Pipes and Cisterns:-

some Basic Formulas:-

1. If an inlet pipe can fill the tank in x hours, then the part filled in 1 hour = 1/x

2.If an outlet pipe can empty the tank in y hours, then the part of the tank emptied in 1 hour = 1/y

Some Shortcut Methods:-

Trick-1:

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

    = (x*y)/(x+y)

1. Two pipes can fill (or empty) a cistern in 5 and 4 hours while working alone. If both pipes are opened together, then the time taken to fill (or empty) the cistern ?

Solution:
        = (x*y)/(x+y)
        = (5*4)/(5+4)
        = 20/9 hrs

Trick-2:

Three pipes can fill (or empty) a cistern in x,y and z hours while working alone. If all the three pipes are opened together, the time taken to fill (or empty) the cistern is given by

$$= (x*y*z)/(xz+yz+xy)$$

1. Three pipes can fill (or empty) a cistern in 1,2 and 3 hours while working alone. ff all the three pipes are opened together, the time taken to fill (or empty) the cistern ?

Solution:
$$= (x*y*z)/(xz+yz+xy)$$
$$= (1*2*3)/[\{(1*2)+(2*3)+(1*3)]$$
$$= 6/11 \text{ hrs}$$

Trick-3

A pipe can If a pipe can fill a cistern in x hours and another can fill the same cistern in y hours, but a third one can empty the full tank in z hours, and all of them are opened together, then

     = (x*y*z)/(xy+yz-xy)

1. A pipe can If a pipe can fill a cistern in 3 hours and another can fill the same cistern in 4 hours, but a third one can empty the full tank in 2 hours, and all of them are opened together.how much time taken fill the cistern ?

Solution:
     = (x*y*z)/(xy+yz-xy)
     = (2*3*4)/[(2*3)+(2*4)-(3*4)]
     = 12 hrs

Trick-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

=(x*y)/(y-x)

1. A pipe can fill a cistern in 5 hours. Due to a leak in the bottom, it is filled in 6 hours. If it is full* the time taken by the leak to empty the cistern ?

Solution:
        = (x*y)/(y-x)
        = (5*6)/(6-5)
        = 30 hrs

Trick-5:

'A' pipe in 'x' hours & 'B' pipe in ' y' hours. Both opened for 'a' hours . then,A is shut-off .alone 'B' pipe fill the remaining tank in hours

        = y-[a*(x+y)]/x hours

1. A tank can be filled by a tap in 20 minutes and by another tap in 60 minutes. Both the taps are kept open for 10 minutes and then the first tap is shut off. After this, how much time required to fill tank will be completely ?

Solution:
        = y-[a*(x+y)]/x hours
        = 60-[10*(20+60)/20
        = 20 min