1) Zeros
0! = 1
k^0 = 1
0^0 is not defined
Zero is neither positive nor negative
Zero is even
Zero is divisible by every integer (except 0), since remainder of 0/k = 0
Zero is a multiple of every integer. 0 = k*0

2) Sum of an evenly spaced series is: 5 +10 +15 + 20 + 25 +... + 100
S = n/2 ((2a + (n-1)*d) = 20/2 (5*2 + 19*5) = 1050

3) (a-b)^3 = a^3-b^3-3ab(a-b)

4) For an equilateral triangle, [sqrt(3)/4] a^2 = Area, where a is a side.
The radius of a circle in which an equilateral triangle inscribed = a/sqrt(3).
If a side, a = 6, then radius of the circle = 2 sqrt(3). Thus area = 12 pi

5) Circular Permutation: n! /n = (n-1)!

6) Diagonal is the longest distance in a rectangular box.
Diagonal D = sqrt(L^2 + W^2 + H^2) = D = sqrt(10^2 + 10^2 + 5^2) D = sqrt(225) D = 15

Finding the slope of a line with two points (x1,y1) (x2,y2) = (y2-y1)/(x2-x1)
Distance between two points = sqrt{(x1-x2)^2 + (y1-y2)^2}
Distance of a point (x1, y1) from a line (ax + by + c = 0) : (ax1+by1+c)/ sqrt(a^2+b^2)

7) Area of the triangle: Sqrt[S(S-a)(S-b)(S-c)]. Where, S=(a+b+c)/3

Area of the triangle: Sqrt[S(S-a)(S-b)(S-c)]. Where, S=**(a+b+c)/2**

8) Area of the equilateral triangle: [Sqrt(3)/4] (S^2)

9) Equilateral triangle inscribed in a circle, r = a/sqrt(3). Therefore in this case, a = 6 and radius of the circle = 2 sqrt(3). Thus area = 12 pi

10) Area of the Pyramid = 1/3 * base S * height

Surface Area of a Pyramid = 1/2 * Perimeter of the base * Side + (Area of the Base)

11) Acute triangle = All angles less than 90 degrees
12) Obtuse angle = One angle is 90 degree or more than 90 degree
13) Scalene triangle = None of the sides are equal
14) Size of the Right Angle Triangles = 30 : 60 : 90 (1 : √3 : 2)
45 : 45 : 90 (1 : 1 : √2)

15) Trapezoid = A quadrilateral with two opposite sides parallel.
16) Parallelogram = A quadrilateral with parallel opposite sides.
17) Rhombus = A quadrilateral with all equal sides and parallel opposite sides.
18) A parallelogram with sides 14 and 18 and 1 diagonal of 16, other diagonal = =d1^2 + d2^2 =2(a^2+b^2) =28, where d1 and d2 are two diagonals, a and b are two sides. I am not sure about how/ if it extends to trapezoid, but it extends a to a Rhombus: d1^2 + d2^2 = 4a^2
Diagonal is the longest distance in a rectangular box.
Diagonal D = sqrt (L^2 + W^2 + H^2)
D = sqrt (10^2 + 10^2 + 5^2) = sqrt (225) = 15.

19) No of ways in which n things can be divided among r persons so that each of them can receive 0 or more is = (n+r-1)C(r-1) ways. If n= 5, r = 3, so required ways = 7C2 = 21.
20) no of ways in which n things can be divided among r persons so that each of them receive at least 1 = (n-1)C(r-1)=4C2=6.
21) Bi-nominal dist = nPk = nCk . pk (1-p)n-k
22) PEMDAS = (), Ex x ÷ + -
23) Standard Deviation = Mean + or – 1 SD = 68%
Mean + or – 2 SD = 95%
Mean + or – 3 SD = 99% or 99.7%

24) Quadratic Equation =
Ax2 + bx + c = 0
x2 + (b/a) x = -c/a
[x + (b/2a)]2 = -c/a + b2/4a2
[x + (b/2a)]2 = (b2-4ac)/4a2
x + b/2a = +or – sqrt (b2-4ac)/2a
x = +or – sqrt (b2-4ac)/2a - b/2a
x = [- b {+ or –} sqrt (b2-4ac)]/2a
Some other Important Tips:

25) Watch for |X|, GMAT likes questions involving modulus.
26) In general, X^2 is greater than X. However, if X is a fraction between 0 and 1, any higher (n greater than or equal to powers of X i.e. X^N < X i.e. X is bounded with in 0 and 1. i.e. 0 < X < 1.
27) Note that 2 is a very special number. It is an even number and also a prime number. When plugging in numbers for a problem involving prime numbers, usually we think of odd numbers but not 2. Note that GMAT is setting up a trap for you.
28) Note that the inequality changes when multiplied by negative numbers e.g. X <2> -4. By multiplying by -2, the inequality has changed. However, multiplying by a positive number, the inequality does not change. For example, if X < 2 then 3 X <6> 0, y > 0.

31) Note the following simple facts:
Sum, product or difference of two even numbers yields an even number.

Sum and difference of two odd numbers is Even. Product of two odd numbers is Odd.
Sum or difference of an odd and even number is odd.
Product of an odd and even number is Even.

32) Know the difference between a factor and a multiple. Do not get confused.
33) Note that for any real number x not equal to zero, x ^^ 2 is always positive

34) Even though X^^2 = 16 has two solutions, X^^3 = 8 has only one real solution. i.e. X ^^3 = 8 does not mean x is either 2 or -2. NO. X is 2. Eg:
1. statement 1 : X^^2 = 4, Statement 2: X^^3 > X Answer C.
2. Statement 1: X^^3 = 8, statement 2: X^^3 > X. Answer A.

35) As already posted earlier, test some critical conditions such as

x = 0, 1, -1.
x = even and odd
x = fraction between 0 and 1

36) Note that 2 independent equations are needed to solve for x and y. GMAT likes to set up a trap where Statement 1 and Statement 2 appear to provide two equations. So, it is natural to pick answer C thinking that two equations and two unknown. Write down the equations. In some cases, both statements 1 and 2 might give you the same equation. In other words, you will end up with only one equation to solve for x and y. So, in this case the answer should be E.

37) Do not assume any information that is not provided. For example, GMAT tries to set you up by saying x, y, and z are three consecutive integers. This does not mean => x<y<z>y>z unless otherwise stated.

1. Mixture: when you mix different quantities (say n1 and n2) of A and B, with different strengths or values v1 and v2 then their mean value vm after mixing will be:

$$Vm = (v1.n1 + v2.n2) / (n1 + n2)$$

you can use this to find the final price of say two types of rice being mixed or final strength of acids of different concentration being mixed etc....

the ratio in which they have to be mixed in order to get a mean value of vm can be given as:
$$n1/n2 = (v2 - vm)/(vm - v1)$$

When three different ingredients are mixed then the ratio in which they have to be mixed

in order to get a final strength of vm is:
n1 : n2 : n3 = (v2 - vm)(v3 - vm) : (vm - v1)(v3 - vm) : (v2 - vm)(vm - v1)

2. If from a vessel containing M units of mixtures of A & B, x units of the mixture is taken out & replaced by an equal amount of B only .And If this process of taking out & replacement by B is repeated n times , then after n operations,
Amount of A left/ Amount of A originally present = (1-x/M)^n

3. If the vessel contains M units of A only and from this x units of A is taken out and replaced by x units of B. if this process is repeated n times, then:

Amount of A left = M [(1 - x/M)^n]

This formula can be applied to problem involving dilution of milk with water, etc...

Here is the 2nd part:
PROGRESSION:
Sum of first n natural numbers: 1 +2 +3 + ... + n = [n(n+1)]/2
Sum of first n odd numbers: 1 + 3 + 5 + ... upto n terms = n^2
Sum of first n even numbers: 2 + 4 + 6 + ... upto n terms = n(n+1)
ARITHMETIC PROGRESSION
nth term of an Arithmetic progression = a + (n-1)d
Sum of n terms in an AP = s = n/2 [2a + (n-1)d]
where, a is the first term and d is the common differnce.
If a, b and c are any three consequtive terms in an AP, then 2b = a + c
GEOMETRIC PROGRESSION
nth term of a GP is = a[r^(n-1)]
sum of n terms of a GP:
s = a [(r^n - 1)/(r-1)] if r > 1
s = a [(1 - r^n)/(r-1)] if r < 1]
sum of an infinite number of terms of a GP is
s(approx.) = a/ (1-r) if r <1>v, then their relative speed = (u-v) m/s
*Suppose 2 trains or 2 bodies are moving in the opposite direction at u m/s and v m/s, where u>v, then their relative speed = (u+v) m/s
*If 2 trains of length a metres and b metres are moving in opposite directions at u m/s and v m/s, then the time taken by the trains to cross each other = (a+b)/(u+v) sec
*If 2 trains of length a metres and b metres are moving in same directions at u m/s and v m/s, then the time taken by the faster train to cross the slower train = (a+b)/(u-v) sec
*If 2 trains(or bodies) start at the same time from points A and B towards each other and after crossing they take a and b sec in reaching B and A respectively, then
(A's speed) B's speed) = (root(B):root(A))

4. Divisibility: This one is a nice formula for finding the number of unique divisors for any number and also the sum of those divisors.... such questions are there in powerprep and so you might also get it in your real GMAT

If N is a number such that
N = (a^m) (b^n) (c^p)....
where, a, b, c, ... are prime numbers, then the number of divisors of N, including N itself is equal to:
(m+1) (n+1) (p+1)....
and the sum of the divisors of N is given by:
S = [(a^m+1) - 1]/[a - 1] * [(b^n+1) - 1]/[b - 1] * [(c^p+1) - 1]/[c- 1].....

Example: for say N = 90, on factorizing you get 90 = 3*3*5*2= (3^2)*(5^1)*(2^1)
then the number of divisors of 90 are (2+1)(1+1)(1+1) = 12
the 12 divisors are 1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90
And the sum of the divisors would be
[(3^3) - 1]/[3 - 1] * [(5^2) - 1]/[5 - 1] * [(2^2) - 1]/[2 - 1]
= (26/2) (24/4) (3/1)
= 234

Though this method looks more complicated than listing the factors and adding them, once you get used to this formula, it saves lot of time..

The 5th part: Co-ordinate geometry:

Let the coordinates of P1 be (x1,y1) and of P2 be (x2,y2)

- The distance from P1 to P2 is:
d = sqrt[(x1-x2)2+ (y1-y2)2]
- The coordinates of the point dividing the line segment P1P2 in the ratio r/s are: ([r x2+s x1]/[r+s], [r y2+s y1]/[r+s])
- As a special case, when r = s, the midpoint of the line segment has coordinates: ([x2+x1]/2,[y2+y1]/2)
- The slope m of a non-vertical line passing through the points P1 and P2:
slope = m = (y2 -y1)/(x2 -x1)

* Two (non-vertical) lines are parallel if their slopes are equal.
* Two (non-vertical) lines are perpendicular if the product of their slopes = -1
* Slope of a perpendicular line is the negative reciprocal of the slope of the given line.

6. The population of a town decreases by 'x%' during the first year, decreases by 'y%' during the second year and again decreases by 'z%' during the third year. If the present population of the town is 'P', then the population of the town three years ago was::

P*100*100*100

(100-x)(100-y)(100-z).

The population of a town is 'P'.It decreases by 'x%' during the first year, decreases by

'y%' during the second year and again deceases by 'z%' during the third year. The population after 3 years will be:
P*(100-x)(100-y)(100-z)

100*100*100.

If 'X' litres of oil was poured into a tank and it was still 'x%' empty, then the quantity of oil that must be poured into the tank in order to fill it to the brim is:
X*x
------- litres.
100 - x

If 'X' liters of oil was poured into a tank and it was still 'x%' empty, then the capacity of the tank is:
X*100
---------- litres.
100 - x

7. Permutation & Combination:

1. If one operation can be performed in m ways and another operation in n ways, then the two operations in succesion can be done in m*n ways

2. The linear permutation of n distinct objects (that is, the number of ways in which these n objects can be arranged is n! and the circular permutation of n distinct objects is (n-1)! But if the clockwise and anticlockwise directions are indistinguishable then the circular permutations of n different things taken at a time is (n-1)!/2

3. But out of these n objects, if there are n1 objects of a certain type, n2 of another type and n3 of another, and so on, Then the number of arrangements (linear permutations) possible is n!/n1!n2!...nz!

4. The total number of ways of arranging r things from n things is given by nPr = n!/(n-r)!

5. The number of ways to select r things out of n things is given by nCr = n!/(r!*(n-r)!)

6. nPr = r! * nCr

8th part: COUNTING

SUM OF FIRST “n” NATURAL NUMBERS = n(n+1)/2
Sum of first “n” ODD integers = n*n
Sum of first “n” EVEN integers = n(n+1)
Sum of the squares of the first n integers = n(n+1)(2n+1)/6

Sum of the cubes of first n integers =(n(n+1)/2)^2

IF n is even, then
No. of odd no.s from 1 to n is n/2
No. of even no.s from 1 to n is n/2

If n is odd then,
No. of odd no.s from 1 to n is (n+1)/2
No. of even no.s from 1 to n is (n-1)/2

9th part: POWERS AND INDICES

To find the unit digit of p^n

If there is an odd no. in the unit place of p eg 741,843 etc
Multiply the unit digit by itself until u get 1.

Example: If u need to find the unit digit of (743)^38:
Multiply 3 four times to get 81. (743)^38=(743)^36 X (743)^2.
36 is a multiple of 4, and 3 when multiplied 4 times gives 1 in the unit digit.Therefore, when multiplied 9 x 4 times, it will still give 1 in the unit digit. the unit digit of (743)^38, hence will be 1 x 9 =9

In short
(…..1)^n =(…..1)
(….3)^4n=(…..1)
(….7)^4n=(…..1)
(….9)^2n=(….1)

If the unit digit of p is even and u need to find the unit digit of (p)^n

Multiply the unit digit of p by itself until a 6 is in the unit place
(…2)^4n=(….6)
(….4)^2n=(….6)
(….6)^n=(….6)
(….8)^4n=(….6)

For numbers ending with 1,5,6, after any times of multiplication, you get only 1, 5, 6 respectively.

Number of numbers divisible by a certain integer: How many numbers upto 100 are divisible by 6?

Soln: Divide 100 by 6, the resulting quotient is the required answer
Here, 100/6 = 16x6+4 16 is the quotient and 6 is the remainder. Therefore, there are 16

numbers within 100 which are divisible by 6.

10. PERCENTAGES

* If the value of a number is first increased by x% and later decreased by x%, the net change is always A DECREASE= (x^2)/100 %
* if the value of a number is first increased by x% and then decreased by y%, then there is (x-y-(xy/100))% increase if positive , and decrease if negative
* If the order of increase or decrease is changed, THE RESULT IS UNAFFECTED
* If the value is increased successively by x% and y%,then final increase is given by x+y+(xy/100) %

11. Letter Arrange: Suppose you have a name with n letters, and there are k1 of one letter, k2 of another letter, and so
on, up to kz. For example, in ELLEN,

n = 5, k1 = 2 [two E's], k2 = 2 [two L's], k3 = 1 [one N]). Then the number of rearrangements is n!/k1!k2!...kz!

Area
1. Area of a triangle with base b and height h = (1/2)*b*h
2. The area of an equilateral triangle with side a is [sqrt(3)/4]*a^2
3. The area of any triangle given the length of its 3 sides a, b and c:is sqrt[s(s-a)(s-b)(s-c)] where s= (a+b+c)/2

Number Theory:

The product of any three consecutive integers is divisible by 6. Similarly, the product of any four consecutive integers is divisible by 24.

Math-o-pedia: Did You Know? : Permutation and Combination

When n dice (n > 1) are rolled simultaneously, the number of outcomes in which all n dice show the same number is 6, irrespective of the value of n.

Similarly, when n fair coins (n > 1) are tossed simultaneously, the number of outcomes in which all n coins turn up as heads or as tails is 1, irrespective of the value of n.

12. Math-o-pedia: Did you know? : Speed Time

When an object travels the first x hours at p km/hr and the next x hours at q km/hr, the average speed of travel is the arithmetic mean of p and q.

However, when the object travels the first x kms at p km/hr and the next x kms at q km/hr, the average speed is the harmonic mean of p and q.

Math-o-pedia: Did you know? : Number Theory

Any perfect square has an odd number of factors including 1 and the number itself and a composite number has an even number of factors including 1 and itself. Any perfect square can be expressed in the form 4n or 4n+1.

Math-o-pedia: Did you know?: Profit Loss

If the selling price of 2 articles are equal and 1 of them is sold at a profit of p% and the other at a loss of p%, then the 2 trades will result in a cumulative loss of ((p^2)/100)%.

If the cost of price of 2 articles are equal and 1 of them is sold at a profit of p% and the other at a loss of p%, then the 2 trades will result in no profit or loss.

Math-o-pedia: Did you know? : Progressions

Arithmetic mean of 'n' numbers will always be greater than the geometric mean of those 'n' numbers which will be greater than the Harmonic mean of those 'n' numbers.

Arithmetic mean of 2 numbers = geometric mean of '2' numbers = harmonic mean of '2' numbers if both the numbers are equal.

13. TIME AND WORK

* If A can do a piece of work in x days, then A’s one day’s work=1/x
* If the ratio of time taken by A and B in doing a work is x:y, then, ratio of work done is 1/x :1/y=y:x. And the ratio in which the wages is to be distributed is y:x
* If A can do a work in x days and B can do the same work in y days, then A and B can together do the work in (xy)/(x+y) days
* If “a” men or “b” women can do a piece of work in x days, then “m” men and “n” women can together finish the work in (abx)/(an+bm) days
* If A is x times efficient than B, and working together, they finish the work in y days, then Time taken by A=y(x+1)/(x), Time taken by B=y(x+1)
* If A and B can finish a work in “x” and “ax” days respectively, that is if A is “a” times efficient than B, then working together, they can finish the work in (ax)/(a+1) days
* If A and B working together can complete a work in x days, whereas B working alone can do the same work in y days, ten, A alone will complete the work in (xy)/(y-x) days.
* Pipe A can fill a tank in x hrs and B can empty a tank in y hrs.If both pipes are opened together, the tank will be filled in (xy)/(y-x) hrs
* A pipe can fill a cistern in x hrs but due to leakage in the bottom, it is filled in y hrs, then the time taken by the leak to empty the cistern is (xy)/(y-x) hrs

14. Rectangle:

Area = lw. Perimeter = 2l + 2w

Parallelogram: Area = bh

Triangle: Area = 1/2 of the base X the height = 1/2 bh
Perimeter = a + b + c
Trapezoid: Perimeter = P = a + b1 + b2 + c

Circle: The distance around the circle is a circumference. The distance across the circle is the diameter (d). The radius (r) is the distance from the center to a point on the circle. (Pi = 3.14)
d = 2r
c = ?d = 2 ?r
A = ?r2
??=3.14)

15th part: Rectangular Solid

Volume = lwh. Surface = 2lw + 2lh + 2wh

Prisms
Volume = Base area X Height

Surface = 2b + Ph (b is the area of the base P is the perimeter of the base)

Cylinder
Volume = ?r2 h
Surface = 2?rh

Pyramid
V = 1/3 bh
b is the area of the base
Surface Area: Add the area of the base to the sum of the areas of all of the triangular faces. The areas of the triangular faces will have different formulas for different shaped bases.

Cones
Volume = 1/3 Pi*r2 x height = 1/3 Pi*r2*h
Surface = Pi*r2 + Pi*r*l

Sphere
Volume = 4/3*Pi*r^3
Surface area = 4*Pi*r^2

16. Distance of a Point from a Line

The perpendicular distance d of a point P (x 1, y 1) from the line ax +by +c = 0 is given by:
d =| ax1 +by1 +c|/[$(a^2 + b^2)$]

Simple And Compound Interest
1. Simple Interest = PNR/100
where, P --> Principal amount
N --> time in years
R --> rate of interest for one year

2. Compound interest (abbreviated C.I.) = A -P =
where A is the final amount, P is the principal, r is the rate of interest compounded yearly and n is the number of years

3. When the interest rates for the successive fixed periods are r1 %, r2 %, r3 %, ..., then the final amount A is given by A =

4. S.I. (simple interest) and C.I. are equal for the first year (or the first term of the interest period) on the same sum and at the same rate.

5. C.I. of 2nd year (or the second term of the interest period) is more than the C.I. of Ist year (or the first term of the interest period), and C.I. of 2nd year -C.I. of Ist year = S.I. on the interest of the first year.

17. Central Tendency

1. Mean.
(i) Mean (for ungrouped data) = where x1, x2, x3, ..., xn are the observations and n is the total no. of observations.
(ii) Mean (for grouped data) = , where x1, x2, x3, ..., xn are different variates with frequencies f1, f2, f3, ..., fn respectively.
(iii) Mean for continuous distribution.
Let there be n continuous classes, yi be the class mark and fi be the frequency of the ith class, then
mean = (Direct method)
Let A be the assumed mean, then
mean = A + , where di = yi -A (Short cut method)
If the classes are of equal size, say c, then
mean = A +c x , where ui = (Step deviation method)

1. Median.
(i) Median is the central value (or middle observation) of a statistical data if it is arranged in ascending or descending order.
(ii) Let n be the total number of observations, then
Median =

2. Quartiles
(i) Lower Quartile =
(ii) Upper Quartile =
(iii) Inter quartile-range = upper quartile -lower quartile

3. Mode.
(i) Mode (or modal value) of a statistical data is the variate which has the maximum frequency.
(ii) The class with maximum frequency is called the modal-class.

18. LINES - BASICS:

1. The equation of X axis: y =0
2. The equation of Y axis: x = 0
3. Equation of straight line parallel to X axis: y =a, where a is any constant
4. Equation of straight line parallel to Y axis: x =a, where a is any constant
5. Equation of a straight line through a given point (x1, y1) and having a given slope m: y -y1 = m (x - x1)
6. Equation of a straight line through a given point (0, 0) and having a given slope m: y = m x
7. Equation of a straight line with a slope m and y-intercept c is: y = mx + c
8. Equation of a straight line passing through two points (x1, y1) and (x2, y2) is:
(y -y1)/(y2 - y1) = (x -x1)/(x2 -x1)
9. Equation of a straight line whose x and y intercepts are a and b is:
x/a + y/b = 1
10. The length of the perpendicular drawn from origin (0,0) to the line Ax + By + C =0 is :
C/ sqrt(A^2 + B^2)

11. Length of the perpendicular from (x1, y1) to the line Ax + By + C =0 is: Ax1 + By1 +C / sqrt(A^2 + B^2)

12. The point of intersection of two lines a1x + b1y +c1 = 0 and a2x + b2y +c2 = 0 is :
([b1*c2 - b2*c1]/[a1*b2 - a2*b1], [c1*a2 - c2*a1]/[a1*b2 - a2*b1])
13. The condition for concurrency of three lines a1x + b1y +c1 = 0, a2x + b2y +c2 = 0 and a3x + b3y +c3 = 0 is (in determinant form)
| a1 b1 c1 |
| a2 b2 c2 | = 0
| a3 b3 c3 |

14. The angle between two lines y = m1x + c1 and y = m2x + c2 is tan inverse of the modulus of : [(m1 - m2)/(1 + m1*m2)]

15. Condition for parallelism of two lines with slopes m1 and m2 is m1 = m2

16. Condition for perpendicularity of two lines with slopes m1 and m2 is m1*m2 =-1

19th part: CIRCLES:

17. General equation of a circle with centre (x1, y1) and radius r is:
$(x - x1)^2 + (y - y1)^2 = r^2$
18. The equation of a circle whose diameter is the line joining the points (x1, y1) and (x2, y2) is :
$(x - x1)(x - x2) + (y - y1)(y - y2) = 0$
19. The equation of the tangent to the circle $x^2 + y^2 = a^2$ (where a is the radius of the circle) at the point (x1, y1) on it is :
$x*x1 + y*y1 + a^2$
20. The condition for y = mx + c to be a tangent to the circle $x^2 + y^2 = a^2$ is :
$c^2 = a^2 (1 + m^2)$

20th part: Events:
1. If two events are mutually exclusive (i.e. they cannot occur at the same time), then the probability of them both occurring at the same time is 0. then: P(A and B) = 0 and P(A or B) = P(A) + P(B)

2. if two events are not-mutually exclusive (i.e. there is some overlap) then: P(A or B) = P(A) + P(B) - P(A and B)

3. If events are independent (i.e. the occurrence of one does not change the probability of the other occurring), then the probability of them both occurring is the product of the probabilities of each occurring. Then: P(A and B) = P(A) * P(B)

4. If A, B and C are not mutually exclusive events, then P(A or B or C) = P(A) + P(B) + P(C) - P(A and B) - P(B and C) - P(C and A) + P(A and B and C)

and = intersection
or = union

Harmonic mean:
The harmonic mean of x1,...,xn is
n / (1/x1 + ... + 1/xn)

As the name implies, it's a mean (between the smallest and largest values). An example of the use of the harmonic mean: Suppose we're driving a car from Amherst (A) to Boston (B) at a constant speed of 60 miles per hour. On the way back from B to A, we drive a constant speed of 30 miles per hour (**** Turnpike). What is the average speed for the round trip?

We would be inclined to use the arithmetic mean; (60+30)/2 = 45 miles per hour. However, this is incorrect, since we have driven for a longer time on the return leg. Let's assume the distance between A and B is n miles. The first leg will take us n/60 hours, and the return leg will take us n/30 hours. Thus, the total round trip will take us (n/60) + (n/30) hours to cover a distance of 2n miles. The average speed (distance per time) is thus:

$2n / \{(n/60) + (n/30)\} = 2 / (1/20) = 40$ miles per hour.
The reason that the harmonic mean is the correct average here is that the numerators of the original ratios to be averaged were equal (i.e. n miles at 60 miles/hour versus n miles at 30 miles/hour). In cases where the denominators of two ratios are averaged, we can use the arithmetic mean.

21st part: Ratio, LCM, HCF:

* Product of 2 numbers is the produst of their LCM & HCF.
* LCM of a fraction = LCM of numerator/HCF 0f denominator.
*HCF of a fraction = HCF of numer./LCM of denom.

Ratio & Proportion:
* if a/b = c/d = e/f = ...
then, a/b = c/d = e/f =(a+c+e+...)/(b+d+f+...)

* If a/b = c/d, then,

i) b/a = d/c
ii) a/c = b/d
iii) (a+b)/ b = (c+d)/d
iv) (a-b)/b = (c-d)/d
v) (a+b)/(a-b) = (c+d)/(c-d)

22nd part: Money in Compound Interest gets doubled in 70/r years (approximately)

ie. $P(1+r/100)^N = 2P$ when $N=70/r$

23rd part: Divisibility Rules

Divisibility by:
2 If the last digit is even, the number is divisible by 2.
3 If the sum of the digits is divisible by 3, the number is also.
4 If the last two digits form a number divisible by 4, the number is also.
5 If the last digit is a 5 or a 0, the number is divisible by 5.
6 If the number is divisible by both 3 and 2, it is also divisible by 6.
7 Take the last digit, double it, and subtract it from the rest of the number; if the answer is divisible by 7 (including 0), then the number is also.
8 If the last three digits form a number divisible by 8, then so is the whole number.
9 If the sum of the digits is divisible by 9, the number is also.
10 If the number ends in 0, it is divisible by 10.
11 Alternately add and subtract the digits from left to right. If the result (including 0) is

divisible by 11, the number is also.
Example: to see whether 365167484 is divisible by 11, start by subtracting:
3-6+5-1+6-7+4-8+4 = 0; therefore 365167484 is divisible by 11.
12 If the number is divisible by both 3 and 4, it is also divisible by 12.
13 Delete the last digit from the number, then subtract 9 times the deleted digit from the remaining number. If what is left is divisible by 13,then so is the original number.

No. of Diagonals:
N(N-3)/2 whre N=no. of sides

24th part: SD of Prob:
Say that x1, x2, x3, x4, x5, ..., xn are n draws from a (random) sample. Then:

Step 1: Compute the mean, i.e. m =[Sum xi (i=1,..., n)] / n
Step 2: Compute the squared deviation of each observation from its mean, i.e.
For x1 --------> (x1-m)^2
For x2---------> (x2-m)^2
.....
For xn---------> (xn-m)^2
Step 3: The variance is V= [(x1-m)^2 + (x2-m)^2 + ... + (xn-m)^2] / n
Step 4: The s.d. is s.d. = V^(1/2)

Example: Let x1=10, x2= 20 and x3=30
Then:
(1) m=20
(3) V = [(10-20)^2 + 0 + (30-20)^2] / 3 = 200/3
(4) s.d. = (20/3) ^ (1/2)

Measurement
a. Customary system or English system
1. Length:
12 inches (in) = 1 foot (ft)
3 feet = 1 yard (yd) = 36 inches
5280 feet = 1760 yards = 1 mile
2. Area:
144 sq inches = 1 sq foot
9 square feet = 1 sq yard
3. Weight
16 drams = 1 ounce
16 ounces (oz) = 1 pound (lb)
2000 pounds = 1 ton
4. capacity
2 cups = 1 pint
2 pints = 1 quart
4 quarts = 1 gallon
4 pecks = 1 bushel

5. Time
b. Metric System

1. Length
1 km = 1000 mts
1 hectometer = 100 meters
1 decameter = 10 meters
10 decimeters = 1 meter
100 centimeters = 1 meter
1000 millimeters = 1 meter

2. volume
1000 litters = 1 kiloliter (kl)
1000 liters = 1 kiloliter

3. mass
1000 milligrams (mg) = 1 gram (g)
1000 grams = 1 kg
1000 kgs = 1 metric ton (t)

Some approximations:
a. One meter is little more than a yard.
b. One km is about 0.6 mile.
c. One km is about 2.2 pounds.
d. One liter is slightly more than a quart.