[107] Rounding and Estimating

Rounding and estimating are two names for basically the same concept of using an approximate value for a number instead of an exact value.

Usually, with rounding, you are told "to what decimal place" you should approximate the numbers, and with estimating, you are simply using your judgement to figure out an answer that is close to correct (depending on the situation).

The result is that you have changed a hard-to-do math problem into one that is "easy math."

The student needs to understand that the words *rounding* and *estimating* both mean *about*. With both of these terms, you are seeking to know "*about how much*" there is.

Teaching ideas

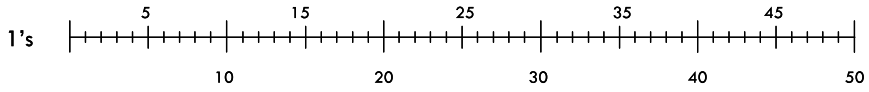
Estimating purchases

1. You can begin teaching these concepts in real life before you start on paper.

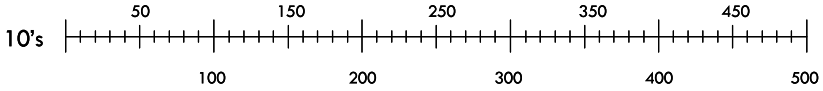
   In the store, start by pointing out two items that cost close to a dollar figure, and then telling your child that you want to know about how much money you will need to buy them. For example, if you saw pencils that cost $3.29 and a note pad that costs $1.90, you would say, "Those pencils cost about $3 and that note pad costs about $2, so I'll need about $5 to buy both." Then repeat the process using different items. Transition to having your child give one of the amounts, and then both amounts. Avoid using items that end in 50 - 59 cents until after your child has a firm grasp of the concept.

Using a number line

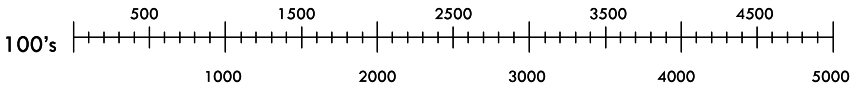
2. When you are ready to teach a formal lesson on rounding, one approach is to use number lines. Draw number lines with different units. Talk about when you would use each different type. Here are some examples. See if you can come up with additional ideas.



   This might be used to chart someone's age or the cost of a toy.



   This might be used to record the number of miles on a long trip, or the number of pages in a long book.



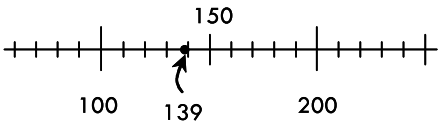
   This might be used to record how much a used car costs, or how many years ago a historical event took place.

   After discussing the number lines, choose a number such as 12, and find it on the 1's line. Ask the child if it is closer to 10 or 20. (If he or she is not sure, use the halfway mark to help him/ her.) Tell him or her that when estimating or rounding, he or she gets to *change hard math into easy math*. Adding 10's is easy — rounding makes the math easy!

Try adding two numbers like 27 and 38. Then find the estimate for 27 and 38. *Make it easy math!* Using rounding, you get 30 and 40, which are easier to add.

Practice rounding/estimating on the 1's number line, and then repeat with the 10's and 100's number lines.

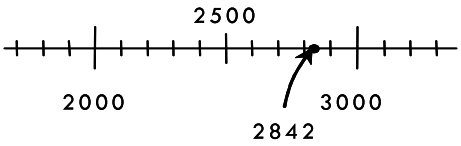
10's line: Start with a 3-digit number like 139. Locate about where it would be – there won't be a *specific* mark because each mark is worth 10. Then check to see if the number is closer to 100 or 200.



Remember – *make the math easy.*

100's line: Start with a 4-digit number, like 2842.

There will not be an *exact* mark, since each mark is worth 100. Locate *about where* it would be, and then check to see if it is closer to 2000 or 3000.



Rounding to a given place value

3. Here is another way to teach how to round/estimate.

a. When the rounding place-value is given, underline it.

b. Put a zero below every digit to the right of the one that is underlined.

The question is: will the underlined digit stay the same or get 1 bigger?

c. Draw an arrow from the underlined digit to the one on its right. If it points to a 4 or less, copy the underlined digit directly below the underline mark (to the left of the zeros you wrote in step b). If the arrow points to a 5 or greater, increase the underlined digit by one before copying it.

d. Copy the digits on the left of the underlined number into the rounded number.

Round 625,132,192 to the 10,000 place
a. 625,1<u>3</u>2,192
b. 625,1<u>3</u>2,192 0,000
c. 625,1<u>3</u>2,192 <u>3</u>0,000
d. 625,1<u>3</u>0,000

Round 625,137,192 to the 10,000 place
a. 625,1<u>3</u>7,192
b. 625,1<u>3</u>7,192 0,000
c. 625,1<u>3</u>7,192 <u>4</u>0,000
d. 625,1<u>4</u>0,000

NOTE: There are different ways to handle 5, since it is half-way between 0 and 10. The easiest way is to just round up for numbers that are 5 or bigger, and round down for numbers that are 4 and smaller.

General rounding and estimating

Sometimes you need to round or estimate, and no place value is given. In this case, here are some options.

1. Round to the digit with the highest place value (on the far left of the number).
2. Round to the digit that makes the most sense.
3. If you are going to add or subtract estimated numbers, round to the largest place value of the smallest number (*as shown underlined*).

$$\begin{array}{r} 328 \\ +\ 82 \\ \hline \end{array} \Rightarrow \begin{array}{r} 3\underline{2}8 \\ +\ \underline{8}2 \\ \hline \end{array} \Rightarrow \begin{array}{r} 330 \\ +\ 80 \\ \hline \end{array}$$