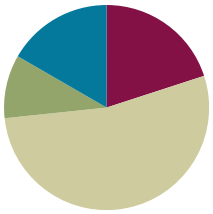
Lesson 8

Objectives: Round multi-digit numbers to any place using the vertical number line.

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(6 minutes)
Concept Development	(32 minutes)
Student Debrief	(10 minutes)
Total Time	**(60 minutes)**



Fluency Practice (12 minutes)

- Sprint: Find the Midpoint **4.NBT.3** (9 minutes)
- Rename the Units **4.NBT.2** (3 minutes)

Sprint: Find the Midpoint (9 minutes)

Materials: (S) Find the Midpoint Sprint

Note: Practicing this skill in isolation lays a foundation to conceptually understand rounding on a vertical number line.

Rename the Units (3 minutes)

Materials: (S) Personal white board

Note: This fluency activity applies students' place value skills in a new context that helps them better access the lesson's content.

T: (Write 357,468.) Say the number.
S: 357,468.
T: (Write 357,468 = ____ thousands 468 ones.) On your personal white boards, fill in the equation.
S: (Write 357,468 = 357 thousands 468 ones.)

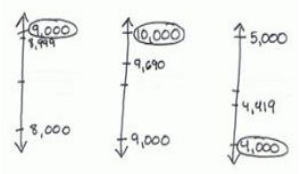
Repeat process for 357,468 = ____ ten thousands 7,468 ones; 357,468 = ____ hundreds 6 tens 8 ones; and 357,468 = ____ tens 8 ones.

Application Problem (6 minutes)

Jose's parents bought a used car, a new motorcycle, and a used snowmobile. The car cost $8,999. The motorcycle cost $9,690. The snowmobile cost $4,419. About how much money did they spend on the three items?

Note: This Application Problem builds on the content of previous lessons. Students are required to round and then to add base thousand units.

Car $8,999 ≈ $9,000
Motorcycle $9,690 ≈ $10,000
Snowmobile $4,419 ≈ $4,000
9 thousands + 10 thousands + 4 thousands = 23 thousands
Jose's parents spent about $23,000.

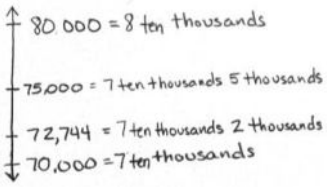


Concept Development (32 minutes)

Materials: (S) Personal white board

Problem 1: Use a vertical number line to round five- and six-digit numbers to the nearest ten thousand.

(Display a number line with endpoints 70,000 and 80,000.)



T: We are going to round 72,744 to the nearest ten thousand. How many ten thousands are in 72,744?

S: 7 ten thousands.

T: (Mark the lower endpoint with 7 ten thousands.) And 1 more ten thousand would be…?

S: 8 ten thousands.

T: (Mark the upper endpoint with 8 ten thousands.) What's halfway between 7 ten thousands and 8 ten thousands?

S: 7 ten thousands 5 thousands. → 75,000.

T: (Mark 75,000 on the number line.) Where should I label 72,744? Tell me where to stop. (Move your marker up the line.)

S: Stop.

T: (Mark 72,744 on the number line.)

T: Is 72,744 nearer to 70,000 or 80,000?

S: 72,744 is nearer to 70,000.

NOTES ON MULTIPLE MEANS OF REPRESENTATIONS:

An effective scaffold when working in the thousands period is to first work with an analogous number in the ones period. For example:

T: Let's round 72 to the nearest ten.

T: How many tens are in 72?

S: 7 tens.

T: What is 1 more ten?

S: 8 tens.

T: 7 tens and 8 tens are the endpoints of my number line.

T: What is the value of the halfway point?

S: 7 tens 5 ones. → Seventy-five.

T: Tell me where to stop on my number line. (Start at 70 and move up.)

S: Stop!

T: Is 72 less than halfway or more than halfway to 8 tens or 80?

S: Less than halfway.

T: We say 72 rounded to the nearest ten is 70.

T: We use the exact same process when rounding 72 thousand to the nearest ten thousand.

T: We say 72,744 rounded to the nearest ten thousand is 70,000.

Repeat with 337,601 rounded to the nearest ten thousand.

Problem 2: Use a vertical number line to round six-digit numbers to the nearest hundred thousand.

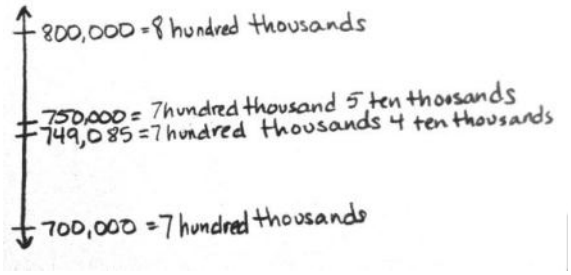
T: (Draw a number line to round 749,085 to the nearest hundred thousand.) We are going to round 749,085 to the nearest hundred thousand. How many hundred thousands are in 749,085?

S: 7 hundred thousands.

T: What's 1 more hundred thousand?

S: 8 hundred thousands.

T: Label your endpoints on the number line. What is halfway between 7 hundred thousands and 8 hundred thousands?



S: 7 hundred thousands 5 ten thousands. → 750,000.

T: Designate the midpoint on the number line. With your partner, mark 749,085 on the number line, and round it to the nearest hundred thousand.

S: 749,085 is nearer to 7 hundred thousands. → 749,085 is nearest to 700,000. → 749,085 rounded to the nearest hundred thousand is 700,000.

Repeat with 908,899 rounded to the nearest hundred thousand.

Problem 3: Estimating with addition and subtraction.

T: (Write 505,341 + 193,841.) Without finding the exact answer, I can estimate the answer by first rounding each addend to the nearest hundred thousand and then adding the rounded numbers.

T: Use a number line to round both numbers to the nearest hundred thousand.

S: (Round 505,341 to 500,000. Round 193,841 to 200,000.)

T: Now add 500,000 + 200,000.

MP.2

S: 700,000.

T: So, what's a good estimate for the sum of 505,341 and 193,841?

S: 700,000.

T: (Write 35,555 – 26,555.) How can we use rounding to estimate the answer?

S: Let's round each number before we subtract.

T: Good idea. Discuss with your partner how you will round to estimate the difference.

S: I can round each number to the nearest ten thousand. That way I'll have mostly zeros in my numbers. 40,000 minus 30,000 is 10,000. → 35,555 minus 26,555 is like 35 minus 26, which is 9. 35,000 minus 26,000 is 9,000. → It's more accurate to round up. 36,000 minus 27,000 is 9,000. Hey, it's the same answer!

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Make the lesson relevant to students' lives. Discuss everyday instances of estimation. Elicit examples of when a general idea about a sum or difference is necessary, rather than an exact answer. Ask, "When is it appropriate to estimate? When do we need an exact answer?"

T: What did you discover?

S: It's easier to find an estimate rounded to the largest unit. → We found the same estimate even though you rounded up and I rounded down. → We got two different estimates!

T: Which estimate do you suppose is closer to the actual difference?

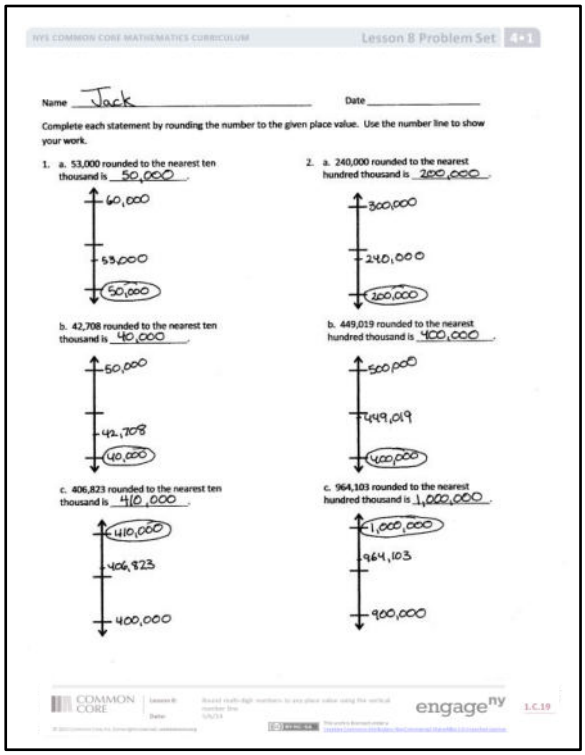
S: I think 9,000 is closer because we changed fewer numbers when we rounded.

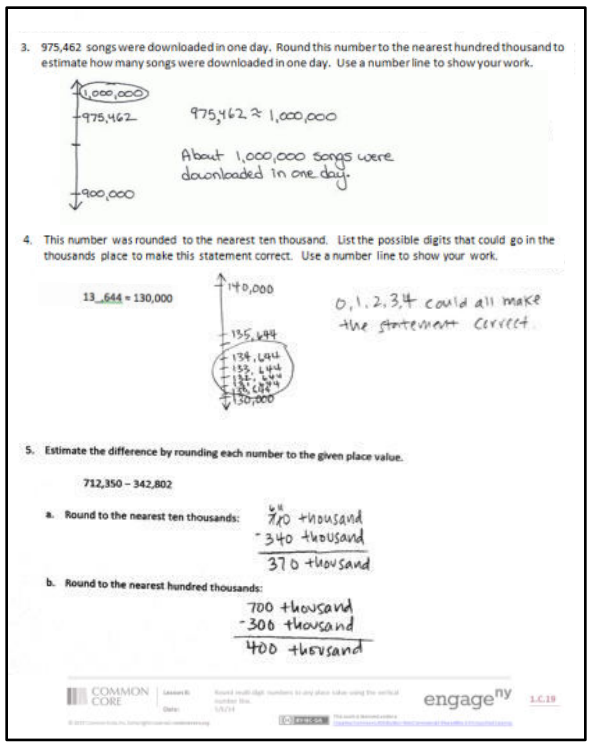
T: How might we find an estimate even closer to the actual difference?

S: We could round to the nearest hundred or ten.

Problem Set (10 minutes)

Students should do their personal best to complete the Problem Set within the allotted 10 minutes. For some classes, it may be appropriate to modify the assignment by specifying which problems they work on first. Some problems do not specify a method for solving. Students should solve these problems using the RDW approach used for Application Problems.





Student Debrief (10 minutes)

Lesson Objective: Round multi-digit numbers to any place value using the vertical number line.

Invite students to review their solutions for the Problem Set and the totality of the lesson experience. They should check work by comparing answers with a partner before going over answers as a class. Look for misconceptions or misunderstandings that can be addressed in the Student Debrief. Guide students in a conversation to debrief the Problem Set.

Any combination of the questions below may be used to lead the discussion.

- Compare Problem 1(b) and (c). How did you determine your endpoints for each number line?
- Tell your partner your steps for rounding a number. Which step is most difficult for you? Why?
- Look at Problem 5. How did your estimates compare? What did you notice as you solved?

- What are the benefits and drawbacks of rounding the same number to different units (as you did in Problem 5)?
- In what real life situation might you make an estimate like Problem 5?

Write and complete one of the following statements in your math journal:

- The purpose of rounding addends is _____.
- Rounding to the nearest _____is best when _____.

Exit Ticket (3 minutes)

After the Student Debrief, instruct students to complete the Exit Ticket. A review of their work will help with assessing students' understanding of the concepts that were presented in today's lesson and planning more effectively for future lessons. The questions may be read aloud to the students.

A

Number Correct: _____

Find the Midpoint

1.	0	10	
2.	0	100	
3.	0	1000	
4.	10	20	
5.	100	200	
6.	1000	2000	
7.	30	40	
8.	300	400	
9.	400	500	
10.	20	30	
11.	30	40	
12.	40	50	
13.	50	60	
14.	500	600	
15.	5000	6000	
16.	200	300	
17.	300	400	
18.	700	800	
19.	5700	5800	
20.	70	80	
21.	670	680	
22.	6700	6800	
23.	6000	7000	
24.	600	700	
25.	60	70	
26.	260	270	
27.	9260	9270	
28.	80	90	
29.	90	100	
30.	990	1000	
31.	9990	10,000	
32.	440	450	
33.	8300	8400	
34.	680	690	
35.	9400	9500	
36.	3900	4000	
37.	2450	2460	
38.	7080	7090	
39.	3200	3210	
40.	8630	8640	
41.	8190	8200	
42.	2510	2520	
43.	4890	4900	
44.	6660	6670	

B

Number Correct: _____

Improvement: _____

Find the Midpoint

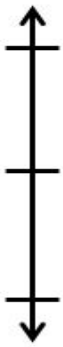
1.	10	20	
2.	100	200	
3.	1000	2000	
4.	20	30	
5.	200	300	
6.	2000	3000	
7.	40	50	
8.	400	500	
9.	500	600	
10.	30	40	
11.	40	50	
12.	50	60	
13.	60	70	
14.	600	700	
15.	6000	7000	
16.	300	400	
17.	400	500	
18.	800	900	
19.	5800	5900	
20.	80	90	
21.	680	690	
22.	6800	6900	

23.	7000	8000	
24.	700	800	
25.	70	80	
26.	270	280	
27.	9270	9280	
28.	80	90	
29.	90	100	
30.	990	1000	
31.	9990	10,000	
32.	450	460	
33.	8400	8500	
34.	580	590	
35.	9500	9600	
36.	2900	3000	
37.	3450	3460	
38.	6080	6090	
39.	4200	4210	
40.	7630	7640	
41.	7190	7200	
42.	3510	3520	
43.	5890	5900	
44.	7770	7780	

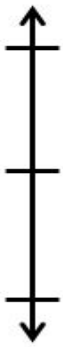
Name _____ Date _____

Complete each statement by rounding the number to the given place value. Use the number line to show your work.

1. a. 53,000 rounded to the nearest ten thousand is _____.



b. 42,708 rounded to the nearest ten thousand is _____.



c. 406,823 rounded to the nearest ten thousand is _____.

2. a. 240,000 rounded to the nearest hundred thousand is _____.

b. 449,019 rounded to the nearest hundred thousand is _____.

c. 964,103 rounded to the nearest hundred thousand is _____.

3. 975,462 songs were downloaded in one day. Round this number to the nearest hundred thousand to estimate how many songs were downloaded in one day. Use a number line to show your work.

4. This number was rounded to the nearest ten thousand. List the possible digits that could go in the thousands place to make this statement correct. Use a number line to show your work.

$$13\_,644 \approx 130,000$$

5. Estimate the difference by rounding each number to the given place value.

$$712,350 - 342,802$$

   a. Round to the nearest ten thousands.

   b. Round to the nearest hundred thousands.

Name _____ Date _____

1. Round to the nearest ten thousand. Use the number line to model your thinking.

a. 35,124 ≈ _____

b. 981,657 ≈ _____

2. Round to the nearest hundred thousand. Use the number line to model your thinking.

a. 89,678 ≈ _____

b. 999,765 ≈ _____

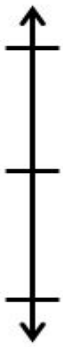
3. Estimate the sum by rounding each number to the nearest hundred thousand.

257,098 + 548,765 ≈ _____

Name _____ Date _____

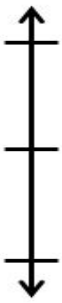
Complete each statement by rounding the number to the given place value. Use the number line to show your work.

1. a. 67,000 rounded to the nearest ten thousand is _____.



b. 51,988 rounded to the nearest ten thousand is _____.

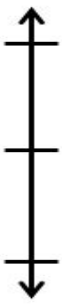
c. 105,159 rounded to the nearest ten thousand is _____.



2. a. 867,000 rounded to the nearest hundred thousand is _____.

b. 767,074 rounded to the nearest hundred thousand is _____.

c. 629,999 rounded to the nearest hundred thousand is _____.



3. 491,852 people went to the water park in the month of July. Round this number to the nearest hundred thousand to estimate how many people went to the park. Use a number line to show your work.

4. This number was rounded to the nearest hundred thousand. List the possible digits that could go in the ten thousands place to make this statement correct. Use a number line to show your work.

1_9,644 ≈ 100,000

5. Estimate the sum by rounding each number to the given place value.

164,215 + 216,088

a. Round to the nearest ten thousand.

b. Round to the nearest hundred thousand.