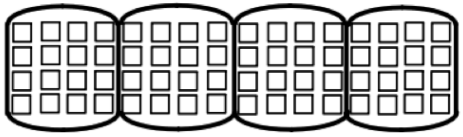
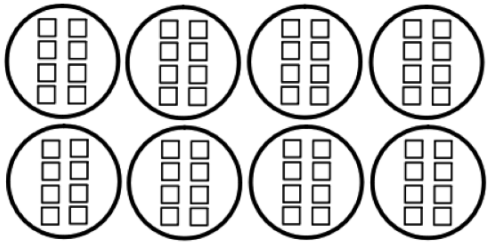
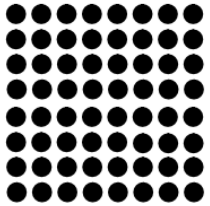
Task: Birthday Party Task	**3rd Grade**
Ella's mother is baking 4 pans of brownies for a birthday party. Each pan can be divided into 16 squares of brownies. Ella wants to share them equally with her friends at the party. There are 8 children altogether. How many squares of brownies will each child get? Draw a picture and write an equation that shows how you solved the problem.	
Teacher Notes:	
Models used in solution paths show different interpretations of multiplication and division. It is possible for a student to use any combination of models shown below.	
Common Core State Standards for Mathematical Content	**Common Core State Standards for Mathematical Practice**
Represent and solve problems involving multiplication and division. 3.OA.A.1 Interpret products of whole numbers, e.g., interpret *5 × 7* as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5 × 7.* 3.OA.A.2 Interpret whole-number quotients of whole numbers, e.g., interpret 56 ÷ 8 as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as 56 ÷ 8.* 3.OA.A.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. 3.OA.B.5. Apply properties of operations as strategies to multiply and divide.2 *Examples: If 6 × 4 = 24 is known, then 4 × 6 = 24 is also known. (Commutative property of multiplication.) Knowing that 8 × 5 = 40 and 8 × 2 = 16, one can find 8 × 7 as 8 × (5 + 2) = (8 × 5) + (8 × 2) = 40 + 16 = 56. (Distributive property.)*	1. Make sense of problems and persevere in solving them 2. Reason abstractly and quantitatively 3. Construct viable arguments and critique the reasoning of others 4. Model with mathematics. 5. Use appropriate tools strategically 6. Attend to precision 7. Look for and make use of structure 8. Look for and express regularity in repeated reasoning
Essential Understandings	
• Multiplication can be used to find the total number of objects when there are a specific number of groups with the same number of objects. • When multiplying two factors, either factor can be partitioned or both. Example: 4 x 16 = 4 x (10 + 6) or (2 + 2) x 16 • Division can be used to find how many equal groups (measurement - repeated subtraction) or how many are in each group (partitive - sharing) • Multiplication and division have an inverse relationship and can be used to find division or multiplication facts	

Explore Phase	
Possible Solution Paths	**Assessing and Advancing Questions**
<u>Equal Groups or Arrays:</u> Students may find the total number of brownies by thinking about **4 groups of 16 brownies** and using the equation, 4 x 16 = 64 and then find the number of brownies each child will get by thinking about **64 brownies divided into groups of 8**, 64 ÷ 8 = 8. Each child will get 8 brownies when shared equally.   4 groups of 16 or 4 x 16 = 64   64 is divided into groups of 8 or 64 ÷ 8 = 8	<u>Assessing Questions:</u> - Why did you decide to group the brownies by 16 and 8? - What does each number represent in your equation? (Ask students to relate numbers back to the model.) - How does an array show equal groups? <u>Advancing Questions:</u> - Why did you decide to write these equations? - What is the relationship between multiplication and division? - What do you notice about the product and the dividend? Why are they the same? - What would happen if you turned your array sideways? - How can you make a connection between the two models (equal sized groups and arrays)?

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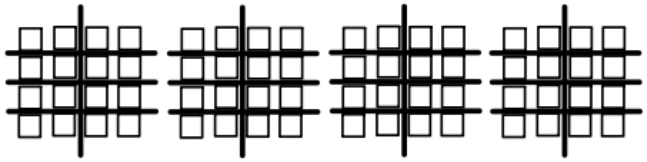
Equal Sharing for Each Pan

Students may think about sharing each pan of brownies with 8 children, 16 ÷ 8 = 2 so each child will receive 2 brownies from one pan. Then the student may realize that there are 4 pans of brownies so the student decides to multiply by 4 pans to find the total number of brownies each child will receive at the party, 2 x 4 = 8.



16 ÷ 8 = 2 16 ÷ 8 = 2 16 ÷ 8 = 2 16 ÷ 8 = 2

2 brownie squares x 4 pans = 8 brownie squares

Each child will receive 8 brownie squares.

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Assessing Questions:
- Why did you decide to group the brownies by 2 for each pan?
- What does each number represent in your equation? (Ask students to relate numbers back to the model.)

Advancing Questions:
- Why did you decide to divide first and then multiply?
- Does this always work on all problems? Explain
- What is the relationship between multiplication and division?
- How is this model different or the same as the previous model?

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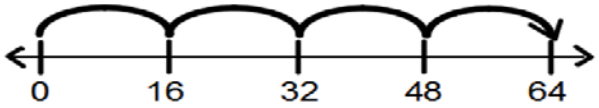
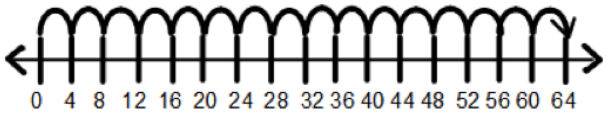
Repeated Addition and Subtraction

Students may use **repeated addition** to find the total number of brownie squares: 16 + 16 + 16 + 16 = 64 or 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 + 4 = 64





Students may use **repeated subtraction** to find the number of brownie squares each child will get when shared equally with 8 children.

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Assessing Questions:
- Why did you choose to add and subtract?
- How many times did you add and subtract? Why?
- Can you explain how addition and subtraction equations relate to the model? Explain

Advancing Questions:
- What is the relationship between addition and multiplication?
- How can you write a multiplication equation for the addition sentence?
- What is the relationship between subtraction and division?
- How can you write a division equation for the subtraction problem?

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64 – 8 = 56

56 – 8 = 48

48 – 8 = 40

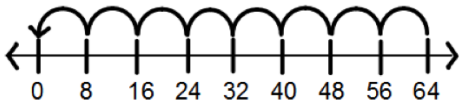
40 – 8 = 32

32 – 8 = 24

24 – 8 = 16

16 – 8 = 8

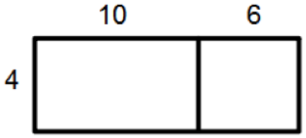
8 – 8 = 0

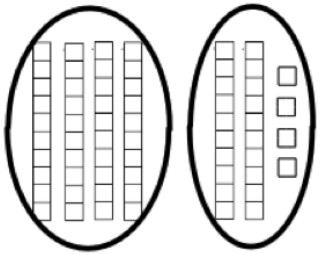


8 brownie squares for each child at the party

<u>Area Model</u>

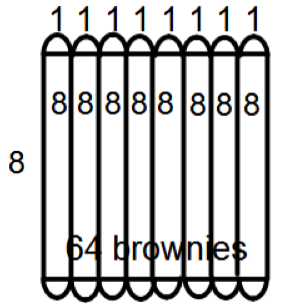
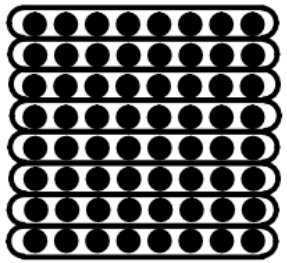
Students may use the distributive property to solve 4 x 16 by thinking about 4 (10 + 6) = 40 + 24 = 64





<u>Assessing Questions:</u>
- How is breaking the rectangle apart helpful in solving the problem?
- Why did you multiply to find the total number of brownie squares?
- How does your equation relate to the model?

<u>Advancing Questions:</u>
- Is it possible to partition (break apart) either factor or both? Explain your thinking.
- How can you make a connection between the two models (area model and base-ten model)?

Then solve 64 ÷ *8 = 8* by using the area model *8 x 8 = 64* or partition 64 base-ten blocks into groups of 8.  	
Students may use multiplication and division equations to solve the problem. 4 x 16 = 64 64 ÷ 8 = 8 Each child will receive 8 brownie squares at the birthday party.	<u>Assessing Questions:</u> - Why did you decide to multiply and then divide? - What does each number represent in your equation? <u>Advancing Questions:</u> - How can you solve the problem another way? - How can you draw a model to match your equations?
Possible Student Misconceptions	
Students may not realize there are 4 pans of brownies and each pan has 16 brownie squares Students may not realize this is a two-step problem and only find the total number of brownie squares	<u>Assessing Questions:</u> - What is the question you are trying to answer? - How can you find out how many brownies are in 4 pans? <u>Advancing Questions:</u> - Does your answer make sense? - What do you need to do after you find the total number of brownie squares?

Entry/Extensions	Assessing and Advancing Questions
If students can't get started….	<u>Assessing Questions:</u> - How can you state the problem in your own words? - What are you trying to find or do? - What information do you need to solve the problem? - What model could you draw to help you solve the problem? <u>Advancing Questions:</u> - How many brownie squares are in 1 pan? 2 pans?
If students finish early….	<u>Assessing Questions:</u> - Does your solution make sense when you look at the original problem? - Is it reasonable? Explain your thinking. <u>Advancing Questions:</u> - Is there another way of finding the solution?

Discuss/Analyze

Whole Group Questions

Select and sequence refers to when a teacher anticipates possible student strategies ahead of time and then selects and determines the order in which the math ideas/strategies that students will share during the whole group discussion. The purpose of this is to determine which ideas will be most likely to leverage and advance student thinking about the core math idea(s) of the lesson.

During a whole group discussion, students are sharing their strategies that have been pre-selected and sequenced by the teacher. Strategies to consider sharing: Equal Groups or Arrays, Repeated Addition & Subtraction, Area Model, Multiplication and Division Equations

-How are these strategies similar and different? (Use Accountable Talk to ask students to compare strategies.)

-One student used the partition model to solve the problem. How is breaking the rectangle apart helpful in solving the problem? Is it possible to partition (break apart) either factor or both? Explain your thinking.

- What does each number represent in your equation? (Relate numbers back to the model.)

- What do you notice about the product and the dividend? Why are they the same in this problem?

- When do you use multiplication to solve a problem? When do you use division to solve a problem?

- What is the relationship between multiplication and division?