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 41^2 , Add 40+41 to 1600 =1681

To find 59^2 , Subtract 60^2-(60+59) = 3481

eg:  $x^4+3x^2+2x+6=0$  has no positive roots.

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

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

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) .

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

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.

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

a1x+b1y=c1 a2x+b2y=c2

Then,

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

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*base*altitude = 1/2*a*b*sinC = 1/2*b*c*sinA = 1/2*c*a*sinB = root(s*(s-a)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b)*(s-b
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 = \dots, 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)} + \dots + a^{(n-1)}) \dots Very useful for finding multiples
.For example (17-14=3 \text{ will be a multiple of } 17^3 - 14^3)
e^x = 1 + (x)/1! + (x^2)/2! + (x^3)/3! + \dotsto 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 guadrilateral, 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.
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The ratio of the radii of the circumcircle and incircle of an equilateral triangle is 2:1 .

## **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 .

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.

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

++++	+++++++	+++++++++++++++++++++++++++++++++++++++					+++++++++++++++++++++++++++++++++++++++				
WINE			and			WATER			formula:		
Q	be		the	vo	lume		of		а	vessel	
of a be A	mixture o the nu be th	f water Imber Ie fil	and of nal	wine b time qty	e ren s of	noved this wine	each ope e	time ration in	from a be the	mixture done mixture	
(1-q/Q) +++++	^n +++++++	+++++	.++++	+++++	++++	++++	++++	++++	+++++	, ·++++	
f a hexa +++++	agon = root( +++++++	(3) * 3 * +++++	(side)⁄ ++++	^2 +++++	++++	++++	++++	++++	+++++	+++++	
^n ~ (1 +++++	+nx) if x<< +++++++	<1 +++++	++++	+++++	++++	++++	++++	++++	+++++	+++++	
Some			pythagorean					triplets:			
3 5 7 1 51 37 55	(8^2 (12	^2 (16^2	/	2	2	=	=	=	(3 (5^2 (7^2 15+17 (9^2 (11^2	^2=4+5) =12+13) =24+25) ) =40+41) =60+61) 35+37) 63+65)	
	+++++ Q of a be A (1-q/Q) +++++ of a hexa +++++ ^n ~ (1 +++++ 35 57 1 51 37 55	++++++++++++++++++++++++++++++++++++	+++++++++++++++++++++++++++++++++++++	+++++++++++++++++++++++++++++++++++++	+++++++++++++++++++++++++++++++++++++	+++++++++++++++++++++++++++++++++++++	+++++++++++++++++++++++++++++++++++++	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	+++++++++++++++++++++++++++++++++++++	

\*\*\*\*\*\*

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 .

Let	W	be	any	point	inside	а	rectangle	ABCD	
Then									
WD^2		+	WB	^2	=	WC^2	+	V	VA^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.

 $(5X)^{2} = 5^{2} + X / X^{2}$ 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 discounts of succesive types sums. population 1999 10% like increses by 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