NUMBER SYSTEMS

H.C.F. of fractions = H.C.F. of numerators/L.C.M of denominators

L.C.M. of fractions = G.C.D. of numerators/H.C.F of denominators

Product of two numbers = Product of their H.C.F. and L.C.M.

**¬ Divisibility Rules:**

A number is divisible by 2 if it is an even number.

A number is divisible by 3 if the sum of the digits is divisible by 3.

A number is divisible by 4 if the number formed by the last two digits is divisible by 4.

A number is divisible by 5 if the units digit is either 5 or 0.

A number is divisible by 6 if the number is also divisible by both 2 and 3.

A number is divisible by 8 if the number formed by the last three digits is divisible by 8.

A number is divisible by 9 if the sum of the digits is divisible by 9.

A number is divisible by 10 if the units digit is 0.

A number is divisible by 11 if the difference of the sum of its digits at odd places and the sum of its digits at even places, is divisible by 11.

A number is divisible by 12 if the number is also divisible by both 3 and 4.

**POINT TO REMEMBER FOR SPECIAL CASE –**

For Divisibility of 7 - We take Unit digit & multiply with 2 then Substract .

For Divisibility of 13 - We take Unit digit & multiply with 4 then Add .

For Divisibility of 17 - We take Unit digit & multiply with 5 then Substract .

For Divisibility of 19 - We take Unit digit & multiply with 2 then Add .

ALGEBRA

Sum of first n natural numbers = n(n+1)/2

Sum of the squares of first n natural numbers = n(n+1)(2n+1)/6

Sum of the cubes of first n natural numbers = [n(n+1)/2]2

Sum of first n natural odd numbers = n2

Average = (Sum of items)/Number of items

Arithmetic Progression - An A.P. is of the form a, a+d, a+2d, a+3d, ... where a is called the 'first term' and d is called the 'common difference' nth term of an A.P.

tn = a + (n-1)d

Sum of the first n terms of an A.P. Sn = n/2[2a+(n-1)d] or Sn = n/2(first term + last term) ¬ Geometrical Progression (G.P) - A G.P. is of the form a, ar, ar2, ar3, ... where a is called the 'first term' and r is called the 'common ratio'. nth term of a G.P. tn = arn-1

Sum of the first n terms in a G.P. Sn = a|1-rn|/|1-r|

Ages

They are generally simple to attempt if you have done practice and remember the formulae. Important formulae to remember are :

1. If the current age is *x*, then *n* times the age is *nx*.
2. If the current age is *x*, then age *n* years later/hence = *x* + *n*.
3. If the current age is *x*, then age *n* years ago = *x* – *n*.
4. The ages in a ratio *a*: *b* will be *ax* and *bx*.
5. If current age is x, then 1/n of the age is x/n.

PERMUTATIONS & COMBINATIONS

Number of Permutations Number of all permutations of n things, taken r at a time, is given by: nPr = n(n - 1)(n - 2) ... (n - r + 1) = n! (n - r)!

Number of Combinations: The number of all combinations of n things, taken r at a time is: nCr = n! = n(n - 1)(n - 2) ... to r factors . (r!)(n - r)! r!

nCn = 1 and nC0 = 1. nCr = nC(n - r)

PROFIT & LOSS

Gain = Selling Price(S.P.) - Cost Price(C.P)

Loss = Cost Price (C.P.) - Selling Price (S.P)

Gain % = Gain x 100 / C.P

Loss % = Loss x 100 / C.P

S.P. = [(100 + Gain%)/100] x C.P

S.P. = [(100 - Loss%)/100] x C.P

C.P. = [100/ (100 + Gain%) ] x S.P

C.P. = [100/ (100 - Loss%) ] x S.P

Gain% = [ Error / (True value – Error ) ] x 100 %

TIME & DISTANCE

Distance = Speed X Time

1 km/hr = 5/18 m/sec

1 m/sec = 18/5 km/hr

Suppose a man covers a certain distance at x kmph and an equal distance at y kmph.

Then, the average speed during the whole journey is 2xy/(x+y) kmph.

Relative Speed = Moving in same direction( speeds get subtracted )

= Moving in opposite direction (speed get added)

TRAINS

Case 1: For stone/person/Pole (negligible items when compared to train) 🡪 Distance = length of train itself

Case 2: For tunnel/ platform/bridge 🡪 Distance = length of train + length of tunnel/platform/bridge

Case 3: For 2 trains crossing each other 🡪 Distance = length of train A + length of train B

If two trains of length x km and y km are moving in the same direction at u kmph and v kmph, where u>v, then time taken by the faster train to cross the slower train = (x+y)/(u-v) hours.

If two trains of length x km and y km are moving in the opposite directions at u kmph and v kmph, then time taken by the trains to cross each other = (x+y)/(u+v)hours.

BOATS & STREAMS

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 the stream is 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 the speed upstream is b km/hr,

then : Speed in still water = 1/2 (a + b) km/hr

Rate of stream = 1/2 (a - b) km/hr

**CLOCKS:**

A clock is a complete circle having 360 degrees. It is divided into 12 equal parts i.e. each part is 360/12 = 30°.   
As the minute hand takes a complete round in one hour, it covers 360° in 60 minutes.  
In 1 minute it covers 360/60 = 6°/ minute.