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| **NC.4.OA.1** **Donuts & Pastries** |
| **Domain** | Operations and Algebraic Thinking |
| **Cluster** | Use the four operations with whole numbers to solve problems. |
| **Standard(s)** | **NC.4.OA.1** Interpret a multiplication equation as a comparison. Multiply or divide to solve word problems involving multiplicative comparisons using models and equations with a symbol for the unknown number. Distinguish multiplicative comparison from additive comparison.  |
| **Materials** | paper and pencil, chart paper or white board, activity sheet |
| **Task** | Present the following problem to students:**A donut shop makes three times as many donuts as pastries. If the shop makes 186 donuts per day, how many pastries do they make?** **How can we compare the amount of donuts to the amount of pastries using models and equations with a symbol for the unknown?**Allow students time to solve and come up with ways to compare the donuts and pastries as stated above. As students are solving, circulate and select students to share their work and comparisons. See the examples below for various ways students may solve the problem. Try to choose a variety of examples to share with the class. As students briefly share the strategies, record their statements on chart paper or a white board as sentences and/or equations. Examples:There are *three times as many* donuts as pastries. 3 x pastries = donuts 3*p* = *d* 186 = 3 x pastries 186 ÷ 3 = 62  62 x 3 = 186There are *one third as many* pastries as donuts. 1/3 x donuts = pastries 1/3*d* = *p*If a student uses a model, be sure to have that student share. If not, introduce the model as a way of solving the problem. Be sure to explain the thinking behind the model.

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| 186 donuts |
| 1/3 | 1/3 | 1/3 |

**Possible Extensions:**Ask students to consider: How many donuts and pastries are in the donut shop each day? (186 donuts + 62 pastries = 248) How would the equation change? (d + p = total; The equation changes to an addition equation because you are combining the amount of donuts and pastries to find the total amount of bakery items sold each day.)Ask students to generate additional examples of multiplicative comparisons and see if they can state the inverse and/or the equations.*Examples*: I have five times as many toes as feet. I have one fifth as many feet as toes. 5 x feet = toes is the same as 1/5 x toes = feetThere are half as many boys in our class as girls. There are twice as many girls in our class as boys. boys x 2 = girls is the same as ½ x girls = boys **The optional *Donut Shop* activity sheet can be used for additional practice of the multiplicative comparison concept.** **Additional Resource:** <http://www.mathplayground.com/thinkingblocks.html> (multiplication link) |

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| **Rubric** |
| **Level I****Not Yet** | 1. **Level II**
2. **Progressing**
 | **Level III****Meets Expectation** |
| Has difficulty creating and/or solving an equation that represents a multiplicative comparison problem AND has difficulty creating a model that accurately represents the problem. | Uses addition equation to represent multiplicative comparison.  ORUses a correct multiplication or division equation to represent multiplicative comparison, but is unable to correctly solve the equation. ORIs able to generate a correct multiplication or division equation to represent a comparison, but is unable to provide a model that clearly and accurately compares two or more amounts multiplicatively. ORIs able to create a model that clearly and accurately compares two or more amounts multiplicatively, but is unable to generate a correct multiplication or division equation to represent the multiplicative comparison. | Generates a multiplication or division equation to represent multiplicative comparison AND can draw a model that clearly and accurately compares two or more amounts multiplicatively.  |

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| **Standards for Mathematical Practice** |
| **1. Makes sense and perseveres in solving problems.** |
| **2. Reasons abstractly and quantitatively.** |
| 3. Constructs viable arguments and critiques the reasoning of others. |
| **4. Models with mathematics.** |
| 5. Uses appropriate tools strategically. |
| **6. Attends to precision.** |
| 7. Looks for and makes use of structure. |
| 8. Looks for and expresses regularity in repeated reasoning. |

**Donuts & Pastries**

****A donut shop makes three times as many donuts as pastries. If the shop makes 186 donuts per day, how many pastries do they make?

How can we compare the amount of donuts to the amount of pastries using models and equations with a symbol for the unknown?

![Description: C:\Users\scobb\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.IE5\BQP28AB6\MC900198665[1].wmf]()**Donut Shop**

Show your thinking using models, equations, or words.

1. At the party, Emily ate 2 donuts. Lucas ate four times as many donuts as Emily. How many donuts did they eat altogether?
2. Frank ordered 24 cookies from the donut shop. That is three times as many cookies as Jenny ordered and six times as many cookies as Barb ordered.

How many cookies did they order altogether?

How many more cookies did Frank order than Jenny and Barb together?

1. The donut shop made 28 chocolate donuts. That is 7 times as many strawberry donuts as they made. How many more chocolate donuts did the shop make than strawberry donuts?
2. Students in Mr. Juarez’s class predicted the number of donuts they could eat. The chart below shows their predictions.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Rosa | Jeremy | Frank | Jill | Emile | Troy | Sandy | Lucas | Shante | Molly |
| 2 | 18 | 4 | 6 | 3 | 14 | 9 | 12 | 36 | 8 |

Compare these numbers in as many ways as you can.

**Example:**  *Shante said he could eat three times as many donuts as Lucas.*

**ANSWER KEY for Donut Shop**

1. Emily: 2 donuts

Lucas: 8 donuts 4 x 2 = 8

Altogether: 10 donuts 8 + 2 = 10 or (4 x 2) + 2 = 10

1. Frank: 24 cookies

Jenny: 24 ÷ 3 = 8 8 x 3 = 24 1/3 x 24 = 8

Barb: 24 ÷ 6 = 4 6 x 4 = 24 1/6 x 24 = 4

Altogether: 24 + 8 + 4 = 36

Frank ordered 24 cookies and together, Jenny and Barb ordered 12 cookies.

24 - 12 = 12 Frank ordered 12 more cookies than Jenny and Barb together.

1. The shop made 24 more chocolate donuts than strawberry donuts.

28 = 7 x *s* *s* = 4 (strawberry donuts)

28 - 4 = 24

1. Answers will vary but should use multiplicative relationships between the numbers in the chart.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Rosa | Jeremy | Frank | Jill | Emile | Troy | Sandy | Lucas | Shante | Molly |
| 2 | 18 | 4 | 6 | 3 | 14 | 9 | 12 | 36 | 8 |

**Possible answers:**

* Jeremy said he could eat nine times as many donuts as Rosa, and she said she could eat one ninth as much as him.
* Jill said she could eat twice as much as Emily, three times as much as Rosa, half as much as Lucas, one third as much as Jeremy, and one sixth as much as Shante.
* Emily will eat one third as much as Sandy. Sandy will eat three times as much as Emily.
* Frank will eat two thirds as much as Jill.
* Sandy will eat ¾ as much as Lucas.

**Scoring Examples**

**Not Yet:** The student did not create a model or an equation to correctly represent the problem. The student created a model in which the number of pastries was three times more than the number of donuts, instead of the number of donuts being three times more than the number of pastries.

**Progressing:** The student was able to solve the problem correctly using addition, but did not use a multiplicative strategy. In order to progress to the next level, this student would need to represent the multiplicative relationship using models and equations.

**Meets Expectation:** The student was able to correctly solve the problem using a model to compare the two amounts and generate a division equation to represent the multiplicative comparison.

