Important Formulae TIME,SPEED,DISTANCE

i) Speed=Distance/Time

ii) Time=Distance/speed
iii) Distance = speed×time

iv) 1km/hr=5/18m/s

v) 1m/s=18/5km/hr

vi) If the ratio of the speed of A and B is a:ba:b,then the ratio of the time taken by them to cover the same distance is 1/a:1/b or b:a

vii) Suppose a man covers a distance at xx kmph and an equal distance at yy kmph, then the ***AVERAGE SPEED*** during the whole journey is 2xy/x+ y kmph

Out of time, speed and distance we can compute any one of the quantities when we happen to know the other two. For example, suppose we drive for 2 hours at 30 miles per hour, for a total of 60 miles.

If we know the time and the speed, we can find the distance
2 hour * 30 miles/ hour=60 miles
If we know the time and the distance, we
can find the speed
60 miles/2 hours=30miles/hour

Example:

A train meets with an accident and moves at $(3/4)^{th}$(3/4)th its original speed. Due to this, it is 20 min late. Find the original time for the journey beyond the point of accident?

Method1:

Think about 2 diff. situations, 1st with accident and another w/o accident. As distance in both the cases is constant

So $V_1V_2=T_2T_1$
$\Rightarrow V_1[(3/4)*V_1]=T_1+20T_1$
$\Rightarrow 43=T_1+20T_1$
$\Rightarrow T_1=60$

Method 2:

Velocity decreases by 25% (3/4 of original speed => decrement by 1/4) so time will increase by 33.3% (4/3 of original time => increment by 1/3)

now, 33.3%=20 min

$\Rightarrow 100\% = 60$ min

3. Relative Speed

Case 1:

Two bodies *are moving in opposite directions* at speed V_1 & V_2 respectively. The relative speed is defined as $V_r = V_1 + V_2$

Case 2:

Two bodies are moving *in same directions* at speed V_1 & V_2 respectively. The relative speed is defined as $V_r = |V_1 - V_2|$

4. Train Problems

The basic equation in train problem is the same $\text{Speed} = \frac{\text{Distance}}{\text{Time}}$Speed=DistanceTime
The following things need to be kept in mind while solving the train related problems.

- When the train is crossing a moving object, the speed has to be taken as the relative speed of the train with respect to the object.
- The *distance to be covered when crossing an object*, whenever trains crosses an object will be equal to*: Length of the train + Length of the object*

5. Boats and Streams

Let,

$U =$ U= Velocity of the boat in still water
$V =$ V= Velocity of the stream.

Upstream:

While moving in ***upstream***, distance covered, distance covered, $S = (U - V)T$S=(U−V)T

Downstream:

In case of ***downstream***, distance covered ,distance covered , $S = (U + V)T$S=(U+V)T

6. Clock

For clock problems consider the clock as a circular track of 60km.

Min. hand moves at the speed of 60km/hr (think min. hand as a point on the track) and hour hand moves at 5km/hr and second hand at the speed of 3600 km/hr.

Relative speed between HOUR hand and MINUTE hand = 55