

Relationships Between Numbers to Ten

Student Probe

Ask students “What is $5 + 5$?”

Most students will readily say 10.

Then say, “So if $5 + 5$ is 10 then what is $6 + 5$?”

Students who begin counting on their fingers do not know the relationships and need to engage in this lesson.

Lesson Description

This lesson uses dot cards and ten frames to build understanding of the relationships of the numbers to 10, that is, one more, one less, two more, two less, distance to 5 and distance to 10

Rationale

After students have acquired a concept of cardinality and are able to count meaningfully, they are now ready to build on their understanding of the relationships between the numbers to 10. They need to build a flexible understanding of number that does not require always counting.

Preparation

Prepare the dot cards and ten frames. Have available for students: a blank 10 frame, 2 color-counters, paper and pencil or students’ white boards and markers.

At a Glance

What: Students will develop understanding of the distance between the numbers to 10; specifically, 1 more/1 less, 2 more/2 less, distance to 5 and distance to 10

Standard:

AR.Math.Content.1.OA.C.6

Add and subtract within 20, demonstrating *computational fluency* for addition and subtraction within 10.

Mathematical Practices:

SMP6: Attend to precision.

SMP7: Look for and make use of structure.

Who: Students who are “counting all” on their fingers or students who have some facts memorized but for others they count on their fingers suggests they do not understand the relationship of numbers.

Grade Level: 1

Prerequisite Vocabulary: more, less, ten frames, dot cards, right, left, corner, middle, arrangement

Prerequisite Skills:

One-to-one correspondence, rote count numbers 1-20, subitizing

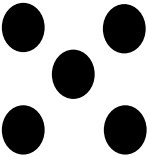
Delivery Format: individual, small group

Lesson Length: 20 minute increments – ongoing depending on the level of the students

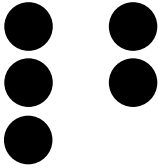
Materials, Resources, Technology: ten frames, dot cards, blank 10 frame, blank paper, pencil or student white board and marker, two-color counters

Student Worksheets: Blank ten frame

Lesson

The teacher says or does...	Expect students to say or do...	If students do not, then the teacher says or does...
<p>1. Choose a dot card that a student knows well (for example 5)</p> <p>Show the pattern for 2 to 3 seconds and then ask: How many dots do you see?</p>	<p style="text-align: center;">“5”</p> 	<p>Have the child build the arrangement with counters (if using two-colored, make sure the child only uses one side or the other so color does not interfere) OR Have the child draw the arrangement.</p>
<p>2. Exclaim: How were you able to know that so quickly? You didn't have time to count by ones!</p> <p>Ask: How were the dots arranged? OR What did the dots look like?</p> <p><i>(Do NOT have students prove their answer is correct by having them count by ones. This defeats the purpose of trying to have them see the number a unit.)</i></p>	<p>I saw “2 on the top, 2 on the bottom, and 1 in the middle” OR “A square with one in the middle” (ask “how many dots mad up the square?”) OR “4 and 1”</p>	<p>If a student says I saw it in my head, say “pretend I can't see the dot arrangement, can you explain to me about how I might build it?” You may need to probe a little by saying “What is the shape?” or “Are there some on the top or some on the bottom?”</p>
<p>3. Say: Now I want you to close your eyes and try to see this same dot arrangement of 5 in your mind.</p> <p>Ready? Close your eyes. Can you see it?</p>	<p>Student closes eyes and says “Yes, I can see the dots” OR “No, I can't see the dots”</p>	<p>If the student says no, flash the card again, have the student rebuild, and describe.</p> <p>Say: Now take a picture with your mind of the dots. Can you see it? If the child still has trouble, refer to Visualizing Numbers to Ten.</p>

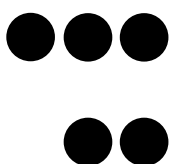
The teacher says or does...	Expect students to say or do...	If students do not, then the teacher says or does...
<p>4. Say: Now keep your eyes closed. I want to you take one of the dots away.</p> <p>Did you do it?</p> <p>How many dots are left after you took one away?</p>	<p>Yes, I took one away</p> <p>There are now "4".</p>	<p>Repeat the dot card flash or Refer to Visualizing Numbers to Ten.</p>
<p>5. Which one did you take away in your mind?</p>	<p>I took away the one in the middle.</p> <p>I took away one dot in the corner.</p>	<p>If student has difficulty explaining: Ask: Was it in the middle? Was it in the corner? Which corner? Top right, top left, bottom right, bottom left.....? (may need to indicate with your hands right and left).</p>
<p>6. How many are left?</p>	<p>"4"</p>	<p>Well, think back and tell me exactly what you did in your mind. Describe the dots. How many are there? Now which one did you take away? How many are left?</p>
<p>7. How do you know?</p>	<p>Because $4+1$ is 5 OR Because 5 take away 1 is 4.</p>	<p>If can't explain, help with the student with the language by going to the next step.</p>
<p>8. I want you to show me what you did in your mind with the two color counters.</p> <p>Prove to me there are now 4.</p>	<p>Student draws or builds the pattern, takes the dot away and proves there are 4 left.</p> <p>"I took the one in the top right corner away and there are four."</p> <p>I took the one in the middle away and now there are 4.</p>	<p>Help the student describe. Through each part, say: Now tell me what you are doing.</p>

The teacher says or does...	Expect students to say or do...	If students do not, then the teacher says or does...
<p>9. Show another arrangement of 5 and repeat the process. For example the following card lends itself to taking the bottom left dot away. (a student make take away a different dot and that is fine)</p> 		
<p>10. After repeating the same steps with the second card...</p> <p>How is this dot card the same or different than the other dot card?</p>	<p>Student explains that both cards have 5 dots; the dots are just rearranged.</p>	<p>Have the student build both arrangements physically and then have him/her point out and describe how the arrangements are the same and different. Make sure the student understands that both card are 5.</p>
<p>11. So if I have 5 dots or 5 apples or 5 chairs , and I take one away, will I always have 4 no matter what?</p> <p>Why? (Be sure to always include the units; for example, 4 dots minus 1 dot or 4 chairs minus 1 chairs, etc., with the numbers since 5-1 is not always 4; for example 5 quarters minus 1 dime does not equal 4. This will help with place value later.)</p>	<p>Yes, because 5 chairs take away 1 chair is 4 chairs. It doesn't matter how the chairs are arranged.</p>	<p>Act out the different scenarios and rearrange the objects until they are certain 5 dots take away 1 dot is ALWAYS 4 dots.</p>

The teacher says or does...	Expect students to say or do...	If students do not, then the teacher says or does...
Proceed in this same manner with all numbers to 10 asking, "What is one less?". Once students are fluent with this relationship, move to the other ones. See below.		

1 More

Same process. It is always best to begin with a card that visually lends itself to adding one more such as:



2 Less/2 More

Materials: Dot Cards

This process will be just like 1 more/1 less except instead of choosing 5 to visualize, maybe choose 7 so the arrangement is easy to mentally take away 2

Ten Frames (distance from 10 and 5)

Materials: Ten frame arrangements and template

Use the same lesson format as with the dot cards.

Probe: Show a ten frame to the student:

Example:

●	●	●	●	●
●	●	●	●	

Questions vary:

How many dots? How do you know? How far from 10? How do you know? OR How far from 5?

Teacher Notes:

It is best to remain with one relationship before moving on to another one. You can interchange one more, one less easily, but have students become fluent with this before moving on to 2 more, 2 less etc. Having the students to visualize the dot arrangements in their mind will enable them to use these relationships to develop strategies such as doubles plus and minus one; making 10, etc. Students are now ready for the addition strategies/basic facts lesson. Twenty minutes is the suggested time period for an intervention lesson.

Formative Assessment

Keep track of the number relationships for which students are fluent. Continue working with the students using these materials and questions until all relationships of the numbers to 10 are fluent; that is, continue until students are confident and explaining easily.

References

Elementary and Middle School Mathematics, Teaching Developmentally, Fifth Edition, John A. Van De Walle, pp. 119-124.

Coming to Know Number, by Grayson Wheatley, Second Edition, 2010.