5E Lesson Plan

Student Name(s): Morgan Rae Reschenberg and Pooja Kumar
Mentor Teacher Name: Alison Kelly
School/Room#: Room 7
Grade Level and Subject: 3rd Grade Mathematics
Date/Time to be Taught: November 9th, 12:30 - 1:45

Lesson Source(s):	Engage NY, Common Core Mathematics Standards Extra Sources: Baldwin, Ginny. "Round in Real-life Situations." *LearnZillion*. N.p., 2016. Web. 05 Nov. 2016.
Focus/Essential Question:	How do we use a vertical number line to visualise rounding?
Student Learning Objectives:	● Students will be able to round two- and three-digit numbers to the nearest ten on the vertical number line ● Students will be able to round two- and three-digit numbers to the nearest ten ● Students will identify how many tens, ones, and hundreds make up a number ● Students will be able to connect rounding skills to real-life situations
Content Standards:	3.NBT.1: Use place value understanding to round whole numbers to the nearest 10 or 100. 3.NBT.3: Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., 9 × 80, 5 × 60) using strategies based on place value and properties of operations.
Using & Scaffolding Data Skills	Three Levels of Engagement (Students will not be working with data in this activity, but we will still be working with orientation skills for the focus on: a) Students will use vertical number lines to visualise data of various units b) To be successful with the number line usage, students should be familiar with reading linear scales. Students should also be familiar with interpreting different increments of numbers (by 2's, by 5's, etc.) c) To ensure student success, instructors will be consistent in academic language, review concepts of scale and measurement, and check for understanding before proceeding with the next lesson segment.
Student Prior Knowledge:	Prior knowledge: - Students should be familiar with rounding numbers to the nearest tens', hundreds', and thousands' place. - Prior to this lesson, students have used balance scales and interpreted quantities measured on spring scales → students should be able to read data off incremented measuring devices - Students have used place value charts to express values in expanded and standard form Potential misunderstandings: - Students may struggle while identifying which place value is the most significant when rounding larger numbers (ie. 188 to the nearest tens →

	190) - Students may find it difficult to round numbers which lie exactly halfway between two tens/hundreds/thousands places (ie. 45 to the nearest tens, 1750 to the nearest hundreds)
Lesson Agenda for your students:	1. Rounding Roadway Warm Up and Application - Endpoint, midpoint, and rounding 2. Concept Development - Rounding two digit numbers 3. Concept Development - Rounding three digit numbers 4. Problem Set 5. Exit ticket
Lesson Rationale:	The Rounding Roadway activity will help connect the topic to the everyday lives of students and will assist in reviewing vocabulary they should be familiar with. As the storyline of the topic fades, students will have a chance to work on concrete problems while practicing and reinforcing ideas discussed in the warm up activity. They will practice these ideas through the problem set and exit ticket.

Materials and Technology List:	Students will each need a personal whiteboard, whiteboard marker, and eraser. Students should have their own workbooks with the problem set for this lesson. Each student will need a copy of the Exit Ticket for this lesson.
Preparation Tasks:	- Will need to setup number line on front whiteboard before class for Rounding Roadway activity. - Will need to make sure that students are transitioning from carpet to tables in a right way, and prepare for any problems in between - Will need to make copies of the exit ticket (one per student, two blank copies for reference = 22 copies)
Safety Concerns:	No safety issues anticipated. Standard classroom policies regarding first aid, etc. will be observed

Lesson Title: Using a Vertical Number Line to Round Two- and Three-digit Numbers

Engage: Activities that engage students' interest and build connections to their lives and prior knowledge.	Previous Experience and Baseline Learning
After lunch, students will come into class and have a seat on the carpet. Prior to their arrival, I will have setup the number line on the whiteboard for this activity. After waiting for the class to settle down and exhibit good listening behaviour, I'll select one volunteer for our activity. - **Morgan**: Okay! Today we're going to do a quick, fun activity for our math warm up and then we're going to jump into practicing rounding! Before we do that, though, I'm going to tell you a special story about the Rounding Roadway. - [Volunteer] is going on a road trip! They're really excited to get going, so they jump on the Rounding Roadway. The Rounding Roadway is a special kind of road: it has exits every mile, but some of the exits are special. <u>If the exit is a multiple of ten, it has a gas station. If it isn't a multiple of ten, there isn't any gas station there!</u> Pause, ask students: What exits have gas stations? Direct volunteer to stand under the number line. - [Volunteer] gets on the Rounding Roadway at exit one and drives all the way to exit twenty-seven. Direct the volunteer to "drive"/move about to where exit 27 should be on the number line. Prompt/have rest of class assist by counting by ones from the nearest ten (20) or by fives to the nearest midpoint (25) and then by ones. - When they get there, though, they realise that (Oh no!) they were so excited to leave that they forgot to fill the car up with gas and now the car is almost empty! - Now, you can go backwards and forwards on the Rounding Roadway, but because [Volunteer] is almost out of gas, they want to make sure to go to the closest gas station; what are the two gas stations closest to [Volunteer]? How do we know that? S: The closest gas stations are at exits 20 and 30 → they both are multiples of 10--which is how we know they have gas stations--and we know that 2 has two tens, so the nearest stations are two tens (20) and three tens (30). - Great! Let's have two more volunteers to represent the two closest exits I'll give two volunteers whiteboards with "20" and "30" written on them. They will stand next to our driver, representing the two closest exits.	Watch for: - Students should be able to recognize the form of the number line - Students should also be familiar with the vocabulary used (ie. endpoints, midpoint, tens-place, multiple of ten, etc.) - Students may struggle with calculating the midpoint or understanding how the relationship of the midpoint and the number we're plotting relates to rounding - This activity has a lot of action, and I expect it might be difficult to keep students focused throughout - Try to make sure most students are following along rather than being completely lost Response: - Emphasis will be placed on using vocabulary words in context to allow students an authentic opportunity to develop/use academic language - Students will be encouraged to think about the problem independently before talking to a partner about their solution - Emphasis will be placed on how midpoint numbers help us round and how we can calculate the relationship between the number we're plotting and our midpoint (see underlined section at left) - Emphasis on rounding numbers based on place values like tens and ones place - If things get too off topic or hard to handle, we'll move to

- I love how you oriented yourselves correctly! 20 is less than 27, so it is on the left, and 30 is greater than 27, so it is on the right. We know number lines grow from small to large. - We know what the closest exits are, but how can we figure out which one 27 is closer to? M: Now it's time to turn and talk with your partner. What exit does your partner think 27 is closer to? 20 or 30? Why do they think that? <u>Take a few responses from students. Expected responses: Counting from 20 to 27 and 27 to 30 (27 to 30 takes less time so it's closer), subtract 27 from 30 and 20 from 27, use the midpoint/halfway point to see where 27 falls.</u> - We can use the halfway point (or the <u>midpoint</u>) to see if 27 is closer to 20 or 30. At this point, I expect the students will be tired of sitting, so I'll pick a final volunteer to represent the midpoint. They will receive a whiteboard numbered 25 and will stand where they think 25 should be. - Great! Lets check our order: first we have 20, then 25, then 27, and finally 30. What does this tell us? S: It tells us that 27 is greater than 25 which means it is above the halfway point. Because 27 is more than halfway between 20 and 30, it is closer to 30. - Awesome! You're absolutely right: because 27 is greater than the midpoint (25), we know that it is closer to our <u>larger</u> endpoint--30. Thank you volunteers! You can come join us back on the carpet. **Pooja**: I will draw a number line on my board and ask the students to review how we approached and solved the problem - Let's rewrite the problem we just solved on a numberline. What should I label my endpoints? S: You should label them 20 and 30 because those were the exits we fell between - Great! And what about my midpoint, how do I figure out what my midpoint is? S: The midpoint is the number halfway between your endpoints; because our endpoints are 10 apart, we know the midpoint is at half of that, or five past the first endpoint--25. - Great, so now I've labeled my endpoints and my midpoint. Where should I put [Volunteer] on the numberline? S: You should place them at 27. - How do I know where 27 is? S: 27 is bigger than our midpoint (25), so you can count by ones starting at the midpoint--25, 26, 27.	regular whiteboard problems and continue the example there. - To revisit prior knowledge, we may reference when they learned the similar concepts. Such as, remember last week we talked about rounding?

- Great! We know that 27 is two past 25, so we can count by ones until we get to it. - What does this tell us about which number 27 is closest to? S: It tells us that because 27 is larger than our midpoint, it is closer to the bigger endpoint: 30. In order to deal with those with different needs or different learning levels, Pooja or Morgan (depending on who is not teaching the certain section of the lesson plan) will walk around the class and engage students who may have trouble learning the concepts. That way, we are not diverting time from the actual lesson where students are involved and learning. **<u>Time: 15 minutes</u>**	
Explore: Hands-on tasks designed to explore ideas and to develop skills together.	Focus, Involvement, Collaboration, Results, and Recording
Pooja: Student helpers will now pass out whiteboards, markers, and erasers to each student. I will prompt this by instructing the passer-outers of the week to hand out white boards, markers, and erasers. We will demonstrate how rounding refers to different increments for counting such as 2's and 5's, and then relate it to the vertical number line. At the beginning, I can ask the class if anyone can define "endpoint" or "midpoint" to bring up academic language and review concepts of measurement. - Lets use the same logic as our previous problem to figure out how to round 42. On your whiteboards, draw a number line and label the two endpoints; your endpoints should be the closest multiples of 10. - After you label the endpoints, show me your board. How do we know these are the endpoints? Students should draw a number line with endpoints 40 and 50. I will draw this number line on my board so students who may have gotten it wrong have a chance to adjust their board for the next portion. This will help cooperative student work. S: We know these are the endpoints because 42 is made of four tens → 40 and one more than four tens is five tens → 50 - Great! Now, label the midpoint of your number line and show where 42 should be. Circle the endpoint that 42 is closer to. Show me your board when you've finished. Students should label 45 as the midpoint and place 42 closer to 40 than 45. 40 should be circled. - How do we know which number 42 is closer to?	Watch for: - I expect students to grasp this portion of the lesson fairly well after our example - Again, depending on the success of the previous activity, energy levels may be a little high. - When we repeat the process, I expect students to be able to do it quicker the second time. - I expect students to not talk too much and getting distracted during this activity since they already have practice doing these concepts. Response: - To encourage students to explore the concept, I'll approach this problem step-by-step to lend structure to solving these types of problems (ie. Can you find a way to determine the endpoints, what is the midpoint, how can we use these to help us round?) - Range of students not understanding, then choose students who may not understand it as well to answer

S: We know the midpoint is 45 because 45 is halfway between 40 and 50. 42 is less than 45 and so it is closer to the smaller endpoint: 40. I will label the midpoint on my board and then count to where 42 is. After showing it is less than the midpoint, I'll circle 40. - Let's repeat the process. Erase your boards and draw a number line to show how you'd round 68. - Show how 68 can be split up into 6 tens and 8 - Be sure to label your endpoints and your midpoint. Circle the endpoint that 68 is closest to. Show me when you've finished. Now, Morgan will show you how to round three digit numbers. Keep your whiteboards with you and don't put away your markers. During this section if students are struggling, Morgan can work individually with those students if necessary. (This is how we will prompt the transition to the Explain section.) **Time: 10 minutes**	questions, so they can get practice - If they seem to get this topic quickly, I'll move onto three-digit numbers and skip the second exercise. - We could introduce the concept and say, "What happens if a number is exactly between the two endpoints, like the number 45?
Explain: Students explain the phenomena they explored and discuss their different ideas and perspectives.	Participation, Reporting, Debating, and Evidence-Based Reasoning

We will ensure that the students are still on the carpet and are organized in the same way they were during the explore section. This is a good way for students to discuss their observations since it is a more casual classroom setting.

To interpret and synthesize the information, they will be practicing the problems on their whiteboards with a partner, then individually on the problem set. We will explain concepts using data visualizations like the vertical number lines, increments, and academic language similar to the problem sets.

- **Morgan:** Don't erase your whiteboards! Find a partner sitting close to you. Work together to figure out how to solve this next problem.
- Instead of rounding 68 on the number line, we're going to round 368 to the nearest ten. Can we change our endpoints without erasing our board? Talk to your partner. When you've decided how to change your endpoints, change them and show me.

Students should change their endpoints from 60 to 360 and 70 to 370 by adding a 3 in the hundreds place of each endpoint.

- What did you notice about finding the answer without erasing your board?

S: 368 is three-hundred more than 68, so we added 300 to both our endpoints since we're still rounding to the nearest ten. 368 has six tens (360). One more than six tens is seven tens (370).

- How does our midpoint change?

S: Our midpoint also changes by 300 to become 365 instead of 65 because 365 is halfway between 360 and 370.

- What does this tell us about the closest tens value to 368? Talk with your partner. Also, what approach did your partner take?

S: Based on our earlier problem, we know that 68 is closer to 70 because it is more than our midpoint 65. Similarly, 368 is closer to 370 because it is more than our midpoint 365. Both of our problems used the same number line and the same logic.

- Right! <u>Because we're rounding to the nearest ten, the change in the hundreds place doesn't affect how we solve this problem; we're still paying attention to the value of the tens place.</u>

Big observations students may encounter is that rounding two and three digit numbers may look very different, but they are similar and not as complex as they look.

They will conclude that midpoint and endpoint strategy works for two and three digit numbers.

Crosscutting concepts they may encounter are patterns. For example, they may notice that 37, 47, 57, and 67 all round up because the last number is 7 and is closer to the higher endpoint.

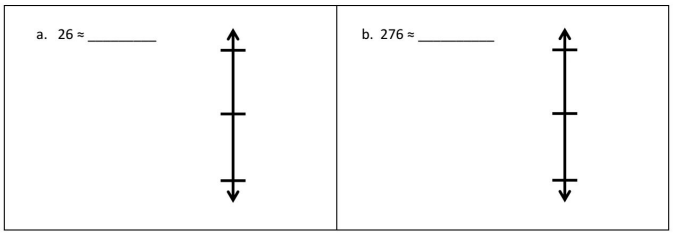
Watch for:

- Based on the exams students completed last week, I expect common problems and misconceptions students will struggle with is differentiating between rounding to the nearest ten and rounding to the nearest hundred.

Response:

- If the misconception persists, I'll prompt the group to think back to how we used the place value chart to show us which digit/place is the one we want to pay attention to.
- To deal with overly-critical debate, or too much or too little sharing, we will use sticks to pick students to ensure fairness.

Students will be given time to work on their problem sets in their math workbooks independently. We will walk around the room and answer questions as they arise. If there seems to be a general misconception or lack of understanding, I'll stop and review the necessary concept or make a clarifying announcement to the class. -Workbook problems will relate to drawing number lines and figuring out whether number like "37" round to 40 or 30. Copy of the workbook problem set is in the file we have shared with you. **<u>Time: 15 minutes</u>**	
Elaborate: Teacher-stimulated application and clarification of concepts, skills, attitudes, processes or terminology.	Demonstrated Understanding, Use of Skills, and Other Applications
In order to relate rounding to tens to real world situations, we will bring up concepts and ideas that relate to students in this section. I will review vocabulary at the introduction of this problem. P: We will be reviewing midpoint, which is the halfway point between two numbers. We will also be reviewing endpoints which in our case is when the ones digit is 0, and we round to the nearest ten like 60 or 70. Also, we will be using the vertical number line to solve these problems. Can anyone draw it out for me? S: *Draws it out and shows it on paper* I will draw it out on the board if there is any confusion. For example, I will explain that 2 in 258 is hundreds place, and 5 in 258 is tens place. I will explicitly say "this is similar to what we did in the previous section relating to rounding" to make sure students know that these are skills we used right before. ● Rosa Parks Elementary School needs to purchase water bottles for field day. If there are 258 students that are participating in field day, about how many water bottles should be purchased if water comes in cases of 10? S: I think that 258 rounds rounds to 260 since it is only 2 away from 260 and 8 away from 250! ● What if Rosa Parks had 252 students participating? About how many water bottles will they need? Will they have enough water bottles for every student? S: They will need about 250 ● P: Rounding can help in the real world but sometimes you have to round up depending on the situation. If we only get 250 water bottles then 2 students won't have water bottles. So, we will still need to buy at least 260 water bottles.	Watch for: - Students should raise their hands if they have questions and need help applying what they learn. - If students are not engaging in the conversation, we will know they need help with what they are learning. Response: - If a misconception arises among a large number of students, I'll stop and review the concept - If misconception arises among one student, we will each work individually with them.

Discussion will include communicating with students and figuring out if they understand the concepts. We will walk around to help students who are struggling and may have academic problems. **Time: 5 minutes**	
Evaluate (Reflect): Students evaluate and reflect on their own learning	Reflecting on learning experience
Morgan and Pooja: Students will complete an Exit Ticket that we will collect. Prior to completing the exit ticket, we will discuss what we learned today and what kinds of problems we solved. If students have problems remembering what they learned, we will give a brief overview. Otherwise, we will ask them to apply what they learned in the exit ticket. Here is a copy of our exit ticket: Name _____ Date _____ 1. Round to the nearest ten. Use the number line to model your thinking. a. 26 ≈ _____ b. 276 ≈ _____  2. Bobby rounds 603 to the nearest ten. He says it is 610. Is he correct? Why or why not? Use a number line and words to explain your answer. We have been able to talk about all our objectives ● We have practiced with vertical number lines in explore and explain. It is also demonstrated in 1a and 1b in this exit ticket. ● Also, we have practiced rounding two and three digit numbers in explain and elaborate, and once again in 1b and 2 in this exit ticket. ● We also need to review concepts relating to ones, tens, hundreds, and do so in engage section. We can put stickers on Exit Tickets to motivate students to finish before class ends. These exit tickets allow them to individually reflect on what they learned. **Time: 10 minutes (3 min discussion, 7 min working)**	Expectation: - Students should be able to identify the key concepts discussed in the lesson. - They should be able to realize what they may have problems with. Discussion questions: - When we're using a number line, what values do we label? - How do we find the endpoints? - How do we find our midpoint? - What does the midpoint tell us about how to round our number? - We could even ask, how did your ideas change in that now you know that 276 rounds to 280 when referring to tens, rather than 300?