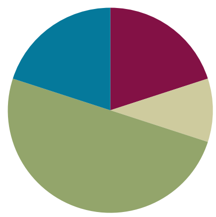
Lesson 10

Objective: Use place value understanding to round multi-digit numbers to any place value using real world applications.

Related Topics: More Lesson Plans for the Common Core Math

Suggested Lesson Structure

Fluency Practice	(12 minutes)
Application Problem	(6 minutes)
Concept Development	(30 minutes)
Student Debrief	(12 minutes)
Total Time	**(60 minutes)**



Fluency Practice (12 minutes)

- Round to the Nearest 10,000 **4.NBT.3** (9 minutes)
- Multiply by Ten **4.NBT.1** (3 minutes)

Sprint: Round to the Nearest 10,000 (9 minutes)

Materials: (S) Round to the Nearest 10,000 Sprint

Note: This fluency will review Lesson 9's content and work towards automatizing rounding skills.

Multiply by Ten (3 minutes)

Materials: (S) Personal white boards

Note: This fluency will deepen student understanding of base ten units.

T: (Write 10 x 10 =____.) Say the multiplication sentence.
S: 10 x 10 = 100.
T: (Write ____ten x 10 = 100.) On your boards, fill in the blank.

Students write 1 ten x 10 = 100.

T: (Write ____ten x ____ten = 100.) On your boards, fill in the blanks.

Students write 1 ten x 1 ten = 100.

T: (Write ____ten x ____ten = ____hundred.) On your boards, fill in the blanks.

Students write 1 ten x 1 ten = 1 hundred.

Repeat using the following sequence: 1 ten x 50 =____, 1 ten x 80 = ____hundreds, 1 ten x ____= 600. 3 tens x 1 ten = ____hundreds.

Note: Watch for students who say 3 tens x 4 tens is 12 tens rather than 12 hundreds.

Application Problem (6 minutes)

The post office sold 204,789 stamps last week and 93,061 stamps this week. About how many more stamps did the post office sell last week than this week? Explain how you got your answer.

Note: This application problem builds on the concept of the previous lesson (rounding multi-digit numbers to any place value) and creates a bridge to this lesson's concept (rounding using real world applications).

$204,789 \approx 200,000$
$93,061 \approx 90,000$
200 thousands - 90 thousands = 110 thousands
The post office sold about 110,000 more stamps last week than this week. I got my answer by rounding to the nearest ten thousand and then subtracting.

Concept Development (30 minutes)

Materials: (S) Personal white boards

Introduction

T: Write 935,292≈____. Read it to your partner and round to the nearest hundred thousand.
S: 900,000.
T: It is 900,000 when we round to the largest unit. What's the next largest unit we might round to?
S: Ten thousands.
T: Round to the ten thousands. Then round to the thousands.
S: 940,000. 935,000.

$935,292 \approx 900,000$
$935,292 \approx 940,000$
$935,292 \approx 935,000$

T: What changes about the numbers when rounding to smaller and smaller units? Discuss with your partner.
S: When you round to the largest unit, every other place will have a zero. → Rounding to the largest unit gives you the easiest number to add, subtract, multiply, or divide. → As you round to smaller units, there are not as many zeros in the number. → Rounding to smaller units gives an estimate that is closer to the actual value of the number.

Problem 1

Determine the best estimate to solve an application problem.

In the year 2012, there were 935,292 visitors to the White House.

MP.3

T: Let's read together. Now, use this information to predict the number of White House maps needed for visitors in 2013. Discuss with your partner how you made your estimate.

S: I predict 940,000 maps are needed. I rounded to the nearest ten thousands place in order to make sure every visitor has a map. It is better to have more maps than not enough maps. → I predict more people may visit the White House in 2013. So I rounded to the nearest ten thousand— 940,000—the only estimate that is greater than the actual number.

T: (Display.) In the year 2011, there were 998,250 visitors to the White House. Discuss with your partner how this data may change your estimate.

S: The data shows the number of visitors has decreased in recent years. It may be wiser to predict 935,000 or 900,000 maps needed for 2013.

T: How can you determine the best estimate in a situation?

S: I can notice patterns or data that might inform my estimate.

NOTES ON MULTIPLE MEANS OF REPRESENTATION:

For ELL students, define unfamiliar words and experiences, such as the *White House*. Give an alternative example using a more familiar tourist attraction, perhaps from their cultural experience.

Problem 2

Choose the unit of rounding to solve an application problem.

T: (Display.) 2,837 students attend Lincoln Elementary school. Discuss with your partner how you would estimate the number of chairs needed in the school.

S: I would round to the nearest thousand for an estimate of 3,000 chairs needed. If I rounded to the nearest hundred—2,800—some students may not have a seat. → I disagree. 3,000 is almost 200 too many. I would round to the nearest hundred because some students might be absent.

T: Compare the effect of rounding to the largest unit in this problem and Problem 1.

S: In Problem 1, rounding to the largest unit resulted in a number less than the actual number.
By contrast, when we rounded to the largest unit in Problem 2, our estimate was greater.

T: What can you conclude?

S: Rounding to the largest unit will effect different results for different numbers. → I will choose the unit based on the situation and what is most reasonable.

$2{,}837 \approx 3{,}000$

$2{,}837 \approx 2{,}800$

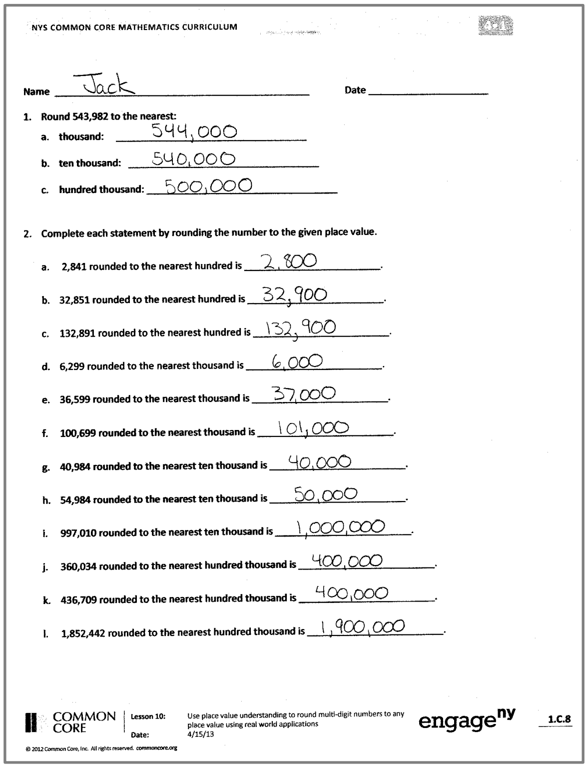
$2{,}837 \approx 2{,}840$

NOTES ON MULTIPLE MEANS OF ENGAGEMENT:

Challenge above grade level students to think of at least two situations similar to that of Problem 2 where choosing the unit to which to round is important to the outcome of the problem. Have them share and discuss.

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.



NYS COMMON CORE MATHEMATICS CURRICULUM

Name Jack Date

1. Round 543,982 to the nearest:
   a. thousand: 544,000
   b. ten thousand: 540,000
   c. hundred thousand: 500,000

2. Complete each statement by rounding the number to the given place value.
   a. 2,841 rounded to the nearest hundred is 2,800.
   b. 32,851 rounded to the nearest hundred is 32,900.
   c. 132,891 rounded to the nearest hundred is 132,900.
   d. 6,299 rounded to the nearest thousand is 6,000.
   e. 36,599 rounded to the nearest thousand is 37,000.
   f. 100,699 rounded to the nearest thousand is 101,000.
   g. 40,984 rounded to the nearest ten thousand is 40,000.
   h. 54,984 rounded to the nearest ten thousand is 50,000.
   i. 997,010 rounded to the nearest ten thousand is 1,000,000.
   j. 360,034 rounded to the nearest hundred thousand is 400,000.
   k. 436,709 rounded to the nearest hundred thousand is 400,000.
   l. 1,852,442 rounded to the nearest hundred thousand is 1,900,000.

COMMON CORE Lesson 10: Use place value understanding to round multi-digit numbers to any place value using real world applications Date: 4/15/13 engage^ny 1.C.8

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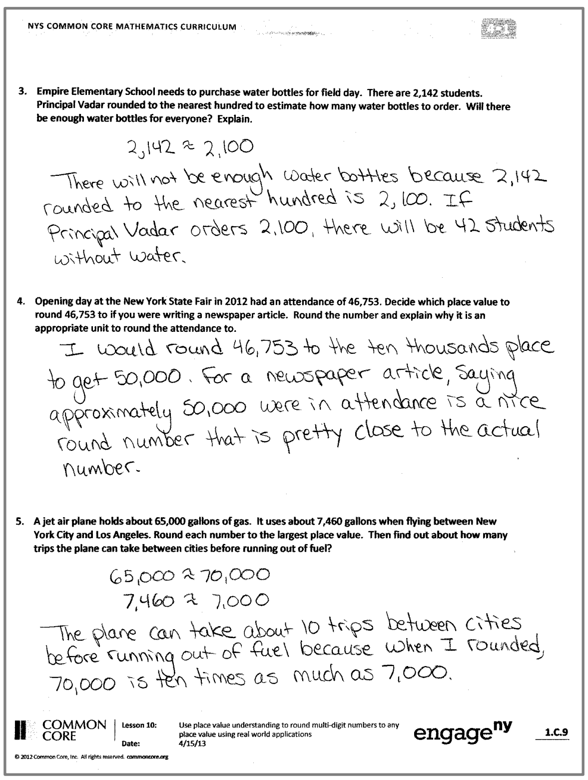
Student Debrief (12 minutes)

Lesson Objective: Use place value understanding to round multi-digit numbers to any place value using real world applications.

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.

- In Problem 3 why didn't rounding to the nearest hundred work? Would rounding to the nearest thousand have worked better? What does this show you about rounding?
- When estimating, how do you choose to which unit you will round? Would it have been more difficult to solve Problem 5 if you rounded both numbers to the hundreds? Why or why not?
- Notice, in Problem 5, that 65,000 rounded to 70,000 and that 7,460 rounded to 7,000. What is the relationship between 7,000 and 70,000. How does this relationship make it easier to determine the number of trips?
- In Problem 1, how do your estimates compare?
- How do you choose a best estimate? What is the advantage of rounding to smaller and larger units?
- Why might you round up, even though the numbers tell you to round down?



NYS COMMON CORE MATHEMATICS CURRICULUM

3. Empire Elementary School needs to purchase water bottles for field day. There are 2,142 students. Principal Vadar rounded to the nearest hundred to estimate how many water bottles to order. Will there be enough water bottles for everyone? Explain.

   2,142 ≈ 2,100

   There will not be enough water bottles because 2,142 rounded to the nearest hundred is 2,100. If Principal Vadar orders 2,100, there will be 42 students without water.

4. Opening day at the New York State Fair in 2012 had an attendance of 46,753. Decide which place value to round 46,753 to if you were writing a newspaper article. Round the number and explain why it is an appropriate unit to round the attendance to.

   I would round 46,753 to the ten thousands place to get 50,000. For a newspaper article, saying approximately 50,000 were in attendance is a nice round number that is pretty close to the actual number.

5. A jet air plane holds about 65,000 gallons of gas. It uses about 7,460 gallons when flying between New York City and Los Angeles. Round each number to the largest place value. Then find out about how many trips the plane can take between cities before running out of fuel?

   65,000 ≈ 70,000
   7,460 ≈ 7,000

   The plane can take about 10 trips between cities before running out of fuel because when I rounded, 70,000 is ten times as much as 7,000.

COMMON CORE Lesson 10: Use place value understanding to round multi-digit numbers to any place value using real world applications Date: 4/15/13 engage^ny 1.C.9

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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 _____

Round to the nearest ten thousand.

1	21,000 ≈		23	185,000 ≈	
2	31,000 ≈		24	85,000 ≈	
3	41,000 ≈		25	95,000 ≈	
4	541,000 =		26	97,000 ≈	
5	49,000 ≈		27	98,000 ≈	
6	59,000 ≈		28	198,000 ≈	
7	69,000 ≈		29	798,000 ≈	
8	369,000 ≈		30	31,200 ≈	
9	62,000 ≈		31	49,300 ≈	
10	712,000 ≈		32	649,300 ≈	
11	28,000 ≈		33	64,520 ≈	
12	37,000 ≈		34	164,520 ≈	
13	137,000 ≈		35	17,742 ≈	
14	44,000 ≈		36	917,742 ≈	
15	56,000 ≈		37	38,396 ≈	
16	456,000 ≈		38	64,501 ≈	
17	15,000 ≈		39	703,280 ≈	
18	25,000 ≈		40	239,500 ≈	
19	35,000 ≈		41	708,170 ≈	
20	235,000 ≈		42	188,631 ≈	
21	75,000 ≈		43	777,499 ≈	
22	175,000 ≈		44	444,919 ≈	

B Improvement _____ # Correct _____

Round to the nearest ten thousand.

1	11,000 ≈		23	185,000 ≈	
2	21,000 ≈		24	85,000 ≈	
3	31,000 ≈		25	95,000 ≈	
4	531,000 =		26	96,000 ≈	
5	39,000 ≈		27	99,000 ≈	
6	49,000 ≈		28	199,000 ≈	
7	59,000 ≈		29	799,000 ≈	
8	359,000 ≈		30	21,200 ≈	
9	52,000 ≈		31	39,300 ≈	
10	612,000 ≈		32	639,300 ≈	
11	18,000 ≈		33	54,520 ≈	
12	27,000 ≈		34	154,520 ≈	
13	127,000 ≈		35	27,742 ≈	
14	34,000 ≈		36	927,742 ≈	
15	46,000 ≈		37	28,396 ≈	
16	346,000 ≈		38	54,501 ≈	
17	25,000 ≈		39	603,280 ≈	
18	35,000 ≈		40	139,500 ≈	
19	45,000 ≈		41	608,170 ≈	
20	245,000 ≈		42	177,631 ≈	
21	65,000 ≈		43	888,499 ≈	
22	165,000 ≈		44	444,909 ≈	

Name ____ Date ____________________

1. Round 543,982 to the nearest

   a. thousand: ________________________________

   b. ten thousand: ________________________________

   c. hundred thousand: ________________________________

2. Complete each statement by rounding the number to the given place value.

   a. 2,841 rounded to the nearest hundred is _______________________.

   b. 32,851 rounded to the nearest hundred is _______________________.

   c. 132,891 rounded to the nearest hundred is _______________________.

   d. 6,299 rounded to the nearest thousand is _______________________.

   e. 36,599 rounded to the nearest thousand is _______________________.

   f. 100,699 rounded to the nearest thousand is _______________________.

   g. 40,984 rounded to the nearest ten thousand is _______________________.

   h. 54,984 rounded to the nearest ten thousand is _______________________.

   i. 997,010 rounded to the nearest ten thousand is _______________________.

   j. 360,034 rounded to the nearest hundred thousand is _______________________.

   k. 436,709 rounded to the nearest hundred thousand is _______________________.

   l. 1,852,442 rounded to the nearest hundred thousand is _______________________.

3. Empire Elementary School needs to purchase water bottles for field day. There are 2,142 students. Principal Vadar rounded to the nearest hundred to estimate how many water bottles to order. Will there be enough water bottles for everyone? Explain.

4. Opening day at the New York State Fair in 2012 had an attendance of 46,753. Decide which place value to round 46,753 to if you were writing a newspaper article. Round the number and explain why it is an appropriate unit to round the attendance to.

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Name ____ Date ______________________

1. There are 598,500 Apple employees in the United States.
   a. Round the number of employees to the given place value:

      thousand ________________________________

      ten thousand _____________________________

      hundred thousand __________________________

   b. Explain why two of your answers are the same.

2. A company developed a student survey so that students could share their thoughts about school. In 2011, 78,234 students across the United States were administered the survey. In 2012, the company planned to administer the survey to 10 times as many students from 2011. About how many surveys should the company have printed in 2012? Explain how you found your answer.

Name ____ Date ____________________

1. Round 845,001 to the nearest

   a. thousand: _____________________________________

   b. ten thousand: ___________________________________

   d. hundred thousand: _______________________________

2. Complete each statement by rounding the number to the given place value.

   a. 783 rounded to the nearest hundred is ______________________________.

   b. 12,781 rounded to the nearest hundred is ____________________________.

   c. 951,194 rounded to the nearest hundred is ___________________________.

   d. 1,258 rounded to the nearest thousand is _____________________________.

   e. 65,124 rounded to the nearest thousand is ____________________________.

   f. 99,451 rounded to the nearest thousand is _____________________________.

   g. 60,488 rounded to the nearest ten thousand is ___________________________.

   h. 80,801 rounded to the nearest ten thousand is ___________________________.

   i. 897,100 rounded to the nearest ten thousand is __________________________.

   j. 880,005 rounded to the nearest hundred thousand is _______________________.

   k. 545,999 rounded to the nearest hundred thousand is _______________________.

   l. 689,114 rounded to the nearest hundred thousand is _______________________.

3. Solve the following problems using pictures, numbers, and words.

   a. In the 2011 New York City Marathon, 29,867 men finished the race and 16,928 women finished the race. Each finisher was given a t-shirt. About how many men's shirts were given away? About how many women's shirts were given away? Explain how you found your answers.

   b. In the 2010 New York City Marathon, 42,429 people finished the race and received a medal. Before the race, the medals had to be ordered. If you were the person in charge of ordering the medals and estimated how many to order by rounding, would you have ordered enough medals? Explain your thinking.

   c. In 2010, 28,357 of the finishers were men and 14,072 of the finishers were women. About how many more men finished the race than women? To determine your answer, did you round to the nearest ten thousand or thousand? Explain.