



Bridging for Math Strength Resources

Standards of Learning Curriculum Framework

Standard of Learning (SOL) 3.4a Represent multiplication and division through 10×10 , using a variety of approaches and models



Student Strengths	Bridging Concepts	Standard of Learning
Students can skip count by twos, fives, and tens and identify number patterns. Students can determine sums and differences.	Students can relate skip counting (equal groups) to multiplication and relate repeated addition/subtraction to multiplication/division. Students understand multiplication/division conceptually (understanding making equal groups or shares).	Students can represent multiplication and division through 10×10.

Understanding the Learning Trajectory

Big Ideas:

- Early counting and addition strategies, such as skip counting and using doubles, provide a foundation for solving multiplication problems. Multiplication and division are inverse operations. Multiplication and division can be represented in a variety of different approaches and models, such as equal-sized groups, arrays, length model (number line), commutative property.
- The equal-sets or equal-groups model lends itself to sorting a variety of concrete objects into equal groups and reinforces the concept of multiplication as a way to find the total number of items in a collection of groups, with the same amount in each group, and the total number of items can be found by repeated addition or skip counting. The array model, consisting of rows and columns (e.g., four rows of six columns for a 4-by 6 array), helps build an understanding of the commutative property.
- In multiplication, one factor represents the number of equal groups and the other factor represents the number in or size of each group. The product is the total number in all of the groups. Models of multiplication may include repeated addition and collections of like sets, partial products, and area or array models.

- Division is the operation of making equal groups or shares. When the original amount and the number of shares are known, divide to determine the size of each share. When the original amount and the size of each share are known, divide to determine the number of shares. Both situations may be modeled with base-ten manipulatives. Division is the inverse of multiplication. Terms used in division are dividend, divisor, and quotient. Students benefit from experiences with various methods of division, such as repeated subtraction and partial quotients.

[Math Strength Instructional Video 3.4a](#)[↗]

Formative Assessment:

- [Just in Time Mathematics Quick Check 3.4a PDF](#)
- [Just in Time Mathematics Quick Check 3.4a Desmos](#)

Important Assessment Look Fors:

- Student relates skip counting to multiplication.
- Student uses repeated addition/subtraction and relates it to multiplication/division.
- Student solves problems in different ways that show the same idea.
- Student uses manipulatives to represent a problem and translate that into an accurate picture.

Purposeful Questions:

- Tell me about your answer. What does your answer represent?
- How does your drawing represent the problem? Explain your reasoning for selecting that representation.
- Is there another representation you could use? What would it look like on a number line?
- Which number is the whole (product/dividend) and which numbers are the parts (factors/divisor/quotient) in your related facts?
- What expression (or equation) would match this problem? (e., Sue has 5 pencil boxes with 8 pencils in each box. How many pencils does she have?).
- Does it matter what order the factors are in? Why or why not?

Bridging Activity to Support Standard	Instructional Tips
Routine Number Talk Array Photos Same but Different Math Same & Different: Dog Treat Packs mathlearningcenter.org	These number talk array photos will allow students to connect rectangular arrays with rows and column and multiplication facts. Same but different Math has opportunities to connect students who are using skip counting and repeated addition with the efficiency of multiplication. In addition there are many visuals that show equal groups and numbers in each group and shows the two different ways as shown here with 2×3 and 3×2 with the popcorn containers showing the commutative property of multiplication or 3×6 and 6×3 with the dog treat packs.
Rich Tasks Amara's Tiles	For Amara's Tiles, teachers can extend to include various representations of

From Classroom-Ready Rich Math Tasks Gr. 2-3 Koala Party From Classroom-Ready Rich Math Tasks Gr. 2-3 “How Many Pencils?” Illustrative Mathematics	students’ rectangles (other options for representations: array, equal groups, number line). Koala Party is a great task to show equal groupings using division. The number of guests is the dividend, the number of seating around each table is the divisor and the quotient tells you how many tables. This open ended task allows students to determine the seating around the table (other options for representations: array, equal groups, number line). How Many Pencils? (Equal Groups) There are 6 tables in Mrs. Potter's art classroom. There are 4 students sitting at each table. Each student has a box of 10 colored pencils. (A) How many colored pencils are at each table? (B) How many colored pencils do Mrs. Potter's students have in total? (other options for representations: array, equal groups, number line).
Games/Tech How Many Rows? Youcubed Bunny Times from NCTM ↗ Mathigon Multiplication Cards ↗ Desmos 3.4a Polygraph: Dot Arrays Desmos 3.4a Multiplication with Arrays: Building on 2s and 5s	Teachers can extend the pencil routine to include different representations of the same value of pencils (compare how an array is similar to base-ten blocks). Become confident in facts up to 12 x 12 using visual models that stress the conceptual aspects of multiplication. This Custom Polygraph is designed to spark vocabulary-rich conversations about dot arrays. Key vocabulary that may appear in student questions include but are not limited to: array, equal groups, rows, columns, product, factors, rectangle, squares. This activity encourages students to solve multiplication problems using arrays that build from 2, 5, and 10 facts. Students match the fact to the representation. They also decompose arrays to make friendlier facts.
Other Resources: • VDOE Mathematics Instructional Plans (MIPS): ◦ 3.4a - Multiplication Representations (Word) / PDF Version • VDOE Co-teaching Mathematics Instructional Plans ◦ 3.4 - Multiplication and Division (Word) / PDF Version • VDOE Word Wall Cards: Grade 3 (Word) and (PDF) Learning Trajectory Resources: Charles, R. (2005). Big ideas and understandings as the foundation for elementary and middle school mathematics. <i>Journal of Mathematics Education Leadership</i>, 7(3), NCSM. Clements, D. H., & Sarama, J. (2019). Learning and teaching with learning trajectories [LT]2. Marsico Institute, Morgridge College of Education, University of Denver. https://www.learningtrajectories.org/ Common Core Standards Writing Team. (2019). Progressions for the Common Core State Standards for Mathematics. Tucson, AZ: Institute for Mathematics and Education, University of Arizona. Richardson, K. (2012). How Children Learn Number Concepts: A Guide to Critical Learning Phases. Bellingham: Math Perspectives Teacher Development Center.	

Van De Walle, J., Karp, K. S., & Bay-Williams, J. M. (2018). *Elementary and Middle School Mathematics: Teaching Developmentally*. (10th edition) New York: Pearson (2019:9780134802084)
VDOE Curriculum Framework for All Grades - Standard of Learning Curriculum Framework (SOL)