6th GRADE

COMPREHENSIVE COURSE OVERVIEW

Sample Mathematics Learning Plan

Big Idea/ Topic

- Complete understanding of division of fractions and extend the notion of number to the system of rational numbers, which includes negative numbers

Standard(s) Alignment

Apply and extend previous understandings of multiplication and division to divide fractions by fractions.

- **MGSE6.NS.1** Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, including reasoning strategies such as using visual fraction models and equations to represent the problem.

Compute fluently with multi-digit numbers and find common factors and multiples.

- **MGSE6.NS.2** Fluently divide multi-digit numbers using the standard algorithm.
- **MGSE6.NS.3** Fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
- **MGSE6.NS.4** Find the common multiples of two whole numbers less than or equal to 12 and the common factors of two whole numbers less than or equal to 100.

  a. Find the greatest common factor of 2 whole numbers and use the distributive property to express a sum of two whole numbers 1-100 with a common factor as a multiple of a sum of two whole numbers with no common factors. (GCF) *Example: 36 + 8 = 4(9 +2)*

  b. Apply the least common multiple of two whole numbers less than or equal to 12 to solve real- world problems.

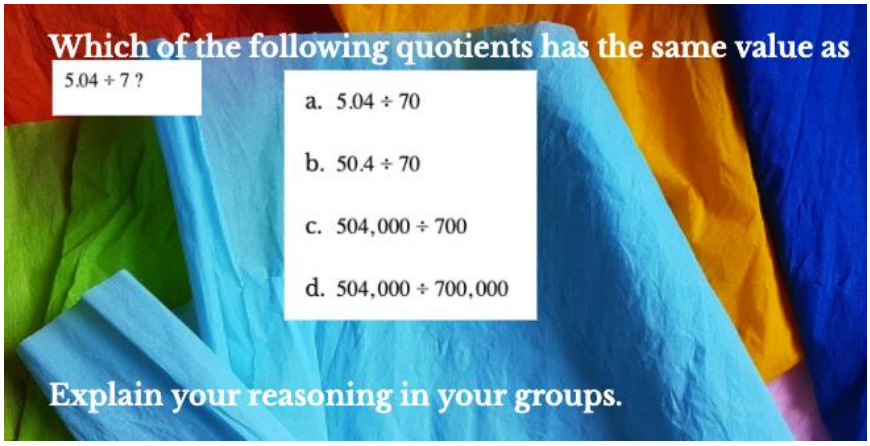
Diagnostic Assessment

Estimating Solutions Assessment Probe

This probe can be implemented synchronously, asynchronously, or offline. Each student will need access to their own copy of the probe. To obtain valid diagnostic data, inform students that calculators should not be used during the assessment. Instruct students to answer each question to the best of their knowledge and provide explanations even if they are unable to arrive at a solution for the question.

Instructional Design

Engage (Incorporating the Standards for Mathematical Practice)



Allot 3-5 minutes for this activity. Student think time should encompass the majority of this activity time.

- **Synchronous**

Post the activating strategy for students to view. Allot time for students to jot their thinking on a separate sheet of paper or on a digital post-it note such as Padlet. Encourage students to share their thinking with a partner or small group prior to sharing with the entire class (if you're using Zoom, Jigsaw, or Teams, you can create a Breakout Room). As students' share their thinking, the teacher should listen for interpretation of the number relationships.

Listen for students to acknowledge the following:

- Connection between same digit, but different value
- Mathematical terminology such as dividend, divisor, quotient
- Dividend and divisor should increase by the same power of 10

- **Asynchronous**

Utilize Padlet to encourage students to share their thinking with the entire class via FlipGrid (click here for a guide to using FlipGrid), or VoiceThread (click here for guide). As students' share their thinking, the teacher should review postings for interpretation of the number relationships.

Look for students to acknowledge to following:

- Connection between same digit, but different value
- Mathematical terminology such as dividend, divisor, quotient
- Dividend and divisor should increase by the same power of 10

- **Unplugged/ Offline**

For this activity, students will complete the task as instructed. Provide students with a Teacher Feedback page, which will engage students in next steps based on the data gathered from the activity. Consider using the instructions below:

If you answered:

A and C. Solve the problems again using a calculator. Which problems have the same quotient as 5.04 ÷ 7? What do you notice about the dividends and divisors of those problems?

B and D. Move on to the Using the Partial Quotients Method task.

Differentiation: The purpose of this activating strategy is to focus on number relationships within the place value system. If the decimal quantity is a barrier for students, provide equations using only whole numbers.

Extension: Encourage students to record their conjecture for why the quotients are the same. Ask students to prove this concept works every time.

Explore (Visual Mathematics)

Using the Partial Quotients Method from Illustrative Mathematics

- **Synchronous**

If actual base-ten blocks are available, model the quantity Elena has in Lesson 9.1 if not use these (Virtual base ten blocks). Pose the discussed questions on a Google Doc or Office 365 Microsoft Word document and allot for independent think time, then allow students to post their thinking on the document, after, call on one or two students to share their thinking aloud to the class..

- **Asynchronous**

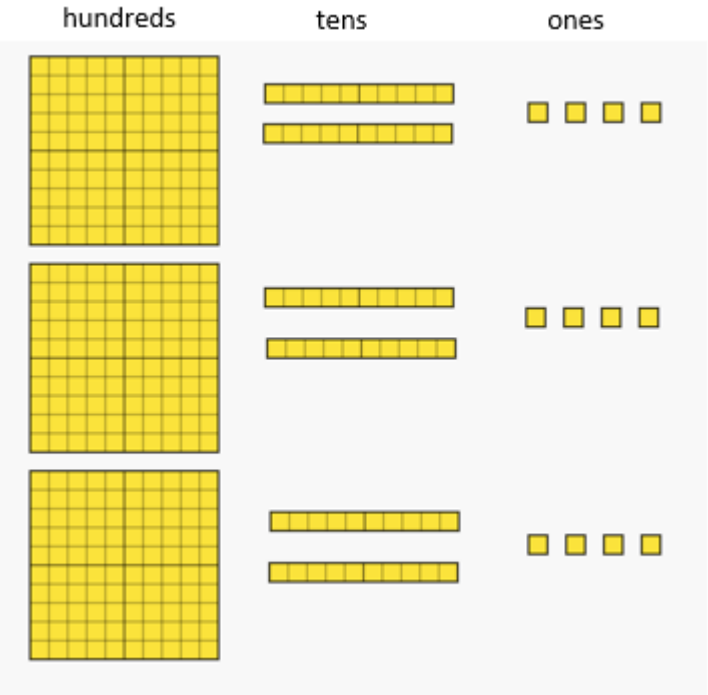
Using Nearpod, create 3 slides using the following image and information. Note, this information could be uploaded directly into a Learning Management System as well:

Slide 1:

Elena used base-ten diagrams to find 372 ÷ 3. She started by representing 372.

Slide 2:

She made 3 groups, each with 1 hundred. Then, she put the tens and ones in each of the 3 groups. Here is her diagram for $372 \div 3$.



Slide 3: Insert the questions and instruct students to respond within Nearpod.

Question 1: Elena's diagram for 372 has 7 tens. The one for $372 \div 3$ has only 6 tens. Why?

Question 2: Where did the extra ones (small squares) come from?

Note: If the information is uploaded into the learning management system, consider utilizing the discussion feature of the LMS. Instruct students to post their thinking to the questions and respond to at least 2 other students' thinking.

- **Unplugged/ Offline**

Provide students with a print out of Elena's strategy student handout and the associated questions. A copy can be found within the Appendix of this Sample Learning Plan.

Here's another sample activity:

Where Does the Decimal Point Go? Using Estimation When Dividing Decimals

In this portion of the lesson, students will apply their thinking from the activating strategy and the exploration activity to estimate solutions for equations involving the division of decimals. The initial problem in the task is $146 \div 7$. While some students will not need the use of a visual to complete the

task, some students may need the visuals as a scaffold. In instances where students need to utilize the visual, consider adjusting the quantities to make a friendly solution for the use of base-ten blocks. An equation you may consider using might be 188 ÷ 4.

- **Synchronous**

Allow students to work independent of the teacher to explore this task. Encourage them to use their thinking from the activating strategy and the explore activity to help within this portion of the lesson. Encourage students to collaboratively discuss with one another their thinking as they record their conjectures on their own recording sheet. Using a blank Google Doc or Office 365 Microsoft Word document to serve as the class collective thought in regards to the solutions and explanations.

As students work on this activity, make note of students who struggle to:

  - Connect the concept of powers of 10 as they work problems
  - Divide the quantities even with the support of a virtual or concrete manipulative
  - Reason abstractly and quantitatively

- **Asynchronous/Unplugged/ Offline**

Create clock partners for students. Students should coordinate with the clock partner a time during the window of time provided by the teacher to complete the task. Students should submit their responses to the teacher for review. Ways to collect student responses:

  - Within the discussion board within the LMS
  - Using an editable version of the task
  - A recording of the collaborative conversation

Apply (Productive Struggle)

Nissan Girl Scout Cookies 3-Act Task In this task, students will determine how many boxes of Girl Scout cookies will fit in the trunk of the Nissan vehicle.

- **Synchronous**

Nissan Girl Scout Cookies task by Dan Meyer. Click here to read more about 3-Act tasks as a strategy for engaging students in more conceptual learning of mathematics. To eliminate the need for conversion between cubic inches and cubic feet, consider providing this information during Act 2 as students solicit for information: 39.3 cubic feet is equivalent to 471.6 cubic inches.

- **Asynchronous**

Engage students in noticing and wondering by providing access to view the Act 1 Video. Students can post notice and wonder thoughts using Padlet. Consider the following release conditions for students to engage with the task:

- Watch Act 1 video and post notice and wonder thoughts to release guiding question.
- Complete the Doodle Poll providing your just right estimate.

- Provide a list of information you know and information you need to know in order to answer the guiding question.

- **Unplugged/ Offline**

Nissan is going to stuff the trunk of a Nissan Rogue full of boxes of Girl Scout cookies. Nissan lists the Rogue's trunk space as 39.3 cubic feet. A box of cookies measures 7 inches x 2.3 inches x 4.6 inches. How many boxes will they fit in the trunk?

Reflect

I Used to Think, But Now I Know… Formative Assessment

Provide time for a quiet think and write. Explain to students that they should describe how their ideas changed or how they became more detailed compared to what they knew at the beginning of instruction.

Some students may have difficulties recalling their original ideas. Encourage students to refer back to ideas discussed during the Explore portion of the lesson.

- **Synchronous**

Listen to students give an account of how their understanding has changed from the beginning of the lesson to the end. As a result of the learning session, how has their level of understanding improved.

- **Asynchronous/Unplugged/ Offline**

Encourage students to express how their understanding has changed from the beginning of the lesson to the end. As a result of the learning session, how has their level of understanding improved. Alternatively, students may take a picture of the I Used to Think, But Now I Know template and annotate over it, then they will post their pictures to a Learning Management System (LMS) or email it to the teacher directly. A sample template has been provided at the end of the Sample Learning Plan.

Evidence of Student Success

Anecdotal Notes:

Anticipating student thinking aids the teacher with keeping a pulse on how students are progressing towards the GSE as they go through the lesson. Prior to implementing a task or activity, it is helpful to consider possible understandings AND misunderstandings which may arise as students complete a task.

I Used to Think...But Now I Know… is a formative assessment as well as a self-assessment. This can be implemented during the reflection portion of a lesson as shown in this sample learning plan.

Student Learning Supports

At all grades, the mathematics big ideas encourage students to reason mathematically, to evaluate mathematical arguments both formally and informally, to use the language of mathematics to communicate ideas and information precisely, and to make connections among mathematical topics and to other disciplines. The following strategies are intended to support students who are struggling to progress towards this goal:

- ***Conceptual Processing:*** Utilize the Concrete-Representational-Abstract instructional sequence to support students in making connections among mathematical ideas, facts and skills, and reflecting upon and refining one's own understanding of relationships, generalizations and connections.
- ***Language:*** Strategically select language routines to support students in describing strategies, explaining their reasoning, justifying solutions and making persuasive arguments.
- ***Visual-Spatial Processing:*** Provide opportunities for students to engage with visual representations and manipulatives (virtual or concrete) as they solve problems, explore concepts and communicate ideas.
- ***Organization:*** Teach problem-solving strategies and problem types, as seen in the Mathematics Glossary: K – 12, in order to support students in figuring out how to get started, carrying out a meaningful sequence of steps while solving problems, keeping track of the information from prior steps, monitoring their own progress and adjusting strategies accordingly.
- ***Memory:*** Focus on conceptual strategies and patterns for computation, providing a scaffold for students who struggle with basic facts and carrying out written algorithms.

Here is a learning activity that can be used to support students' deepened understanding of the big idea.

- **Elena's Strategy Activity:**

Differentiation: Students may need to reenact Elena's thinking using base-ten blocks. If the actual manipulative is not available, the use of virtual base ten blocks would be helpful.

Extension: Encourage students to begin thinking beyond whole numbers. How might Elena use her strategy to solve 4.3 ÷ 2?

Engaging Families

Open Up Resources Family Activities- This resource from Illustrative Mathematics provides literature for parents/caregivers to understand the rationale of the strategies addressed within this unit. Sample problems are a part of this resource. Families are encouraged to work on the problems together.

Appendix

Student Handout

I Used to Think… But Now I Know Formative Assessment

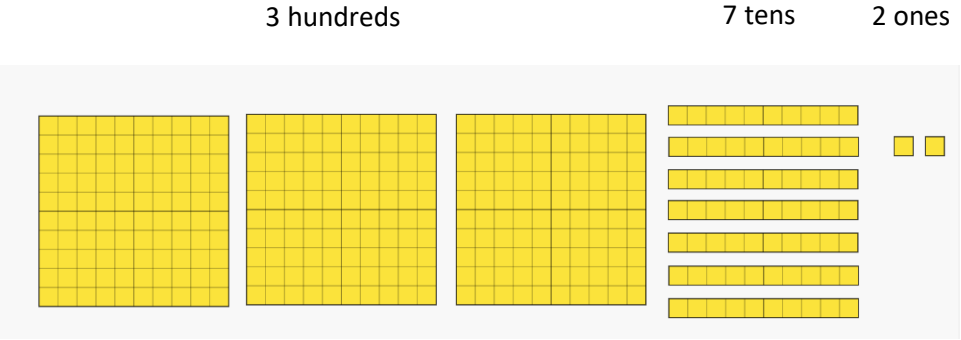
I used to think...	But now I know...

Appendix

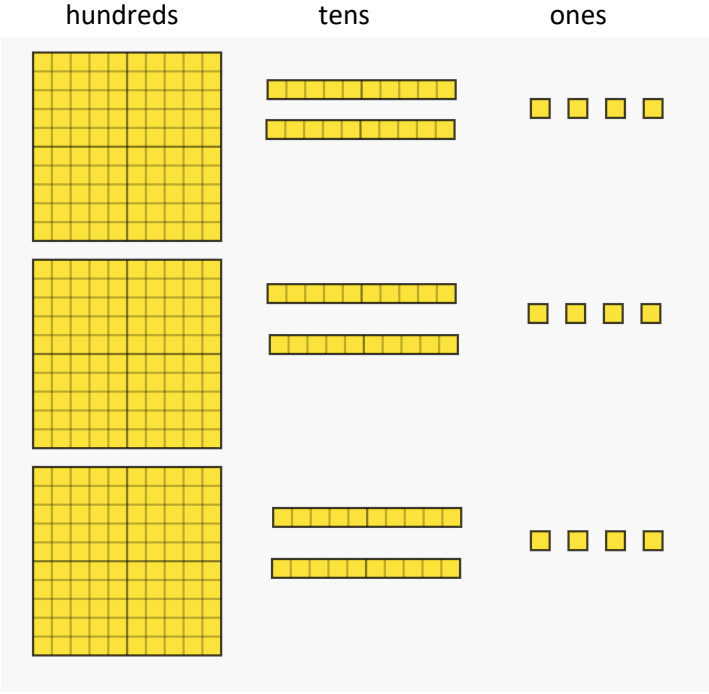
Student Handout

Elena's Strategy

Elena used base-ten diagrams to find 372 ÷ 3. She started by representing 372 using the following combination of base-ten number pieces:



She then made 3 groups, each with 1 hundred. Then, she put the tens and ones in each of the 3 groups. Here is her diagram for 372 ÷ 3.



Analyze the two diagrams and answer the following questions:

Question 1: Elena's diagram for 372 has 7 tens. The one for 372 ÷ 3 has only 6 tens. Why?

Question 2: Where did the extra ones (small squares) come from?