Time and Work

Rule :

If A can do a piece of work in n days, then

The work done by A in one day = 1/n

Rule:

Chocolate Rule or unitary method

Rule :

Whosoever is more efficient will take less time

Rules and Tricks:

Rule 1: Universal Rule

This rule can be used in almost every problems.

- If M_1 persons can do W_1 work in D_1 days and M_2 persons can do W_2 works in D_2days then we can say
  $M_1D_1W_2 = M_2D_2W_1$
- If the persons work T_1 and T_2 hours per day respectively then the equation gets modified to
  $M_1D_1T_1W_2 = M_2D_2T_2W_1$
- If the persons has efficiency of E_1 and E_2 respectively then,
  $M_1D_1T_1E_1W_2 = M_2D_2T_2E_2W_1$

Rule :

If A can do a piece of work in X days and B can do the same work in

$$\frac{XY}{X + y} \text{ days.}$$

Rule :

Two persons A and B, working together, can complete a piece of work in X days. If A, working alone, can complete the work in Y days, then B, working alone, will complete the work in

$$\frac{XY}{Y - X} \text{ days.}$$

- salary must be divided according to efficiency i.e number of Chocolates consumed

- **IF A can complete a task in x days**
- **B Can Complete same task in y days**
- **C can Complete same task in z days**
- **Then in how many days A' and B' and C ' will complete the same task**
- **No of days = 1/ ((A'/Ax) + (B'/By) + (C' / Cz))**
- **Where A ' B ' C ' new set of persons**
-
- **A B C previous corresponding set of persons**
-
- **x y z Corresponding number of days**

PIPES & CISTERNS

✓ If a pipe can fill a tank in x hours, then

Part of tank filled in 1 hour $= \frac{1}{x}$

✓ If a pipe can empty a tank in y hours, then

Part of tank emptied in 1 hour $= \frac{1}{y}$

Rules and Tricks:

Rule 1:

Two pipes A and B can fill (or empty) a cistern in X and Y hours respectively, while working alone. If both the pipes are opened together, then the time taken to fill (or empty) the cistern is given by

$$\left\{\frac{XY}{X+Y}\right\}$$ **hours.**

- Chocolate Rule or unitary method
- Every time outlet pipe is mentioned efficiency will come with negative sign

Rule 4:

A pipe can fill a cistern in x hours. Because of a leak in the bottom, it is filled in y hours. If it is full, the time taken by the leak to empty the cistern is

$$\frac{XY}{Y - X} \text{ hours.}$$

TIME & DISTANCE

✓ Speed, Time and Distance

$$\text{Speed} = \frac{Distance}{Time} \quad \text{Time} = \frac{Distance}{Speed}$$

$$\text{Distance} = \text{Speed} \times \text{Time}$$

✓ km/hr to m/sec conversion:

$$a \text{ km/hr} = a \times \frac{5}{18} \text{ m/sec}$$

✓ m/sec to km/hr conversion:

$$a \text{ m/sec} = a \times \frac{18}{5} \text{ km/hr}$$

- ✓ If the ratio of speeds of A and B is a : b, then the ratio of the time taken by them to cover the same distance will be $\frac{1}{a} : \frac{1}{b}$ or b : a

- ✓ Suppose a man covers a certain distance at x km/hr and an equal distance at y km/hr, then the average speed of whole journey $= \frac{2xy}{x+y}$ km/hr

- Average Speed = Total Distance / Total Time

- S1/S2 = Square root of T2 /Square Root T1
- (only to be used when after crossing each other is mentioned in statement)

PROBLEM ON TRAINS

- ✓ Time taken by a train of length l meters to pass a pole or standing man or signal post is equal to the time taken by the train to cover l meters.
- ✓ Time taken by a train of length l meters to pass a stationary object of length b meters is equal to the time taken by the train to cover (l + b) meters.
- ✓ Suppose two trains are moving in same direction at u m/s and v m/s, where u>v, then their relative speed will be (u - v) m/s.
- ✓ Suppose two trains are moving in opposite direction at u m/s and v m/s, then their relative speed will be (u + v) m/s.

- Time taken by two trains to cross each other

  if moving in same direction

  $T=D/S=(L1+L2) / (S1-S2)$ $S1>S2$

  If moving in opposite direction

  $T= D/S=(L1+L2) / (S1+S2)$

L1= Length of first Train & S1= Speed of First Train

L2= Length of Second Train & S2= Speed of second Train

BOATS & STREAMS

- ✓ **Downstream / Upstream**

In water, the direction along the stream is called Downstream and the direction against the stream is called Upstream.

- ✓ If the speed of a boat in still water is u km/hr and the speed of stream in v km/hr, then

  Speed Downstream = (u + v) km / hr

  Speed Upstream = (u - v) km / hr

- ✓ If the speed downstream is a km/hr and speed upstream is b km/hr, then:

  Speed in still water = ½ (a + b) km/hr

  Rate of stream = ½ (a - b) km/hr