MrF

**Grade 12 Applied - Calculator Practice 4**

1. **Use Technology**. You should be readily familiar with several different calculators and Apps on your device. They have different features (some with brackets, some without, etc). Buttons in different places. Different calculators have different ways of doing the operations: sometimes you enter the angle then hit the function button (like 'sin'), sometimes you just type it in like the expression is written.

2. **Decent Calculator**. Get especially familiar with your own *decent* calculator, a **TI-83 Plus**, and several others. A Dollarama $3 calculator is **not sufficient**.

3. **Brackets**. A decent calculator has **brackets**, learn how to use them, but often it becomes too tricky if there is a complex calculation even with using brackets. Always use brackets to group together expressions in the numerator and expressions in the denominator. Example: $\frac{\mathbf{3+1}}{\mathbf{2+2}}$ would be entered as: **(3 + 1) ÷ (2 + 2)** on the calculator if you insist on relying on the brackets on your calculator.

4. **Steps**. Often you will have to solve large calculations in several **steps** and writing the side-calculations down along the way on paper! Not everything can be reliably crunched into a calculator as one huge expression.

5. **Fractions**. Be sure you know how to do fractions on your calculator. Despite that fractions are generally trivial and do not require a calculator, many students have not learned fractions.

5. **Estimation**. You should almost always have a rough idea of what your '*plastic brain*' is going to tell you, so do an estimate of the answer before you start smashing numbers into the '*plastic brain*'! At least that way you may be able to catch any big errors you might make with your calculator.

6. **BEDMAS**. Don't forget **BEDMAS**: the order of operations if you are doing calculations manually: **Brackets** first, then **Exponents and Roots**, then **Multiply & Divide**, then **Add & Subtract**. Your calculator knows the BEDMAS rules, but sometimes it needs some help!

7. **Practice**. Calculate (ie: evaluate) the expressions below; try calculating them first manually (or even mentally) without a calculator or at least attempt

an estimate. Use several different calculators if you can. Try to always state the answer exactly (which often means stating it as a fraction in lowest terms). If you must express the answer as a decimal then round it, in this exercise, to at least four significant digits.

| | | | |
|---|---|---|---|
| a. **10 – (-2)**<br>12.00 | b. –20 **+ $5^2$**<br>5.000 | c. **$(3 + 1)^2/8$**<br>2.000 | d. $\frac{2}{14}$<br>1/7 or 0.1428 |
| e. $\frac{6+4}{10}$<br>1.000 | f. $\frac{6+4}{3+2}$<br>2.000 | g. $\sqrt{18-2}^2$<br>16.00 | h. **$2.1^3$**<br>9.261 |
| i. $\left(\frac{2}{3}\right)\left(\frac{8-2}{2}\right)^2$<br>6.000 | j. $3\sqrt{20+5}$<br>15.00 | k. $\frac{1}{2\sqrt{4-3}}$<br>½ or 0.5000 | l. 2**sin(30°)**<br>1.000 |

| | | | |
|---|---|---|---|
| m. $\frac{3\tan 45}{6}$<br>½ ; 0.5000 | n. $\sqrt[3]{7+1}$<br>2.000 | o. $\frac{3}{8}+2\frac{1}{4}$<br>2.625 or 21/8 or $2\frac{5}{8}$ | p. $\left(\frac{1}{2}\right)^0$<br>1.000 |
| q. $\$10*\left(1+\frac{0.05}{12}\right)^{(5*12)}$<br>$12.83358679 | | r. $\frac{12.4*10^{11}}{6.2*10^{9}}$<br>200.0 | s. $(3*10^6)^2$<br>9 E 12'<br>or '9*10^12 |

8. **Geometry**. Some typical geometry calculations you would have done in Grades 10 and 11.

| | |
|---|---|
| a. $SA_{sphere}=4\pi(12cm)^2=$<br>1810 cm² | b. $Vol_{cylinder}=\pi*(5cm)^2*12cm$<br>942.5 cm³ |
| c. $SA_{cylinder}=2\pi r^2+2\pi rh$; where r = 3 m and h = 10 m<br>245.0 square m | |
| d. $Area_{trapezoid}=\frac{1}{2}(a+b)*h$; where a = 4ft, b= 6ft, h = 3ft<br>15ft² | |

9. **Fractions**. Fractions *really are* trivial once you have mastered them. If you have **not** yet got the sense of how they work by Grade 12 then ensure you know how to do them on a calculator. If neither your current calculator nor you yourself are able to do fractions, make sure you get a calculator that does, so that you can at least practice till you do learn them yourself.

| | | |
|---|---|---|
| a. $\frac{1}{2} * \frac{3}{4} =$ <br> 3/8 | b. $1\frac{2}{3} * 6 =$ <br> 7 | c. $2\frac{1}{2} \div \frac{1}{8} =$ <br> 20 |
| d. $1\frac{1}{2} + 2\frac{3}{4} =$ <br> 4 ¼ | e. $\frac{1}{2} + \frac{2}{5} =$ <br> 9/10 | f. $\frac{2}{3} * \frac{3}{4} * \frac{4}{9} * \frac{9}{10} =$ <br> 1/5 |

10. **Trigonometry**. Know how to make sure ***your*** calculator and others are in the correct **angle mode** for '*angle*' measurements (ie: how to make sure it is in degrees [°] instead of 'rads'). Try some of these trigonometry practice problems from Grades 10 and 11. If you are using a Dollarama calculation be sure you understand that you pretty much have to type in calculations backwards especially in trigonometry!

| | |
|---|---|
| a. $\frac{4.35\ sin42°}{6} =$ <br> 0.4851 | b. $\frac{6.31\ tan62°}{8} =$ <br> 1.483 |
| c. Evaluate: <br> $\sqrt{a^2+b^2-2ab*cosA}$ <br> where a = 5, b = 6, and A = 60 <br> *Your **ANS** button may be useful here* <br> 5.568 | d. $\angle A = cos^{-1}\left(\frac{3^2+5^2-4^2}{2*3*5}\right)$ <br> *Your **ANS** button may be useful here* <br> 53.13° |

11. **Science and Engineering**. Explore, or maybe ask, about Scientific Notation using your calculator if you are soon taking a science course. Some calculators will have an **EXP** button or an **EE** button to input Scientific Notation. This is essential if you take Physics or Chemistry! Science uses some rather large and tiny numbers! Try a couple typical Grade 11 and 12 physics questions below:

a. The period of a pendulum, **T**, is given by $\boldsymbol{T = 2\pi\sqrt{\frac{l}{9.8m/sec^2}}}$; where l is the length of the pendulum
If $\boldsymbol{l}$ is 1.6 m, then what is the T? (the time to make one full swing)

**2.539 seconds**

b. The speed you have to go to escape the earth's gravity is given by:

$velocity_{escape} = \sqrt{\frac{2GM}{r}}$; where G is $6.673*10^{-11}$;
(ie: G = 0.00000000006673); **m** is the mass of the earth: $5.98x10^{24}$ kg. (ie: 5,980,000,000,000,000,000,000,000 kg). Determine the speed we must go to escape from earth and never return. The result will be in m/sec.

**Ans: 11,184 m/s; ie: 40,262.4 km/hr**

12. **Irrational Numbers**. And remember, your calculator only works in decimal, so any answers you get may not be exact answers! $\sqrt{2}$ or $\pi$ for example will never *ever* be calculated by any computer! Did you know that the calculator on a laptop is super accurate!

**$\pi * 5^2$ = 235.619**4490192344928846982537459 6

13. There are *many more* features on a calculator to explore! Play, have fun! Ask your teacher.