

### Algebra

$ax^2+bx+c$  sum roots:  $-b/a$   
 $\Delta =b^2-4ac$  product roots:  $c/a$

### Ratios

$q1 : q2 = q2\text{-final} : q1\text{-final}$   
 num<denum so fraction<1 so  $(x+1)/(y+1) > x/y$   
 num>denum so fraction>1 so  $(x+1)/(y+1) < x/y$

**from exercise:**  $a-10 + b-20 + c-15 = 11k + 18k + 24k$  so  $1105-45=53k$  (ratios gains)

efficacy= $1/t$  (inverse proportionality)

$1/t1 : 1/t2 : 1/t3$

take LCM = k so you have  $k/t1 : k/t2 : k/t3$

compute to get  $x : y : z$  form

then do  $x + y + z$  and cross product

Rate of interest =  $\text{interestperyear}/\text{principalinvested} * 100$

When compared, use compared amount as the base

so you have  $\Delta / \text{base} * 100$

Use quantity as unit of q, the percentage change is

$\Delta = \text{increased or decrease quantity} / \Delta 1(\text{original amount}) * 100$

To make a profit, take initial price and add the desired profit so that: **new price per unit = initial (1+profit)**

Always find a 100 that makes the calculation easy = if it's not marked price it's cost price etc.

On Y1, simple and compound interests are the same

Find interest rate w/ difference and interest on interest

Interest =  $\text{principal} * \text{rate} * \text{time}$

### Ratios (cont)

discount of marked price =  $\text{discount} / \text{marked price} * 100$

Usually, these questions include:

- ratios of shared amounts,
  - time to perform a task,
  - investments and interests
  - price increases or decreases
- => **FOR PROFITS**

### Number properties

remainder of sum = sum of remainders

remainder of product = product of remainders

nb of trailing zeros = at least nb of 5s

number of factors = product of each power + 1 [ex:  $120 \rightarrow 2^3 * 5^1 * 3^1 \rightarrow (1+1)*(1+1)*(3+1) = 16$ ]

**from exercise:** If remainder of product to find, can work by pairs

If two expressions are equal, the exponents must be equal (if  $2^{n+2m} = 2^{3m-1}$  then  $n+2m = 3m-1$ )

**AP** Sum of arithmetic progression =  $(1st + Last / 2) * \text{nb of terms}$

**AP** nth term  $\rightarrow an = a1 + (n-1) * d$  (common divisor)

**AP** sum of the n first terms :  $n/2 [2a1 + (n-1)d]$

**GP** sum of first n terms =  $a(r^n-1) / r-1$  where r is common ratio

Number of ways of selecting two distinct integers from the set of first 100 positive integers =  $100C2$  ways.  
 i.e.,  $100C2 = 100 * 99 / 2$

### Sets

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$P(A \cup B \cup C) = P(A) + P(B) + P(C) + P(A \cap B \cap C) - [P(A \cap B) + P(A \cap C) + P(B \cap C)]$

### Statistics and Average

Standard deviation =  $\text{mean} \rightarrow (\text{number-mean})^2 \rightarrow \text{mean} \rightarrow \text{square root}(\text{mean})$

### From video

#### ⚡ Work and Rate ⚡

$R=J/T$

machines identiques:  $nR=J/T$

### Geometry / Coordinate Geometry

air triangle =  $1/2 * \text{products of sides} * \sin(\text{inside angle})$

$\sin 150^\circ = 1/2$

sum of interior angles of polygon =  $(n-2)*180$

Pythagorean triplets (c is odd, at least 2 prime numbers, 1 even number): (3,4,5) / (5,12,13) / (7,24,25) / (8,15,17) / (9,40,41) / (11,60,61) / (12,35,37)

area triangle =  $r(\text{inserted circle}) * \text{semi-perimeter triangle}$

equation of a circle center (a,b):  $(x-a)^2 + (y-b)^2 = r^2$

equation of a line that crosses two intercepts:  $x/\text{value } x + y/\text{value } y = 1$  so  $(\text{value } x) + (\text{value } y)x = (\text{value } x)(\text{value } y)$



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