

**I. Objectives**

1. Write numbers using scientific notation.
2. Learn the meaning of metric prefixes and symbols.

**II. Introduction**

In astronomy, and other sciences, we need to utilize both large and small measurements for time, distance, mass, and other quantities. We need to make measurements to compare data gathered by scientists at different times and locations, to communicate information, and to formulate and confirm theories.

The sciences utilize the *Système International d'Unités*, abbreviated as **SI**, which consists of: meter (m) for measuring length or distance, kilogram (kg) for measuring mass, second (sec or s) for measuring time, newton (N) for measuring force, and joule (J) for measuring energy. Other units can be derived by combining these five basic units.

**III. Prelab Definitions**

1. scientific notation
2. exponent
3. coefficient
4. decimal
5. metric prefix

**IV. Lab Procedure**

1. Complete column C of the *Base Ten Units* table below (the data in columns D and E is for information purposes).

*Base Ten Units*

A	B	C	D	E
Unit	Standard notation	Scientific notation	Metric prefix	Symbol
billionth	0.000000001	$1 \times 10^{-9}$	nano	n
hundred millionth	0.00000001			
ten millionth	0.0000001			
millionth	0.000001		micro	$\mu$
hundred thousandth	0.00001			
ten thousandth	0.0001			
thousandth	0.001		milli	m
hundredth	0.01		centi	c
tenth	0.1		deci	d
one	1			
ten	10		deca	
hundred	100		hecta	
thousand	1,000		kilo	k
ten thousand	10,000			
hundred thousand	100,000			
million	1,000,000		mega	M
ten million	10,000,000			
hundred million	100,000,000			
billion	1,000,000,000		giga	G
ten billion	10,000,000,000			
hundred billion	100,000,000,000			
trillion	1,000,000,000,000		tera	T

**V. Lab Discussion**

1. What are the advantages of using a decimal-based system?
2. What are the 3 fundamental units of the *Système International d'Unités*?
3. What is the SI unit of force? What are the three units from which this unit of force is derived?
4. What is the SI unit of energy? What are the two units from which this unit of energy is derived?
5. Complete the following table:

*Temperature Scale Data*

Temperature scale	Temperature at which water freezes	Temperature at which water boils
Fahrenheit		
Celsius/centigrade		
Kelvin		

6. Why is an understanding of scientific notation and its usage important in the study of science and math?