

Putting Rounding to Rest

Objective: Teachers are given multiple strategies for developing student number sense leading to a better understanding of and success with rounding. Strategies presented include use of manipulatives, benchmark numbers, 10-frames, number lines, and the learning of multiples.

Standards: Kindergarten: Number Sense 3.0 Students use estimation strategies in computation and problem solving that involve numbers that use the ones and tens place.

Kindergarten: Number Sense 3.1 Recognize when an estimate is reasonable.

1st Grade: Number Sense 3.0 Students use estimation strategies in computation and problem solving that involve numbers that use the ones, tens, and hundreds place.

1st Grade: Number Sense 3.1 Make reasonable estimates when comparing larger or smaller numbers.

2nd Grade: Number Sense 6.0 Students use estimation strategies in computation and problem solving that involve numbers that use the ones, tens, hundreds, and thousands place.

2nd Grade: Number Sense 6.1 Recognize when an estimate is reasonable in measurements (e.g., closest inch).

Multiple Strategies for Side-by-Side comparisons of each mathematical property:

- | | | | |
|---|---------------------------------------|---|---------------|
| * | Counters with 10-frames for recording | * | Linking cubes |
| * | Number lines | | |

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Linking Cubes Activity

Objectives: Students use linking cubes to compare and round numbers.

Materials: Linking cubes in towers of 10.

Vocabulary: multiples, compare, closer, farther

Introduction: Today we are going to use linking cubes to represent and compare numbers.
(Go over classroom norms for using manipulatives. Pass out linking cubes after teacher demonstrates with whole class.)

Sometimes when we are talking about numbers we want to know if a number is close to another number. Usually the numbers are multiples of 10, those are the numbers that you count when you count by 10s. Let's count by 10s: 10, 20, 30, 40, 50, 60, 70, 80, 90, 100.

I want to know if 1 is closer to 0 or if it is closer to 10. I'm going to build the number 1 with linking cubes.

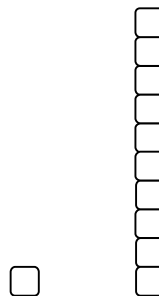
Take one linking cube and show it to the students.

How many linking cubes do you see? [1]

I want to know if 1 is closer to 0 or 10. One way I can do this is to compare 1 to 0 and 10.

Ask: If I want to represent 0 how many linking cubes do I need? (0) If I want to represent 10 how many linking cubes do I need? (10)

Compare towers of 1 linking cubes to 9 linking cube and 10 linking cubes.



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Look at the towers I have made. Is 1 more like 0 or 10? [0] I can then say that 1 is closer to 0 than it is to 10.

Let's check our answer. I am going to count from 0 to 1. As I count I want you to clap. One. I only had to count once when I counted from 0 to 1. I heard you clap only one time.

As you count the linking cubes point to them.

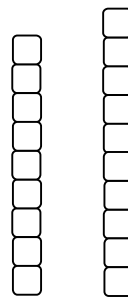
Now I'm going to count from 1 to 10. As I count I want you to clap. One, two, three, four, five, six, seven, eight, nine. I heard you clap nine times. I had to count nine times when I counted from 1 to 10. 1 is a lot less than 9. That proves that 1 is closer to 0 than it is to 10.

Let's record what we just found out. I'm going to write that 1 is closer to 0 than 10.

Closer to 0	Closer to 10
1	

I want to know if 9 is closer to 0 or 10. One way I can do this is to compare 9 to 0 and 10.

Compare towers of 9 linking cubes to 0 linking cube and 10 linking cubes.



Look at the towers I have made. Is 9 more like 0 or 10? [10] I can then say that 9 is closer to 10 than it is to 0.

Let's check our answer. I am going to count from 0 to 9. As I count I want you to clap. One, two, three, four, five, six, seven, eight, nine. I had to count nine times when I counted from 0 to 9. I heard you clap nine times.

As you count the linking cubes point to them.

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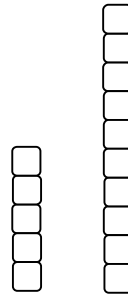
Now I'm going to count from 9 to 10. As I count I want you to clap. One. I heard you clap one time. I had to count one time when I counted from 9 to 10. 1 is a lot less than 9. That proves that 9 is closer to 10 than it is to 0.

Let's record what we just found out. I'm going to write that 9 is closer to 10 than 0.

Closer to 0	Closer to 10
1	9

I want to know if 5 is closer to 0 or 10. One way I can do this is to compare 5 to 0 and 10.

Compare towers of 5 linking cubes to 0 linking cube and 10 linking cubes.



Look at the towers I have made. Is 5 more like 0 or 10? [?] They are both very close.

Let's check our answer. I am going to count from 0 to 5. As I count I want you to clap. One, two, three, four, five. I had to count five times when I counted from 0 to 5. I heard you clap five times.

As you count the linking cubes point to them.

Now I'm going to count from 5 to 10. As I count I want you to clap. One, two, three, four, five. I heard you clap five times. I had to count five times when I counted from 5 to 10. 5 is the same as 5. We will use five as the middle place between 0 and 10.

Let's record what we just found out. I'm going to write that 1 is closer to 0 than 10.

Closer to 0	In the middle	Closer to 10
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1	5	10
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Now you will do this activity with your partner. Take turns with your partner making numbers and comparing them to 0 and 10. Which numbers are closer to 0 and which numbers are closer to 10.

Formative Assessment – As you walk the room note students who are succeeding and those who are struggling. Make note of which numbers students are having difficulty with this task. Continue this process with 2, 3, 4, 6, 7, and 8. Provide students with linking cubes so that they can make the comparisons. Ask thinking questions like, “Show me why you think 3 is closer to 0 than it is to 10?”

Closure: Which numbers are closer to 0? Which numbers are closer to 10? What number is right in the middle?

Students need to practice this skill many times to reinforce their learning of the concepts.

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Ten Frame Activity

Objectives: Students use ten frames to compare and round numbers.

Materials: Ten frames with two-sided counters and stickers.

Vocabulary: ten frame, difference, closer

Introduction: Today we are going to use ten frames to represent and compare numbers.
(Go over classroom norms for using manipulatives. Pass out ten frames and two-sided counters after teacher demonstrates with whole class.)

Sometimes when we are talking about numbers we want to know if a number is close to another number. Usually the numbers are multiples of 10, those are the numbers that you count when you count by 10s. Let's count by 10s: 10, 20, 30, 40, 50, 60, 70, 80, 90, 100.

I want to know if 1 is closer to 0 or if it is closer to 10. I'm going to use a ten frame to represent the number 1.

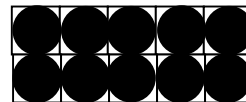
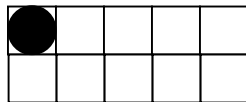
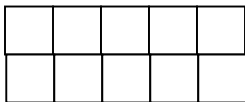
Place one two-sided counter in the ten frame and show it to the students.

How many counters do you see? [1]

I want to know if 1 is closer to 0 or 10. One way I can do this is to compare 1 to 0 and 10.

Ask: If I want to represent 0 how many counters do I need? (0) If I want to represent 10 how many counters do I need? (10)

Compare ten frames with 0 counters to 1 counter and 10 counters.



Look at the ten frames I have made. Is 1 more like 0 or 10? [0] I can then say that 1 is closer to 0 than it is to 10.

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Let's check our answer. I am going to count the number dots in the first ten frame. As I count I want you to clap. One. I only had to count once when I counted from 0 to 1. I heard you clap only one time. The difference between the 0 ten frame and the 1 ten frame is 1 dot.

As you count the dots in the ten frame point to them.

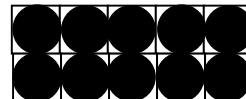
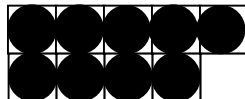
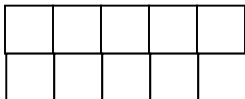
Now I'm going to count the difference between the ten frame with only one dot and the ten frame with ten dots. To do this I will count the empty frames. As I count I want you to clap. One, two, three, four, five, six, seven, eight, nine. I heard you clap nine times. I had to count nine times when I counted the empty frames. 1 is a lot less than 9. That proves that 1 is closer to 0 than it is to 10.

Let's record what we just found out. I'm going to write that 1 is closer to 0 than it is to 10.

Closer to 0	Closer to 10
1	

I want to know if 9 is closer to 0 or 10. One way I can do this is to compare 9 to 0 and 10.

Place nine two-sided counter in the ten frame and show it to the students.



Look at the ten frames I have made. Is 9 more like 0 or 10? [10] I can then say that 9 is closer to 0 than it is to 10.

Let's check our answer. I am going to count the number dots in the first ten frame. As I count I want you to clap. One, two three , four, five, six, seven, eight, nine. I had to count nine times when I counted from 0 to 9. I heard you clap nine times. The difference between the 0 ten frame and the 9 ten frame is 9 dots.

As you count the dots in the ten frame point to them.

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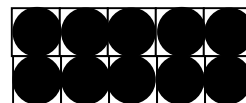
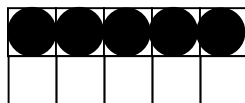
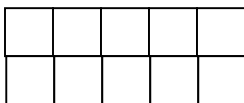
Now I'm going to count the difference between the ten frame with nine dots and the ten frame with ten dots. To do this I will count the empty frames. As I count I want you to clap. One. I heard you clap one time. I had to count one time when I counted the empty frames. 9 is a lot more than 1. That proves that 9 is closer to 10 than it is to 0.

Let's record what we just found out. I'm going to write that 9 is closer to 10 than 0.

Closer to 0	Closer to 10
1	9

I want to know if 5 is closer to 0 or 10. One way I can do this is to compare 5 to 0 and 10.

Place five two-sided counter in the ten frame and show it to the students.



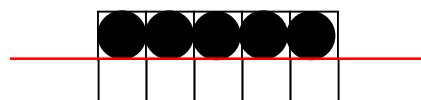
Look at the ten frames I have made. Is 5 more like 0 or 10? [?] They are both very close.

Let's check our answer. I am going to count the dots in the first ten frame. As I count I want you to clap. One, two, three, four, five. I had to count five times when I counted from 0 to 5. I heard you clap five times.

As you count the dots in the ten frame point to them.

Now I'm going to count the difference between the ten frame with five dots and the ten frame with ten dots. To do this I will count the empty frames. As I count I want you to clap. One, two, three, four, five. I heard you clap five times. I had to count five times when I counted the empty frames. 5 is the same as 5.

We will use five as the middle place between 0 and 10. Imagine a line drawn right in the middle of the ten frame. When we fill up the ten frame to that line we are in the middle. (This will help students to start developing the concept of "rounding up for numbers with 5 in the ones place.)



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Let's record what we just found out. I'm going to write that 5 is in the middle of 0 than 10.

Closer to 0	In the middle	Closer to 10
1	5	10

Now you will do this activity with your partner. Partner 1 will build a ten frame to show a number and partner 2 will decide if the number is closer to 0 or 10.

Formative Assessment – As you walk the room note students who are succeeding and those who are struggling. Make note of which ten frame configurations are easiest for students to round and those that are more difficult. Ask thinking questions like, “When you make 7 with the ten frame how do you know it is closer to 10 than 0?”

Closure: Which numbers are closer to 0? Which numbers are closer to 10? What number is right in the middle?

Students need to practice this skill many times to reinforce their learning of the concepts.

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Number Line Activity

Objectives: Students use number lines to compare and round numbers.

Materials: Paper and pencils.
Rulers are optional.

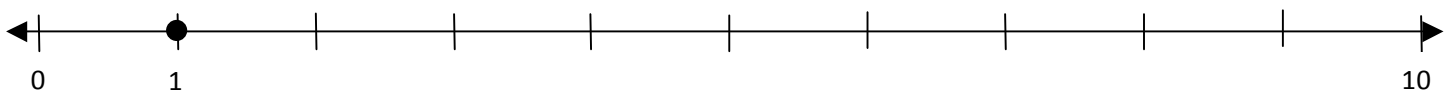
Vocabulary: number line, difference, closer, farther, distance

Introduction: Today we are going to use number lines to represent and compare numbers.
(Pass out paper after teacher demonstrates with whole class.)

Sometimes when we are talking about numbers we want to know if a number is close to another number. Usually the numbers are multiples of 10, those are the numbers that you count when you count by 10s. Let's count by 10s: 10, 20, 30, 40, 50, 60, 70, 80, 90, 100.

I want to know if 1 is closer to 0 or if it is closer to 10. I'm going to use a number line to represent the number 1. I first need to draw a number line. (Explain how to draw a # line.)

Draw a number line on the board. Make sure that each side has an arrow pointing away from the other side. Draw in 11 lines to designate each integer. Write in the numbers 0 and 10. Place a marker at 1 and write in the number 1



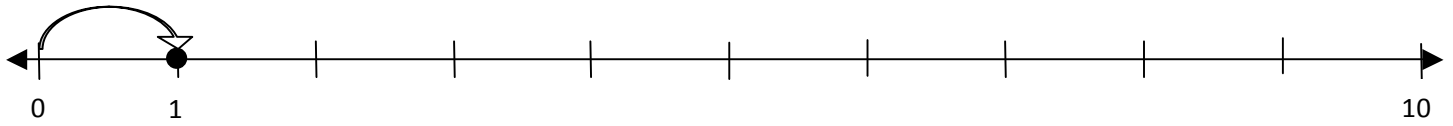
Next I write in where the number one goes. Where should the number one go?

I want to know if 1 is closer to 0 or 10. One way I can do this is to compare 1 to 0 and 10.

Look at the number line I drew. Is 1 closer to 0 or 10? [0] I can then say that 1 is closer to 0 than it is to 10.

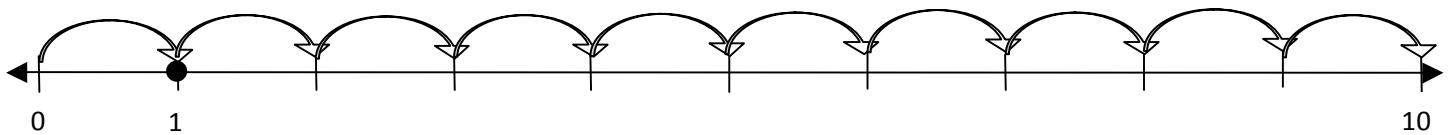
Let's check our answer. I am going to count the distance between 0 and 1. As I count I want you to clap. One. I only had to count once when I counted from 0 to 1. I heard you clap only one time. The difference between the 0 and 1 on the number line is 1.

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As you count the difference between 0 and 1 point to the jump.

Now I'm going to count the difference between 1 on the number line and 10 on the number line. As I count I want you to clap. One, two, three, four, five, six, seven, eight, nine. I heard you clap nine times. I had to count nine times when I counted the difference between 1 and 10. 1 is a lot less than 9. That proves that 1 is closer to 0 than it is to 10.



Let's record what we just found out. I'm going to write that 1 is closer to 0 than 10.

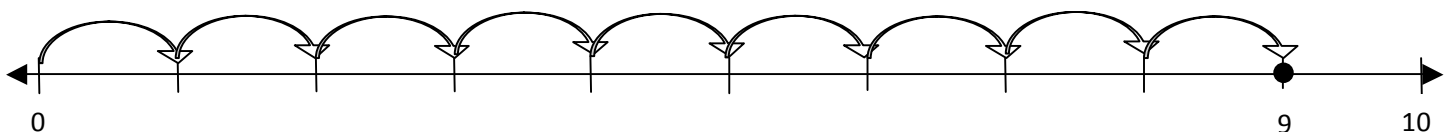
Closer to 0	Closer to 10
1	

I want to know if 9 is closer to 0 or 10. One way I can do this is to compare 9 to 0 and 10.

On the number line put a point at the number 9 and write the number nine under it.

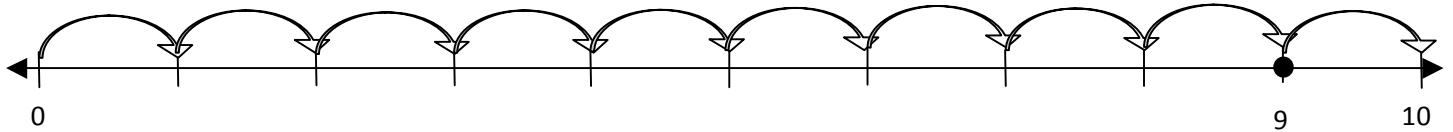
Look at the number line I drew. Is 9 closer to 0 or 10? (10) I can then say that 9 is closer to 10 than it is to 0.

Let's check our answer. I am going to count the distance between 0 and 9. As I count I want you to clap. One, two three, four, five, six, seven, eight, nine. I had to count nine times when I counted from 0 to 9. I heard you clap nine times. The difference between the 0 and 9 on the number line is 9.



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Now I'm going to count the difference between 9 on the number line and 10 on the number line. As I count I want you to clap. One. I heard you clap one time. I had to count one time when I counted the difference between 9 and 10. 1 is a lot less than 9. That proves that 9 is closer to 10 than it is to 0.



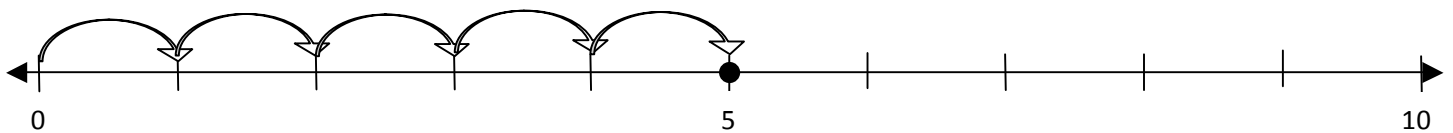
Let's record what we just found out. I'm going to write that 9 is closer to 10 than it is to 0.

Closer to 0	Closer to 10
1	9

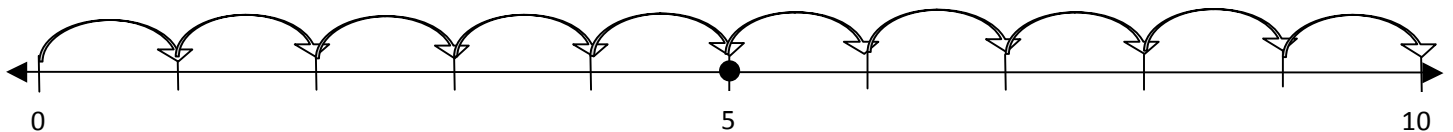
I want to know if 5 is closer to 0 or 10. One way I can do this is to compare 5 to 0 and 10.

Look at the number line I drew. Is 5 closer to 0 or 10? (?) They are both very close.

I am going to count the distance between 0 and 5. As I count I want you to clap. One, two three, four, five. I had to count five times when I counted from 0 to 5. I heard you clap five times. The difference between the 0 and 5 on the number line is 5.

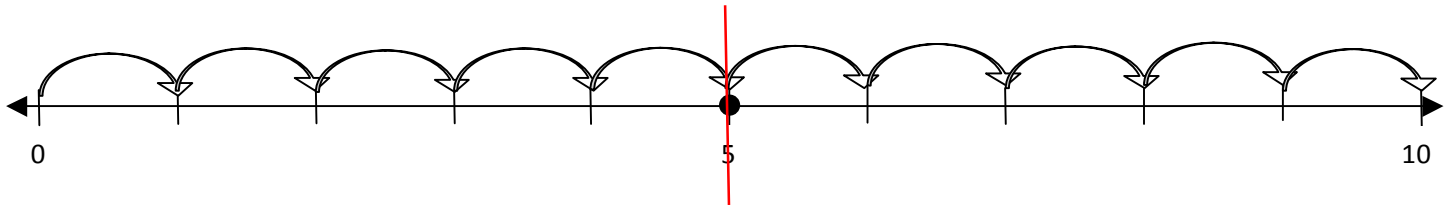


Now I'm going to count the difference between 5 on the number line and 10 on the number line. As I count I want you to clap. One, two, three, four, five. I heard you clap five times. I had to count five times when I counted the difference between 5 and 10. 5 is the same as 5. That proves that 5 is right in the middle of 0 and 10.



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We will use five as the middle place between 0 and 10. Imagine a line drawn right in the middle of the ten frame. When we fill up the ten frame to that line we are in the middle. (This will help students to start developing the concept of “rounding up for numbers with 5 in the ones place.)



Let's record what we just found out. I'm going to write that 5 is in the middle of 0 than 10.

Closer to 0	In the middle	Closer to 10
1	5	10

Now you will do this activity with your partner. Partner 1 will draw a number on a number line and 2 will decide if the number is closer to 0 or 10.

Formative Assessment – As you walk the room note students who are succeeding and those who are struggling. Make note of which number line configurations are easiest for students to round and those that are more difficult. Ask thinking questions like, “When you make 7 with the number line how do you know it is closer to 10 than 0?”

Closure: Which numbers are closer to 0? Which numbers are closer to 10? What number is right in the middle?

Students need to practice this skill many times to reinforce their learning of the concepts. Explore other numbers, beginning with the number 1-10 and then extend it to larger numbers.

Use all three strategies side by side to make connections.