



**Domain:** Operations and Algebraic Thinking

**Title:** Greater Than, Less Than, Equal To in

Range up to 10

**Grade: 1**

**Formative Assessment Lesson**

Designed and revised by the Kentucky Department of Education  
Field-tested by Kentucky Mathematics Leadership Network Teachers

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(Revised 2017)

This Formative Assessment Lesson is designed to be part of an instructional unit. This task should be implemented approximately two-thirds of the way through the instructional unit. The results of this task should be used to inform the instruction that will take place for the remainder of your unit.

### **Mathematical goals:**

This lesson is intended to help you assess how well students are able to:

- Recognizing equivalent expressions (number sentence).
- Using strategies to determine related expressions (number sentence).
- Recognize and use the symbols =, <, >, -, +

### **Kentucky Academic Standards:**

Kindergarten – Counting and Cardinality – Foundational support as stated in the Deconstructed Standards on Kentucky Department of Education’s (KDE’s) website. (<http://education.ky.gov/curriculum/conpro/Math/Pages/Mathematics-Deconstructed-Standards.aspx>)

- K.CC.C.6 - Describe greater than, less than, or equal to
- K.CC.C.7 - Compare 2 numbers between 1 and 10 presented as written numerals

This lesson involves *mathematical content* in the standards from within the 1<sup>st</sup> grade content, with emphasis on:

#### First Grade - Operations and Algebraic Thinking

- 1.OA.2 - Know how to add three whole numbers whose sum is less than or equal to 20. (This is a knowledge target taken from Deconstructed Standards on KDE’s website.)
- 1.OA.3 - Understand and apply properties of operations and the relationship between addition and subtraction.
- 1.OA.6 - Add and Subtract within 20 (demonstrating fluency for addition and subtraction within 10)
- 1.OA.7 – Understand the meaning of the equal (=) sign
- 1.OA.8 – Determine the unknown whole number in an addition or subtraction equation relating to three whole numbers. (Extension to challenge students.)

#### First Grade – Number and Operations

- 1.NBT.3 Know what each symbol represents less than, greater than, equal to.

This lesson involves a range of *Standards for Mathematical Practice (MP)*, with emphasis on:

- MP2. Reason abstractly and quantitatively
- MP3. Construct viable arguments and critique the reasoning of others
- MP6. Attend to precision
- MP7. Look for and make use of structure

## **Introduction:**

This lesson is structured in the following way:

- Before the lesson, students work individually on an assessment task that is designed to reveal their current understandings and difficulties. You then review/analyze their responses and create questions for students to consider/answer in order to improve their solutions.
- After a whole class introduction, students work in partners on a card matching activity.
- Students work with a partner in a collaborative discussion tasks. Throughout their work, students justify and explain their decisions to their peers.
- Toward the end of the lesson there is a whole class discussion.
- Students return to their original assessment tasks or a similar task and try to improve their own responses.

## **Materials Required:**

Each individual student will need:

- Two copies of the assessment task ***Greater Than, Less Than, or Equal?*** per student.
- Each student will need a red, a yellow, and a blue crayon

Each pair of students will need the following resources: (It is recommended to put sets on different colors of cardstock or construction paper and laminate for durability.)

- Card Set A (already cut out and laminated in an envelope)
- Chart A
- Card Set B (already cut out and laminated and hand out to groups as they finish Card Set A)
- Chart B
- Card Set C (already cut out and laminated and hand out to groups as they finish Card Set B)
- Chart C
- Blank Template Chart D (hand out to partners as they finish Card Set C) (Students will not need Cards for Chart D. They will write their expressions (number sentences) on the chart.)
- Card Set E (already cut out and laminated in an envelope) **\*\*ONLY USE WITH GROUPS THAT STRUGGLED WITH THE PRE-ASSESSMENT OR GROUPS THAT STRUGGLED WITH CARD SET A. CARD SET E IS FOR CHECKING UNDERSTANDING OF VOCABULARY FOR GREATER, LESS, AND EQUAL**

Teacher materials needed for this FAL:

- Markers
- Anecdotal Notes on FAL
- A set of Card Set A
- Chart A written on large chart paper for whole group discussion

## **Time Needed:**

- Approximately 15 minutes for the individual pre- assessment task (at least a day or two before lesson),
- Two 40 - minute lessons (30 minutes for partner task and 10 minutes for whole class discussion),
- 15 minutes for the individual post-assessment task.
- Times given are only approximate. Exact timings will depend on the needs of the class.
- *All students need not complete all sets of card activities.*

## **Before the Lesson:**

### **Assessment Task: Greater Than, Less Than, or Equal?**

- Have students do the initial task, *Greater Than, Less Than, or Equal?* Individually in class a day or two before the formative assessment lesson. **REMEMBER:** *You will give this same assessment again as a post-assessment.*)
- This will give you an opportunity to assess the work, and to find out the kinds of misconceptions students have with it.
- You will be able to target your help more effectively in the follow-up lesson. Depending on your class you can have them do it all at once or in small teacher-led groups (they should still work individually.)

### **Framing the pre-assessment: (10-15 minutes):**

Give each student a copy of the assessment task *Greater Than, Less Than, or Equal?* and read the directions. You may need to model one on the board.

*“Look at the card at the top of the page. If the expression (number sentence) is greater than (>) the shaded box, color it red. If the expression (number sentence) is less than (<) the shaded box, color it blue. If the expression (number sentence) is equal to (=) the shaded box, color it yellow.”*

Greater Than, Less Than, or Equal?		
Name _____	Pre	Post
Solve for the given number sentence in the shaded box. Then solve the number sentences in the white boxes. If the number sentence is <u>greater than (&gt;)</u> the shaded box, color it <u>red</u> . If the number sentence is <u>less than (&lt;)</u> the shaded box, color it <u>blue</u> . If the number sentence is <u>equal to (=)</u> the shaded box, color it <u>yellow</u> .		
$5 + 4$		
$5 + 2 + 2$	$12 - 2$	$3 + 4$

It is important that the students are allowed to answer the questions without your assistance, as far as possible. If students struggle to get started ask questions that help them understand what they are being asked to do, but do not do the problem for them. See the *Common Misconceptions Chart* for guiding questions on Page 5.

Students should not worry too much if they do not understand or cannot do everything, because in the next lesson they will engage in a similar task, which should help them. Explain to students that by the end of the next lesson, they should expect to answer questions such as these confidently.

**Assessing Students’ Responses:** *Remind students they should know most of the content and this is a review for me to see what we need to review on.*

- Collect students’ responses to the task. We suggest that you do not actually score student’s work. The research shows that this will be counterproductive, as it will encourage students to compare their scores, and will distract their attention from what they can do to improve their mathematics
- Instead, help students to make further progress by summarizing their difficulties as a series of questions. Some questions in the *Common Misconceptions* chart may serve as examples. These questions have been drawn from commonly identified student misconceptions.
- Make notes about what their work reveals about their current levels of understanding and their different problem solving approaches.
- Strategically partner students based on pre-assessment data. Partner students with others who display similar errors/misconceptions on the pre-assessment task. While this may seem counterintuitive, this will allow each student to more confidently share their thinking. This may result in partnering students who were very successful together, those who did fairly well together, and those who did not do very well together.
- If you have students who struggled with the pre-assessment, start that pair with Card Set E and then move to Card Set A. Remember all students may not get through all sets of cards and that is ok.

### **We recommend you:**

- write one or two questions on each student’s work, or
- give each student a printed version of your list of questions and highlight the questions for each individual student or
- display a small list of questions on the board that will be of help to the majority of students

- For younger students, you may need to go over these questions orally, or just use them as you walk around the room and notice mistakes they are making.
- The solution to all these difficulties is not to teach one particular way of solving a problem, but to help students to find a variety of ways that work in different situations and make sense to them.

Below is a list of common misconceptions and questions/prompts that may be written on individual tasks, on the board or asked during the collaborative activity to help students clarify and extend their thinking.

<b>Common Misconceptions:</b>	<b>Suggested questions and prompts:</b>
<b>Students will confuse &lt; &gt; signs.</b>	<ul style="list-style-type: none"> <li>• Ask the student to read the problem out loud</li> <li>• Can you build or draw a representation of that math expression (number sentence)?</li> <li>• Why do you think that expression (number sentence) is true?</li> <li>• What did you do to decide if this expression (number sentence) should be greater than, less than, or equal to?</li> </ul>
<b>Students will confuse symbols for adding and subtracting (+ -)</b>	<ul style="list-style-type: none"> <li>• Ask the student to read the problem out loud</li> <li>• Can you build or draw a representation of that math expression (number sentence)?</li> <li>• Why do you think that expression (number sentence) is true?</li> <li>• What did you do to decide if this expression (number sentence) should be addition or subtraction?</li> <li>• What does this symbol mean for you to do?</li> </ul>
<b>Students will forget to add the third numeral when adding three numerals.</b>	<ul style="list-style-type: none"> <li>• How did you get your answer?</li> <li>• What did you add first? Now what did you do?</li> <li>• Read the problem to me.</li> <li>• Can you build or draw a picture of that math expression (number sentence)?</li> </ul>
<b>Students will randomly select expressions</b>	<ul style="list-style-type: none"> <li>• Does the problem make sense?</li> <li>• Can you draw or build a representation to show that math expression (number sentence)?</li> </ul>
<b>Students will incorrectly solve for the unknown number.</b>	<ul style="list-style-type: none"> <li>• What strategy did you use to solve for the unknown number?</li> <li>• Can you build or draw a representation of that math expression (number sentence)?</li> <li>• Read the problem to me?</li> <li>• What does the blank line mean?</li> </ul>
<b>Students who struggle with vocabulary (greater than, less than, equal)</b>	<ul style="list-style-type: none"> <li>• Use card set E -</li> </ul>

**Recommendation for the teacher:** Keep in mind the misconceptions that each student had during the pre-assessment. As you walk around the room monitoring students working, address those areas of misconceptions with the students. You can do this by developing your own anecdotal notes. (An example of Anecdotal Notes on FAL is below on pages 19 and 20.)

## Suggested Lesson Outline: DAY 1: Individual Assessment without help (15-20 minutes)

- Give Pre-Assessment

### Greater Than, Less Than, or Equal?

Name \_\_\_\_\_

Pre

Post

Solve for the given number sentence in the shaded box. Then solve the number sentences in the white boxes.

If the number sentence is greater than ( $>$ ) the shaded box, color it



If the number sentence is less than ( $<$ ) the shaded box, color it



If the number sentence is equal to ( $=$ ) the shaded box, color it



- Make notes about the misconceptions of each student. (Anecdotal Notes on FAL)
- Strategically partner students based on pre-assessment data. Partner students with others who display similar errors/misconceptions on the pre-assessment task. While this may seem counterintuitive, this will allow each student to more confidently share their thinking. This may result in partnering students who were very successful together, those who did fairly well together, and those who did not do very well together.
- Card Set E (already cut out and laminated in an envelope) **\*\*ONLY USE WITH GROUPS THAT STRUGGLED WITH THE PRE-ASSESSMENT OR GROUPS THAT STRUGGLED WITH CARD SET A. CARD SET E IS FOR CHECKING UNDERSTANDING OF VOCABULARY FOR GREATER, LESS, AND EQUAL**

## DAY 2 (and Day 3, if needed):

### Part 1: Whole Class Introduction (mini-lesson) (15 minutes)

The student misconception data from the pre-assessment will drive this whole class mini-lesson (e.g. It could be about the unknown number, greater than, less than, equal to, or adding three numerals.)

*Today we are going to do some more work on comparing (inequality) about whether or not the answer is greater than, less than, or equal to the first number sentence (equation).*

- Teacher uses chart paper to model Chart A diagram but use  $6 + 2$  instead of  $7 + 2$ .
- Students use their mini whiteboard to solve  $6 + 2$ .
- Teacher would then write the answer on the chart paper next to  $6 + 2$ .
- Teacher will show another expression (number sentence) to students for the students to solve on their whiteboards. (Teacher may use Card Set A or teacher can use post cards to make up their own expression (number sentence) to use for modeling  $6 + 2$ .) **(MP 7)**
- After answering, the teacher will facilitate a discussion on comparing (inequality) with the students about whether or not that answer is greater than, less than, or equal to  $6 + 2$ .
- After the discussion, they will place the card under the appropriate column on the chart paper (greater than, less than, or equal to).
- Repeat this process with another expression (number sentence), if need be.
- Refer back to Common Misconceptions Chart (page 5) for questions to help guide discussion.

### Part 2: Collaborative Activity: (20-30 minutes)

*Explain to students how they are to work collaboratively. Sample dialogue below:*

- *"I want you to work in partners. There is a lot of work to do today and you may not all finish."*
- *"The important thing is to learn something new, so take your time."*
- *"I just modeled for you how to complete this activity" (mini-lesson from above)*

- “Solve the expression (number sentence) at the top of the chart.” (MP 6)
- “Take turns choosing a card.”
- “Solve the expression (number sentence) on the card that you chose.” (MP 6)
- “Explain the strategy you used to solve the expression (number sentence).” (MP 7)
- “Decide if the answer to the card is greater than, less than, or equal to the expression (number sentence) at the top of the chart and place it under the greater than, less than, or equal to column. (MP2)
- “Remember each time you solve the number sentence and place it under a column, you need to explain your thinking clearly to your partner”. (MP 3)
- “If your partner disagrees with your match then challenge him or her to explain why.” (MP 3)
- “It is important that you both understand why each card is placed where it is.” (MP 3)
- Hand out Card Set A and Chart A to each pair. As partners finish a card set, hand the pairs the next card set B and then C. Remember every pair may not complete all 3 sets.

**While students are completing the tasks, the teacher’s job is to:**

- Walk around and monitor/facilitate discussions with students, asking them how they solved the expressions (number sentences) and why they placed the cards under the chosen column trying to determine strategies they are using, reasoning behind their work, and correcting misconceptions as they arise. *\*\*Refer back to Common Misconceptions Chart (Page 5) for questions to help guide discussion.*
- Make a note of whose strategies or thinking you would like to share during Discussion/Reflection time. Inform the student you would like them to be prepared to share their thinking process later. (MP 7)
- Make note of any common misconceptions you observed during the partner work.
- The notes you should have gathered during partner work time can guide the whole-class discussion at the end of the lesson or the instruction given during the mini-lesson of Day 3 if needed.
- Since this is given 2/3 of the way through the unit, you can use the data you gathered to guide instruction in the remaining 1/3 of the unit.

**Ways You Can Support Student Problem Solving While Teacher is Monitoring:**

- Try not to make suggestions that move students toward a particular approach to the task. Instead, ask questions to help students clarify their thinking. Encourage students to use each other as a resource for learning. Encourage students to explain their reasoning carefully.
- If one student has placed a particular card on the chart, challenge their partner to provide an explanation.
- If you find students have difficulty articulating their decisions, then you may want to use the questions from the *Common Misconceptions* chart to support your questioning.
- If the whole class is struggling on the same issue, then you may want to write a couple of questions on the board and engineer a quick whole class discussion.

**Extension activities -- Individual Student Work for the groups who finish Card Sets A, B, and C quickly.**

- Ask students who finish all of the sets **quickly** to use Chart D to write their own expression (number sentence) in the box at the top of the chart.
- Using the expression (number sentence) they wrote in the box, the students will create and write their own expression (number sentence) under the appropriate headings “greater than”, “less than”, and “equal to” to show their understanding of greater than, less than, and equal to.

### **Part 3: Whole-class discussion/reflection (10 minutes) Carpet Time**

- Focus discussion on strategies used by charting student's strategy used.
- Conclude the lesson by discussing and generalizing what has been learned.
- The generalization involves first extending what has been learned to new examples, and then examining some of the conclusions students came up with.
- Allow pairs to bring up some of their work samples and share their thinking.
- The purpose of this discussion is to explore the processes involved in a range of different approaches.
- The aim is to get students to understand and share their reasoning, not just checking that everyone found the correct matches.

Ask students:

*Why did you decide to place that card there?*

*What clues did you use to help you in your decision?*

*Is there another card that could go there?*

*What strategy did you use to determine where to place your card?*

### **Improving individual solutions to the assessment task (10 minutes)**

- Give the students a new copy of the assessment "Greater Than, Less Than, or Equal?"
- You could say to the students: "Think about what you have learned during this lesson. Using what you have learned, try to improve your work on this assessment compared to the pre-assessment that you took a few days ago."
- Remember to use the data from this assessment to guide the remaining instruction of the unit.



Greater Than, Less Than, or Equal?

Name \_\_\_\_\_

Pre

Post

Solve for the given number sentence in the shaded box. Then solve the number sentences in the white boxes.

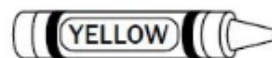
If the number sentence is greater than ( $>$ ) the shaded box, color it



If the number sentence is less than ( $<$ ) the shaded box, color it



If the number sentence is equal to ( $=$ ) the shaded box, color it



$$5 + 4$$

$5 + 2 + 2$	$8$	$3 + 4$
$8 - 3$	$9$	$10 - 1$
$9 - 5$	$4 + 6$	$9 + 1$

$$10 - 2$$

$3 + 5$	$9 - 0$	$9 + 1$
$8 + 2$	$4 + 3$	$2 + 3 + 3$
$7 - 2$	$9 - 1$	$8 - 1$
$2 + 2 + 4$	$2 + 3 + 2$	$4 + 5 + 0$

Chart A



Greater than >	Less Than <	Equal =

**Card Set A**  
**(Cut apart)**

<b>8 + 1</b> card set A	<b>5 + 2</b> card set A	<b>9 - 4</b> card set A
<b>8 + 2</b> card set A	<b>9 + 1</b> card set A	<b>10 - 3</b> card set A
<b>6 + 2</b> card set A	<b>9 - 0</b> card set A	<b>10 - 0</b> card set A
<b>6 + 2 + 1</b> card set A	<b>5 + 5</b> card set A	<b>10 - 1</b> card set A
<b>7 + 3</b> card set A	<b>1 + 1 + 1</b> card set A	<b>2 + 2 + 5</b> card set A

Chart B

$$10 - 5$$

Greater than >	Less Than <	Equal =

**Card Set B**  
**(cut apart)**

<b>9 - 1</b> card set B	<b>5 - 0</b> card set B	<b>6 + 1</b> card set B
<b>10 - 4</b> card set B	<b>7 - 6</b> card set B	<b>5 + 0</b> card set B
<b>3 + 2</b> card set B	<b>3 + 3 + 2</b> card set B	<b>9 - 7</b> card set B
<b>1 + 1 + 2</b> card set B	<b>2 + 2</b> card set B	<b>8 - 3</b> card set B
<b>2 + 3 + 0</b> card set B	Find the unknown to make <b>4 + _____</b> Greater than <b>10 - 5</b> card set B	<b>5 - 2</b> card set B

Chart C

$$5 + 5$$

Greater than >	Less Than <	Equal =

**Card Set C**  
**(cut apart)**

$4 + 5$ card set C	$12 - 2$ card set C	$8 + 3$ card set C
$3 + 7$ card set C	$13 - 2$ card set C	$10 - 7$ card set C
$5 + 3 + 1$ card set C	$3 + 7 + 1$ card set C	$4 + 4 + 2$ card set C
$4 + 6$ card set C	$6 + 6$ card set C	$8 - 4$ card set C
$2 + 2$ card set C	$12 - 1$ card set C	$10 - 0$ card set C
Find the unknown to make $8 + \underline{\quad}$  <u>Greater than</u> $5 + 5$ card set C	Find the unknown to make $9 - \underline{\quad}$  <u>Less than</u> $5 + 5$ card set C	Find the unknown to make $3 + \underline{\quad}$  <u>Equal to</u> $5 + 5$ card set C

**Chart D – Extension Activity for early finishers**



<b>Greater than</b> <b>&gt;</b>	<b>Less Than</b> <b>&lt;</b>	<b>Equal</b> <b>=</b>



Chart E



Greater than >	Less Than <	Equal =

**(This set is to check understanding of vocabulary)**

**Card Set E**  
**(cut apart)**

<b>0</b> card set E	<b>1</b> card set E	<b>2</b> card set E
<b>3</b> card set E	<b>4</b> card set E	<b>5</b> card set E
<b>6</b> card set E	<b>7</b> card set E	<b>8</b> card set E
<b>9</b> card set E	<b>10</b> card set E	<b>0</b> card set E
<b>1</b> card set E	<b>8</b> card set E	<b>4</b> card set E
<b>10</b> card set E	<b>12</b> card set E	<b>16</b> card set E

**(This set is to check understanding of vocabulary)**

Anecdotal notes on FAL Lesson on Greater than, less than, equal to:

**EXAMPLE ONLY**

<b>Miriam</b>	<b>Tabetha</b>	<b>Tristan</b>	<b>Taylor</b>	<b>Hunter</b>
<b>Cheyenne</b>  <u>pre-assess data:</u> adding 3 numbers- left off adding the 3 <sup>rd</sup> number	<b>Andrew</b>	<b>Dylan</b>	<b>Autumn</b>	<b>Angel</b>  <u>pre-assess data:</u> switched +/- signs on number sentences
<b>Tristan</b>	<b>Jonathan</b>	<b>Cayden</b>	<b>Athena</b>	<b>Carson</b>
<b>Luke</b>	<b>Alexander</b>  <u>pre-assess data:</u> was able to solve for unknown on + problems, not on - problems	<b>Braylee</b>	<b>Owen</b>	<b>Natalia</b>
<b>Aaron</b>	<b>Chloe</b>	<b>Savannah</b>	<b>Haley</b>	<b>Ayrionna</b>

Anecdotal notes on FAL Lesson on Greater than, less than, equal:
