Temple of Learning

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QUANTITATIVE APTITUDE

TIME & WORK, PIPES & CISRERN

FORMULAS

- The basic formula for solving is: $1/r + 1/s = 1/h$
- Let us take a case, say a person Hrithik
- Let us say that in 1 day Hrithik will do $1/20^{th}$ of the work and 1 day Dhoni will do $1/30^{th}$ of the work. Now if they are working together they will be doing $1/20 + 1/30 = 5/60 = 1/12^{th}$ of the work in 1 day. Now try to analyze, if two persons are doing $1/12^{th}$ of the work on first day, they will do $1/12^{th}$ of the work on second day, $1/12^{th}$ of the work on third day and so on. Now adding all that when they would have worked for 12 days $12/12 = 1$ i.e. the whole work would have been over. Thus the concept works in direct as well as in reverse condition.
- The conclusion of the concept is if a person does a work in 'r' days, then in 1 day- $1/r^{th}$ of the work is done and if $1/s^{th}$ of the work is done in 1 day, then the work will be finished in 's' days. Thus working together both can finish $1/h$ ($1/r + 1/s = 1/h$) work in 1 day & this complete the task in 'h' hours.
- The same can also be interpreted in another manner i.e. If one person does a piece of work in x days and another person does it in y days. Then together they can finish that work in $xy/(x+y)$ days
- In case of three persons taking x, y and z days respectively, They can finish the work together in $xyz/(xy + yz + xz)$ days

Illustration 1: Samir can do a job in 30 days. In how many days can he complete 70% of the job?

Sol: Now as per the question he finishes the work in 30 days, or he can do 100% of the work in 30 days. If he has to do only 70% of the work, he will require 70% of the time.

Number of days required = $30 \times 70/100 = 21$ days.

Illustration 2: Reshma can do 75% job in 45 days. In how many days can she complete the job?

Sol: Every work is 100% in itself. Reshma does 75% of the work in 45 days. That means she does 1% of the work in 45/75 days and she will do 100% of the work in $100 \times 45/75 = 60$ days.

Illustration 3: John can do a piece of work in 60 days; he will do how much of the work in 40 days?

Sol: In 1 day, John does 1/60th of the work, so in 40 days he will do 40 × 1/60 = 2/3rd of the work.

Illustration 4: Anup can finish a piece of work in 30 days. He will finish what percent of the work in 15 days?

Sol: In 1 day, he does 1/30th of the work, and in 15 days, he will do 15/30th of the work which is 100 × 15/30 = 50%.

Illustration 5: Ria can do a piece of work in 40 days, she will take how many days to finish three-fourth of the work?

Sol: Ria can complete the work in 40 days. She will do ¾th of the work in ¾th of the total time. i.e. she will need 40 × 3/4 = 30 days.

Approach One:

If a pipe fills a tank in A minutes and another pipe fills the same tank in B minutes. Then in how much time the tank will be filled completely?

(1/A) + (1/B) = (1/C), where C is the time in which tank will be filled, (in minutes). These have been added because both the pipes are filling the tank.

If a pipe fills a tank in A minutes and another pipe empties the same full tank in B minutes. Then in how much time the tank will be filled completely, if both the pipes are opened simultaneously?

(1/A) - (1/B) = (1/C), where C is the time in which tank will be filled (in minutes). It is subtracted because the second pipe is a drain pipe and it reduces the work done by the first pipe.

Illustration : If a pipe fills a tank in 20 minutes and a pipe empties the same tank in 60 minutes. Then in how much time the tank will be filled completely if both the pipes are opened together?

Sol: Let the tank be filled in X minutes.

By unitary method,

(1/20) - (1/60) = (1/X).

Solving the equation, we get, x = 30 minutes. So, the tank will be filled in 30 minutes.

Illustration

A pipe can fill a cistern in 12 minutes and another can fill it in 15 minutes, but a third pipe can empty it in 6 minutes. The first two are kept open for 6 minutes in the beginning and then the third pipe is also opened, in what time will the cistern be emptied?

Solution:

Let the capacity of the tank = LCM of (12,15, 6) = 60 litres.

Rate of work done by the first pipe = 60/12

⇒ 5 L/min

Rate of work done by the second pipe = 60/15

⇒ 4L/min

Rate of work done by the draining pipe = 60/6

⇒10L/min

Basic Concepts

INLET: An inlet is a pipe which is connected to the tank and with the help of this pipe, the tank is filled.

OUTLET/LEAK: An outlet is a pipe which is connected to the tank. This pipe drains out water from the tank and the tank gets emptied if this pipe is opened.

Formulae

1. If a pipe can fill a tank in a hrs, then the part filled in 1 hr =1/a.
2. If a pipe can empty a tank in b hrs, then the part of the full tank emptied in 1 hr = 1/b.
3. If a pipe can fill a tank in a hrs and the another pipe can empty the full tank in b hrs, then the net part filled in 1 hr, when both the pipes are opened =[1/a - 1/b] ∴ Time taken to fill the tank, when both the pipes are opened = ab/(b - a)

4. If a pipe can fill a tank in a hrs and another can fill the same tank in b hrs, then the net part filled in 1 hr, when both pipes are opened = [1/a + 1/b] ∴ Time taken to fill the tank = ab/(a + b)

5. If a pipe fills a tank in a hrs and another fills the same tank in b hrs, but a third one empties the full tank in c hrs, and all of them are opened together, the net part filled in 1 hr = [1/a+ 1/b-1/c] ∴ Time taken to fill the tank =abc/(bc + ac – ab) hrs.

6. A pipe can fill a tank in a hrs. Due to a leak in the bottom it is filled in b hrs. If the tank is full, the time taken by the leak to empty the tank = ab/(b - a) hrs.

Question No. - 1

A can do a piece of work in 10 days, and B can do the same work in 20 days. With the help of C, they finished the work in 4 days. C can do the work in how many days, working alone?

1. 5 days

2. 10 days

3. 15 days

4. 20 days

Sol : Option 1

Explanation: Their combined 4 day work = 4(1/10 + 1/15) = 12/20 = 3/5.

Remaining work = 1 – 3/5 = ⅖.

This means C did 2/5 work in 4 days, hence he can finish the complete work in 5/2 × 4 = 10 days.

Question No. - 2

A can do a piece of work in 12 days. B can do this work in 16 days. A started the work alone. After how many days should B join him, so that the work is finished in 9 days?

1. 2 days

2. 3 days

3. 4 days

4. 5 days

Sol : Option 4

Explanation:A's work in 9 days = 9/12 = 3/4. Remaining work = 1/4.

This work was done by B in 1/4 × 16 = 4 days.

∴ B would have joined A after 9 – 4 = 5 days.

Question No. - 3

A and B can do a piece of work in 40 days, B and C can do it in 120 days. If B alone can do it in 180 days, in how many days will A and C do it together?

1. 45 days

2. 22.5 days

3. 25 days

4. 18 days

Sol : Option 1

Explanation:A + B take 40 days. B alone takes 180 days.

$\therefore$ A will take $1/40 - 1/180 = 7/360 \Rightarrow 360/7$ days.

B + C take 120 days. $\therefore$ C alone will take $1/120 - 1/180 = 1/360$

i.e. 360 days. $\therefore$ A & C together will take $7/360 + 1/360 = 8/360 \Rightarrow 360/8 = 45$ days to complete the work.

Question No. - 4

A, B, C, and D can do a piece of work in 20 days. If A and B can do it together in 50 days, and C alone in 60 days, find the time in which D alone can do it.

1. 120 days

2. 200 days

3. 150 days

4. 75 days

Sol : Option 4

Explanation:D alone will take 1/20 – 1/50 – 1/60 = 4/300 = 1/75

⇒ 75 days to complete the work.

Question No. - 5

A and B undertake to do a piece of work for Rs. 450. A can do it in 20 days and B can do it in 40 days. With the help of C, they finish it in 8 days. How much should C be paid for his contribution?

1. Rs. 180

2. Rs. 40

3. Rs. 120

4. Rs. 60

Sol : Option 1

Explanation:A & B would have done 8/20 & 8/40 of the work respectively in 8 days. Together they have done 3/5th of the work. This implies that C has done 2/5th of the work. Thus, C should be paid 2/5th of the amount i.e. 450 × 2/5 = Rs. 180.

Question No. - 6

Working efficiencies of P and Q for completing a piece of working are in the ratio 3 : 4. The number of days to be taken by them to complete the work will be in the ratio ?

A. 3 : 2

B. 2 : 3

C. 3 : 4

D. 4 : 3

Answer & Solution

Answer: **Option D**

Solution:

Since we know efficiency and time are inversely proportion to each other.

	P : Q
Efficiency	3 : 4
Time	4 : 3

Question No. - 7

P is thrice as good a workman as Q and therefore able to finish a job in 48 days less than Q. Working together, they can do it in ?

A. 18 days

B. 24 days

C. 30 days

D. 12 days

Answer & Solution

Answer: **Option A**

Solution:

Let time taken by P = x days

Then, time taken by Q = 3x days

$\therefore 3x - x = 48$

$\Rightarrow 2x = 48$

$\Rightarrow x = 24$

$\therefore$ (P + Q)'s 1 day's work

$$= \frac{1}{24} + \frac{2}{72}$$

$$= \frac{3+1}{72}$$

$$= \frac{1}{18}$$

$\therefore$ Required time = 18 days

Question No. - 8

A does 20% less work than B. If A can complete a piece of work in $7\frac{1}{2}$ hours, then B can do it in ?

A. $6\frac{1}{2}$ hours

B. 6 hours

C. $5\frac{1}{2}$ hours

D. 5 hours

Answer & Solution

Answer: **Option B**

Solution:

Let time taken by B = x

$$\text{Efficiency} \propto \frac{1}{\text{Time taken}}$$

So, if B is 100% efficient. then A is 80% efficient

So,

$$\Rightarrow \frac{80}{100} = \frac{x}{15/2}$$

$$\Rightarrow x = \frac{80 \times 15}{100 \times 2}$$

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

Question No. - 9

A man is twice as fast as a women and a woman is twice as fast as a boy in doing a work. If all of them, a man , a woman and a boy can finish the work in 7 days, a boy will do it alone ?

A. 49 days

B. 7 days

C. 6 days

D. 42 days

Answer & Solution

Answer: **Option A**

Solution:

	Man	:	Woman	:	Boy
Efficiency	4	:	2	:	1

Total work = Time × (Efficiency of man + woman + boy)

⇒ 7 days × (4 + 2 + 1) = 49 units

∴ Boy can do this work in = $\frac{49}{1}$ = 49 days

Question No. - 10

If 3 men or 9 boys can finish a piece of work in 21 days, in how many days can 5 men and 6 boys together do the same piece of work ?

A. 8 days

B. 12 days

C. 14 days

D. None of these

Answer & Solution

Answer: Option D

Solution:

1 men's 1 day's work

$$= \frac{1}{21 \times 3}$$

$$= \frac{1}{63}$$

1 boy's 1 day's work

$$= \frac{1}{21 \times 9}$$

$$= \frac{1}{189}$$

(5 men + 6 boy) 's 1 day's work

$$= \frac{5}{63} + \frac{6}{189}$$

$$= \frac{5}{63} + \frac{2}{63}$$

$$= \frac{7}{63}$$

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

Hence, 5 men's and 6 boy's together can do the work in 9 days.

Question No. - 11

40 men can complete a piece of work in 15 days. 20 more men joined them after 5 days they start doing work. How many days will be required by them to finish the remaining work ?

A. $7\frac{2}{3}$ days

B. $6\frac{1}{5}$ days

C. $8\frac{1}{4}$ days

D. $6\frac{2}{3}$ days

Answer & Solution

Answer: Option D

Solution:

Work done by 40 men in 5 days = $\frac{1}{3}$

(As if whole work is completed in 15 days then in 5 days $\frac{1}{3}^{\text{rd}}$ of the work will be finished)

$\text{Remaining work} = 1 - \frac{1}{3} = \frac{2}{3}$

$\because$ 40 men do 1 work in 15 days.

60 men can do $\frac{2}{3}$work in x day

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

$M_1 = 40\,,\, M_2 = 60$

$D_1 = 15\,,\, D_2 = x$

$W_1 = 1\,, W_2 = \frac{2}{3}$

$$\Rightarrow \frac{40 \times 15}{1} = \frac{60 \times x}{2}$$

$$\Rightarrow \frac{2}{3}(40 \times 15) = 60x$$

$$\Rightarrow 2 \times 40 \times 5 = 60x$$

$$\Rightarrow x = \frac{20}{3}$$

$$\Rightarrow x = 6\frac{2}{3} \text{ days}$$

Question No. - 12

A and B working separately can do a piece of work in 9 and 15 days respectively. If they work for a day alternatively, with A beginning, then the work will be completed in ?

A. 10 days

B. 11 days

C. 9 days

D. 12 days

Answer & Solution

Answer: **Option B**

Solution:

L.C.M. of Total Work = 45

One day work of A = $\frac{45}{9}$ = 5 unit/day

One day work of B = $\frac{45}{15}$ = 3 unit/day

$(A + B)$'s 2 days work

$= 5 + 3$

$= 8$ units

They will do in

$= \frac{40}{8} \times 2$

$= (5 \times 2)$

$= 10$ days

$\therefore$ Work left

$= 45 - 40$

$= 5$ units

Now,

A's turn and he will complete in

$= \frac{5}{5}$

$= 1$ days

Then total work completed in

$= 10 + 1$

$= 11$ days

Question No. - 13

12 monkeys can eat 12 bananas in 12 minutes. In how many minutes can 4 monkeys eat 4 bananas ?

A. 4 minutes

B. 10 minutes

C. 12 minutes

D. 8 minutes

Answer & Solution

Answer: Option C

Solution:

Let the required time = T

$$\Rightarrow \frac{m_1 \times d_1 \times t_1}{w_1} = \frac{m_2 \times d_2 \times t_2}{w_2}$$

$$\Rightarrow \frac{12 \times 12}{12} = \frac{4 \times \text{time}}{4}$$

$$\Rightarrow \text{Time} = 12 \text{ minutes}$$

Question No. - 14

16 men can finish a piece of work in 49 days. 14 men started working and 8 days they could finish certain amount of work. If it is required to finish the remaining work in 24 days. How many more men should be added to the existing workforce ?

A. 21

B. 28

C. 16

D. 14

Answer & Solution

Answer: Option D

Solution:

Given,

$M_1 = 16$, $M_2 = ?$

$D_1 = 49$, $D_2 = 24$

$W_1 = 1$, $W_2 = ?$

According to the question,

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

$$\Rightarrow \frac{16 \times 49}{1} = \frac{14 \times 8}{W_2}$$

$$\Rightarrow W_2 = \frac{14 \times 8}{16 \times 49}$$

$$\Rightarrow W_2 = \frac{1}{7}$$

Remaining work

$$= \left(1 - \frac{1}{7}\right)$$

$$= \frac{6}{7}$$

Again, $\frac{M_1 D_1}{W_1} = \frac{M_2 D_2}{W_2}$

$$\Rightarrow \frac{16 \times 49}{1} = \frac{M_2 \times 24}{\frac{6}{7}}$$

$$\Rightarrow 16 \times 49 = \frac{M_2 \times 24 \times 7}{6}$$

$$\Rightarrow 16 \times 49 = M_2 \times 4 \times 7$$

$$\Rightarrow M_2 = \frac{16 \times 49}{4 \times 7}$$

$$\Rightarrow M_2 = 28$$

$\therefore$ Numb

$= (28 -$

$= 14$

Question No. - 15

A can do a piece of work in 18 days. He worked at it for 12 days and B finished the remaining work in 8 days. B alone can do the whole work in ?

A. 16 days

B. 24 days

C. 35 days

D. 28 days

Answer & Solution

Answer: Option B

Solution:

$$18A = 12A + 8B$$

$$6A = 8B$$

$$\frac{A}{B} = \frac{4}{3}$$

So,

Efficiency of A and B are 4, 3.

Total work

$$= 18 \times 4$$

$$= 72 \text{ units}$$

So, B will do

$$= \frac{72}{3}$$

$$= 24 \text{ days}$$

Question No. - 16

A and B can do a work in 8 days, B and C can do the same work in 12 days. A, B and C together can finish it in 6 days. A and C together will do it in ?

A. 4 days

B. 6 days

C. 8 days

D. 12 days

Answer & Solution

Answer: Option C

Solution:

L.C.M. of Total Work = 24

One day work of A + B = $\frac{24}{8}$ = 3 unit/day

One day work of B + C = $\frac{24}{12}$ = 2 unit/day

One day work of A + B + C = $\frac{24}{6}$ = 4 unit/day

$$\text{Efficiency of C}$$
$$= 4 - 3$$
$$= 1$$
$$\text{Efficiency of A}$$
$$= 4 - 2$$
$$= 2$$
$$\text{Efficiency of B}$$
$$= 4 - 1$$
$$= 3$$
$$\text{Efficiency of A} + \text{C}$$
$$= 2 + 1$$
$$= 1$$
$$\text{Time taken by A} + \text{C}$$
$$= \frac{24}{3}$$
$$= 8 \text{ days}$$

Question No. - 17

A can do a certain job in 12 days and B is 60% more efficient than A. The B can do the same piece of work in ?

A. 8 days

B. $7\frac{1}{2}$ days

C. $6\frac{1}{4}$ days

D. 6 days

Answer & Solution

Answer: **Option B**

Solution:

Ratio of time, taken by A and B = 160 : 100 = 8 : 5

If A takes 8 days, B takes 5 days

If A takes 12 days,

B takes $= \frac{5}{8} \times 12 = \frac{15}{2} = 7\frac{1}{2}$ days

Question No. - 18

If 72 men can build a wall of 280 m length in 21 days, how many men could take 18 days to build a similar type of wall of length 10 m ?

A. 30

B. 10

C. 18

D. 28

Answer & Solution

Answer: Option A

Solution:

Here work is 280 m length of wall

And 100 m length of wall

Let, M men will finish 100 m wall.

$$\frac{72 \times 21}{280} = \frac{M \times 18}{100}$$

$$\Leftrightarrow M = 30$$

Question No. - 19

A can do a piece of work in 4 hours, B and C together in 3 hours, and A and C together in 2 hours. How long will B alone take to do it ?

A. 8 hours

B. 10 hours

C. 12 hours

D. 24 hours

Answer & Solution

Answer: Option C

Solution:

$$\text{A's 1 hour's work} = \frac{1}{4}$$

$$(\text{B} + \text{C})\text{ 's 1 hour's work} = \frac{1}{3}$$

$$(\text{A} + \text{C})\text{ 's 1 hour's work} = \frac{1}{2}$$

$$(\text{A} + \text{B} + \text{C})\text{ 's 1 hour's work}$$

$$= \frac{1}{4} + \frac{1}{3}$$

$$= \frac{7}{12}$$

$$\therefore \text{B's 1 hour's work}$$

= (A + B + C)'s 1 hour's work - (A + C)'s 1 hour's work

$$= \frac{7}{12} - \frac{1}{2}$$

$$= \frac{1}{12}$$

So, B alone can complete the work in 12 hours.

Question No. - 20

A work could be completed in 100 days by some workers. However, due to the absence of 10 workers, it was completed in 110 days. The original number of workers was ?

A. 100

B. 110

C. 55

D. 50

Answer & Solution

Answer: Option B

Solution:

Let total number of worker in beginning is N

According to the question,

$$\frac{N \times 100_{\text{days}}}{1_{\text{work}}} = \frac{(N-10) \times 110_{\text{days}}}{1_{\text{work}}}$$

$$100N = 110N - 1100$$

$$\Rightarrow 10N = 1100$$

$$\Rightarrow N = 110$$

Question No. - 21

Two pipes A and B can fill a cistern in $37\frac{1}{2}$ minutes and 45 minutes respectively. Both pipes are opened. The cistern will be filled in just half an hour, if the B is turned off after:

A. 5 min.

B. 9 min.

C. 10 min.

D. 15 min.

Answer & Solution

Answer: **Option B**

Solution:

Let B be turned off after x minutes.

Then, Part filled by (A + B) in x min. + Part filled by A in (30 - x) min. = 1

$$\therefore x\left(\frac{2}{75}+\frac{1}{45}\right)+(30-x).\frac{2}{75}=1$$

$$\Rightarrow \frac{11x}{225}+\frac{60-2x}{75}=1$$

$$\Rightarrow 11x+180-6x=225$$

$$\Rightarrow x=9$$

Question No. - 22

One pipe can fill a tank three times as fast as another pipe. If together the two pipes can fill the tank in 36 minutes, then the slower pipe alone will be able to fill the tank in:

A. 81 minutes

B. 108 minutes

C. 144 minutes

D. 192 minutes

Answer & Solution

Answer: Option C

Solution:

Let the slower pipe alone fill the tank in x minutes.

Then, faster pipe will fill it in $\frac{x}{3}$ minutes.

$$\therefore \frac{1}{x} + \frac{3}{x} = \frac{1}{36}$$

$$\Rightarrow \frac{4}{x} = \frac{1}{36}$$

$$\Rightarrow x = 144 \text{ minutes}$$

Question No. - 23

Three taps A, B and C can fill a tank in 12, 15 and 20 hours respectively. If A is open all the time and B and C are open for one hour each alternately, the tank will be full in:

A. 6 hours

B. $6\frac{2}{3}$ hours

C. 7 hours

D. $7\frac{1}{2}$ hours

Answer & Solution

Answer: Option C

Solution:

$$(A + B)\text{'s 1 hour work}$$

$$= \frac{1}{12} + \frac{1}{15} = \frac{9}{60} = \frac{3}{20}$$

$$(A + C)\text{'s 1 hour work}$$

$$= \frac{1}{12} + \frac{1}{20} = \frac{8}{60} = \frac{2}{15}$$

$$\text{Part filled in 2 hrs}$$

$$= \frac{3}{20} + \frac{2}{15} = \frac{17}{60}$$

$$\text{Part filled in 6 hrs}$$

$$= 3 \times \frac{17}{60} = \frac{17}{20}$$

$$\text{Remaining part}$$

$$= 1 - \frac{17}{20} = \frac{3}{20}$$

Now it is the turn of A and B and

$\frac{3}{20}$ part is filled by A and B in 1 hour

$\therefore$ Total time taken to fill tank

= (6 + 1) hrs

= 7 hrs

Question No. - 24

Three pipes A, B and C can fill a tank in 6 hours. After working at it together for 2 hours, C is closed and A and B can fill the remaining part in 7 hours. The number of hours taken by C alone to fill the tank is:

A. 10

B. 12

C. 14

D. 16

Answer & Solution

Answer: **Option C**

Solution:

Part filled in 2 hours = $\frac{2}{6} = \frac{1}{3}$

Remaining part = $1 - \frac{1}{3} = \frac{2}{3}$

$\therefore$ (A + B)'s 7 hour's work = $\frac{2}{3}$

(A + B)'s 1 hour's work = $\frac{2}{21}$

$\therefore$ C's 1 hour's work = {(A + B + C)'s 1 hour's work} - {(A + B's 1 hour's work}

$= \frac{1}{6} - \frac{2}{21}$

$= \frac{1}{14}$

$\therefore$ C alone can fill the tank in 14 hours

Question No. - 25

Two pipe can fill a cistern in 3 hours and 4 hours respectively and a waste pipe can empty it in 2 hours. If all the three pipes are kept open, then the cistern will be filled in-

A. 5 hours

B. 8 hours

C. 10 hours

D. 12 hours

Answer & Solution

Answer: **Option D**

Solution:

Part of the cistern filled in 1 hour

$$= \frac{1}{3} + \frac{1}{4} - \frac{1}{2}$$

(Cistern filled by 1st pipe + Cistern filled by 2nd pipe – Cistern emptied by 3rd pipe)

$$\frac{4 + 3 - 6}{12}$$

$$= \frac{1}{12}$$

Hence, the cistern will be filled in 12 hours.

Question No. - 26

$\frac{3}{4}$ part of the tank is full of water. When 30 litres of water is taken out, the tank becomes empty. The capacity of the tank is

A. 36 liters

B. 42 liters

C. 40 liters

D. 38 liters

Answer & Solution

Answer: **Option C**

Solution:

If tank has 4x liters of total capacity and its holds 3x liters of water and if 30 liters of water is taken out, then tank becomes empty.

It means 3x liters of water is taken out

$3x = 30$ liters

$x = 10$ liters

Capacity of tank

$= 4x = 4 \times 10 = 40$ liters

Question No. - 27

One pipe can fill a tank three times as fast as another pipe. If together the two pipes can fill the tank in 36 minutes, then the slower pipe alone will be able to fill the tank in-

A. 81 min

B. 108 min

C. 144 min

D. 192 min

Answer & Solution

Answer: **Option C**

Solution:

Let the slower pipe alone fill the tank in x minutes

Then, Faster pipe alone will fill it in $\frac{x}{3}$ minutes

$$\therefore \frac{1}{x} + \frac{3}{x} = \frac{1}{36}$$

$$\Rightarrow \frac{4}{x} = \frac{1}{36}$$

$$\Rightarrow x = 144$$

So slower pipe alone will fill the tank in 144 min.

Question No. - 28

A tank is 7 metre long and 4 meter wide wide. At what speed should water run through a pipe 5 cm broad and 4 cm deep so that in 6 hours and 18 minutes water level in the tank rises by 4.5 meter?

A. 10 km/hours

B. 12 km/hours

C. 8 km/hours

D. None of these

Answer & Solution

Answer: Option A

Solution:

Rate of flow of water = x cm/minute

∴ Volume of water that flowed in the in 1 minutes

= (5 × 4 × x) = 20 x cu.cm.

∴ Volume of water that flowed in the tank in 6 hours 18 minutes.

i.e. (6 × 60 + 18) = 378 minutes

= 2x × 378 cu. cm.

According to question,

$$20x \times 378 = 700 \times 400 \times 450$$

$$\Rightarrow x = \left(\frac{700 \times 400 \times 450}{20 \times 378}\right) \text{cm /minutes}$$

$$\Rightarrow x = \left(\frac{700 \times 400 \times 450 \times 60}{100000 \times 20 \times 378}\right) \text{km/hours}$$

$$\Rightarrow x = 10 \text{ km/hours}$$

Question No. - 29

A tank can be filled by pipe A in 2 hours and pipe B in 6 hours. At 10 A.M. pipe A was opened. At what time will the tank be filled if pipe B is opened at 11 A.M. ?

A. 12.45 A.M.

B. 5 P.M.

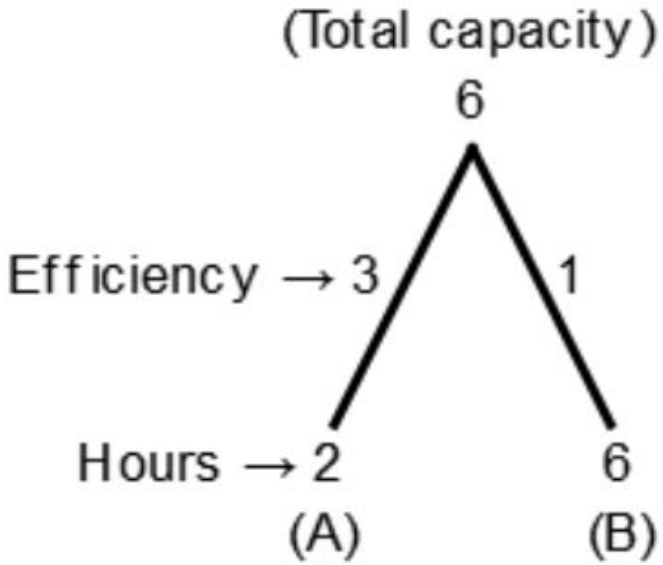
C. 11.45 A.M.

D. 12 P.M.

Answer & Solution

Answer: Option C

Solution:



Pipe A will fill 3 units till 11 A.M. Remaining capacity

= 6 - 3

= 3 units

Now both pipes will fill the tank in

$$\frac{\text{Total Capacity}}{\text{Efficiency}} = \frac{3}{(3+1)} = \frac{3}{4} \text{ hours}$$

So, $\left(11 + \frac{3}{4}\right)$ A.M., tank will be filled = 11.45 A.M.

Question No. - 30

Pipe A can fill a tank in 4 hours and pipe B can fill it 6 hours. If they are opened on alternate hours and if pipe A is opened first then in how many hours, the tank shall be full ?

A. $4\frac{1}{2}$ hours

B. $4\frac{2}{3}$ hours

C. $3\frac{1}{2}$ hours

D. $3\frac{1}{4}$ hours

Answer & Solution

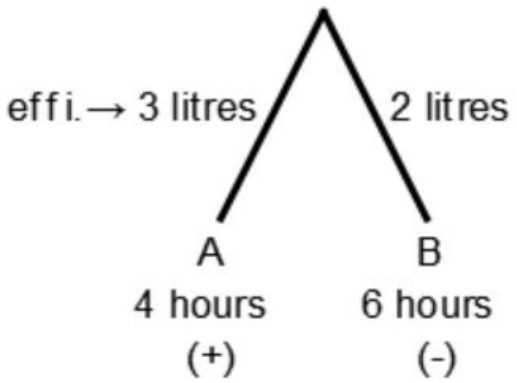
Answer: Option B

Solution:

A → 4 hours

B → 6 hours

LCM → 12 litres → Total capacity



According to question,

⇒ For the first hour tap A is opened and B for second hour

⇒ Work done by both in 2 hours

$\rightarrow (3\,\text{lit/h} + 2\,\text{lit/h}) \times 2 = 10\,\text{units}$

$\underset{4\text{ hours}}{\overset{2\text{ hours}}{|}} \times 2 \qquad \underset{10\text{ litres}}{\overset{5\text{ liters}}{|}} \times 2$

⇒ Remaining part

= 12 - 10 = 2 liters

⇒ Again 5th hour A will be opened Tap A will fill the 2 liters water with its efficiency = $\frac{2}{3}$ hours

⇒ Therefore tank will be filled in

= $\left(4 + \frac{2}{3}\right)$ hours

= $4\frac{2}{3}$ hours

Question No. - 31

Pipe A can fill the tank in 8 hours and pipe B can fill it in 12 hours. If pipe A is opened at 7:00 AM and pipe B is opened at 9:00 AM, then at what time will the tank be full ?

A. 12:00 PM

B. 12:30 PM

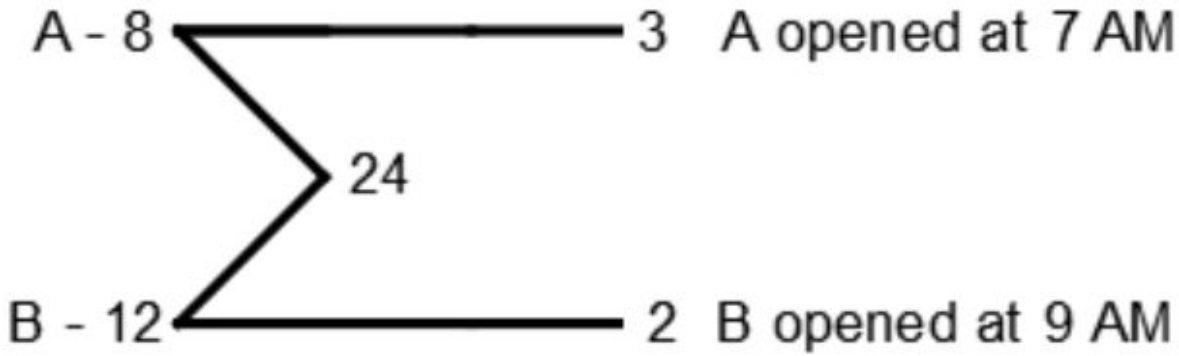
C. 11:48 PM

D. 12:36 PM

Answer & Solution

Answer: **Option D**

Solution:



A opened 2 hours early to B

In 2 hours A can do 3 × 2 = 6 unit work

Remaining work = 24 - 6 = 18

A + B can do it in

$$= \frac{18}{5} \text{hours}$$

$$= 3\frac{3}{5} \text{hours}$$

$$= 3 \text{ hours } 36 \text{ minutes}$$

∴ Tank will be full in 9 AM + 3 hours 36 minutes = 12.36 PM

Question No. - 32

Two pipes A and B can fill a tank with water in 30 minutes and 45 minutes respectively. The third pipe C can empty the tank in 36 minutes. First A and B are opened. After 12 minutes C is opened. Total time (in minutes) in which the tank will be filled up is -

A. 12 minutes

B. 24 minutes

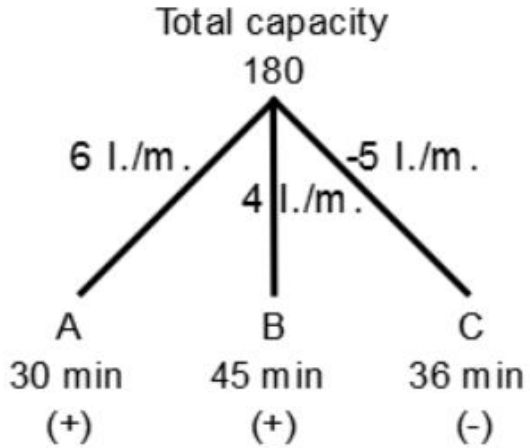
C. 30 minutes

D. 36 minutes

Answer & Solution

Answer: Option B

Solution:



A . . . . . (+) 30 minutes

B . . . . . (+) 45 minutes

C . . . . . (-) 36 minutes

⇒ Water filled by (A + B) in 12 min

= 12 × (6 + 4)

= 12 × 10 = 120 liters

⇒ Remaining capacity

= 180 - 120 = 60 liters

⇒ After 12 minutes emptied pipe C is also opened

⇒ Total capacity (A + B - C)

= (6 + 4 - 5) = 5 liters/minutes

⇒ Time taken by (A + B - C) with capacity 5 liters/minutes to fill the remaining part

$$= \frac{60 \text{ liters}}{5 \text{ liters/minutes}} = 12 \text{ minutes}$$

⇒ Therefore, total time in which the tank will be filled up is

= 12 + 12

= 24 minutes