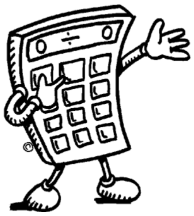

Know Your Calculator!

1. **Priority of Operations**: Do the following calculation in the order written *without* using your calculator, then check your answer *with* your calculator without using parentheses:

$2 + 3 \times 2 + 1 - 3^2 + 2 \div 3 =$

2. **Scientific Notation**: Do this calculation without touching the multiplication (X) key!

$$\frac{3.00 \times 10^{8} \text{ m/sec}}{2.89 \times 10^{-7} \text{ m}} =$$

3. Most scientific calculators have built-in **statistics** functions. For the following set of numbers,

3.5, 4.0, 4.1, 3.6, and 3.8

calculate the *mean* ($\bar{x}$), and the *"unbiased" standard deviation* (σ_{n-1}, also labeled as "s").

4. **Order of Steps, Use of Parentheses and/or Memory Registers**: Evaluate the following using your calculator *only* (do not write down any intermediate numbers):

$$\frac{-(-3.52) + \sqrt{(-3.52)^2 - (4)(7.5)(-1.98)}}{2(7.5)}$$

5. **Math Operations Practice**: Solve for x:

a) $5^x = 20$

b) $25x = 2.5^{6.7}$

c) $x^4 = 4.67 \times 10^{-26}$

d) $\ln(x) = \log(853)$

e) $x = \frac{4}{3}\pi (5.29 \times 10^{-11} \text{ m})^3$

f) $\sin(x) = 0.7071$

g) $x^{4.3} = 105$

h) $12x^2 - 9x = 16$

Answers

1. Normally, your calculator will *prioritize* certain operations over others, for instance, multiplication and division over addition and subtraction, x^2, 1/x, log(x), etc, over multiplication and division. In other words, your calculator treats the calculation this way:

$2 + (3 \times 2) + 1 - (3^2) + (2/3) = 2/3 =$ **0.67** approximately. (If your calculator gives a different result, show me!)

2. **1.04×10^{15}**. Use your **EXP** or **EE** key to enter numbers in scientific notation *always*. Also note that "10.4×10^{14}" and "1.04 E15", although understandable, are *not* written in *proper* scientific notation. Proper notation is n.xxx… $\times 10^x$ where n is an integer from 1 to 9 and x is any whole number.

3. Use the **stat** function on your calculator to obtain $\bar{x}$ = **3.8**, σ_{n-1} = **0.25**

4. **0.80** (rounded to two significant figures)

5. **a**) Take the **logarithm** of both sides: $\log(5^x) = \log(20)$, $x \log(5) = \log(20)$, $x = 1.3010/0.69897 =$ **1.86**
You can use either **ln** (natural, or base e, logarithm) or **log** (common, or base ten logarithm) for this kind of problem.

b) $25x = 463.65832$, $x =$ **19** (rounded to two significant figures)

c) $x = \sqrt[4]{4.67 \times 10^{-26}} = \mathbf{4.65 \times 10^{-7}}$

d) $\ln(x) = 2.93095$, $x = \text{anti}\ln(2.93095)$ or $e^{2.93095} =$ **18.7**

e) $\mathbf{6.20 \times 10^{-31}\ m^3}$

f) $x = \sin^{-1}(0.7071)$ ("inverse sine" (*not* = 1/sin), also called "arcsin") = **45.00 degrees**

g) Take the 4.3th root of both sides:

$$x = \sqrt[4.3]{105} = (105)^{1/4.3} = (105)^{0.23256} = \mathbf{2.95}$$

h) This is a quadratic formula problem, which some calculators can solve simply by entering the values of a, b, and c. Otherwise, we must plug into the quadratic formula.

For the general equation $ax^2 + bx + c = 0$, $\quad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Using $a = 12$, $b = -9$, and $c = -16$, we obtain $x_+ =$ **1.59** and $x_- =$ **–0.84**.