Lesson Planning Tool (Bart 2: Planning the Activity)

Name: Evan Williams	**Date:** February 9, 2010	**Grade:** 3rd	**Subject:** Math	**Topic:** Division	**Literature Connection:** *The Doorbell Rang* by Pat Hutchins

The Lesson Topic

What topic am I teaching?	- Division (as repeated subtraction)

What I Want Students to Learn Now

What are the learning goals for this lesson?	**1.** After completing the cookie task, students will be able to demonstrate the concept of division as repeated subtraction and sharing. The will also understand that division is the inverse of multiplication. **2.** Students will also be able to use concrete objects (cookies) to represent the numbers in the problem and find different solutions. They will be able to use trial and error of the manipulative to understand how to equally divide the cookies. **3.** Students will be able to select an appropriate method (division/grouping/repeated subtraction) to solve a problem presentment to them in the book and then an additional task presented to them afterwards. They will be able to develop a plan, follow through with the plan, and check their answers. ***** After the cookie activity, students should understand how real world problems can be solved using mathematics. After the cookie activity, students should be more comfortable with the concept of sharing equally, or division. They will know that numbers in a division equation represent concrete ideas (24 cookies / 2 kids= 12 cookies each). Students should develop an understanding of the different strategies that can used to solve a problem presented to them. They should recognize that there are various ways to evenly divide 24 and that there are different strategies to reach these solutions. They should understand the relationship between division, grouping, and repeated subtraction and should be able to use all three to solve the task presented to them. Additionally, students should see the value of using concrete objects to help them solve problems.
What State Standard(s) am I addressing that align with the learning goals?	**Standard - 2.1.3.B:** Represent equivalent forms of the same number through the use of concrete objects, drawings, word names, and symbols. **Assessment Anchor** - M3.A.1: Demonstrate an understanding of numbers, ways of representing numbers, relationships among numbers and number systems. **Anchor Descriptor** - M3.A.1.1: Apply place-value concepts and numeration to counting, ordering, grouping and equivalency. **M3.A.1.1.5:** Match a symbolic representation of numbers to appropriate whole numbers **Standard - 2.1.4.F:** Understand the concepts of addition and subtraction and their inverse relationships; understand the concepts of multiplication and division; use the four basic operations to solve problems, including word problems and equations. **Assessment Anchor** - M4.A.2: Understand the meanings of operations, use operations and understand how they relate to each other. **Anchor Descriptor** - M4.A.2.1: Use operations to solve problems (may include word problems). **M4.A.2.1.1:** Solve problems involving all operations with whole numbers, and/or explain the solution (limit to two-step problems; e.g., multiply then add – single digit multipliers and divisors). **Standard - 2.5.3.A:** Develop a plan to analyze a problem, identify the information needed to solve the problem, carry out the plan, check whether an answer makes sense, and explain how the problem was solved in grade appropriate contexts. **Assessment Anchor -** M3.A.2: Understand the meanings of operations, use operations and understand how they relate to each other. **Anchor Descriptor** - M3.A.2.1: Understand various meanings of operations and the relationship between them. **M3.A.2.1.3:** Identify the correct operation(s) to solve a word problem (no more than 2 operations using +, - and/or X). **Standard - 2.8.3.B:** Use concrete objects and trial and error to solve number sentences (equations and inequalities). **Assessment Anchor** - M3.D.2: Represent and/or analyze mathematical situations using numbers, symbols, words, tables and/or graphs. **Anchor Descriptor** - M3.D.2.1: Create/model expressions, equations and inequalities to match a problem situation. **M3.D.2.1.1:** Create or match a story to a given combination of symbols (+, –, x, <, >, =) and numbers. **M3.D.2.1.2:** Choose the number sentence that matches a given story (one operation, + or – only).

*What NCTM **content standard**(s) am I addressing that align with the learning goals?*	**Numbers and Operations:** • Understand meanings of operation and how they relate to one another - understanding various meanings of multiplication and division; -understanding the effects of multiplying and dividing whole numbers; - identify and use relationships between operations, such as division as the inverse of multiplication, to solve problems *****Students will begin to understand the relationship of multiplication and division and how they are the inverse of each other. The students will also understand what each number in the division expression represents (For example 24 Cookies divided by 12 People equals 2 Cookies each). I will use modeling throughout the book to show them how to approach division problems. We will also use concrete materials ("cookies") to helps the students learn what the numbers represent. Students should consider and discuss differ types of problems that can be solved using mathematics, in this case, how can you evenly divide 24 cookies **(NCTM, 2010)**.
*What NCTM **process standard**(s) am I addressing that align with the learning goals?*	**Problem Solving:** • Build new mathematical knowledge through problem solving; • Solve problems that arise in mathematics and in other contexts; • Apply and adapt a variety of appropriate strategies to solve problems • Monitor and reflect on the process and mathematical problem solving. *****Students should be able to develop and carry out a plan to solve a mathematical problem. When students are given the cookie task, they will see that the problem can be solved in a variety of ways using different techniques and strategies (grouping the concrete objects ("cookies), repeated subtraction). The cookie task will emphasize the need to understand and use various strategies, and relationships. The activity should force students to generate and organize the information presented to them in the problem. This lesson will challenge students to develop and apply strategies, introduce them to the concept of division, and provide context for using division (How to evenly divide cookies). Afterwards, as a group discussion students will be able to reflect on the different ways about representing a problem solution. They will see several possibilities and understand how they are alike and different. The students will be able to present their solution the problem and show the class why and how it worked. This task should also increase students' confidence and self assurance with mathematics as they discover they are very capable of doing mathematics and finding different solutions to the task presented **(NCTM, 2010)**. **Reasoning & Proof:** • Recognize reasoning and proof as fundamental aspects of mathematics; • Make and investigate mathematical conjectures; • Develop and evaluate mathematical arguments and proof; • Select and use various types of reasoning and methods of proof. * Students should begin to think of mathematical objects in classes and develop descriptions and statements and understand the relationship between them. Students should move toward reasoning that depends on relationships and properties. During this task, students should understand *why* 24 divides evenly by some numbers and not by other numbers. I will be challenging the students by asking "what if we had 2 dozen cookies. Could we figure out the solution the same way we did for the dozen cookies?" The students will be making various conjunctures and investigate them. Sometimes they will work out, and divide evenly, other times they will see they do not work out, or do not divide evenly. As the lesson goes on we will use a shared classroom experience to look at each other's conjunctures, explain them and revise, expand and update the generalizations to reach to correct solutions **(NCTM, 2010)**. **Representation:** • Create and use representations to organize, record, and communicate mathematical ideas; • Select, apply and translate among mathematical representations to solve problems; • Use representations to model and interpret physical, social and mathematical phenomena. *****Students should use physical models as well as equations to represent and understand ideas such as division. For this task, students will be using "cookies" as a manipulative to discover different ways to evenly group 24 cookies. This will be tools for thinking and solving the problem and help students see important relationships while they are completing the activity. Using the

*NCTM **process standard**(s) cont.*	representation will help students see the different ways of thinking about the problem. They will have a concrete object to connect to the numbers presented in the problem and be able to use the objects and arrange it in different groups to see the different solutions to the problem **(NCTM, 2010)**. **Communication:** • Organize and consolidate their mathematical thinking through communication; • Communicate their mathematical thinking coherently and clearly to peers, teachers, and others; • Analyze and evaluate the mathematical thinking and strategies of others. *Students should be able to learn and work with their peers and teachers and this lesson will encourage them to do so. The task will require the students to communicate their ideas and discuss the ideas of solving the problem; this will help them make sense of mathematics. First in small groups, then as a class discussion, we will discuss the different solutions to the problem. The students will learn to be comfortable explaining their thinking and ideas. Students can also learn from each other as they present their ideas and explanations for solving the cookie task **(NCTM, 2010)**. **Connections:** • Recognize and use connections among mathematical ideas; • Understand how mathematical ideas interconnect and build on one another to produce a coherent whole; • Recognize and apply mathematics in contexts outside of mathematics. *Students will see the connection between multiplication and division. We will discuss the ideas of division based on what they already know about multiplication. We will also discuss the ideas of division based on what they know about subtraction. Students will be given a real-world context (evenly dividing cookies) to provide opportunities for them to connect what they are learning to their own environment. This will help them to see the value of mathematics to their everyday life **(NCTM, 2010)**.
What I Want Students to Learn	
*What **big idea** (large, important understanding) does this lesson/set of lessons help to develop?*	**Big Idea #2:** The Base Ten Numeration System: The best ten numeration system is a scheme for recording numbers using digits 0-9, groups of ten, and place value. • Numbers can be represented using objects, words and symbols. **Big Idea #3:** Any number, measure numerical expression, algebraic expression, or equation can be represent in an infinite number of ways that have the same value. • Numbers can be decomposed into parts in an infinite number of ways. **Big Idea #5:** Operation Meanings & Relationships: The same number sentence can be associated with different concrete or real-world situations, and different number sentences can be associated with the same concrete or real-world situation. • Some real-world problems involving joining equal groups, separating equal groups, comparison, or combinations can be solved using multiplication; others can be solved using division. • Andy division calculation can be solved using multiplication **Big Idea #7:** Basic Facts & Algorithms: Basic facts and algorithms for operations with rational numbers use notions of equivalence to transform calculations into simpler ones. • Division facts can be found by thinking about the related multiplication fact • Multiplication can be used to check division • When you divide whole numbers sometimes there is a remainder; the remainder must be less than the divisor • The real-world situation determines how remainder needs to be interpreted when solving a problem **(Charles, 2005)** * Students should understand how real world problems can be solved using mathematics. After the cookie activity, students should be more comfortable with the concept of sharing equally, or division. They will know that numbers in a division equation represent concrete ideas (24 cookies / 2 kids= 12 cookies each). Students should develop an understanding of the different strategies that can used to solve a problem presented to them. They should recognize that there are various ways to evenly divide 24 and that there are different strategies to reach these solutions. They should understand the relationship between division, grouping, and repeated subtraction and should be able to use all three to solve the task presented to them. Additionally, students should see the value of using concrete objects to help them solve problems.

Knowing Your Students	
What knowledge do the students already have about the topic and the big idea?	- This is the student's first official introduction to division. Some students will know about the basic idea of division through their own curiosity. Other students have no knowledge of division what so ever. - The students are familiar with the connection between multiplication and addition. Some students also know that division is the inverse of multiplication, but not all. - Students are familiar with the practice of solving a problem with mathematics. They have "problem solving" every Friday with the Special Education Instructor and should know that math can be used to solve problems they could really encounter in life.
What confusions, misconception, and/or gaps in knowledge might they have?	- Because this is the student's first lesson in division, there may be some confusion what division means and how to solve problems using it - Students may not know that there can be many solutions, strategies and answers in mathematics - Students may need to be shown how to use the manipulative to group and discover answers - Students will need to learn how to write a division equation and should be familiar with how it is written in long division as well - Students will need to learn what the numbers in a division equation represent and how to state the answer to the problem
Supporting Student Learning	
Selecting the Tasks/Activities • *Describe the tasks/activities you will use to achieve the learning goal(s).* • *What do you hope to see/hear as students work on tasks? How will you know students are working towards achieving learning gals?*	**1.** I will engage the students by sharing the lesson plan and objectives: "Today we are going to do something different with mathematics. We're going to see how we can use mathematics to solve situations that could happen in your real life, kind of like what you do with Ms. Sudar in problem solving (hook). But we are going to read a book and solve a problem in the book using mathematics. Then after we solve the problem in the book, I have a different task for you to complete in your groups." **2.** I will then introduce the book, "The Doorbell Rang" by Pat Hutchins. **3.** I will ask if anyone has read the book. **4.** I will explain it is a book about sharing a dozen of cookies. **5.** I will ask the students, "how many cookies are in a dozen?" **6.** I will ask the students, "if the book is about sharing cookies, what kind of computation do you think we will be using?" ➢ ***Some students should know and raise their hand to respond we will be using division.*** **7.** Next, I will activate students' prior knowledge by asking them what multiplication is. ➢ ***The students should know and respond that multiplication is repeated addition.*** **8.** I will then ask the students if they know what division is? ➢ ***Some students will be able to answer that division is repeated subtraction, however, others will be unfamiliar with the concept.*** **9.** I may have to explain to the students that division is repeated subtraction and that division is the inverse of multiplication. I will show an example on the board to show why this is true. **10.** I will then explain that "as we read the book, we will be using division, or repeated subtraction, to figure out how many cookies each child will get." **11.** I will remind students to be at a level 0 while she is reading and to raise their hand when responding to the questions. **12.** I will read the first page then stop to figure out how many cookies Victoria and Sam will get if they share them. **13.** I will use a chart on the SMART board to record the steps of solving the problem. **14.** I will model the first problem of dividing the cookies between two children. **15.** I will show how first you group the cookies into 2 groups and then count how many cookies are in each of those two groups. **16.** Next, I will show the students how this same answer can be reached by using repeated subtraction. I will write, "12-2=10-2=8-2=6-2=4-2=2-2=0" and point out that you had to subtract 2 from 12, 6 times in order to reach 0. **17.** Next, I will write the division equation and long division on the board so students will become familiar with it. **18.** I will ask the students what each number in the equation represents in the problem they are solving. ➢ ***Students should now begin to understand division and should volunteer answers such as: 24 represents how mnay cookies you are starting with or want to equally share; the 2 represents how many kids you are dividing the cookies between; and the 6 represents how many cookies each child will get.***

Task/Activity & Students Response *cont.*	**19.** Finally, I will ask the students, "so how many cookies will Victoria and Sam each get?" (6). ➢ ***Students should respond that Victoria and Same will each get six cookies.*** **20.** For the rest of the book, we will follow these same steps except the students will complete the tasks on the board. **21.** I will be sure to guide the students through each step by using scaffolding if the students are struggling. ➢ ***Students should be (1) grouping the cookies appropriately (2) using and showing repeated subtraction to reach the solution and (3) know how to write the equation which correctly corresponds to the "real-world" problem we are trying to solve.*** **22.** I will ask the students ***why*** they are doing what they are doing to be sure they are grasping the concept of the lesson. If students lacking understanding of the lesson, I will review with the students what to do and why. **23.** As students are completing the task, I will be sure to ask students to ***explain*** to their peers what they are doing. **24.** As more children come into the book, we will stop to solve each problem of how many cookies the children will now get. ➢ ***All students should be volunteering to solve the problem and should now be able to use grouping and repeated subtraction to discover the answer.*** **25.** After the book is read, and all division problems have been solved, I will present students with a new problem: "Now I have a challenge for you. If I made 2 dozen cookies, how many different ways can I <u>evenly</u> divide them among children?" **26.** Meanwhile, I will be passing out the handout to the children. **27.** I will ask "what does it mean if I want to evenly divide the cookies?" and "How many cookies are in 2 dozen?" **28.** Meanwhile I will pass out 24 "cookies" to each group. **29.** I will explain: "You will be working in groups and should use the "cookies" as a manipulative to figure out the different ways to evenly divide them. Use trial and error to test your ideas and answers to the solution." **30.** I will continue to thoroughly explain the task: "I want you to show how you used grouping, repeated subtraction and then write the equation on the handout just as we did on the SMART Board while we were reading the book. Also, make sure you write the final answer at the bottom. Remember, we are trying to find out how many different ways we can evenly divide 24, so keep going after you find one solution. I will be around to help you." **31.** I will walk around and work with each group. **32.** I will make sure they are meeting the learning goals by observing their procedures to solve the problem. ➢ ***Students should be using the manipulative to group the cookies and show how they are going to share the cookies.*** ➢ ***After they use the manipulative students should show the grouping on the worksheet.*** ➢ ***Students should be writing the repeated subtraction procedure on the worksheet and showing all work.*** ➢ ***Students will be writing an equation to represent the "real-world" problem.*** ➢ ***Students will write the final answer and show they now what each part of the equation represents by filling out how many kids get how many cookies.*** ➢ ***Students should not stop at the first solution, they should continue to find different ways to share the cookies.*** **33.** I will guide the students who are struggling and ask challenging questions of each group, such as, "could I give five cookies to each of the children?" ➢ ***After using the manipulative, students should see that you cannot share five cookies to children because you would either have not enough for each or would have some left over.*** **34.** I will make sure the groups are using all steps of the problem: repeated subtraction, grouping and then writing the final answer. **35.** When I see students are grasping the concept and finding most if not all of the 6 different ways to evenly divide 24, I will call the students' attention by telling them to "SLANT." **36.** After students are brought to attention, I will bring up the same worksheet on the SMART Board and go over each of the 6 different ways as a class discussion. **37.** I will facilitate the discussion by calling on the students. ➢ ***Ideally, students will be leading the discussion by explaining and showing all steps to solving the problem.*** **38.** I will be sure the students are <u>*explaining*</u> their solutions and answers to their peers and will be sure to <u>not</u> provide too much guiding.

Task/Activity & Students response *cont.*	**39.** Meanwhile, students will be showing their steps and solutions on the SMART board. ➢ ***Ideally at this point, all students will be volunteering to share their solutions, ideas and answers.*** **40.** After all the solutions are on the board, I will ask the students what patterns, connections and similarities they see in the different solutions, steps and answers. ➢ ***Students should see a connection between division and multiplication. If not, I will explain and show how division is the inverse of multiplication. (Example: 24/2=12 and 12X2=24)*** ➢ ***Students should also see a connection within the division problems. I will elaborate on this idea. (Example: 24/2=12 and 12/12=2)*** **41.** I will ask the students for any last questions or comments regarding the task they completed. **42.** I will ask the students what they learned today. ➢ ***Students should make comments such as:*** ***Division is repeated subtraction;*** ***How they can evenly group items;*** ***How they can use math to solve real world problems;*** ***How sometimes you cannot evenly divide a number and there will be a remainder;*** ***Using objects can help them solve problems;*** ***Math can be done in a variety of ways and there can be many solutions and answers to problems.*** 44. I will collect the worksheets and handout cookies to the students if they behaved well and participated in the activity appropriately and successfully.
Questioning Students • *While students engage in the tasks, what questions will you ask to support their learning?* • *What responses to these questions might you anticipate from students?*	○ Has anyone read this book before? - ***Some students will say Yes and others No*** ○ How many cookies are in a dozen? - ***Students should respond with 12*** ○ What is multiplication? - ***Student should respond with repeated addition*** ○ If the book is about sharing cookies, what computation do you think we will use to solve the problem? - ***Some students will respond with division or subtraction*** ○ Since multiplication is repeated addition, does anyone know what division may be then? - ***Some students will know it is repeated subtraction*** ○ How are we going to figure out how many cookies each of the kids are going to get? - ***Ideal students will respond with: Pass them out evenly, divide, group them*** ○ "Now I have a challenge for you. If I made 2 dozen cookies, how many different ways can I evenly divide them among children?" - ***24÷24=1; 24÷2=12; 24÷2=8; 24÷4=6; 24÷8=3; 24÷6=4; 24÷2=12*** ○ How many cookies would be in 2 dozen? - ***Hopefully students will respond with 24, some students may need this explained however*** ○ How can we use these "cookies" to help us find the answers? - ***Ideal Response: We can pass them out*** - ***Ideal Response: We can put them into groups*** ○ What are the different ways to group the 2 dozen cookies? - ***Ideal Response: 2, 3,4,6,8,12*** ○ Who would like to share their solution/answer? ○ **Why** are you doing that? ○ Can you explain **how** you figured that out?

Questioning cont.	○ Does anyone have a different answer or a different way to solve the problem? ○ Does anyone see any connections between our solutions, strategies or answers? ○ What does each of the number in the equation represent? - ***Ideal Response: 24 cookies divided by 2 kids = 2 cookies each, etc.*** ○ Can I give five cookies to each of the kids? - ***Ideal Response: No because five will not divide evenly into 24*** ○ Does anyone have any other comments about the activity or task? ○ What did you learn from this lesson? ***Ideal Responses:*** - ***Division is repeated subtraction;*** - ***How they can evenly group items;*** - ***How they can use math to solve real world problems;*** - ***How sometimes you cannot evenly divide a number and there will be a remainder;*** - ***Using objects can help them solve problems;*** - ***Math can be done in a variety of ways and there can be many solutions and answers to problems.***
Providing Tools • *What scaffolding/support will you provide so students can achieve the learning goal(s)?* • *Will some students require special tools or more support than others? If so, how will you accommodate them?*	- I will use modeling while reading the book to show the students how to figure out how to solve the problem of how many cookies each kid will get. I will model how to groups the manipulative, do repeated subtraction, and write an equation. - I will guide them through various activities as we read the book but will make sure they are discovering their own answers. - I will scaffold the students by asking engaging questions which they should be able to answer but are still challenging (see questions above) - I will use verbal prompts to guide their thinking and answers when necessary. - I will then ask them to elaborate on short answers to ensure they have a deep understanding and will require them to explain their reasoning and method of finding the solution. - When students are working in groups, I will notify them when they are on the right track and encourage them to keep searching for the answer - I will command them when they have found one solution but ask them to find other solutions as well by asking guiding questions. - Some students may need more support grasping the task. I will be sure to work closely with these students and make sure their group members are helping them. I will encourage students who understand the task to explain their ideas to group members who are having trouble with the task.
Grouping • *What grouping patterns will best support learning given the tasks/activities you have chosen and the learning tools students will be using?* • *Will grouping remain the same throughout the lesson or change at certain points?* •	- Whole group instruction will be used to read the book and solve how many cookies the children will get on the next page. This will allow me to model the task to the entire class. - Students will work in four groups of five to complete the cookie task after reading the book. This will allow students to work together, feed off of each other, and explain and share their ideas. - Whole group discussion will be used to go over the different ways to evenly divide 24 cookies. This will allow us to come together and share what we discovered. Students will be able to see and hear how others solved the problem. The whole group discussion will allow me to ensure all students are meeting the learning goals and see all the possible solutions, strategies, and answers.

Monitoring Learning Progress During the Lesson	
What do you expect to see and hear to provide evidence that students are meeting the learning goals?	- I expect students to be actively responding to my questions throughout the lesson - I expect to see students interacting with the lesson by correctly completing the activities on the SMART board - While the students are working in groups, I expect to see them using the manipulative to figure out grouping and to solve the problem - Students should be explaining their answers and procedures to each other in their groups as well as to me - Students should be showing their work on their worksheet including grouping, repeated subtraction, a division equation and the final answer - Students should be discovering different solutions to the problem - During the whole group discussion I expect to see students raising their hand and volunteering to share their answers and solutions. - I expect students to be behaving appropriately and being respectful to myself and others during the entire lesson
What will you do to support students who are not making progress?	- I will work one-on-one with students who are having trouble with the lesson - I will use modeling to show the students how to use the manipulative and how to use repeated subtraction - I will guide ideas and the processes for students of grouping and repeated subtraction - I will probe them with questions that hint towards answers but still require them to generate their own ideas - I will encourage students who are meeting learning goals to explain and help members of their groups who are struggling
What feedback will you provide students and in what form?	- I will provide verbal feedback to the students during the lesson as we work together to figure out how many cookies the children are going to get. - It will be positive and focus on their correct responses - Feedback will be constructive and tell students where and how they need to adjust their thinking or process to reach a correct response - During group work, I will serve as a "consultant" to students and provide feedback that will guide their thinking, not direct it. - I will point out things they are doing correctly such as: "I like the way _____ is passing out the cookies to figure out how they can share the cookies"; "I like the way _____ is showing all their work"; "I like the way _____is continuing to find different solutions to the task" - After the lesson, I will check the worksheets and give each student written feedback on their work and success in completing the task
Evaluating Student Learning at the End of the Lesson	
What kind(s) of evidence will you use to indicate how well the learning goals have been met?	**1.** I will use the students' participation during the whole-class activity while reading as evidence that they are grasping the learning goals. Students should be answering the questions, and should be able to go to the white board and show grouping, repeated subtraction, and ultimately find a solution to the problem: how many cookies will each child get. **2.** During the group task, I will use the students' interaction, discussion and participation as evidence that they are meeting the learning goals. Students should be equally participating and engaging in the task. They should be using the manipulative to help them solve the problem. **3.** After the lesson and task, I will assess whether learning goals were met by reviewing each groups completed worksheet. Students should have found many different ways to divide 24 evenly (ideally 6). Their worksheets should show that they used grouping, repeated subtraction, and a division equation to find the answer. The final part of their solution should show they understand what each part of the division equation represents. (Example: 24 cookies ÷ 12 kids = 2 cookies each)