IB Math Studies Yr 1

Name_____ _____ Date: _____

**Lesson 1-5:**

**Learning Goals:**

**#1: How do we perform operations using scientific notation?**

**#2: How do we answer IB-style questions involving rounding, significant figures, and scientific notation?**

## SCIENTIFIC NOTATION REVIEW

1. Express the following in the form $\mathbf{a \times 10^k}$**, where** $\mathbf{1 \leq a < 10}$ **and** $k \in \mathbb{Z}$ (***scientific notation)***:

| | |
|---|---|
| a) A dust particle is about $0.002$ mm across. | b) Each minute, about 3000000000 cells in the human body die. |
| c) The distance from the Earth to the Sun averages about $138{,}000{,}000{,}000$ m. | d) The mass of a paper clip is 0.000812 kg. |

2. Write each as a decimal in ***standard form***:

| | |
|---|---|
| a) The diameter of the Milky Way is $1.4 \times 10^5$ light years. | b) 80 gsm photocopy paper has a thickness of $1.1 \times 10^{-2}$ metres. |
| c) A small virus has greatest width of $9.8 \times 10^{-4}$ mm. | d) The estimated population of the world in the year 2010 is $6.8 \times 10^9$ people. |

# OPERATIONS WITH SCIENTIFIC NOTATION

- When performing operations with scientific notation (addition, subtraction, multiplication division), the use of your calculator can be very helpful.
- Make sure you use parenthesis when entering the problems into your calculator! (Parentheses are necessary when dealing with operations due to PEMDAS)
- When entering in a fraction, use the fraction button on your calculator! **ALPHA → y= → 1: n/d**
- Your final answer only has to be written in scientific notation when you see "**$a \times 10^k$, where $1 \leq a < 10$ and** $k \in Z$ ". Otherwise, leave your answer in standard form!

**MODEL PROBLEM 1:** Let $m = 7.23 \times 10^8$ and $n = 5.91 \times 10^{-2}$.

Express each of the following in the form $a \times 10^k$, where $1 \leq a < 10$ and $k \in \mathbb{Z}$.

| | |
|---|---|
| (a) $mn$; | (b) $\frac{m}{n}$; |
| (c) $m + n$; | (d) $n - 2m$; |
| (e) $m^2$; | (f) $2(m + n)$; |

**MODEL PROBLEM 2:** Consider the numbers $p = 2.78 \times 10^{11}$ and $q = 3.12 \times 10^{-3}$.

(a) Calculate $\sqrt[3]{\frac{p}{q}}$. Give your full calculator display.

(b) Write down your answer to part (a) correct to two decimal places;

(i) correct to two decimal places;

(ii) correct to three significant figures.

(c) Write your answer to **part (b)(ii)** in the form $a \times 10^k$, where $1 \leq a < 10$, k ∈ Z.

**NOW YOU TRY!:** Given $z = \frac{17x^2}{a-b}$

(a) Find the value of $z$ when $x = 12.5$, $a = 0.572$ and $b = 0.447$. Write down your full calculator display.

(b) Write down your answer to part (a)

(i) correct to the nearest 1000;

(ii) correct to three significant figures.

(c) Write your answer to **part (b)(ii)** in the form $a \times 10^k$, where $1 \leq a < 10$, k ∈ Z.

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**Lesson 1-5 Homework (Unit 1 Quiz Review!)**

1. A problem has an exact answer of $x = 0.0126$

   a) State the value of *x* given correct to *two* significant figures.

   b) Round the value of *x* correctly to the nearest hundredth.

   c) Give your answer to part (a) min the form $a \times 10^k$, where $1 \leq a < 10$, $k \in \mathbb{Z}$.

2. Let $x = 7.94$.

   (a) Calculate the value of $\frac{2x+1}{x^3}$.

   (b) Give your answer correct to **three** decimal places.

   (c) Give your answer to part (b) min the form $a \times 10^k$, where $1 \leq a < 10$, $k \in \mathbb{Z}$.

3. Given $\frac{77.2\times 3^3}{3.60\times 2^2}$.

(a) Write down the exact value of the expression above.

(b) Express your answer to part (a) in the form $a \times 10^k$, where $1 \leq a < 10$ and $k \in \mathbb{Z}$.

(c) Give your answer to part (b) correct to 3 significant figures.

4. Let $A = 4.5 \times 10^{-3}$ and $B = 6.2 \times 10^{-4}$.

Express each of the following in the form $a \times 10^k$, where $1 \leq a < 10$ and $k \in \mathbb{Z}$.

(a) $A - B$;

(b) $2(A + B)$.

5. Consider $c = 5.2 \times 10^3$ 5200 and $d = 3.7 \times 10^{-6}$

(a) Write down the value of $r = c \times d$.

(b) Write down your value of $r$ in the form $a \times 10^k$, where $1 \leq a < 10$ and k∈Z

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