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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.

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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

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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.

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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.)

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For a cubic equation $ax^3+bx^2+cx+d=0$

sum of the roots = $-b/a$

sum of the product of the roots taken two at a time = c/a

product of the roots = $-d/a$

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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

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If for two numbers $x+y=k$ (=constant), then their PRODUCT is MAXIMUM if $x=y$ ($=k/2$). The maximum product is then $(k^2)/4$

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 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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$|x| + |y| \geq |x+y|$ (| 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

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 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

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 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) .
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Area of a regular hexagon : $root(3)*3/2*(side)*(side)$
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 For any 2 numbers $a>b$

$a>AM>GM>HM>b$ (where AM, GM ,HM stand for arithmetic, geometric , harmonic menasa respectively)

$(GM)^2 = AM * HM$

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For three positive numbers a, b ,c

$$(a+b+c) * (1/a+1/b+1/c) \geq 9$$

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For any positive integer n

$$2 \leq (1+1/n)^n \leq 3$$

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$$a^2+b^2+c^2 \geq ab+bc+ca$$

If a=b=c , then the equality holds in the above.

$$a^4+b^4+c^4+d^4 \geq 4abcd$$

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$$(n!)^2 > n^n \text{ (! for factorial)}$$

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

$$\text{if } a/p = b/q = c/r = d/s .$$

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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 $a_1/a_2 = b_1/b_2 \neq c_1/c_2$, then we have no solution for these equations.(\neq means not equal to)

If $a_1/a_2 \neq b_1/b_2$, then we have a unique solutions for these equations..

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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 lengths of the diagonals.

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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) .

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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

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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]

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Area of a triangle

$1/2 * \text{base} * \text{altitude} = 1/2 * a * b * \sin C = 1/2 * b * c * \sin A = 1/2 * c * a * \sin B = \text{root}(s * (s-a) * (s-b) * (s-c))$ 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

$$a = b * \cos C + c * \cos B$$

$$b = c * \cos A + a * \cos C$$

$$c = a * \cos B + b * \cos A$$

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If $a_1/b_1 = a_2/b_2 = a_3/b_3 = \dots$, then each ratio is equal to
 $(k_1 * a_1 + k_2 * a_2 + k_3 * a_3 + \dots) / (k_1 * b_1 + k_2 * b_2 + k_3 * b_3 + \dots)$, which is also equal to

$$(a_1 + a_2 + a_3 + \dots) / (b_1 + b_2 + b_3 + \dots)$$

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(7) In any triangle

$$a / \sin A = b / \sin B = c / \sin C = 2R$$
, where R is the circumradius

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$x^n - a^n = (x-a)(x^{n-1} + x^{n-2} + \dots + a^{n-1})$ Very useful for finding multiples
.For example $(17-14=3)$ will be a multiple of $17^3 - 14^3$

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$$e^x = 1 + (x)/1! + (x^2)/2! + (x^3)/3! + \dots \text{to infinity}$$
$$2 < e < 3$$

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$$\log(1+x) = x - (x^2)/2 + (x^3)/3 - (x^4)/4 \dots \text{to infinity}$$
 [Note the alternating sign .
.Also note that the logarithm is with respect to base e]

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

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

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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 $m! * n!$.

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If a quadrilateral circumscribes a circle , the sum of a pair of opposite sides is equal to the sum of the other pair .

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

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

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The coordinates of the centroid of a triangle with vertices (a,b) (c,d) (e,f)
is $((a+c+e)/3, (b+d+f)/3)$.

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The ratio of the radii of the circumcircle and incircle of an equilateral triangle is 2:1 .
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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 $2(AD^2 + DC^2)$.

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

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

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Volume of a pyramid = $1/3$ * base area * height
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In an isosceles triangle , the perpendicular from the vertex to the base or the angular bisector from vertex to base bisects the base.

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

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The quadrilateral formed by joining the angular bisectors of another quadrilateral is always a rectangle.
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Roots of $x^2+x+1=0$ are $1, w, w^2$ where $1+w+w^2=0$ and $w^3=1$

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$|a|+|b| = |a+b|$ if $a*b \geq 0$
else $|a|+|b| > |a+b|$

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$2 \leq (1+1/n)^n \leq 3$

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To find the squares of numbers from 50 to 59

For $5X^2$, use the formulae

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

$$\text{Eg ; } (55)^2 = 25+5 / 25$$

$$=3025$$

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

$$=3136$$

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

$$=3481$$

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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 successive 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 likeiwise