

Multiplying Integers

Unit Topic : **Multiplying and Dividing Rational Numbers**

Grade level : 7th

Presenter : Dung Le

Lecture Objectives

STUDENTS ARE ABLE TO:

- REPRESENT A MULTIPLICATION PROBLEM OF THE FORM $P \times Q$, WHERE P OR Q IS A POSITIVE OR NEGATIVE INTEGER, BY WRITING A PHRASE AND DRAWING AN INTEGER TILES PICTURE TO REPRESENT THE PROBLEM.
- CALCULATE THE PRODUCT OF THE MULTIPLICATION PROBLEM USING INTEGER TILES.
- RECOGNIZE THE SIGN OF THE PRODUCT OF TWO INTEGERS WHEN THE TWO INTEGERS HAVE THE SAME OR DIFFERENT SIGNS.

Math Content Standards

CCSS.MATH.CONTENT.7.NS.A.2

APPLY AND EXTEND PREVIOUS UNDERSTANDINGS OF MULTIPLICATION AND DIVISION AND OF FRACTIONS TO MULTIPLY AND DIVIDE RATIONAL NUMBERS.

CCSS.MATH.CONTENT.7.NS.A.2.A

UNDERSTAND THAT MULTIPLICATION IS EXTENDED FROM FRACTIONS TO RATIONAL NUMBERS BY REQUIRING THAT OPERATIONS CONTINUE TO SATISFY THE PROPERTIES OF OPERATIONS, PARTICULARLY THE DISTRIBUTIVE PROPERTY, LEADING TO PRODUCTS SUCH AS $(-1)(-1) = 1$ AND THE RULES FOR MULTIPLYING SIGNED NUMBERS. INTERPRET PRODUCTS OF RATIONAL NUMBERS BY DESCRIBING REAL-WORLD CONTEXTS.

CCSS.MATH.CONTENT.7.NS.A.2.C

APPLY PROPERTIES OF OPERATIONS AS STRATEGIES TO MULTIPLY AND DIVIDE RATIONAL NUMBERS.


How to Present The Multiplication Problem below?

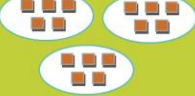
$$3 \times 5$$

Yes/No Question

Yes/No? $3 + 5$

Yes/No? Repeated Addition
 $5 + 5 + 5$

Yes/No? An array with 3 rows and 5 columns


Yes/No? 3 groups of 5


Educational Hook – Smart Art Visual Aid

MORE: How to Present Other Multiplication Problems?

Multiplication Problems

$$3 \times -5$$

$$-3 \times 5$$

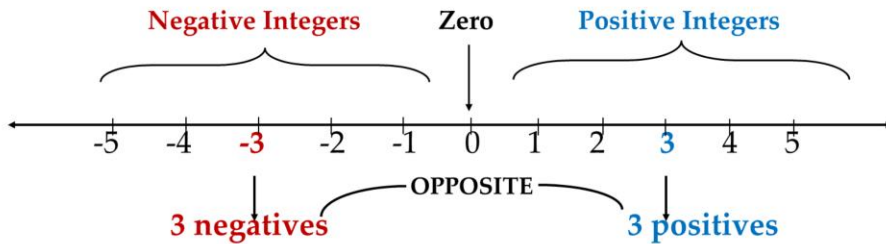
$$-3 \times -5$$



Educational Hook – Dual Coding Visual Aid

Review: Positive and Negative Integers

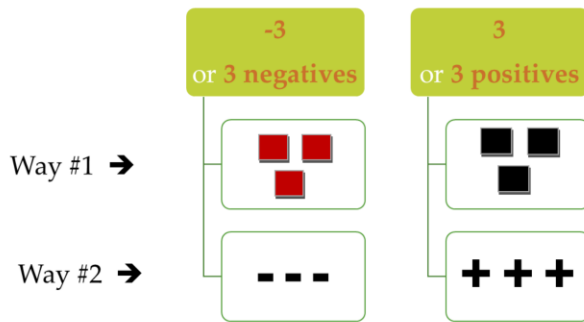
A Number Line



The opposite of 3 negatives is 3 positives
The opposite of 3 positives is 3 negatives

Dual Coding – Visual Aid

Using Virtual Integer Tiles to Represent Integers



Note: You can color the virtual integer tiles $+$ and $-$, e.g., $+$ and $-$

Dual Coding - Smart Art Visual Aid

NOW YOU TRY: Use Integer Tiles to Represent Some Integers

REQUEST	IMPLEMENTATION
Use integer tiles to present 7 negatives	
Use integer tiles to present 11 positives	
Use integer tiles to present the <u>opposite</u> of 7 negatives	
Use integer tiles to present the <u>opposite</u> of 11 positives	
Use integer tiles to present two groups of 3 negatives (two groups, each group has 3 negatives)	

Progress Monitoring Questions

EXAMPLES: Use Integer Tiles to Represent Some Integers






REQUEST	IMPLEMENTATION
Use integer tiles to present 7 negatives	
Use integer tiles to present 11 positives	
Use integer tiles to present the <u>opposite</u> of 7 negatives	
Use integer tiles to present the <u>opposite</u> of 11 positives	
Use integer tiles to present two groups of 3 negatives (two groups, each group has 3 negatives)	

Table Organizer

NOW YOU TRY: Use Integer Tiles to Represent 3×5

Fill out the blanks

Multiplication

How many groups?

3×5

How many in each group?

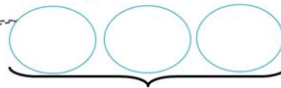
= _____

The product

Write: _____ groups of _____ positives

Draw: Use integer tiles to represent the problem

Fill up what are inside each group

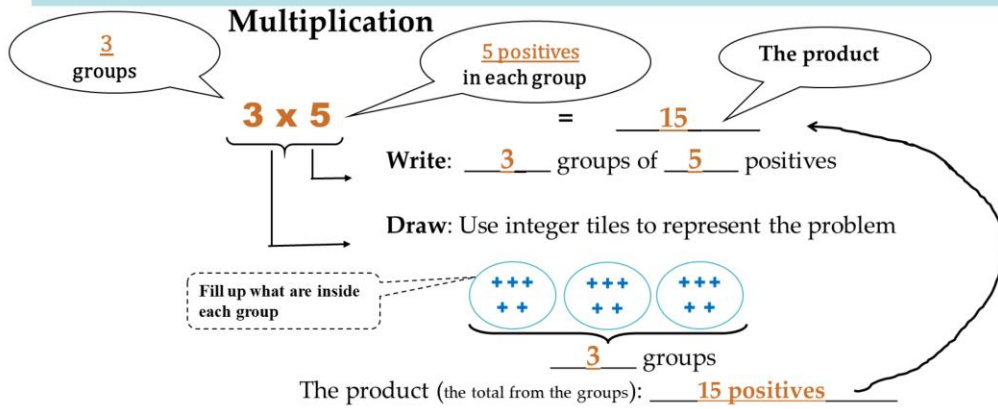


_____ groups

The product (the total from the groups) = _____





Progress Monitoring Question

WHAT WE FOUND: Use Integer Tiles to Represent 3×5







Dual Coding-Demonstration

The 4 TYPICAL PROBLEMS of Multiplying Integers




PROBLEM 	<i>Write</i> 	 Draw: Use integer tiles to represent the problem	The product
3×5	3 groups of 4 positives		15
3×-5			
-3×5			
-3×-5			

Guided Notes -1

Solve Problem 2: 3×-5




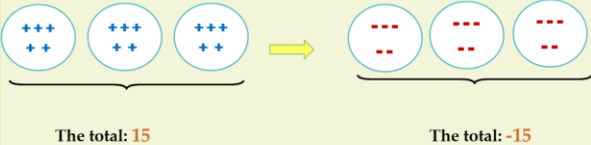
PROBLEM 	<i>Write</i> 	 Draw: Use integer tiles to represent the problem	The product
3×5			
3×-5	3 groups of 5 negatives		-15
-3×5			
-3×-5			

NOW YOU TRY: Solve $2x - 7$




PROBLEM 	Write 	Draw: Use integer tiles to represent the problem 	The product
$2x - 7$			

Progress Monitoring Question

Solve Problem 3: -3×5




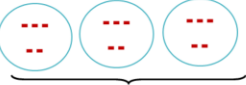

PROBLEM 	Write 	Draw: Use integer tiles to represent the problem 	The product
3×5			
3×-5			
-3×5	The OPPOSITE of 3 groups of 5 positives	<p style="text-align: center;"> <u>3 groups of 5 positives</u> The OPPOSITE of 3 groups of 5 positives </p> 	-15
-3×-5			

NOW YOU TRY: Solve -2×7




PROBLEM 	<i>Write</i> 	 Draw: Use integer tiles to represent the problem	The product
-2×7			

Progress Monitoring Question

Solve Problem 4: -3×-5

PROBLEM 	<i>Write</i> 	 Draw: Use integer tiles to represent the problem	The product
3×5			
3×-5			
-3×5			
-3×-5	The OPPOSITE of 3 groups of 5 negatives	<p> 3 groups of 5 negatives  → The OPPOSITE of 3 groups of 5 negatives  </p> <p> The total: -15 The total: 15 </p>	15

NOW YOU TRY: Solve -2×-7

PROBLEM 	Write 	Draw: Use integer tiles to represent the problem 	The product
-2×-7			

Progress Monitoring Question

The 4 TYPICAL PROBLEMS of Multiplying Integers (COMPLETED)

PROBLEM 	Write 	Draw: Use integer tiles to represent the problem 	The product
3×5	3 groups of 4 positives	<p style="text-align: center;">The total: $\rightarrow 15$</p>	15
3×-5	3 groups of 5 negatives	<p style="text-align: center;">The total: $\rightarrow -15$</p>	-15
-3×5	The OPPOSITE of 3 groups of 5 positives	<p style="text-align: center;">3 groups of 5 positives</p> <p style="text-align: center;">The total: 15</p> <p style="text-align: center;">\rightarrow</p> <p style="text-align: center;">The OPPOSITE of 3 groups of 5 positives</p> <p style="text-align: center;">The total: -15</p>	-15
-3×-5	The OPPOSITE of 3 groups of 5 negatives	<p style="text-align: center;">3 groups of 5 negatives</p> <p style="text-align: center;">The total: -15</p> <p style="text-align: center;">\rightarrow</p> <p style="text-align: center;">The OPPOSITE of 3 groups of 5 negatives</p> <p style="text-align: center;">The total: 15</p>	15

Dual Coding - Visual Aid

SIGN-OF-PRODUCT Table (Incomplete)

Signs of two integers a and b		Sign of the Product a x b
+	+	
+	-	
-	+	
-	-	



Thinking

Guided Notes - 2

SIGN-OF-PRODUCT Table (Completed)

Signs of two integers a and b		Sign of the Product a x b
+	+	+
+	-	-
-	+	-
-	-	+



Thinking

Table Organizer

? NOW YOU TRY: RULE of Signs in Multiplication

1. From the Sign-of-Product table, what do you notify about the signs of multiplication?

2. Is there any rule of multiplication signs we can build up?

- If two integers have the **same sign**, their product _____

- If two integers have **different signs**, their product _____

Culminating Questions

NOW YOU TRY

Practice solving multiplication problems (Fill up the blanks)

$$-7 \times (-8) = \underline{\hspace{2cm}}$$

$$-4 \times 9 = \underline{\hspace{2cm}}$$

$$3 \times (-11) = \underline{\hspace{2cm}}$$

$$15 \times 19 = \underline{\hspace{2cm}}$$

$$4 \times (\underline{\hspace{1cm}}) = -4$$

$$\underline{\hspace{1cm}} \times -3 = 18$$

$$-9 \times (\underline{\hspace{1cm}}) = 45$$

$$\underline{\hspace{1cm}} \times 7 = -21$$

$$-5 \times 4 \times (-8) = \underline{\hspace{2cm}}$$

$$6 \times (-7) \times 3 = \underline{\hspace{2cm}}$$

$$-2 \times (-6) \times (-3) = \underline{\hspace{2cm}}$$

Culminating Activity