WORKING WITH FORMULAS

✻ Remember that multiplication can be symbolized using parenthesis, as in $(2)(5)=10$, the cross symbol, "×", as in $2\times5=10$, or the star symbol, "*", as in $2*5=10$. In addition, if two variables are simply written next to each other, we may assume that they are being multiplied.

✻ Note that sometimes different subscripts on the same letter are used to denote different variables, such as b_0 (pronounced "*b-naught*"), and b_1,(pronounced "*b-one*" or "*b-sub-one*").

✻ You should also familiarize yourself with certain Greek letters such as μ (pronounced "*myoo*"), σ (pronounced "*sigma*"), and α (pronounced "*alpha*").

Model Problems:

In the following exercises a formula is given, along with the values of all but one of the variables in the formula. Find the value of the variable that is not given:

1. $y=mx+b; m=3.4, x=5.62, b=-780$

$y=3.4(5.62)+(-780)$ Plug in the given values, placing any negative values in parenthesis if necessary

$y=19.108-780$ Isolate the unknown variable if necessary

$y=-760.892$ Evaluate

2. $y=m*x+b; y=1000, m=-20.5, x=150$

$1000=(-20.5)*150+b$

$1000=-3075+b$

$b=1000+3075$

$b=4075$

3. $y = b_1x + b_0$; $b_1 = 1.6$, $b_0 = -3$, $y = 100$

$100=1.6x+(-3)$

$100=1.6*x-3$

$\frac{100+3}{1.6}=x$

$x=64.375$

4. $z=\frac{x-\mu}{\sigma}; x=300, \mu=250, \sigma=40$

$z=\frac{300-250}{40}$

$z=\frac{50}{40}$

$z=1.25$

5. $F=\left(\frac{9}{5}\right)C+32$; C = 40

$F=\left(\frac{9}{5}\right)40+32$

$F=\left(\frac{360}{5}\right)+32$

F = 72 + 32 = 104

Practice Exercises:

In the following exercises a formula is given, along with the values of all but one of the variables in the formula. Find the value of the variable that is not given:

1. $y = mx + b; m = -12.111, x = 52.7, b = 1500$

2. $y_2 - y_1 = m(x_2 - x_1)$; $y_2 = 6$, $y_1 = 3$, $x_1 = 2$; $x_2 = 4$

3. $y = b_1 * x + b_0; y = 256.5, b_1 = -30, b_0 = 101.1$

4. $z = \frac{x - \mu}{\sigma}; x = 300, \mu = 225, \sigma = 25$

5. $x = z(\sigma) + \mu; z = -1.61, \sigma = 13, \mu = 200$

6. $F = \left(\frac{9}{5}\right) C + 32$; C = 85

7. $z = \frac{x - \mu}{\sigma}; x = 550, z = 1.2, \sigma = 50$

8. $z * \sigma + \mu = x; z = -2, \mu = 10, x = 6$

9. $V = C\left(1 - \frac{n}{N}\right)$; n = 20, C = \$50,000, N = 5

10. Body Mass Index: $BMI = \frac{W}{H^2}(703)$; w=196, H = 70

Answers:

1.	$y = 861.7503$	2.	$m = \frac{3}{2}$	3.	$x = -5.18$	4.	$z = 3$
5.	$x = 179.07$	6.	C = 185	7.	$\mu = 490$	8.	$\sigma = 2$
9.	v = -150,000	10.	BMI = 28.1				