MBA PIONEER 2024

QUANTITATIVE APTITUDE

DPP: 14

Work Rate and Time - 3

Q1 Three students Clint, Raj and Karl were working on a certain job. Clint is 40% more efficient than Raj, who is 40% more efficient than Karl. Clint takes 10 days less than Raj to complete the project. Clint starts the job and works for 10 days and then Raj takes over. Raj works on the job for the next 14 days and then stops the work due to health issues, handing it over to Karl to complete it. In how many days, would Karl complete the remaining job?

(A) 4 days (B) 6.4 days
(C) 8 days (D) 9.8 days

Q2 In a ship, there was food for 1000 passengers for a month (30 days). After 10 days, another ship had drowned and it's 1000 passengers were rescued into the ship. How many days would the passengers be able to carry on with the remaining food?

(A) 5 (B) 10
(C) 15 (D) 20

Q3 Three wall painters are given the contract for 30 days to complete a house painting. In the course of work, all of them remained absent for few days due to covid infection. One of them was absent for 10 days more than the second painter and the third painter did $\frac{1}{3}$rd of the total work. How many more days the third painter was present than the the first one (Assume that efficiency of each painter is equal)?

(A) 5 (B) 6
(C) 7 (D) 8

Q4 Rakul is thrice as better workman as Preet and Preet is thrice as better workman as Shyam. If Rakul and Preet can together accomplish a specific work in 3 days, then Shyam can finish the same work by himself in:

(A) 18 (B) 24
(C) 36 (D) 42

Q5 A and B work on alternate days. A working on the 1st day, B on the 2nd, then A again on the 3rd followed by B on the 4th and so on. Following this routine, they finish the work in 15 days. The work done by A on a particular day 'n' is 'n' units. B works at a constant rate. The ratio of the work done by A on the 1st day to that done by B on the 2nd day is 2:5. Find out how many days B alone will require to finish the work.

(A) 30
(B) $32\frac{3}{5}$
(C) $33\frac{3}{5}$
(D) $33\frac{1}{5}$

Q6 6 Men can complete a project work in 5 days. 8 Women can do 50% of same work in 5 days and 4 Children can do 80% of same work in 8 days. If 3 Men, 4 Women and 2 Children start work alternately i.e. Men on the first day, Women on the second day and Children on the third day and this process keeps repeating, then who will be the last to complete the work?

(A) Men

(B) Women
(C) Child
(D) Can't be determined

Q7 3 civil engineers Karl, Satish and Madhavan can design the structure of a bridge in 5 days. Karl takes 10 days less than Satish to complete the design. Find in how many days will Madhavan complete the whole design alone with $\frac{500}{7}$% of his original efficiency, if Satish can complete the design alone in 30 days?
(A) $10\frac{5}{7}$
(B) 11
(C) 12
(D) $13\frac{6}{7}$

Q8 Three CBI Officers Rajib, Rahul and Manuka are assigned to complete an investigation work. They together started the investigation but Manuka left after 4 days when 36% of the investigation was done. The remaining investigation was done by Rajib and Rahul in 8 days. The ratio of efficiency of Rajib and Rahul is 5 : 6. Find the number of days required by the slowest CBI Officer to complete the entire task alone?
(A) 30 days
(B) 100 days
(C) 36 days
(D) $39\frac{1}{4}$ days

Q9 Two men X and Y can complete a job in 24 and 36 hours respectively. A woman, Z can complete the whole work alone in t hours with 9/13 th of her original efficiency. If all the three working together with their usual efficiency can complete the whole work in 4 hours, then what is the value of t?
(A) $\frac{560}{37}$
(B) $12\frac{1}{3}$
(C) 8
(D) 6

Q10 P, Q and R together can complete a work in 36 days. P is four times as efficient as Q whereas the efficiency of R is 40% of the combined efficiency of P and Q. Find the time (in days) required by P and R to complete the job working together at half their original efficiencies?

Q11 Jadu takes 15 hours more to complete a certain work than that of Madhu. If they work together then by what percentage should Madhu decrease her efficiency so that both of them complete the work in 30 hours and both of them had completed the work in equal proportion?
(A) 20% (B) 25%
(C) 30% (D) 35%

Q12 Two pipes P & Q are attached to a tank. P can fill or empty a filled tank in 20 minutes and Q can fill or empty a completely filled tank in 30 minutes. The pipe P acts like an inlet pipe in every odd minute and works like an outlet pipe in every even minute. Pipe Q acts like an inlet pipe throughout. There is a hole at $4/5^{th}$ height of the tank from the base which has a draining capacity half of that of Q. Find the part of tank filled in 23 minutes?
(A) $\frac{4}{5}$
(B) $\frac{3}{4}$
(C) $\frac{61}{75}$
(D) $\frac{59}{75}$

Q13 A and B together can do a piece of work in 14 days, B and C together can do the same piece of work in 20 days and C and A together can do the same piece of work in 15 days. They all

work together for 10 days after which A and B leave the work. How many days C will take to finish the remaining work?

(A) $1\frac{2}{17}$
(B) $3\frac{1}{15}$
(C) $2\frac{12}{19}$
(D) $1\frac{2}{19}$

Q14 The ratio of number of days taken by B is to C is 3:7. The ratio of efficiency of A is to C is 7:6. A takes 5 days less than C when A and C complete work individually. A, B and C started the work and B & C left after 7 days. The number of days taken by A to complete the remaining work is:

(A) $6\frac{1}{3}$
(B) $5\frac{1}{2}$
(C) 3
(D) 2

Q15 A work is done by worker A in 18 days. Worker B is 50% more efficient than A. Both worked together for 4 days. Worker C alone completed the remaining work in 16 days. A, B, and C together will complete the same work in?

(A) $6\frac{1}{5}$ days
(B) 5 days
(C) 6 days
(D) $5\frac{1}{4}$ days

Q16 A can complete a work in 40 days and B can do it in 48 days. 40% of the work is completed by C in 6p days and remaining work is completed by A and B together in 9p days, then find the time taken by B and C to complete the work together?

(A) 15 days (B) 10 days
(C) 16 days (D) 25 days

Q17 A, B and C, working together, can build a wall in 60 days. B, who is 50% more efficient than C, would take 75 days to build the same wall when working only with A. B and C started building the wall. When exactly half of the wall was constructed, B left and A joined. A and C then continued to work together for 20 days, after which C left. A then worked alone to complete the rest of the wall. How many days did it take to build the wall from beginning?

(A) 108 (B) 112
(C) 115 (D) 118

Q18 A, B, and C together can do a piece of work in 5 days. A alone takes 8 days less than C alone to finish the work. If B alone can finish that work in 15 days, then find the time taken by C alone to finish 3/4th of the total work.

(A) 16 days (B) 10 days
(C) 20 days (D) 15 days

Q19 Three inlet pipes A, B, and C can fill a cistern in 12 hours, 18 hours, and 24 hours, respectively. An outlet pipe at the bottom of the cistern can empty the full cistern in 48 hours. Inlet pipes A, B, and C are respectively opened for 1 hour each in the same sequence, starting with pipe A, and then the outlet pipe is opened for 1 hour after Pipe C. This cycle is repeated until the cistern is full. How long will it take to fill the cistern?

(A) 26 hours (B) 28.4 hours
(C) 24.5 hours (D) 27.6 hours

Q20 Anish can complete a task in 40 days, Brijesh can do it in 48 days, Chirag can do it in 60 days, and Dinesh can do it in 80 days. They form two teams: Team A with Anish and Brijesh, and Team B with Chirag and Dinesh. They work on alternate days, starting with Team A. On the

22nd day, Chirag is replaced by Eshan, who can alone complete the task in 72 days. If the whole work is completed in 'n' days, then find the value of 11n.

(A) 426 (B) 398
(C) 196 (D) 294

Q21 Joli can do a specific work in 8 days, while Shekhawat can do it in 12 days. They work for 4 days, and leave the rest of the work on Uday alone, who completes it in 3 days. If they get Rs. 1440 for the whole work, then what is the sum of daily wages (in Rs.) of Shekhawat and Uday?

(A) 200 (B) 400
(C) 600 (D) 800

Q22 The work done by A in 12 hours is equal to the work done by B in 8 hours, by C in 6 hours, and by D in 18 hours. If working 4 hours per day, 8 As can complete a work in 23 days. Then, in how many days can 6 As, 8 Bs, 10 Cs, and 12 Ds together finish the same work working 8 hours per day?

(A) 6 (B) 4
(C) 2 (D) 3

Q23 Wage earners A, B, C, and D can complete a job in 20, 25, 30, and 40 days respectively. If they are hired to work together on the job, and they are to be paid a total of $1200 for completing the job, what is the difference between the amounts (in $) paid to A and D, considering that they are paid in proportion to the amount of work they do? [Round off the result up to two decimal places]

(A) 201.25 (B) 202.25
(C) 203.25 (D) 204.25

Q24 Natasha alone requires 36 days to complete 48 parts of a work, and Rubi alone takes 72 days for that. They began the task of making 48 parts together, but Natasha departed after 6 days, leaving Rubi to finish the remaining parts alone. How many days did Rubi have to work alone if Natasha returns with only 12 parts of the work remaining to complete?

(A) 12 days (B) 36 days
(C) 48 days (D) 26 days

Q25 Sankar and Bhola finish a task in 12 days. Bhola and Raju complete the same task in 16 days. Sankar worked for 5 days before leaving. Bhola worked for 7 days before leaving. Raju finishes the rest of the work in 13 days. Find out how many days longer Bhola will need to finish the task alone than Raju.

(A) 20 days (B) 24 days
(C) 28 days (D) 32 days

Q26 A started the work and completed 40% of the work in 30 days. B is 50% more efficient than A, and C is 25% more efficient than B. In how many days did all three together complete the remaining work?

(A) $15\frac{2}{7}$
(B) $13\frac{1}{7}$
(C) $10\frac{2}{7}$
(D) $7\frac{1}{7}$

Q27 If 5 men, 4 women, and 15 boys can complete a task in 15 days. The same task is completed by 3 men,6 women, and 5 boys in 20 days. Again 10 men and 10 women take 12 days to complete the task. How many days will take 8 men,1 woman, and 5 boys to complete the task?

(A) 25 (B) 24
(C) 23 (D) 22

Q28 Karan and Arjun are working on a project together, taking turns on a daily basis. Karan works on odd-numbered days, while Arjun

works on even-numbered days. If Karan can finish the project in 45 days working alone, and Arjun can complete it in 50 days by himself, how many days will it take for them to finish the entire project when working together?

(A) $42\frac{2}{3}$

(B) $47\frac{1}{3}$

(C) $73\frac{2}{3}$

(D) $84\frac{1}{3}$

Q29 Simba and Rocky are asked to complete a job. Rocky needs 12 more hours than Simba to complete a given job. When both work together, they take 16 hours less than Rocky would take to complete the job alone. How many hours will Simba and Rocky need together to complete another job twice as difficult as the first one?

(A) 15 (B) 16

(C) 17 (D) 18

Q30 A task can be finished by a woman in two days, whereas a man can complete it in one day, and per day a child can accomplish half of the work done by a woman in a day. A contractor employs 60 individuals, consisting of men, women, and children in a 6:5:4 ratio, paying a total of Rs. 1900/day. The payment is based on the work completed. What is the daily wage of a child?

(A) 25 (B) 12.5

(C) 30 (D) 15

Answer Key

Q1	(D)
Q2	(B)
Q3	(A)
Q4	(C)
Q5	(B)
Q6	(C)
Q7	(C)
Q8	(B)
Q9	(C)
Q10	84
Q11	(B)
Q12	(C)
Q13	(C)
Q14	(C)
Q15	(C)
Q16	(A)
Q17	(B)
Q18	(D)
Q19	(C)
Q20	(D)
Q21	(A)
Q22	(C)
Q23	(B)
Q24	(B)
Q25	(B)
Q26	(C)
Q27	(B)
Q28	(B)
Q29	(B)
Q30	(B)

Hints & Solutions

Q1 Text Solution:

Since it is given than Clint is 40% more efficient than Raj, it means that Clint would take $\frac{5}{7}$th of the time that Raj takes. Also, it is given to us that Clint takes, 10 days less than Raj.

Let x and y be the time taken by Clint and Raj to complete the work alone respectively.

Therefore, x = $\frac{5}{7}$ × y ..... (i)

Also, x = y – 10 ..... (ii)

=> x = $\frac{7x}{5}$ – 10

=> $\frac{2x}{5}$ = 10

=> x =25

From (i), we get

y = 35

Hence, the number of days can be worked out as 25 and 35 for Clint and Raj respectively.

If Raj is 40% more efficient than Karl, then Karl would take 40% more time than Raj to complete the work. Consequently, Karl's required time to finish the work alone would be 40% more than 35 days = 49 days.

Given the time frames for which they have worked we can get: Work done by Clint and Raj = 80% of the total work and then Karl would complete the remaining 20% (= $\frac{1}{5}$) of the work in $\frac{49}{5}$ = 9.8 days.

Option (D) is correct.

Q2 Text Solution:

Suppose that, food consumed by 1 passenger in one day be 1 unit.

The total amount of food consume by 1000 passengers in one day = 1 × 1000 units

Now, the total amount of food consume by 1000 passenger in 30 days = 30 × 1000 unit

= 30000 units

So, the total amount of food consume by 1000 passengers in 10 days = 10 × 1000 unit

= 10000 units

Remaining food = 30000-10000

= 20000 units

Due to the joining of 1000 more passengers, total number of passengers in the ship = 1000+1000 = 2000

Now, total food consumed by 2000 passengers in 1 day = 2000 × 1

= 2000 units

Required number of days = 20000/2000

= 10 days

The required number of days 10 days**.**

Q3 Text Solution:

Let k be the part of work painters can do in one day and x -10, x, y be the number of days for which they remained present. Then

(x-10) k+ xk = $\frac{2}{3}$ ..... (i)

and yk = $\frac{1}{3}$ ..... (ii)

From (i) and (ii), we have

$\frac{(2x-10)}{3y}$ = $\frac{2}{3}$

2x-10 = 2y

x-5 = y

The required number of days = y - (x-10) = x - 5 – (x-5-5)

= x – 5 – x + 10

= 5 days

Option (A) is correct.

Q4 Text Solution:

Let Shyam can do the work in y days.

Then, Preet can do the work in $\frac{y}{3}$ days.

Rakul can do the work in $\frac{1}{3}$ × $\frac{y}{3}$ = $\frac{y}{9}$ days.

Rakul in 1 day can do $\frac{9}{y}$ th of the work.

Preet in 1 day can do $\frac{3}{y}$ th of the work.

They together in 1 day can do $\frac{9}{y} + \frac{3}{y} = \frac{12}{y}$ th of the work.

i.e., Rakul and Preet together will complete the work in $\frac{y}{12}$ days.

Now, according to the problem, $\frac{y}{12} = 3$

=> y = 36 days.

Shyam can do the work in 36 days.

Option (C) is correct.

Q5 Text Solution:

Work done by A on 1st day = 1 unit

Work done by A on 3rd day = 3 units

Work done by A on 15th day = 15 units

Total work done by A = 1 + 3 + 5 + ... + 15 = 64 units

B does 2.5 units of work per day.

Work done by B in 7 days = $7 \times 2.5 = 17.5$ units.

Total work = 81.5 units

Time taken by B alone to finish the work = $\frac{81.5}{2.5}$ = 32.6 days = $32\frac{3}{5}$ days.

Q6 Text Solution:

Let's find the work done by men, women, and children individually.

6 men can complete the work in 5 days.

Let the work done by 1 man in 1 day be M.

So, work done by 6 men in 1 day is 6M.

Hence, work done by 6 men in 5 days is 5 × 6M = 30M.

8 women can do 50% of the same work in 5 days.

Let the work done by 1 woman in 1 day be W.

So, work done by 8 women in 1 day is 8W.

Hence, work done by 8 women in 5 days is 5 × 8W = 40W.

Since 40W is 50% of the work, the total work is 80W.

4 children can do 80% of the same work in 8 days.

Let the work done by 1 child in 1 day be C.

So, work done by 4 children in 1 day is 4C.

Hence, work done by 4 children in 8 days is 8 × 4C = 32C.

Since 32C is 80% of the work, the total work is 40C.

Now, we have the total work represented as 30M = 80W = 40C.

Since 3 men, 4 women, and 2 children work alternately, let's find their combined work done in 3 days:

In 3 days:

3 men work for 1 day: 3M

4 women work for 1 day: 4W

2 children work for 1 day: 2C

Total work done in 3 days is 3M + 4W + 2C.

Now, let's express M, W, and C in terms of the total work:

M = $\frac{80W}{30}$

C = $\frac{80W}{40}$ = 2W

Substitute M and C in the 3-day work equation:

3-day work = $3(\frac{80W}{30}) + 4W + 2(2W) = 8W + 4W + 4W = 16W$

In 3 days, they complete 16W work. We know that the total work is 80W. Let 'n' be the number of 3-day cycles required to complete at least 80W work.

n × (16W) ≥ 80W

n ≥ $\frac{80W}{16W}$

n ≥ 5

Since we can't have a fraction of a cycle, we need 5 full cycles (each of 3 days) to complete at least 80W work. In 5 cycles, they will complete 5 × 16W = 80W work, which is exactly the total work.

Total time = 5 cycles × 3 days/cycle = 15 days

On the 15th day, the last to work are 2 children.

So, the last to complete the work are the children.

Q7 Text Solution:

Total days taken by (Karl + Satish + Madhavan) to complete design = 5 days

Satish alone can complete the design in 30 days

Karl alone can complete the design in (30 – 10) = 20

Total units of work = LCM (5, 20, 30) = 60

(Karl + Satish + Madhavan)'s one day's work = 12 units

Karl's one day's work = 3 units

Satish's one day's work = 2 units

Madhavan's one day's work = 12 – (3+2) = 7 units

i.e., Madhavan's original efficiency was 7 units/day.

Madhavan's new efficiency to do the work alone

= $7 \times \frac{500}{7}\%$

= 5 units/day

Time required to complete the work alone by Madhavan

= $60 \times \frac{1}{5}$

= 12 days

Q8 Text Solution:

Let x, y and z are the one day's work of Rajib, Rahul and Manuka respectively.

According to the question,

⇒ 4 × (x + y + z) = 36% of the work

=> (x + y + z) = 9%

Also, since the remaining investigation (i.e., 100 – 36 = 64%) was done by Rajib and Rahul in 8 days, so,

8 × (x + y) = 64% of the work

⇒ x + y = 8% of the work .... (i)

∵ The ratio of efficiency of Rajib and Rahul is 5 : 6,

∴ 6x = 5y ..... (ii)

Solving (i) and (ii), we get

x + $\frac{6x}{5}$ = 8% of the work

$\frac{11x}{5}$ = 8% of the work

11x = 40% of the work

x = $\frac{40\%}{11}$ of the work

∴ Manuka is the slowest and she would do the work in $\frac{100}{1}$ = 100 days.

Option (B) is correct.

Q9 Text Solution:

Let the total units of work = LCM (24, 36) = 72

Since, the whole work can be completed by all in 4 hours, so

(X+Y+Z)'s one hour's work = 18 units

In 24 hours, X can complete 72 units of work

So, X's one hour's work = 3 units

Similarly, Y's one hour's work = 2 units

Z's one hour's work = 18 – (3+2) = 13 units

Z's efficiency to do the work alone = 13 × $\frac{9}{13}$ = 9 units/hour

Thus, the time required to complete the work

= $72 \times \frac{1}{9}$

= 8 hours

Hence, option (C) is correct.

Q10 Text Solution:

Let the efficiency per day of Q be 1 unit, then efficiency of P = 4 units

Efficiency of R = 40% of 5 = 2 units

Combined efficiency of P + Q + R = 4 + 1 + 2 = 7 units/day

Total Work = 36 x 7 (as they can together finish the work in 36 days)

Time required by P and R to finish the job together

= $\frac{36 \times 7}{4+2}$

$= \frac{36 \times 7}{6}$

$= 42\ days$

But since both of them are working at half their original efficiencies, they will require double this time i.e.

42 x 2

= 84 days

Q11 Text Solution:

Let Madhu takes x hours to complete the work and then Jadu will take x + 15 hours to complete the same work.

Both of them complete the work in 30 hours and both of them had completed the piece of work in equal proportion it means Jadu does half of the work in 30 hours and Madhu does half of the Work in 30 hours.

Jadu will do the complete work in 30 × 2 = 60 hours and Madhu with new efficiency will do the complete work in 30 × 2 = 60 hours

There is no change in the efficiency of Jadu it means x + 15 = 60

x = 45 hours

It means with the original efficiency Madhu can complete the work in 45 hours but with the new efficiency she does in 60 hours.

Efficiency is inversely proportional to time

Madhu's original efficiency: Madhu's new efficiency = 60: 45 = 4: 3

Thus, the required % change = $\frac{(4-3)}{4} \times 100$ = 25%

Option (B) is correct.

Q12 Text Solution:

Let us assume that the total volume of the tank is 60 unit.

So, the efficiency of pipe P is $\frac{60\ unit}{20\ min}$ = 3 unit/min

Pipe Q has an efficiency of $\frac{60\ unit}{30\ min}$ = 2 unit/min

So, in every odd minute the volume filled is (3 + 2) unit = 5 unit

In the every even minute the volume filled is (-3 + 2) unit = -1 unit

In every 2 min, total volume filled is (5 unit - 1 unit) = 4 unit.

44 unit is filled in $44 \times \frac{2}{4}$ min = 22 min.

In 23rd minute, 4 more units will be filled in $\left(\frac{4\times60}{5}\right)$ sec.

After 22 min. 48 sec. the hole will start leaking at 1 unit/min

Now in next 12 sec. units filled = $\left(\frac{4\times12}{60}\right) = 4/5$ units

Total unit filled till 23rd minute = $48\frac{4}{5}$ units

So, the part of tank filled at the end of 23 minutes = $\frac{48\frac{4}{5}}{60} = \frac{61}{75}$

Answer to this question is $\frac{61}{75}$

Q13 Text Solution:

Let total work = LCM of 14, 20, and 15 = 420 units

Efficiency of A and B = $\frac{420}{14}$ = 30 units per day

Efficiency of B and C = $\frac{420}{20}$ = 21 units per day

Efficiency of C and A = $\frac{420}{15}$ = 28 units per day

2 × (A+B+C) = 79

=> A+B+C = $\frac{79}{2}$

Efficiency of C = $\frac{79}{2}$ - 30 = $\frac{19}{2}$ units per day

Work done by A, B, and C in 10 days = $\frac{79}{2} \times 10$ = 395

Remaining work = 420 - 395 = 25 units

Required number of days = 25 × $\frac{2}{19}$ = $\frac{50}{19}$ = $2\frac{12}{19}$ days.

Q14 Text Solution:

Ratio of days taken by B and C = 3:7

Ratio of efficiency of A is to C is = 7:6

Than ratio of days taken by C is to A is = 7:6

Now ratio of days taken by A, B & C = 6:3:7

7x -6x = 5

=> x= 5

So, the days taken by A, B, and C = 30, 15, and 35

They work together till 7 days = $7\left(\frac{1}{30} + \frac{1}{15} + \frac{1}{35}\right) = \frac{27}{210} \times 7 = \frac{189}{210}$

The remaining work = 1 - $\frac{189}{210}$ = $\frac{21}{210}$ = $\frac{1}{10}$

The days taken by A in completing the remaining work = $\frac{1}{10}$ × 30 = 3 days.

Q15 Text Solution:

Time taken by worker A = 18 days

Time taken by worker B = 18 × $\frac{100}{150}$ = 12 days

Part of work done by A and B in 4 days = 4 × [$\frac{1}{18}$ + $\frac{1}{12}$]

= 4 × $\frac{5}{36}$ = $\frac{5}{9}$

Part of work done by C in 16 days = 1 – $\frac{5}{9}$ = $\frac{4}{9}$

Whole work done by C in 16 × $\frac{9}{4}$ = 36 days.

One day of A, B, and C working together = ($\frac{1}{18}$ + $\frac{1}{12}$ + $\frac{1}{36}$) = $\frac{6}{36}$ = $\frac{1}{6}$

A, B, and C working together will take 6 days to complete the work.

Q16 Text Solution:

A can complete a work in 40 days.

B can complete a work in 48 days.

40% of work means $\frac{2}{5}$ of the work is completed by C in 6p days

So, total work completed by C in $\frac{(6p \times 5)}{2}$ i.e., 15p days

As, 60% work completed by A and B in 9p days.

So, total work completed by A and B in 15p days.

Therefore, $\frac{1}{40}$ + $\frac{1}{48}$ = $\frac{1}{15p}$

=> p = $\frac{16}{11}$

So, the total work completed by C in 15p = 15 × $\frac{16}{11}$ = $\frac{240}{11}$ days.

Now, the total work done by B and C in 1 day

= $\frac{1}{B}$ + $\frac{1}{C}$ = $\frac{1}{48}$ + $\frac{11}{240}$

= $\frac{(240 + 48 \times 11)}{(48 \times 240)}$

= $\frac{768}{(48 \times 240)}$

Time taken by B and C together to complete the work together = $\frac{(48 \times 240)}{768}$ = 15 days

Q17 Text Solution:

LCM of 60 and 75 is 300 which we are taking as total work

Efficiency of A + B + C = $\frac{300}{60}$ = 5

Efficiency of A + B = $\frac{300}{75}$ = 4

Then efficiency of C = 5 - 4 = 1

Also, since, B is 50% more efficient than C, so ratio of efficiency of B and C = 1.5 : 1

Then efficiency of A = 4 -1.5 = 2.5

Efficiency of A = 2.5, B = 1.5 and C = 1

Total work is 300.

B and C do 150 work in = $\frac{150}{2.5}$ days = 60 days

A and C in 20 days do 20 × 3.5= 70

Remaining work = 300 - 150 - 70 = 80

A does the remaining work in $\frac{80}{2.5}$ = 32

Total number of days = 60+20 +32 = 112

Q18 Text Solution:

One day work A, B, and C together = $\frac{1}{5}$

One day work of B = $\frac{1}{15}$

One day work of A and C together = $\frac{1}{5}$ - $\frac{1}{15}$ = $\frac{2}{15}$

Let number of days taken by C = X

Then number of days taken by A = (X-8)

Therefore,

$\frac{1}{X}$ + $\frac{1}{X-8}$ = 2/15

=> $\frac{(2X-8)}{(X^2 - 8X)}$ = 2/15

=> 15X-60 = X²- 8X

=> X² - 23X + 60 = 0

=> (X-20) (X-3)=0

=> X = 20 or 3

=> X cannot be 3. So, X = 20.

C takes 20 days to complete the whole work alone.

So, $\frac{3}{4}$th of the work completed by C in 20 × $\frac{3}{4}$= 15 days.

Q19 Text Solution:

Let's first find the rate at which each pipe fills the cistern and the rate at which the hole empties it.

Pipe A fills the cistern at a rate of $\frac{1}{12}$ per hour.

Pipe B fills the cistern at a rate of $\frac{1}{18}$ per hour.

Pipe C fills the cistern at a rate of $\frac{1}{24}$ per hour.

The outlet pipe empties the cistern at a rate of $\frac{1}{48}$ per hour.

During the 4-hour cycle, the net rate of filling the cistern is:

$\frac{1}{12} + \frac{1}{18} + \frac{1}{24} - \frac{1}{48}$

To find a common denominator, we can use the LCM of 12, 18, 24, and 48, which is 144:

$\frac{12}{144} + \frac{8}{144} + \frac{6}{144} - \frac{3}{144} = \frac{23}{144}$

So, in each 4-hour cycle, the cistern gets filled by $\frac{23}{144}$.

After the 6th 4 hours cycle, total amount of water filled is $\frac{23\times6}{144} = \frac{138}{144}$.

The remaining amount of water to be filled is $\frac{6}{144}$.

This amount can be filled by pipe A in $\frac{\frac{6}{144}}{\frac{12}{144}}$ = 30 min time.

So, in 4 × 6 + 0.5 hours = 24.5 hours the cistern will be completely filled.

Q20 Text Solution:

Let the total work be 720 units (LCM of 40, 48, 60, 72, and 80).

Efficiency of Anish = $\frac{720}{40}$ = 18 units/day

Efficiency of Brijesh = $\frac{720}{48}$ = 15 units/day

Efficiency of Chirag = $\frac{720}{60}$ = 12 units/day

Efficiency of Dinesh = $\frac{720}{80}$ = 9 units/day

Efficiency of Eshan = $\frac{720}{72}$ = 10 units/day

Now, let's calculate the work done by each team:

Team A (Anish and Brijesh) works on odd days: (18 + 15) = 33 units/day

Team B (Chirag and Dinesh) works on even days: (12 + 9) = 21 units/day

For the first 20 days, they work alternatively. In two days, they complete 33 + 21 = 54 units of work.

In 20 days, they will complete: ($\frac{54}{2}$ × 20) = 540 units

Remaining work = 720 - 540 = 180 units

On 21st day, Team A will finish = 33 units

So, at the end of 21st day, total work finished = 540 + 33 = 573 units

From the 22nd day, Team B has Eshan replacing Chirag, so the new efficiency of Team B is (10 + 9) = 19 units/day.

On 22nd day, Team B will finish = 19 units

So, the total work finished till 22nd day = 573 + 19 = 592 units.

Now, Team A and Team B will continue working alternatively.

On 23rd day, Team A will finish = 33 units.

So, the total work finished till 23rd day = 592 + 33 = 625 units

So, the total work finished till 24th day = 625 + 19 = 644 units

Till 25th day, total work finished = 644 + 33 = 677 units

Till 26th day, total work finished = 677 + 19 = 696 units

Now, the remaining work = 720 – 696 = 24 units

Team A finishes 33 units in 1 day

So, 24 units by $\frac{1}{33}$ × 24 = $\frac{8}{11}$ days

So, the total time required to finish the work = 26 + $\frac{8}{11}$ = $\frac{294}{11}$ days (n)

So, 11n = 294

Q21 Text Solution:

Let the total work to be done be LCM(8, 12) = 24 units.

Efficiency of Joli = $\frac{24}{8}$ = 3 units/day

Efficiency of Shekhawat = $\frac{24}{12}$ = 2 units/day

Work of Joli in 4 days = 3×4 = 12 units;

Work of Shekhawat in 4 days = 2×4 = 8 units

Combined work done by Joli and Shekhawat in 4 days = (12+8) = 20 units

Work left = 24 - 20 = 4 units (completed by Uday)

Their wages can be found in the following ratio

W_J: W_S: W_U = 12: 8 : 4 = 3 : 2 : 1

Total wage of Joli = 1440 × $\frac{3}{6}$ = Rs. 1440 × $\frac{1}{2}$ = Rs. 720

Total wage of Shekhawat = 1440 × $\frac{2}{6}$ = Rs. 480 i.e., per day wage = $\frac{480}{4}$ = Rs 120

Total wage of Uday = 1440 × $\frac{1}{6}$ = Rs 240 i.e., per day wage = $\frac{240}{3}$ = Rs. 80

So, combined daily wage of Shekhawat and Uday = Rs. (120+80) = Rs. 200

Q22 Text Solution:

Let the work done by A in 1 hour be denoted as W_A, and similarly, for B, C, and D. We are given that:

$12W_A = 8W_B = 6W_C = 18W_D$

Now, let's express W_B, W_C, and W_D in terms of W_A:

$W_B = \frac{12}{8}W_A = 1.5W_A$

$W_C = \frac{12}{6}W_A = 2W_A$

$W_D = \frac{12}{18}W_A = \frac{2}{3}W_A$

We're also given that 8 As can complete the work in 23 days working 4 hours per day. So, the total work can be expressed as:

Total work = $8W_A$ × 23 days × 4 hours/day

Now, we need to find the number of days it will take for ***6 As, 8 Bs, 10 Cs,*** and ***12 Ds*** to finish the same work working 8 hours per day. Let's denote the number of days as 'd'. Then, the equation for the combined work of A, B, C, and D is:

$6W_A$ × 8 hours/day × d + $8W_B$ × 8 hours/day × d + $10W_C$ × 8 hours/day × d + $12W_D$ × 8 hours/day × d = Total work

Now, substitute the expressions for W_B, W_C, and W_D in terms of W_A:

$6W_A \times 8d + 8(1.5W_A) \times 8d + 10(2W_A) \times 8d + 12(\frac{2}{3}W_A) \times 8d = 8W_A \times 23 \times 4$

Simplify the equation:

$48W_Ad + 96W_Ad + 160W_Ad + 64W_Ad = 736W_A$

Combine the terms on the left side:

$368W_Ad = 736W_A$

Divide both sides by W_A:

$368d = 736$

Therefore, d = 2.

Q23 Text Solution:

To calculate each worker's share of the payment, we need to find the proportion of work each one does when they work together. To do this, we will first find the amount of work each worker can do in a day.

Work done by A in a day: $\frac{1}{20}$ of the job

Work done by B in a day: $\frac{1}{25}$ of the job

Work done by C in a day: $\frac{1}{30}$ of the job

Work done by D in a day: $\frac{1}{40}$ of the job

When they work together, they complete the following portion of the job in a day:

$\frac{1}{20} + \frac{1}{25} + \frac{1}{30} + \frac{1}{40}$

$= \frac{(30 + 24 + 20 + 15)}{600}$

$= \frac{89}{600}$ of the job.

Thus, it takes them $\frac{600}{89}$ days to complete the whole job.

Now, let's find the proportion of work each worker does in the $\frac{600}{89}$ days:

Proportion of work done by A: $\frac{\frac{1}{20}}{\frac{89}{600}} = \frac{30}{89}$

Proportion of work done by B: $\frac{\frac{1}{25}}{\frac{89}{600}} = \frac{24}{89}$

Proportion of work done by C: $\frac{\frac{1}{30}}{\frac{89}{600}} = \frac{20}{89}$

Proportion of work done by D: $\frac{\frac{1}{40}}{\frac{89}{600}} = \frac{15}{89}$

Next, we'll calculate the payment for each worker based on the proportions:

Payment for A: \$1200 × $\frac{30}{89}$ ≈ \$404.50

Payment for B: \$1200 × $\frac{24}{89}$ ≈ \$323.60

Payment for C: \$1200 × $\frac{20}{89}$ ≈ \$269.66

Payment for D: \$1200 × $\frac{15}{89}$ ≈ \$202.25

Hence, the required difference between the amount paid to A and D
= 404.50 – 202.25 = $202.25

Q24 Text Solution:

In one day, Natasha can make = $\frac{48}{36} = \frac{4}{3}$ parts
In one day, Rubi can make = $\frac{48}{72} = \frac{2}{3}$ parts
Number of parts done in six days = $(\frac{4}{3} + \frac{2}{3}) \times 6$ = 12 parts
Remaining parts = 48 – 12 = 36
When Natasha returns, only 12 parts are left to be made.
Therefore, Rubi alone did 36 – 12 = 24 parts.
Let 'x 'be the number of the days taken by Rubi to make 24 parts.
$\frac{2}{3} \times x = 24$
=> x = 36 days

Q25 Text Solution:

Let Sankar, Bhola and Raju complete the job in m, r and s days.
Sankar's 5 day work = $\frac{5}{m}$
Bhola's 7 days work = $\frac{7}{r}$
Putting x = $\frac{1}{m}$, y = $\frac{1}{r}$, z = $\frac{1}{s}$
Sankar and Bhola do the work in 1 day = $\frac{1}{12}$
$\frac{1}{m} + \frac{1}{r} = \frac{1}{12}$
=> x + y = $\frac{1}{12}$ .... (i)
Bhola and Raju do work in 1 day = $\frac{1}{16}$
$\frac{1}{r} + \frac{1}{s} = \frac{1}{16}$
=> y + z = $\frac{1}{16}$ ..... (ii)
Work to be done by Raju = 1 – $(\frac{5}{m} + \frac{7}{r})$
But Raju does the rest of the work in 13 days,
So,
$\frac{13}{s} = 1 - (\frac{5}{m} + \frac{7}{r})$
=> $\frac{5}{m} + \frac{7}{r} + \frac{13}{s} = 1$
=> 5x + 7y + 13z = 1 ...(iii)
Multiplying (i) by 5 and (ii) by 7 and subtracting from (iii) and solving the resulting equations
We get,
x = $\frac{1}{m} = \frac{1}{16}$
=> m = 16 days
y = $\frac{1}{r} = \frac{1}{48}$
=> r = 48 days
z = $\frac{1}{s} = \frac{1}{24}$
=> s = 24 days.
Hence, Bhola will take 24 more days to do the job alone as compared to Raju.
Option (B) is correct.

Q26 Text Solution:

A can complete the whole work in = $\frac{(100 \times 30)}{40}$ = 75 days
Ratio of efficiency A : B = 100 : 150 = 2 : 3
Ratio of time taken by A and B to complete the work = 3 : 2
B alone can complete the work = 75 × $\frac{2}{3}$ = 50 days
Ratio of efficiency B : C = 100 : 125 = 4: 5
Ratio of time taken by B and C to complete the work = 5 : 4
C can complete the work alone = 50 × $\frac{4}{5}$= 40 days
Late whole work = LCM of 30, 75, 50, and 40 = 600 units
One day work of A = $\frac{600}{75}$ = 8 units
One day work of B = $\frac{600}{50}$ = 12 units
One day work of C = $\frac{600}{40}$ = 15 units
Remaining work = 60% of 600 = 360 units
One day work of A, B, and C together = 8 + 12 + 15 = 35 units
Required days = $\frac{360}{35} = \frac{72}{7} = 10\frac{2}{7}$

Q27 Text Solution:

5 men, 4 women, and 15 boys can take 15 days.
We know that, Total Work = Man × Days
The total work done (which is 1 task) is
So, 75 MD + 60 WD + 225 BD = 1 task ...(1)
(Note that, MD = Man Days, WD = Woman Days, BD = Boy Days)
Similarly,

60MD + 120WD + 100BD = 1 task ...(2)
120MD + 120WD = 1 task ...(3)
Equating equation (2) and equation (3)
60MD + 120WD + 100BD = 120MD + 120WD
100BD = 60MD
5BD = 3MD
Equating equation (1) and equation (3)
75MD + 60WD + 225BD= 120MD + 120WD
-45MD + 225BD = 60WD
-45MD + 45(5BD) = 60WD
-45MD + 45(3MD) = 60WD [since, 5BD = 3MD]
90MD = 60WD
3MD = 2WD
Put WD = 3MD/2 in equation (3)
120MD + 120WD = 120MD + 120 × 3MD/2 = 300 MD
Now, 8 men, 1 woman and 5 boys take,
8MD + $\frac{3MD}{2}$ + 3MD = $\frac{25MD}{2}$
So, total days $\frac{300MD}{\frac{25MD}{2}}$ = 24 days.

The required number of days taken is 24 days.

Q28 Text Solution:

Let the total work is LCM(45,50) = 450 units
Work done by Karan in 1 day = $\frac{450}{45}$ = 10 units
Work done by Arjun in 1 day = $\frac{450}{50}$ = 9 units
Therefore, working together, Karan and Arjun can complete (10 + 9) or 19 units in 2 days
So, proceeding in such a manner, Karan and Arjun work on a rotation basis, thereby completing 437 units in 46 days.
Now, on the 47th day, Karan does 10 units of work.
So, total work completed till now is (437 + 10) or 447 units
The remaining work of 3 units is completed by Arjun in $\frac{3}{9}$, i.e., $\frac{1}{3}$ days
Therefore, the total work is completed in $47\frac{1}{3}$ days.

Q29 Text Solution:

Let Simba needs x hours to complete the job.
Simba does in 1 hours = $\frac{1}{x}$
Rocky takes x + 12 hours to complete the job.
Rocky does in 1 hour = $\frac{1}{x+12}$
When, Simba and Rocky work together, they take 16 hours lesser than Rocky needs i.e.
Simba and Rocky work together in = x + 12 – 16 = x – 4 hours.
So,
$\frac{1}{x} + \frac{1}{x+12} = \frac{1}{x+12-16}$
=> $\frac{1}{x} + \frac{1}{x+12} = \frac{1}{x-4}$
=> $\frac{2(x+6)}{x(x+12)} = \frac{1}{x-4}$
=> (2x+12)(x-4) = x^2 + 12x.
=> x^2 – 8x - 48 =0
=> x^2 – 12x + 4x - 48 = 0
=> x (x - 12) + 4 (x - 12) = 0
=> (x - 12) (x + 4) = 0
=> x = 12, as x ≠ -4 ,hours can't be negative.
Thus, Simba takes 12 hours.
Rocky takes = x + 12 = 12 + 12 = 24 hours to complete the work.
Simba and Rocky complete the work together in x - 4 = 8 hours.
Since the job is twice as difficult as the first one, Simba and Rocky will need twice the time they take to complete the first one = 2 × 8 = 16 hours.
Hence, Simba and Rocky will finish the job twice as difficult as the first one in 16 hours.

Q30 Text Solution:

For the same work, if a man takes 1 day to finish it, then a woman takes 2 days to finish it while a child takes 4 days to finish it.
So ratio of work done per day by them is 4:2:1 (Man: Women: Children)
As total number of men, women and children employed is 60
So, 6x + 5x + 4x = 60
or, 15x = 60

x = 4

Number of men = 24, women = 20 and children = 16

Ratio of amount of per day work done by them =24 $\times$ 4 : 2 $\times$ 20 : 1 $\times$ 16 = 12 : 5 : 2

So, total wages = 12a + 5a + 2a (As wages are proportional to work done)

19a = 1900

or, a = 100

Thus, total wages earned by 16 children in a day = Rs. 200

So, the daily wage of a child is Rs. $\frac{200}{16}$ = Rs. 12.5