

1. Vera's mutual fund lost \$6.00 each month for  $3\frac{1}{3}$  months. What was the total change in her investment during that period?

2. a) Fill in the blanks with two different pairs of rational numbers that make the equation true:

$$\underline{\hspace{2cm}} \times \underline{\hspace{2cm}} = -3.6$$

b) Suppose six different numbers are multiplied to give a product of  $-3.6$ . How many of the factors can be negative?

$$\underline{\hspace{1cm}} \times \underline{\hspace{1cm}} \times \underline{\hspace{1cm}} \times \underline{\hspace{1cm}} \times \underline{\hspace{1cm}} \times \underline{\hspace{1cm}} = -3.6$$

3. Choose one of your solutions to Problem 2(a) and create a real-life situation that can be modeled by that multiplication problem.

**Teacher Notes:**

Before beginning this task, give the students a review of the commutative property of multiplication, associative property of multiplication, and distributive property of multiplication over addition, if necessary.

For the third whole group question, it would be helpful to have a stack of notecards containing positive and negative rational numbers so that students can draw from the deck. Include mixed numbers, because these provide opportunities for the use of the distributive property. Also place integers (both positive and negative) strategically so that the Commutative and Associative properties can be used to group the factors in convenient ways.

**Tennessee State Standards for Mathematical Content**

**7.NS.A.2** Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.  
**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

**Tennessee State Standards for Mathematical Practice**

1. Make sense of problems and persevere in solving them.
2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.
4. Model with mathematics.
5. Use appropriate tools strategically.
6. Attend to precision.

<p>such as <math>(-1)(-1) = 1</math> and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.</p> <p>c. Apply properties of operations as strategies to multiply and divide rational numbers.</p>	<p>7. Look for and make use of structure.</p> <p>8. Look for and express regularity in repeated reasoning.</p>
<p><b>Essential Understandings:</b></p>	
<ul style="list-style-type: none"> <li>• Properties of operations provide different avenues for multiplying and dividing rational numbers.</li> <li>• Rational numbers follow the same properties of multiplication and division as integers, whole numbers, and fractions.</li> <li>• When multiplying two negative numbers the resulting product is a positive number. When two factors have different signs, the product is negative.</li> </ul>	
<p><b>Explore Phase</b></p>	
<p><b>Possible Solution Paths</b></p>	<p><b>Assessing and Advancing Questions</b></p>
<p>1. Using the distributive property: <math>-6\left(3 + \frac{1}{3}\right) = -6 \cdot 3 + (-6) \cdot \frac{1}{3} = -18 + (-2) = -20</math></p> <p>Thus, the change in the investment is -\$20.</p>	<p><b>Assessing Questions:</b></p> <ul style="list-style-type: none"> <li>• How did you know that the distributive property was needed?</li> <li>• Why did you multiply <math>-6</math> by <math>1/3</math>?</li> <li>• Why are both addends negative?</li> </ul> <p><b>Advancing Questions:</b></p> <ul style="list-style-type: none"> <li>• What does the number “3 and <math>1/3</math>” mean?</li> <li>• Is there a property of operations that could help with this problem?</li> <li>• What does the distributive property say?</li> <li>• What operation(s) is(are) involved in this problem?</li> </ul>
<p>1. Change the mixed number form of <math>3\frac{1}{3}</math> to an improper fraction: <math>\frac{9}{3} + \frac{1}{3} = \frac{10}{3}</math>. Then multiply by <math>-6</math>: <math>-6 \cdot \frac{10}{3} = -\frac{6}{1} \cdot \frac{10}{3} = -\frac{60}{3} = -20</math></p>	<p><b>Assessing Questions:</b></p> <ul style="list-style-type: none"> <li>• Why did you change <math>3\frac{1}{3}</math> to <math>\frac{10}{3}</math>?</li> <li>• What operation is involved in this problem?</li> <li>• Is there a way to work this problem that does not involve an improper fraction?</li> <li>• How did you know that the answer is negative?</li> </ul> <p><b>Advancing Questions:</b></p> <ul style="list-style-type: none"> <li>• What operation is involved in this problem?</li> <li>• Is there another way to write <math>3\frac{1}{3}</math>?</li> <li>• Will the answer be a negative number or a positive number?</li> </ul>
<p>2. a) Some examples are: <math>-3 \times 1.2</math> <math>2 \times (-1.8)</math></p>	<p><b>Assessing Questions:</b></p> <ul style="list-style-type: none"> <li>• How many positive factors do you have in each solution?</li> </ul>

$-4 \times 0.9$ $0.4 \times (-9)$ $\frac{1}{2} \times (-7.2)$	<ul style="list-style-type: none"> <li>• How many negative factors do you have in each solution?</li> <li>• Why must you have one negative factor and one positive?</li> <li>• How many different pairs of factors are possible? (<i>Infinitely many</i>)</li> </ul> <p><b>Advancing Questions:</b></p> <ul style="list-style-type: none"> <li>• What operation is involved in this problem?</li> <li>• How can the product of two numbers be negative?</li> <li>• How many different pairs of factors can result in a product of <math>-3.6</math>?</li> <li>• If one factor is negative, what kind of number must the other factor be?</li> </ul>
<p>b) The possible scenarios are:</p> <p>One negative factor, five positive factors</p> <p>Three negative factors, three positive factors</p> <p>Five negative factors, one positive factor</p>	<p><b>Assessing Questions:</b></p> <ul style="list-style-type: none"> <li>• How did you know that you must have (<i>insert their response</i>) negative factors?</li> <li>• Is there another possibility?</li> <li>• Why can't all of the factors be negative?</li> <li>• Why is the product of two negative numbers positive?</li> </ul> <p><b>Advancing Questions:</b></p> <ul style="list-style-type: none"> <li>• What is the product of two negative numbers? Three negative numbers?</li> <li>• How can the product of two numbers be negative?</li> <li>• Have you tried different combinations of numbers?</li> <li>• What happens when a negative number is multiplied by a positive number?</li> </ul>
<p><b>Possible Student Misconceptions</b></p>	<p><b>Assessing and Advancing Questions</b></p>
<p>1. Students may fail to multiply the <math>-6</math> by both the <math>3</math> and the <math>\frac{1}{3}</math>.</p>	<ul style="list-style-type: none"> <li>• What does the number "3 and <math>\frac{1}{3}</math>" mean?</li> <li>• Is there a property of operations that could help with this problem?</li> <li>• What does the distributive property say?</li> <li>• What operation(s) is(are) involved in this problem?</li> </ul>
<p>1. Students may miscalculate the improper fraction form of <math>3\frac{1}{3}</math>.</p>	<ul style="list-style-type: none"> <li>• (<i>If you want to help the student review mixed numbers</i>) How did you change <math>3\frac{1}{3}</math> to (<i>insert student's wrong answer</i>).</li> <li>• What does "three and one third" mean? What is the operation that is implied?</li> </ul>

	<ul style="list-style-type: none"> <li>• How do you add a fraction and a whole number?</li> <li>• <b>Preferred:</b> (To emphasize the Distributive Property) Is there a property of operations that could help us with this multiplication problem?</li> <li>• What does “three and one third” mean? What is the operation that is implied?</li> <li>• How can a sum be multiplied by a whole number?</li> </ul>
2a. Students may have trouble finding factors of 3.6	<ul style="list-style-type: none"> <li>• Could factors of 36 be helpful?</li> <li>• Can you write <math>-3.6</math> in a way that involves the number 36?</li> <li>• Would making a table be helpful?</li> </ul>
<b>Entry/Extensions</b>	<b>Assessing and Advancing Questions</b>
If students can't get started....	<ul style="list-style-type: none"> <li>• What does the word “loss” in Problem 1 tell you about the sign of the number?</li> <li>• What does the number “three and one third” really mean? Is an operation implied?</li> <li>• How do you determine the sign of a multiplication problem's answer?</li> <li>• What are some possible real-life meanings of negative numbers?</li> </ul>
If students finish early....	<ul style="list-style-type: none"> <li>• Describe the use of the Distributive Property in Problem 1 if the monthly loss is <math>3\frac{1}{3}</math> dollars and the length of time is six months. Why is the answer the same?</li> <li>• Create a word problem that involves the multiplication of three signed numbers.</li> </ul>
<b>Discuss/Analyze</b>	
<b>Whole Group Questions</b>	
<ul style="list-style-type: none"> <li>• What is the distributive property, and why is it necessary?</li> <li>• Use the commutative property to re-write your solution of Problem 1.</li> <li>• Create a list of four rational numbers (or draw from the deck), and then use the associative property, the commutative property, and the distributive property of multiplication over addition (each property as needed) to find their product. Make sure to include some fractions, mixed numbers, and negative numbers. Are some arrangements of the numbers easier to calculate than others? Explain your reasoning, and justify your arrangement by citing the three properties.</li> </ul>	

Name \_\_\_\_\_

### Extending the Number System Task

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