Modifiers of time :

Decade = 10 years

Score = 20 years

Silver = 25 years

Golden = 50 years

Diamond = 75 years

Century or Centennial = 100 years

II. Digit Problems

Original Number = 100h + 10t + u

Reversed/Interchanged Number = 100u + 10t + h

The sum of digits = h + t + u

The product of digits = htu

Where

H = hundreds digit

T = tens digit

U = units digit

Example 3:

In a three digit number, the hundreds digit is twice the units digit. If 396 be subtracted from the number, the order of the digits will be reversed. Find the number if the sum of the digits is 17.

$h = 2u \rightarrow 1st$

$100h + 10t + u - 396 = 100u + 10t + h \rightarrow 2nd$

$99h - 99u = 396$

$h - u = 4 \rightarrow 2nd$

$h + t + u = 17 \rightarrow 3rd$

$1st \circ 2nd$

$2u - u = 4$

$u = 4$

$h = 8$

$t = 17 - 8 - 4$

$t = 5$

$100(8) + 10(5) + 4 = 854$

2. Constant Multiplier Method

$$\frac{60}{11}x = y$$

where y is the minutes needed for the question
where x is number related to the starting/origin number.

Final Formula:

$$M = \frac{60H \mp 2\Theta}{11}$$

where H is the starting/origin hour

where Θ is the angle of the hour hand between the minute hand

where M is the minutes passed

Miscellaneous

- Consecutive Integers

  n, n + 1, n + 2, n + 3
- Consecutive Even Integers

  n, n + 2, n + 4, n + 6

  where n is an even number
- Consecutive Odd Integers

  n, n + 2, n + 4, n + 6

  where n is an odd number

Type 2 : Water Vehicle Motion

Case 1 : Upstream

Upstream Speed = Boat Speed – Stream Speed

Case 2 : Downstream

Downstream Speed = Boat Speed + Stream Speed

Also

Speed of Boat in Still Water $= \frac{d+u}{2}$

Speed of Stream $= \frac{d-u}{2}$

Where d = downstream speed

u = upstream speed

Case 2 : Work

$$\frac{1}{T_A} \pm \frac{1}{T_B} \pm \frac{1}{T_C} = \frac{1}{T_{ABC}}$$

Where Ta, Tb, and Tc is the time it needed for Person/Object A/B/C to complete a certain task.

Where Tabc is the time total time Person/Object A/B/C can complete a certain task

Use + if the object is given to contribute to the assigned and wanted task to be performed

Use – if the object is given to detriment the assigned and wanted task to be performed(e.g. Pipes)

Case 3 : Repeated Dilution

In some cases, this is used to calculate the pure quantity left after “n” number of processes of repeated replacement is done on the pure quantity. Suppose, a container contains x units of a liquid from which y units are taken out and replaced by quantity (water is commonly used). After “n” operations quantity of pure.

$$x\left(1-\frac{y}{x}\right)^{n}$$

Example

Solution Y is 30 percent liquid X and 70 percent water. If 2 kilograms of water evaporate from 8 kilograms of solutions Y and 2 kilograms of solution Y are added to the remaining 6 kilograms of liquid, what percent of this new liquid solution is liquid X?

Find: x′

Equation:

$$x' = \frac{A'}{C + \Sigma\Delta_C} = \frac{xC + x\Sigma_C + \Sigma\Delta_A}{C + \Sigma\Delta_C}$$

Given data:

x = 0.30 C=8 kg Σc= 2kg

ΣΔA = 0 kg A = amount of X

ΣΔC= -2 kg(from evaporated water) + 2 kg(from addition of solution Y)

$$x' = \frac{xC + x\Sigma_C + \Sigma\Delta_A}{C + \Sigma\Delta_C} = \frac{0.30(8) + 0.30(2) + 0}{8 + (-2 + 2)} = 0.375$$

Therefore x′=37.5 percent

Answer : 13 years

Sum of their ages:

M + A = 18 1^{st} equation

After three years

M+3=2(A+3) 2^{nd} equation

Combining 1^{st} and 2^{nd} will gain

M = 13 yrs old

A = 5 yrs old

Airi will be 18 in (18-5) = 13 years

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8. What time after 1:00 will the hands of the clock be together for the first time?

Time's Up!

Answer : 24 pages

$$x\left(\frac{1}{2}+\frac{1}{3}+\frac{1}{4}\right)=78$$

$$\left(\frac{13\,pages}{12\,\min}\right)x=78\,pages$$

$$x=72\,\min$$

$$B=\frac{72\,\min}{\frac{3\,\min}{page}}=24\,pages$$

Answer : 18 fps and 12 fps

For opposite direction
(1st equation)

$$10A + 10B = 300$$

$$A + B = 30$$

For same direction
(2nd equation)

$$50A = 50B + 300$$

$$A - B = 6$$

Combining 1st and 2nd equation will yield

A = 18 fps

B = 12 fps