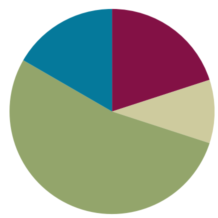
Lesson 8

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

Related Topics: [More Lesson Plans for the Common Core Math]

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)

- Find the Halfway Point **4.NBT.3** (9 minutes)
- Rename the Units **4.NBT.2** (3 minutes)

Sprint: Find the Midpoint (9 minutes)

Materials: (S) Find the Halfway Point Sprint

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

Rename the Units (3 minutes)

Materials: (S) Personal white boards

Note: This fluency applies students' place value skills in a new context that will help 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 number sentence.
S: (Students write 357,468 = 357 thousands 468 ones.)

Repeat process for 357,468 = ____ ten thousands 7468 ones; 357,468 = ____ hundreds 6 tens 8 ones; 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?

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.

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

Concept Development (32 minutes)

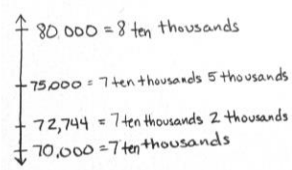
Materials: (S) Personal white boards

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: (Draw a number line 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.)

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

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

T: We can say 72,755 rounded to the nearest ten thousand is 70,000.

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

NOTES ON MULTIPLE 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?

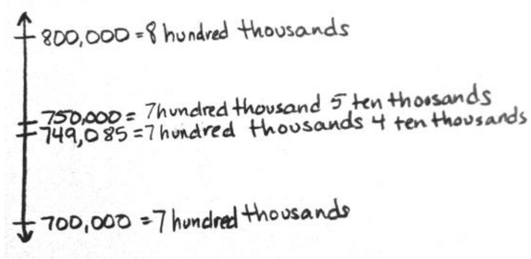
S: Less than halfway.

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.

Problem 2

Use a vertical number line to round a six-digit number to the nearest hundred thousand.



T: (Draw a number line 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 thousand.

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

S: 7 hundred thousand 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.

(Write 505,341 + 193,841.)

MP.2

T: Without finding the actual answer, I can estimate the answer by rounding each addend to the nearest hundred thousand and then add 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.

S: 700,000.

T: So, what's a good estimate of 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:

For students working below grade level, make the lesson relevant to their lives. Discuss everyday instances of estimation. Elicit examples of our frequent use of a general idea of a sum or difference—rather than the exact answer. Ask, "When is it appropriate to estimate? When do we need an exact answer?"

T: What did you discover?

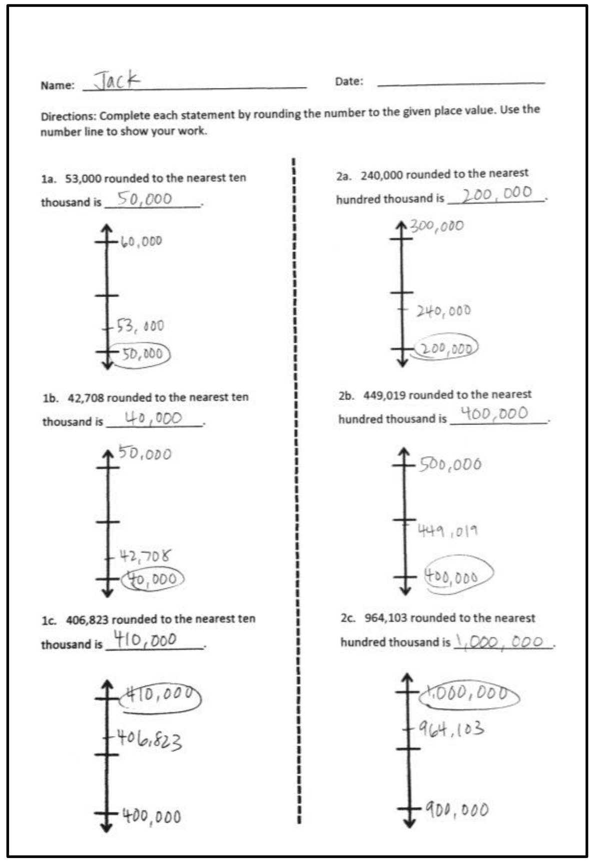
S: It's easier to find an estimate rounded to the largest unit. → We found the same estimate even though he rounded up and I rounded down. → We got two different estimates!

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.


Name: Jack Date:

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

1a. 53,000 rounded to the nearest ten thousand is 50,000.

60,000
53,000
50,000

2a. 240,000 rounded to the nearest hundred thousand is 200,000.

300,000
240,000
200,000

1b. 42,708 rounded to the nearest ten thousand is 40,000.

50,000
42,708
40,000

2b. 449,019 rounded to the nearest hundred thousand is 400,000.

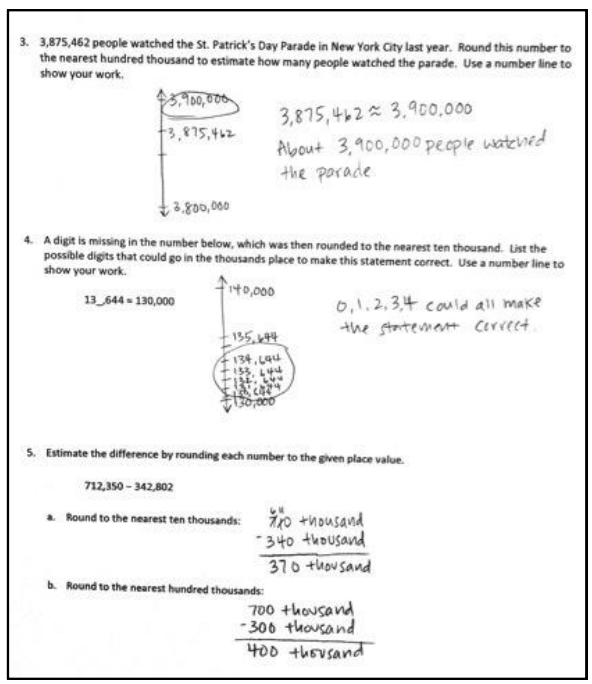
500,000
449,019
400,000

1c. 406,823 rounded to the nearest ten thousand is 410,000.

410,000
406,823
400,000

2c. 964,103 rounded to the nearest hundred thousand is 1,000,000.

1,000,000
964,103
900,000


3. 3,875,462 people watched the St. Patrick's Day Parade in New York City last year. Round this number to the nearest hundred thousand to estimate how many people watched the parade. Use a number line to show your work.

3,900,000
3,875,462
3,800,000

3,875,462 ≈ 3,900,000

About 3,900,000 people watched the parade

4. A digit is missing in the number below, which was then 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 ≈ 130,000

140,000
135,644
134,644
133,644
132,644
131,644
130,000

0, 1, 2, 3, 4 could all make the statement correct.

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

712,350 − 342,802

a. Round to the nearest ten thousands:

710 thousand
− 340 thousand
370 thousand

b. Round to the nearest hundred thousands:

700 thousand
− 300 thousand
400 thousand

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 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 Debrief. Guide students in a conversation to debrief the Problem Set. You may choose to use any combination of the questions below to lead the discussion.

- Compare Problems 1(b) and 1(c). How did you determine your endpoints for each number line?
- Retell to your partner your steps for rounding a number. Which step is most difficult for you? Why?
- How did Problem 1(c) help you to find the missing number possibilities in Problem 4?

- 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 you assess the students' understanding of the concepts that were presented in the lesson today and plan more effectively for future lessons. You may read the questions aloud to the students.

A # Correct ______

Find the halfway point.

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

B Find the halfway point.

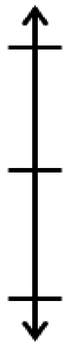
Improvement ______ # Correct ______

1	10	20	23	7000	8000
2	100	200	24	700	800
3	1000	2000	25	70	80
4	20	30	26	270	280
5	200	300	27	9270	9280
6	2000	3000	28	80	90
7	40	50	29	90	100
8	400	500	30	990	1000
9	500	600	31	9990	10,000
10	30	40	32	450	460
11	40	50	33	8400	8500
12	50	60	34	580	590
13	60	70	35	9500	9600
14	600	700	36	2900	3000
15	6000	7000	37	3450	3460
16	300	400	38	6080	6090
17	400	500	39	4200	4210
18	800	900	40	7630	7640
19	5800	5900	41	7190	7200
20	80	90	42	3510	3520
21	680	690	43	5890	5900
22	6800	6900	44	7770	7780

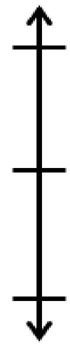
Name ____ Date ____________________

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

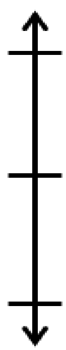
1a. 53,000 rounded to the nearest ten thousand is ______________.



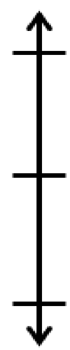
2a. 240,000 rounded to the nearest hundred thousand is ______________.



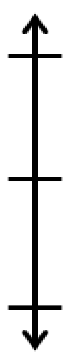
1b. 42,708 rounded to the nearest ten thousand is ______________.



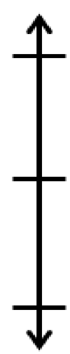
2b. 449,019 rounded to the nearest hundred thousand is ______________.



1c. 406,823 rounded to the nearest ten thousand is ______________.



2c. 964,103 rounded to the nearest hundred thousand is ______________.



3. 3,875,462 people watched the St. Patrick's Day Parade in New York City last year. Round this number to the nearest hundred thousand to estimate how many people watched the parade. Use a number line to show your work.

4. A digit is missing in the number below, which was then 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 ≈ 130,000

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

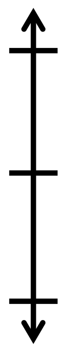
   712,350 – 342,802

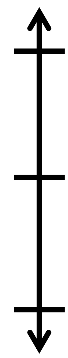
   a. Round to the nearest ten thousands.

   b. Round to the nearest hundred thousands.

Name ____ Date ____________________

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

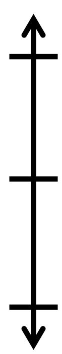


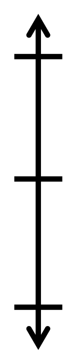


a. 35,124 ≈ __________

b. 981,657 ≈ __________

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





a. 89,678 ≈ __________

b. 999,765 ≈ __________

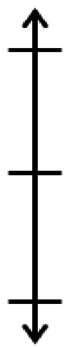
3. Estimate the sum by rounding each number to the nearest hundred thousand.

257,098 + 548,765 ≈ __________

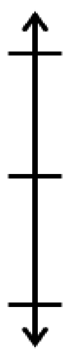
Name ____ Date ______________________

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

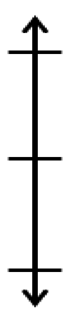
1a. 67,000 rounded to the nearest ten thousand is _______________.



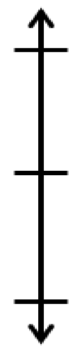
1b. 51,988 rounded to the nearest ten thousand is _______________.



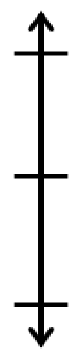
1c. 105,159 rounded to the nearest ten thousand is _______________.



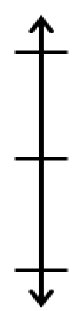
2a. 867,000 rounded to the nearest hundred thousand is _______________.



2b. 767,074 rounded to the nearest hundred thousand is _______________.



2c. 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. A digit is missing in the number below, which was then 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.

$$1\_9{,}644 \approx 100{,}000$$

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

$$164{,}215 + 216{,}088$$

   a. Round to the nearest ten thousands.

   b. Round to the nearest hundred thousands.