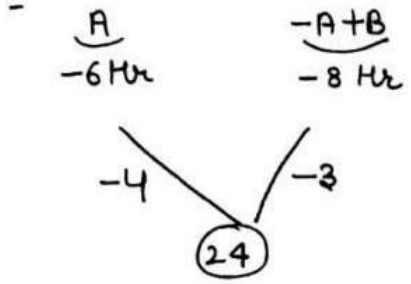
C will empty the tank $= \frac{60}{1} = 60$ Hrs

Efficiency of C of taking out = 45 litre/min

Capacity of Tank $= 60 \times 60 \times 45$

$= 162000$ ltr.

(16) A leak in the bottom of the tank can empty it in 6 Hrs. A tap fill the tank @ 4L/min is turn on. if both taps are opened then the tank will empty in 8 Hrs. Find the capacity of the tank ?



$-A+B = -3$

$-4 \quad +1$

B = 1

B will fill the tank = $\frac{24}{1}$ = 24 Hrs

B can fill 4 litre/min

∴ capacity of Tank = 24 × 60 × 4

= 5760 litre.

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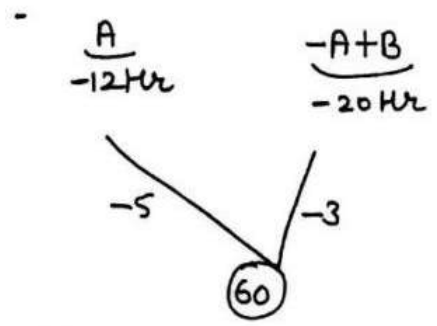
(17) A leak in the bottom of a tank can empty it in 12 Hrs. A tap which can added 20L/min is turn on. Both the taps are opened now, then the tank is emptied in 20 Hrs. Find the capacity of the tank.



$-A+B = -3$

$-5 \quad +2$

B = 2

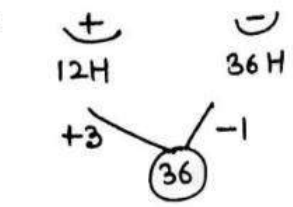
B will fill = $\frac{60}{2}$ = 30 Hrs

B can fill 20 litre/min

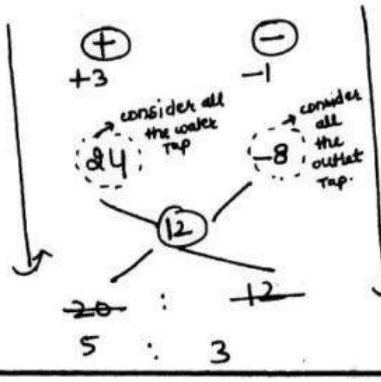
∴ capacity of Tank = 30 × 60 × 20

= 36000 litre.

(18) 8 taps are fitted in a tank, some are water taps & rest are outlet tap. Each water tap can fill the tank in 12 Hrs and each outlet tap can empty in 36 Hours. Then calculate the no. of water taps if the whole tank fill in 3 Hrs.



$\frac{36}{3} = 12$



5+3 = 8 unit — 8

1 unit — 1

water Taps = 5

outlet Taps = 3.

Ans

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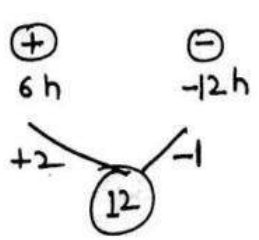
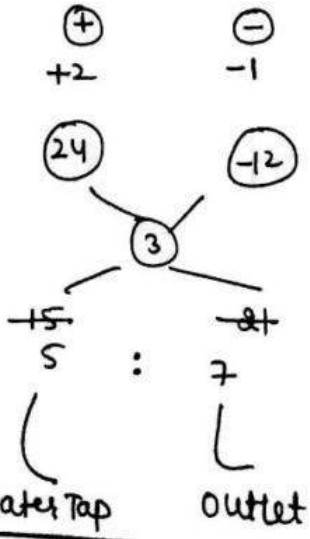
(19) 12 taps are fitted in a tank, some are water taps & rest are outlet taps. Each water tap can fill the tap in 6 Hr and each outlet tap can empty the tap in 12 Hr. If all the taps are open together then the tank is full in 4 Hrs. find the no. of water taps.



$\frac{12}{4} = 3.$



5+7=12.

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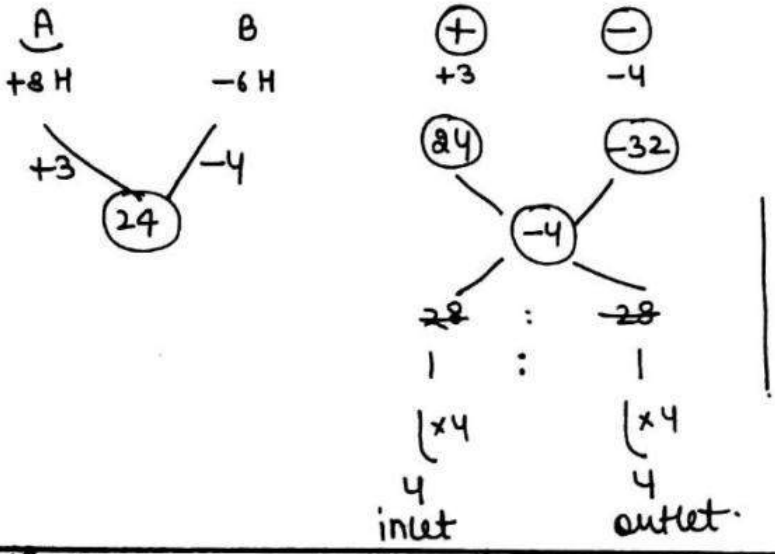
(20) A tank is connected with 8 pipes. Some of them are inlet pipes and rest are outlet pipes. Each of the inlet pipe can fill the tank in 8 Hrs individually while each outlet pipe can empty the tank in 6 Hrs individually. If all the pipes are kept open when the tank is full, it will take 6 Hrs for the tank to empty. How many of these are inlet pipes?

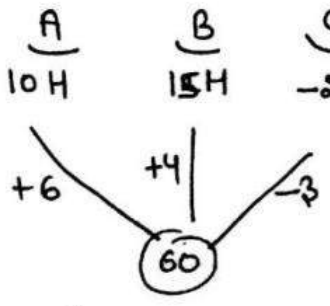


$\frac{24}{6} = -4$.

$1+1=2 \longrightarrow 8$

$1 \longrightarrow 4$

(21) If A & B can fill a tank in 10 Hrs & 15 Hrs respectively An outlet tap C can empty it in 20 Hrs. Initially the tap A and tap B are opened and when the tank was supposed to be filled it was found that tap C was open mistakenly, now C is closed. After how much time tank will fill?



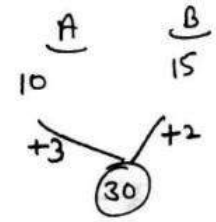
$C = -3 \times 6 = -18$

A & B fill it $= \frac{18}{10}$

$= 1\frac{4}{5}$ Hrs.

$(A+B) = \frac{60}{10} = 6$ Hrs

(22) A bath can be filled by the cold water pipe in 10 minutes and by the hot water pipe in 15 minute. A person leaves the bathroom after turning on both pipes simultaneously and returns at the moment when the bath should be full. finding however, that the waste pipe has been open, he now closed it. In 4 min more the bath is full. In what time would the waste pipe empty it?



$A+B = \frac{30}{5} = 6$ Hrs

$\frac{3}{6} \times$ waste pipe $= (A+B) \times 4 + 2$

$3 \times$ waste pipe $= (3+2) \times 2$

$3 \times$ waste pipe $= 10$

waste pipe $= \frac{10}{3}$

waste pipe will empty $= \frac{30}{10/3} = \frac{\overset{3}{\cancel{30}} \times 3}{\cancel{10}}$

$= 9$ min

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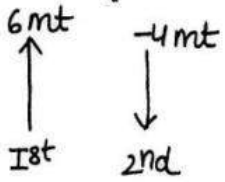
(23) A monkey climb a pole of height 100 m. It climbs 6 m above in 1st min and 4 m below in 2nd min. In how many minutes monkey will climbs on the pole?



1 cycle (2 min) — 2 mt.

$\downarrow \times 47$ $\downarrow \times 47$

94 min — 94 mt

1 min — 6 mt

95 min — 100 m

(24) A monkey climb a pole of height 60 m. It climb 5 m above in 1st min and 4 m below in 2nd min. In how many minutes monkey will climb on the pole ?

+5 (1st) , -4 (2nd)

1 cycle (2 min) —— 1 mt.

×55 ↓ ×55 ↓

110 min — 55 mt.

1 min — 5 mt

111 min — 60 mt

Starting में इतने पानी लगाने हैं कि diff (−) वाली term से ज्यादा रहे।

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(25) A, B, C are pipes attached to a cistern. A & B can fill it in 20 min & 30 min respectively while C can empty in 15 min. If A, B, C kept open successively for 1 min each, how soon the cistern will be filled ?

A	B	C
20	30	15
+3	+2	−4

A	B	C
+3	+2	−4

1 cycle (3h) —— 1

×55 ↓ ×55

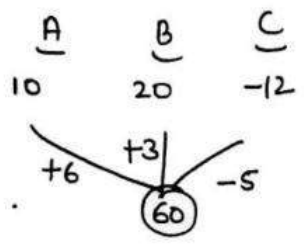
165 — 55

1 min — +3

1 min — +2

167 min — 60

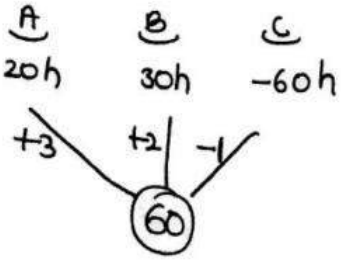
(26) Tap A and Tap B can fill a tank in 10 Hrs & 12 Hrs respectively. Tap C can empty it in 12 Hrs. If all the taps are open alternatively 1 Hr each, then the whole tank will fill in how many hours.



A B C
+6 +3 -5

1 cycle (3H) —— 4
|x13 |x13
39H 52
1h +6
$\frac{2}{3}$ h 2
60
$40\frac{2}{3}$ Hr.

(27) Three pipes A, B, C are attached to a cistern. Pipe A & B can fill the cistern in 20 & 30 Hr respectively and the pipe C can empty in 60 Hrs. Pipe A&C are opened for the 1st Hour and the pipe B&C are opened for the 2nd Hour & this process continues till the cistern does not fill. In how much time the tank will be filled?



I II
A+C B+C
↓ ↓
2 1

1 cycle (2 Hr) —— 3 unit
|x20 |x20
40 Hr 60 unit

(28) In what time would a cistern is filled by 3 pipes whose diameters are 1cm, $1\frac{1}{3}$ cm, 2cm running together, when the largest alone fill it in 61 min. The amount of water flowing in by each pipe being proportional to the square of its diameter?

1 : $\frac{4}{3}$: 2

D→ 3 : 4 : 6

Eff→ 9 + 16 + (36)

capacity of tank = 36×61

⇒ 9+16+36 = 61

Cistern will fill = $\frac{36\times61}{61}$ = 36 min

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(29) In what time would a cistern be filled by 3 pipes whose diameters are 1cm, 2cm, 4cm running together. When the largest alone fill it in $1\frac{1}{20}$ Hours, the amount of water flowing in by each pipe being proportional to the square of its diameter.

D→ 1 : 2 : 4

Eff→ 1 : 4 (16)

1+4+16 = 21

capacity of Tank = $16\times\frac{21}{20}$

Tank will fill = $\frac{16\times\frac{21}{20}}{21}$

$\frac{16\times21}{20}\times\frac{1}{21} = \frac{4}{5}$ Hr.

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(30) One fill pipe A take three min more to fill the tank than two pipes A & B opened together to fill it. 2nd fill pipe B takes $21\frac{1}{3}$ min more to fill the tank than A+B together take. When the tank will be full if both pipes are opened simultaneously?

(A+B) → A+3 min

(A+B) → B + $\frac{64}{3}$ min

$\sqrt{3\times\frac{64}{3}}$ = 8min

A+B will fill = 8 min Ans

(31) $3m+4b$ can earn Rs 756 in 7 days. $11m+13b$ can earn Rs 3008 in 8 days. In what time will 7 men + 9 boys earn Rs 2480.?

$$\frac{(3m+4b)\times 7}{\cancel{756}\ \cancel{+108}\ 54} = \frac{(11m+13b)\times 8}{\cancel{3008}\ \cancel{374}\ 187}$$

$$\frac{m}{b} = \frac{5x}{3x}$$

$$(3m+4b) = (15x+12x) = 27x$$

$$(11m+13b) = (55x+39x) = 94x$$

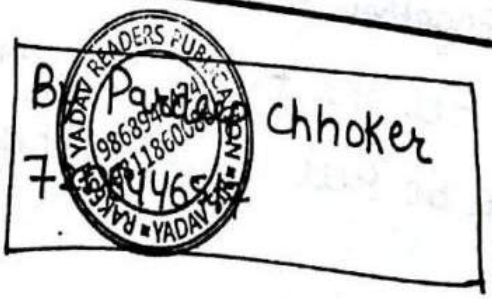
$$27x \times 7 = \cancel{756}\ 108$$

$$\boxed{x=4}$$

$$\frac{m}{b} = \frac{20}{12}$$

$$7m+9c = 140+108 = 248$$

$$(7m+9c) \text{ will earn in} = \frac{2480}{\cancel{248}} = 10 \text{ days.}$$



Chhoker