**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Per.\_\_\_\_\_\_\_**

### U14 CWK #2 *Expressing Decimals as Fractions*

As we discovered in the previous section, when we converted fractions into decimals, the result was either a **terminating** (ending) **or repeating decimal**.

If we are given a terminating or repeating decimal, we need a method for changing them into a fraction in order to prove that they fit the definition of a rational number.

In 7th grade, you learned how to convert terminating decimals into fractions. Here are a few examples:

Now you try a few… Show your work

We know that to change a terminating decimal to a fraction we just to the math operation that a fraction represents – division.

**So, how do we express a repeating decimal as a fraction? Will the same process work?**

For example, how would you convert the repeating decimal into a fraction? Try in the space below.

We can use a **system of two linear equations** to convert a repeating decimal into a fraction. Let’s look at an example:

**Example:**

The decimal is a repeating decimal that can be thought of as 0.33333… where the “…” indicates that the 3’s repeat forever. If they repeat forever, how can we write this number as a fraction?

Here’s a method that will eliminate our repeating #’s.

Let *a* represent our number .

Multiply both sides of the equation by 10 which would give us a second equation .

Now we have the following two equations:

Let’s expand these out:

What will happen if we subtract the second equation from the first?

 Let’s try it (remembering to line up the decimals):

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 (Divide both sides by 9)

 (Simplify the fraction)

**Practice 1:** Change the decimal into a fraction

The decimal is a repeating decimal that can be thought of as 2.4444444… where the “…” indicates that the 4s repeat forever.

Let *a* represent our number .

**Practice 2:**

The decimal is a repeating decimal that can be thought of as 0.54545454… where the “…” indicates that the 54 repeats forever. Let’s see how to express this as a fraction.

Let *a* represent our number .

Why do you think we multiplied the second problem by 100 instead of 10 as we did in the first problem? What would have happened if we had only multiplied by 10?

**Example 4:** Change the decimal into a fraction.

**Example 5:** Change the decimal into a fraction.

**Example 6:** Change the decimal into a fraction.

**Example 7:** Change the decimal into a fraction.