

## Aptitude Assignment 4

1. A leak in the bottom of a tank can empty the full tank in 6 hours. An inlet pipe fills water at the rate of 4 liters per minute. When the tank is full, the inlet is opened, and due to the leak, the tank is empty in 8 hours. Find the capacity of the tank.

Let's assume the capacity of the tank is  $C$  liters.

The leak can empty the full tank in  $b$  hours, which means it can empty  $1/b$ th of the tank's capacity per hour.

When the tank is full and the inlet is opened, the net rate of water entering the tank is the rate of water coming in minus the rate of water going out (due to the leak).

Rate of water coming in = 4 liters per minute =  $(4/60)$  liters per second =  $1/15$  liters per second.

Rate of water going out due to the leak =  $1/b$ th of the tank's capacity per hour =  $(1/b)C$  liters per hour =  $(1/b)C$  liters per second.

So, the net rate of water entering the tank is  $(1/15 - 1/b)C$  liters per second.

Given that the tank gets filled and emptied in 8 hours, we can set up the following equation:

$$8 * C(1/15 - 1/b) = C$$

Let's solve this equation to find the value of  $C$ .

$$8/15 - 8/(bC) = C$$

Multiplying through by  $15C$ , we get:

$$8C - 40 = 15C^2$$

Rearranging and simplifying:

$$15C^2 - 8C + 40 = 0$$

This is a quadratic equation, which can be solved using the quadratic formula:

$$C = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(15)(40)}}{2 * 15}$$

$$C = \frac{8 \pm \sqrt{64 - 2400}}{30}$$

$$C = \frac{8 \pm \sqrt{-2336}}{30}$$

Since the term inside the square root is negative, the quadratic equation has no real solutions. Therefore, there is no real value for the capacity of the tank that satisfies the given conditions.

2. Of the 1000 inhabitants in a town, 60% are males, 20% are literate. If 25% of all the inhabitants are literate, then what percentage of females are literate?

Let's solve this problem step by step:

We know that there are 1000 inhabitants in the town.

60% of the inhabitants are males, which means there are  $0.60 * 1000 = 600$  males in the town.

The remaining 40% of the inhabitants must be females, so there are  $0.40 * 1000 = 400$  females in the town.

20% of all the inhabitants are literate, which means there are  $0.20 * 1000 = 200$  literate individuals in the town.

25% of all the inhabitants are literate, which means there are  $0.25 * 1000 = 250$  literate individuals in the town.

To find the percentage of females who are literate, we need to determine how many of the literate individuals are females.

Since we know that there are 200 literate individuals in total, and we also know that 250 individuals are literate, we can conclude that all 200 literate individuals are included in the 250 individuals.

Therefore, the number of literate males must be  $250 - 200 = 50$ .

To find the percentage of females who are literate, we divide the number of literate females (200) by the total number of females (400) and multiply by 100:

Percentage of females who are literate =  $(200/400) * 100 = 50\%$ .

So, 50% of the females in the town are literate.

**3. In an examination, 80% candidates passed in English and 85% candidates passed in Mathematics. If 73% of candidates passed in both these subjects, what percent of candidates failed in both the subjects?**

**Ans:**

To find the percentage of candidates who failed in both subjects, we need to subtract the percentage of candidates who passed in both subjects from 100%.

Percentage of candidates who passed in both subjects = 73%

Percentage of candidates who failed in both subjects =  $100\% - 73\%$

Percentage of candidates who failed in both subjects = 27%

Therefore, 27% of the candidates failed in both English and Mathematics.

4. The monthly income of a person is 13,500, and his monthly expenditure is 9,000. Next year's income increased by 14%, and his expenditure increased by 7%. Find percent increase in his savings is?

To find the percent increase in savings, we need to calculate the savings for both the current year and the next year.

$$\text{Current year's savings} = \text{Income} - \text{Expenditure} = 13,500 - 9,000 = 4,500.$$

$$\text{Next year's income increased by 14\%, which means the new income is } 13,500 + (14/100) * 13,500 = 13,500 + 1,890 = 15,390.$$

$$\text{Next year's expenditure increased by 7\%, which means the new expenditure is } 9,000 + (7/100) * 9,000 = 9,000 + 630 = 9,630.$$

$$\text{Next year's savings} = \text{New Income} - \text{New Expenditure} = 15,390 - 9,630 = 5,760.$$

Now, let's calculate the percent increase in savings:

$$\begin{aligned} \text{Percent increase in savings} &= ((\text{Next year's savings} - \text{Current year's savings}) / \text{Current year's savings}) * 100 \\ &= ((5,760 - 4,500) / 4,500) * 100 \\ &= (1,260 / 4,500) * 100 \\ &= 28\%. \end{aligned}$$

Therefore, the percent increase in savings is 28%.

5. 49 pumps can empty a tank in 10 days, working 10 hours a day. if 70 pumps are used for 7 hours each day then in how many days the tank can be emptied?

Let's assume the capacity of the tank is 1,000 liters and proceed with the calculations.

Using 70 pumps for 7 hours each day, the rate of emptying the tank is  $\frac{1}{7}$  of the tank's capacity per hour.

Rate of 70 pumps =  $(\frac{1}{7}) * 1000 = 143.57$  liters per hour (approximately).

To calculate the number of days required to empty the tank, we divide the total capacity of the tank by the rate of emptying:

Number of days =  $1000 / 143.57 \approx 6.96$  days.

Therefore, with 70 pumps working for 7 hours each day, it will take approximately 6.96 days to completely empty a tank with a capacity of 1,000 liters.