## 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 x 10 <sup>8</sup> km
154 thousand picometres	154 000 pm	1.54 x 10⁵ pm
602 sextillion molecules	602 000 000 000 000 000 000 000 molecules	6.02 x 10 <sup>23</sup> molecules
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Scientific Notation				
SCIENTIFIC NOTATION (P.650) <ul> <li>uses powers of ten to write large/small numbers</li> </ul>				
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## Scientific Notation

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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).

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 For example,
 2 394
 0.067

 =
 2.394 x 1000
 =
 6.7 x 0.01

 =
 2.394 x 10<sup>3</sup>
 =
 6.7 x 10<sup>-2</sup>

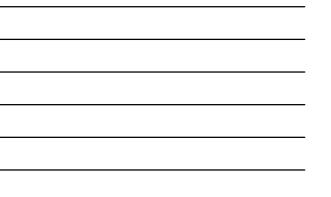
Scientific notation also enables us to show the correct number of significant digits. As such, it may be necessary to use scientific notation in order to follow the rules for certainty (discussed later).

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Scientific Notati	ion	
PRACTICE		
1. Express each of the foll	1. Express each of the following in scientific notation.	
(a) 6 807	6.807 x 10 <sup>3</sup>	
(b) 0.000 053	5.3 x 10 <sup>-5</sup>	
(c) 39 879 280 000	3.987928 x 10 <sup>10</sup>	
(d) 0.000 000 813	8.13 x 10 <sup>-7</sup>	
(e) 0.070 40	7.040 x 10 <sup>-2</sup>	
(f) 400 000 000 000	4 x 10 <sup>11</sup>	
(g) 0.80	8.0 x 10 <sup>-1</sup>	
(h) 68	6.8 x 10 <sup>1</sup>	
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Scientific Nota	tion	
PRACTICE		
2. Express each of the following in common notation.		
(a) 7 × 10 <sup>1</sup>	70	
(b) $5.2 \times 10^3$	5 200	
(c) $8.3 \times 10^9$	8 300 000 000	
(d) 10.1 × 10 <sup>-2</sup>	0.101	
(e) 6.386 8 × 10 <sup>3</sup>	6 386.8	
(f) 4.086 × 10⁻³	0.004 086	
(g) $6.3 \times 10^2$	630	
(h) 35.0 × 10 <sup>-3</sup>	0.035 0	
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Scientific Notation With Calculators	
On many calculators, scientific notation is entered using a special key, labelled <b>EXP</b> or <b>EE</b> . This key includes " <b>x 10</b> " from the scientific notation; you need to enter only the exponent. For example, to enter	
7.5 x 10 <sup>4</sup> press 7.5 EXP 4	
3.6 x 10 <sup>-3</sup> press 3.6 EXP +/- 3	
<b>NOTE!</b> Depending on the type of calculator you have, the "+/-" signs may need to be entered <u>after</u> the relevant number.	
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