MATATAG

Bansang Makabata Batang Makabansa

BAGONG PILIPINAS

School Logo

Name of School:		*Quarter:*	*4th Quarter*
Grade Level & Section:	*Grade 7*	*Week:*	*Week 8 Day 3*
Subject:	*MATHEMATICS*	*Date and Time:*	
Topic:		*Teacher:*	

I. CONTENT, STANDARDS AND LEARNING COMPETENCIES		*ANNOTATIONS*
A. CONTENT STANDARDS	The learners should have knowledge and understanding of operations using scientific notation. (MG)	
B. PERFORMANCE STANDARDS	By the end of the quarter, the learners are able to write numbers in scientific notation and perform operations on numbers written in scientific notation.	
C. LEARNING COMPETENCIES	At the end of the lesson, the learners are expected to: 1. Write numbers in scientific notation to represent very large or very small numbers, and vice versa. 2. Perform operations on numbers expressed in scientific notation.	
I. CONTENT		
Writing numbers in scientific notations		
II. LEARNING RESOURCES		

A. REFERENCES	
B. OTHER LEARNING RESOURCES	Dodds, C. (2012, February 6). Colin Dodds - Scientific Notation (Math Song) [Video]. YouTube. https://www.youtube.com/watch?v=AWof6knvQwE CK-12 Foundation. (n.d.). CK-12 Foundation. https://flexbooks.ck12.org/cbook/ck-12-conceptos-de-matem%C3%A1ticas-de-la-escuela-secundaria-grado-8-enespa%C3%B1ol/section/5.16/related/lesson/operations-with-numbers-in-scientific-notationmsm7/ Operations with Scientific Notation (Addition, Multiplication, Subtraction of Numbers) - BYJUS. (2022, August 10). BYJU'S. https://byjus.com/us/math/operations-in-scientific-notation/

III. TEACHING AND LEARNING PROCEDURE

BEFORE/PRE-LESSON PROPER

ACTIVATING PRIOR KNOWLEDGE	**Short Review**
	
	Scientific notation is a way of writing very **large** or **small** numbers in a compact and easier-to-read format using powers of ten. It follows the form:
	
	$$a \times 10^n$$
	
	Where:
	
	• **a** (coefficient) is a number between **1 and 10** (**1 ≤ a < 10**).
	• **10n** is a power of ten, where **n** (exponent) tells how many places to move the decimal point.
	
	How to Convert a Number into Scientific Notation
	
	1. **For large numbers:**
	  ○ Move the decimal **left** until only one nonzero digit remains before it.
	  ○ Count the number of places moved → this becomes the **positive exponent** of 10.	

	Example: • **45,000,000 → 4.5 × 10⁷** **How to Convert a Number into Scientific Notation** 1. **For large numbers:** ○ Move the decimal **left** until only one nonzero digit remains before it. ○ Count the number of places moved → this becomes the **positive exponent** of 10. **Example:** ○ **45,000,000 → 4.5 × 10⁷** 2. **For small numbers:** ○ Move the decimal **right** until only one nonzero digit remains before it. ○ Count the number of places moved → this becomes the **negative exponent** of 10. **Example:** ○ **0.00023 → 2.3 × 10⁻⁴** **Converting Back to Standard Form** • **Positive exponent**: Move the decimal **right** to make the number larger. ○ **3.2×1043.2 \times 10^43.2×104 → 32,000** • **Negative exponent**: Move the decimal **left** to make the number smaller. ○ **5.6×10−35.6 \times 10^{-3}5.6×10−3 → 0.0056**	
LESSON PURPOSE/INTENTION	**Lesson Purpose** **Simplify complex calculations** involving very large or very small numbers. **Perform mathematical operations** efficiently without converting numbers back to standard form. **Apply scientific notation** in real-world problems, such as astronomy, physics, and engineering.	

	Develop problem-solving skills by using the rules of exponents in scientific notation.	
LESSON LANGUAGE PRACTICE	**Vocabulary** ✔ **Scientific Notation** – A way of expressing very large or very small numbers using the form **a×10na \times 10^na×10n**, where **aaa** is between 1 and 10, and **nnn** is an integer. ✔ **Exponent** – The small raised number in a power that tells how many times the base (10) is multiplied by itself. Example: In 10410^4104, the exponent is **4**. ✔ **Base** – The number that is raised to a power. In scientific notation, the base is always **10**. ✔ **Coefficient** – The number in scientific notation that is **between 1 and 10** and multiplied by a power of 10. Example: In 3.2×1053.2 \times 10^53.2×105, the coefficient is **3.2**. ✔ **Addition of Scientific Notation** – The process of adding two numbers in scientific notation, requiring them to have the **same exponent** before adding their coefficients. ✔ **Subtraction of Scientific Notation** – The process of subtracting two numbers in scientific notation, also requiring the **same exponent** before subtracting their coefficients. ✔ **Multiplication of Scientific Notation** – The process of multiplying two numbers in scientific notation by multiplying the **coefficients** and adding the **exponents**. ✔ **Division of Scientific Notation** – The process of dividing two numbers in scientific notation by dividing the **coefficients** and subtracting the **exponents**. ✔ **Exponent Rules** – A set of mathematical rules used to simplify expressions with exponents, such as: • $a^m \times a^n = a^{m+n}$ (Multiplication Rule) • $a^m \div a^n = a^{m-n}$ (Division Rule)	

	✔ **Standard Form** – The regular way of writing numbers without exponents. Example: **4.5×10^3** in standard form is **4,500**.	
DURING/LESSON PROPER		
READING THE KEY IDEA/STEM	Scientific notation is a way to express very **large** or **small** numbers in a simplified form using powers of ten. When working with numbers in scientific notation, we often need to perform **operations** such as addition, subtraction, multiplication, and division. **1. Addition and Subtraction of Numbers in Scientific Notation** **Important Rule:** For addition and subtraction, the exponents **must be the same**. If they are different, adjust one of the numbers so that both have the same exponent. Example 1: Add 3.5×10^4 and 2.1×10^4 Both numbers have **the same exponent (10^4)**, so we add the coefficients: $$(3.5 + 2.1) \times 10^4 = 5.6 \times 10^4$$ **Final Answer:** 5.6×10^4 **Example 2: Subtract 6.4×10^5 from 8.2×10^5** Since both numbers have **10^5 as the exponent**, we subtract the coefficients: $$(8.2 – 6.4) \times 10^5 = 1.8\ 10^5$$ **Final Answer:** 1.8×10^5 **What if the exponents are different?** ✔ Convert one number to match the other exponent before adding or subtracting. ✔ **Example: $4.5 \times 10^3 + 6.2 \times 10^4$**	

	✔ Convert 4.5×10^3 to 0.45×10^4 ✔ Now add : $(0.45 + 6.2) \times 10^4 = 6.65 \times 10^4$ **2. Multiplication of Numbers in Scientific Notation** **Important Rule:** • **Multiply the coefficients**. • **Add the exponents**. Example 3: Multiply $(2.5 \times 10^3) \times (4 \times 10^2)$ 1.Multiply the coefficients: $2.5 \times 4 = 10$ 2.Add the exponents: $10^{3+2} = 10^5$ **Final Answer:** $10 \times 10^5 \rightarrow$ Convert to proper scientific notation: 1.0×10^6 **3. Division of Numbers in Scientific Notation** **Important Rule:** • **Divide the coefficients**. • **Subtract the exponents**. **Example 4: Divide $(6.0 \times 10^7) \div (2.0 \times 10^3)$** 1.Divide the coefficients: $6.0 \div 2.0 = 3.0$ 2.Subtract the exponents: $10^{7-3} = 10^4$ 3.Final Answer: 3.0×10^4 After the learners accomplished Activity 3, present and explain to the class the steps in Adding/Subtracting and Multiplying/Dividing numbers expressed in scientific notation.	

	In adding (or subtracting) numbers expressed in scientific notation, follow these steps: 1. Rewrite the number with the smaller exponent so that it has the same exponent as the number with the larger exponent by moving the decimal point of its decimal number. 2. Add (or subtract) the decimal numbers. The power of 10 will not change. 3. Convert your result to scientific notation, if necessary. In multiplying (or dividing) numbers expressed in scientific notation, here are the steps: 1. Multiply (or divide) the decimal numbers. 2. Multiply (or divide) the powers of 10 by adding (or subtracting) their exponents. 3. Convert your answer to scientific notation, if necessary. **Worked Example** Example 1: Add (5.7×10^4) and (4.87×10^5). Solution: Since the given numbers have different exponents, rewrite 5.7×10^4 so that its exponent becomes 5. Because you need to increase the exponent by 1, you will need to move the decimal 1 place to the left. 5.7×10^4 becomes 0.57×10^5. Now you have, $(0.57 \times 10^5) + (4.87 \times 10^5)$. Next is to add the decimals 0.57 and 4.87. The power of 10 stays the same. Therefore, the answer is 5.44×10^5. Note: Always make sure that your answer is expressed properly in scientific notation. Remember that $1 \leq a < 10$. **Example 2:** Calculate the difference: $(4.2 \times 10^{-2}) - (3.3 \times 10^{-3})$ Solution: Since the given has different exponents, rewrite 3.3×10^{-3} so that its exponent becomes –2. Because you need to increase the exponent by 1, you will need to move the decimal 1 place to the left. 3.3 × 10−3 becomes 0.33×10^{-2}	You may add more examples, if needed. Note: Always make sure that the answer

<table>
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<td>Now you have, $(4.2 \times 10^{-2}) - (0.33 \times 10^{-2})$. Next is to subtract the decimals 4.2 and 0.33. The power of 10 stays the same. Therefore, the answer is 3.87×10^{-2}

Example 3: Multiply: $(3.4 \times 10^{-2})\ (6.2 \times 10^{6})$. Solution: First, multiply 3.4 and 6.2. This will give us the product 21.08

Next, multiply the powers of 10. In multiplying powers with the same base, we add their exponents. Thus, we have, $(10^{-2})\ (10^{6}) = 10{-}2{+}6 = 10^{4}$

Now, combining the results gives us 21.08×10^{4}. Finally, convert the result to scientific notation by rewriting 21.08×10^{4} so that $1 \leq a < 10$. Move the decimal one place to the left and increase the exponent by 1. Therefore, the answer is 2.108×10^{5}.

Example 4: Find the quotient when (8.4×10^{5}) is divided by (1.4×10^{-2}). Solution: First, divide 8.4 and 1.4. This will give us the quotient 6.

Next, divide the powers of 10. In dividing powers with the same base, we subtract their exponents. So, we have $(10^{5} \div 10^{-2}) = 10^{5}{-}({-}2) = 10^{5+2} = 10^{7}$

Now, combining the results gives us 6×10^{7} since $1 \leq a < 10$.</td>
<td>is expressed properly in scientific notation. Remember that $1 \leq a < 10$.
If the answer to the first step is not exact, then you may agree
that answers may be rounded off up to 4 decimal places.</td>
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<td>DEVELOPING and DEEPENING UNDERSTANDING OF THE KEY IDEA/STEM</td>
<td>Lesson Activity
Activity 4: Compute It!
Instruction: Let the learners perform the indicated operation in each item. Ask them to show their solutions.
1. $(3.1 \times 10^{3}) + (4.3 \times 10^{3})$

2. $(5 \times 10^{-3}) + (3.3 \times 10^{-6})$

3. $(6.36 \times 10^{3}) - (5.8 \times 10^{-1})$

4. $(3.48 \times 10^{3})\ (9.8 \times 10^{4})$

5. $(4 \times 10^{4}) \div (1.25 \times 10^{-4})$

Rubrics (Maximum of 3 points for each item).
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<tr><th>Score</th><th>Indicator/s</th></tr>
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<td>This activity may be done by pair or by small groups (3 to 4 members). Provide enough time for them to solve and discuss
their work with their partner/group.

Refer to the provided rubrics in checking the activity.

Answer Key:
1. 7.4×10^{3}
2. 5.0033×10^{-3}</td>
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	3	Provided a complete solution with correct procedure and arrived at the correct answer.	3. 6.35942×10^3 4. 3.4104×10^8 5. 3.2×10^8
	2	Provided a complete solution with minor error in the procedure but still arrive at the correct answer.	
	1	Provided an incomplete with major error in the procedures and did not arrive at the correct answer.	
	0	Did not attempt to solve the problem.	
AFTER AFTER/POST-LESSON			
MAKING GENERALIZATIONS AND ABSTRACTIONS	**Worksheet** Synthesis/Extended What you have learned In a one sheet of paper write something you understand about the lesson we discussed today.		
EVALUATING LEARNING	**Directions:** Choose the correct answer from the given options. Write the letter of your answer. 1. What is the sum of $(3.2 \times 10^5) + (4.5 \times 10^5)$? a) **$7.7 \times 10^5$** b) **$7.7 \times 10^{10}$** c) **3.2 × 10^6** d) **4.5×10^6** 2. What is the result of $(6.8 \times 10^4) – (2.5 \times 10^4)$? a) **$4.3 \times 10^4$** b) **$4.3 \times 10^8$** c) **$9.3 \times 10^4$** d) **$4.3 \times 10^3$** 3. Solve: $(5.6 \times 10^6) + (7.3 \times 10^5)$ a) **6.33×10^6** b) **6.3×10^5** c) **1.29×10^6** d) **6.33×10^5** 4. Multiply $(2.5 \times 10^3) \times (4.0 \times 10^2)$ a) **10×10^5** b) **1.0×10^6** c) **10.0×10^3** d) **1.0×10^5** 5. Solve: $(3.0 \times 10^7) \times (2.0 \times 10^5)$	**ANSWER** **1.A** **2.A** **3.A** **4.B** **5.A**

	a) **6.0×10^{12}** b) **6.0×10^{2}** c) **5.0×10^{12}** d) **6.0×10^{11}**	
ADDITIONAL ACTIVITIES FOR APPLICATION OR REMEDIATION (IF APPLICABLE)	**Directions:** Solve the following problems involving operations on scientific notation. Show your complete solution. **1. Solve:** $(4.2 \times 10^{6}) + (3.8 \times 10^{6})$ **2. Solve:** $(7.5 \times 10^{4}) - (2.3 \times 10^{4})$ **3. Solve:** $(9.6 \times 10^{5}) + (4.4 \times 10^{4})$ **4. Multiply:** $(3.0 \times 10^{3}) \times (2.0 \times 10^{4})$ **5. Multiply:** $(5.2 \times 10^{6}) \times (4.0 \times 10^{2})$	
REMARKS		
REFLECTION		

Prepared by:

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_____

Subject Teacher
Teacher

Reviewed by:

Master Teacher/Head