Name:_____

Activity: Period and frequency.

Periodic motion repeats itself in time after and interval called the "period" [For this we use the symbol T]. Frequency is another way to express the same thing by indicating how frequently (how many times) the motion repeats itself in a given unit of time. [For this we will use the symbol f].

Frequency and period have a simple mathematical relationship. If the period of the motion is T, then the frequency of the motion is that it happens once per unit of time T. So:

$$f = \frac{1}{T}.$$

The electrical voltage in a wall outlet pulsates at 60 cycles per second. One cycle per second is also called one Hertz (Hz). How much time is there in each period?

step 1. First write the equation so that you have the period in terms of the frequency.

$$T = \frac{1}{f}$$

step 2. Then substitute the symbol for frequency by the actual number.

$$T = \frac{1}{60\ (Hz)}$$

step3. Do the arithmetic.

$$T = 0.0166\ (s)$$

step4. Make sure that the units make sense. If the unit of time is the second, then the unit of frequency (Hz=cycle per second) is 1/second. You can change to a different time unit by using its definition. For example 1 (s) = 1000 (milliseconds)= 1000 (ms). This means $1 = \frac{1000\ (ms)}{1\ (s)}$. You don't change your answer by multiplying by 1 but you can change the size of the unit this way. To change the unit of our answer from seconds to milliseconds:

$$T = .0166\ (s) = \ .0166\ (s)\frac{1000\ (ms)}{1(s)} = 16.6\ (ms)$$

The musical note called "concert A" is a frequency of 440 Hz. How much time does each cycle of vibration take?

$$T = \frac{1}{440\ Hz} = .00227\ s$$