

Lesson 10: Understanding Multiplication of Integers

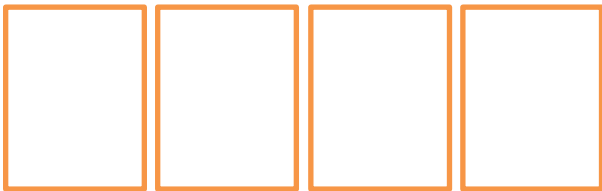
Classwork

Exercise 1: Integer Game Revisited

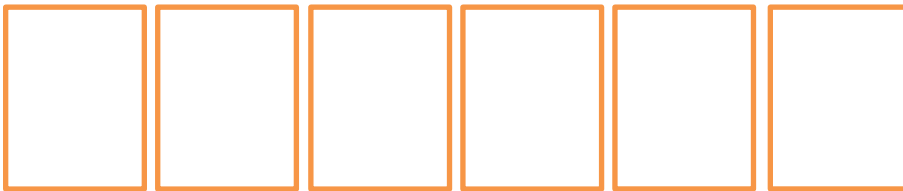
In groups of four, play one round of the Integer Game (see Integer Game outline for directions).

Example 1: Product of a Positive Integer and a Negative Integer

Part A:



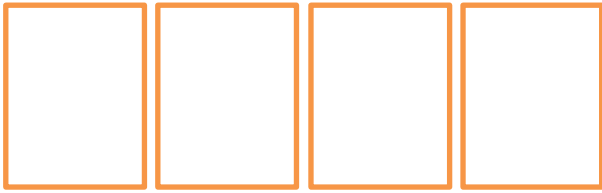
Part B:



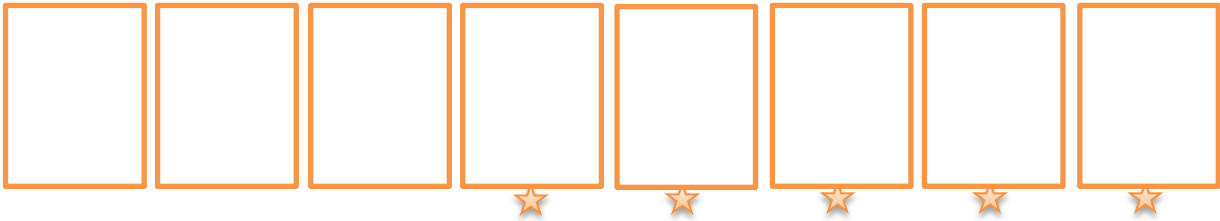
Use your cards from Part B to answer the questions below:

- Write a product that describes the three matching cards.
- Write an expression that represents how each of the \star cards changes your score.
- Write an equation that relates these two expressions.
- Write an integer that represents the total change to your score by the three \star cards.
- Write an equation that relates the product and how it affects your score.

Part C:



Part D:

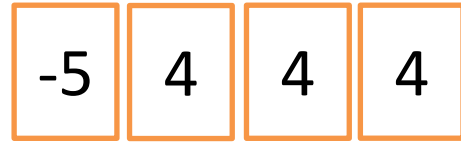


Use your cards from Part D to answer the questions below:

- f. Write a product that describes the five matching cards.
- g. Write an expression that represents how each of the ★ cards changes your score.
- h. Write an equation that relates these two expressions.
- i. Write an integer that represents the total change to your score by the three ★ cards.
- j. Write an equation that relates the product and how it affects your score.
- k. Use the expression 5×4 to relate the multiplication of a positive valued card to addition.
- l. Use the expression $3 \times (-5)$ to relate the multiplication of a negative valued card to addition.

Example 2: Product of a Negative Integer and a Positive Integer

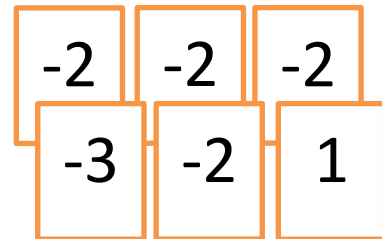
- a. If all of the 4's from the playing hand on the right are discarded, how will the score be affected? Model this using a product in an equation.



- b. What three matching cards could be added to those pictured to get the same change in score? Model this using a product in an equation.
- c. Seeing how each play affects the score, relate the products that you used to model them. What do you conclude about multiplying integers with opposite signs?

Example 3: Product of Two Negative Integers

- a. If the matching cards from the playing hand on the right are discarded, how will this hand's score be affected? Model this using a product in an equation.



- b. What four matching cards could be added to those pictured to get the same change in score? Model this using a product in an equation.
- c. Seeing how each play affects the score, relate the products that you used to model them. What do you conclude about multiplying integers with the same sign?

Using the conclusions from Examples 2 and 3, what can we conclude about multiplying integers? Write a few examples.

Lesson Summary

Multiplying integers is repeated addition and can be modeled with the Integer Game. If $3 \times a$ corresponds to what happens to your score if you get three cards of value a , then $(-3) \times a$ corresponds to what happens to your score if you lose three cards of value a . Adding a number multiple times has the same effect as removing the opposite value the same number of times (e.g., $a \times b = (-a) \times (-b)$ and $a \times (-b) = (-a) \times b$.)

Problem Set

- Describe sets of two or more matching integer cards that satisfy the criteria in each part below:
 - Cards increase the score by eight points
 - Cards decrease the score by 9 points
 - Removing cards that increase the score by 10 points
 - Positive cards that decrease the score by 18 points
- You have the integer cards shown at the right when your teacher tells you to choose a card to multiply four times. If your goal is to get your score as close to zero as possible, which card would you choose? Explain how your choice changes your score.
- Sherry is playing the Integer Game and is given a chance to discard a set of matching cards. Sherry determines that if she discards one set of cards her score will increase by 12. If she discards another set, then her score will decrease by eight. If her matching cards make up all six cards in her hand, what cards are in Sherry's hand? Are there any other possibilities?

