

# Science



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[http://denisemeeks.com/science/notebooks/notebook\\_science.pdf](http://denisemeeks.com/science/notebooks/notebook_science.pdf)

## Science: Scientific Method

- Ask a question. What do you want to know about the world? Why do you want to know it? How can science answer the question?
- Do research. Has this question been asked before? Are there related questions? Can others provide information?
- Form a hypothesis. What do you think is the answer? Why do you think so? Can your prediction be tested?
- Test the hypothesis. Design an experiment. Perform the experiment carefully. Record the data.
- Analyze the data. Make a chart or graph. Compare your data to others' data. See if your data fits your hypothesis.
- Draw conclusions. What was learned from the experiment? Was the hypothesis correct? What questions remain?

## Science: Scientific Notation and Significant Figures

scientific notation:  $m \times 10^n$ , where  $m$  is written with only one non-zero digit to the left of the decimal point and  $n$  is an integer

significant figure rules:

1. non-zero digits are always significant
2. any zeros between two significant digits are significant.
3. a final zero or trailing zeros in the decimal portion ONLY are significant

(Source: <http://chemistry.bd.psu.edu/jircitano/sigfigs.html>)

## Science: Fundamental Units of the International System

quantity	unit	abbreviation
length	meter	m
mass	kilogram	kg
time	second	s
electric current	ampere	A
temperature	kelvin	K
amount	mole	mol
luminosity	candela	cd

## Science: Derived Units of the International System

quantity	unit	abbreviation
temperature	degree celsius	$^{\circ}\text{C}$
force	newton ( $\text{kg m/s}^2$ )	N
energy, work, heat	joule (N m)	J
pressure	pascal ( $\text{N/m}^2$ )	Pa
frequency	hertz (cycle/s)	Hz
electric potential	volt	V
resistance	ohm	$\Omega$
power, heat flow	watt (J/s)	W

## Science: Divisions of the International System

factor	prefix	symbol
$10^{-1}$	deci	d
$10^{-2}$	centi	c
$10^{-3}$	milli	m
$10^{-6}$	micro	$\mu$
$10^{-9}$	nano	n
$10^{-12}$	pico	p
$10^{-15}$	femto	f
$10^{-18}$	atto	a
$10^{-21}$	zepto	z
$10^{-24}$	yocto	y

## Science: Divisions of the International System

factor	prefix	symbol
$10^1$	deca	da
$10^2$	hecto	h
$10^3$	kilo	k
$10^6$	mega	M
$10^9$	giga	G
$10^{12}$	tera	T
$10^{15}$	peta	P
$10^{18}$	exa	E
$10^{21}$	zetta	Z
$10^{24}$	yotta	Y

### Science: Metric and American Conversions

<b>distance</b> 1 kilometer (km) = 1000 meters (m) 1 meter (m) = 100 centimeters (cm) 1 centimeter (cm) = 10 millimeters (mm) 1 yard (yd) = 0.914 meters (m) 1 mile (mi) = 1.609 kilometers (km)	<b>force</b> 1 newton (N) = 10 <sup>5</sup> dynes
<b>mass and weight</b> 1 kilogram (kg) = 1000 grams (gm) 1 pound (lb) = 0.454 kilograms (kg)	<b>energy</b> 1 joule (J) = 10 <sup>7</sup> ergs
<b>volume</b> 1 liter (L) = 1000 milliliters (mL) 1 gallon (gal) = 3.785 liters (L)	

### Science: Temperature Conversion

Fahrenheit to Celsius:  ${}^{\circ}C = \frac{5}{9}({}^{\circ}F - 32)$

Celsius to Fahrenheit:  ${}^{\circ}F = \frac{9}{5}({}^{\circ}C) + 32$

Celsius to Kelvin:  $K = {}^{\circ}C + 273$

Kelvin to Celsius:  ${}^{\circ}C = K - 273$

### Science: Angular Conversions

$$(1 \text{ radian}) \frac{360^{\circ}}{2\pi \text{ radians}} = 57.3^{\circ}$$

$$(1^{\circ}) \frac{2\pi \text{ radians}}{360^{\circ}} = 0.0174 \text{ radians}$$

$$\theta \text{ (in radians)} = \frac{s}{r}$$

### Science: Areas and Volumes

object	area	volume
regular polygon	$A = \frac{nsr}{2}$ , $n$ = number of sides, $s$ = side length, $r$ = radius	
sphere	$A = 4\pi r^2$	$V = \frac{4}{3}\pi r^3$
right circular cylinder	$A = 2\pi r^2 + 2\pi rh$	$V = \frac{4}{3}\pi r^2 h$

### Science: How to Write a Scientific Experiment

1. Chose a descriptive, concise title
2. Determine the purpose of the experiment
3. State the hypothesis. Be sure that it is measurable and specific.
4. Create a list of materials.
5. Write, proofread, and rewrite the procedure so that it would be reproducible by others using the same or similar materials.
6. Perform the experiment.
7. Record all results, including those that are unexpected.
8. Discuss the results.
9. Accept or reject the hypothesis, based on the results.
10. Discuss all errors and parts of the experiment and environment that may have affected the outcome.

(Source: <https://www.wikihow.com/Do-a-Lab-Write-Up>)