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Quantitative Aptitude Tips & Tricks

Finding number of Factors
To find the number of factors of a given number, express the number as a product of powers of prime numbers.

In this case, 48 can be written as 16 * 3 = (24 * 3)
Now, increment the power of each of the prime numbers by 1 and multiply the result.
In this case it will be (4 + 1)*(1 + 1) = 5 * 2 = 10 (the power of 2 is 4 and the power of 3 is 1)
Therefore, there will 10 factors including 1 and 48. Excluding, these two numbers, you will have 10 – 2 = 8 factors.
Sum of n natural numbers
-> The sum of first n natural numbers = n (n+1)/2
-> The sum of squares of first n natural numbers is n

$(n+1)(2n+1)/6$
-> The sum of first n even numbers= $n(n+1)$
-> The sum of first n odd numbers= n^2

Finding Squares of numbers

To find the squares of numbers near numbers of which squares are known

To find 41^2 , Add 40+41 to 1600 =1681
To find 59^2 , Subtract $60^2-(60+59)$ =3481

Finding number of Positive Roots

If an equation (i:e $f(x)=0$) contains all positive co-efficient of any powers of x , it has no positive roots then.
Eg: $x^4+3x^2+2x+6=0$ has no positive roots .
Finding number of Imaginary Roots

For an equation $f(x)=0$, the maximum number of positive roots it can have is the number of sign changes in $f(x)$; and the maximum number of negative roots it can have is the number of sign changes in $f(-x)$.

Hence the remaining are the minimum number of imaginary roots of the equation(Since we also know that the index of the maximum power of x is the number of roots of an equation.)
Reciprocal Roots

The equation whose roots are the reciprocal of the roots of the equation ax^2+bx+c is cx^2+bx+a
Roots

Roots of $x^2+x+1=0$ are $1,w,w^2$ where $1+w+w^2=0$ and $w^3=1$
Finding Sum of the roots For
a cubic equation $ax^3+bx^2+cx+d=o$ sum of the roots = – b/a sum

of the
product of the roots taken two at a time = c/a product of the roots =
-d/a
For a biquadratic equation ax^4+bx^3+cx^2+dx+e = 0 sum of the roots = –
b/a sum of the product of the roots taken three at a time = c/a sum of
the product of the roots taken two at a time = -d/a product of the roots
= e/a

Maximum/Minimum

-> If for two numbers x+y=k(=constant), then their PRODUCT is MAXIMUM if x=y(=k/2). The maximum product is then (k^2)/4
-> If for two numbers x*y=k(=constant), then their SUM is MINIMUM if x=y(=root(k)). The minimum sum is then 2*root(k) .

Inequalties

-> x + y >= x+y (stands for absolute value or modulus) (Useful in solving some inequations)
-> a+b=a+b if a*b>=0 else a+b >= a+b
-> 2<= (1+1/n)^n <=3 -> (1+x)^n ~ (1+nx)
if x<< When you multiply each side of the inequality by -1, you
have to reverse the direction of the inequality.

Product Vs HCF-LCM

Product of any two numbers = Product of their HCF
and LCM . Hence product of two numbers = LCM of the numbers if they are
prime to each other

AM GM HM

For any 2 numbers a>b a>AM>GM>HM>b (where AM,
GM ,HM stand for arithmetic, geometric , harmonic menasa respectively)
(GM)^2 = AM * HM

Sum of Exterior Angles

For any regular polygon , the sum of the exterior angles is equal to
360 degrees hence measure of any external angle is equal to 360/n. (
where n is the number of sides)
For any regular polygon , the sum of interior angles =(n-2)180 degrees
So measure of one angle in
Square——=90
Pentagon—=108

Hexagon—=120

Heptagon—=128.5

Octagon—=135

Nonagon—=140

Decagon—=144
Problems on clocks

Problems on clocks can be tackled as assuming two runners going round
a circle , one 12 times as fast as the other . That is , the minute
hand describes 6 degrees /minute the hour hand describes 1/2 degrees
/minute . Thus the minute hand describes 5(1/2) degrees more than the
hour hand per minute .

The hour and the minute hand meet each other after every 65(5/11)
minutes after being together at midnight. (This can be derived from the
above) .

Co-ordinates

Given the coordinates (a,b) (c,d) (e,f) (g,h) of a parallelogram , the coordinates of the meeting point of the diagonals can be found out by solving for [(a+e)/2,(b+f)/2] =[(c+g)/2 , (d+h)/2]

Ratio

If a1/b1 = a2/b2 = a3/b3 = ………….. , then each ratio is equal to (k1*a1+ k2*a2+k3*a3+…………..) / (k1*b1+ k2*b2+k3*b3+…………..) , which is also equal to (a1+a2+a3+…………./b1+b2+b3+……….)

Finding multiples

x^n -a^n = (x-a)(x^(n-1) + x^(n-2) + …….+ a^(n-1)) ……Very useful for finding multiples .For example (17-14=3 will be a multiple of 17^3 – 14^3)

Exponents

e^x = 1 + (x)/1! + (x^2)/2! + (x^3)/3! + ……..to infinity 2 <>GP

-> In a GP the product of any two terms equidistant from a term is always constant .

-> The sum of an infinite GP = a/(1-r) , where a and r are resp. the first term and common ratio of the GP .

Mixtures

If Q be the volume of a vessel q qty of a mixture of water and wine be removed each time from a mixture n be the number of times this operation be done and A be the final qty of wine in the mixture then ,

$A/Q = (1-q/Q)^n$

Some Pythagorean triplets:

3,4,5———-($3^2=4+5$)

5,12,13———($5^2=12+13$)

7,24,25———($7^2=24+25$)

8,15,17———($8^2 / 2 = 15+17$)

9,40,41———($9^2=40+41$)

11,60,61——-($11^2=60+61$)

12,35,37——-($12^2 / 2 = 35+37$)

16,63,65——-($16^2 /2 = 63+65$)

20,21,29——-(EXCEPTION)

Appolonius theorem

Appolonius theorem could be applied to the 4 triangles formed in a parallelogram.

Function

Any function of the type $y=f(x)=(ax-b)/(bx-a)$ is always of the form $x=f(y)$.

Finding Squares

To find the squares of numbers from 50 to 59

For $5X^2$, use the formulae

$(5X)^2 = 5^2 +X / X^2$

Eg ; $(55^2) = 25+5 /25 =3025$

$(56)^2 = 25+6/36 =3136$

$(59)^2 = 25+9/81 =3481$

Successive Discounts

Formula for successive discounts

$a+b+(ab/100)$

This is used for succesive discounts types of sums.like 1999 population increses by 10% and then in 2000 by 5% so the

population in
2000 now is 10+5+(50/100)=+15.5% more that was in 1999 and if there is a
decrease then it will be preceeded by a -ve sign and likewise.

Rules of Logarithms:

-> loga(M)=y if and only if M=ay

-> loga(MN)=loga(M)+loga(N)
-> loga(M/N)=loga(M)-loga(N)
-> loga(Mp)=p*loga(M)
-> loga(1)=0-> loga(ap)=p
-> log(1+x) = x – (x^2)/2 + (x^3)/3 – (x^4)/4 ………to infinity [Note the alternating sign . .Also note that the ogarithm is with respect
to base e]

Vedic maths

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