++

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 = (2^4 * 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.
++

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

++
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
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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 .
++
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.)
++

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
+++
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) .
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|x| + |y| >= |x+y| (|| stands for absolute value or modulus)
(Useful in solving some inequations)
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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

++
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

++
If any parallelogram can be inscribed in a circle , it must be a rectangle.

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If a trapezium can be inscribed in a circle it must be an isosceles trapezium (i:e oblique sides equal).

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For an isosceles trapezium , sum of a pair of opposite sides is equal in length to the sum of the other pair of opposite sides .(i:e AB+CD = AD+BC , taken in order) .
++

Area of a regular hexagon : root(3)*3/2*(side)*(side)
++
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

+++

For three positive numbers a, b ,c

$(a+b+c) * (1/a+1/b+1/c)>=9$

+++
For any positive integer n

$2<= (1+1/n)^n <=3$

+++

$a^2+b^2+c^2 >= ab+bc+ca$
If a=b=c , then the equality holds in the above.

$a^4+b^4+c^4+d^4 >=4abcd$
+++

$(n!)^2 > n^n$ (! for factorial)
+++

If a+b+c+d=constant , then the product $a^p * b^q * c^r * d^s$ will be maximum
if a/p = b/q = c/r = d/s .
+++

Consider the two equations

$a_1x+b_1y=c_1$
$a_2x+b_2y=c_2$

Then ,
If $a_1/a_2 = b_1/b_2 = c_1/c_2$, then we have infinite solutions for these equations.
If $a_1/a_2 = b_1/b_2$ <> c_1/c_2 , then we have no solution for these equations.(<> means not equal to)
If a_1/a_2 <> b_1/b_2 , then we have a unique solutions for these equations..
+++
For any quadrilateral whose diagonals intersect at right angles , the area of the quadrilateral is $0.5*d_1*d_2$, where d_1,d_2 are the lenghts of the diagonals.
+++
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) .
+++
If n is even , n(n+1)(n+2) is divisible by 24

If n is any integer , $n^2 + 4$ is not divisible by 4

+++
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]

++

Area of a triangle
1/2*base*altitude = 1/2*a*b*sinC = 1/2*b*c*sinA = 1/2*c*a*sinB = root(s*(s-a)*(s-b)*(s-c)) where s=a+b+c/2
=a*b*c/(4*R) where R is the CIRCUMRADIUS of the triangle = r*s ,where r is the inradius of the triangle .

In any triangle
a=b*CosC + c*CosB
b=c*CosA + a*CosC
c=a*CosB + b*CosA
++

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+..........)
++

(7)In any triangle
a/SinA = b/SinB =c/SinC=2R , where R is the circumradius
++
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)
++

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

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]
++

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

For a cyclic quadrilateral , area = root((s-a) * (s-b) * (s-c) * (s-d)) , where s=(a+b+c+d)/2
++

For a cyclic quadrilateral , the measure of an external angle is equal to the measure of the internal opposite angle.

(m+n)! is divisible by m! * n! .
++
+++++
If a quadrilateral circumscribes a circle , the sum of a pair of opposite sides is equal to the sum of the other pair .
++

The sum of an infinite GP = a/(1-r) , where a and r are resp. the first term and common ratio of the GP .
++
The equation whose roots are the reciprocal of the roots of the equation ax^2+bx+c is cx^2+bx+a

++
The coordinates of the centroid of a triangle with vertices (a,b) (c,d) (e,f) is((a+c+e)/3 , (b+d+f)/3) .
++
The ratio of the radii of the circumcircle and incircle of an equilateral triangle is 2:1 .
++

Area of a parallelogram = base * height
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APPOLLONIUS THEOREM:

In a triangle , if AD be the median to the side BC , then
AB^2 + AC^2 = 2(AD^2 + BD^2) or 2(AD^2 + DC^2) .

++

for similar cones , ratio of radii = ratio of their bases.

The HCF and LCM of two nos. are equal when they are equal .

+++

Volume of a pyramid = 1/3 * base area * height
+++

In an isosceles triangle , the perpendicular from the vertex to the base or the angular bisector from vertex to base bisects the base.

+++

In any triangle the angular bisector of an angle bisects the base in the ratio of the other two sides.

++
The quadrilateral formed by joining the angular bisectors of another quadrilateral is always a rectangle.
+++

Roots of x^2+x+1=0 are 1,w,w^2 where 1+w+w^2=0 and w^3=1
+++

|a|+|b| = |a+b| if a*b>=0
else |a|+|b| >= |a+b|
+++

2<= (1+1/n)^n <=3

++
WINE and WATER formula:

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
++

Area of a hexagon = root(3) * 3 * (side)^2
++

(1+x)^n ~ (1+nx) if x<<<1
++

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

Area of a trapezium = 1/2 * (sum of parallel sids) * height = median * height where median is the line joining the midpoints of the oblique sides.
++

when a three digit number is reversed and the difference of these two numbers is taken , the middle number is always 9 and the sum of the other two numbers is always 9 .
++
ANy function of the type y=f(x)=(ax-b)/(bx-a) is always of the form x=f(y) .
++

Let W be any point inside a rectangle ABCD .
Then
WD^2 + WB^2 = WC^2 + WA^2

Let a be the side of an equilateral triangle . then if three circles be drawn inside this triangle touching each other then each's radius = a/(2*(root(3)+1))
++

Let 'x' be certain base in which the representation of a number is 'abcd' , then the decimal value of this number is a*x^3 + b*x^2 + c*x + d
++

when you multiply each side of the inequality by **-1**, you have to reverse the direction of the inequality.

+++

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

+++

many of u must b aware of this formula, but the ppl who don't know it must b useful for them.
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 likeiwse