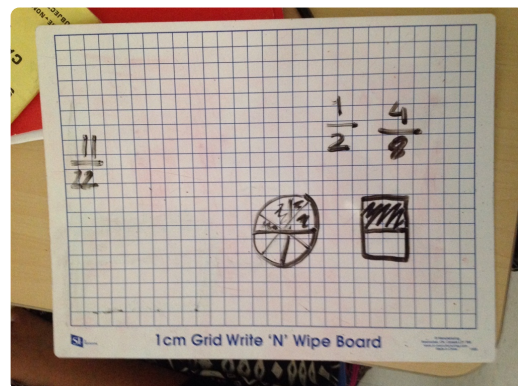
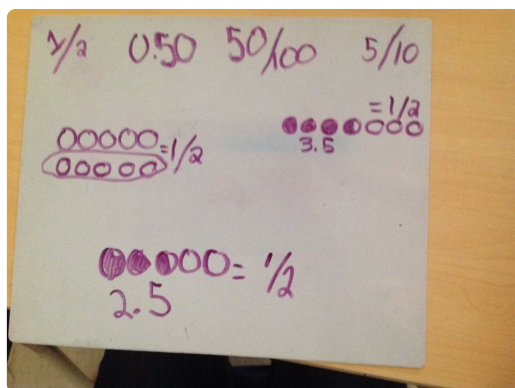
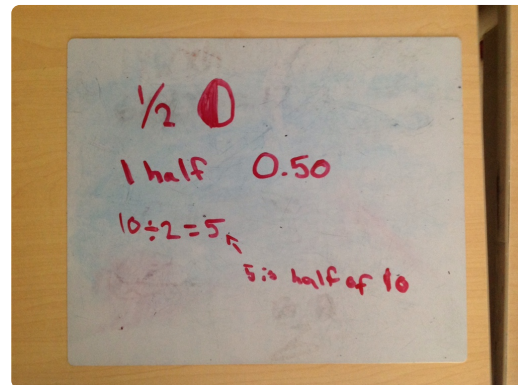
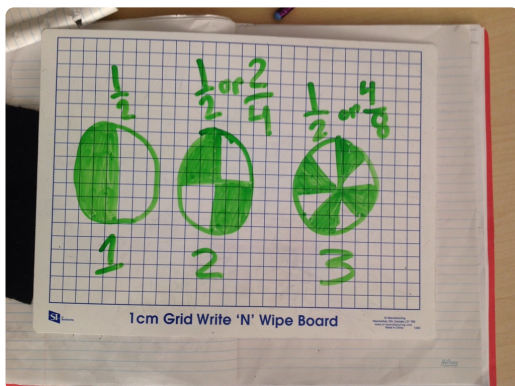
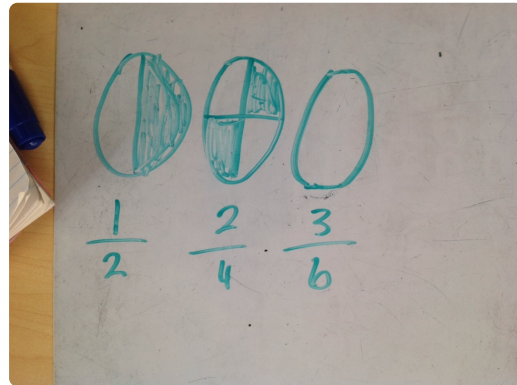
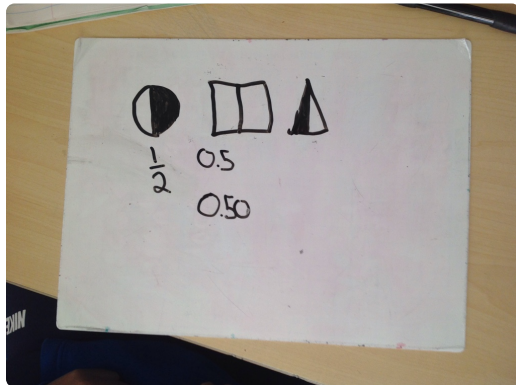


## Learning Goal

We are learning to connect decimals and fractions, and that a decimal can be represented in more than one way.

## Minds On

On the whiteboard, ask students to represent  $\frac{1}{2}$  in three different ways.



I know one whole is one, so half of that is 0.5

## Working on it Eyes on Math problem

Principle 2: The base ten place value system is built on symbols around the ones place. The base ten system is built on symbols around the ones place. The base ten system is built on symbols around the ones place. The base ten system is built on symbols around the ones place.

Principle 3: Decimals can represent parts of a whole. Decimals can be used to represent improper numbers. For example, 1.2 means  $\frac{12}{10}$  or  $1\frac{2}{10}$ .

Principle 4: Decimals can be read in more than one way. Decimals can be renamed just as whole numbers. The first example below uses a full 10 with fractions, it is critical that the whole be 1.

2.2 = 22 tenths  
If one 10-frame is the whole, or 1, this model also shows 2 ones and 2 tenths, or 22 tenths.

example below, the base ten block that is used to represent whole numbers is now used to represent decimals. Manipulatives on page 296. For some examples of using a new colour of block, if available, see page 296.

23 TENTHS, 2 HUNDREDTHS

### DECIMALS: EQUIVALENCE

Describe this in 2 ways:-  
What 4 decimals and 4 fractions could this figure represent?

### DECIMALS: EQUIVALENCE

What two decimals could you use to describe how full of pennies the grid is?

**JUST AS STUDENTS LEARN** to rename fractions with equivalent names to help them in situations where they are comparing or operating with fractions, the same is true for decimals. By using an array that is  $10 \times 10$ , it is easy to see tenths as full rows (or columns) and hundredths as individual items within the array.

It is also important that students recognize that if only tenths and hundredths are considered, then only decimals of the form  $\frac{a}{10}$  (e.g., 0.20, 1.30, etc.) will have two equivalent decimal representations. Some students who might be familiar with decimal thousandths may raise the point that any decimal can be represented in more than one way by using more decimal digits (e.g., 0.42 as 0.420); but many will not think of it, and that is to be expected in Grades 3 or 4. The notion of equivalence of different decimal representations is first addressed in **Common Core State Standards 4.NF**.

The picture provided here provides students the opportunity to see that 0.4 is also 0.40 (or 40 hundredths). By connecting with money, the 0.40 makes lots of sense, while the column arrangement allows students to clearly see the 0.4.

**QUESTIONS** to supplement the question with the picture and to include in a conversation about the picture include:

- What decimal describes each small square in the grid? [We want students to recognize that when the whole has 100 parts, each part is 0.01.]
- What coin describes a whole column? Why? [We want students to realize that 10 pennies is worth 1 dime, so a dime describes a column.]
- What decimal describes a whole column? Why does the answer make sense in terms of the coins? [We want students to realize that it makes sense that a dime is represented as 0.1 of a dollar.]
- Would you have to fill whole columns to be able to represent coins as either decimal tenths or decimal hundredths of a dollar? [We want students to realize that tenths are groups of 10 squares, so that as long as a multiple of 10 squares are filled, whether they are full columns or not, we can write the amount as either tenths or hundredths.]

**EXTENSION** Ask students to choose two other equivalent decimals and to draw a picture that does not use coins to show why those decimals are equivalent.

Describe this in two ways, how what could you use two four decimals + 4 fractions could this grid represent.

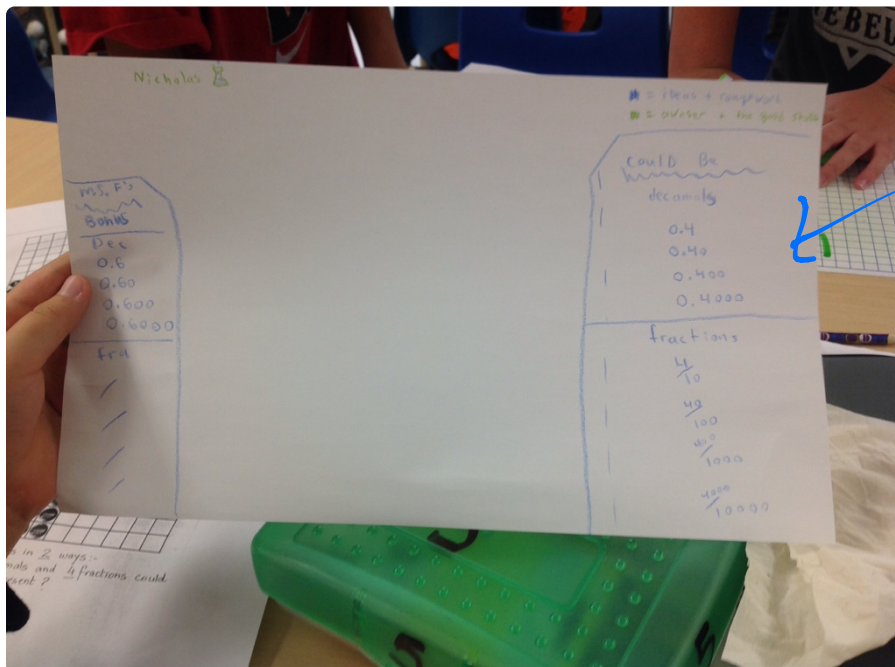
# 5 Practices for Orchestrating Productive Mathematics Discussions Anticipation Organizer

| Strategy                              | Key Questions to Ask   | Who and What | Order |
|---------------------------------------|--|--------------|-------|
| Understand Part in relation to whole. | What base 10 block <del>was</del> would you use to rep the whole, column, square                     |              |       |
| Understanding equivalent fractions    | How do you know these fractions are the same?<br>How could you represent this with another fraction? |              |       |
| Connecting fraction to decimal.       | Could this fraction show more than one decimal?<br>What other decimals make sense?                   |              |       |
| Understanding zero in hundredths      | What decimal describes a whole column?   |              |       |
|                                       |  |              |       |
|                                       |  |              |       |
|                                       |  |              |       |

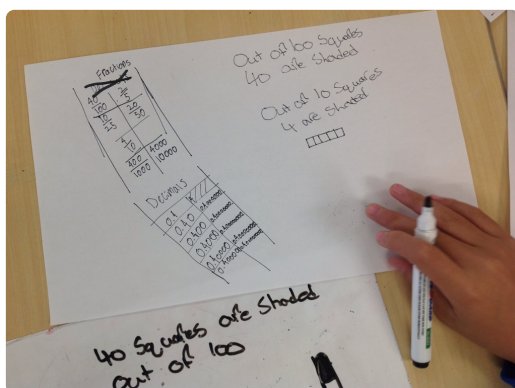
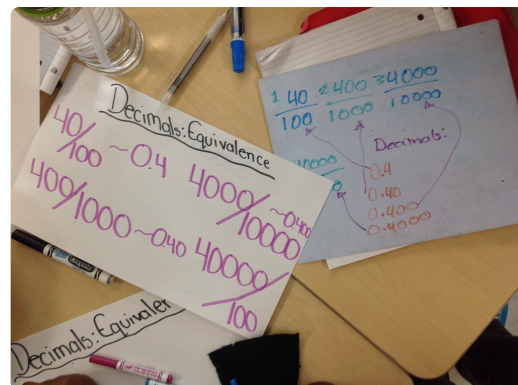
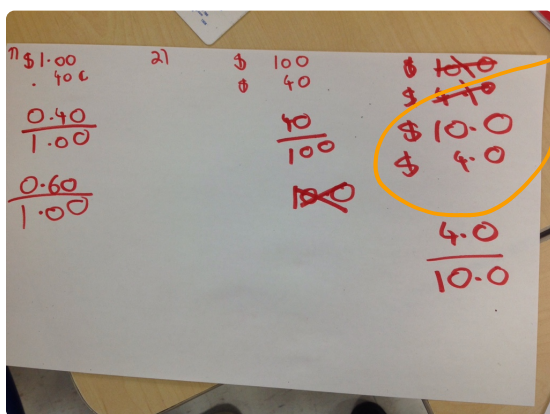
Additional questions:

-Now that you have thought about the pennies, what could the white space represent?

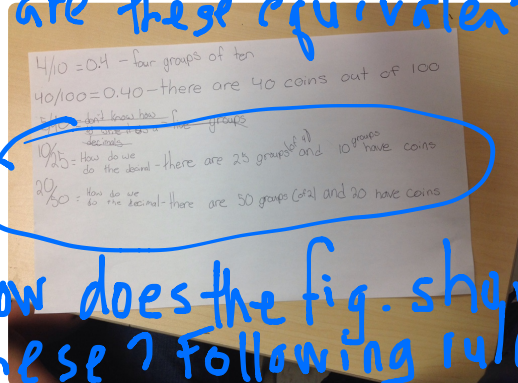
-How would you represent that with money?



Which fractions show which decimals?

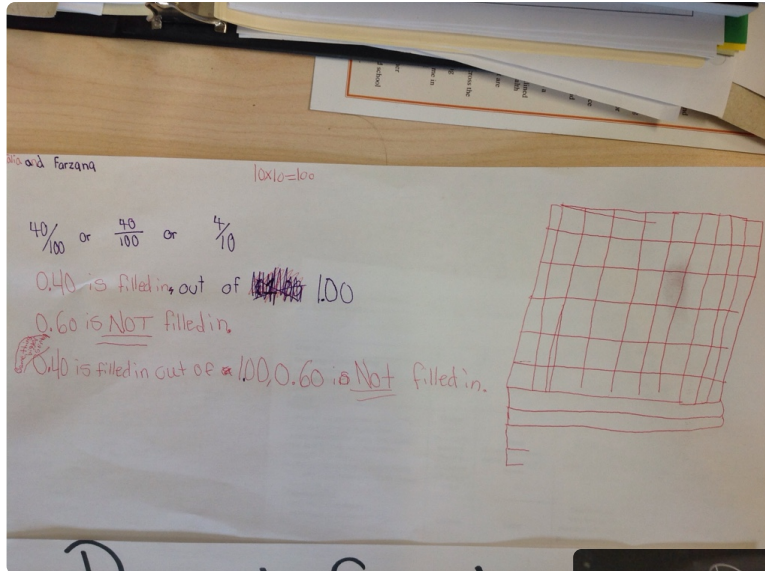


How are these equivalent?



How does the fig. show these? Following rules?

## The Debrief



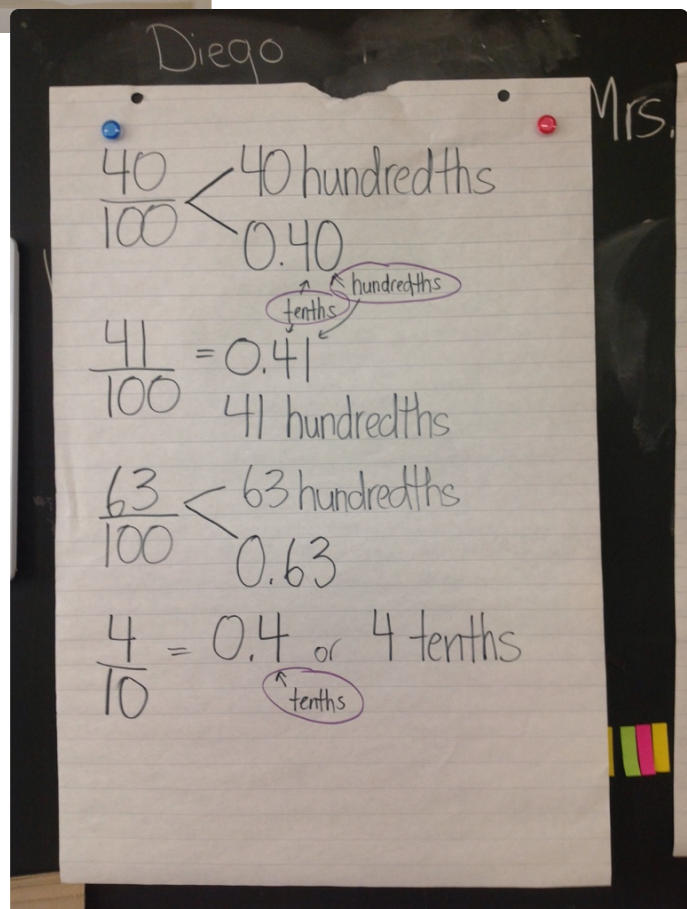
What is the connection between the fraction and the decimal, how do you know they are the?

Students shared their fraction of 40/100 and connected it to the decimal .40

- modelled with base ten
- compared the whole to one dollar, 1.00, and the pennies to 40 cents, or .40
- used a comparison of 41 cents, if there were 41 pennies on the grid, what would that fraction be, and decimal?
- discussed naming each place value, tenths and hundredths
- thought about 63 pennies on the grid and how the represent them with a fraction and decimal

- next, tackled  $\frac{4}{10}$  as representing the pennies on the grid. Modelled 10 units as a rod, or a tenth, and showed how there were four rods, out of a possible ten, on the grid

- asked how students could show that as a decimal

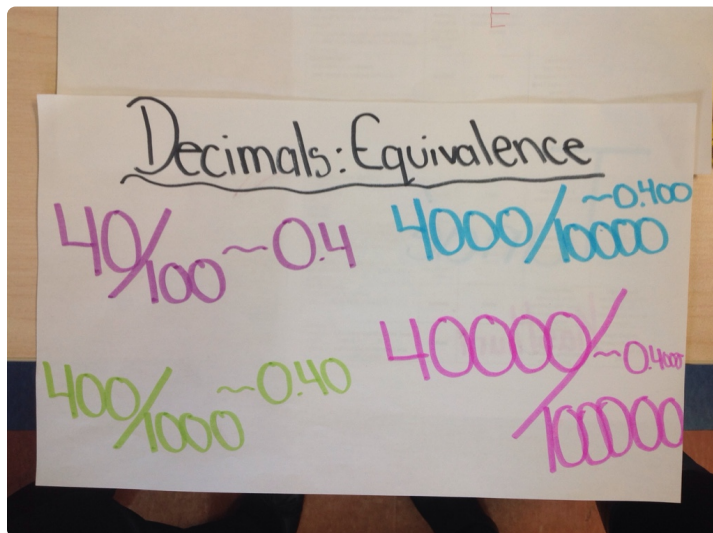
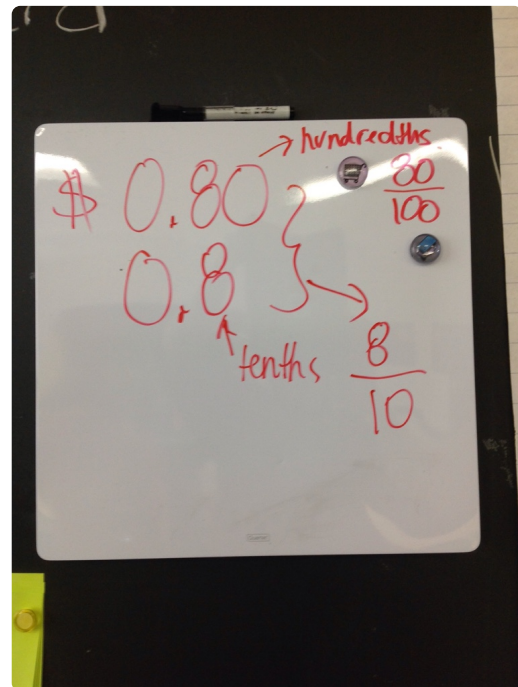


- many thought that would be .4, and gave relaxing why (the four is in the tenths place)

How are .40 and .4 the same and different?

If I went to Walmart and chocolate bars are 80 cents, on sale, how would they write that on a sign?

Why would they include that zero (in the hundredths place)?



Could ask students if they agree with these fraction and decimal relationships...why or why not?