Understand the place value system (Standards 5.NBT.1–4).
Standard 5.NBT.4 Use place value understanding to round decimals to any place.

Key Elements: When students understand the relationship between the place values, they can come to understand the convention of rounding to the indicated place value.

What is Rounding? The common convention that is used when rounding is that when any digit is five or more you round, or ignore the smaller place values for a rough estimate of the desired size, you increase the larger place value by one. I.e. 5.367 being rounded to the nearest tenth becomes 5.4, ignoring the two smaller place values, but increasing the digit from three to four because of the size of the hundredths place. If the digit is smaller than five, four to zero, the number in the larger place value stays the same and you ignore the other smaller place values. I.e. 8.726 being rounded to the nearest tenth would result in the number 8.7.

A common misconception for students is that they get stuck on “rounding up” or “rounding down” instead of the idea of focusing on rounding to the place value. Many students when rounding will round to a smaller number. I.e. 4.53 becomes 4.4, which is not correct. If they are making this mistake make sure to connect their thinking with some sort of model. The more appropriate language to use would be rounding to the tenths place, or rounding to the nearest hundredths, etc.

The biggest question is why do we have such a convention and how can it be taught. Some of the easiest ways to show why we have this convention and how it works is through an area model and number line.

Area Model: An area model is a great way show how rounding to any indicated place value works. For any student rounding with an area model, they will need to represent the number usually by defining the whole as a rectangle or square. From there, the other place values can be shown and shaded in. Find the desired place value that will be rounded to and look the next place value smaller. It should be clear that if there is one shading done there, or if there are less than five parts shaded in, it is less than half of the place value you are rounding it to, making it more similar with what your current place value is. If there are five or more parts shaded in, it is closer in size to the place value you are rounding to, which means that it is closer to one more of your place value that you are rounding to. (Insert image)

Number Line: When showing rounding, a number line is a versatile tool that can be used because of the nature of the tool. Finding numbers on number line highlight the relationship between wholes, tenths, hundredths etc. As students find where the number is and figure out the specific number, it is clear that there is some amount of estimation going on. This naturally leads to the idea of rounding, as students can be asked where the line is closest when using a smaller place value. This means that a student will see that 0.14 is closer to 0.1 than it is to 0.2. It also makes clear that 2.47 is closer to 2.5 than it is to 2.4, though it would also make it clear as to why rounding it to the nearest whole it would end up being 2, rather than 3, because there is less than half of the space between wholes filled in. (Insert image)

For some students, a vertical number line may make more sense using the same indicated strategies above. It may also be useful to use such analogies as going on a hike and if you are 0.4 of a mile away, is better for you to turn around and return or finish? (Supposing that you need to turn make it somewhere closest right then.) What if you were at 0.5, or 0.7? Would you

go back, or would you finish the hike? This may help some students understand this convention of math. (Insert image)