DRAFT

Unit of Study
Introduction to Fractions

Grade: 3	Topic: Numbers and Operations: Fractions	Length of Unit: 15-20 days

Focus of Learning

Common Core Standards:

Develop understanding of fractions as numbers.

3.NF.1 Understand a fraction 1/*b* as the quantity formed by 1 part when a whole is partitioned into *b* equal parts; understand a fraction *a*/*b* as the quantity formed by *a* parts of size 1/*b*.

3.NF.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram.

a. Represent a fraction 1/*b* on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into *b* equal parts. Recognize that each part has size 1/*b* and that the endpoint of the part based at 0 locates the number 1/*b* on the number line.

b. Represent a fraction *a*/*b* on a number line diagram by marking off *a* lengths 1/*b* from 0. Recognize that the resulting interval has size *a*/*b* and that its endpoint locates the number *a*/*b* on the number line.

3.NF.3 Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.

a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.

b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model.

c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.

d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <,and justify the conclusions, e.g., by using a visual fraction model.

Supporting Standards:

Geometry 3.G - Reason with shapes and their attributes.

3.G.1 Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.

3.G.2 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.*

Standards for Mathematical Practice:

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.

Enduring Understanding(s): *Students will understand that…*

- fractions are numbers that express relationships between the parts and the whole

Guiding Questions: *These questions will guide student inquiry.*

- What is a fraction?
- How are fractions related to whole numbers?
- Why are fractions important?
- How can I use what I know about whole numbers to help me better understand fractions?
- Why does the size or the amount of the whole matter?
- How can I represent fractions of different sizes?
- How do we compare fractions?
- How are fractions used in real life?

Student Performance

Knowledge: *Students will understand/know…*

- Fractions can be represented as parts of a whole, parts of a set, parts of an area, as a measure, and as numbers on the number line.
- The size or the amount of the whole matters when expressing relationships with fractions.
- The more fractional parts used to make a whole, the smaller the parts. *E.g. eighths are smaller than fifths.*
- Partitioning a whole into equal-sized pieces results in unit fractions.
- The meaning of a denominator and a numerator
- With a unit fraction, the greater the denominator the smaller the pieces.
- Equivalent fractions are ways of describing the same amount by using different-sized fractional parts.
- When comparing fractions, the whole must be the same.

Application: *Students will be able to…*

- Build and manipulate fractions
- Read, write, and label fractions
- Identify fractions
- Compare fractions
- Count, add, and subtract fractions
- Represent fractions as parts of a whole, parts of a set, on a number line, as an area…
- Create equivalent fractions by partitioning each equal piece into more equal pieces
- Use equivalent fractions to compare fractions with unlike denominators
- Recognize and identify attributes of quadrilaterals
- Divide shapes into equal parts
- Express the area of equal parts of a shape as a unit fraction

Assessments (Attached)

Pre-Assessment:

- Fractions (Prior Knowledge)

Formative Interim Assessments:

- Mid-Unit Check 1 & Mid Unit Check 2 (To be given after Lesson 6)

Suggested Formative Assessments

- Illustrative Mathematics 3.NF Find 1, (a. use a unit fraction to find 1 on the number line; b. when the numerator is greater)
- Smarter Balanced Sample Item: MAT.03.ER.3.000NF.B.229 (Use between Lesson 2 and Lesson 3)
- Smarter Balanced Sample Item: MAT.03.TE.1.000NF.F.233 (Use between Lesson 4 and Lesson 5)
- Smarter Balanced Sample Item: MAT.03.ER.3.000NF.E.216 (Use between Lesson 6 and Lesson 7)
- Smarter Balanced Sample Item: MAT.03.SR.1.000NF.E.266 (Use after Lesson 10)

Summative Assessment (Culminating Task)

- Candy Bar Model (To be given at end of Unit of Study)

Learning Experiences *(Lesson Plans Attached)*

Days	Lesson Sequence	Materials
	Pre-Assessment: Fractions **Lesson 1: Sharing Equal Parts** *Students will know…* • wholes and sets can be divided into equal parts *Students will be able to…* • create equal parts by partitioning each whole or set into equal pieces; divide quadrilaterals (rhombuses, rectangles, squares) into equal parts	
	Lesson 2: Fractions as Parts of a Whole *Students will know…* • fractions can be represented as parts of a whole *Students will be able to…* • build fractions, identify fractions, and label fractions created with equal size pieces; divide quadrilaterals into equal parts	**Suggested Formative Assessment:** • Smarter Balanced Sample Item: MAT.03.ER.3.000NF.B.229
	Lesson 3: Modeling Fractions with Area Models *Students will know…* • fractions can be represented as part of an area *Students will be able to…* • read, write, label and, identify fractions as an area with equal size pieces; express the area of equal parts of a shape as a unit fraction	

	Lesson 4: Modeling Fractions with Length of Measurement *Students will know…* • fractions can be represented as a measure of length, and as a numbers on the number line *Students will be able to…* • read, write, label and, identify fractions as part of a whole on a number line with equal size pieces	**Suggested Formative Assessment:** • Smarter Balanced Sample Item: MAT.03.TE.1.000NF.F.233
	Lesson 5: Fractions as Parts of a Set *Students will know…* • fractions can be represented as parts of a set *Students will be able to…* • build fractions, identify fractions and label fractions using equal sized parts of a set	
	Lesson 6: Representing Fractions in Multiple Ways *Students will know…* • fractions can be represented as parts of a whole, parts of a set, parts of an area, as a measure, and as numbers on the number line. *Students will be able to…* • represent fractions as parts of a whole, parts of a set, on a number line, and as an area with equal size parts; identify (unit fractions), read, write, and label fractions; Express the area of equal parts of a shape as a unit fraction	**Suggested Formative Assessment:** • Smarter Balanced Sample Item: MAT.03.ER.3.000NF.E.216
	Review and Assessment : Fraction Concepts Check Point *Students will:* • propose, justify, and communicate solutions	**Formative Interim Assessment:** • Mid-Unit Check 1 • Mid-Unit Check 2
	Lesson 7: Numerator and Denominator *Students will know…* • the meaning of a denominator and a numerator; with a unit fractions, the greater the denominator the smaller the pieces *Students will be able to…* • identify (numerator and denominator), read, write, and label fractions	
	Lesson 8: Comparing Wholes *Students will know…* • that the size or the amount of the whole matters when expressing relationships with fractions *Students will be able to…* • compare fractions based on the size of the original wholes (1/4 of a bite-size candy bar is not equal to 1/4 of a king-size candy bar); divide quadrilaterals into equal parts	
	Lesson 9: Equivalent Fractions *Students will know…* • equivalent fractions are ways of describing the same amount by using different-sized fractional parts; *w*hen comparing fractions, the whole must be the same. *Students will be able to…* • create equivalent fractions by partitioning each equal piece into more equal pieces	
	Lesson 10: Comparing Fractional Parts; Unlike Denominators *Students will know…* • that the more fractional part used to make a whole, the smaller the parts. (eighths are smaller than fifths) *Students will be able to…* • identify unit fractions, represent fractions as parts of a whole, parts of a set, and on a number line	**Suggested Formative Assessment:** • Smarter Balanced Sample Item: MAT.03.SR.1.000NF.E.266

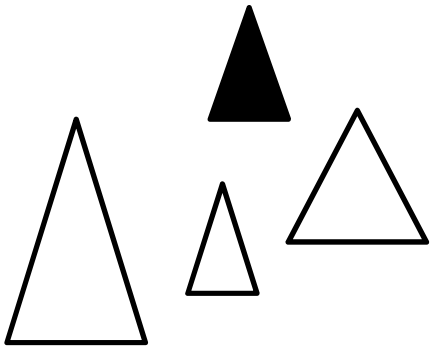
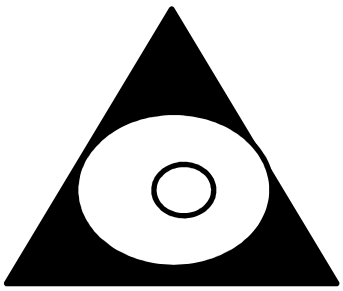
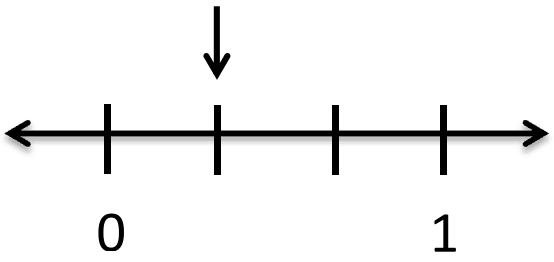
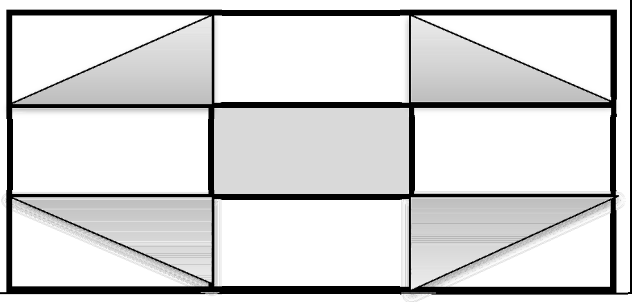
	Culminating Task: Candy Bars and Friends
	Students will…
	• show their knowledge and understanding of fractions
		Summative Assessment:
		• Candy Bars and Friends
		  ○ Parts 1-3
		  ○ Performance Task

Resources

Online	Text
Georgia Department of Education https://www.georgiastandards.org/Common-Core/Pages/Math.aspx **Illustrative Mathematics** http://www.illustrativemathematics.org/ **Inside Mathematics** http://www.insidemathematics.org/ **MARS tasks** http://map.mathshell.org/materials/index.php **Massachusetts Department of Elementary and Secondary Education** http://www.doe.mass.edu/candi/commoncore/ **National Library of Virtual Manipulatives** http://nlvm.usu.edu/en/nav/vlibrary.html **North Carolina Department of Public Instruction** http://www.dpi.state.nc.us/acre/standards/common-core-tools/#unmath **Progressions for the Common Core State Standards in Mathematics** http://ime.math.arizona.edu/progressions/ **Smarter Balanced Assessment Consortium** http://www.smarterbalanced.org/smarter-balanced-assessments/#item	**McGraw-Hill. *California Mathematics: Concepts, Skills, and Problem Solving: Grade 3*. New York: McGraw-Hill Companies, Inc. 2009.** **Shoseki, Tokyo. *Mathematics International: Grade 3*. 2012 (Japanese Text)** **Van de Walle, John, and LouAnn Lovin. *Teaching Student-Centered Mathematics: Grades K-3.* Vol. 1. Boston: Pearson, 2006.** **Van de Walle, John, and LouAnn Lovin. *Teaching Student-Centered Mathematics: Grades 3-5.* Vol. 2. Boston: Pearson, 2006.**

Name_____ **Date**_____

Mid-Unit Check 1

one-third of the triangles 	one-third of the area of the triangle 
the arrow is pointing at one-third 	one-third of the area of the rectangle 

a. Circle each diagram above that shows 1/3.

b. Choose one of the diagrams that you circled. Say how you know this diagram shows 1/3.

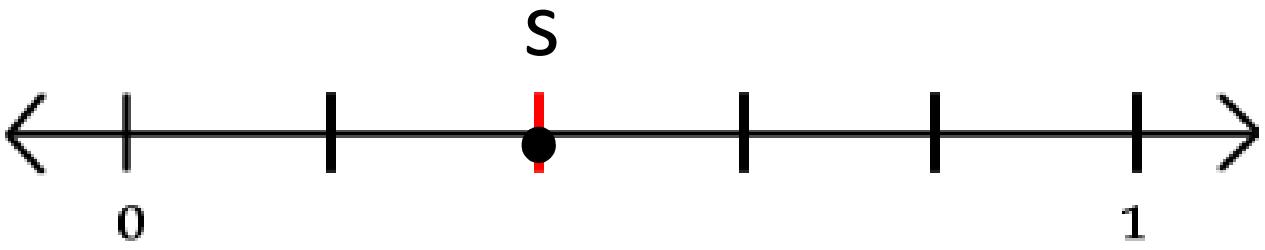
c. Choose one of the diagrams that **y**ou did not circle. Say how you know this diagram does not show 1/3.

Name_____ **Date**_____

Mid-Unit Check 2

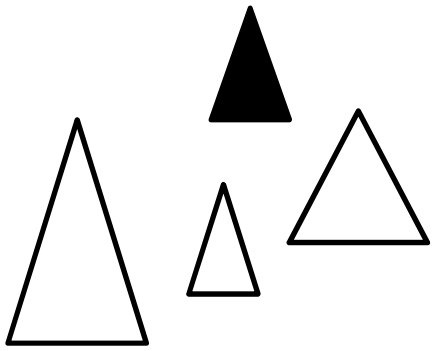
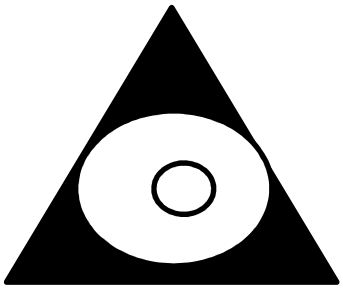
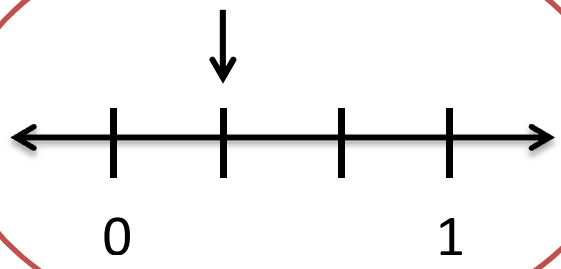
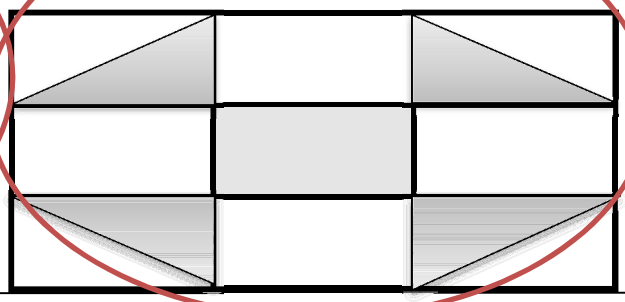
Sandra ran a race during track and field. The point on the line shows how far she ran. If the race is one mile long, how many miles did she run?

She ran _____ _____.



Assessment Key

Mid-Unit Check 1

one-third of the triangles	one-third of the area of the triangle
	
the arrow is pointing at one-third 	one-third of the area of the rectangle 

a. Circle each diagram above that shows 1/3.

b. Choose one of the diagrams that you circled. Say how you know this diagram shows 1/3.

Possible answers:

a) The number line shows 1/3rd because the whole is cut into 3 equal pieces and the arrow is pointing to the first section of that whole.

b) The rectangle is divided into 9 equal pieces and the parts shaded are equal to 3 of those parts (two triangles make one of the small rectangular parts). 3/9th is equivalent to 1/3.

c. Choose one of the diagrams that you did not circle. Say how you know this diagram does not show 1/3.

a) The triangles are a set of 4 and only 1 part is shaded, so it shows 1/4th not 1/3rd.

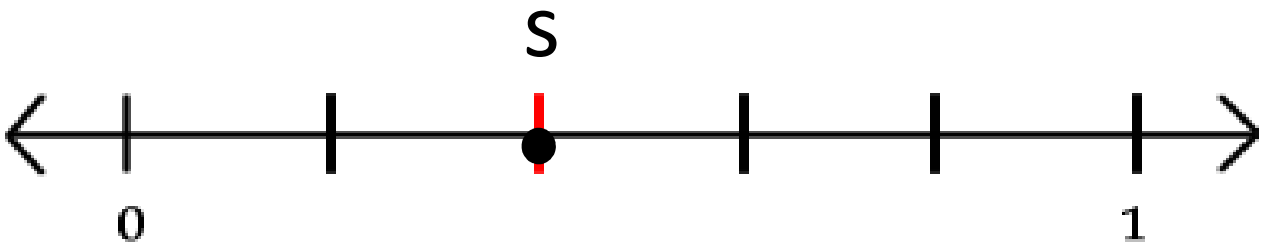
b) The triangle with the circles inside does not show 1/3rd because even though the triangle is broken into three parts each part is not equal; therefore the black area is not 1/3 of the total area.

Assessment Key

Mid-Unit Check 2

Sandra ran a race during track and field. The point on the line shows how far she ran. If the race is one mile long, how many miles did she run?

She ran 2/5 mile.



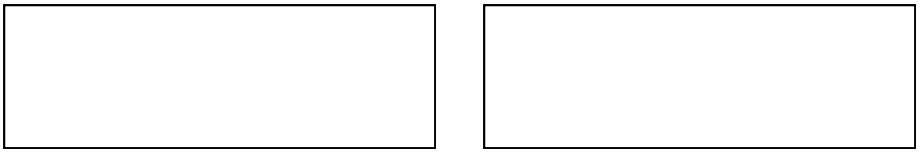
Name_____ Date_____

Third Grade – Module 3

Candy Bars for Friends

Sarah went to the store and had only enough money to buy two candy bars for herself and her friends to share. The two candy bars that she bought are equal in size.

A B



Part One:

1. Sarah's mother said that she could only have ½ of candy bar A. Show how much of the candy bar Sarah can have.

2. Ana's mother said that she could only have ¼ of candy bar B. Show how much of the candy bar Ana can have.

3. a. When Sarah got ½ of candy bar A, how many parts was it divided into? Explain how you know.

3. b. When Ana got ¼ of candy bar B, how many parts was it divided into? Explain how you know.

Name_____ Date_____

Part Two:

4. Which is more, ½ or ¼ of a candy bar?
   Show your work and explain your answer.

5. a. Ana's mother changed her mind and said that Ana could have the same amount of candy as Sarah. How much more of candy bar B would Ana need to take?
   Show your work.

5. b. Ana's mother told her that ½ equals $^{2}/_{4}$. Explain why this is true.

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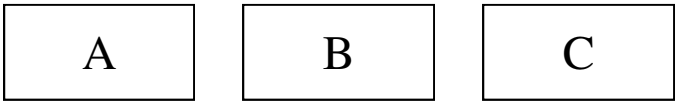
Part Three:

The next week, Sarah bought more candy bars to share with her friends. All three candy bars are equal in size.

- Sarah has $\frac{1}{6}$ of candy bar A.
- Ana has $\frac{3}{4}$ of candy bar B.
- John has $\frac{1}{2}$ of candy bar C.



6. Draw a picture to represent what part of the candy bar each person got.

7. a. Out of Sarah, Ana, and John, who has the largest part?
   Show your work.

   b. Who has the smallest part?
   Show your work.

   c. Show where each part is represented on a number line.

Name_____ Date_____

Performance Task

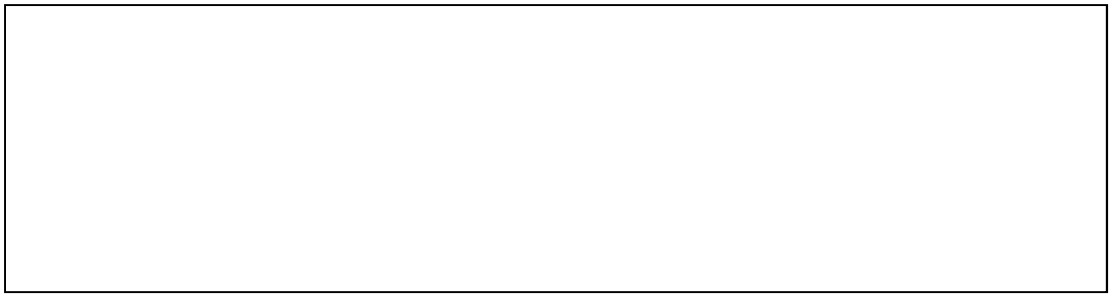
8. Sarah's mother gets the remaining part of candy bar A.
    a. How much of candy bar A will she get?
    Show your work.

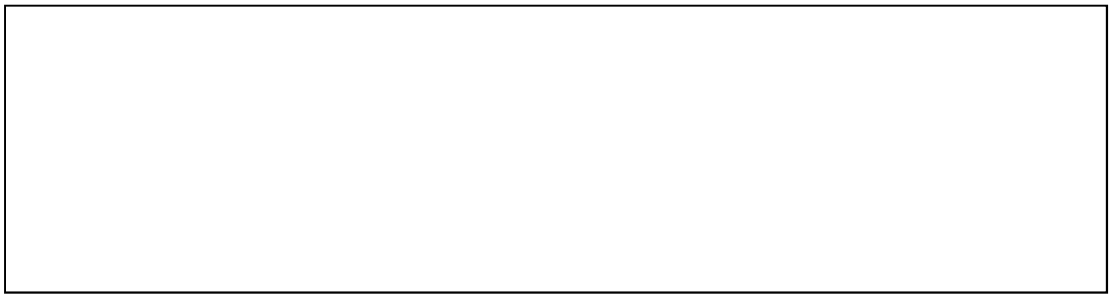
    b. Who will have the largest part of the candy bars – Sarah, Ana, John, or Sarah's mother?
    Show your work and explain how you know.

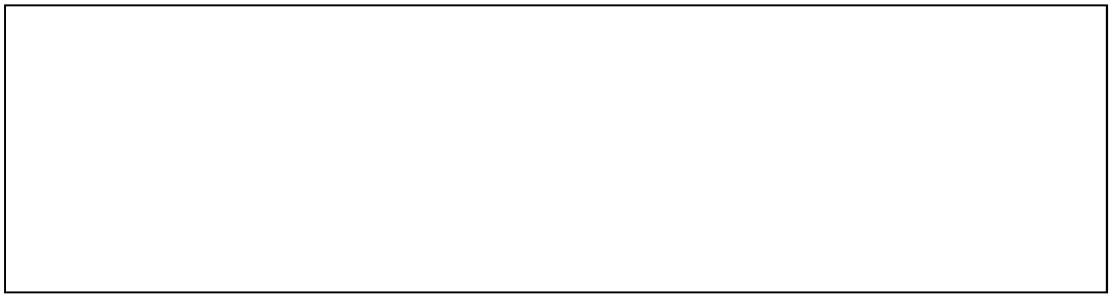
    c. Show where each part is represented on the number line, including Sarah's mother.

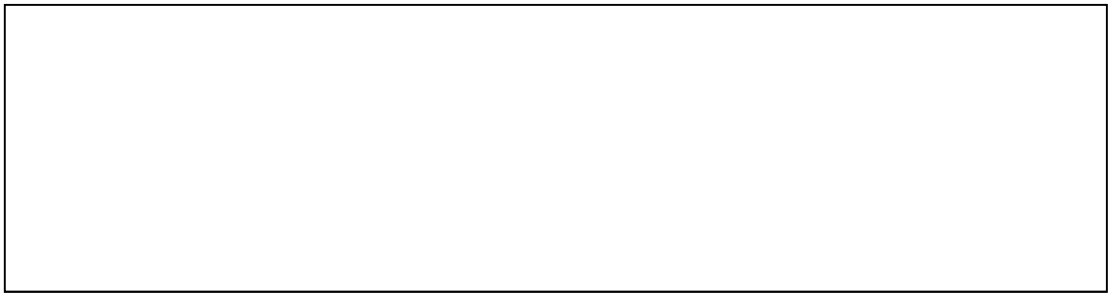
Name_____ Date_____

Candy Bar Models









Rubric

Candy Bars for Friends Credit for specific aspects of performance should be given as follows:	Points	Total Points
1. Candy bar correctly divided into one half.	1 point	1 point
2. Candy bar correctly divided into one quarter.	1 point	1 point
3. Solutions must include: a. 2 parts Explanation **(Possible explanation):** I folded the paper in half and there were two parts. **(Possible explanation):** I drew a line down the middle of the paper. b. 4 parts Explanation **(Possible explanation):** I folded the paper into fourths and there were four parts. **(Possible explanation):** I drew a line down the middle of the paper and then another line down the middle of each half. **(Possible explanation):** I folded the paper in half once, and then folded the paper in half again.	 1 point 1 point 1 point 1 point	4 points
4. Solutions must include: • ½ of a candy bar • Correct representation of the comparison and size between ½ and ¼. • Explanation **(Possible explanation):** I drew one picture to show ½ and I drew another picture to show ¼. Then I compared their size. **(Possible explanation):** I folded one paper in ½ and then I folded the other paper into ¼ and compared their size. **(Possible explanation):** I know that the bigger the denominator, the smaller the part of the whole.	 1 point 1 point 1 point	3 points
5. Solutions must include: a. ¼ more of candy bar B Correct representation of the fractional parts b. Explanation **(Possible explanation):** I drew a picture and shaded in ½. I drew another picture and shaded in 2/4 and noticed that they were the same size. **(Possible explanation):** I folded one paper into ½ and another paper into 2/4. Then I compared their size.	 1 point 1 point 1 point	3 points

6. Solutions must include: • Candy bar A represented correctly • Candy bar B represented correctly • Candy bar C represented correctly	 1 point 1 point 1 point	3 points
7. Solutions must include: a. Ana has the largest part Correct representation of work b. Sara has the smallest part Correct representation of work c. Candy bar A represented correctly on the number line Candy bar B represented correctly on the number line Candy bar C represented correctly on the number line	 1 point 1 point 1 point 1 point 1 point 1 point 1 point	7 points
8. **Performance Task** Solutions must include: a. Sarah's mother will get $^5/6$ of candy bar A. Correct representation of work. b. Sarah's mother will have the largest part. Correct representation of work **(Possible explanation):** I drew a picture of each person's part of the candy bar and compared sizes. **(Possible explanation):** I folded paper to represent each person's candy bar and compared the sizes. **(Possible explanation):** I used the number 12 as the least common denominator when comparing the sizes. b. Candy bar A represented correctly on the number line Candy bar B represented correctly on the number line Candy bar C represented correctly on the number line Sarah's mother's candy bar represented correctly on the number line	 1 point 1 point 1 point 1 point 1 point 1 point 1 point 1 point	8 points
	Total Points	30 points