Work and Wages

- If a person can do a piece of work in 'n' days, then in one day, the person will do '1/n' work. Conversely, if the person does '1/n' work in one day, the person will require 'n' days to finish the work.
- In questions where there is a comparison of work and efficiency, we use the formula $M_1 D_1 H_1 E_1 / W_1 = M_2 D_2 H_2 E_2 / W_2$, where
- M = Number of workers
- D = Number of days
- H = Number of working hours in a day
- E = Efficiency of workers
- W = Units of work
- In case we have more than one type of workers, then the formula modifies to $\sum(M_i E_i) D_1 H_1 / W_1 = \sum(M_j E_j) D_2 H_2 / W_2$, where 'i' and 'j' may vary as per the number of workers.
- If a person A is 'n' times more efficient than person B, then Ratio of work done by A and B in one day (Ratio of efficiencies) = n : 1 Ratio of time taken by A and B = 1 : n

- Total work = No. of Days x Efficiency
- If a group of people are given salary for a job they do together, their individual salaries are in the ratio of their individual efficiencies if they work for same number of days. Otherwise, salaries are divided in the ratio of units of work done.

Example

Example 1. Ram and Shyam have been given a task of painting a house for Rs. 800. With the help of Rita, they complete the job in just 3 days. Had Ram alone be doing the task, he would need 6 days. If Shyam alone would be doing the task, he would need 8 days. How much money will Rita get?

a. Rs. 80
b. Rs. 150
c. Rs. 100
d. Rs. 125

Answer:

In one day, Ram does $\frac{1}{6}$ and Shyam does $\frac{1}{8}$ amount of work

In one day, Ram and Shyam together do $\frac{1}{6}+\frac{1}{8}=\frac{7}{24}$ amount of work

Actually the work is done by Ram, Shyam and Rita in just 3 days.

So in one day, all 3 together do $\frac{1}{3}$ amount of work

So how much would be the work done by Rita in one day?

Work by Rita in one day $=\frac{1}{3}-\frac{7}{24}=\frac{1}{24}$

Job is done in 3 days, **so total work by Rita (i.e. in 3 days)** $= 3 \times \frac{1}{24} = \frac{1}{8}$

> **Tip: Amount of work done ∝ Amount of wages earned**

Share of Rita $= \frac{1}{8}$ of Total Amount $= \frac{1}{8} \times 800 =$ **Rs. 100**

Example 2. What will be share of Rajesh, if together Ramesh and Suresh complete only 7/11 of the task, and all three had been given the contract to finish the task for Rs. 1100?

a. Rs. 350(4/11)
b. Rs. 200
c. Rs. 400
d. Rs. 650

Answer:

Ramesh and Suresh complete $\frac{7}{11}$ of the task

Remaining task $= 1 - \frac{7}{11} = \frac{4}{11}$

This is done by Rajesh. If work done is $4/11^{th}$, share in wages will also be $4/11^{th}$.

$\therefore$ **Share of Rajesh** $= \frac{4}{11}$th of Rs. $1100 = \frac{4 \times 1100}{11} =$ **Rs. 400**

Example 3. P and Q together earn Rs. 188 per day. Q and R together earn Rs. 152 per day. P, Q and R when working together earn Rs. 300 per day. How much does Q earn daily?

a. Rs. 43
b. Rs. 56
c. Rs. 45
d. Rs. 40

Answer:

Let daily wages of P = Rs. P; daily wages of
Q = Rs. Q and daily wages of R = Rs. R
$\therefore$ **P+Q+R = Rs. 300**
Also, **P+Q = Rs. 188** $\rightarrow$ **(1)**
And, **Q+R = Rs. 152** $\rightarrow$ **(2)**
Adding equations (1) and (2)
P + Q + Q + R = 188 + 152
$\therefore$ Q + P + Q + R = 340
Substituting value of P+Q+R, we get,
Q+300 = 340
$\therefore$ **Q = Rs. 40 = Q earns this much per day**

Example 4. P and Q work together on a task for 5 days. They then leave and rest of the task is done by R in just 2 days. All the three together are paid Rs. 450. What will be R's share out of the payment if P alone could do the task in 10 days and Q alone can do the task alone in 15 days?

a. Rs. 100
b. Rs. 75
c. Rs. 225
d. Rs. 50

Answer:

In one day, P does $\frac{1}{10}$ amount of work

In one day, Q does $\frac{1}{15}$ amount of work

In one day, P and Q together do $\frac{1}{10}+\frac{1}{15}=\frac{5}{30}=\frac{1}{6}$ amount of work

They work together for 5 days, so they complete $5 \times \frac{1}{6}=\frac{5}{6}$ amount of work.

Remaining work $= 1-\frac{5}{6}=\frac{1}{6}$

This is done by R. If work done is 1/6th, share in wages will also be 1/6th.

$\therefore$ Share of R $=\frac{1}{6}$ th of Rs. 450 $=\frac{450}{6}=$ **Rs. 75**

Example 5. P and Q work together and get a payment of Rs. 1400. P can complete the work alone in just 30 days. But Q takes 40 days to complete the work alone. What is P's share out of the wages they get?

a. Rs. 800
b. Rs. 600
c. Rs. 1000
d. Rs. 700

Answer:

In one day, P does $\frac{1}{30}$ amount of work

In one day, Q does $\frac{1}{40}$ amount of work

Divide their one day work,

$$\therefore \frac{P}{Q}=\frac{\frac{1}{30}}{\frac{1}{40}}$$

$$\therefore P=\frac{4Q}{3}$$

$\therefore$ Work done by P is 4/3 times the work done by Q

$\therefore$ Share of P $=\frac{4}{3}$ **Share of Q**

Now we know,

Share of P + Share of Q = Rs. 1400

$$\therefore \frac{4}{3}Q+Q=1400$$

$\therefore$ Q = Rs. 600 = Share of Q

$\therefore$ Share of P $= 1400\text{-}600 =$ **Rs. 800**

Example 6. Johnny employs 8 workers to work for 6 hours per day. In total he pays them Rs. 630 for a week. How much should Johnny pay 18 workers working 4 hours per day for a week?

a. Rs. 945
b. Rs. 645
c. Rs. 630
d. Rs. 1050

Answer:

6 hours per day for a week means $6 \times 7 = 42$ hours.
8 workers for 42 hours get Rs. 630
$\therefore$ 8 workers for 1 hour get $630/42 =$ Rs. 15
1 worker for 1 hour gets Rs. $\frac{15}{8}$
So 18 workers for 1 hour will get $18 \times \frac{15}{8} =$ Rs. $\frac{135}{4}$
Now, these 18 workers work for 4 hours per day for 1 week $= 4 \times 7 = 28$ hours
18 workers for 28 hours will get $28 \times \frac{135}{4} =$ **Rs. 945**

Example 7. The amount of money with which A's wage can be paid for 18 days, when A is working alone, is enough for paying B's wage for 12 days, when B is working alone. If A and B start working together, then the same amount would be enough for wages of both of them for how many days?

a. 36/5 days
b. 5/36 days
c. 15 days
d. 6 days

Answer:

Let the amount be Rs. M
In one day, **A gets Rs.** $\frac{M}{18}$ and **B gets Rs.** $\frac{M}{12}$
When both work together,
In one day wages given = wage of A + wage of B = $\frac{M}{18} + \frac{M}{12} =$ **Rs.** $\frac{5M}{36}$
If in one day Rs. $\frac{5M}{36}$ **is given then Rs. M will last for how many days?**
It is simply the reciprocal i.e. $\frac{36}{5}$ **days**

Example 8. P, Q and R get Rs. 10800 for doing a work in 18 days. P and R get Rs. 3760 for doing the same work in 10 days, while Q and R get Rs. 6080 for doing the same work in 20 days. Find the amount received by R per day?

a. Rs. 95
b. Rs. 126
c. Rs. 80
d. Rs. 200

Answer:

$$1\text{day wage of P and R} = P + R = \frac{Rs.3760}{10} = Rs.\ 376$$

$$1\text{day wage of Q and R} = Q + R = \frac{Rs.6080}{20} = Rs.\ 304$$

$$1\text{day wage of P, Q and R} = P+Q+R = \frac{Rs.10800}{18} = Rs.\ 600$$

$\therefore P + 304 = 600 \longrightarrow$ Put value of Q+R

$\therefore P = Rs.\ 296$

$\therefore \mathbf{R} = 376\text{-}P = 376\text{-}296 = \mathbf{Rs.\ 80} = \mathbf{Amount\ received\ by\ R\ per\ day}$

Example 9. Wages of 44 women for 56 days comes to Rs.29568. How many men are needed for 47days to receive Rs. 16920, if the daily wages of a man being 5 times those of a woman?

a. 9 men
b. 8 men
c. 6 men
d. 5 men

Answer:

$$1\text{ day wage of 44 women} = \frac{Rs.29568}{56\text{ days}}$$

$$\mathbf{1\ day\ wage\ of\ 1\ woman} = \frac{29568}{56\text{ days x 44 women}} = \mathbf{Rs.\ 12}$$

$$1\text{ day wage of 1 man} = 5 \times 12 = Rs.\ 60$$

Using above concept,

$$1\text{ day wage of 1 man} = \frac{Rs.16920}{47\text{ days x Number of Men}} = Rs.\ 60$$

$$\therefore \mathbf{Number\ of\ men} = \frac{16920}{47 \times 60} = \mathbf{6\ men}$$

Example 10. Total wages of 6 men, 4 women and 8 boys is Rs. 26. If the wages of 6 men is equal to that of 8 women and the wages of 4 women is equal to that of 6 boys, then find out the total wages of 8 men, 6 women and 4 boys?

a. Rs. 32
b. Rs. 24
c. Rs. 25
d. Rs. 29

Answer:

Let Daily wages of $\rightarrow$ Men = M; Women = W and Boys = B

$6M = 8W$ and $4W = 6B \longrightarrow \mathbf{1}$

Also, $6M + 4W + 8B = Rs.\ 26$

$\therefore 8W + 4W + 8\left(\frac{4W}{6}\right) = Rs.26 \longrightarrow$ Substituting values of M and B from **1**

$\therefore \mathbf{W = Rs.\ 1.5 = Daily\ wages\ of\ 1\ woman}$

$\therefore M = \left(\frac{8W}{6}\right) = \mathbf{Rs.\ 2 = Daily\ wages\ of\ 1\ man}$

Also, $B = \left(\frac{4W}{6}\right) = \mathbf{Rs.\ 1 = Daily\ wages\ of\ 1\ boy}$

Wage of 8 men, 6 women, 4 boys = (8 x 2) + (6 x 1.5) + (4 x 1) = Rs. 29