

Place Value and Rounding

Summary

This lesson helps students understand the concepts of place value and rounding.

Main Core Tie

Mathematics Grade 3

[Strand: NUMBER AND OPERATIONS IN BASE TEN \(3.NBT\) Standard 3.NBT.1](#)

Additional Core Ties

Mathematics Grade 3

[Strand: NUMBER AND OPERATIONS IN BASE TEN \(3.NBT\) Standard 3.NBT.2](#)

Group Size

Large Groups

Materials

Invitation to Learn

- [Digit Cards](#)
- [Place Value Cards](#)

Rounding

- [Rounding Mountains](#)
- [Number Lines](#)

White Boards

Overhead markers

Additional Resources

Articles

The Mailbox the Idea Magazine for Teachers, The Education Center; August/September 1997.
Volume 19, Number 4 (Intermediate)

Background for Teachers

Students should have knowledge of place value of a given digit up to and including a five-digit numeral and have had a chance to practice and understand the concept of place value. They should have understanding of numbers and number sense. Students should be taught specific vocabulary relating to the lesson before you begin. This should include: numeral, digit, and place value. The first activities taught at the 2008 Core Academy on place value will give your students the background knowledge they will need to know before you teach the activities listed below.

Intended Learning Outcomes

1. Develop a positive learning attitude toward mathematics
4. Communicate mathematical ideas and arguments coherently to peers, teachers, and others using the precise language and notation of mathematics.
6. Represent mathematical ideas in a variety of ways.

Instructional Procedures

Invitation to Learn

This activity is called "Place Value Match-Up". Have students draw five blanks in their journal to

represent a five-digit number. You have the *Place Value Match-up Digit Cards* that include 0-9. You also have *Place Value Cards* that include 10,000s, 1,000s, 100s, and 10s. Shuffle the ten digit cards. Draw a card and announce the digit to the class. Each student writes that digit in one of his five blanks. After the digit is written it cannot be moved. Lay the card aside, and continue drawing and announcing four more cards. (Keep these cards together to use later). After you have drawn five cards, each student will have written a five digit number. Mix up the five discarded cards. Draw one place value match up digit card and one place value card. If a student's number matches both the digit card and the place value card then he earns one point. If a student has a match he/she can draw a circle around their number. Continue drawing four more pairs of cards: one each of the discarded digit cards and one of the place value cards. If all five of a student's digits match, he earns a bonus of five extra points for a total of ten points altogether.

Instructional Procedures

Rounding

Each student should receive a *Rounding Mountains* sheet. Hand these out after you have taught them how to round using the rounding mountains.

The teacher should have an overhead made of the Rounding Mountains. Show the overhead to the students.

The first mountain on the left shows an example of rounding to the nearest 10. Show students the number 1,523 and have them say the number out loud. Explain to them that since we are rounding to the nearest 10 there is an arrow pointed to the two which is in the 10's place.

On the line left of the mountain shows the number 1,520 then point to the numbers starting with 0 and continue all the way to 10 going around the mountain.

On the line right of the mountain shows the number 1, 530.

Explain to the students that the numbers written on the lines are the two different numbers they would choose when rounding 1,523 to the nearest 10. (the 10 before the number and the 10 after the number)

Sing the song "The Bear Goes over the Mountain" but instead of saying the bear say the digit to the right on the arrow. For example, sing: Did the three go over the mountain, did the three go over the mountain, did the three go over the mountain? No, we didn't get up the mountain. So we know that this rounds to the number on the line closest to the three which is 1,520.

Repeat this with rounding to the nearest 100 and rounding to the nearest 1,000.

When rounding 1,523 to the nearest 1,000 your students may be confused because the number five is on top of the mountain. If you use the analogy of you holding a bowling ball and climbing the mountain. Once you got to the top would your momentum take you forward over the mountain or back down the mountain? Help them to understand that it would take you forward over the mountain, so it would round to 2,000.

Model using your rounding mountain sheet on the overhead before you hand out their sheet. I would model this until your class is ready to begin working on their own rounding mountain sheet.

Once students have practiced and have been assessed in using the rounding mountain sheet you can then begin introducing them to rounding with a number line.

Make an overhead of the *Number Lines* sheet.

Ask students to compare the rounding mountains to the number line. What is the same about the two different number lines and what is different about them?

Ask students the following question: Would you use the number line to round the same way you would use the mountain number line to round? Teach them that the rounding mountain has been stretched out to make a straight line which is now the number line.

Show the overhead of the *Number Lines* sheet.

The first number line on the left shows an example of rounding to the nearest 10. Show

students the number 1,523 and explain to them that since we are rounding to the nearest 10 there is an arrow pointed to the two which is in the 10's place.

The number line begins with 1,520 and ends with 1,530. Show the number 1, 525 and ask why do you think they have put that number on the number line? (it is half way)

Have students show where 1,523 should go on the number line and put a dot on the line and name the dot 1,523.

Repeat this with rounding to the nearest 100 and rounding to the nearest 1,000 on the number line.

Make sure you have modeled this and your students understand how to use the number line before you hand out the number line sheet.

Give each student the *Number Line* sheet and have them practice rounding.

Students have learned to round numbers using a rounded number line and a straight number line. Now introduce them to rounding without using a number line.

Put a number on the board or overhead (e.g. 123) and tell students you are going to round this number to the nearest 10.

Put an arrow underneath the two which is in the 10's place. Underline the number three which is the number on the right side of the two.

The number three is the controlling number or the "Boss". It decides if we are going to keep the two which is in the 10's place the same or bump it up to a three.

Write 120 to the left side of our number and write 130 to the right side of our number.

Remind students of the mountain number line and decide if the controlling number would go over the mountain or would go down the mountain.

The controlling number would go down the mountain, so 123 would round to 120.

Model this many times using different numbers and round to the nearest 10, 100 or 1,000.

When students understand this concept then pass out the white boards and markers.

Model with your students as they practice rounding on their own white boards.

Put students in groups or partners and have them practice rounding on their white boards.

Extensions

Curriculum Extensions/Adaptations/ Integration

For advanced learners you can extend the Place Value Match-up game by including larger numbers. Students can play in groups so that you can adapt the game for each level in your classroom.

For learners with special needs have them work together with a partner or group to complete their *Rounding Mountain* and number line sheet.

An extension to the rounding activity with white boards is to make up number cards with three to five digit numbers. Underneath each number, write round to the nearest 10 or 100 or 1,000. Have students pair up in partners and give each partner 3-5 different cards. One partner would turn over a card and then each student would round their number on their white board. Then share it with their partner to see if they match. If they match turn over another card. If they don't match then help each other find the correct answer.

Partner up your advanced learners and have them time each other to see how fast they can round their numbers. You can also have them race each other and the first one that completes their problem correctly gets a point.

Advanced learners can round larger numbers to the nearest 10, 100 or 1,000. They can also round larger numbers to the nearest 10,000, 100,000 etc.

Family Connections

Have students take home a *Rounding Mountain* and a *Number Lines* sheet and share what they have learned with their parents.

Students can show their family members how they learned to round without using a number line. Those students who are advanced learners can race their parents or siblings when rounding different numbers to the nearest 10's, 100's, or 1,000's. Parents can help students create their own rounding game to share with the class.

Assessment Plan

The teacher should walk around and make sure students are completing the *Rounding Mountain* sheet and the *Number Lines* sheet correctly. Have students hand in their *Rounding Mountain* sheet and *Number Line* sheet so you can assess their work. Another way to assess is by having students work together and to assess each others *Rounding Mountain* and *Number Lines* sheets. When students begin rounding on their white boards the teacher should walk around making sure that each student understands the concept of rounding.

Bibliography

Research Basis

Klein, K., & Jones, R., (2003). How Teachers Phrase Discussion Questions. Retrieved November 24, 2006, from Studies of Teaching 2003 Research Digest, Wake Forest University Leah P. McCoy, Editor

Classroom discussion is one of the most important teaching techniques used to help students learn and understand the information they are being taught. Discussion allows the students to become engaged with the material by formulating their own opinions, listening to other students' opinions, and applying specific information to a broader situation.

Mulrvan, C. (1995). Involvement and participation in cooperative small groups in mathematics. *Elementary School Journal*, Volume 95.4 p. 297.

Students do not fully understand math concepts if they cannot relate it to something in their own experiences. The use of many different techniques help make mathematics a pleasure rather than a chore. Students are more active learners and are more motivated when they work in small groups.

Authors

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