Name: _____

# Review of Mathematics and Measurements for ASTR 1010 and 1020

**Measure each line in centimeters (cm) to the nearest 1/10 cm:**

1. a: _____ 

   b: _____ 

   c: _____ 

**Measure each line in millimeters (mm) to the nearest 1 mm:**

2. a: _____ 

   b: _____ 

   c: _____ 

3. How many millimeters are in one centimeter? Hint: use your ruler to figure it out

**Convert measurements from 1abc from cm to mm: Ex: 1.4 cm = 14 mm**

4. a: _____

   b: _____

   c: _____

**Convert measurements from 2abc from mm to cm: Ex: 14 mm = 1.4 cm**

5. a: _____

   b: _____

   c: _____

***Centimeters*** *and* ***millimeters*** *are both units that are used when measuring length. Here are some other units used in Astronomy for measuring lengths and distances:*

**AU** (distance from Earth to the Sun) = $1.49 \times 10^{8}$ km

**parsec** (pc) = $3.09 \times 10^{13}$ km **lightyear** (ly) = $9.46 \times 10^{12}$ km

***Seconds*** *and* ***years*** *are both units that are used when measuring time.*

6. What are three other units for measuring time?

7. How many seconds are in a minute? _____

   How many minutes are in an hour? _____

   How many hours are in a day? _____

   How many days are in a years? _____

*Using the answers from #7, you can convert from hours to seconds to determine how many seconds are in one hour:*

$$1\ hour \times \frac{60\ minutes}{1\ hour} \times \frac{60\ seconds}{1\ minute} = 60 \times 60\ seconds = 3600\ sec$$

8. How many seconds are in one year? **Show your work.**

*In Astronomy, we use lots of really big numbers. Rather than writing them out in their* ***long*** *form, we use what's called* ***Scientific Notation****. This method of writing numbers employs an exponent to keep track of how many places you need to move the decimal place to convert between the long form and the scientific notation form. Here are some examples:*

| | |
|---|---|
| $1 \text{ X } 10^{5} = 100{,}000$ | $3.67 \text{ X } 10^{5} = 367{,}000.00$ |
| $1 \text{ X } 10^{2} = 100$ | $3.67 \text{ X } 10^{2} = 367.00$ |
| $1 \text{ X } 10^{0} = 1$ | $3.67 \text{ X } 10^{0} = 3.67$ |
| $1 \text{ X } 10^{-2} = 0.01$ | $3.67 \text{ X } 10^{-2} = 0.0367$ |
| $1 \text{ X } 10^{-5} = 0.00001$ | $3.67 \text{ X } 10^{-5} = 0.0000367$ |

*As you can see, the exponent of 10 is the number of places the decimal point must be shifted to give the number in long form. A **positive** exponent shows that the decimal point is shifted that number of places to the right. A **negative** exponent shows that the decimal point is shifted that number of places to the left.*

9. Write your answer from #8 into Scientific Notation form:

*Let's make sure you know how to enter these numbers into your calculator:*

Following these steps should work for all basic calculators:

1. Locate the **Multiplication Sign** (X) and the **Exponent Sign** (^)
2. Enter the **base number** into the calculator. Ex: For $3.16 \text{ X } 10^7$ the base number is "3.16"
3. Now input the exponent part exactly as follows: X (10 ^ 7)
4. Go ahead and press the equals sign, you should get either $3.16 \text{ X } 10^7$ or 31,600,000.

*Now you can do some basic math with numbers in Scientific Notation using your calculator:*

**Enter the following into your calculator exactly as they're written. Don't forget the parenthesis!!!**

**Write your answer in Scientific Notation, keeping digits after the decimal place.**

10. a: (4.215 X (10 ^ -2) ) + (3.20 X (10 ^ -1) ) = _____

b: (1.05 X (10 ^ 3) ) X (9.20 X (10 ^ 2) ) = _____

c: (7.39 X (10 ^ 8) ) / (4.82 X (10 ^ 6) ) = _____

*When doing any calculation, remember that there is an order of operations that must be followed*:

| | |
|---|---|
| **Rule 1:** | First perform any calculations inside parentheses. |
| **Rule 2:** | Next perform all multiplications and divisions, working from left to right. |
| **Rule 3:** | Lastly, perform all additions and subtractions, working from left to right. |

**Complete the following WITHOUT using your calculator:**

10. a: $1 + (3 \times 4) / 2 =$ _____

b: $2 \wedge 3 \times 5 + 1 =$ _____

c: $9 / 3 - (6 / 2) =$ _____