

Embedded Teaching Support

Unit Overview

The **Unit Overview** provides professional development to support the unit's instruction at the point of use, including:

- Focus, Coherence, and Rigor
- Routines
- Mathematical Practices
- Effective Teaching Practices
- Social and Emotional Learning
- Language Supports
- Routines

Unit Overview

Focus

Multiplication and Division

In this unit, students use a variety of representations to show multiplication and division situations. Visual representations of equal groups lay the foundation for multiplication and division. Real-life objects are used first, with students moving to representing multiplication and division with manipulatives, and then with numbers and symbols.

By the end of this unit, students should recognize whether a problem should be thought of as a multiplication or a division situation depending on how it is written. They also recognize that multiplication and division relate to each other because they represent the same number of objects and the same number of groups.

Students extend their understanding of addition and equal-group concepts learned in previous grades. These include:

- **Repeated addition:** Students use equal groups to find the product in multiplication equations.
- **Arrays:** Students use arrays to represent equal groups and can help solve multiplication and division equations.

Coherence

What Students Have Learned	What Students Are Learning	What Students Will Learn
<ul style="list-style-type: none"> • Repeated Addition and Arrays Students used repeated addition to find the total number of objects in an array. (Grade 2) • Equal Groups Students determined whether a group of objects was odd or even by pairing objects into two equal groups. (Grade 2) • Relate Addition and Subtraction Students add and subtract within 100 using the relationship between addition and subtraction. (Grade 2) 	<ul style="list-style-type: none"> • Understand Multiplication Students understand that multiplication represents the total number of objects in equal groups. • Understand Division Students understand that division can represent equal sharing or equal grouping. • Relate Multiplication and Division Students use representations to understand the relationship between multiplication and division. 	<ul style="list-style-type: none"> • Multiply Within 100 Students use patterns and multiplication properties to multiply within 100. (Grade 3, Units 4 and 5) • Divide Within 100 Students use strategies to divide within 100. (Grade 3, Unit 9) • Relate Multiplication and Division Students use the relationship between multiplication and division to solve division equations. (Grade 3, Unit 9)

Rigor

<p>Conceptual Understanding</p> <p>Students develop understanding of</p> <ul style="list-style-type: none"> • the meaning of multiplication; • the meaning of division; • the relationship between multiplication and division. 	<p>Procedural Skill and Fluency</p> <p>Students build proficiency with</p> <ul style="list-style-type: none"> • multiplication within 100; • division within 100; • solving real-world problems using multiplication and division. 	<p>Application</p> <p>Students apply their knowledge of:</p> <ul style="list-style-type: none"> • equal groups and arrays to solve multiplication problems; • equal groups and arrays to solve division problems.
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Effective Teaching Practices

Implement Tasks That Promote Problem Solving and Reasoning

Students need to be fully engaged in a complex problem or task and be able to discuss it with someone before they feel they have fully grasped the concept. This is especially true in mathematics because there are often multiple ways to arrive at the same solution. Discussions with others allow students to discover varied points of view and different strategies that they can apply to future problems.

Problems that best promote reasoning and problem solving are non-routine problems, or problems that require a higher level of thinking. Multiple steps may be involved in solving the problem, which would allow for even more variety of strategies to be developed.

Students may have differing opinions or may be confused by the information provided during some of these lessons. When this occurs, spend time discussing these problems.

When students are given the choice between multiplication and division in this unit, intentionally pair students who solved the problem using multiplication with those who solved the problem using division to analyze each other's answers. This grouping and academic discourse will allow for a deeper understanding of the relationship between multiplication and division.

- Instead of specifying tools or specific pathways, encourage students to find multiple solutions to multiplication and division problems. This allows for more strategies and creativity to develop.
- Assign tasks that require a higher level of thinking. For example, ask students to create representations to justify their answers. Consider having students write a word problem to match a multiplication or division equation.

Math Practices and Processes

Look For and Make Use of Structure

Mathematically proficient students try to discover patterns and structures, especially when introduced to new concepts. In some situations, students may be able to take a previously learned concept or structure and apply the same ideas to a new problem, add upon those ideas for a more advanced problem, or use those ideas to form a completely new structure. When students are fully able to develop and make use of structures, they can see the big picture and shift their perspective as needed. They are able to break down complex problems into simpler parts.

To help students build proficiency with looking for and making use of structure, they need opportunities to interact with different problem types. Some suggestions for building proficiency include:

- have students regularly analyze how their representations model the equations. This helps them notice the purpose and structure of the representation;
- have students find the products of several sets of factors, using counters in different colors to create representations. Ask them what pattern they notice when they multiply factors in a different order;
- to help them discern the patterns and structure of operations, have students look for similarities and differences between multiplication and division representations.

Social and Emotional Learning

What Skills Will We Develop?

- **Relationship Skills – Effective Communication** (Lesson 3-1): Students who can communicate effectively are more likely to build strong relationships and contribute to a positive classroom culture.
- **Self-Regulation – Initiative** (Lesson 3-2): When students independently initiate problem solving steps, they develop stronger learning habits.
- **Social Awareness – Value Diversity** (Lesson 3-3): When students value diversity, they create a stronger, more inclusive classroom community.
- **Responsible Decision-Making – Logic and Reasoning** (Lesson 3-4): When students think logically and apply reasoning, they can make informed decisions to help them find solutions.
- **Self-Awareness – Self-Efficacy** (Lesson 3-5): Students with high self-efficacy are more likely to persevere to complete a challenging task.
- **Self-Regulation – Planning and Problem Solving** (Lesson 3-6): Strong planners analyze a problem and create an informed plan for solving.
- **Responsible Decision-Making – Analyze Problems** (Lesson 3-7): As students analyze problems, they make informed decisions for solving.



Expert Insight Videos present industry experts who unpack each unit's content and identify what to look for as the unit progresses.

Effective Teaching Practices

Reveal Math's instructional design integrates NCTM's Effective Teaching Practices to ensure an environment that promotes rich learning, deep understanding, and mathematical success for all.

- Establish mathematical goals to focus learning.
- Implement tasks that promote reasoning and problem-solving.
- Use and connect mathematical representations.
- Facilitate meaningful mathematical discourse.
- Pose purposeful questions.
- Build procedural fluency from conceptual understanding.
- Support productive struggle in learning mathematics.
- Elicit and use evidence of student thinking.

Activity-Based Exploration

Students explore different arrangements of arrays to determine whether the orientation of the array changes the total number of objects in the array.

Materials: counters, geoboards, rubber bands

Directions: Students should be grouped in pairs. Provide 24 counters, a geoboard and rubberbands to each pair.

- Does changing the order of the factors change the product?

Encourage students to use a variety of tools and equations to explore this question. Students should provide several examples and models to justify their reasoning.

ETP Implement Tasks That Promote Reasoning and Problem Solving

- How can you change the order of the factors in the equation?
- How can you use an array to represent the multiplication equation?
- How can you use a geoboard or counters to represent the multiplication equation?
- How does changing the order change the representation?
- What do you notice about the factors and products for both equations?

Math is... Structure

- How are 3 groups of 4 and 4 groups of 3 similar?

Students should conclude 3 groups of 4 and 4 groups 3 represent the same total amount.

