TIME AND WORK

1. 4 men can complete a piece of work in 5 days. How many men are required to complete 3 times the work in 4 days?
   (a) 5   (b) 15
   (c) 80   (d) 20
   [RRB JE 2014 GREEN SHIFT]

2. When Ram and Mohan work together, they complete a work in 4 days. If Ram alone can complete this work in 12 days then in how many days Mohan alone can complete this work ?
   (a) 10 days   (b) 8 days
   (c) 6 days   (d) 16 days
   [RRB JE 2014 RED SHIFT]

3. Pipe 'F can fill a tank in 36 hours and pipe 'Q' can fill this tank in 45 hours. If both the pipes are opened simultaneously, then how much time will be taken to fill this tank ?
   (a) 20 hours   (b) $40\dfrac{1}{2}$ hours
   (c) 9 hours   (d) 42 hours
   [RRB JE 2014 RED SHIFT]

4. To complete a work P takes 50% more time than Q. If together they take 18 days to complete the work, how much time shall Q take to do it?
   (a) 30 days   (b) 35 days
   (c) 40 days   (d) 45 days?
   [RRB JE 2014 YELLOW SHIFT]

5. Two pipes can fill a tank in 20 minutes and 30 minutes respectively. If both the pipes are opened simultaneously, then the tank will be filled in
   (a) 10 minutes   (b) 12 minutes
   (c) 15 minutes   (d) 25 minutes
   [RRB JE 2014 YELLOW SHIFT]

6. A and B can do a piece of work in 8 days. A alone can do the same work in 12 days. The number of days in which B alone can do the same work is
   (a) 20
   (b) 24
   (c) 40
   (d) 48
   [RRB JE 2015 26th AUG 1st SHIFT]

7. P and Q can do a piece of work in 12 days, Q and R in 15 days and R and P in 20 days. In how many days P alone can do the same work?
   (a) 15   (b) 30
   (c) 23.5   (d) 35
   [RRB JE 2015 26th AUG 1st SHIFT]

8. A and B can do a piece of work in 24 days. If efficiency of A is double than B, then in how many days, A alone can do the same work?
   (a) 30   (b) 36
   (c) 60   (d) 72
   [RRB JE 2015 26th AUG 2nd SHIFT]

9. P and Q can do a piece of work in 12 days, Q and R in 15 days and R and P in 20 days. In how many days Q alone can do the same work?
   (a) 20   (b) 30
   (c) 47   (d) 60
   [RRB JE 2015 26th AUG 2nd SHIFT]

10. A can do a piece of work in 15 days and B ran do the same work in 10 days. If they work together, number of days required to complete the same work is
    (a) 5   (b) 6
    (c) 7   (d) 8
    [RRB JE 2015 26th AUG 3rd SHIFT]

11. P and O can do a piece of work in 10 days, Q and R in 12 days and R and P in 15 days. In how many days P alone can do the same work?
    (a) 24   (b) 40
    (c) 6   (d) $\dfrac{40}{3}$
    [RRB JE 2015 26th AUG 3rd SHIFT]

12. A and B can do a piece of work in 24 days. If efficiency of A is double than B, then in how many days B alone can do the same work?
    (a) 72
    (b) 60
    (c) 36
    (d) 30
    [RRB JE 2015 27th AUG 1st SHIFT]

13. P and Q can do a piece of work in 12 days, Q and in R in 15 lays and R and P in 20 days. In how many days R alone can do the same work?

(a) 70   (b) 60

(c) 45   (d) 30

14. A can do a piece of work in 20 day and B can do the same work in 30 days. If they work together th number of days required to do the same work is

(a) 18   (b) 16

(c) 14   (d) 12

15. P and Q can do a piece of work in 10 days. Q and R in 12 days and R and P in 15 days. In how many days R alone can do the same work?,

(a) 70   (b) 60

(c) 40   (d) 30

16. A and B can do a piece of work in 6 days. A alone can do the same work in 10 days. In how many days B alone, can do the same work?

(a) 15   (b) 8

(c) 7   (d) 8.5

17. P and Q can do a piece of work in 15 days. Q and R in 12 days, and R and P in 20 days. The number of days required for Q to do the same work alone is

(a) 60   (b) 40

(c) 30   (d) 20

18. A and B can do a piece of work in 10 days. A alone can do the same work in 15 days. In how many days B alone can do same work?

(a) 30   (b) 25

(c) 22   (d) 20

19. P and Q can do a piece work in 15 days, Q and R in 12 days and R and P in 20 days. The number of days required for P to do same work is

(a) 20   (b) 6

(c) 11   (d) 15

20. A can do a piece of work in 30 days and B can do same work in 20 days. If they work together, in how many days they can complete the same work?

(a) 10   (b) 12

(c) 15   (d) 16

21. P and Q can do a piece work in 15 days. Q and R in 12 days and R and P in 20 days. The number of days required for R to complete the same work is

(a) 60   (b) 50

(c) 30   (d) 20

22. B can do a piece of work in 30 days. If A and B together can do same work in 12 days, then, the number of days required for A alone to do the same work is

(a) 20   (b) 25

(c) 30   (d) 32

23. P and Q can do a piece work in 20 days, Q and R in 15 days and R and P in 12 days. The number of days required for P to do same work is

(a) 20   (b) 30

(c) 40   (d) 60

24. A and B can do a piece of work in 18 days, B and C in 24 days and A and C in 36 days. In what tune (in days) can A do it alone?

(a) $28\dfrac{2}{3}$ (b) 48

(c) 54   (d) $56\dfrac{3}{5}$

25. Two pipes A and B can fill a cistern in 10 and 24 minutes respectively. Both pipes saving being opened at the same time. When should the first pipe be turned off so that the cistern may be completely filled in 9 minutes

(a) 6 minutes 15 seconds

(b) 5 minutes 30 seconds

(c) 3 minutes 45 seconds

(d) 4 minutes 45 seconds

26. A can do a piece of work in 40 days. He worked for 5 days, then B finished it in 21 days. A and B together can finish the work in

(a) 24 days   (b) 20 days

(c) 15 days   (d) 12 days

27. A certain number of persons can do a piece of work in 40 days, but if there were 8 persons more, it would have been finished 10 days earlier. How many persons were there in the beginning?

(a) 28   (b) 24

(c) 20   (d) 18

28. A can do a piece of work in 15 days. He did it for 3 days and was then joined by B. The work lasted for 11 days altogether. In how many days could B alone do the same work?

(a) 14   (b) 28

(c) 30   (d) 32

29. 6 men and 8 women can do a piece of work in 10 day while 26 men and 48 women can do the same work in 2 days. 15 men and 20 women will do the same work in .... days

(a) 2   (b) 3

(c) 4   (d) 5

30. 4 men and 3 women finish a job in 6 days. .And 5 men and 7 women can do the same job in 4 days. How long will 1 man and 1 women take to do the work.

(a) $22\left(\dfrac{2}{7}\right)$ days   (b) $25\left(\dfrac{1}{2}\right)$ days

(c) $5\left(\dfrac{1}{7}\right)$ days   (d) $12\left(\dfrac{7}{22}\right)$ days

31. A can do a work in 15 days and B in 20 days. If they work on it together for 4 days, then the fraction of the work that in left is

(a) $\dfrac{1}{4}$ (b) $\dfrac{1}{10}$

(c) $\dfrac{7}{15}$ (d) $\dfrac{8}{15}$

32. 4 men and 6 women can complete a job in 8 days, while 3 men and 7 women can complete it in 10 days. In how many days will 10 women complete it

(a) 35   (b) 40

(c) 45   (d) 50

33. A. B and C can do a piece of work in 20, 30 and 60 days respectively. In how many days can A do the work if he is assisted by B and C on every third day

(a) 12 days   (b) 15 days

(c) 16 days   (d) 18 days

ANSWERS

1. (b)	**2.** (b)	**3.** (a)	**4.** (a)	**5.** (b)	**6.** (b)	**7.** (b)	**8.** (b)	**9.** (a)	**10.** (b)
11. (a)	**12.** (a)	**13.** (b)	**14.** (d)	**15.** (c)	**16.** (a)	**17.** (d)	**18.** (a)	**19.** (a)	**20.** (b)
21. (c)	**22.** (a)	**23.** (b)	**24.** (a)	**25.** (*)	**26.** (c)	**27.** (b)	**28.** (c)	**29.** (c)	**30.** (a)
31. (d)	**32.** (b)	**33.** (b)							

EXPLANATIONS

1. Required number of men will be

$$= \frac{4 \times 5 \times 3}{4} = 15$$

2. Let the total work be 12 units such that work done by Ram in one day be 1 unit.

$\Rightarrow$ Work done by Mohan in one day

$$= \frac{12}{4} - 1 = 2 \text{ units.}$$

3. Let the capacity of the tank be 180 units i.e LCM of 36 and 45 such that efficiencies of the two pipes = 5 units and 4 units.

$\Rightarrow$ required time $= \dfrac{180}{5+4} = 20\text{hrs.}$

4. Let the time taken by P and Q to complete the work alone be 3x and 2x such that total work be 6x units and their respective efficiencies be 2 units and 3 units.

$$\Rightarrow \frac{6x}{3+2} = 18$$

$\Rightarrow$ x = 15

Hence, Q will complete the work in 2x

$\quad$ = 2 × 15 = 30 days

5. Let the capacity of the tank be 60 units i.e. LCM of 20 and 30 such that their respective efficiencies be 3 units and 2 units.

Hence, required time $= \dfrac{60}{3+2} = 12$ minutes.

6. Let the total work be 24 units i.e. LCM of 8 and 12.

$\Rightarrow$ work done by A and B in one day $= \dfrac{24}{8}$

$$= 3 \text{ units}$$

and that by A alone in one day $= \dfrac{24}{12} = 2$ units

Hence, work done by B in one day = 1 unit

and required time $= \dfrac{24}{1} = 24$ days.

7. Let the total work be 60 units i.e. LCM of 12, 15 and 20.

$\Rightarrow$ work done by P and Q in one day $= \dfrac{60}{12}$

$$= 5 \text{ units}$$

and that by Q and R in one day $= \dfrac{60}{15}$

$$= 4 \text{ units}$$

and that by P and R in one day $= \dfrac{60}{20}$

$$= 3 \text{ units}$$

Thus, work done by P, Q and R in 1 day

$$= \frac{(5+4+3)}{2} = 6$$

and that by P in one day = 6 4(work done by Q and R in 1 day) = 2 units

Hence, required time $= \dfrac{60}{2} = 30$ days.

8. Set the work done by A and B value in one day be 2 units and 1 units respectively

$\Rightarrow$ Total work = 24 × (2 + 1) = 72 units and

required time $= \dfrac{72}{2} = 36$ units

9. Set the total work be 60 unit i.e. LCM of 12, 15 and 20

$\Rightarrow$ Work done in one day

by P and Q = 5 units   ....(1)

by Q and R = 4 units   ....(2)

and by R and P = 3 units ....(3)

$\Rightarrow$ Adding (1), (2) and (3) we get

2(P + Q + R) = 5 + 4 + 3

$$\Rightarrow P + Q + R = \frac{12}{2} = 6 \text{ units}$$

Thus, work done y Q in one day

$\quad$ = (P + Q + R) – (P + R)

$\quad$ = 6 – 3 = 3 units

Hence, required time $= \dfrac{60}{3} = 20\text{units.}$

10. Work done by A in 1day $= \dfrac{1}{15}$

Work done by in B in 1day $= \dfrac{1}{10}$

Let number of days required = x

$$\therefore \left(\frac{1}{15} + \frac{1}{10} \right) x = 1$$

$\Rightarrow$ x = 6

11. Let P do work in P days

A/Q $\dfrac{1}{P}+\dfrac{1}{Q}=\dfrac{1}{10}$ (1)

$\dfrac{1}{Q}+\dfrac{1}{R}=\dfrac{1}{12}$ (2)

$\dfrac{1}{P}+\dfrac{1}{R}=\dfrac{1}{15}$ (3)

Solving (1), (2), (3)

P = 24

12. Efficiency ratio A : B = 2 : 1

Time ratio A : B = 1 : 2

i.e x & 2x

A/Q $\dfrac{1}{x}+\dfrac{1}{2x}=\dfrac{1}{24}$

$\Rightarrow$ x = 36

∴ B can do work in 2x days = 72

13. Let work done in 1 day by P, Q, R

$=\dfrac{1}{p},\dfrac{1}{q},\dfrac{1}{r}$

∴ $\dfrac{1}{p}+\dfrac{1}{q}=\dfrac{1}{12}$ ....(1)

$\dfrac{1}{q}+\dfrac{1}{r}=\dfrac{1}{15}$ ....(2)

$\dfrac{1}{r}+\dfrac{1}{p}=\dfrac{1}{20}$ ...(3)

By solving (4) & (2),

$\rightarrow \dfrac{1}{r}-\dfrac{1}{p}=\dfrac{1}{15}-\dfrac{1}{12}$ ....(4)

solving (3) & (4) :

$\dfrac{2}{r}=\dfrac{1}{15}-\dfrac{1}{12}+\dfrac{1}{20}\Rightarrow r=60$

∴ Number of days in which r can do work = 60

14. Work done by A in 1 day = $\dfrac{1}{20}$

_____ B _____ = $\dfrac{1}{30}$

Let no. of days required = D

∴ $\left(\dfrac{1}{20}+\dfrac{1}{30}\right)D=1$

$\Rightarrow$ D = 12

15. Let R do the work in R days

$\Rightarrow$ A/Q, $\dfrac{1}{P}+\dfrac{1}{Q}=\dfrac{1}{10}$ ....(1)

$\dfrac{1}{Q}+\dfrac{1}{R}=\dfrac{1}{12}$ ....(2)

$\dfrac{1}{P}+\dfrac{1}{R}=\dfrac{1}{15}$ ....(3)

solving (1), (2), (3):-

R = 40

16. Let B can do the work in x days

$\Rightarrow$ A/Q $\dfrac{1}{10}+\dfrac{1}{x}=\dfrac{1}{6}$

$\Rightarrow \dfrac{1}{x}=\dfrac{1}{6}-\dfrac{1}{10}=\dfrac{1}{15}$

$\Rightarrow$ Ans = 15 days

17. A/Q $\dfrac{1}{P}+\dfrac{1}{Q}=\dfrac{1}{15}$

$\dfrac{1}{Q}+\dfrac{1}{R}=\dfrac{1}{12}$

$\dfrac{1}{R}+\dfrac{1}{P}=\dfrac{1}{20}$

$\Rightarrow 2\left(\dfrac{1}{P}+\dfrac{1}{Q}+\dfrac{1}{R}\right)=\dfrac{1}{15}+\dfrac{1}{12}+\dfrac{1}{20}$

$\dfrac{1}{P}+\dfrac{1}{Q}+\dfrac{1}{R}=\left(\dfrac{4+5+3}{60}\right)\dfrac{1}{2}=\dfrac{1}{10}$

$\Rightarrow \dfrac{1}{Q}=\dfrac{1}{10}-\dfrac{1}{20}=\dfrac{1}{20}\Rightarrow Q=20\text{days}$

18. Let B do the work in x days

$\Rightarrow$ A/Q

$\dfrac{1}{15}+\dfrac{1}{x}=\dfrac{1}{10}$

$\Rightarrow \dfrac{1}{x}=\dfrac{1}{10}-\dfrac{1}{15}$

$=\dfrac{1}{30}$

$\Rightarrow$ x = 30 days

19.
$$\left.\begin{array}{l}\dfrac{1}{P}+\dfrac{1}{Q}=\dfrac{1}{15}\\[4pt]\dfrac{1}{Q}+\dfrac{1}{R}=\dfrac{1}{12}\\[4pt]\dfrac{1}{R}+\dfrac{1}{P}=\dfrac{1}{20}\end{array}\right\}\Rightarrow 2\left(\dfrac{1}{P}+\dfrac{1}{Q}+\dfrac{1}{R}\right)=\dfrac{1}{5}$$
$$\dfrac{1}{P}+\dfrac{1}{Q}+\dfrac{1}{R}=\dfrac{1}{10}$$

$$\dfrac{1}{P}=\left(\dfrac{1}{P}+\dfrac{1}{Q}+\dfrac{1}{R}\right)-\left(\dfrac{1}{Q}+\dfrac{1}{R}\right)$$

$$=\dfrac{1}{10}-\dfrac{1}{12}$$

$$=\dfrac{1}{60}$$

$\Rightarrow$ P = 60 days

$$\dfrac{1}{P}+\dfrac{1}{Q}=\dfrac{1}{15}$$

$$\dfrac{1}{60}+\dfrac{1}{Q}=\dfrac{1}{15}$$

$$\dfrac{1}{Q}+\dfrac{1}{15}-\dfrac{1}{60}=\dfrac{45}{15\times 60}=\dfrac{1}{20}$$

20. A/Q $\left(\dfrac{1}{30}+\dfrac{1}{20}\right)D=1$; Let D be no. of days

$\Rightarrow$ D = 12 days

21.
$$\left.\begin{array}{l}\dfrac{1}{P}+\dfrac{1}{Q}=\dfrac{1}{15}\\[4pt]\dfrac{1}{Q}+\dfrac{1}{R}=\dfrac{1}{12}\\[4pt]\dfrac{1}{R}+\dfrac{1}{P}=\dfrac{1}{20}\end{array}\right\}\Rightarrow\dfrac{1}{P}+\dfrac{1}{Q}+\dfrac{1}{R}=\dfrac{1}{10}$$

$$\Rightarrow\dfrac{1}{R}=\left(\dfrac{1}{P}+\dfrac{1}{Q}+\dfrac{1}{R}\right)-\left(\dfrac{1}{P}+\dfrac{1}{Q}\right)$$

$$=\dfrac{1}{10}-\dfrac{1}{15}$$
$\Rightarrow$ R = 30° days

22. Let days required by A = x

$\therefore$ A/Q, $\dfrac{1}{a}+\dfrac{1}{30}=\dfrac{1}{12}$

$\Rightarrow$ a = 20

23. Let numbers of days required by P = P

_____ Q = Q

_____ R = R

24. A/Q $\dfrac{1}{A}+\dfrac{1}{B}=\dfrac{1}{18}$ (1)

$$\dfrac{1}{B}+\dfrac{1}{C}=\dfrac{1}{24}\qquad (2)$$

$$\dfrac{1}{A}+\dfrac{1}{C}=\dfrac{1}{36}\qquad (3)$$

Solving (1), (2), (3)

A = 48

25. Let time = x for which A & B are opened together

$\therefore$ A/Q $\left(\dfrac{1}{10}+\dfrac{1}{24}\right)x+\dfrac{1}{24}(9-x)=1$

$\Rightarrow x=\dfrac{25}{4}$ = 6.25 min

        = 6 min 15 sec

26. $A=\dfrac{1}{40},\ B=\left(1-\dfrac{5}{40}\right)\times\dfrac{1}{21}=\dfrac{1}{24}$

$$A+B=\dfrac{1}{40}+\dfrac{1}{24}=\dfrac{3+5}{120}=\dfrac{8}{120}=\dfrac{1}{15}$$

or 15 days.

27. x people in 1 day = $\dfrac{1}{40}$

x + 8 people in 1 day = $\dfrac{1}{30}$

40x = 30(x + 8) or 10x = 240 or x = 24.

28. $A=\dfrac{1}{15}$, $3\times\dfrac{1}{15}+8\left(\dfrac{1}{15}+B\right)=1$

$$\dfrac{1}{15}+B=\dfrac{12}{15\times 8}$$

$$B=\dfrac{1}{10}-\dfrac{1}{15}=\dfrac{3-2}{30}=\dfrac{1}{30}\text{ or 30 days.}$$

19.
$$\dfrac{1}{P}+\dfrac{1}{Q}=\dfrac{1}{20}\qquad ....(1)$$

$$\dfrac{1}{Q}+\dfrac{1}{R}=\dfrac{1}{15}\qquad ....(2)$$

$$\dfrac{1}{R}+\dfrac{1}{P}=\dfrac{1}{12}\qquad ....(3)$$

solving (1), (2) & (3):-

P = 30 days

29. $6m + 8w = \dfrac{1}{10}$, $26m + 48w = \dfrac{1}{2}$

$36m + 48w = \dfrac{3}{5}$, $26m + 48w = \dfrac{1}{2}$

$10m = \dfrac{1}{10}$ or $\dfrac{1}{100}$ and $w = \dfrac{1}{200}$

$15m + 20w = \dfrac{15}{100} + \dfrac{20}{200} = \dfrac{50}{200} = \dfrac{1}{4}$

or 4 days.

30. $4m + 3w = \dfrac{1}{6}$, $5m + 7w = \dfrac{1}{4}$

$20m + 15w = \dfrac{5}{6}$, $20m + 28w = 1$

$13w = \dfrac{1}{6}$, $w = \dfrac{1}{78}$

$4m = \dfrac{1}{6} - \dfrac{3}{78} = \dfrac{10}{78}$

$m = \dfrac{10}{78 \times 4} = \dfrac{10}{312}$

$m + w = \dfrac{10}{312} + \dfrac{1}{78} = \dfrac{14}{312} = 22\left(\dfrac{2}{7}\right)$ days.

31. $A = \dfrac{1}{15}$, $B = \dfrac{1}{20}$

$1 - 4(A + B) = 1 - 4\left(\dfrac{4+3}{60}\right)$

$= \dfrac{1 - 28}{60} = \dfrac{32}{60} = \dfrac{8}{15}.$

32. Let the work done by a man in one day = x units.

_____ woman _____ = y units.

A/Q $(4x + 6y) \times 8 = (3x + 7y) \times 10$.

$\Rightarrow$ 2x = 22y

$\Rightarrow$ x = 11y

$\therefore$ Time table

$= \dfrac{(3x + 7y) \times 10}{10y} = \dfrac{40y \times 10}{10y}$

= 40 days.

33. Work done by A, B, C in one day

$= \dfrac{1}{20}, \dfrac{1}{30}, \dfrac{1}{60}$

Let number of days needed = x

$\therefore \dfrac{1}{20}\left(\dfrac{2x}{3}\right) + \left(\dfrac{1}{20} + \dfrac{1}{30} + \dfrac{1}{60}\right)\dfrac{x}{3} = 1$

$\Rightarrow$ $x = \dfrac{180}{12} = 15$ days