Rounding: Identifying the Range

Strand: Number and Number Sense

Topic: Identifying the range of numbers that rounds to a given place value.

Primary SOL: 4.1 The students will
               c) round whole numbers expressed through millions to the nearest thousand, ten thousand, and hundred thousand.

Related SOL: 4.1a

Materials

- Large sheet of paper or dry-erase boards (one for each student)
- What's the Range? activity sheet (attached)
- Ten-sided number cube

Vocabulary

between, closest to, hundred thousand, millions, number line, place value, range, round, ten thousand, thousand

Student/Teacher Actions: What should students be doing? What should teachers be doing?

Note: This lesson is not intended to be an introductory lesson to rounding and should be taught after students have been working with the concept of rounding.

1. Write the number 3,000 on the board and ask the students to give a number that when rounded to the nearest thousand would round to 3,000. Have students provide several different examples, while writing the numbers on the board for the students to view. If students do not suggest numbers both greater than and less than 3,000, pose some questions such as, *"So, I am wondering if all the numbers that round to 3,000 have a 2 in the thousands place?"*

2. Next, give each student a large sheet of paper or dry-erase board. Have students write the number 3,000 in the middle of the paper or board. This number should not be too large, since students will be adding additional numbers that round to 3,000 in the upcoming activity. Have the students place a box around the number 3,000 so that this number stands out from the rest of the numbers that will be added to the sheet of paper.

3. Have each student place a sheet of paper in the middle of their desk. Tell the students that they are going to take turns going to one another's desks (similar to musical chairs, but in this game no one will sit out). Once each student is at a different desk, they are to add an additional number to the sheet of paper that would round to 3,000. Students should review the numbers that have been already added to make sure that they do not duplicate any previous numbers. Continue until the students have visited all of their classmates' desks. At the end of the activity, each student should have a different number that rounds to 3,000 from each student in the class. An example is shown below.

| 3,092 | 2,987 | 3,023 |
| 3,467 | 3,000 | 2,876 |
| | 2,546 | |
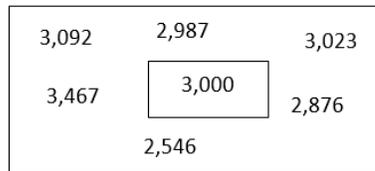
4. Once all of the students, or as many rotations as you determine for the class, have an opportunity to write a number on their classmates' papers, have the class come back together to share. Have the students share a number that was written on their sheet of paper. Continue until you have several different responses from the class. If the smallest number that rounds to 3,000 has not been shared by the students, ask the class whether they can identify the smallest number that would round to 3,000. Once the students are able to identify that number, ask the students to identify the largest number that would round to 3,000. Ask the students if they could use this information to identify the range of numbers that round to 3,000.

5. Next, ask, *"How could we display the range of numbers that round to 3,000 on a number line?"* Have the students work with a partner to create a number line that would model the range of numbers that round to 3,000. Walk around to monitor the progress and listen to the conversations that the students are having when creating this number line. As you circulate around the room, identify any misconceptions that the students may have.

6. Transition the class back together to share the number line that they created to model the range of numbers. Draw a number line on the board and have the students share ideas and strategies they used to create the model. An example of a number line is shown below that shows the range of numbers that would round to 3,000.
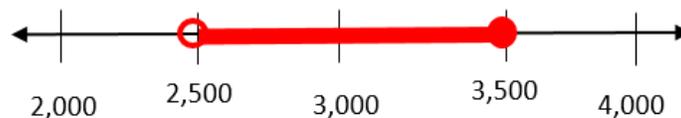
Looking at the number line shown above, ask: *"Why does the highlighted range on the number line starts directly on 2,500 but stops right before the number 3,500?"* Because the range is 2,500–3,499, some students may not include the number 3,500 on their number line but instead may place the number 3,499 on their number line. Ask, *"Would the numbers 2,500 through 3,499 all round to 3,000? Why or why not?"* *"Why is the number 3,500 not included in this range or highlighted on the number line?"*

Inform students that mathematicians have agreed upon using an open circle as way to show getting as close to a number as you can on the number line but not including the number and then using a closed circle to make it clear that a number is included. See below.
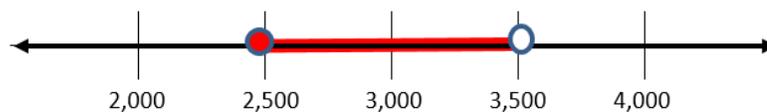
7. Next, have students work with a partner to identify the range of numbers that would round to 40,000. First, give the students a minute or two to list as many numbers with their partner as they can that would round to 40,000. Once the time is up, have each

partner share a number that would round to 40,000. Place these numbers on the board for all of the students to view. If the students do not share the smallest number or largest number that rounds to 40,000, pose questions to the class to see whether they can identify these numbers. Ask students what they notice about the numbers that round to 40,000. Ask students whether they can identify the range of numbers that would round to 40,000. Ask, *"How do you use place value when identifying the range of numbers that round to a given place?"*

8. Have the students work with a partner and complete the What's the Range? activity sheet. Partners will take turns rolling a 10-sided number cube and strategically placing the digits in the correct location so that the number will round to the given number. If you do not have 10-sided number cubes, you can use number cards or a spinner with 0–9. The first partner to create a number and identify the range will win a point for that round. If both partners are able to create a number, then the partner with the highest number wins that round.

9. After the students have played the game with their partner, have the students share different strategies they used to create their number.

10. The game can also be played making numbers that round to 600,000.

Assessment

- **Questions**
  - What is the smallest number that rounds to 100,000?
  - What is the largest number that rounds to 20,000?
  - When rounded to the nearest ten thousand, which range of numbers would all round to 40,000?

- **Journal/writing prompts**
  - Three students were asked to identify the range of numbers that round to 60,000.
    - Student A said that 54,999–64,999 is the range of numbers that would round to 60,000.
    - Student B said that 55,499–64,999 is the range of numbers that would round to 60,000.
    - Student C said that 55,000–64,999 is the range of numbers that would round to 60,000.

    Which student do you agree with? Why?
  - The teacher asked the following students to round the number 3,459,803.
    - Student A said that the number rounds to 3,000,000.
    - Student B said that the number rounds to 3,500,000.

    Which student(s) rounded the number correctly? Explain your answer.

- **Other Assessments (include informal assessment ideas)**
  - Use a number line to model 54,783 rounded to the nearest thousand.
  - Identify three numbers that round to 300,000 when rounding to the nearest hundred thousand. Identify the range of numbers that round to 300,000 when rounding to the nearest hundred thousand.

        o   Round 1,078,289 to the nearest thousand, ten thousand, and hundred thousand.

Extensions and Connections (for all students)

- Provide experiences where students are required to round to a place that is not the initial place value. For example, given 235,478 ask the students to find the range of numbers that round to 230,000, 235,000, to 235,400.
- Provide a number line.
- Provide a place-value chart.
- When building the placemat, provide a set of numbers for students to sort as within the rounding range for the target number or not in the rounding range.

Note: The following pages are intended for classroom use for students as a visual aid to learning.

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What's the Range?

Name: _____   Date:_____

Directions: Partners take turns rolling a 10-sided number cube to create a number that would round to the given number provided. If the player is unable to use the number rolled, then you lose your turn. Each player must be allowed the same number of rolls as the number of place value digits in the problem. The first player to create a number and identify the range wins that round. If both players are able to create a number, then the player with the highest number wins.

Round 1: Create a number that when rounded to the nearest thousand will round to 8,000.

Partner 1:   Partner 2:

_____, _____ _____ _____   _____, _____ _____ _____

The range of numbers that round to 8,000 are _____ to _____.

Round 2: Create a number that when rounded to the nearest hundred thousand will round to 200,000.

Partner 1:   Partner 2:

____ ____ ____ , ____ ____ ____   ____ ____ ____ , ____ ____ ____

The range of numbers that round to 200,000 are _____ to _____.

Round 3: Create a number that when rounded to the nearest ten thousand will round to 70,000.

Partner 1:   Partner 2:

____ ____ , ____ ____ ____   ____ ____ , ____ ____ ____

The range of numbers that round to 70,000 are _____ to _____.

Answer the following questions.

What are some strategies you and your partner used when creating the number?

_____

_____

_____

_____

If you were given a six-sided number cube, would the game change? Why or why not?

_____

_____

_____

_____

All of the numbers in the range of 450,000–549,999 would round to which number?

_____

_____

_____

_____

What is the range of numbers that would round to 900,000?

_____

_____

_____

_____