

MBA PIONEER 2024

QUANTITATIVE APTITUDE

DPP: 12

Work Rate and Time - 1

- Q1** Pipes A and B can fill a tank in 15 and 18 minutes respectively. Pipe A and B are both kept open for the first 6 minutes after which pipe B is closed. How much more time will be taken to fill the tank?
 (A) 10 mins (B) 8 mins
 (C) 4 mins. (D) 6 mins
- Q2** A cistern can be filled by two pipes in 8 hours and 15 hours respectively while a third pipe empties the full cistern in 24 hours. Let all the three pipes start and operate at the same time. Then, how much time (in minutes) later, will the empty cistern be filled?
- Q3** Sanju can alone complete a project work in 50 days and Ritesh can complete it in 30 days. But if they work together, they will get paid Rs. 7200 for this project. How much amount (in Rs.) Ritesh will have?
- Q4** Gopal and Krishna can complete a car refurbishment in 50 and 40 days respectively. They began the work together, but Gopal left after some days and Krishna finished the remaining repairs in 31 days. After how many days did Gopal leave?
 (A) 5 (B) 6
 (C) 7 (D) 8
- Q5** Sankar & Shaan (music directors) are contracted for creating the music at \$4800. Sankar alone can do it in 78 days while Shaan alone can do it in 52 days. They worked for 26 days and then handed over the work to Vishaal to finish the remaining work. How much should Vishaal get for his work?
 (A) \$500 (B) \$600
 (C) \$700 (D) \$800
- Q6** 11 women and 18 girls can finish a specific job in 3 days and 14 women and 29 girls can do the same job in 2 days. Compare the work done/day by a woman to a girl.
 (A) 4:5
 (B) 3:4
 (C) 3:2
 (D) None of the above
- Q7** A set of paper binding work can be accomplished by 12 women and 15 girls in 3 days. If the same work can be completed by 6 women and 12 girls in 5 days, in how many days can 2 women and 4 girls accomplish the same work?
 (A) 15 days
 (B) $16\frac{2}{5}$ days
 (C) 17 days
 (D) $18\frac{3}{7}$ days
- Q8** Sita can complete a specific job in 16 days. Ram can complete the same job in 8 days. If Sita started her job, then after how many days should Ram join her, so that the job is completed in 10 days ?
 (A) 4 days (B) 5 days
 (C) 6 days (D) 7 days



- Q9** Messi, Ronaldo and Neymar can do a piece of work in 5, 6 and 9 days respectively. They undertook to finish the work together for Rs. 1,07,930. Find the difference (in Rs.) between the share of Messi and that of Ronaldo.
(A) 8540 (B) 7530
(C) 6520 (D) 5510
- Q10** Virushka and Anushka can make their garden in 20 days; Anushka and Kanika can complete the same work in 24 days. Virushka and Kanika can finish it in 30 days. In how many days will Virushka, Anushka and Kanika accomplish it together?
(A) 4 days (B) 6 days
(C) 10 days (D) 16 days
- Q11** Jacky's efficiency is twice of Rocky and collaboratively they can finish a project work in 18 days. How many days does Jacky need to finish the project alone?
(A) 25 (B) 26
(C) 27 (D) 28
- Q12** Palash can complete a song recording in 9 days and Palak alone can do it in 3 days. Palash and Palak undertook to do it for \$1530. With the help of their neighbour Arman, they finished it in 2 days. The share of Arman out of the remuneration is:
(A) \$170 (B) \$180
(C) \$190 (D) \$200
- Q13** While working alone, M can complete a piece of work in 12 days, N in 15 days and O in 20 days. Initially, all the three started working together but O left midway. The remaining work was completed by M and N together. If the whole work was completed in 6 days, then after how many days did O leave?
- Q14** Aisha can do a work in 30 days, while Piranha can do the same work in 45 days. Aisha started the work and was joined by Piranha after 5 days. At the end of 10th day from the beginning, they had an argument and Aisha quit. How many more days did Piranha takes to complete the work? (Both worked at 100% efficiency on all days they worked.)
- Q15** A piece of work can be done by 3 men A, B and C in 10, 15 and 20 hours respectively. If A starts the work then after x hours B joins and after x hours C joins, the work will be done in 5 hours from the starting. Find the time (in min) after which the 2nd man joined the work.
- Q16** Roger completes $\frac{3}{5}$ of a project on quantum mechanics in 3 days. Steve can complete $\frac{1}{5}$ of the same project in 6 days and Barton can complete $\frac{5}{6}$ of the project in 15 days. All of them worked together for 3 days and then Roger and Barton left. How long will it take for Steve to complete the remaining project alone?
(A) 3.33 days (B) 4 days
(C) 5.44 days (D) 6 days
- Q17** 3 male workers and 1 female worker together can complete a project work in 15 days, while 5 male workers and 3 female workers together complete it in 8 days. If a male worker gets paid by Rs. 900 per day, then how much does a female worker earn per day?
(A) 500 (B) 490
(C) 480 (D) 470
- Q18** In a construction field, 8 female workers and 5 male workers can earn Rs. 4950 in 15 days. 6 male workers and 5 female workers can earn Rs. 7587 in 27 days. In how many days will 8 male workers and 3 female workers earn Rs. 1698?



- (A) 4 days (B) 5 days
(C) 6 days (D) 7 days

Q19 Narayan can complete a construction in 9 days which Shiva can spoil in 4 days. Narayan has worked for 5 days, during the last 3 days of which Shiva has been spoiling. How many days must Narayan now work alone to complete the construction?

- (A) 8 days
(B) $9\frac{1}{3}$ days
(C) 10.75 days
(D) 11 days

Q20 Alibaba can plunder the wealth of a city A at thrice the same time in which the forty thieves can. Find the time taken in days by the forty thieves to plunder the city, which Alibaba and 20 thieves can together plunder in 24 days.

- (A) 100 (B) 50
(C) 20 (D) 25

Q21 Two men are as efficient as three boys and five boys are as efficient as four women. If a man takes 30 days to finish a piece of work, find the time taken by five men, five boys and two women to complete the work.

- (A) 3 days (B) 4 days
(C) 5 days (D) 6 days

Q22 Three Pipes A, B, and C can fill a tank in 24 hours, 30 hours and 60 hours, respectively. If Pipe A is opened all the time, Pipe B and Pipe C are opened for alternate hours, starting with Pipe B, how much time will this process take to fill the tank?

- (A) 12.25 hours (B) 3.62 hours
(C) 7.75 hours (D) 14.89 hours

Q23 Tap 'A' and tap 'B' can fill a tank in 40 hours and 35 hours, respectively. If both taps are opened

together, then find the time after which tap 'A' must be closed so the whole tank can be filled in 21 hours.

- (A) 12 hours (B) 20 hours
(C) 18 hours (D) 16 hours

Q24 9 gentlemen together with 16 boys finish a specific work in 8 days. Each boy takes four times the time taken by a gentleman to finish the same work. The time taken (in days) by 16 gentlemen to finish the same work is:

- (A) 5 (B) 6.5
(C) 7 (D) 8.5

Q25 A cistern has an inlet pipe and an outlet pipe. When the outlet pipe is closed, it takes the inlet pipe 9 hours to fill the empty cistern. When the outlet pipe is open, it takes the inlet pipe 12 hours to fill the empty cistern. If only the outlet pipe is open, how many hours will it take to empty the one-third full cistern?

- (A) 10 (B) 12
(C) 14 (D) 16

Q26 A and B can complete a piece of work in 30 days and 45 days, respectively. They worked together till the completion of $\frac{1}{3}$ rd of the work, and the remaining work is completed by B and C together. If the total work is completed in 26 days, then in how many days C can complete the whole work alone?

- (A) 50 days (B) 120 days
(C) 85 days (D) 90 days

Q27 Two men Sonu and Titu work in a royal car painting garage. If Titu worked alone, he would need 10 hours more to finish the car painting than if they both worked together. Now if Sonu worked alone, it would need 7.5 hours more to complete the painting than they both working together. How much time (in hrs.) would Sonu



require to finish the painting if he would not take any help from Titu? [Take $\sqrt{3} = 1.73$]

- (A) 10.15 (B) 12.15
(C) 14.15 (D) 16.15

Q28 There are three pipes, A, B, and C, that can fill a tank in 35, 70, and 140 minutes respectively. Pipes B and C are opened for the first 15 minutes and then Pipe B is closed while Pipe A is opened. The tank just begins to overflow 15 minutes after Pipe C is closed. What is the time required to fill the tank?

- (A) 35 (B) 36
(C) 37 (D) 38

Q29 To complete a piece of work A & B are deployed. A alone worked on the project and completed $\frac{1}{3}$ rd of it and then passed it to B who finished the remaining job. The total time taken in this process was 13 days. If B started the work and completed $\frac{1}{3}$ rd of it and then passed it to A to finish the remaining part, then 14 days were needed to finish the work. In how many days A can finish the work alone?

Q30 There are two pipes that can fill a tank in 15 and 21 hours, respectively. Both pipes are turned on simultaneously, but because of a leak in the tank, it takes an additional 1 hour and 15 minutes to fill the tank completely. If the tank is completely filled, how long (in hours) will it take to completely empty the tank due to the leakage?

- (A) 70 (B) 75
(C) 80 (D) 85



Answer Key

Q1 (C)
Q2 400
Q3 4500
Q4 (A)
Q5 (D)
Q6 (A)
Q7 (A)
Q8 (D)
Q9 (B)
Q10 (D)
Q11 (C)
Q12 (A)
Q13 2
Q14 25
Q15 30

Q16 (B)
Q17 (A)
Q18 (C)
Q19 (C)
Q20 (C)
Q21 (A)
Q22 (D)
Q23 (D)
Q24 (B)
Q25 (B)
Q26 (D)
Q27 (D)
Q28 (C)
Q29 15
Q30 (A)



Hints & Solutions

Q1 Text Solution:

Let the total work be 90 units, then
 the efficiency of A will be $\frac{90}{15} = 6$ units/minute
 and
 the efficiency of B will be $\frac{90}{18} = 5$ units/minute
 Work completed in the first 6 minutes will be
 $(6 + 5) \times 6$
 $= 66$ units
 Remaining work of $90 - 66 = 24$ units needs to
 be completed by A alone for which it will require
 $\frac{24}{6} = 4$ minutes

Q2 Text Solution:

Net part filled in 1 hour

$$= \frac{1}{8} + \frac{1}{15} - \frac{1}{24}$$

$$= \frac{15 + 8 - 5}{120}$$

$$= \frac{18}{120}$$

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

The tank will be full in $\frac{20}{3}$ hrs = $\frac{20}{3} \times 60$ min = 400 minutes.

Q3 Text Solution:

Let the total work will be the LCM of (50 and 30)
 $= 150$ units

Efficiency of Sanju = $\frac{150}{50} = 3$ units/day.

Efficiency of Ritesh = $\frac{150}{30} = 5$ units/day.

Ratio in which the earnings should be distributed among both equal to the ratio of the work done by them.

$$= 3 : 5$$

$$3x + 5x = 7200$$

$$x = 900.$$

$$\text{Share of Ritesh} = 5x = 5 \times 900 = 4500.$$

Q4 Text Solution:

Krishna would have done $\frac{31}{40}$ work in 31 days.

The remaining work i.e., $1 - \frac{31}{40} = \frac{9}{40}$ must have been done by Gopal and Krishna together.

1 day work of both = $\frac{1}{50} + \frac{1}{40} = \frac{9}{200}$ units.

Time taken by both to complete $\frac{9}{40}$ units of work
 $= \frac{9}{40} \div \frac{9}{200} = 5$

Option (A) is correct.

Q5 Text Solution:

In 26 days, Sankar and Shaan would have done
 $\frac{26}{78} = \frac{1}{3}$ and $\frac{26}{52} = \frac{1}{2}$ of the works respectively.

The remaining work is $= 1 - (\frac{1}{3} + \frac{1}{2}) = \frac{1}{6}$

This means Vishaal has done $\frac{1}{6}$ th of the work,
 so he should be paid $\frac{1}{6}$ th of the amount i.e.,
 $4800 \times \frac{1}{6} = \$800.$

Option (D) is correct.

Q6 Text Solution:

11 women + 18 girls can do the work in 3 days.

$3 \times (11 \text{ women} + 18 \text{ girls})$ can do the work in 1 day.

Similarly, $2 \times (14 \text{ women} + 29 \text{ girls})$ can do the same work in 1 day.

Now, equating, 1 day's work in both cases:

$$2 \times (14 \text{ women} + 29 \text{ girls}) = 3 \times (11 \text{ women} + 18 \text{ girls})$$

$$\Rightarrow 28 \text{ women} + 58 \text{ girls} = 33 \text{ women} + 54 \text{ girls.}$$

$$\Rightarrow 5 \text{ women} = 4 \text{ girls}$$

or, woman : girl = 4 : 5

Option (A) is correct.

Q7 Text Solution:

As (12 women + 15 girls) take 3 days,

Therefore, (36 women + 45 girls) takes 1 day (1)

Also, as (6 women + 12 girls) take 5 days,

Therefore, (30 women + 60 girls) takes 1 day (2)

So, equating 1 day's work for both the cases:

Thus, 30 women + 60 girls = 36 women + 45 girls

i.e., 6 women = 15 girls

i.e., 2 women = 5 girls



Efficiency of 1 Woman : 1 Girls = 5 : 2

Let 1 woman's efficiency be 5 units and the efficiency of 1 girl be 2 units.

Total Work = $(12 \times 5 + 15 \times 2) \times 3 = 270$ units.

Time taken by 2 women and 4 girls to complete 270 units of work

$$= \frac{270}{2 \times 5 + 4 \times 2} = 15 \text{ days.}$$

Option (a) is correct.

Q8 Text Solution:

Sita's job in 10 days = $\frac{10}{16} = \frac{5}{8}$.

Remaining work = $1 - \frac{5}{8} = \frac{3}{8}$.

This work was done by Ram in $\frac{3}{8} \times 8 = 3$ days.

\therefore Ram would have joined Sita after = $10 - 3 = 7$ days.

Hence, option (D) is correct.

Q9 Text Solution:

We know that,

The ratio of shares of Messi, Ronaldo and Neymar = The ratio of their efficiencies

$$\begin{aligned} &= \frac{1}{5} : \frac{1}{6} : \frac{1}{9} \\ &= \frac{18}{90} : \frac{15}{90} : \frac{10}{90} \\ &= 18 : 15 : 10 \end{aligned}$$

Difference between the shares of Messi and Ronaldo in ratio $\frac{3}{43}$.

Therefore, actual difference in value = $\frac{3}{43} \times 1,07,930$

= Rs. 7530

Hence, option (B) is correct.

Q10 Text Solution:

(Virushka + Anushka)'s 1 day's work = $\frac{1}{20}$

(Anushka + Kanika)'s 1 day's work = $\frac{1}{24}$

and (Virushka + Kanika)'s 1 day's work = $\frac{1}{30}$

Adding, we get:

2 (Virushka + Anushka + Kanika)'s 1 day's work =

$$\left(\frac{1}{20} + \frac{1}{24} + \frac{1}{30} \right) = \frac{1}{8}$$

(Virushka + Anushka + Kanika)'s 1 day's work = $\frac{1}{16}$

Thus, Virushka, Anushka and Kanika together can finish the work in 16 days.

Option (D) is correct.

Q11 Text Solution:

Jacky's one day's work : Rocky's one day's work = 2 : 1.

\Rightarrow Out of every three parts of work done, 2 will be done by Jacky and 1 by Rocky.

Total Work = $3 \times 18 = 54$ units.

Time taken by Jacky to finish 54 units = $\frac{54}{2} = 27$ days

Q12 Text Solution:

Let Arman's one day's work = $\frac{1}{X}$

So, (Palash + Palak + Arman)'s one day's work = $\frac{1}{9} + \frac{1}{3} + \frac{1}{X}$.

(Palash + Palak + Arman)'s two day's work = $2 \times \left(\frac{1}{9} + \frac{1}{3} + \frac{1}{X} \right)$. (Because they need 2 days to do the job.)

$$\Rightarrow 2 \left[\frac{1}{9} + \frac{1}{3} + \frac{1}{X} \right] = 1$$

On solving we get, $X = 18$ days.

This means that Arman can do the whole work alone in 18 days.

\Rightarrow In one day, he does $\frac{1}{18}$ of the work.

\Rightarrow In two days, he does $\left(2 \times \frac{1}{18} \right)$ of the work.

\Rightarrow Arman's share = $\frac{1}{18} \times 2 \times 1530 = \170 .

Option (A) is correct.

Q13 Text Solution:

In one day, work done by M, N and O is $\frac{1}{12}$, $\frac{1}{15}$ and $\frac{1}{20}$ respectively.

Let O worked for X days.

$$\Rightarrow \frac{6}{12} + \frac{6}{15} + \frac{X}{20} = 1$$

$$\Rightarrow \frac{X}{20} = 1 - \frac{6}{12} - \frac{6}{15}$$

$$\Rightarrow \frac{X}{20} = \frac{1}{10}$$

$$\Rightarrow X = 2$$

After 2 days O left.

Q14 Text Solution:



Let Aisha completes 'b' units of work in one day, while Piranha completes 'p' units of the same work in one day.

$$\therefore 30b = 45p \Rightarrow b = 1.5p$$

Work done in first 5 days = 5b

Work done in next 5 days = 5b + 5p

Assume that Piranha needs 'y' days to complete the remaining work.

$$\therefore (5b) + (5b + 5p) + yp = 45p$$

$$\therefore 10b + 5p + yp = 45p$$

$$\therefore 10(1.5p) + 5p + yp = 45p$$

$$\therefore 20p + yp = 45p$$

$$\therefore y = 25$$

Therefore, the required answer is 25.

Q15 Text Solution:

Let us say the gap between the joining time of any two workers be x hours

Therefore, the first man worked for whole 5 hours,

2nd man worked for (5 - x) hours, and

3rd men worked for (5 - 2x) hours

By using the above conclusions, we can form this equation:

$$\begin{aligned} \frac{5}{10} + \frac{5-x}{15} + \frac{5-2x}{20} &= 1 \\ \Rightarrow \frac{30+20-4x+15-6x}{60} &= 1 \\ \Rightarrow \frac{65-10x}{60} &= 1 \\ \Rightarrow x &= \frac{1}{2} \end{aligned}$$

By solving this we get $x = \frac{1}{2}$ hours, i.e., 30 mins.

Q16 Text Solution:

Roger does $\frac{3}{5}$ of the work in 3 days.

Roger takes 5 days to complete the whole work.

Part of work finished by Roger in one day = $\frac{1}{5}$

Steve does $\frac{1}{5}$ of the work in 6 days.

Steve takes 30 days to complete the work

Therefore, part of work finished by Steve in one day = $\frac{1}{30}$

Barton does $\frac{5}{6}$ of the work in 15 days.

Barton takes 18 days to complete the work

Therefore, part of work finished by Barton in one day = $\frac{1}{18}$

In 3 days, work done by all three would be:

$$\begin{aligned} &= 3 \times \left(\frac{1}{5} + \frac{1}{30} + \frac{1}{18} \right) \\ &= 3 \times \frac{13}{45} \\ &= \frac{13}{15} \end{aligned}$$

Therefore, the remaining work = $1 - \frac{13}{15} = \frac{2}{15}$

Work left for Steve would be $\frac{2}{15}$ of the work.

Steve would require = $\left(\frac{2}{15} \right) \times 30 = 4$ days.

Option (B) is correct.

Q17 Text Solution:

Given that, (3 male workers + 1 female worker) can complete the work in 15 days.

(5 male workers + 3 female workers) can complete the work in 8 days.

One male worker gets Rs. 900 per day

If a person completes a work in x days, then 1 day's work = $\frac{1}{x}$

(3 male workers + 1 female worker)'s 1 day's work = $\frac{1}{15}$

We know that, Total Work Done = Number of Days \times Efficiency.

Therefore, if m = efficiency of male workers and f = efficiency female workers, then

$$15(3m + 1f) = 1 \dots\dots(1)$$

And (5 male workers + 3 female workers)'s 1 day's work = $\frac{1}{8}$

$$8(5m + 3f) = 1 \dots\dots(2)$$

On equating eqn. (1) and (2)

$$15(3m + 1f) = 8(5m + 3f)$$

$$45m + 15f = 40m + 24f$$

$$\Rightarrow 45m - 40m = 24f - 15f$$

$$\Rightarrow 5m = 9f$$

$$\Rightarrow \frac{m}{f} = \frac{9}{5}$$

So, the efficiency of 1 male worker and 1 female worker is in the ratio of 9 : 5 and this ratio is the same as the wages of 1 male worker and 1 female worker.



$$\frac{900}{\text{wage of female worker}} = \frac{9}{5}$$

$$\text{wage of female worker} = 900 \times \frac{5}{9} = \text{Rs. } 500$$

Option (A) is correct.

Q18 Text Solution:

Let the earnings of a male worker be x and that of a female worker be y in 1 day.

Therefore,

$$5x + 8y = \frac{4950}{15} = 330 \dots\dots (i)$$

$$6x + 5y = \frac{7587}{27} = 281 \dots\dots (ii)$$

Solving the equation (i) and (ii), we get $x = 26$ and $y = 25$

\therefore Earnings of 8 male workers and 3 female workers in 1 day

$$= (8 \times 26 + 3 \times 25) = \text{Rs. } 283$$

$$\therefore \text{Number of days} = \frac{1698}{283} = 6 \text{ days}$$

Hence, option (C) is correct.

Q19 Text Solution:

$$\text{Narayan's 1 day's efficiency} = \frac{1}{9}$$

$$\text{Shiva's 1 day's efficiency} = -\frac{1}{4}$$

Let's assume Narayan takes x more days to complete the work.

The equation will be like

$$\Rightarrow \frac{5+x}{9} - \frac{3}{4} = 1$$

$$\Rightarrow \frac{5+x}{9} = 1 + \frac{3}{4} = \frac{7}{4}$$

$$\Rightarrow 5 + x = \frac{63}{4}$$

$$x = \frac{43}{4} = 10.75 \text{ days}$$

Hence, option (C) is correct.

Q20 Text Solution:

Since time and efficiency are inversely proportional to each other,

Let efficiency of Alibaba = 1 unit per day, thus the efficiency of 40 thieves will be 3 units per day.

Total work = 24 (work done by alibaba + 20 thieves)

Total work = 24 (1 + 1.5) {The efficiency of 20 thieves will be half that of 40 thieves}

Total work = 60

Thus, the time required by 40 thieves will be

$$\frac{60}{3}$$

= 20 days

Q21 Text Solution:

Given that $2M = 3B$ and $5B = 4W$,

Thus, $M : B : W$ will be $6 : 4 : 5$

Let the per day efficiency of each man, boy and women be 6, 4 and 5 units respectively.

Given that a man requires 30 days in order to finish the work, therefore total work will be

$$6 \times 30$$

= 180 units.

Thus, the time required by 5 men, 5 boys and 2 women will be

$$\frac{180}{30+20+10} \left(\text{Efficiency of 5 men} = 30, 5 \right.$$

$$\left. \text{boys} = 20, 2 \text{ women} = 10 \right)$$

$$= \frac{180}{60}$$

= 3 days

Q22 Text Solution:

If we take LCM of 24, 30 and 60 as the total capacity of the tank, then

Total capacity = 120 units

Efficiency of A = 5 units

Efficiency of B = 4 units

Efficiency of C = 2 units

The tank filled in first hour = $5 + 4 = 9$ units

The tank filled in the second hour = $5 + 2 = 7$ units

In 2 hours work done = $9 + 7 = 16$ units

$$16 \times 7 = 112$$

In 14 hours work done = 112 units

Remaining work = $120 - 112$ units = 8 units

Now A and B will fill together 8 units.

Time taken by A and B to fill the remaining tank = $\frac{8}{9} = .89$ hrs

Total time taken = $14 + .89 = 14.89$ hrs.



Hence, option d is the correct answer.

Q23 Text Solution:

Let total capacity of the tank is 280 liters (LCM of 40 and 35)

Quantity of water filled by tap 'A' in one hour = $\frac{280}{40} = 7$ liters

Quantity of water filled by tap 'B' in one hour = $\frac{280}{35} = 8$ liters

Let tap 'A' is closed after 'x' hours

So, $15x + 8 \times (21 - x) = 280$

Or, $7x = 112$

Or, $x = 16$

Hence, option d.

Q24 Text Solution:

Efficiency of 4 boys = Efficiency of 1 Gentleman;

Efficiencies of 9 gentlemen + 16 boys = 9 gentlemen + 4 gentlemen = 13 gentlemen.

Total Work = $13 \times 8 = 16 \times D$, where D is the required number of days.

$D = \frac{13 \times 8}{16} = \frac{13}{2}$ days = 6.5 days.

Option (B) is correct.

Q25 Text Solution:

Given that the inlet pipe fills the empty cistern in 9 hours.

Rate of Inlet pipe = $\frac{1}{9}$

If the outlet pipe is open then the inlet pipe fills the empty cistern in 12 hrs.

Rate of Inlet + Outlet pipe = $\frac{1}{12}$

We have to find the time taken for the outlet pipe to empty $\frac{1}{3}$ rd filled cistern.

Rate of Outlet pipe = $\frac{1}{9} - \frac{1}{12} = \frac{4-3}{36} = \frac{1}{36}$

For emptying the full cistern, the outlet pipe takes 36 hours.

Hence for emptying the $\frac{1}{3}$ rd full cistern, the outlet pipe takes $\frac{36}{3} = 12$ hours.

Q26 Text Solution:

Let the total work = 90 units (L.C.M of 30 and 45)

Efficiency of A = 3 units per day

Efficiency of B = 2 units per day

Number of days taken by A and B to complete $\frac{1}{3}$ rd of the work = $\frac{30}{5} = 6$ days

Number of days taken by B and C to complete the remaining work = $26 - 6 = 20$ days

Remaining work = $90 - 30 = 60$ units

60 units completed in 20 days, thus 3 units per day out of which B's efficiency is 2 units per day, thus efficiency of C will be 1 unit per day.

Therefore, the time required by C to complete the work will be

$\frac{90}{1} = 90$ days

Q27 Text Solution:

Let they both complete work in x hours.

Their combine efficiency = $\frac{1}{x}$

Titu can finish the work in (x + 10) hrs.

So, Titu's efficiency = $\frac{1}{x+10}$

Sonu can finish the work in (x + 7.5) hrs

and Sonu's efficiency = $\frac{1}{x+7.5}$

Thus, the total efficiency is

$$\frac{1}{x+10} + \frac{1}{x+7.5} = \frac{1}{x}$$

$$\frac{1}{x+7.5} = \frac{1}{x} - \frac{1}{x+10}$$

$$\frac{1}{x+7.5} = \frac{10}{x(x+10)}$$

$$x^2 = 75$$

$$x = 8.65$$

Hence, the time required by Sonu alone to complete the painting is

$$= 8.65 + 7.5$$

$$= 16.15 \text{ hrs.}$$

Option (D) is correct.

Q28 Text Solution:

In one minute, A fills $\frac{1}{35}$ th of the tank, B fills $\frac{1}{70}$ th of the tank, and C fills $\frac{1}{140}$ th of the tank.

(B + C) works for 15 minutes, followed by (A + C), which works for t minutes, followed by A, which works for 15 minutes. This ensures that the tank gets filled. This can be written in an equation



form:

$$15 \times \left(\frac{1}{70} + \frac{1}{140}\right) + t \times \left(\frac{1}{35} + \frac{1}{140}\right) + 15 \times \left(\frac{1}{35}\right) = 1$$

$$15 \times \left(\frac{3}{140}\right) + t \times \left(\frac{1}{28}\right) + 15 \times \left(\frac{1}{35}\right) = 1.$$

$$\Rightarrow \frac{9}{28} + \frac{t}{28} + \frac{3}{7} = 1.$$

$$\Rightarrow \frac{t}{28} = 1 - \frac{21}{28}$$

$$\Rightarrow t = 7$$

So, the entire tank was filled in $15 + 7 + 15 = 37$ mins.

Q29 Text Solution:

Let's say the total work is 3 units.

A does 'a' units of work/day and that of B is b units of work per day.

So, as per case-1,

$$\frac{1}{a} + \frac{2}{b} = 13 \text{ ----(i)}$$

As per the second case-2,

$$\frac{2}{a} + \frac{1}{b} = 14 \text{ ----(ii)}$$

Adding (i) & (ii) and dividing by 3 we get

$$\frac{1}{a} + \frac{1}{b} = 9 \text{ ----(iii)}$$

$$(ii) - (iii)$$

$$\frac{1}{a} = 5$$

$$\Rightarrow \frac{3}{a} = 15$$

So, A alone can finish in 15 days.

Q30 Text Solution:

Time taken to fill the tank completely without leakage

$$= \frac{1}{\frac{1}{15} + \frac{1}{21}} \text{ hrs} = \frac{35}{4} \text{ hrs} = 525 \text{ mins} = 8 \text{ hours } 45$$

minutes

Given, it takes 1 hr 15 minutes extra with the leakage.

So, total time taken = 10 hours.

Let x is the time taken by the leakage to completely empty the tank.

Then,

$$\Rightarrow \frac{1}{\frac{1}{15} + \frac{1}{21} - \frac{1}{x}} = 10$$

$$\frac{1}{15} + \frac{1}{21} - \frac{1}{10} = \frac{1}{x}$$

$$\frac{1}{x} = \frac{1}{70}$$

$$x = 70 \text{ hours.}$$

