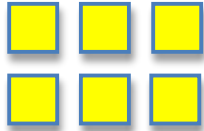


## Exploration: Multiplying Integers

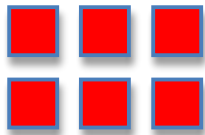
In this Exploration, you will use your algebra tiles to model multiplication.

→ Remember that the multiplication problem  $2 \cdot 3$  means *two sets of three positive items*.



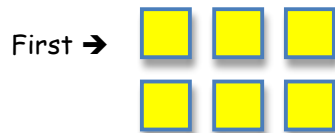
Therefore,  $2 \cdot 3 = 6$

→ Consider  $2 \cdot (-3)$ . This tells you to *put in two sets of three negative items*.

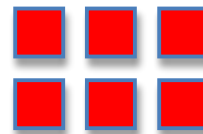


Therefore,  $2 \cdot (-3) = -6$

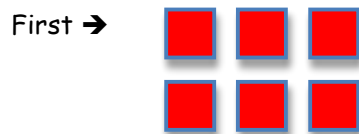
→ Now consider  $-2 \cdot 3$ . Since one meaning of the negative sign is *the opposite of*, you can solve this problem by doing  $2 \cdot 3$  and then taking the opposite of that answer (by flipping the tiles over).



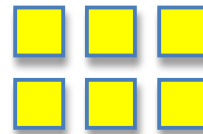
Then take the opposite,  
by flipping over the tiles



→ Finally, consider  $-2 \cdot (-3)$ . Since one meaning of the negative sign is *the opposite of*, you can solve this problem by doing  $2 \cdot (-3)$  and then taking the opposite of that answer (by flipping the tiles over).



Then take the opposite,  
by flipping over the tiles



**Model each set of problems.**

1.  $3 \cdot 4$       2.  $3 \cdot (-4)$       3.  $-3 \cdot 4$       4.  $-3 \cdot (-4)$   
    $4 \cdot 3$            $-4 \cdot 3$            $4 \cdot (-3)$            $-4 \cdot (-3)$

5. How are the expressions  $-3 \cdot 4$  and  $4 \cdot (-3)$  the same? How do they differ?  
What property do they illustrate?

6. We can explore division of integers by using the relationship between division and multiplication.  
Use what you know to solve the problem below:

$-2 \cdot 4 = \underline{\quad}$ ,       $4 \cdot (-2) = \underline{\quad}$        $(-8) \div 4 = \underline{\quad}$ ,       $(-8) \div (-2) = \underline{\quad}$ ,



Notes from the video

<p>1. Multiplying rules:</p> <p>Positive * Positive = _____</p> <p><math>3 * 5 = \underline{\quad}</math></p> <p>Negative * Negative = _____</p> <p><math>-3 * -5 = \underline{\quad}</math></p> <p><math>-6 * -5 = \underline{\quad}</math></p> <p>Positive * Negative = _____</p> <p><math>3 * -5 = \underline{\quad}</math></p> <p><math>6 * -5 = \underline{\quad}</math></p> <p>Negative * Positive = _____</p> <p><math>-3 * 5 = \underline{\quad}</math></p> <p><math>-6 * 5 = \underline{\quad}</math></p>	<p>2. Dividing rules:</p> <p>Positive ÷ Positive = _____</p> <p><math>15 \div 3 = \underline{\quad}</math></p> <p>Negative ÷ Negative = _____</p> <p><math>-15 \div -5 = \underline{\quad}</math></p> <p><math>-56 \div -7 = \underline{\quad}</math></p> <p>Positive ÷ Negative = _____</p> <p><math>15 \div -3 = \underline{\quad}</math></p> <p><math>56 \div -7 = \underline{\quad}</math></p> <p>Negative ÷ Positive = _____</p> <p><math>-15 \div 3 = \underline{\quad}</math></p> <p><math>-56 \div 7 = \underline{\quad}</math></p>
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3. Most weather activity occurs between the ground and 11 km above ground. The temperature in this space drops about  $7^{\circ}\text{C}$  for each kilometer in altitude.

a. High level clouds can reach heights of 6km. If the ground temperature is  $0^{\circ}\text{C}$ , what is the temperature 6 km up?

b. Suppose the temperature at 3 km is  $0^{\circ}\text{C}$ . What would the ground temperature be?

4. In September 2013, a British-led team set the world record for the deepest salvage operations in history. It took 3.5 hours for the team's Remotely Operated Vehicle (ROV), to descend the 5,150 meter journey between the ship and the site of the wreck.

Find the average rate of the descent in meters per hour to the nearest whole number.

