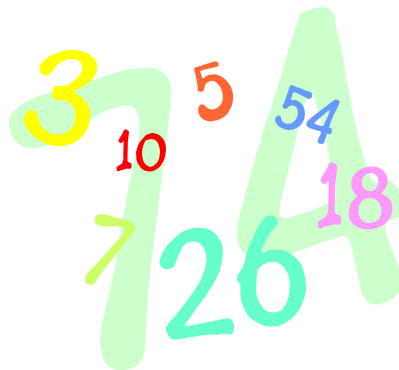


Grade 2

Classroom Challenge *A Formative Assessment Lesson*

Place Value

Colin's Numbers



Before the “Classroom Challenge”

- Teach approximately two thirds of the lessons suggested on the pacing chart for this unit.



Session 1

- Introduction (Teacher)
- Independent Task (Student)

Session 2

- Collaborative Small Group Work
- Whole Group Discussion

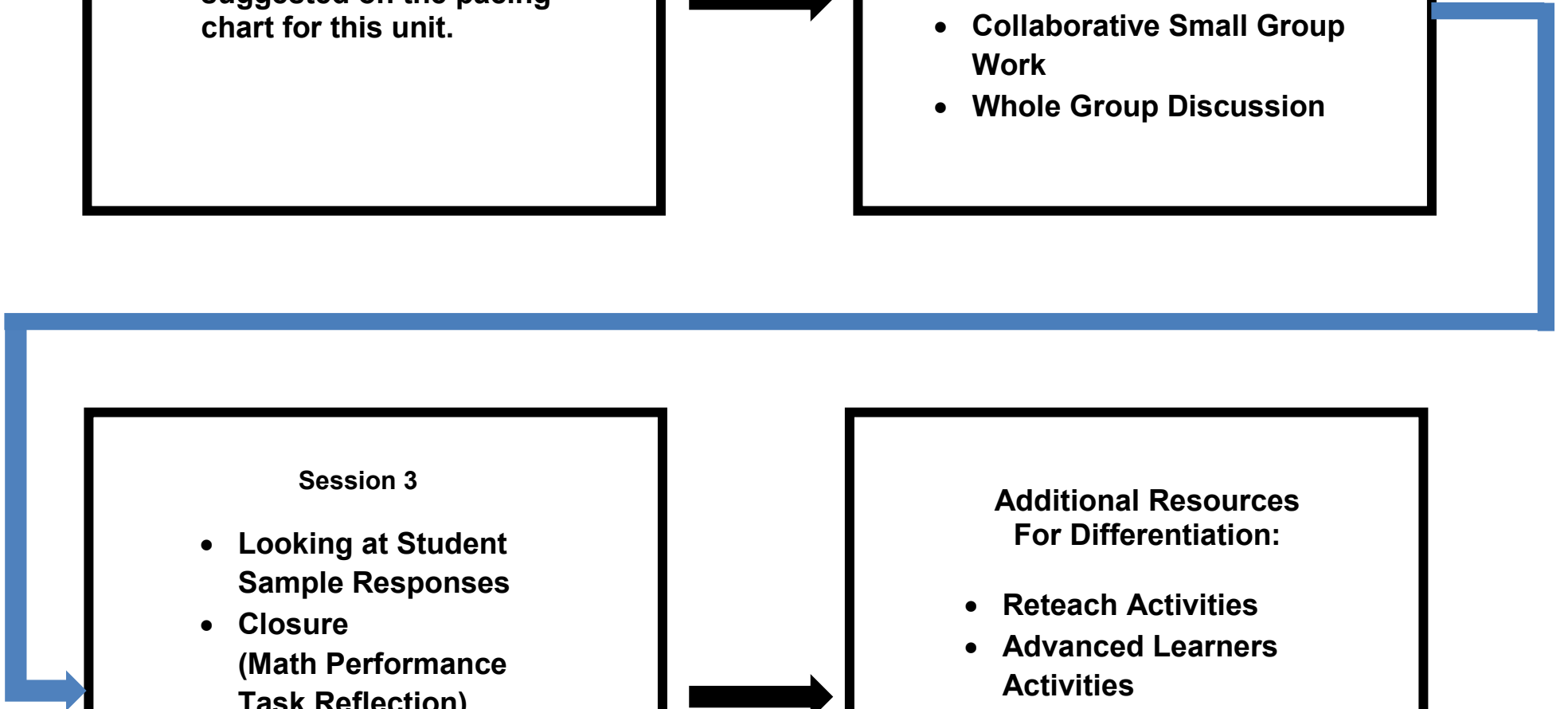
Session 3

- Looking at Student Sample Responses
- Closure (Math Performance Task Reflection)



Additional Resources For Differentiation:

- Reteach Activities
- Advanced Learners Activities



Teacher Guide

Grade 2 Lesson: Colin's Numbers

Introduction

This Classroom Challenge has been modeled after the secondary level lessons created by the Mathematics Assessment Project, University of Nottingham and UC Berkeley. In their booklet, *A Brief Guide for teachers and administrators April 2013*, they state "A Classroom Challenge (CC) is a classroom-ready lesson that supports formative assessment. The CC helps teachers assess and improve students' understanding of mathematical concepts and skills and their ability to use the "mathematical practices" described in the Common Core State Standards."

This formative assessment lesson "first allows students to demonstrate their prior understandings and abilities in employing the mathematical practices, and then involves students in resolving their own difficulties and misconceptions through structured discussion. This results in more secure long-term learning, reducing the need for re-teaching that otherwise takes so much classroom time."

Instructional Prerequisites *(These are met after approximately 2/3 of the unit has been taught.)*

- Students will understand the place value of three-digit numbers.
- Students will understand greater than and less than
- Students will compare three-digit numbers.

Common Core State Standards for Mathematics

- 2.NBT.1** Understand Place Value
2.NBT.4 Compare two three digit numbers

Standards for Mathematical Practices for this lesson:

- MP1** Make sense of problems and persevere in solving them.
MP2 Reason abstractly and quantitatively.
MP3 Construct viable arguments and critique the reasoning of others.
MP4 Model with mathematics.
MP6 Attend to precision

Materials required

- Each individual student will need a copy of the task "Colin's Numbers" task.
- Each small group of students will need an additional blank copy of the task printed and a piece of poster paper, on which they will compile the group responses.
- Each individual student will need a copy of the Math Performance Task Reflection

Time Needed

- The suggested lesson will take approximately 3 math sessions. Exact timings will depend on your class.

Suggested Lesson Outline for Colin's Numbers – Grade 2
The suggested lesson will take approximately three math sessions.

Objective: Students will be able to represent several three-digit numbers and compare three-digit numbers.

Introduction: (Vocabulary reference support, approximately 10 minutes)

- Refer to a Unit Word Wall or create a class Circle Map for Place Value. Say, *“Today you will use what you’ve learned about place value to solve word problems.”*

Independent Task: (No teacher assistance, approximately 20 minutes)

- Give each student a copy of the “Colin’s Numbers” task. Say, *“Read through the questions and try to answer them as carefully as you can. Show how you work out each answer. Don’t worry if you cannot understand or complete everything. In the next lesson you will do further work on this task.”* Collect and read students’ responses. Do not score them; make notes to make notes about their current levels of understanding and their different solution strategies.

Collaborative Small-Group Work: (approximately 10 minutes)

- Organize students into groups of three to four. Discuss “Rules for Math Talk” poster. Give out a large piece of paper for making a poster of their solutions. Say,
“Put your own work aside until later in the lesson. I want you to work in groups now. Your task is to produce a product/document that reflects your groups’ discussion during consensus using math vocabulary/language. In your groups, work on one problem at a time. Take turns to explain your method for solving the problem. (Students may use whiteboards to explain their thinking.) Listen carefully to each other. If you have more than one way of solving the problem, decide as a group which method you prefer. Write your solution on the poster. Before you move on to the next problem, make sure every person in your group understands and can explain the group’s method.”
- The teacher walks the room and uses “Suggested Prompts for Common Issues During Group Discussion” to support student problem solving. (You can cut out the table shown on the following page to use for reference as you walk the room.) Ask questions that help students clarify their thinking. If the whole class is struggling on the same issue, write relevant questions on the board and hold an interim discussion. Note different student approaches to the task so you can use this information to focus a whole class discussion towards the end of the lesson. Teacher might also note the group dynamics such as the flow of conversation between members.

Whole Class Discussion: (approximately 10 minutes)

- Select students with unique, correct, or incorrect solutions to present their work to the class. Ask students to compare the different solution methods. Say, *“Which approach did you like best? Why?”* As necessary, teacher gives further explanations on how students can use precise language/vocabulary to explain their mathematical reasoning.

Collaborative Analysis of Student Responses (approximately 40 minutes, Day 2)

- See the attached document for discussion question samples.

Closure: (approximately 10 minutes, Day 2)

- Ask students to read through their original responses to the task and then fill out the “Math Performance Task Reflection”. Teacher and/or student(s) models an advanced proficient Task Reflection.

Name _____

Date _____

Colin's Numbers

Colin pulled four number cards.

2

1

6

8

Part A

What is the largest three-digit number Colin can make with his cards?

--	--	--

What is the smallest three-digit number Colin can make with his cards?

--	--	--

Part B

Create a number sentence using Colin's greatest number. Make another three-digit number that fits in your number sentence below and use the greater than or less than symbol.

			○			
--	--	--	---	--	--	--

Explain why you chose that number and symbol using words and numbers.

Solutions

<p>Performance Task: Students will be able to create and compare three-digit numbers.</p>
<p>Make the largest and smallest three-digit numbers and then compare numbers using the greater than and less than symbol.</p>
<p>Part A What is the largest three-digit number Colin can make with his cards? What is the smallest three-digit number Colin can make with his cards?</p>
<p>Possible correct answers;</p> <p>Largest number: 862 Smallest number: 126</p>
<p>Part B Use the greatest number, make another three-digit number that fits in the number sentence and use the greater than or less than symbol.</p>
<p>Possible correct answers; Multiple possible answers</p>

Common Issues:	Suggested Questions and Prompts
<p>Students has difficulty getting started</p>	<ul style="list-style-type: none"> <input type="checkbox"/> <i>What do you know?</i> <input type="checkbox"/> <i>What do you need to find out?</i> <input type="checkbox"/> <i>Reread the problem and underline key information.</i>
<p>Student makes an incorrect interpretation of the constraints</p>	<ul style="list-style-type: none"> <input type="checkbox"/> <i>What can you vary?</i> <input type="checkbox"/> <i>What directions do you have to follow?</i>
<p>Student presents work poorly</p>	<ul style="list-style-type: none"> <input type="checkbox"/> <i>Would someone unfamiliar with your type of solution easily understand your work?</i> <input type="checkbox"/> <i>Have you explained how you arrived at your answer?</i>
<p>Student produces a correct solution. (Student needs an extension task.)</p>	<ul style="list-style-type: none"> <input type="checkbox"/> <i>Can you now use a different method? Is this method better than your original one? Why?</i>



Rules for Math Talk

- Every student must listen respectfully to what others say.
- Every student must speak so that others can hear what is said.
- Every student will participate by speaking out at some point.

Looking at Sample Student Responses

Purpose: The purpose of this activity is to give students additional opportunities to explain mathematical reasoning with oral and written language and to evaluate a variety of possible approaches to the problems.

Standard for Mathematical Practice:

Construct viable arguments and critique the reasoning of others

Materials Required:

- See the following three pages of sample responses.
- Copy the “Possible Discussion Questions” found below onto chart paper or on to the class whiteboard to be displayed and used when discussing student work samples

Input: Say, “Today we are going to look at some different student responses to the problems.” The teacher will “think out loud” as she/he critiques the sample student response. For example, the teacher might say, “_____ organized his/her work by drawing a picture and writing an equation. I’m not sure what the student meant when....I think the work might be better if....”

Structured Guided Practice:

The teacher leads students through a discussion of a different page of sample student responses using active participation strategies such as “tell your neighbor what you like about the student response.”

Small Group Discussion:

Students discuss or write a written response to one of the sample student responses that has not been previously discussed.

Possible Discussion Questions

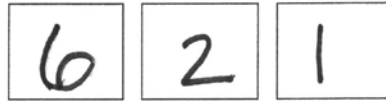
- What approach was used?
- How has the student organized the work?
- What mistakes have been made?
- What isn’t clear?
- What questions do you want to ask this student?
- In what ways might the work be improved?

Sample Response to Discuss: Kristy (Teacher Model)

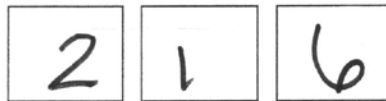


Part A

What is the largest three-digit number Colin can make with his cards?



What is the smallest three-digit number Colin can make with his cards?



Part B

Create a number sentence using Colin's greatest number. Make another three-digit number that fits in your number sentence below and use the greater than or less than symbol.



Explain why you chose that number and symbol using words and numbers.

I compared the numbers in the hundreds first. Two hundred is > greater than 1 hundred.

Suggested Discussion Questions

- What mistakes have been made?
- What isn't clear?

Sample Response to Discuss: Jeff (Structured Guided Practice)

2
1
6
8

Part A
What is the largest three-digit number Colin can make with his cards?

8
2
6

What is the smallest three-digit number Colin can make with his cards?

1
2
6

Part B
Create a number sentence using Colin's greatest number. Make another three-digit number that fits in your number sentence below and use the greater than or less than symbol.

6
7
2
⋖
8
1
2

Explain why you chose that number and symbol using words and numbers.

First I looked at the ones.
 The ones has the same 2.
 Then the tens had different 7 and 1.
 The hundreds had 6 and 8. So I
 knew $672 < 812$. L G

Suggested Discussion Questions

- What questions do you want to ask this student?
- What mistakes have been made?

Group Name _____

Date _____

Sample Response - Lauren:

<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">2</div>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">1</div>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">6</div>	<div style="border: 1px solid black; width: 40px; height: 40px; margin: 0 auto; display: flex; align-items: center; justify-content: center;">8</div>
<p>Part A What is the largest three-digit number Colin can make with his cards?</p>			
<div style="display: flex; justify-content: space-around; align-items: center;"><div style="border: 1px solid black; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 5px;">8</div><div style="border: 1px solid black; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 5px;">6</div><div style="border: 1px solid black; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 5px;">2</div></div>			
<p>What is the smallest three-digit number Colin can make with his cards?</p>			
<div style="display: flex; justify-content: space-around; align-items: center;"><div style="border: 1px solid black; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 5px;">1</div><div style="border: 1px solid black; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 5px;">2</div><div style="border: 1px solid black; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 5px;">6</div></div>			
<p>Part B Create a number sentence using Colin's greatest number. Make another three-digit number that fits in your number sentence below and use the greater than or less than symbol.</p>			
<div style="display: flex; align-items: center; justify-content: center; gap: 20px;"><div style="display: flex; justify-content: space-around; align-items: center;"><div style="border: 1px solid black; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 5px;">8</div><div style="border: 1px solid black; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 5px;">6</div><div style="border: 1px solid black; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 5px;">2</div></div><div style="font-size: 2em;"><</div><div style="display: flex; justify-content: space-around; align-items: center;"><div style="border: 1px solid black; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 5px;">2</div><div style="border: 1px solid black; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 5px;">1</div><div style="border: 1px solid black; width: 40px; height: 40px; display: flex; align-items: center; justify-content: center; margin: 0 5px;">6</div></div></div>			
<p>Explain why you chose that number and symbol using words and numbers.</p>			
<div style="border-top: 1px solid black; border-bottom: 1px solid black; padding: 5px 0;"><p style="font-size: 1.2em; margin: 0;">Eight hundreds is greater than 2 hundreds.</p></div>			

Discussion

Questions

- What mistakes have been made?

- What isn't clear?

- What questions do you want to ask this student?

Sample Comments that might be made about student work for teacher reference:

What is the largest three-digit number Colin can make with his cards? What is the smallest number?		
<p><u>Kristy</u></p> <p>Kristy does not make the greatest number or the smallest number using the four number cards. The largest three-digit number is 862 and the smallest three-digit number is 126.</p>	<p><u>Jeff</u></p> <p>Jeff correctly makes the greatest number 826 and the smallest number 126.</p>	<p><u>Lauren</u></p> <p>Lauren makes the greatest number and the smallest number using Colin's four cards. The greatest number is 862 and the smallest number is 126.</p>
Create a number sentence using the greatest number. Make another three digit number and use the correct symbol to make the sentence true. Explain your work.		
<p>Kristy correctly compares her numbers showing 216 is greater than 128. Comparing the numbers starting in the greatest place is a good strategy.</p>	<p>Jeff is correct showing that 672 is less than 812. However, the problem said to use Colin's greatest number and then make a number of your own. Jeff made two new numbers. Also, his strategy will not always work. The smallest place value should be the last to compare. It is the greatest place(s) that will determine the greater value.</p>	<p>Lauren's number sentence is incorrect. She uses the less than symbol instead of the greater than symbol. Her explanation show that she understands that eight hundred is greater than two hundred, but she is unclear of which symbol makes the number sentence true.</p>

Math Performance Task Reflection

Mathematician's Name _____

Title of Activity _____

Look at your original solution. Make improvements to your work.

Explain what you changed in the work.

Why did you make the change?

Bonus: If you have time, show a different way to solve this problem on the back of the page.