Math Formula Cheat Sheet

Distance/Velocity problems

Distance = (velocity)(time)

Average velocity = $\frac{\text{total distance traveled}}{\text{total time}}$

Graphing formulas

y = mx + b

 $y - y_1 = m(x - x_1)$

Distance between two points = make a right triangle and solve for the hypotenuse

Midpoint = average together the x values and the y values, or:

$$\mathbf{M} = \left(\frac{\mathbf{X}_1 + \mathbf{X}_2}{2}\right), \left(\frac{\mathbf{Y}_1 + \mathbf{Y}_2}{2}\right)$$

Conversions

K = °C +273
°F =
$$\frac{9}{5}$$
 (°*C*) + 32
1 in = 2.5 cm
1 m = 1.1 yd
1 lb = 454g
1 kg = 2.2 lbs

Exponent Rules

- $(X^{b})(Y^{b}) = (XY)^{b}$
- $(X^{b}/Y^{b}) = (X/Y)^{b}$
- $(X^{n})(X^{m}) = X^{n+m}$
- $X^n/X^m = X^{n-m}$

Log Rules

- log (X) + log (Y) = log (XY)
- log (X) log (Y) = log (X/Y)
- n*log (X) = log (Xⁿ)
- When solving a log problem, remember:
 - \circ log X=b can be solved as X= 10^b

Percent Increase/Decrease:

 $[(X_2 - X_1)/X_1] *100\% = percent change$

Probability and Statistics

Combination vs. Permutation: You use *combination* when the order <u>does not</u> matter. You use *permutation* when the order <u>does</u> matter.

Combination formula = $\frac{n!}{(n-r)! \times r!}$

Permutation formula =
$$\frac{n!}{(n-r)!}$$

st.
$$dev = \sigma = \sqrt{\frac{\Sigma(x - x_{avg})^2}{N}}$$

variance = σ^2

In a normal (or Gaussian) distribution, 68% of the data fall within 1 standard deviation of the mean. 95% of the data fall within 2 standard deviations of the mean, and 99.7% of the data fall within 3 standard deviations of the mean.

Geometry

Area formulas

Circle = πr^2 Sphere = $4 \pi r^2$ Hollow cylinder = $2 \pi rh$ Ellipse = πab Triangle = (1/2)bh Rhombus = bh Equilateral triangle = $\frac{S^2 \sqrt{3}}{4}$ S= side of triangle

Area of a regular polygon = $(1/2) \cdot N \cdot sin(360/N) \cdot S^2$ Sum of interior angles = $(N-2) \cdot 180$ N = number of sides, S=length from center to a corner

Volume Formulas

Sphere = (4/3) πr^3 Cylinder = $\pi r^2 h$

Ellipse

Assuming the major axis is the x-axis



a = major axis

b = minor axis

c = distance from center to focus (f_2 in this example) Area of Ellipse = πab

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$
$$c^2 = a^2 - b^2$$

Trigonometry

$\sin A = \frac{\text{opposite}}{\text{hypotenuse}}$	$\csc A = \frac{\text{hypotenuse}}{\text{opposite}} = \frac{1}{\sin A}$
$\cos A = \frac{\text{adjacent}}{\text{hypotenuse}}$	$\sec A = \frac{\text{hypotenuse}}{\text{adjacent}} = \frac{1}{\cos A}$
$\tan A = \frac{\text{opposite}}{\text{adjacent}}$	$\cot A = \frac{\text{adjacent}}{\text{opposite}} = \frac{1}{\tan A}$

 $\frac{\sin A}{\cos A} = \tan A$ $\sin A = \cos(90^\circ - A)$ $\cos A = \sin(90^\circ - A)$

sin(-A) = -sin Acos(-A) = cos (A)

 $\sin 2A = 2 (\sin A) (\cos A)$ $\cos 2A = \cos^2 A - \sin^2 A$

 $\sin^2 A + \cos^2 A = 1$

*Know how to rearrange this identity, for example dividing this identity by sin²A gives:

 $1 + \cot^2 A = \csc^2 A$



Unit Circle



Must know triangles





Law of Sines

а	b	С
$\overline{\sin(A)}$ =	$= \frac{1}{\sin(B)}$	$= \frac{1}{\sin(C)}$



Combined Work Questions

Ex. "If Tom gets a job done in 4 hours (t_1) and Jerry gets it done in 3 hours (t_2), how many hours does it take to get the job done working together (t_{total})?"

$$\frac{1}{t_1} + \frac{1}{t_2} + \frac{1}{t_3} \dots = \frac{1}{t_{total}}$$

Simple and Compound Interest

Simple Interest I = PRT

l = interest P = principal R = annual rate T = time in years

Compound Interest $FV = PV \times (1+r)^n$

FV = future value PV = present value r = annual interest rate n = number of periods

ex. If the interest is compounded quarterly (every 3 months), and the length of the investment is one year, then n = 4 periods.