Math 25 Activity 2: Integers

Mathematics has a rich history of providing a means to quantify how our society interacts. Early history of mathematics indicated a need to be able to answer the question, how many. This requirement was answered with the numbers 1, 2, 3, 4, 5 ... As this group of numbers initially had only one purpose, to count, they have become known as counting numbers. Early there was little reason to have a symbol to denote “having nothing” and thus, the number zero took several centuries to appear to be useful and for the symbol, “ 0 “ to appear. This inclusion of zero with counting numbers developed the whole number system. At this point, people were pleased as they had every number ever desired.

Rational numbers next arrived on the math scene as the need for describing parts of an item grew. For example what would 2/3 of a pie look like? Rational numbers are composed of whole numbers in the numerator divided by counting numbers in the denominator.

In your groups, answer the following question: Why do we allow whole numbers in the numerator and not in the denominator?

Rational numbers are not always written at first glance as a whole number divided by a counting number. If the number can be changed to a whole number divided by a counting number, then it is said to be rational.

Here are some rational numbers. Can you rewrite in the form: whole number divided by a counting number?

0.1 = 1/10 (why?)

2.3/4 = 23/40 (why?)

.03 =

1.2 =

2.5/5 =
Note for another day: Rational numbers can be written as decimals. However, all decimals are not rational numbers. Decimals that terminate .03 = 3/100 or repeat .33333...=1/3 are rational. But decimal numbers that do not repeat or terminate are not rational numbers. One example is $\pi$. Decimal numbers that do not terminate or repeat are called irrational numbers.

As time progressed, the need to use numbers to describe positive and negative situations grew. As this need grew, we added negative numbers to our list of possible numbers. Thus, -5 was a needed number, but it was not a counting or a whole number. When we included negative numbers in with the already existing whole numbers, we called the new set of numbers **integers**. Thus, integers are any counting number with either a positive or negative sign or the number zero.

<table>
<thead>
<tr>
<th></th>
<th>Counting</th>
<th>Whole</th>
<th>Rational</th>
<th>Integer</th>
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</thead>
<tbody>
<tr>
<td>1/5</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>-6</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>4</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>16/4</td>
<td></td>
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<tr>
<td>-3/8</td>
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<tr>
<td>0</td>
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<td></td>
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<tr>
<td>-7</td>
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A. Describe two real life situations where knowing if a number is positive or negative might be important.

A1.

A2.

In mathematics, every time we learn a new skill, we may need to rethink our old definitions, which includes improving a definition in light of a new skill. Before integers were introduced, we described rational numbers as: “If the number can be changed to a whole number divided by a counting number, then it is said to be **rational**.”

Rewrite the definition of rational numbers using the word **integer** instead of whole number.

Does your definition of rational numbers account for the distinction between the use of whole numbers and counting numbers from the original definition? If not, please rewrite your definition.

Please indicate the following numbers as counting, whole, rational and/or integer. The first three lines are examples and are already finished for you.
B. Describe three real life situations where adding and subtracting positive and negative numbers might be important.

B1.
B2.
B3.

Write one of your answers on the board where the instructor has indicated. If others have already written an answer try to make sure yours is original.

C. Describe three real life situations where multiplying and dividing positive and negative numbers might be important.

C1.
C2.
C3.

Write one of your answers on the board where the instructor has indicated. If others have already written an answer try to make sure yours is original.

Take the time to go over what is written on the board as a class. As a class, if needed, review the rules of adding, subtracting, multiplying, and dividing integers.