SPH3U UNIVERSITY PHYSICS

REVIEW: MATH SKILLS

- Scientific Notation (P.650)

Scientific Notation

In science we frequently encounter numbers which are difficult to write in the traditional way - velocity of light, mass of an electron, distance to the nearest star. ***Scientific notation****, or standard notation, is a technique, using powers of ten, for concisely writing unusually large or small numbers.*

Expression	Common decimal notation	Scientific notation
124.5 million kilometres	124 500 000 km	1.245×10^8 km
154 thousand picometres	154 000 pm	1.54×10^5 pm
602 sextillion molecules	602 000 000 000 000 000 000 000 molecules	6.02×10^{23} molecules

Scientific Notation

SCIENTIFIC NOTATION (P.650)

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Scientific Notation

In scientific notation, the number is expressed by:

1. *writing the correct number of significant digits with one non-zero digit to the left of the decimal point, and then*
2. *multiplying the number by the appropriate power (+ or -) of ten (10).*

Scientific Notation

For example,

	2 394	*0.067*
=	*2.394 x 1000*	= *6.7 x 0.01*
=	*2.394 x 10^{3}*	= *6.7 x 10^{-2}*

NOTE!

Scientific notation also enables us to show the correct number of significant digits. As such, it may be necessary to use scientific notation in order to follow the rules for certainty (discussed later).

Scientific Notation

PRACTICE

1. Express each of the following in scientific notation.

(a) 6 807	6.807 x 10^{3}
(b) 0.000 053	5.3 x 10^{-5}
(c) 39 879 280 000	3.987928 x 10^{10}
(d) 0.000 000 813	8.13 x 10^{-7}
(e) 0.070 40	7.040 x 10^{-2}
(f) 400 000 000 000	4 x 10^{11}
(g) 0.80	8.0 x 10^{-1}
(h) 68	6.8 x 10^{1}

Scientific Notation

PRACTICE

2. Express each of the following in common notation.

(a) 7×10^{1}	70
(b) 5.2×10^{3}	5 200
(c) 8.3×10^{9}	8 300 000 000
(d) 10.1×10^{-2}	0.101
(e) $6.386\ 8 \times 10^{3}$	6 386.8
(f) 4.086×10^{-3}	0.004 086
(g) 6.3×10^{2}	630
(h) 35.0×10^{-3}	0.035 0

Scientific Notation With Calculators

*On many calculators, scientific notation is entered using a special key, labelled **EXP** or **EE**. This key includes "**x 10**" from the scientific notation; you need to enter only the exponent. For example, to enter*

7.5×10^{4} press 7.5 EXP 4

3.6×10^{-3} press 3.6 EXP +/- 3

NOTE!

Depending on the type of calculator you have, the "+/-" signs may need to be entered <u>after</u> the relevant number.