

**GRADE 3 UNIT 3 – SOLVE PROBLEMS INVOLVING TH FOUR OPERATIONS & UNDERSTAND FRACTIONS AS NUMBERS ON THE NUMBER LINE**

<p><b>Established Goals:</b> Standards</p> <p><b><u>Operations and Algebraic Thinking</u></b></p> <p><b>3.3.OA.7</b> Fluently multiply and divide within 50, using the relationship between multiplication and division (e.g., if <math>44 \div 2</math> equals 22, then <math>22 \times 2</math> must equal 44).</p> <p><b>3.3.OA.8</b> Find the value of an unknown (expressed as a letter) in an equation that is a representation of a two-step word problem (with any four operations) and assess the reasonableness of the value.</p> <p><b><u>Number and Fractions</u></b></p> <p><b>3.3.NF.1</b> Interpret the unit fraction <math>1/b</math> as the quantity formed by 1 of <math>b</math> equal parts of a whole and the fraction <math>a/b</math> as the quantity formed by <math>a</math> parts <math>1/b</math>; e.g., 3 unit fractions of <math>1/4</math> add to the quantity <math>3/4</math>.</p> <p><b>3.3.NF.2</b> Represent the equal parts of shapes as a unit fraction (e.g., a pizza cut into 8 equal slices has 8 slices and each slice has quantity <math>1/8</math> of the whole pizza).</p> <p><b>3.3.NF.2.a</b> Make a drawing of a number line depicting the position of <math>1/b</math> (with <math>b = 2, 3, 4, 6,</math> or <math>8</math>). Represent the unit fraction <math>1/4</math> on the number line by dividing the number line between 0 &amp; 1 into 4 equal lengths and naming the point at the end of the first length as the position of unit fraction <math>1/4</math>; apply the same method for locating the points <math>1/2, 1/3, 1/5, 1/6,</math> and <math>1/8</math> on the number line.</p> <p><b>3.3.NF.2.b</b> Make a drawing of a number line depicting a fraction <math>a/b</math> (with <math>a &lt; b</math> and <math>b = 2, 4, 3, 4, 6,</math> or <math>8</math>).</p> <p><b><u>Measurement &amp; Data</u></b></p> <p><b>MA.3.3.MD.2</b> Solve one-step word problems by estimating,</p>	<b>Transfer</b>	
	<p><i>Students will be able to:</i></p> <p>Understanding the relationship between fractions and whole numbers can help us explore and solve a variety of mathematical situations.</p> <p>Apply strategies of the four numerical operations and measurement to solve real world measurement problems involving time, volume and mass.</p>	
	<b>Meaning</b>	
	<b>ENDURING UNDERSTANDING</b>	<b>ESSENTIAL QUESTIONS</b>
	<ul style="list-style-type: none"> <li>We can represent quantities of unit fractions and fractions in a variety of ways: Pictures, Number Lines, Partitioned Shapes or Parts of a set to understand Fractions and Mixed Numbers and their values.</li> <li>We can solve real world problems involving measurement and data in several ways such as– choosing the correct operation, starting with the end result, reversing the process, breaking down into smaller parts and/or working backwards.</li> </ul>	<ul style="list-style-type: none"> <li>What is the relationship between fractions and whole numbers (e.g. represent them in models, fractions and mixed numbers)?</li> <li>What measurement strategies can be used to solve problems involving time, mass and volume?</li> <li>How can we set up real world problems using equations to solve for N as the unknown variable for whole numbers and fractions in any of the four operations</li> </ul>
	<b>Acquisition</b>	
<b>KNOWLEDGE</b>	<b>SKILLS</b>	
<p><i>Students will know how to...</i></p> <ul style="list-style-type: none"> <li>Unit Fractions represent part of a whole or set</li> <li>Fractions are parts of a whole or set</li> <li>Difference between numerator and</li> </ul>	<p><i>Students will be skilled at...</i></p> <ul style="list-style-type: none"> <li>Connect pictorial shapes/and or parts of a set to fractions</li> <li>Equally Partition shapes and fractional</li> </ul>	

<p>measuring, and comparing liquid volumes and masses using appropriate tools and units.</p> <p><b>3.3.MD.1</b> Tell and write time to the nearest minute to solve word problems with addition and subtraction involving time intervals in minutes.</p> <p><b>Model with mathematics</b></p> <p><b>Reason abstractly and quantitatively</b></p> <p><b>Make sense of problems and persevere in solving them.</b></p> <p><b>Construct viable arguments and critique the reasoning of others</b></p>	<p>denominator</p> <ul style="list-style-type: none"> <li>Fractions can be represented on a number line</li> <li>Recognize <math>\frac{1}{4}</math>, <math>\frac{1}{2}</math>, <math>\frac{3}{4}</math> as a quantity and in measurement</li> <li>Time is measured in intervals</li> <li>Hour Hand</li> <li>Minute Hand</li> <li>Measurement Quantities &amp; Representation (mL, L etc.)</li> <li>Volume &amp; Mass can be measured using the metric system</li> <li>Represent the unknown with “N” in equations</li> </ul>	<p>parts of a set</p> <ul style="list-style-type: none"> <li>Use fraction bars to solve problems</li> <li>Segment fraction bars and number lines to show unit fractions</li> <li>Connect fraction models to actual numerators and denominators.</li> <li>Write the fraction with a Numerator and a Denominator</li> <li>Estimate and Analyze Fractional Parts</li> <li>Compare Fractions</li> <li>Use Benchmarking to compare fractions (<math>\frac{1}{4}</math>, <math>\frac{1}{2}</math>, <math>\frac{3}{4}</math>)</li> <li>Estimate measurement quantities</li> <li>Solve Problems involving measurement</li> <li>Apply fraction strategies to discover measurement quantities</li> <li>Tell time to the minute</li> <li>Calculate elapsed time</li> </ul>
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Vocabulary	Instruction and Pacing (suggested order to teach)	
Fraction Halves Thirds Fourths Fifths Sixths Eighths Tenths	<b>Measurement &amp; Data – Solve problems involving time</b>	<b>1 1/2 Weeks</b>
	<b>Measurement &amp; Data – Solve real world problems involving liquid capacity &amp; volume</b>	<b>1 ½ Weeks</b>
Twelfths Numerator Denominator Number Line Equal Part Unit Fraction	<b>Fractions – Represent Fractions showing equal units using drawings/pictures</b>	<b>1 Week</b>
	<b>Fluency (Multiplying/Divide within 50)</b>	<b>Entire Unit</b>
	<b>Find the value of the unknown in equations (all four operations)</b>	<b>Entire Unit</b>
Mixed Numbers Benchmark Fractions Halves	<b>Represent Unit Fractions on a Number Line with denominators of 2, 3, 4, 6, or 8</b>	<b>2 Weeks</b>
Number Line Numerator Denominator Mixed Numbers	<b>Benchmark Testing &amp; Reteaching</b>	<b>2 Weeks</b>
Equivalent Hour Half Hour Quarter Hour Minute Seconds		
A.M P.M. Elapsed Time Analog Clock Digital Clock		

Liter (L) Mass Gram (g) Kilogram (kg) Weight Ounce

Capacity Milliliter (mL) Liter (L)

### Resources

Common Core Standards, New Jersey Model Curriculum

Envisions Math Program Suggested Lessons:

Topic 12 Time

Topic 15 Liquid Volume & Mass

Topic 9 – Understanding Fractions

MANIPULATIVES AND GRAPHIC ORGANIZERS – Hand held analog clocks, Number Lines (unit fractions), Fraction Bars, Balance Scale & weights, Unit Cubes (volume),

Liquid Capacity Containers, Templates for Communicators/Smart Pal Sleeves

<http://illuminations.nctm.org>, <https://www.illustrativemathematics.org>

<http://pearsonrealize.com> <http://prodigygame.com>

NCTM Illuminations <http://illuminations.nctm.org>

Illustrative Math <https://www.illustrativemathematics.org/>

#### **Additional Resources for ELL Learners**

**Problem solving worksheet** [http://media.pearsoncmg.com/curriculum/math/envision2012/pdf/cc4\\_tt\\_1.pdf](http://media.pearsoncmg.com/curriculum/math/envision2012/pdf/cc4_tt_1.pdf)

<http://www.franklinboe.org/cms/lib/NJ01000817/Centricity/Domain/2056/Katie%20Bookshelf%20Word%20Problem%20Kids.pdf>

**Multiplication Units** <http://www.njctl.org/courses/math/3rd-grade-math/multiplication/>

**Division Unit** <http://www.njctl.org/courses/math/3rd-grade-math/division/>

<https://www.khanacademy.org/math/cc-third-grade-math/cc-3rd-fractions-topic>

#### **Time and Measurement Unit**

<http://www.njctl.org/courses/math/3rd-grade-math/time/>

**Time Math Games** <http://www.math-play.com/time-games.html>

**Time worksheets** <http://www.math-aids.com/Time/>

## Differentiation and Accommodations

(options)  
 Provide graphic organizers  
 Provide additional examples and opportunities for additional problems for repetition  
 Provide tutoring opportunities  
 Provide retesting opportunities after remediation (up to teacher and district discretion)  
 Teach for mastery not test  
 Teaching concepts in different modalities  
 Adjust pace and homework assignments

### ELL Modifications

- Demonstrate comprehension of two equivalent fractions by explaining how to locate them on a number line , how to using L1 and/or gestures, examples and selected technical words
- Identify and explain whole numbers as fractions on a number line using Teacher Modeling, a word wall and verbal scaffolds (Sentence Starter, Sentence Frame, Cloze Sentences).
- Use anchor charts for fractions, area, multiplying and dividing numbers
- Illustrated word wall
- Use manipulatives- unifix cubes & blocks for area, fractions and to show multiplication & division problems
- Use variety of strategies to solve word problems- act out word problems, draw pictures, model
- Total physical response- students physically represent fractions and area

**ELL scaffolding for Unit 4 3<sup>rd</sup>** <http://www.state.nj.us/education/modelcurriculum/math/ellscaffolding/revised/3u4.pdf>

### 21<sup>st</sup> Century Skills

Critical Thinking, Creative Thinking, Collaborating, Communicating, and Technology Literacy

### Instructional Strategies

Fairfield Township School recognizes the importance of the varying methodologies that may be successfully employed by teachers within the classroom and, as a result, identifies a wide variety of possible instructional strategies that may be used effectively to support student achievement. These may include, but not be limited to, strategies that fall into categories identified by the Framework for Teaching by Charlotte Danielson:

- Communicating with students
- Using questioning and discussion techniques
- Engaging students in learning
- Using assessment in instruction
- Demonstrating Flexibility and Responsiveness

### Interdisciplinary Connections

ELA, Science, and Technology

### Common Misconceptions

### Proper Conceptions

Students will incorrectly divide shapes into equal parts	Using number lines and graph paper provide visual fractions
Difficulty with the transition of using fraction symbols and meanings	Numerators are parts of the whole which is the denominator
Fractions are smaller numbers	A fraction is relative to the size of the whole
A fraction is not a number	Fractions are values of a whole or values less than one
Larger Denominators are Larger Fractions	Numerators are parts of the whole which is the denominator
Students incorrectly estimate fraction equivalents or values	Benchmark Fractions $\frac{1}{2}$ , $\frac{1}{4}$ , $\frac{1}{3}$ help us to estimate fractions
Students have difficulty writing fractions on a number line	Begin segmenting number lines in half or fourths
Students incorrectly calculate or count minutes of time	Time is counted/measured in units of five
Students confuse the hour and minute hand	Longer hand is the minute hand the shorter hand is the hour hand
Students incorrectly count the minutes	Count by 5's and then ones (if needed )to count minutes

Students have difficulty telling time two different ways	Time can be measured minutes before the hour or after the previous hour
Students have difficulty calculating elapsed time	Using tools (clock face or number line) help to calculate elapsed time

**Performance Task (optional)**

**Hershey Fractions**

**Description: Students will use a Hershey Chocolate Bar to reinforce fractional concepts in real life situations.**

**HERSEY BAR FRACTIONS**

HERSHEY	HERSHEY	HERSHEY	HERSHEY
HERSHEY	HERSHEY	HERSHEY	HERSHEY
HERSHEY	HERSHEY	HERSHEY	HERSHEY
HERSHEY	HERSHEY	HERSHEY	HERSHEY

**How many rows are in this Hershey Bar ?**

**How many columns are in this Hershey Bar ?**

**Write an addition and multiplication equation you see using the above information.**

**Shade 4 of the pieces of chocolate bar that you will share with a friend. What fraction do you see?**

**Shade 4 more pieces of the chocolate bar to share. What is your fraction now?**

**Look at the chocolate bar and estimate how much of the chocolate bar you have left, and explain your answer.**

**About  $\frac{1}{4}$   $\frac{1}{2}$  or  $\frac{3}{4}$  ?**

### Rubric

**3 – Student counts the correct number of rows and columns and also writes the correct multiplication and repeated addition equation. The student shades 4 parts of the Hershey Bar  $\frac{4}{16}$  and writes the correct fraction and 8 parts  $\frac{8}{16}$ . Student estimates  $\frac{8}{16}$  to  $\frac{1}{2}$  of the candy bar is eaten and explains how they derived at their answer.**

**2 – Student discovers the correct amount of rows and columns and writes at least one correct addition/multiplication equation. And shades and identifies at least one of the fractional parts ( $\frac{4}{16}$  or  $\frac{8}{16}$ ). Student identifies  $\frac{8}{16}$  as  $\frac{1}{2}$  but may not have a clear explanation.**

**1 – Student has correctly identifies rows & columns and has at least one of the correct equations. Student correctly shades and identifies atleast one of the shaded parts correctly. Student incorrectly identifies  $\frac{8}{16}$  as  $\frac{1}{2}$  and does not explain their answer.**

**0 – Student does not show a clear understanding of any of the mathematical tasks.**

## ASSESSMENTS

### Suggested Formative Assessment (options)

Problem of the Day

Lesson Quizzes

Exit Ticket

Anecdotal Records (Topic Observation Checklist)

**Suggested Summative Assessment** - Grade Level developed Unit/Envisions Topic Tests/ Ed Connect Tests/ State Unit Benchmark/Performance Task