Things to Memorize for the ACT!

1) Times Table (to 12 times 12). Where could you go for online help? Multiplication.com of course -- Try it! And get a flash card multiplication deck from the Dollar Store -- you only need to use the part of the deck you have trouble with.

2) Write the definition of the seven sets of numbers used in Algebra 1/2 and on the ACT.

3) List the perfect squares from (12)(12) to (20)(20).

4) List the perfect cubes from (2)(2)(2) to (10)(10)(10).

5) List four "primitive" or "parent" Pythagorean Triples.

6) Write the arithmetic sequence and the arithmetic series formulas.

7) Define the arithmetic mean a_2 for two numbers a_1 and a_3 that repesent any three consecutive numbers a_1, a_2, and a_3 in an arithmetic sequence.

8) Write the geometric sequence and geometric series formulas.

9) What is the formula for the sum of an infinite geometric series where the absolute value of the common ratio, r is less than 1, and is also not zero?

10) Define the geometric mean a_2 for two numbers a_1 and a_3 that repesent any three consecutive numbers a_1, a_2, and a_3 in an geometric sequence.

11) Define "solution to an equation or inequality".

12) Define the Golden Rule of Equations (GRE).

13) Define the Golden Rule of Inequalities (GRI).

14) Define a relation.

15) Define a function.

16) List five different pairs of names for the ordered pair of coordinates in a function.

17) Given two points, list the formula for slope.

18) Define "y-intercept". What variable is commonly used to represent it?

19) List the three forms of a linear equation.

20) Let c represent a constant, i.e. any real number. Write the equation of any horizontal line.

21) Let c represent a constant, i.e. any real number. Write the equation of any vertical line.

22) What is the slope of all horizontal lines?

23) What is the slope of all vertical lines?

24) How are the slopes of parallel lines related? How are the slopes of perpendicular lines related?

25) Define "like terms".

26) Write the formula for the circumference of a circle.

27) Write the formula for the area of a circle.

28) Write the formula for the area of any triangle if you know two sides and the angle between them. For this case assume you know sides a and b and the angle between them is C.

29) Write the formula for the number of arrangements of n things taken r at a time if order IS important. What is this called?

30) Write the formula for the number of arrangements of n things taken r at a time if order IS NOT important. What is this called?

31) What is the difference between the probability of an event and the odds of an event?

32) Write the (h,k) form of a parabola. What does the (h,k) give you?

33) Write the (h,k) form of a circle. What does the (h,k) give you?

34) List i to the first through i to the 4th power. What is i raised to the 100, 101, 102, and 103rd power?

35) Write the formula for the area of a trapezoid.

36) Write the Pythagorean Identity.

37) Write the Quotient Identity for the tangent.

38) What are the signs (+ or -) of the sin, cos, and tan in Quadrants I to IV?

39) What are the proportions of all 30, 60, 90 degree triangles?

40) What are the proportions of all 45, 45, 90 degree triangles?

41) On the Unit Circle centered at the origin, name the first five Quadrantal Angles and give the (x,y) coordinates of the point on the terminal side of these angles and on the Unit Circle. How do these coordinates relate to the sine, cosine, and tangent of these Quadrantal Angles?

42) Using a, b, h, and k for coefficients, write the general form of the sine function and identify the meaning of a, b, h, and k in both degrees and radians.

43) Write the Distance Formula (between two points).

44) Write the Midpoint Formula (between two points).

45) Name and define the seven exponent rules. Give an example of each rule.

46) (a) Write the h,k form of an ellipse that has its major axis parallel to the x-axis. (b) What can you tell from the equation? (c) What is the relationship between the terms in the equation and the foci? (d) What changes if the ellipse is oriented such that its major axis is parallel to the y-axis?

47) If a is half the length of the major axis of an ellipse, and b is half the length of the minor axis of an ellipse, what is the formula for the area of an ellipse?

48) Define a monomial, define a a polynomial.

49) Define the degree of a monomial, define the degree of a polynomial.

50) What is the Fundamental Theorem of Arithmetic (FTOArithmetic)?

51) Define the Fundamental Theorem of Algebra. (FTOAlgebra)

52) Write the formula for the discriminant d. What does its value tell you about the number of solutions and set of numbers the solutions belong to for the quadratic equation in standard form: $ax^2 + bx + c = 0$?

53) What is the special pattern for a Perfect Square Trinomial's (PST) factors when the PST has the form $a^2 + 2ab + b^2$ or $a^2 - 2ab + b^2$?

54) What are the factors of the Difference of Squares (DOS) binomial pattern when it has the form $a^2 - b^2$?

55) For the quadratic function in standard form $y = ax^2 + bx + c$ what is the equation for the vertical line that is the Axis of Symmetry (AOS)?

Answers to Things to Memorize for the ACT! (ID: 1)

1) LOL-I am not writing them all out :-)
2) N=natural {1,2,3,...}, W=whole {0,1,2,3,...}, Z=integers {...-2,-1,0,1,2,...}, Q=rational {a/b} where a and b are integers and b is not zero-- the rational can also be shown as {repeating+terminating decimals},I= irrational {non-repeating infinite decimals}, R=reals {rational+irrational numbers}, Complex Numbers: a+bi where a, b are reals and i is imaginary, i = $\sqrt{-1}$
3) 144,169,196,225,256,289,324,361,400.
4) 8,27,64,125,216,343,512,729,1000.
5) (3,4,5), (5,12,13), (7,24,25) and (8,15,17).
6) Arithmetic Sequence: $a_n = a_1 + (n - 1)d$ Arithmetic Series: $S_n = \frac{n}{2}(a_1 + a_n)$
7) Arithmetic Mean of Two Numbers: $a_2 = \frac{a_1 + a_3}{2}$
8) Geometric Sequence: $a_n = a_1 r^{n-1}$ Geometric Series: $S_n = a_1 \cdot \frac{1 - r^n}{1 - r}$
9) $S_n = a_1 \cdot \frac{1}{1 - r}$
10) Geometric Mean of Two Numbers: $a_2 = \sqrt{a_1 \cdot a_3}$
11) Value (or values) of a variable which, when substituted into the ORIGINAL equation or inequality, make a true equation or inequality.
12) GRE: whatever you do to one side of an equation, do to the other.
13) GRI: (1) Whatever you do to one side of an inequality, do to the other. (2) Plus, whenever you multiply OR divide the inequality by a NEGATIVE term, flip the inequality symbol. In other words, change all signs including the inequality symbol.
14) A set (collection) of ordered pairs. Example: (x,y)
15) A relation (set of ordered pairs) where each x is paired with exactly one y.
16) (x,y), (domain,range), (independent variable, dependent variable) (input,output) and (x,f(x))
17) m = y2-y1/x2-x1
18) y-intercept is the y-coordinate of the point where a function crosses the y-axis. The x-coordinate is always zero i.e. (0,y-int) or, since "b" is commonly used to represent the y-int, (0,b).
19) slope-intercept: y=mx+b, standard: Ax+By=C where A,B,C are not fractions and A is positive, point-slope: y-y1=m(x-x1).
20) y=c
21) x=c
22) Zero
23) Undefined. slope= rise/run but run = 0 and division by zero is undefined.
24) Parallel lines have the same slope, perpendicular lines have slopes that are opposite in sign AND are reciprocals of each other. Example: the lines $y = 2x + 3$ and $y = 2x + 9$ are parallel. The lines $y = 2x + 5$ and $y = -\frac{1}{2}x + 7$ are perpendicular.
25) Terms (1) with the same variables and (2) each variable has the same exponent.
26) 2*Pi*r
27) Pi*r^2
28) A=(1/2)*a*b*sin(C)
29) Permutation nPr = n!/(n-r)!
30) Combination nCr = n!/(n-r)!*r!
31) Probability=#success/#total, Odds=#success/#failure
32) y=a(x-h)^2 + k The vertex is at (h,k).
33) (x-h)^2 + (y-k)^2 = r^2 , the Center is at (h.k).
34) i^1=i, i^2=-1,i^3=-i,i^4=1 since 100/4=remaider of zero = i^4 = 1. 101/4 ==> rem 1 so i, 102/4 ==> rem 2 so -1, 103/4 ==> rem 3 so - i
35) A=(1/2)(b1+b2*)h
36) sin^2(x) + cos^2(x) = 1
37) tan(x) = sin(x)/cos(x)
38) ASTC==> QI = all +, QII = sin +, QIII = tan +, QIV = cos +

39) 1, sqrt(3), 2 opposite 30, 60, 90 respectively. 40) 1,1,sqrt(2) opposite 45,45,90 respectively.

41) 0° (1,0), 90° (0,1),180° (-1,0), 270° (0,-1), and 360° (1,0). The x coordinate is the cosin of the angle, the y coordinate is the sin of the angle, and the tangent of the angle is y/x.

42) $y = f(x) = a\sin\left(b(x-h)\right) + k$ where $|a|$=amplitude, period = $\dfrac{360}{|b|}$ in degrees or $\dfrac{2\pi}{|b|}$ in radians, horizontal or phase shift = h, vertical shift = k

43) d^2=rise^2+run^2 so d=sqrt((y2-y1)^2 + (x2-x1)^2)

44) Midpoint = (middle of x's, middle of y's) = ((x2+x1)/2, (y2+y1)/2)

45) Multiplication Rule: when multiplying powers with the same base, add the exponents. $x^5x^2 = x^7$ Division Rule: when dividing powers with the same base, subtract the exponents top minus the bottom. $\dfrac{x^5}{x^3} = x^2$ Zero Exponent Rule: anthing to the zero power is 1 except zero to the zero power is still zero. $(xyz)^0 = 1$ Negative Exponent Rule: a power with a negative exponent is in the wrong part of a fraction, if in the top, make it positive and put it in the bottom, and vice versa. $x^{-2} = \dfrac{1}{x^2}$ Power to a Power Rule: when raising a power to a power, multiply the exponents. $\left(x^5\right)^3 = x^{15}$ Group to a Power Rule: when raising a group to a power, bring the exponent in to EVERY member of the group. $\left(\dfrac{2xy}{cd}\right)^2 = \dfrac{4x^2y^2}{c^2d^2}$ Fractional Exponent Rule: $b^{\frac{m}{n}}$ = mth root of b to the nth power.
$5^{\frac{2}{3}} = \sqrt[3]{5^2}$ OR $\left(\sqrt[3]{5}\right)^2$

46) (a) $\dfrac{(x-h)^2}{a^2} + \dfrac{(y-k)^2}{b^2} = 1$, (b) Midpoint is (h,k), length of major axis is 2a, length of minor axis is 2b, (c) the distance between the focal points is 2c and $c^2 = a^2 - b^2$, (d) the "a" term is under the y for an "up/down ellipse

47) Area of ellipse = $\pi a \cdot b$, NOTE: in a circle a=b and we call it r so Area of a circle = $\pi r \cdot r$

48) Monomial: a number, a variable, or the product of a number and one or more variables. Polynomial: a monomial or more than one monomial separated by addition or subtraction.

49) Degree of a Monomial: the sum of the exponents of all the variables in the monomial. Note: a constant has degree zero. Degree of a Polynomial: the degree of the highest degree monomial term in the polynomial. Note: DO NOT ADD the monomial degrees, the highest monomial degree term becomes the degree of the entire polynomial.

50) FTOArithmetic: all of the whole numbers greater than 1 can be written as a unique product of primes. The process used to find this unique product is called a "prime factorization" or a "factor tree".

51) FTOAlgebra: A polynomial equation of degree n, has n roots (solutions). Note: these roots may be complex. Complex roots always occur in pairs. For example, the polnomial equation $x^3 = 20$ is guaranteed to have 3 solutions by the FTOA, it may have 3 real solutions but it turns out in this example one solution is real and two are complex.

52) $d = b^2 - 4ac$ If d is positive and a perfect square there are 2 real, rational solutions (the quadratic is factorable). If d is positive and not a perfect square there are 2 real, irrational solutions. If d is zero, there is 1 real, rational solution and it is $-\dfrac{b}{2a}$ and the solution is a double root i.e. the quadratic is a perfect square trinomial. If d is negative, there are 2 complex solutions and they are complex conjugates of the form $a + b \cdot i$ and $a - b \cdot i$.

53) If $a^2 + 2ab + b^2$ is a perfect square trinomial its factors are $(a + b)^2$ and if $a^2 - 2ab + b^2$ is a perfect square trinomial its factors are $(a - b)^2$.

54) The factors of $a^2 - b^2$ are the conjugates $(a + b)$ and $(a - b)$.

55) AOS: $x = -\frac{b}{2a}$