Question 7:

A can do a piece of work in 30 days, while B can do it in 40 days. A and B working together can do it in:

(a) $15\frac{2}{7}$ days

(b) $17\frac{1}{7}$ days

(c) $18\frac{3}{7}$ days

(d) None of these

Solution:

Step 1: Calculate the work rate of A and B. The work rate of A is:

$$\frac{1}{30} \text{ work/day.}$$

The work rate of B is:

$$\frac{1}{40} \text{ work/day.}$$

Step 2: Calculate the combined work rate of A and B.

$$\text{Combined rate} = \frac{1}{30} + \frac{1}{40} = \frac{4}{120} + \frac{3}{120} = \frac{7}{120} \text{ work/day.}$$

Step 3: Calculate the time taken to complete the work together.

$$\text{Time} = \frac{1}{\text{Combined rate}} = \frac{1}{\frac{7}{120}} = \frac{120}{7} = 17\frac{1}{7} \text{ days.}$$

The correct answer is: (b) $17\frac{1}{7}$ days

Question 8:

A can do $\frac{1}{3}$ of a work in 5 days, and B can do $\frac{2}{5}$ of the work in 10 days. In how many days can both A and B together do the work?

(a) $13\frac{2}{3}$ days

(b) $9\frac{3}{8}$ days

(c) $18\frac{5}{8}$ days

(d) None of these

Solution:

Step 1: Calculate the total work rate of A. A can do $\frac{1}{3}$ of the work in 5 days, so the total work rate of A is:
$$\text{Rate of A} = \frac{\frac{1}{3}}{5} = \frac{1}{15} \text{ work/day.}$$

Step 2: Calculate the total work rate of B. B can do $\frac{2}{5}$ of the work in 10 days, so the total work rate of B is:
$$\text{Rate of B} = \frac{\frac{2}{5}}{10} = \frac{2}{50} = \frac{1}{25} \text{ work/day.}$$

Step 3: Calculate the combined work rate of A and B.
$$\text{Combined rate} = \frac{1}{15} + \frac{1}{25} = \frac{5}{75} + \frac{3}{75} = \frac{8}{75} \text{ work/day.}$$

Step 4: Calculate the time taken to complete the work together.
$$\text{Time} = \frac{1}{\text{Combined rate}} = \frac{1}{\frac{8}{75}} = \frac{75}{8} = 9\frac{3}{8} \text{ days.}$$

The correct answer is: (b) $9\frac{3}{8}$ days

Question 17:

Imran can finish a work in 10 days, and Kamran is twice as efficient as Imran. If they work together, in how many days will the work be finished?

(a) $3\frac{1}{3}$ days

(b) $5\frac{2}{3}$ days

(c) $4\frac{1}{3}$ days

(d) None of these

Solution:

Step 1: Calculate the work rate of Imran. Imran can finish the work in 10 days, so his work rate is:
$$\text{Rate of Imran} = \frac{1}{10} \text{ work/day.}$$

Step 2: Calculate the work rate of Kamran. Kamran is twice as efficient as Imran, so his work rate is:
$$\text{Rate of Kamran} = 2 \times \frac{1}{10} = \frac{1}{5} \text{ work/day.}$$

Step 3: Calculate the combined work rate of Imran and Kamran.
$$\text{Combined rate} = \frac{1}{10} + \frac{1}{5} = \frac{1}{10} + \frac{2}{10} = \frac{3}{10} \text{ work/day.}$$

Step 4: Calculate the time taken to finish the work together.
$$\text{Time} = \frac{1}{\text{Combined rate}} = \frac{1}{\frac{3}{10}} = \frac{10}{3} = 3\frac{1}{3} \text{ days.}$$

The correct answer is: (a) $3\frac{1}{3}$ days

Question 18:

A is 4 times as fast as B and is therefore able to finish a work in 45 days less than B. A and B, working together, can complete the work in:

(a) 12 days

(b) 16 days

(c) 8 days

(d) None of these

Solution:

Step 1: Let the time taken by B to finish the work alone be x days. Since A is 4 times as fast as B, the time taken by A to finish the work alone is:

$$\frac{x}{4} \text{ days.}$$

It is given that A takes 45 days less than B:

$$\frac{x}{4} = x - 45.$$

Step 2: Solve for x.

$$x - \frac{x}{4} = 45 \implies \frac{4x - x}{4} = 45 \implies \frac{3x}{4} = 45 \implies x = 60.$$

Thus, B takes 60 days, and A takes:

$$\frac{60}{4} = 15 \text{ days.}$$

Step 3: Calculate the combined work rate of A and B. The work rate of A is:

$$\frac{1}{15} \text{ work/day.}$$

The work rate of B is:

$$\frac{1}{60} \text{ work/day.}$$

The combined work rate is:

$$\frac{1}{15} + \frac{1}{60} = \frac{4}{60} + \frac{1}{60} = \frac{5}{60} = \frac{1}{12} \text{ work/day.}$$

Step 4: Calculate the time taken to finish the work together.

$$\text{Time} = \frac{1}{\text{Combined rate}} = \frac{1}{\frac{1}{12}} = 12 \text{ days.}$$

The correct answer is: (a) 12 days

Question 28:

10 men can cut 15 trees in 2 hours. If 2 men leave the job, how many trees will be cut in 3 hours?

(a) 20 Trees

(b) 18 Trees

(c) 24 Trees

(d) None of these

Solution:

Step 1: Calculate the rate of cutting trees per hour for 10 men.

$$\text{Rate of 10 men} = \frac{15}{2} = 7.5 \, \text{trees/hour.}$$

Step 2: Calculate the rate of cutting trees per hour for 1 man.

$$\text{Rate of 1 man} = \frac{7.5}{10} = 0.75 \, \text{trees/hour.}$$

Step 3: Calculate the rate of cutting trees per hour for 8 men (after 2 men leave).

$$\text{Rate of 8 men} = 8 \times 0.75 = 6 \, \text{trees/hour.}$$

Step 4: Calculate the total number of trees cut in 3 hours.

$$\text{Total trees} = 6 \times 3 = 18 \, \text{trees.}$$

The correct answer is: (b) 18 Trees

Question 29:

45 men complete a piece of work in 30 days working 12 hours a day. In how many days will 60 men complete the work working 10 hours a day?

(a) 27 days

(b) 30 days

(c) 24 days

(d) None of these

Solution:

Step 1: Calculate the total work in man-hours.

$$\text{Total work} = 45 \times 30 \times 12 = 16,200\,\text{man-hours.}$$

Step 2: Calculate the daily work rate for 60 men working 10 hours a day.

$$\text{Daily work rate} = 60 \times 10 = 600\,\text{man-hours/day.}$$

Step 3: Calculate the number of days required to complete the work.

$$\text{Days} = \frac{\text{Total work}}{\text{Daily work rate}} = \frac{16,200}{600} = 27\,\text{days.}$$

The correct answer is: (a) 27 days

Question 30:

Two men A and B working together complete a piece of work which it would have taken them respectively 30 and 40 days to complete if they worked separately. If they received a payment of Rs. 2100, B's share is:

(a) Rs. 900

(b) Rs. 1200

(c) Rs. 800

(d) Rs. 1300

Solution:

Step 1: Calculate the work rates of A and B. The work rate of A is:

$$\text{Rate of A} = \frac{1}{30} \text{ work/day.}$$

The work rate of B is:

$$\text{Rate of B} = \frac{1}{40} \text{ work/day.}$$

Step 2: Calculate the combined work rate of A and B.

$$\text{Combined rate} = \frac{1}{30} + \frac{1}{40} = \frac{4}{120} + \frac{3}{120} = \frac{7}{120} \text{ work/day.}$$

Step 3: Calculate the ratio of their contributions. The ratio of A's work to B's work is:

$$\text{Ratio} = \frac{\frac{1}{30}}{\frac{1}{40}} = \frac{40}{30} = \frac{4}{3}.$$

Step 4: Divide the payment in the ratio $4 : 3$. The total ratio is:

$$4 + 3 = 7.$$

B's share is:

$$\text{B's share} = \frac{3}{7} \times 2100 = 900 \text{ Rs..}$$

The correct answer is: (a) Rs. 900

Question 34:

A and B can do a piece of work in 18 days, B and C in 24 days, and C and A in 36 days. A alone can do the work in:

(a) 48 days

(b) 56 days

(c) 40 days

(d) None of these

Solution:

Step 1: Let the total work be 1 unit. The work rates of A and B, B and C, and C and A are:

$$\text{Rate of A and B} = \frac{1}{18}, \quad \text{Rate of B and C} = \frac{1}{24}, \quad \text{Rate of C and A} = \frac{1}{36}.$$

Step 2: Add the three rates.

$$\text{Rate of (A + B) + (B + C) + (C + A)} = \frac{1}{18} + \frac{1}{24} + \frac{1}{36}.$$

Find the LCM of 18, 24, and 36, which is 72:

$$\frac{1}{18} + \frac{1}{24} + \frac{1}{36} = \frac{4}{72} + \frac{3}{72} + \frac{2}{72} = \frac{9}{72} = \frac{1}{8}.$$

Step 3: The combined rate of A, B, and C is:

$$\text{Rate of A + B + C} = \frac{1}{2} \times \frac{1}{8} = \frac{1}{16}.$$

Step 4: Calculate the rate of A alone.

$$\text{Rate of A} = \frac{1}{16} - \frac{1}{18} = \frac{1}{48}.$$

The correct answer is: (a) 48 days

Question 35:

A and B finish a job in 12 days, while A, B, and C can finish it in 8 days. C alone will finish the job in:

(a) 24 days

(b) 36 days

(c) 28 days

(d) None of these

Solution:

Step 1: Let the total work be 1 unit. The work rate of A and B together is:

$$\text{Rate of A and B} = \frac{1}{12}.$$

The work rate of A, B, and C together is:

$$\text{Rate of A + B + C} = \frac{1}{8}.$$

Step 2: Calculate the work rate of C alone.

$$\text{Rate of C} = \text{Rate of (A + B + C)} - \text{Rate of (A + B)} = \frac{1}{8} - \frac{1}{12}.$$

Find the LCM of 8 and 12, which is 24:

$$\frac{1}{8} - \frac{1}{12} = \frac{3}{24} - \frac{2}{24} = \frac{1}{24}.$$

Step 3: Calculate the time taken by C alone to finish the job.

$$\text{Time} = \frac{1}{\text{Rate of C}} = \frac{1}{\frac{1}{24}} = 24 \, \text{days}.$$

The correct answer is: (a) 24 days

Question 18:

Three pipes A, B, and C can fill a cistern in 10, 12, and 15 hours, respectively, while working alone. If all three pipes are opened together, the time taken to fill the cistern will be:

(a) 4 hours

(b) 6 hours

(c) 7 hours

(d) None of these

Solution:

Step 1: Calculate the work rates of A, B, and C. The work rate of A is:

$$\text{Rate of A} = \frac{1}{10} \text{ cistern/hour.}$$

The work rate of B is:

$$\text{Rate of B} = \frac{1}{12} \text{ cistern/hour.}$$

The work rate of C is:

$$\text{Rate of C} = \frac{1}{15} \text{ cistern/hour.}$$

Step 2: Calculate the combined work rate of A, B, and C.

$$\text{Combined rate} = \frac{1}{10} + \frac{1}{12} + \frac{1}{15}.$$

Find the LCM of 10, 12, and 15, which is 60:

$$\frac{1}{10} + \frac{1}{12} + \frac{1}{15} = \frac{6}{60} + \frac{5}{60} + \frac{4}{60} = \frac{15}{60} = \frac{1}{4}.$$

Step 3: Calculate the time taken to fill the cistern.

$$\text{Time} = \frac{1}{\text{Combined rate}} = \frac{1}{\frac{1}{4}} = 4 \text{ hours.}$$

The correct answer is: (a) 4 hours

Question 19:

Two pipes can fill an empty tank in 10 and 15 hours, respectively. If waste pipe C is opened, both A and B together can fill the tank in 7.5 hours. The waste pipe can empty the full tank in:

(a) 30 hrs

(b) 50 hrs

(c) 60 hrs

(d) 40 hrs

Solution:

Step 1: Calculate the combined work rate of A and B. The work rate of A is:

$$\text{Rate of A} = \frac{1}{10} \text{ tank/hour.}$$

The work rate of B is:

$$\text{Rate of B} = \frac{1}{15} \text{ tank/hour.}$$

The combined rate of A and B is:

$$\text{Rate of A + B} = \frac{1}{10} + \frac{1}{15}.$$

Find the LCM of 10 and 15, which is 30:

$$\frac{1}{10} + \frac{1}{15} = \frac{3}{30} + \frac{2}{30} = \frac{5}{30} = \frac{1}{6}.$$

Step 2: Calculate the effective work rate when C is also opened. The effective rate is:

$$\text{Effective rate} = \frac{1}{7.5} = \frac{2}{15}.$$

Step 3: Calculate the rate of the waste pipe C.

$$\text{Rate of C} = \text{Rate of A + B} - \text{Effective rate} = \frac{1}{6} - \frac{2}{15}.$$

Find the LCM of 6 and 15, which is 30:

$$\frac{1}{6} - \frac{2}{15} = \frac{5}{30} - \frac{4}{30} = \frac{1}{30}.$$

11

Step 4: Calculate the time taken by C to empty the tank.

$$\text{Time} = \frac{1}{\text{Rate of C}} = \frac{1}{\frac{1}{30}} = 30\,\text{hours.}$$

The correct answer is: (a) 30 hrs

Question 20:

A tank has a leak, which would empty it in 10 hours. A tap is turned on, and it admits 9 liters per minute into the tank, and the tank is now emptied in 25 hours. How many liters do the tank hold?

(a) 9000

(b) 13400

(c) 14500

(d) 10000

Solution:

Step 1: Let the capacity of the tank be x liters. The leak empties the tank in 10 hours, so the rate of leakage is:
$$\text{Rate of leakage} = \frac{x}{10}\,\text{liters/hour.}$$

Step 2: The tap admits 9 liters per minute, which is:

$$\text{Rate of tap} = 9 \times 60 = 540\,\text{liters/hour.}$$

Step 3: The effective rate of emptying the tank is:

$$\text{Effective rate} = \frac{x}{25}\,\text{liters/hour.}$$

Step 4: Write the equation for the effective rate.

$$\text{Rate of leakage} - \text{Rate of tap} = \text{Effective rate.}$$

$$\frac{x}{10} - 540 = \frac{x}{25}.$$

Step 5: Solve for x. Find the LCM of 10 and 25, which is 50:

$$\frac{5x}{50} - 540 = \frac{2x}{50}.$$

$$\frac{5x - 2x}{50} = 540.$$

$$\frac{3x}{50} = 540.$$

$$x = \frac{540 \times 50}{3} = 9000 \,\text{liters.}$$

The correct answer is: (a) 9000