Unit 3: Title of Unit : Fractions, Measurement, Represent and Interpret Data

Content Area: **Mathematics**
Course(s): **Mathematics - Grade 3**
Time Period: **February**
Length: **9 Weeks**
Status: **Published**

Unit Overview

In this unit, students will develop an understanding of fractions as numbers, especially unit fractions (fractions with numerator 1). Students will view fractions as being built out of unit fractions and use fractions with visual models to represent parts of a whole. Students will be able to use fractions to represent numbers equal to, less than and greater than one. Visual fraction models as well as strategies based on noticing equal numerators or denominators will allow students to solve real world problems involving the comparison of fractions.

Students will be able to tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.

Students will be able to draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems using information presented in scaled bar graphs.

Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.

Students will be able to generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.

Chapters 10-12 (allow extra time for fraction concepts and elapsed time)

Chapters do not have to be done in sequential order - cover topics as needed for NJSLA testing.

Transfer

Students will be able to independently use their learning to...

Develop fluency of fractions as numbers in order to perform the basic operations to make sense of real world problems.

Solve problems involving mass and volume.

Tell time to the nearest minute and determine time intervals.

Interpret data from scaled bar graphs, pictographs, and line plots.

Measure to the nearest 1/4 and 1/2 inch.

For more information, read the following article by Grant Wiggins.

http://www.authenticeducation.org/ae_bigideas/article.lasso?artid=60

Meaning

Understandings

Students will understand that...

- they can partition a shape into equal parts
- unit fractions represent the area of each part
- in a fraction, the numerator tells the number of equal parts being represented and the denominator tells the total number of equal parts
- fractions can be used to name part of a whole or part of a set
- the interval from 0 to 1 represents the whole
- a number line can be partitioned into equal parts
- fractions that name the same part of a whole are equivalent
- equivalent fractions are the same point on a number line
- they can use fraction models to compare two fractions

- they can use the symbols <, >, and =
- capacity is the amount of liquid that a container can hold
- liter and milliliter are units of capacity in the metric system
- mass is the amount of matter that an object has
- mass is different than weight
- if necessary, convert so that all measurements in a problem have the same units
- the four operations can be used to solve measurements problems
- a digital clock shows the time in numbers
- an analog clock has an hour hand and a minute hand
- to measure time you can add, subtract, or use a number line
- a pictograph uses a symbol to represent more than one tally from a chart
- a bar graph uses bars of different lengths or heights to show data
- find "how many less" and "how many more" to interpret data in a graph
- you can find the difference between the greatest and the least value
- the horizontal scale is marked off in appropriate units
- x's are drawn above the number line to represent data values
- there are two half inches in one inch and four quarter inches in one inch
- fractional parts of an inch can be used for more precise measurements

Essential Questions

Students will keep considering...

- How can fractions be used to represent numbers and their parts?
- Why do we measure mass and volume?
- Why do we measure time?
- How do we obtain useful information from a set of data?
- Why do we measure length?

Application of Knowledge and Skill

Students will know...

Students will know...

Building upon knowledge and skills gained in preceding grades, students will:

- How to model unit fractions
- How to model fractions
- How to represent fractions on a number line

- How to model equivalent fractions
- How to compare two fractions
- How to estimate metric units of capacity
- How to estimate metric units of mass
- How to solve word problems involving capacity and mass
- How to tell and write time to the nearest minute
- How to measure time intervals in minutes
- How to represent data using scaled graphs
- How to interpret data in graphs
- How to graph measurement on a line plot
- How to use a ruler to measure to the nearest half inch or quarter inch

Students will be skilled at...

Students will be skilled at...

- Using models to represent unit fractions
- Using models to represent fractions like 4/6
- Represent fractions like 5/8 on a number line
- Using models to show that two fractions, such as 2/8 and 1/4, are equivalent
- Comparing two fractions, like 2/3 and 3/4
- Determining reasonable estimates for the capacity of containers
- Determining reasonable estimates for the mass of objects
- Solving measurement problems, such as 4 x 2L= 8L
- Telling time on a digital and analog clock
- Determining time intervals
- Using pictographs and scaled bar graphs to represent data sets
- Using scaled graphs to analyze data and solve problems
- Analyzing data on a line plot
- Measure to nearest 1/4 and 1/2 inch
-

Academic Vocabulary

Review Vocabulary Terms

- fourths
- halves
- thirds

New Vocabulary Terms

Chapter 10

- fraction
- unit fraction
- numerator
- denominator
- equivalent fraction

Chapter 11

- capacity
- liquid volume
- liter (L)
- metric unit
- milliliter (mL)
- gram (g)
- kilograms (kg)
- mass
- analog clock
- digital clock
- time interval

Chapter 12

- data
- survey
- tally chart
- frequency table
- tally mark(s)
- bar graph
- scale
- line plot
- half inch (1/2)
- quarter inch (1/4)

Learning Goal 1

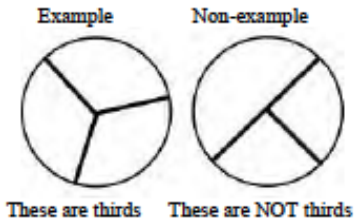
Understand a fraction 1/b as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size 1/b.

Daily Targets

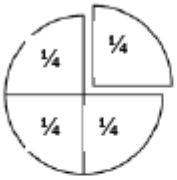
SWBAT:

- Explore and model unit fractions **(Ch.10, Les 1, DOK 2)**
- Read and write fractions that name part of a whole **(Ch.10, Les 2, DOK 2)**
- Use models to represent fractions that name part of a set **(Ch.10, Les 3, DOK 2)**
- Draw a diagram to solve problems **(Ch.10, Les 4, DOK 4)**

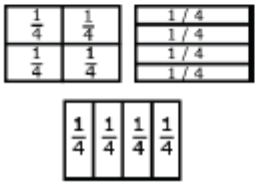
Example:



Example:
This figure was partitioned/divided into four equal parts. Each part is ¼ of the total area of the figure.

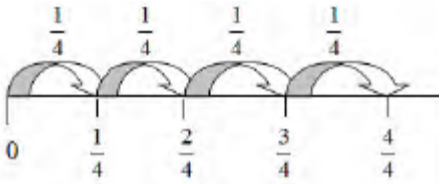


Given a shape, students partition it into equal parts, recognizing that these parts all have the same area. They identify the fractional name of each part and are able to partition a shape into parts with equal areas in several different ways.



In the number line diagram below, the space between 0 and 1 is divided (partitioned) into 4 equal regions. The distance from 0 to the first segment is 1 of the 4 segments from 0 to 1 or 1⁄4 (3.NF.2a). Similarly, the distance from 0 to the third segment is 3 segments that are each one-fourth long. Therefore, the distance of 3 segments from 0 is the fraction 3⁄4 (3.NF.2b).

Example:



MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.3.NF.A	Develop understanding of fractions as numbers.
MA.3.NF.A.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 $1/b$.

Daily Target

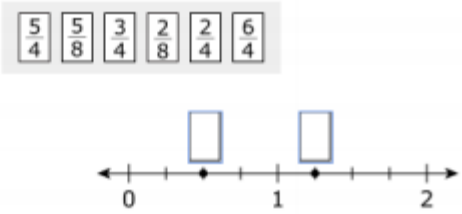
SWBAT

- Represent fractions on a number line **(Ch. 10 Les 5 - DOK 4)**

Examples:

Which fractions represent the points shown on the number line?

Drag and drop the fractions into the boxes.



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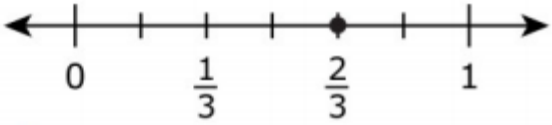
The number line shows a point at $\frac{2}{3}$.



Which fraction is equal to $\frac{2}{3}$?

- A. $\frac{1}{2}$
- B. $\frac{3}{4}$
- C. $\frac{4}{6}$
- D. $\frac{5}{6}$

MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.3.NF.A.2	Understand a fraction as a number on the number line; represent fractions on a number line diagram.
MA.3.NF.A.2a	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.
MA.3.NF.A.2b	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.

Learning Goal 3

Students will be able to use their understanding to generate equivalent fractions (for example, 1/2=2/4; 4/6=2/3) and explain why they are equivalent. Students will be able to express whole numbers as fractions.

Students will use comparison symbols (<, >, and =) to compare fractions and justify the comparison of two fractions with the same numerator or same denominator.

Daily Targets

SWBAT:

- Use models to find equivalent fractions **(Ch.10, Les 6, DOK 2)**
- Express whole numbers as fractions and recognize fractions equivalent to whole numbers
- **(Ch.10, Les 7, DOK 3)**
- Use models to compare two fractions and record the results **(Ch.10, Les 8, DOK 2)**

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.3.NF.A.3	Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.
MA.3.NF.A.3a	Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.
MA.3.NF.A.3b	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.
MA.3.NF.A.3c	Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers.
MA.3.NF.A.3d	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.

Learning Goal 4

Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l).

Add, subtract, mulitply or divide to solve one-step word problems involving masses or volumes that are given

in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.

Please Note:

This standard asks for students to reason about the units of mass and volume. Students need multiple opportunities weighing classroom objects and filling containers to help them develop a basic understanding of the size and weight of a liter, a gram, and a kilogram. Milliliters may also be used to show amounts that are less than a liter. Word problems should only be one-step and include the same units.

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Example:

Students identify 5 things that weigh about one gram. They record their findings with words and pictures. (Students can repeat this for 5 grams and 10 grams.) This activity helps develop gram benchmarks. One large paper clip weighs about one gram. A box of large paper clips (100 clips) weighs about 100 grams so 10 boxes would weigh one kilogram.

Example:

A paper clip weighs about a) a gram, b) 10 grams, c) 100 grams?

Example:

Addition- Susan has 3 liters of water in a jug. Emily has a jug with 6 liters of water. How many liters

of water do they have in all?

Subtraction- A jug holds 12 liters of water. Sammy spilled 4 liters of water from the jug. How many liters are left?

Multiplication- A jug holds 6 liters of water. There are four jugs at the picnic. How many liters of water in all?

Division- A jug holds 12 liters of water. Four people are sharing the water from the jug. How many liters does each person receive?

Foundational understandings to help with measure concepts:

Understand that larger units can be subdivided into equivalent units (partition).

Understand that the same unit can be repeated to determine the measure (iteration).

Understand the relationship between the size of a unit and the number of units needed (compensatory principal).

Daily Targets

SWBAT:

- Explore estimating and measuring liquid volume using metric units of capacity **(Ch.11, Les 1, DOK 2)**
- Use the four operations to solve one-step word problems involving liquid volume **(Ch.11, Les 2, DOK 4)**
- Explore estimating and measuring metric units of mass **(Ch.11, Les 3, DOK 2)**

- Use the four operations to solve one-step word problems involving mass **(Ch.11, Les 4, DOK 4)**

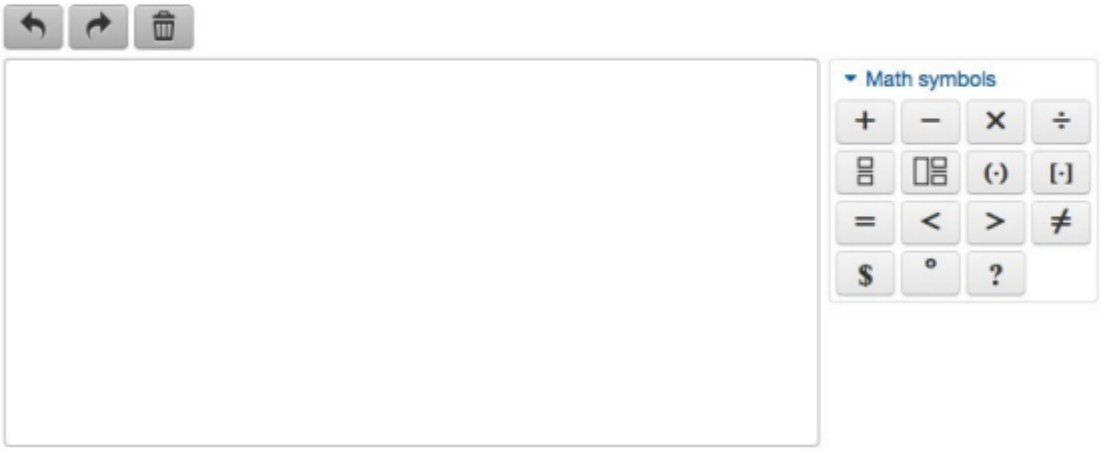
Examples: (Ch.12, Les 1, DOK 2)

Part A

A jar with 64 fluid ounces of water is used to fill cups. The jar is used to fill 3 cups each with 8 fluid ounces of water and 2 cups each with 9 fluid ounces of water.

- How many total fluid ounces of water are left in the jar after filling all of the cups? Show your work or explain your answer.

Enter your answer and your work or explanation in the space provided.

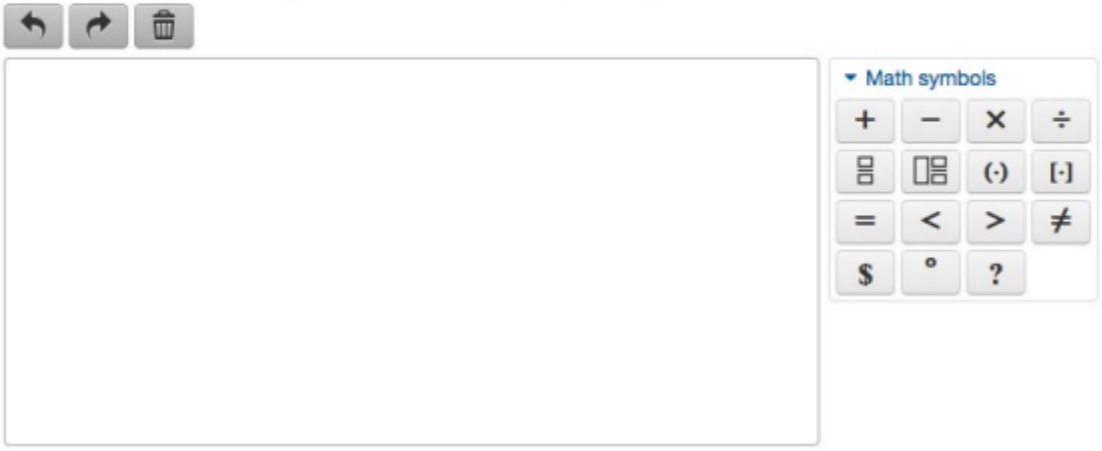


Part B

A different jar has 42 fluid ounces of water. All of the water in the jar is used to fill cups.

Write an equation to show how many cups can be filled if each cup is filled with 7 fluid ounces of water. Use p as the unknown number of cups in your equation.

Enter your equation in the space provided. Enter **only** your equation.



MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.

MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.3.MD.A	Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.
MA.3.MD.A.2	Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem.

Learning Goal 5

Tell and write time to the nearest minute and measure time intervals in minutes.

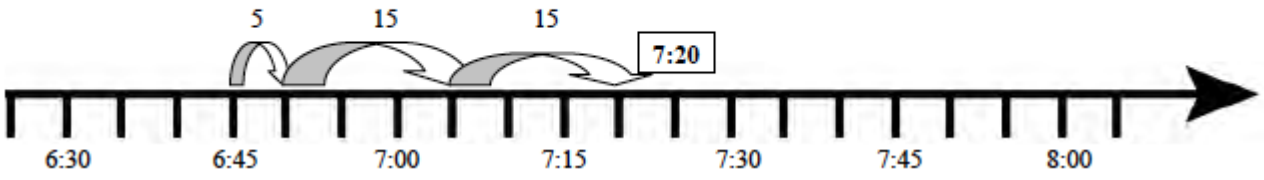
Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.

Daily Target

SWBAT:

- Tell time to the nearest minute **(Ch.11, Les 5, DOK 1)**
- Determine time intervals **(Ch.11, Les 6, DOK 2)**
- Solve problems to determine time intervals using a number line **(Ch.11, Les 7, DOK 3)**

Example:
Tonya wakes up at 6:45 a.m. It takes her 5 minutes to shower, 15 minutes to get dressed, and 15 minutes to eat breakfast. What time will she be ready for school?



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MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.3.MD.A	Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.
MA.3.MD.A.1	Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.

Learning Goal 6

Students will be able to draw a scaled picture graph and scaled bar graph to represent a data set and solve two-step problems using information from scaled bar graphs.

Daily Target

SWBAT:

- Collect and record data through observations and surveys **(Ch.12, Les 1, DOK 3)**
- Draw a scaled picture graph **(Ch.12, Les 2, DOK 3)**
- Draw scaled bar graphs **(Ch.12, Les 3, DOK 3)**
- Relate bar graphs to scaled picture graphs **(Ch.12, Les 4, DOK 3)**

Example:

Students should have opportunities reading and solving problems using scaled graphs before being asked to draw one. The following graphs all use five as the scale interval, but students should experience different intervals to further develop their understanding of scale graphs and number facts.

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.7	Look for and make use of structure.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.3.MD.B.3	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step “how many more” and “how many less” problems

	using information presented in scaled bar graphs. For example, draw a bar graph in which each square in the bar graph might represent 5 pets.

Learning Goal 7

Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch.

Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.

Daily Targets

SWBAT:

- Draw, organize, and analyze data in line plots **(Ch.12, Les 5, DOK 4)**
- Measure lengths to the nearest half inch and nearest quarter inch **(Ch.12, Les 6, DOK 2)**
- Collect and display data to fractions of an inch **(Ch.12, Les 7, DOK 2)**
- Solve problems by solving a simpler problem **(Ch.12, Les 8, DOK 3)**

MA.K-12.1	Make sense of problems and persevere in solving them.
MA.K-12.2	Reason abstractly and quantitatively.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.K-12.4	Model with mathematics.
MA.K-12.5	Use appropriate tools strategically.
MA.K-12.6	Attend to precision.
MA.K-12.8	Look for and express regularity in repeated reasoning.
MA.3.MD.B	Represent and interpret data.
MA.3.MD.B.4	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.

Formative Assessment and Performance Opportunities

Performance Tasks:

Chapter 10 Performance Task: **How Charming** DOK 2, DOK 3: Write fractions from scenarios revolving round making charm necklaces. Locate fractions on a number line and identify equivalent fractions both with and without a number line (Rubric pg. TM622PT1-PT2)

Chapter 11 Performance Task: **Breakfast Before the Big Game** DOK 2, DOK 3: Identify the appropriate

metric units of measure for mass and capacity, and solve time problems in the setting of a team breakfast before the big football game (Rubric pg. TM680PT1-PT2)

Chapter 12 Peformance Task: **More Stickers** DOK 2, DOK 3: Make line plots and a pictograph using the setting of football coaches awarding stickers for excellent play and leadership. Solve a problem using information in a table (Rubric pg. TM744PT1-PT2)

Chapter Projects Available in Student Book:

Chapter 10 Project: A Class Carnival (pg. 561-562)

Chapter 11 Project: Time Travel (pg. 623-624)

Chapter 12 Project: Calling All Volunteers (pg. 681-682)

- Am I Ready Assessments
- Check My Progress Assessments
- classwork
- homework
- performance based tasks
- quizzes
- student interviews
- teacher observation

Summative Assessment

Projects

Tests

Quizzes

Performance Based Assessments

21st Century Life and Careers and Technology

CRP.K-12.CRP2	Apply appropriate academic and technical skills.
CRP.K-12.CRP2.1	Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.

CRP.K-12.CRP4	Communicate clearly and effectively and with reason.
CRP.K-12.CRP4.1	Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.
CRP.K-12.CRP8	Utilize critical thinking to make sense of problems and persevere in solving them.
CRP.K-12.CRP8.1	Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.
CAEP.9.2.4.A	Career Awareness
CAEP.9.2.4.A.4	Explain why knowledge and skills acquired in the elementary grades lay the foundation for future academic and career success.
TECH.8.1.5.D	Digital Citizenship: Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.
TECH.8.1.5.D.3	Demonstrate an understanding of the need to practice cyber safety, cyber security, and cyber ethics when using technologies and social media.
TECH.8.1.5.D.CS1	Advocate and practice safe, legal, and responsible use of information and technology.
TECH.8.1.5.D.CS2	Demonstrate personal responsibility for lifelong learning

Accomodations and modifications

- preteach and/or reteach
- small group instruction or one-on-one (parent volunteer)
- manipulatives whenever necessary (hands-on approach)
- extra brain breaks
- use noise buffers whenever appropriate (headphones or earbuds)
- sensory tools- ex: rubber band around chair to allow for movement
- "act it out" approach
- work with a partner; allow to ask & answer questions
- use a highlighter so students can trace easier
- allow a student to use a highlighter to trace larger numbers
- allow for physical activity to practice skills (ex: jump 5 times; have a large number line and have student hop to each number while counting aloud)
- sing songs/dance to reinforce or introduce skills
- have students "choral respond" (for ex: teacher says sentence aloud; students repeat it to a peer
- small group instruction
- perfomance tasks
- English Language Support Interactive Guide
- Beyond Level Enrichment Resources
- clickers
- challenge problems

- StMath
- Real-World Problem Solving Readers (appoaching level, on level, beyond level, and Spanish)

Unit Resources

- AAAmath http://www.aaamath.com/
- Aleks online component
- Brainpop http://www.brainpop.com/
- Cool math 4 kids http://www.coolmath4kids.com/
- English Language Learners Support in My Math
- Fact Dash
- Funbrain http://www.funbrain.com/
- http://bealearninghero.org/
- https://www.illustrativemathematics.org/content-standards
- Link It https://www.linkit.com/testtaker/testtaker/testtaker.html
- Math Fact Café http://www.mathfactcafe.com/
- Math playground http://www.mathplayground.com/
- McGraw-Hill My Math Chapter 8-10
- Multilingual Glossary on Connect ed
- NCTM illuminations http://illuminations.nctm.org/ factor game, product game
- Power up for PARCC
- Project Based Learning associated with chapter
- Reteach/enrich lessons in My Math
- RTI guide in My Math
- Spanish Resources in Connect ed

Interdisciplinary connections

Real-World Problem Sovling Readers

- Moon Gazing (Real-World Problem Solving Teacher Guide p. 9) (3.NF.1 Students will develop understanding of fractions as numbers.) - Students will use fractions and apply measurement skills to

learn about the phases of Earth's moon.

- Students at Work (Real-World Problem Solving Teacher Guide p. 11) (3.MD.3 Students will represent and interpret data.) - Focuses on students earning money and reaching a goal. Students will use fractions and decimals to solve problems.

SOC.6.1.4.C.10	Explain the role of money, savings, debt, and investment in individuals' lives.
3-ESS2	Earth's Systems
3-LS2	Ecosystems: Interactions, Energy, and Dynamics
3-LS4-1.LS4.A.1	Some kinds of plants and animals that once lived on Earth are no longer found anywhere.