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DEPARTMENT OF EDUCATION

Lesson Exemplar for Mathematics

Lesson Exemplar for Mathematics Grade 7
Quarter 3: Lesson 6 (Week 6)
SY 2024-2025

Development Team

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MATHEMATICS / QUARTER 3 / GRADE LEVEL 7

I. CURRICULUM CONTENT, STANDARDS, AND LESSON COMPETENCIES	
A. Content Standards	The learners should have knowledge and understanding of the four operations with integers.
B. Performance Standards	By the end of the quarter, the learners are able to perform the four operations with integers. (MG)
C. Learning Competencies and Objectives	***Learning Competency*** By the end of the lesson, the learners are able to … 　1.　multiply and divide integers. 　2.　solve problems involving multiplication and division of integers.
D. Content	Multiplying Integers Dividing Integers Solve Word Problems involving Multiplication and Division of Integers
E. Integration	

II. LEARNING RESOURCES
CK-12 Foundation. (n.d.). *CK12-foundation.* Ck12.org. Retrieved February 5, 2024, from https://flexbooks.ck12.org/cbook/ck-12-conceptos-de-matem%C3%A1ticas-de-la-escuela-secundaria-grado-8-en-espa%C3%B1ol/section/2.11/related/lesson/multiply-and-divide-integers-msm8/ *Division of integers*. (2016, March 21). K5 Learning. https://www.k5learning.com/free-math-worksheets/sixth-grade- 6/integers/division-of-integers *Integers in real life situations*. (2022, June 10). Unacademy. https://unacademy.com/content/ssc/study- material/mathematics/integers-in-real-life-situations/ *Multiplication and division of integers*. (n.d.). Cuemath.com. Retrieved February 5, 2024, from https://www.cuemath.com/numbers/multiplication-and-division-of-integers/ *Multiplication and Division of Integers*. (2017, September 25). BYJUS; BYJU'S. https://byjus.com/maths/multiplication-division- integers/ *Multiplying and dividing integers - steps, examples & questions*. (2023, April 20). Third Space Learning. https://thirdspacelearning.com/us/math-resources/topic-guides/number-and-quantity/multiplying-and-dividing-integers/ *No title*. (n.d.). Study.com. Retrieved February 5, 2024, from https://study.com/learn/lesson/integer-operations-properties-rules.html

III. TEACHING AND LEARNING PROCEDURE		NOTES TO TEACHERS
A. Activating Prior Knowledge	**DAY 1** **1. Short Review** Let the learners answer the short activity. Perform the indicated operations on integers and give the results. 1) 6 – 12 + 2 = _____ 6) –1 – 14 + 17 = _____ 2) 11 + 14 – 2 = _____ 7) 6 – 20 +15 = _____ 3) –12 – 5 – 10 = _____ 8) –10 – 8 – 7 = _____ 4) 5 + 13 + 6 = _____ 9) 3 +10 – 15 = _____ 5) 1 – 13 +14 = _____ 10) 3 – 16 + (–16) = _____ **2. Feedback (Optional)** Review the addition and subtraction of integers using the number line if needed.	The teacher will recall prior knowledge of learners to assess their depth of understanding about addition and subtraction of integers before engaging them to the new lesson. If the teacher is not satisfied with the response of the learners to the short review activity, the teacher may add activities to cultivate the necessary knowledge. Students can do this in a separate worksheet provided. **Answers:** 1. –4 6. 2 2. 23 7. 1 3. –27 8. –25 4. 24 9. –2 5. 2 10. –29
B. Establishing Lesson Purpose	**1. Lesson Purpose** Consider the following scenario: A test has 20 questions. Correct answers get +3 points and incorrect answers –1 point. A student answered 5 questions incorrectly. How many points did the student score? **Essential Questions:** 1. What is the highest possible score for the student who took this test? 2. What is the lowest possible score? 3. What is the score of the student in this scenario? In order to answer this problem, we need to learn the concept of *multiplying integers* and other integer operations. **2. Unlocking Content Area Vocabulary** *Multiplication and division of integers* are two of the basic operations performed on integers. Multiplication of integers is the same as the repetitive addition which means adding an integer a specific number of times. For example, 4 × 3	In this part, the teacher will explain the importance of learning the specific topic that involves the multiplication of integers. The teacher may also use the essential questions to engage students on why it is important to learn the lesson.

	means adding 4 three times, i.e., 4 + 4 + 4 = 12. Division of integers means equal grouping or dividing an integer into a specific number of groups. For example, –6 ÷ 2 means dividing –6 into 2 equal parts, which results in –3.	
C. Developing and Deepening Understanding	**SUB-TOPIC 1: Multiplication Of Integers** **1. Explicitation** *Multiplication of integers* is the process of repetitive addition including positive and negative whole numbers called integers. When it comes to multiplication of integers, there are three (3) cases to consider. 　　Case 1: Multiplying two (2) positive numbers 　　Case 2: Multiplying two (2) negative numbers 　　Case 3: Multiplying one (1) positive and one (1) negative number 　　　　For Case 1, POSITIVE × POSITIVE = POSITIVE 　　　　For Case 2, NEGATIVE × NEGATIVE = POSITIVE 　　　　For Case 3, POSITIVE × NEGATIVE = NEGATIVE or 　　　　　　　　NEGATIVE × POSITIVE = NEGATIVE Do you notice a pattern or rule? Rule for multiplying integers: 　1) If the integers multiplied have the SAME SIGN or LIKE SIGNS (Case 1 and Case 2), the product is POSITIVE. 　2) If the integers multiplied have DIFFERENT SIGNS or UNLIKE SIGNS (Case 3), the product is NEGATIVE. **2. Worked Example** Multiply the following integers. 　1) 2 × 3 = ? 　　*Solution:* As repetitive addition, 2 × 3 means adding 2 three times, i.e., 2 + 2 + 2 = 6. If you are familiar already with multiplication of positive numbers, then we can apply Rule 1, i.e. 2 × 3 = 6 since both 2 and 3 have the SAME/LIKE SIGNS the answer is POSITIVE 6 (+6). 　2) 2 × (–3) = ? 　　*Solution:* This is the same as 2 × 3 except that they have UNLIKE SIGNS (Rule 2), then the answer is NEGATIVE 6 (–6).	Make sure that students already learned addition and subtraction of integers. Teachers may use other ways of solving the problem in which he/she can distinguish what solving strategy worked best. Students can do this in the worksheet provided. The teacher may give drills on multiplication of integers before starting this lesson.

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3) $-2 \times 3 = ?$
   Solution: This is the same as 2×3 except that they have UNLIKE SIGNS (Rule 2), then the answer is NEGATIVE 6 (–6).

4) $(-2) \times (-3) = ?$
   Solution: This is the same as 2×3 except that they are both negative or have LIKE SIGNS (Rule 1), then the answer is POSITIVE 6 (+6).

3. Lesson Activity
Practice/Drill 1. Multiply the following integers.

1) $7 \times -2 = \underline{-14}$	6) $-6 \times 8 = \underline{-48}$	11) $4 (-9) = \underline{-36}$
2) $5 \times -4 = \underline{-20}$	7) $-10 \times 2 = \underline{-20}$	12) $-4 (10) = \underline{-40}$
3) $-7 \times 7 = \underline{-49}$	8) $-7 \times 5 = \underline{-35}$	13) $5 (-3) = \underline{-15}$
4) $5 \times 7 = \underline{35}$	9) $-3 \times 6 = \underline{-18}$	14) $-4 (-9) = \underline{36}$
5) $10 \times -5 = \underline{-50}$	10) $9 \times 7 = \underline{63}$	15) $1 (3) = \underline{3}$

DAY 2
SUB-TOPIC 2: Division of Integers
1. Explicitation
Division of integers involves grouping of items equally including positive and negative whole numbers called integers. *Remember that division is the opposite or the reverse operation of multiplication.* Just like multiplication of integers, there are three (3) same cases to consider.

Case 1: Dividing two (2) positive numbers
Case 2: Dividing two (2) negative numbers
Case 3: Dividing one (1) positive and one (1) negative number

For Case 1, POSITIVE ÷ POSITIVE = POSITIVE
For Case 2, NEGATIVE ÷ NEGATIVE = POSITIVE
For Case 3, POSITIVE ÷ NEGATIVE = NEGATIVE or
NEGATIVE ÷ POSITIVE = NEGATIVE

Do you notice a pattern or rule?
Rule for dividing integers:
1) If the integers have the SAME SIGN or LIKE SIGNS (Case 1 and Case 2), the quotient is POSITIVE.
2) If the integers have DIFFERENT SIGNS or UNLIKE SIGNS (Case 3), the quotient is NEGATIVE.

The teacher may use Think, Pair, Share, and other strategies.

Students will do this in a separate worksheet provided.

The teacher should emphasize the real-life applications of integer operations. Additional examples may be given for mastery.

The teacher may use Think, Pair, Share, and other strategies. Students will do this in a separate worksheet provided.
Gain: 2 pesos

Remarks:
1. Dividing by zero is *undefined* because there is no reverse multiplication that is true. Example: 7/0 = undefined because 0 × *any number* **does not equal to** 7.
2. Dividing zero by any number is always zero. Example: 0/7 = 0 because 0 × 7 or any number) = 0.

2. **Worked Example**
Divide the following integers.
1) 16 ÷ 8 = ?
    Solution: As division involves grouping, 16 ÷ 8 means grouping 16 into 8 members per group, which means there are 2 groups, i.e. 16 ÷ 8 = 2. If you are familiar already with division of positive numbers, then we can apply Rule 1, i.e. 16 ÷ 8 = 2 since 2 × 8 = 16. Both 16 and 8 have the SAME/LIKE SIGN, and so the answer is POSITIVE 2 (+2).

2) 16 ÷ (−8) = ?
    Solution: This is the same as 16 ÷ 8 except that they have UNLIKE SIGNS (Rule 2), then the answer is NEGATIVE 2 (-2).

3) −16 ÷ 8 = ?
    Solution: This is the same as 16 ÷ 8 except that they have UNLIKE SIGNS (Rule 2), then the answer is NEGATIVE 2 (−2).

4) (−16) ÷ (-8) = ?
    Solution: This is the same as 16 ÷ 8 except that they are both negative or have LIKE SIGNS (Rule 1), then the answer is POSITIVE 2 (+2).

3. **Lesson Activity**
   Practice/Drill 2. Divide the following integers.

1) −176 ÷ 11 = <u>−16</u>	6) −10 ÷ −10 = <u>1</u>	11) 60 / (−12) = <u>−5</u>
2) −190 ÷ 2 = <u>−95</u>	7) −60 ÷ −12 = <u>5</u>	12) 88 / (−8) = <u>−11</u>
3) 33 ÷ 11 = <u>3</u>	8) 15 ÷ −5 = <u>−3</u>	13) 24 / 12 = <u>2</u>
4) 4 ÷ 4 = <u>1</u>	9) 60 ÷ −10 = <u>−6</u>	14) 110 / −11 = <u>−10</u>
5) 54 ÷ 2 = <u>27</u>	10) 10) 168 ÷ 7 = <u>24</u>	15) −108 / −3 = <u>36</u>

	DAY 3	
	SUB-TOPIC 3: Applications of Operations of Integers	
	1. Explicitation	
	Here are some examples of the uses of positive and negative integers in real life.	
	1) The height of Mount Everest is about 8,850 meters above sea level (positive) while the Mariana Trench is about 11,000 meters deep below sea level (negative).	
	2) The temperature can be expressed as positive or negative below or above 0 degrees.	
	3) In games, if we win, then the points increase. If we lose the game, the points decrease.	
	4) In business, profits are considered positive while losses are considered negative.	
	5) And many more…	
	Let us now solve the problem posed at the beginning of this lesson.	
	2. Worked Example	
	Example. A test has 20 questions. Correct answers get +3 points and incorrect answers –1 point. A student answered 5 questions incorrectly. How many points did the student score?	
	Solution: One correct answer is awarded +3 points while one incorrect answer is awarded –1 point. There are 20 questions, of which the student answered 5 questions incorrectly, i.e., $5 \times (-1) = -5$ points. This also means that the student answered 15 questions correctly, i.e. $15 \times (+3) = 45$ points. Therefore, the score of the student is $45 + (-5) = 40$ points out of 60 points.	
	3. Lesson Activity	
	Problem Set. Solve the problem below.	
	In a game of tossing a coin, you will gain 5 pesos if it lands a head (H), and you will lose 3 pesos if it lands a tail (T). If the coin landed heads 4 times in 10 tosses of the coin, how much did you gain or lose?	
D. Making Generalizations	**1. Learners' Takeaways**	
	A. Generalization Questions	
	1. What do you need to bear in mind in multiplying and dividing integers?	The teacher may ask questions that lead to abstractions of the lesson.
	2. Why do you think multiplying and dividing integers have the same rules?	
	3. Why is it that dividing by zero is not defined?	

	B. Generalization Activities	The teacher may give activities to emphasize the generalization of the lesson.
	Solve the following problem with accuracy.	
	In the NBA, two of the popular teams, the Lakers and the Warriors are said to be the most competitive teams vying for the title. As the games are ongoing, a betting website has these in the game between Warriors vs Lakers:	Recall the lesson activity for them to answer the problem based on their understanding of the lesson activity.
	1. If the Warriors win a game, you lose P100.	Gain: P140
	2. If the Lakers win a game, you win P90.	
	3. If the Warriors win 4 games out of ten games, how much did you gain or lose if you rooted for the Lakers?	
	C. Generalization Statements	
	Multiplication of integers is the process of repetitive addition including positive and negative whole numbers called integers.	The teacher may ask students to give a generalization statement.
	Division of integers involves grouping of items equally including positive and negative whole numbers called integers. *Remember that division is the opposite or the reverse operation of multiplication.*	
	Rules for multiplying and dividing integers:	
	1. If the integers have the SAME SIGN or LIKE SIGNS (Case 1 and Case 2), the product (quotient) is POSITIVE.	
	2. If the integers have DIFFERENT SIGNS or UNLIKE SIGNS (Case 3), the product (quotient) is NEGATIVE.	
	3. Dividing by zero is *undefined* because there is no reverse multiplication that is true. Dividing zero by any non-number is always zero.	
	2. Reflection on Learning	In this part, students may write a reflection about the importance of the lesson in real-life representation.
	What have learned about our lesson? Share your reflections.	

IV. EVALUATING LEARNING: FORMATIVE ASSESSMENT AND TEACHER'S REFLECTION		**NOTES TO TEACHERS**

A. Evaluating Learning	**DAY 4**
	1. Formative Assessment
	A. Multiply the following integers.
	  1. −6 (−8) = <u>48</u> 6. −9 (12) = <u>−108</u>
	  2. 5 (−10) = <u>−50</u> 7. 8 (−11) = <u>−88</u>
		Collaborative activity

3. 3 (−4) = <u>−12</u>   8. (−5)(−9) = <u>45</u>
4. −3 (4) = <u>−12</u>   9. −7 (−8) = <u>56</u>
5. 8 (−9) = <u>−72</u>   10. (−12)(12) = <u>−144</u>

B. Divide the following integers.
11. −12 ÷ 2 = <u>−6</u>   16. 28/4 = <u>7</u>
12. −18 ÷ −6 = <u>3</u>   17. −36/4 = <u>−9</u>
13. −24 ÷ 12 = <u>−2</u>   18. −45/9 = <u>−5</u>
14. −80 ÷ −4 = <u>20</u>   19. −75 ÷ 25 = <u>−3</u>
15. −60 ÷ −30 = <u>2</u>   20. −68 ÷ −2 = <u>34</u>

C. Solve the following problem.
   In the NBA, two of the popular teams, the Lakers and the Warriors are said to be the most competitive teams vying for the title. As the games are ongoing, a betting website has these in the game between Warriors vs Lakers:
   1. If the Warriors win a game, you win P100.
   2. If the Lakers win a game, you lose P90.
   3. If the Warriors win 4 games out of ten games, how much did you gain or lose if you rooted for the Warriors?

2. Homework (Optional)

| Students can do this in a separate Worksheet provided. |

Loss: P140

B. Teacher's Remarks	*Note observations on any of the following areas:*	**Effective Practices**	**Problems Encountered**	The teacher may take note of some observations related to the effective practices and problems encountered after utilizing the different strategies, materials used, learner engagement, and other related stuff.
	strategies explored			
	materials used			
	learner engagement/ interaction			Teachers may also suggest ways to improve the different activities explored/lesson exemplar.
	others			

C. Teacher's Reflection	*Reflection guide or prompt can be on:*
	    ▪ *principles behind the teaching*
	        What principles and beliefs informed my lesson?
	        Why did I teach the lesson the way I did?
	
	    ▪ *students*
	        What roles did my students play in my lesson?
	        What did my students learn? How did they learn?
	
	    ▪ *ways forward*
	        What could I have done differently?
	        What can I explore in the next lesson?
		Teacher's reflection in every lesson conducted/facilitated is essential and necessary to improve practice. You may also consider this as an input for the LAC/Collab sessions.