

Sample Mathematics Learning Plan

Big Idea/ Topic

- Develop an understanding and fluency with multi-digit multiplication, and develop an understanding of dividing to find quotients involving multi-digit dividends, generalize place value understanding to multi-digit whole numbers

Standard(s) Alignment

MGSE4.NBT.5 Multiply a whole number of up to four digits by a one-digit whole number, and multiply two two-digit numbers, using strategies based on place value and the properties of operations. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

MGSE4.NBT.6 Find whole-number quotients and remainders with up to four-digit dividends and one-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Diagnostic Assessment

4th Grade Diagnostic Assessment: What's the Problem?

- Provide each student with a copy of *What's the Problem?* task.
- Allot for 20 minutes for students to work on the task.
- Consider offering students the opportunity to use tiles with numbers written on them to manipulate.
- Make note of students who struggle to begin the task. Consider offering some scaffolding questions such as:
 - What does this mean?
 - What are the quantities in the problem?
 - What guess can I make?

Instructional Design

Engage

Numerical Thinking Game- Have students reflect on the following, "I am thinking of two whole numbers that multiply to 1000. Neither of my numbers contain the digit zero, What is the sum of these two numbers?" Have students record their answers in a variety of ways using words, pictures, and numerical representations.

- **Synchronous:** Complete during a classroom discussion or virtual classroom meeting.
- **Asynchronous:** Introduce the problem to students in a virtual platform; this can be done via e-document or video. Allow students to share responses and provide feedback to their peers within the virtual platform/classroom. VoiceThread is a great tool to use for students to respond and provide feedback to their peers: www.voicethread.com. Provide feedback to individual student responses and highlight multiple strategies used by students.
 - Online platform suggestion
 - **VoiceThread**: Students can use this web-based application to respond and provide feedback to their peers. This [link](#) provides instructions on how to create a new VoiceThread.
- **Unplugged/ Offline:** Encourage students to provide a written explanation of their thinking and how they reached their solution when solving problems. Provide feedback that demonstrates different strategies to solve problems. Alternatively, share a problem along with a strategy and solution; ask students to explain a different way to solve the problem.

Explore

Boxes and Rolls - 3 Act Task In this task, students will determine the amount of money in contained in boxes and rolls of coins.

- **Synchronous:** Complete during a classroom discussion or virtual classroom meeting.
- **Asynchronous:** Pre Record each act or create an e-document for each act. Allow students to share their thinking within the virtual platform/classroom. When students are asked to share their solutions and strategies in act 3, ask them to illustrate with drawings. Showcase different strategies students used and allow them to respond/give feedback within the virtual platform.
- **Unplugged/ Offline:** Provide students with information from Act 2 and provide them with the main questions "How can we use clues and reasoning to find an unknown number?" and "What patterns do I notice when multiplying whole numbers which help me multiply more efficiently?" Ask students to answer the question and provide a drawing that demonstrates how they solved the problem.

Build It, and Break It- In this task, the teacher selects a problem such as 24×16 . The students use base-ten blocks or grid paper to build an area model to match. Students are asked to show and record as many ways as possible to “slice” the 24×16 array.

Virtual Base Ten Blocks

- **Synchronous:** Complete the **Build It, and Break It** task during a classroom discussion.
- **Asynchronous:** Provide students with the materials to complete the activity on their own. Allow students time to virtually share the numerous ways they sliced the 24×16 array.
- **Unplugged/ Offline:** Provide students with the materials to complete the activity. They can record their responses in their math journals.

Apply

Scenario: The sun is capable of producing 10 times more electrical power than the population of the Earth uses. So, is it possible that, one day, the Earth could be completely reliant on solar energy? In this investigation, you will learn about solar energy, how it’s converted to electricity, the pros and cons for using it, and how it might be used in our community. You will also determine a plan for its use in your community.

- Watch this video to introduce solar power and how it works:
<https://www.youtube.com/watch?v=xKxrkht7CpY>
- Instructions for students: Begin this investigation by keeping a record of everything you use that utilizes electricity. Keep a record of how many times you, personally flip a switch on, charge an electronic device, turn on a computer, or television, radio, or phone, etc.?
- Students will keep an individual record of how many times they turn on a light for seven days and for how long they use it.
- The class will create a class data set, totaling the data for all students’ electricity usage.
- Use the data to create a bar graph showing the class electricity usage for each day of the week. Graphs could also be created to compare individual students’ usage of electricity to the class data. Class and team data could also be collected and compared.
- Utilize the [Engineering Design Process](#) to engage students in problem-solving to brainstorm how solar power might be used to decrease the amount of money spent on electricity in the school and/or community. Possible questions: How many solar panels are needed? How much will it cost to purchase/install? Where should they be installed? Do we have space for the panels? How long will they last? What about maintenance?
 - Questions for students and teachers:
 - What do you need to know?
 - What do you need to find out?
 - How can we find the answers to these questions?
- **Synchronous:** Using student data sets, analyze electricity usage (self and classmates’) and suggest ways to reduce use and money spent on electricity. Students can work in small groups online (breakout groups) to work on the Engineering Design problem.

- **Asynchronous:** Students can log data at different times and asynchronously analyze classmates' data. Students can work independently, and share progress from each of their parts of the Engineering Design problem via an online communication platform.
- **Unplugged/Offline:** Students record information on paper and share with the teacher. The teacher should provide data from other students to create class data set. Students can work independently and check in with the teacher on their progress.

Reflect

Would you rather problem: Would you rather have 38 baskets of 12 apples or 40 baskets of 10 apples?

- **Synchronous:** Have students complete the problem as an exit/out the door ticket.
- **Asynchronous:** Have students share their answers in a shared document or online comment forum.
 - Virtually (both synchronously or asynchronously), students can participate in a virtual gallery walk using Padlet. The teacher would share the question and place it in the middle of the Padlet frame. Students would make a case for their choice and group their choices together either for 38 baskets of 12 apples or 40 baskets of 10 apples. <https://padlet.com/>
- **Unplugged/ Offline:** Have students respond to the prompt in a math journal or on paper.

Evidence of Student Success

- Boxes and Rolls Formative Assessment Questions

- What models did you create?
- What organizational strategies did you use?

[4th Grade Diagnostic Assessment](#)

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 such as [CGI Problem Types](#) 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.

Boxes and Rolls - 3 Act Task

- **Intervention:** Allow students to model a roll of pennies using manipulatives or actual coins with a penny roll so that they can visually see and touch a roll of pennies.
- **Extension:** Students can complete a suggested Act IV situation or create their own Act IV situation. The following questions and/or situations can be used as an Act IV:
 - How much money in dollars and cents is in the boxes and rolls?
 - What are different combinations of coins that could be used instead of 6,500 pennies?

Engaging Families

- [Partial Product Finder](#) - This online game helps students develop conceptual understanding that is needed to build fluency of basic facts.
- [Double Digit Division Study Jams video](#) - This video provides students with examples of double-digit division. Students can watch the "Step-by-Step" video and then complete the practice problems in the "Test Yourself" section.