The Consortium
Alberta Professional Learning Consortium

Developing Fluency for Basic Number Facts Multiplication & Division (Grades 3–6)

Summer Symposium 2025
August 18th, 2025
Presented by Tammy Leslie

The Hay Bale, The Trees And The Big Red Grain Elevator - By Jason Carter

Land Acknowledgement

A Little About Me ...

Tammy Leslie
Designer of Professional Learning
tammy.leslie@aplc.ab.ca

Warm-Up – Fact or Fiction?

Instructions:

1. Use Zoom reactions – 👍 for Fact, ❤️ for Fiction.
2. I'll read a statement – respond quickly in the chat.
3. Then we'll briefly discuss the answer whether the statement was fact or fiction

Fact or Fiction?

- 1. If a student can answer 30 multiplication facts in a minute, they are fluent.
- 2. Knowing that 6 × 8 = 48 can help you solve 48 ÷ 6.
- 3. Fluency develops naturally without intentional teaching.
- 4. If you forget a fact, you can use known facts to figure it out.

What We Know .....

- Speed is not the only measure of fluency.
- True fluency combines accuracy, efficiency, and flexibility.
- Linking multiplication and division strengthens number sense.
- Strategy-based thinking helps students recover facts they forget.

Session Overview

- Understanding fluency in multiplication and division
- Exploring foundational concepts and strategies
- Building basic fact fluency by incorporating thinking strategies and embedding practice throughout the year

Let’s Start with the Curriculum

Grade 3 and 4

Supporting every educator
in every classroom

Mathematics Kindergarten to Grade 6 Curriculum

Alberta

	Grade 3			Grade 4		
Organizing Idea	Number: Quantity is measured with numbers that enable counting, labelling, comparing, and operating.					
Guiding Question	How can multiplication and division provide new perspectives of number?			How can multiplication and division be interpreted?		
Learning Outcome	Students analyze and apply strategies for multiplication and division within 100.			Students multiply and divide natural numbers within 10 000.		
	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
	Multiplication and division are inverse mathematical operations. Multiplication is repeated addition. Multiplication can be interpreted in various ways according to context, such as • equal groups • an array • an area Division can be interpreted in various ways according to context, such as • equal sharing • equal grouping • repeated subtraction The order in which two quantities are multiplied does not affect the product (commutative property). The order in which two numbers are divided affects the quotient. Multiplication or division by 1 results in the same number (identity property).	Quantities can be composed and decomposed through multiplication and division.	Compose a product using equal groups of objects. Relate multiplication to repeated addition. Relate multiplication to skip counting. Investigate multiplication by 0. Model a quotient by partitioning a quantity into equal groups or group of a certain size, with or without remainders. Visualize and model products and quotients as arrays. Recognize interpretations of multiplication and division in variou contexts.	Recall of multiplication and division number facts facilitates multiplication and division strategies. Standard algorithms facilitate multiplication and division of natural numbers that have multiple digits. Estimation can be used to check the reasonableness of a product or quotient.	Multiplication and division strategies can be chosen based on the nature of the numbers.	Recall and apply multiplication number facts, with factors to 12, and related division number facts. Investigate patterns in multiplication and division of natural numbers by 10, 100, and 1000. Multiply and divide 3-digit natural numbers by 1-digit natural numbers using personal strategies. Examine standard algorithms for multiplication and division. Multiply and divide 3-digit natural numbers by 1-digit natural numbers using standard algorithms. Divide and express a quotient with or without a remainder. Investigate strategies for estimation of products and quotients. Assess the reas ableness of a product or quo nt using estimation. Solve problem using multiplication and division.

Grade 3 and 4 (cont..d)

Supporting every educator
in every classroom

Mathematics Kindergarten to Grade 6 Curriculum

Alberta

	Grade 3			Grade 4		
	Numbers can be multiplied or divided in parts (distributive property). Multiplication strategies include • repeated addition • multiplying in parts • compensation Division strategies include • repeated subtraction • partitioning the dividend Products can be expressed symbolically using the multiplication sign, ×, factors, and the equal sign. Quotients can be expressed symbolically using the division sign, ÷, dividend, divisor, and the equal sign. A missing quantity in a product or quotient can be represented in different ways, including • $a \times b = \square$ • $a \times \square = c$ • $\square \times b = c$ • $e \div f = \square$ • $e \div \square = g$ • $\square \div f = g$ A remainder is the quantity left over after division.	Sharing and grouping situations can be interpreted as multiplication or division. Multiplication and division strategies can be supported by addition and subtraction.	Investigate multiplication and division strategies. Multiply and divide within 100. Verify a product or quotient using inverse operations. Determine a missing quantity in a product or quotient in a variety of ways. Express multiplication and division symbolically. Explain the meaning of the remainder in various situations. Solve problems using multiplication and division in sharing or grouping situations.			
	A multiplication table shows both multiplication and division facts. Fact families are groups of related multiplication and division number facts.	Multiplication number facts have related division facts.	Examine patterns in multiplication and division, including patterns in multiplication tables and skip counting. Recognize families of related multiplication and division number facts. Recall multiplication number facts, with factors to 10, and related division facts.			

Grade 5 and 6

Supporting every educator
in every classroom

	Grade 5			Grade 6		
Organizing Idea	Number: Quantity is measured with numbers that enable counting, labelling, comparing, and operating.					
Guiding Question	In what ways can the processes of multiplication and division be articulated?			How can the processes of multiplication and division be applied to decimal numbers?		
Learning Outcome	Students multiply and divide natural numbers within 100 000, including with standard algorithms.			Students apply standard algorithms to multiplication and division of decimal and natural numbers.		
	Knowledge	Understanding	Skills & Procedures	Knowledge	Understanding	Skills & Procedures
	Multiplication and division of numbers with many digits is facilitated by standard algorithms.	Standard algorithms are efficient procedures for multiplication and division.	Explain the standard algorithms for multiplication and division of natural numbers. Multiply up to 3-digit by 2-digit natural numbers using standard algorithms. Divide 3-digit by 1-digit natural numbers using standard algorithms. Express a quotient with or without a remainder according to context. Assess the reasonableness of a product or quotient using estimation. Solve problems using multiplication and division of natural numbers.	Standard algorithms are reliable procedures for multiplication and division of numbers, including decimal numbers. A quotient with a remainder can be expressed as a decimal number.	Multiplication and division of decimal numbers is facilitated by standard algorithms.	Explain the standard algorithms for multiplication and division of decimal numbers. Multiply and divide up to 3-digit natural or decimal numbers by 2-digit natural numbers, using standard algorithms. Assess the reasonableness of a product or quotient using estimation. Solve problems using multiplication and division, including problems involving money.

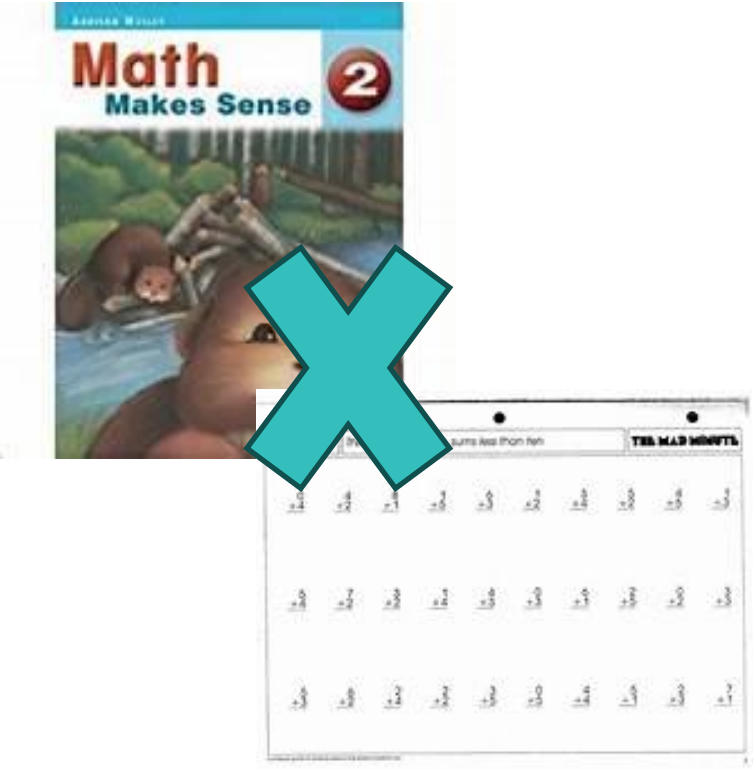
Fundamental Flaws

“Basic fact strategies are taught as a chapter or unit, or during a certain time frame ”

“Assuming timed tests = mastery”

"Students were not taught through a teaching strategy, but through memorization.”

“Students were not given enough time to master foundation and derived facts”



Why might a student struggle with multiplication and division facts?

- Student tries to memorize facts to soon without proper understanding of number relationships.
- Student needs more support with modeling the action of multiplication and division.
- Student didn’t master multiplicative thinking, “equal groups of”.
- A student cannot memorize facts.
- A student doesn’t have efficient and effective strategies.
- A student doesn't understand the inverse relationship between multiplication and division.

Where to Start?

Understanding Multiplication and Division

The Essential “Big Rocks”

- Our number system is a system of patterns.
- Numbers can count objects or groups.
- Addition and multiplication are related operations.
- Subtraction and division are related operations.
- Multiplication and division are inverse operations.
- Numbers are flexible.

Introducing the Concepts of Multiplication and Division

Before pushing for fluency, students need to *understand what multiplication and division mean*.

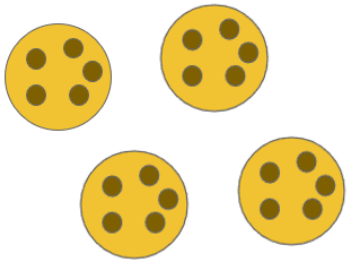
- Use a variety of models to visualize multiplication and division.
- Investigate the concepts of multiplication and division by relating to contexts through student examples and literature.
- Model using different problem types.
- Understand the properties.
- Link the operations by showing how multiplication and division are *inverse operations*. (Fact Families)

Equal Groups

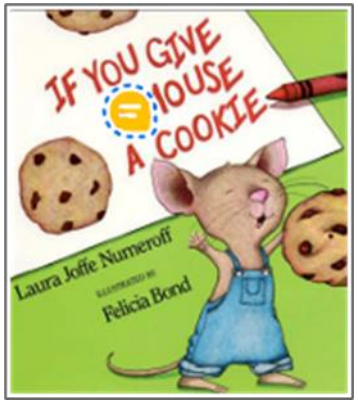
In Grade 3, students develop the concept of multiplication by establishing "the value of equal groups". This is often done through concrete manipulatives and modelling action stories.

This is the start to building **multiplicative thinking.**

Each cookie has 5 chocolate chip cookies on it. The mouse had 4 cookies. How many chocolate chip cookies did the mouse eat?



5+5+5+5=20

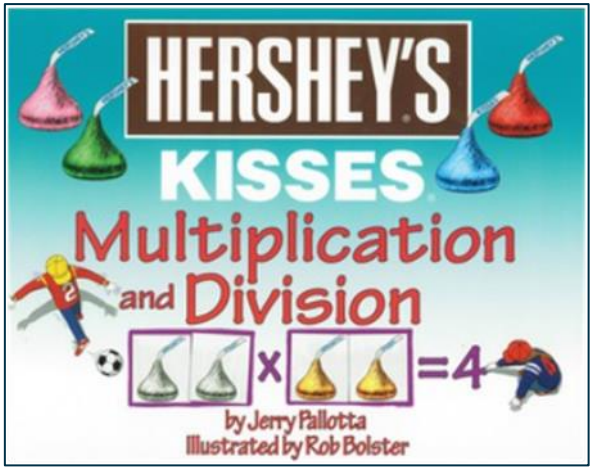


How could you represent this?

- **As equal groups**
- **As repeated addition**

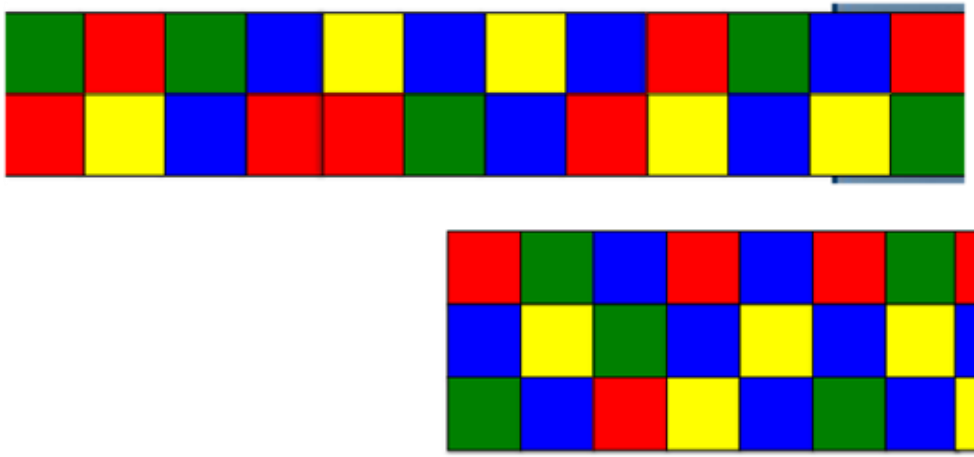
Array

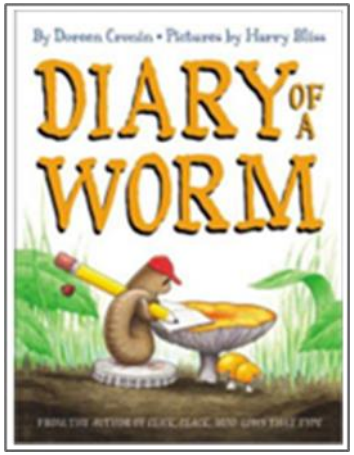
After Halloween, Dylan collected 12 Hershey kisses. He put the kisses in rows and columns. How many different rows and columns could he build with 12 kisses.



Area Model

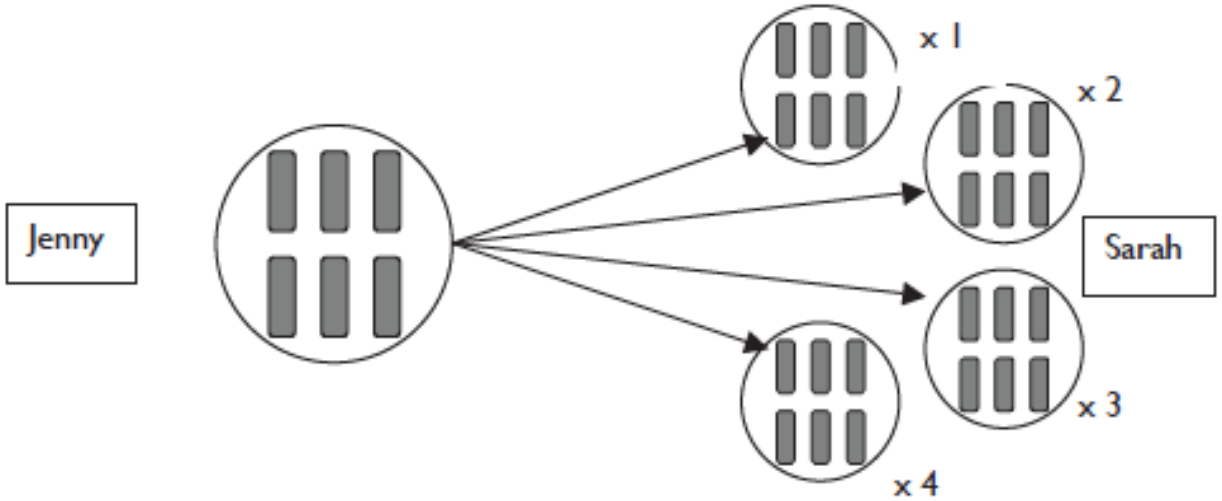
At school, worms built rectangles with exactly 24 tiles. What might the length and width of the rectangles have been?





Multipication can describe a comparison

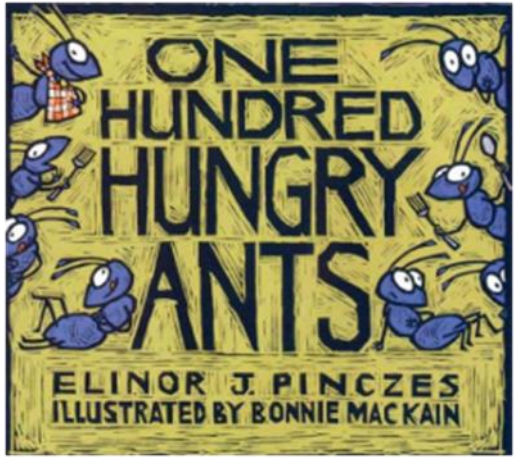
Jenny's found six shells at the beach. Sarah found 4 times as many. How shells did Sarah find?



Repeated Subtraction

There are 18 ants marching off on their own. They split into groups of 3 ants. How many groups of ants will there be?

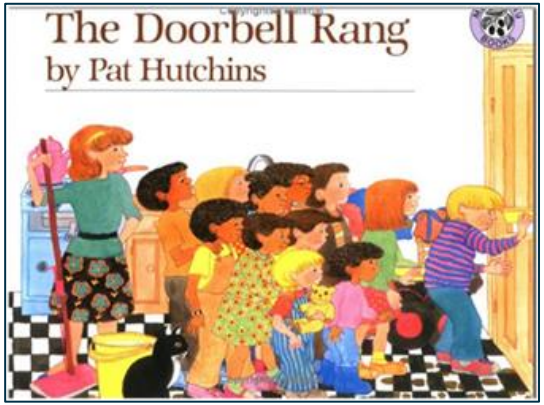
$$18 - 3 = 15$$
$$15 - 3 = 12$$
$$12 - 3 = 9$$
$$9 - 3 = 6$$
$$6 - 3 = 3$$
$$3 - 3 = 0$$



Equal Sharing

Mom bakes **24 cookies** for Victoria and Sam to share. Then the doorbell rings, and **6 friends** arrive, so now there are **8 children** altogether.
If the cookies are shared equally among the children, how many cookies does each child get?

24÷8=



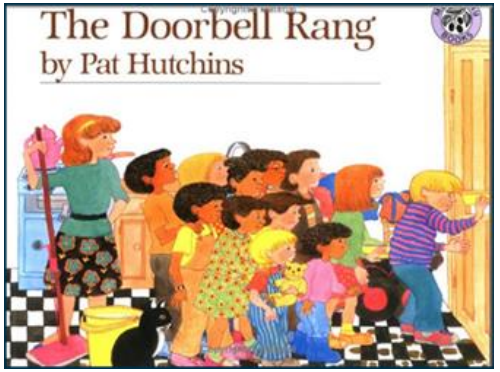
Equal-sharing division (also called "partitive division"):

- *What is **known**:* the *total* and *number* of groups.
- *What is **unknown**:* the *size* of the groups (the rate - how many per one).
- *The **action**:* a total shared equally among a given number of groups to determine how many per group.

Equal Grouping

Mom has 24 cookies. She decides to give 3 cookies to each child. How many children can get cookies before they run out?

24÷3=

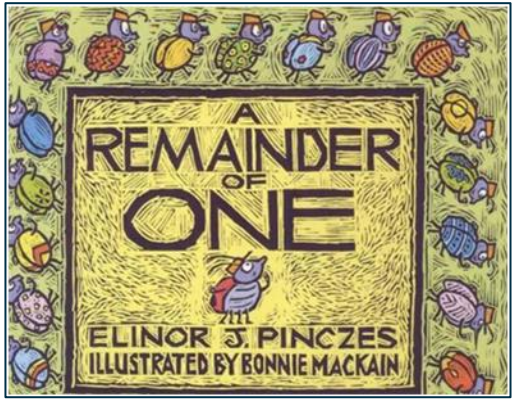


Equal-grouping division (also called "measurement division" or "quotative division"):

- *What is* ***known****:* the *total* and the *size* of groups (the rate - how many per one).
- *What is* ***unknown****:* the *number* of groups.
- *The* ***action****:* from a total, equal groups of a given size measured out.

Division Problems Can Have Remainders

The Queen's army of 25 ants must march in equal rows. General Joe is in charge of arranging the ants, but no matter how hard he tries, there always seems to be 1 ant left over!



If the ants are arranged in 4 equal rows, how many ants will be in each row, and how many ants will be left over?

$25 \div 4 = 6$ with a remainder of 1.

Model Using Different Problem Structures

DID YOU KNOW…

There are around 9 different problem structures for multiplication and division problems.

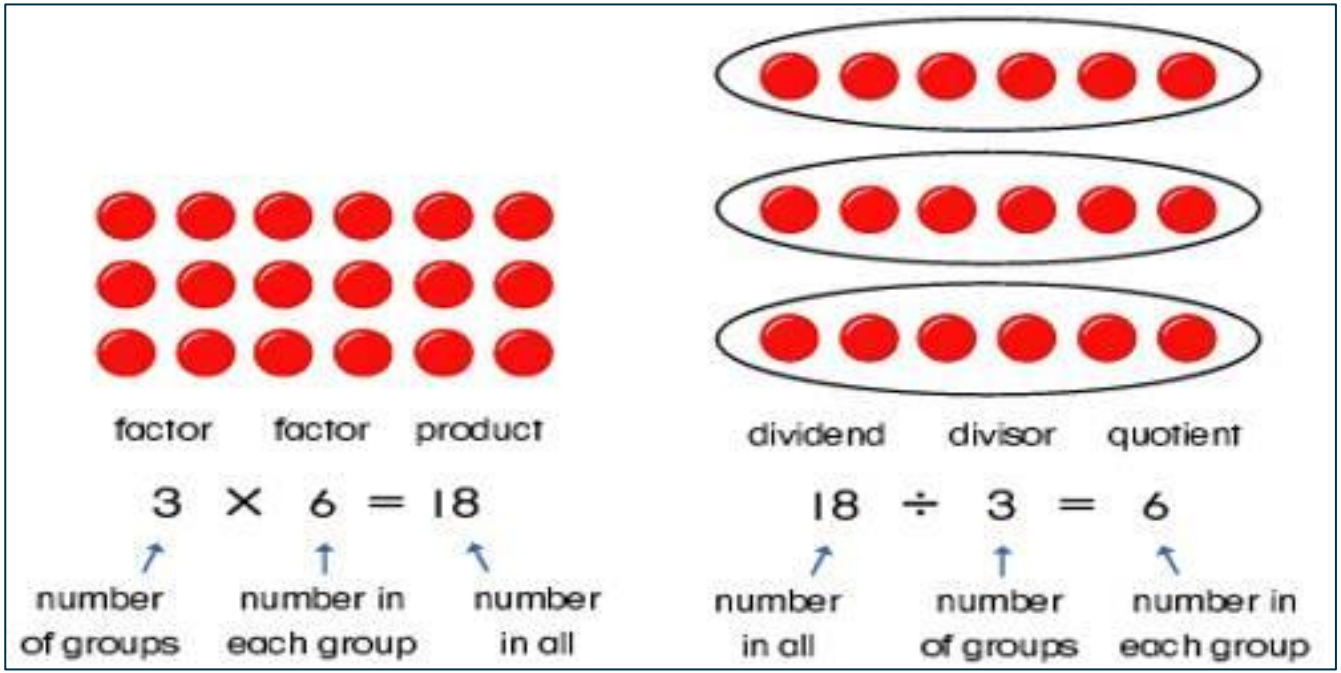
These structures remain the same throughout all grade levels. What changes is operations using multi-digit numbers, fractions or decimals to solve the problem.

	Unknown Product	Group Size Unknown ("How many in each group?" Division)	Number of Groups Unknown ("How many groups?" Division)
	3 × 6 = ?	3 × ? = 18, and 18 ÷ 3 = ?	? × 6 = 18, and 18 ÷ 6 = ?
Equal Groups	There are 3 bags with 6 plums in each bag. How many plums are there in all? *Measurement example.* You need 3 lengths of string, each 6 inches long. How much string will you need altogether?	If 18 plums are shared equally into 3 bags, then how many plums will be in each bag? *Measurement example.* You have 18 inches of string, which you will cut into 3 equal pieces. How long will each piece of string be?	If 18 plums are to be packed 6 to a bag, then how many bags are needed? *Measurement example.* You have 18 inches of string, which you will cut into pieces that are 6 inches long. How many pieces of string will you have?
Arrays,[4] Area[5]	There are 3 rows of apples with 6 apples in each row. How many apples are there? *Area example.* What is the area of a 3 cm by 6 cm rectangle?	If 18 apples are arranged into 3 equal rows, how many apples will be in each row? *Area example.* A rectangle has area 18 square centimeters. If one side is 3 cm long, how long is a side next to it?	If 18 apples are arranged into equal rows of 6 apples, how many rows will there be? *Area example.* A rectangle has area 18 square centimeters. If one side is 6 cm long, how long is a side next to it?
Compare	A blue hat costs $6. A red hat costs 3 times as much as the blue hat. How much does the red hat cost? *Measurement example.* A rubber band is 6 cm long. How long will the rubber band be when it is stretched to be 3 times as long?	A red hat costs $18 and that is 3 times as much as a blue hat costs. How much does a blue hat cost? *Measurement example.* A rubber band is stretched to be 18 cm long and that is 3 times as long as it was at first. How long was the rubber band at first?	A red hat costs $18 and a blue hat costs $6. How many times as much does the red hat cost as the blue hat? *Measurement example.* A rubber band was 6 cm long at first. Now it is stretched to be 18 cm long. How many times as long is the rubber band now as it was at first?
General	$a \times b = ?$	$a \times ? = p$, and $p \div a = ?$	$? \times b = p$, and $p \div b = ?$

[4]The language in the array examples shows the easiest form of array problems. A harder form is to use the terms rows and columns: The apples in the grocery window are in 3 rows and 6 columns. How many apples are in there? Both forms are valuable.
[5]Area involves arrays of squares that have been pushed together so that there are no gaps or overlaps, so array problems include these especially important measurement situations.

Image taken from https://theelementarymathmaniac.blogspot.com/2014/01/multiplication-and-division-word.html

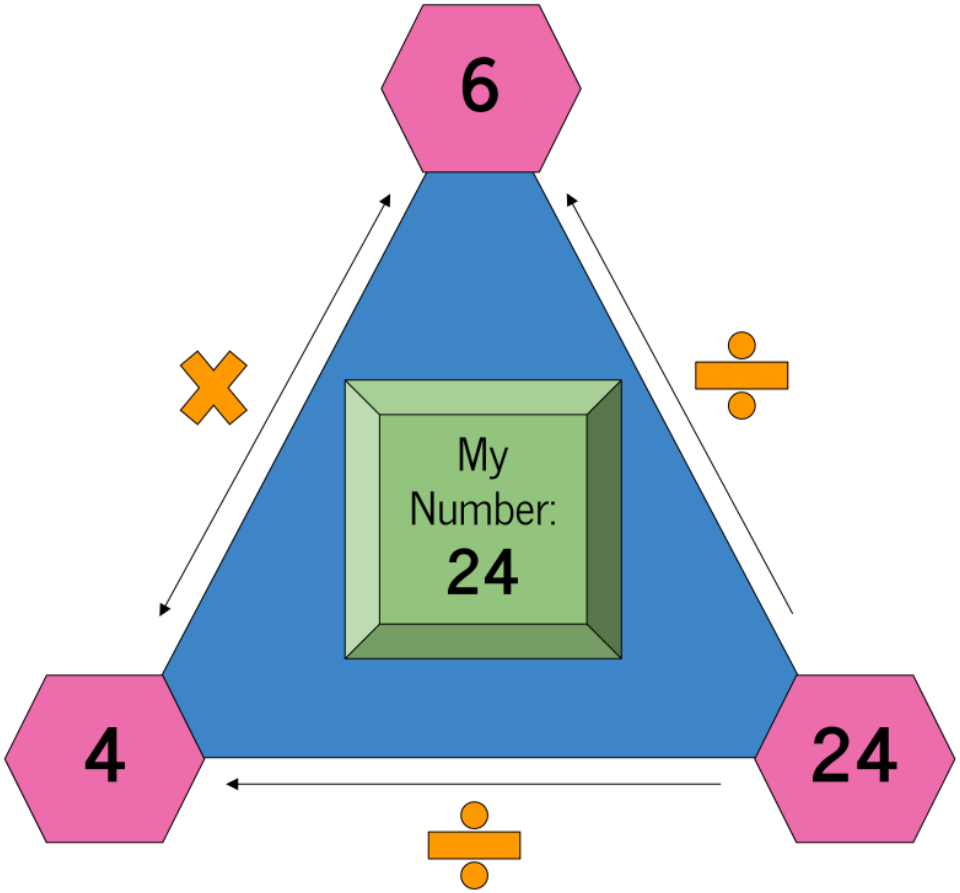
Linking Operations – Multiplication and Division are Inverse Operations



Let's Try:
"Fact Family" Warm-Up

aplc.ca

Multiplication and Division Fact Families



Related Facts

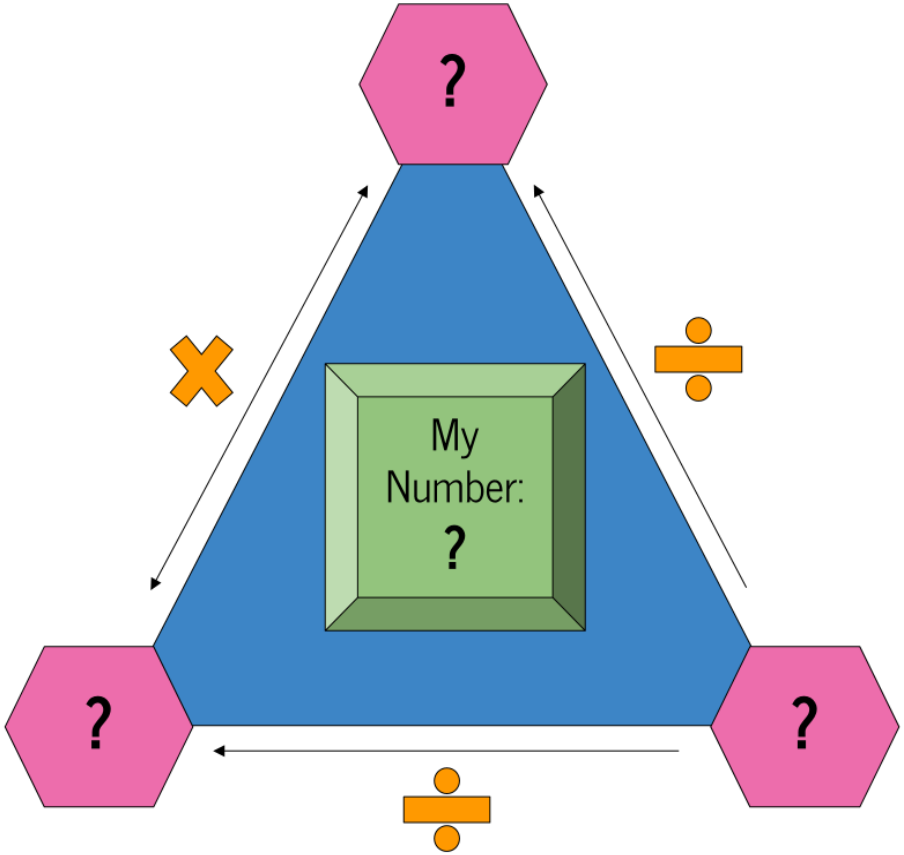
6 x 4 = 24

4 x 6 = 24

24 ÷ 4 = 6

24 ÷ 6 = 4

Multiplication and Division Fact Families



Related Facts

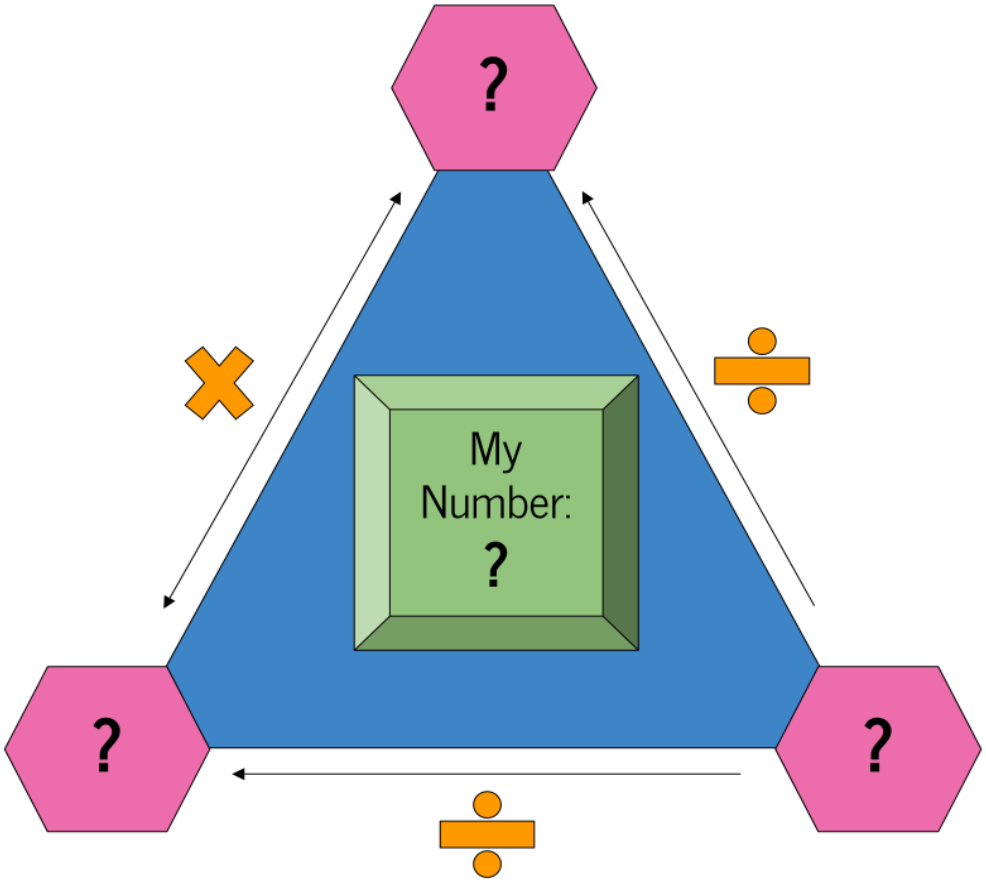
6 x 2 = ?

? x ? = ?

? ÷ ? = ?

? ÷ ? = ?

Multiplication and Division Fact Families



Related Facts

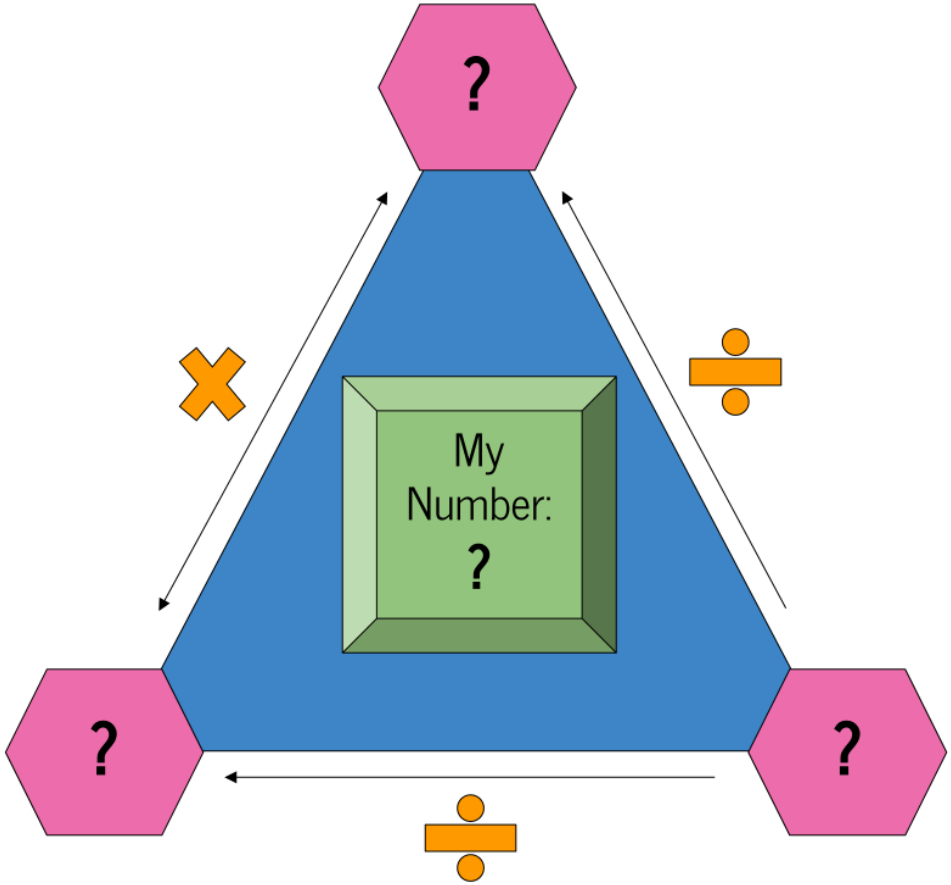
? x ? = ?

? x ? = ?

56 ÷ 8 = ?

? ÷ ? = ?

Multiplication and Division Fact Families



Related Facts

? x ? = ?

? x ? = ?

? ÷ 7 = 4

? ÷ ? = ?

Properties and Relationships

Commutative property - If you know 3 × 6, you also know 6 × 3.

Identity Property of Multiplication - the product of a number and 1 is always equal to the given number. **(1 x 15 = 15)**

Identity Property of Division - any number can be divided by 1 without changing the identity of the number. ($25 \div 1 = 25$

Distributive Property: Break apart tricky facts (e.g., 7 × 8 = (7 × 5) + (7 × 3)).

Inverse Operations: Connect multiplication and division (e.g., 6 × 7 = 42, 7 × 6 = 42, 42 ÷ 6 = 7, 42 ÷ 7 = 6).

Students need to understand the process of “Doubling”

6 x 4 = 24, I know that because 6 x 2 = 12, so 12 + 12 = 24

6 x 8 = 48, I know that because 6 x 4= 24, so 24 + 24 = 48

Let's Try:
"Number Web Challenge"
Warm-Up

aplc.ca

Instructions

Goal: To find related multiplication or division facts that connect to the starting fact.

1. Display a starting fact. (Eg, 5 x2 =10)
2. Provide 1-2 minutes to brainstorm as many as possible responses.
3. Debrief: Discuss strategies used (commutative property, inverse, doubling/halving, nearby facts) to arrive at response.

Number Web Challenge

$$6 \times 4 = 24$$

Find a related multiplication or division facts that connects to the starting fact. Type in the chat box. Be prepared to share the connection using math terms.

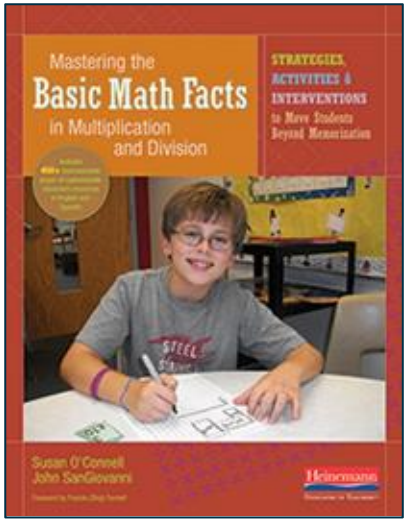
Example Number Web

- Starting fact: $6 \times 4 = 24$
- $4 \times 6 = 24$ (commutative property)
- $24 \div 6 = 4$ (inverse)
- $24 \div 4 = 6$ (inverse)
- $12 \times 4 = 48$ (doubling one factor)
- $6 \times 8 = 48$ (doubling the other factor)
- $3 \times 4 = 12$ (halving one factor and the product)

How to Build Fact Fluency?

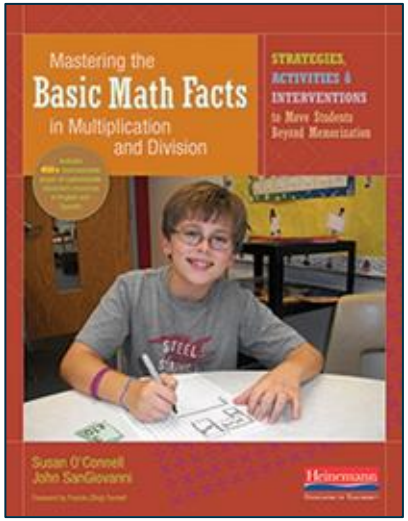
Start with the foundation and build to derived facts using a “Thinking Strategy”

Foundation Facts	
×2	Students have extensive experience skip-counting by twos and grouping in twos (pairs) and have developed an understanding of doubling. This set of facts is a natural place to begin exploring multiplication facts.
×10	The understanding of 10 is foundational in our number system. Students have experience skip-counting by 10, grouping in tens, and working with models of 10, such as ten-frames and base-ten blocks.
×5	Students have extensive experience skip-counting by 5. They recognize connections with money concepts (nickels). Previous exploration with ×10 facts leads to the insight that multiplying by 5 can be thought of as half of multiplying by 10.
×1	Although ×1 facts are simple to memorize, we do not begin with ×1 facts because of the confusion with the grouping aspect of multiplication (e.g., groups of 1?). Providing students with opportunities to explore groups of 2, 5, and 10 provides a stronger foundation for understanding multiplication facts.
×0	×0 facts are easy for students to commit to memory because the product is always 0, but this set of facts can be challenging for concrete thinkers. It is difficult to conceptualize a group of nothing. Once students have explored multiplication with 2, 10, 5, and 1, this set of facts becomes easier to understand.



This is a suggested teaching sequence from "*Mastering the Basic Facts in Multiplication and Division"* by Susan O['Connell and John San Giovanni

Building on the Foundation	
×3	Multiplying by 3 can be thought of as multiplying by 2 and then adding 1 more group, or as tripling a number.
×4	Multiplying by 4 can be thought of as doubling a double. The previous mastery of ×2 facts allows students to double ×2 products to find the ×4 products.
×6	Multiplying by 6 can be thought of as doubling a multiple of 3. Previous mastery of ×3 facts allows students to see that 4 × 6 can be thought of as double 4 × 3, or (4 × 3) + (4 × 3). Previous mastery of ×5 facts also supports students with ×6 facts, knowing that the product of a ×6 fact is simply 1 set more than the product of the related ×5 fact (e.g., the product of 6 × 8 is 8 more than the product of 5 × 8).
×9	Building on knowledge of ×10 facts, the product of a ×9 fact is 1 group less than the product of the same ×10 fact (e.g., 10 × 5 = 50, so 9 × 5 = 45, which is 5 less, or 10 × 7 = 70 and 9 × 7 = 63, which is 7 less).
×8	Multiplying by 8 results in a product that is double that of multiplying by 4. With the teaching sequence suggested in this book, only two of these facts have not been explored through a different strategy (7 × 8 and 8 × 8).
×7	Multiplying by 7 may be the most difficult for students. Students can break apart the 7 (distributive property) to find that it is the sum of 5 times the factor and 2 times the factor (e.g., 7 × 4 is (5 × 4) + (2 × 4). Although this works, it is more efficient to simply think *commutative property* and reverse the order of the factors. By doing this, students realize that they already know all of the ×7 facts except 7 × 7.



Depending on Student Needs

Teach each fact set (x3) at a time to the entire class. Teach a "thinking strategy" to support recall. (Grade 3 and 4)

For older grades or as "Small Group Instruction" - Group each student according the xfact needed to master. Not all students will need the same set practice. (Gr. 5 and 6)

Have multiple tasks and games of the same fact set for students to reinforce and practice. Dice and cards make it easy to provide adaptations.

Assess fact set after multiple practice and reinforcement. Once a student(s) has mastered a thinking strategy move on to the next, using suggested sequence (Susan O'Connell and John SanGiovanni).

An Approach to Mastering the Basic Facts

Introduce: the xfact. Use a "thinking strategy" and concrete visual models to develop the *conceptual understanding. Use anchor charts to display the thinking strategy.*

Target Practice and Reinforcement - Aim for daily practice (10 min/day) focusing only on that fact set.

Assess: the individual fact set and move to next fact set

s.

Introduce: "Today we are learning the thinking strategy called "doubling" to use for the x4 facts.

Supporting every educator in every classroom

<u>After Reading Discuss</u> :

What doubled in the story?
Are doubling and twice as many the same?
Can you find twice as many by adding?
Can you find twice as many by multiplying?

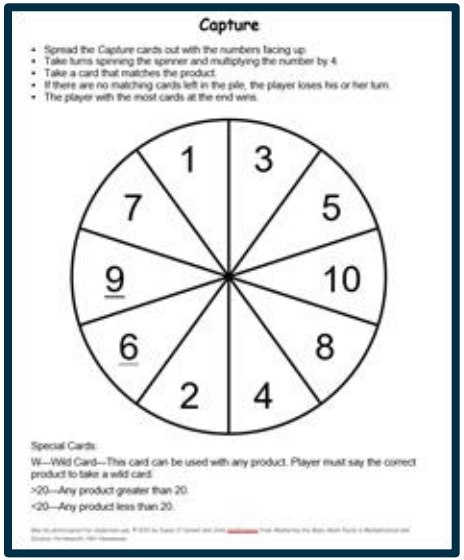
A funny, magical, rags-to-riches tale, which highlights the problems of abundance.

*REINFORCE AND PRACTICE

When students are confident with the conceptual understanding, then reinforce and practice

- frequently (daily)
- in short sessions (10 minutes)
- using a variety of activities

to build automaticity of the fact. (accurate, efficient and flexible).



Capture

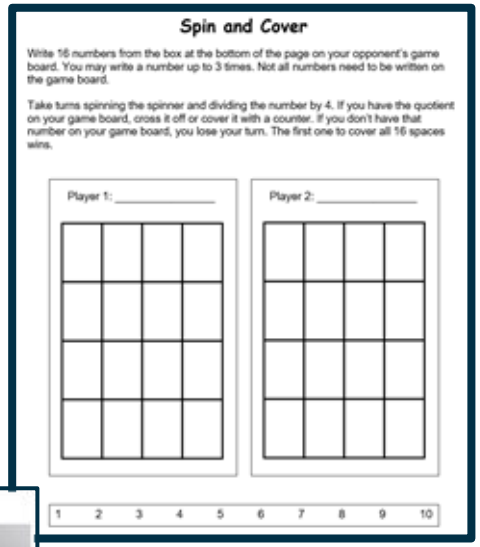
- Spread the Capture cards out with the numbers facing up.
- Take turns spinning the spinner and multiplying the number by 4.
- Take a card that matches the product.
- If there are no matching cards left in the pile, the player loses his or her turn.
- The player with the most cards at the end wins.

Special Cards:

W—Wild Card—This card can be used with any product. Player must say the correct product to take a wild card.

>20—Any product greater than 20.

<20—Any product less than 20.



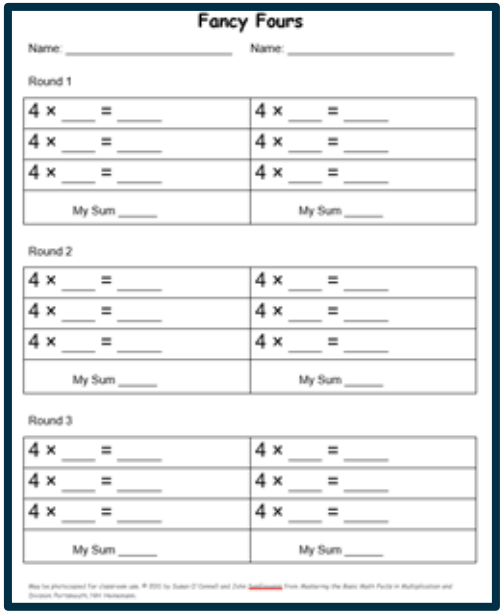
Spin and Cover

Write 16 numbers from the box at the bottom of the page on your opponent's game board. You may write a number up to 3 times. Not all numbers need to be written on the game board.

Take turns spinning the spinner and dividing the number by 4. If you have the quotient on your game board, cross it off or cover it with a counter. If you don't have that number on your game board, you lose your turn. The first one to cover all 16 spaces wins.

Player 1: _____ Player 2: _____

1 2 3 4 5 6 7 8 9 10



Fancy Fours

Name: _____ Name: _____

Round 1

4 × ___ = ___	4 × ___ = ___
4 × ___ = ___	4 × ___ = ___
4 × ___ = ___	4 × ___ = ___
My Sum ___	My Sum ___

Round 2

4 × ___ = ___	4 × ___ = ___
4 × ___ = ___	4 × ___ = ___
4 × ___ = ___	4 × ___ = ___
My Sum ___	My Sum ___

Round 3

4 × ___ = ___	4 × ___ = ___
4 × ___ = ___	4 × ___ = ___
4 × ___ = ___	4 × ___ = ___
My Sum ___	My Sum ___

What does it mean to double a number when you are multiplying?

Give an example of doubles multiplication.

Focus on only one fact set at a time (x4)

Ways to Reinforce and Practice

- ❑ Follow up activities from a mentor text
- ❑ Journal prompts
- ❑ Games
- ❑ Digital (Websites, online games
- ❑ Number/Math Talks
- ❑ Transitions- Use after recess, lunch, end of day (2-3 minutes)
- ❑ Peer Challenges: Cooperative rather than competitive

1. Salute
2. Back to Back
3. Around the World
4. True or False

Click here to access more quick multiplication games

Assess Progress – Check in Before Moving On

Math Fact Automaticity Interview

Student:	Date:
Fact Set:	Score:

Automatic (2)___ Strategy (1)___ Unknown (0)___ Note: Fact:	Automatic (2)___ Strategy (1)___ Unknown (0)___ Note: Fact:
Automatic (2)___ Strategy (1)___ Unknown (0)___ Note: Fact:	Automatic (2)___ Strategy (1)___ Unknown (0)___ Note: Fact:
Automatic (2)___ Strategy (1)___ Unknown (0)___ Note: Fact:	Automatic (2)___ Strategy (1)___ Unknown (0)___ Note: Fact:
Automatic (2)___ Strategy (1)___ Unknown (0)___ Note: Fact:	Automatic (2)___ Strategy (1)___ Unknown (0)___ Note: Fact:
Automatic (2)___ Strategy (1)___ Unknown (0)___ Note:	Automatic (2)___ Strategy (1)___ Unknown (0)___ Note:

Directions for Administering Math Fact Automaticity Interview

- Choose ten fact cards for a fact set.
- Randomly present each fact to a student.
- Record the fact in each box.
- Mark students who respond to the fact in four seconds, or less, as automatic.
- Mark students who respond in more than four seconds as "Strategy." *Note:* The teacher may want to ask the student how he or she arrived at the correct answer and record response in the Note section of the form.
- Mark students who give incorrect answers or say that they don't know the fact as "Unknown."
- Total points. Automatic responses earn 2 points. Strategy responses earn 1 point. Unknown responses earn 0 points.

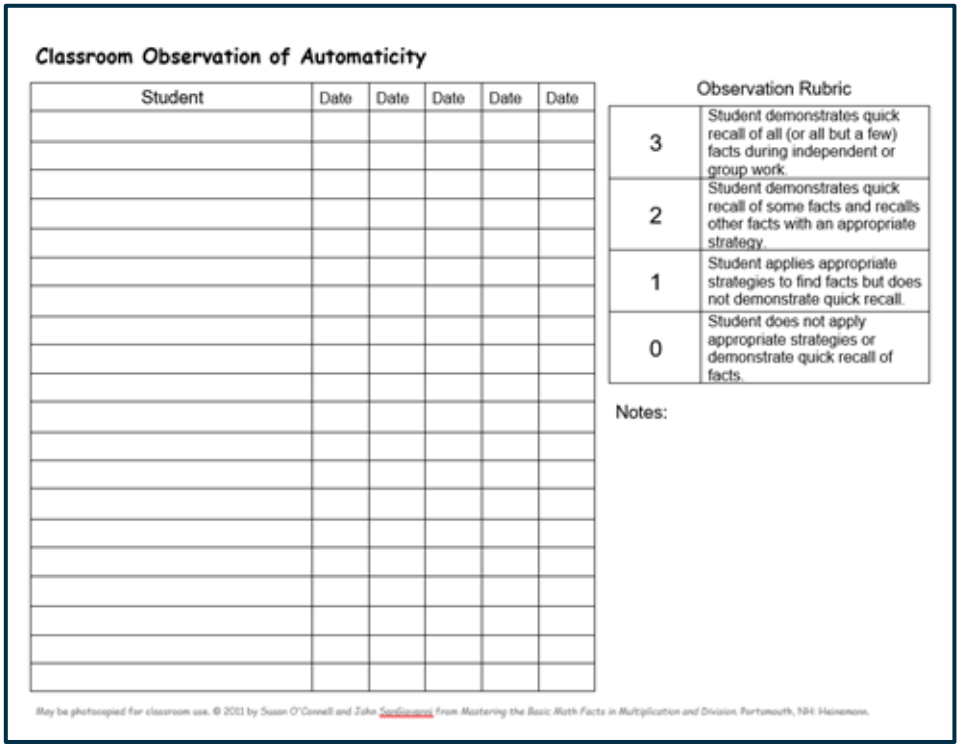
Thoughts About Interviews

- Other students in the class can be working on independent tasks or playing fact games while the teacher administers interviews.
- Interviews may be a good additional data point for students who struggle with quic fact checks or other more formal assessments.
- Four or fewer seconds is recommended for automatic responses. This time can be adjusted. A stopwatch or timer is not necessary. The teacher can simply count in h or her head.
- Notes are optional. It can be helpful to record how a student thinks about a fact or set of facts in order to adjust instruction or practice. Insight into misconceptions may also be revealed. Notes do not need to be formal.
- Notes are not recommended for automatic facts. This is because automaticity is the goal rather than strategy application. Once automatic, students may have little to share other than "I just know it."

x4 Fact Cards

2×4	4×2
3×4	4×3

Progress Monitoring – Grades 5 and 6



Classroom Observation of Automaticity

Student	Date	Date	Date	Date	Date

Observation Rubric

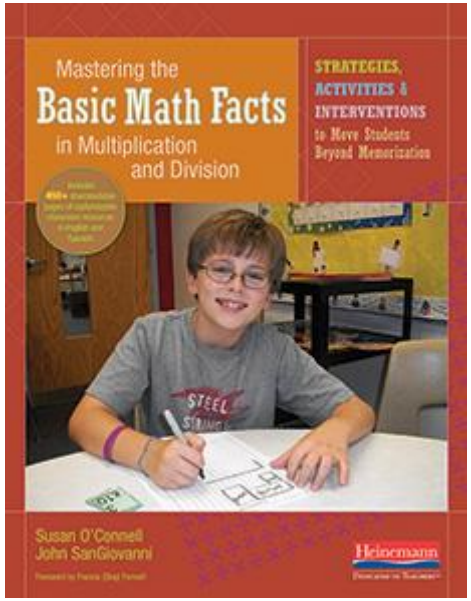
3	Student demonstrates quick recall of all (or all but a few) facts during independent or group work.
2	Student demonstrates quick recall of some facts and recalls other facts with an appropriate strategy.
1	Student applies appropriate strategies to find facts but does not demonstrate quick recall.
0	Student does not apply appropriate strategies or demonstrate quick recall of facts.

Notes:

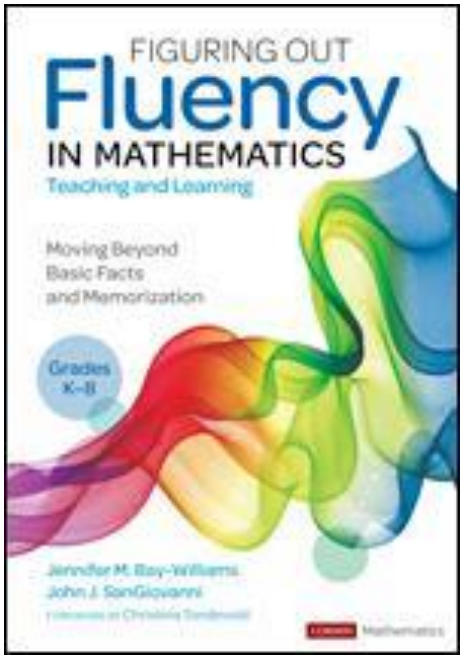
Additional Tips for Automaticity

- Discourage repeated addition/repeated subtraction as the only approach once facts are known.
- Push for retrieval with a “thinking strategy” when recall isn’t instant.
- Celebrate when students use thinking strategies effectively, not just speed.
- Once students have recall of each fact set, incorporate games that have students practice all multiplication and division facts.
- Students may not need to practice all the facts in a fact set. Modify games and activities to target specific facts to meet a student’s need.

Additional Resources



A solid understanding of math facts is one of the biggest keys to success and confidence in math students. This book provides clear strategies, teaching tips, and classroom activities to help mastery of multiplication and division facts become a reality for all of your students.

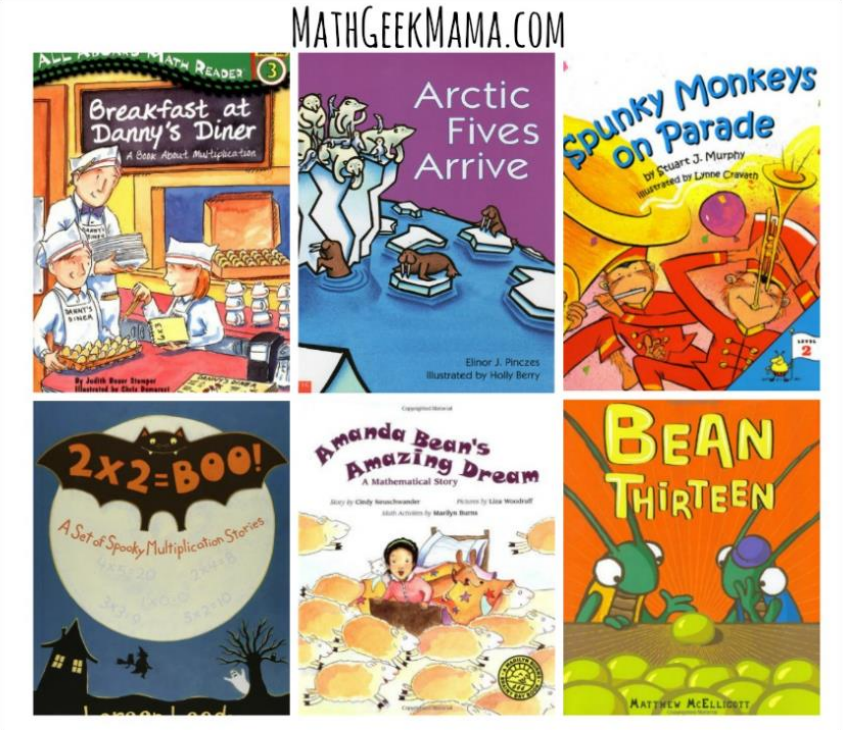


Fluency in mathematics is more than adeptly using basic facts of implementing algorithms. Real fluency involves reasoning and creativity and it varies by the situation at hand.

Figuring Out Fluency in Mathematics Teaching and Learning offers educators the inspiration to develop a deeper understanding of procedural fluency, along with a plethora of pragmatic tools for shifting classrooms toward a fluency approach. In a friendly and accessible style, this hands-on guide empowers educators to support students in acquiring the repertoire of reasoning strategies necessary to becoming versatile and nimble mathematical thinkers. It includes:

Link Literacy and Numeracy

Supporting every educator
in every classroom



Click on image for more literature

Multiplicative Thinking
Elementary Mathematics Professional Learning

Evidence of Understanding

+Big Idea #1

Multiplicative thinking extends through place value, percentages, scale, proportions, rate, ratio, arrays, division, fractions, decimals, etc.

What to look for, what might be evidence of understanding?

- Students understand place of a number, but not necessarily the value of the number. For example, in 324, the 2 is in the tens place. If you ask a student how many 10's are in 324, the correct answer is 32 tens.

+Big Idea #2

Multiplication can often be solved using repeated addition

What to look for, what might be evidence of understanding?

- Students see 3 x 4 as 3 groups of four and that this is different than 4 groups of three.
- Students can explain why 3 x 4 is equal to 4 x 3.
- Students can also provide situations showing 3 x 4 and 4 x 3 are different. For example, 3 dogs with four legs is not the same as 4 dogs with three legs.
- Students see 40 as:
  - 1 forty
  - 2 twenties
  - 4 tens
  - 5 eights
  - 8 fives
  - 10 fours
  - 20 two
  - 40 ones

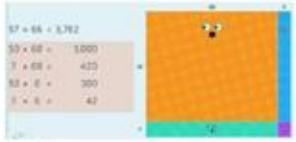
Warning
Multiplication cannot always be solved using repeated addition. For example, 2.5 x 3.8 and ⅓ x ¾ can not be interpreted as repeated addition. However, this concept comes later in grades 7 and up.

+Big Idea #3

The distributive property is a powerful strategy for mental math.

What to look for, what might be evidence of understanding?

- Students decompose numbers in an advantageous manner such as:
  - 28 x 30 = (20 x 30) + (8 x 30) or (30 x 30) - (2 x 30)
  - 12 x 45 = (10 + 2) x (40 + 5) = (10 x 40) + (10 x 5) + (2 x 40) + (2 x 5)
  - 57 x 66



- Evidence from top-end students.
  - 57 x 66 = (60 - 3) x (70 - 4)

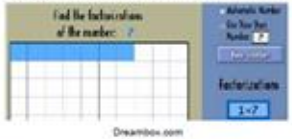
Watch a useful video on distributive property.*
**Please note that you can demonstrate the distributive property in the same manner as shown on the video using Lego blocks.*

+Big Idea #4

Multiplication and division by 1 and 0 have special properties.

What to look for, what might be evidence of understanding?

- When asked to build the area model for 7 x 1, student would build a line of 7.



- When asked to build the area model for 7 x 0, student should say that this is not possible.

+Big Idea #5

Multiplication and division are inverse operations.

What to look for, what might be evidence of understanding?

- Given a pair of factors, students can
  - create the 4 multiplication and division statements that result. For exam
    12; 4 x 3 = 12; 12 ÷ 4 = 3; 12 ÷ 3 = 4
- Students understand that commutative property only applies to multiplication b
  Example: 3 x 4 = 4 x 3 but 12 ÷ 4 ≠ 4 ÷ 12

Vocabulary is important. Click here

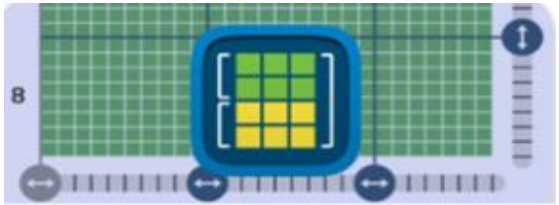
Math Learning Center - Click here

WHITEBOARD APP

Solve problems and explain your thinking in a digital math workspace.

Learn more

Open web app iOS

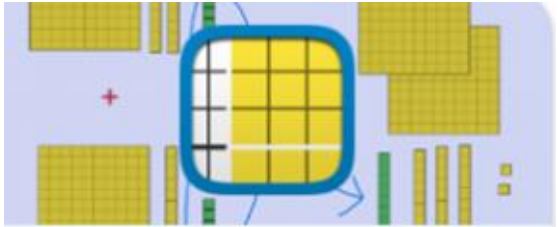


PARTIAL PRODUCT FINDER

Partial Product Finder allows multiplication combinations to be represented as a rectangle, or array, with dimensions that match the combination.

Learn more

Open web app



NUMBER PIECES

Use virtual base ten pieces to represent and work with multi-digit numbers.

Learn more

Open web app iOS Chrome

Planning Guide

Grade 3

Introducing Multiplication

Number

Specific Outcome 11

This Planning Guide can be accessed online at:
http://www.learnalberta.ca/content/mepg3/html/pg3_introducingmultiplication/index.html

Mathematics

Planning Guide

Grade 3

Introducing Division

Number

Specific Outcome 12

This Planning Guide can be accessed online at:
http://www.learnalberta.ca/content/mepg3/html/pg3_introducingdivision/index.html

Planning Guide

Grade 4 *Multiplication and Division Part B*

Number
Specific Outcomes 6, 7

This Planning Guide can be accessed online at:
http://www.learnalberta.ca/content/mepg4/html/pg4_multiplicationanddivisionb/index.html

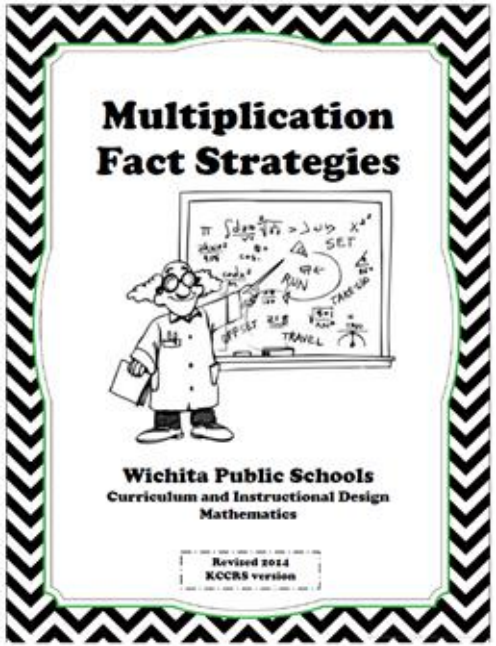
Mathematics

Planning Guide

Grade 5
Multiplying and Dividing Whole Numbers

Number
Specific Outcomes 5 and 6

This Planning Guide can be accessed online at:
http://www.learnalberta.ca/content/mepg5/html/pg5_multiplyingdividingwholenumbers/index.html



Fives Fact Strategy

Students will be working on the facts that have 5 as a factor. Products of facts with five as a factor will end in either a 5 or 0.

Materials Needed:
- Multiplication chart and student copies (use copy from Doubles lesson)
- "Flying High" and student copies
- 10-sided die/deck of cards (each person)
- transparent chip (each person)
- paper clip (pair)

Teaching Fact Activity

Focus: Get out your Multiplication Table and a colored pencil/crayon. Lightly color in the doubles facts once you have them learned. As the days go by, we will see the number of facts to memorize decrease (the spaces not yet shaded).

Directions:
Let's take a look at a problem and talk about how we might solve it.

The class made a mural of everyone's handprints. Jill counted the number of fingers. How many fingers will she have counted on six hands? *(Students respond and explain their thinking using words, pictures, manipulatives, or symbols.)*

She has counted 30 fingers. How many hands has she counted?

Clock Spinner

Materials: *Objects for counting by 5s such as hands, or hundred board and counters, paper and paperclip for each student*

Directions:
Provide opportunities for students to practice counting by 5s using a variety of objects and then from memory. Then have students draw a face clock on a sheet of paper (or provide a copy). Using the paper clip spinner, students generate multiplication problems by spinning the spinner. Whatever number the spinner lands on, multiply that number by 5. Repeat.

9 x 5 = 45

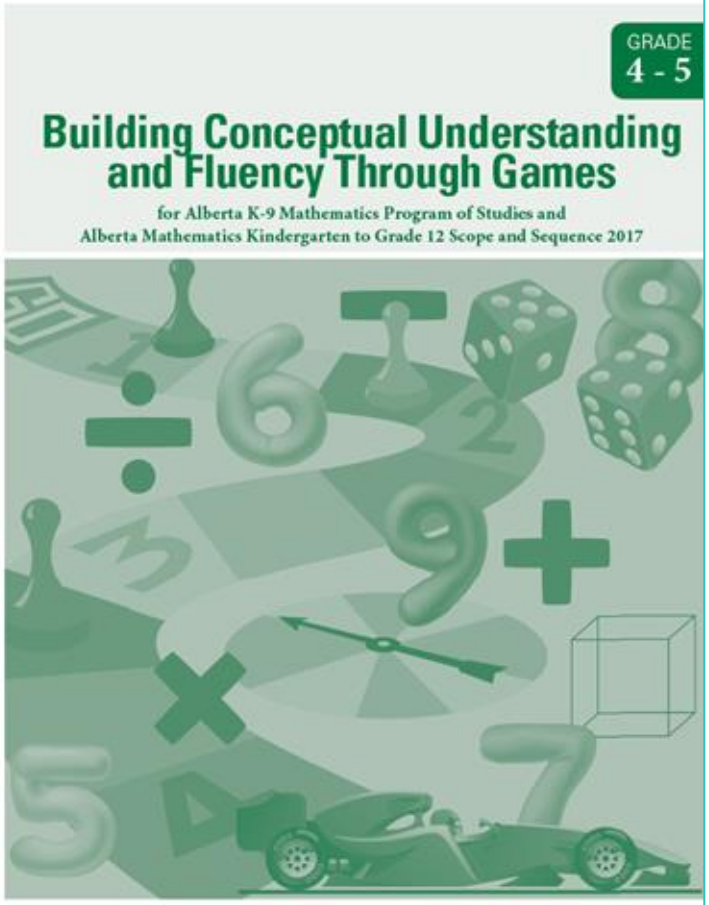
Partner Practice Page

Zeroes, Ones and Fives Strategy

4 x 5 =	0 x 7 =	2 x 1 =	0 x 1 =	6 x 5 =
9 x 0 =	5 x 3 =	4 x 1 =	5 x 5 =	8 x 1 =

1	8	0	6	5	7	1
x6	x5	x5	x5	x3	x0	x1
9	5	3	0	1	4	5
x1	x7	x0	x1	x8	x5	x1
0	1	8	5	7	1	5
x4	x5	x1	x9	x5	x6	x2

9 x 5 =	2 x 3 =	4 x 0 =	5 x 5 =	8 x 5 =
4 x 1 =	2 x 7 =	2 x 1 =	9 x 2 =	6 x 0 =



Multiplication Cover-Up

Building Fluency: multiplication facts

Materials: multiplication game card for each player, something to cover the squares on card, and factor cards

Number of Players: 2-12

Directions:

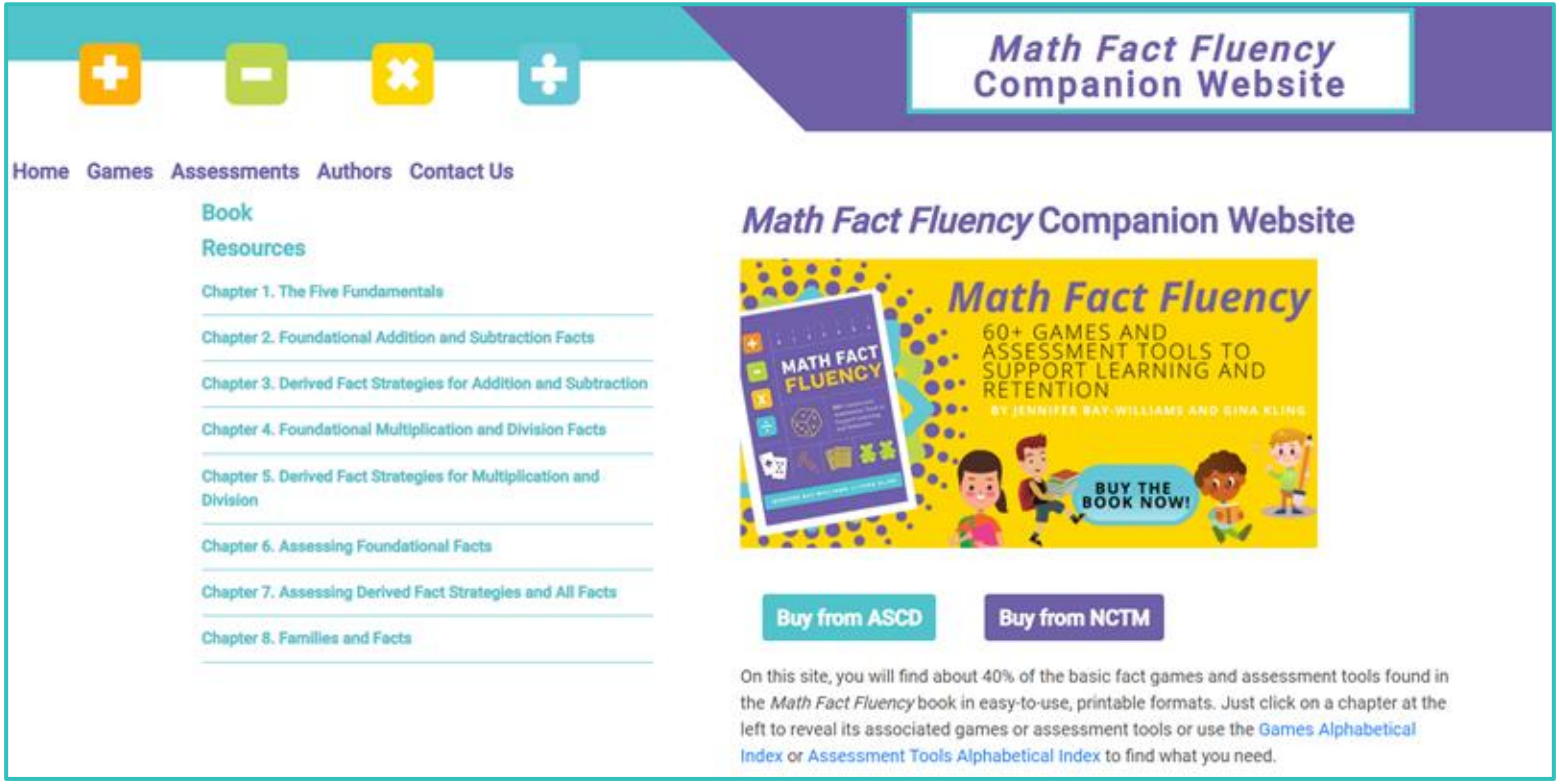
1. Choose one player to be the "caller".
2. The "caller" will place the factor cards face down, then turn one over at a time and call out the multiplication expression. (the two factors on the card)
3. If a player has the product of the expression on their grid, they cover it.
4. The first player to cover 5 in a row, column, or diagonally wins the game.

Variation/Extension: Students share strategies of how they learned the more difficult multiplication facts. Teacher could have students create their own 5 by 5 board in their math notebook filled with products of their choice and play as a class. Additional blank boards are added for your convenience.

SAMPLE BOARDS

9	64	27	5	56
0	45	63	21	36
18	70	FREE	8	1
35	81	20	48	100
28	4	15	54	14

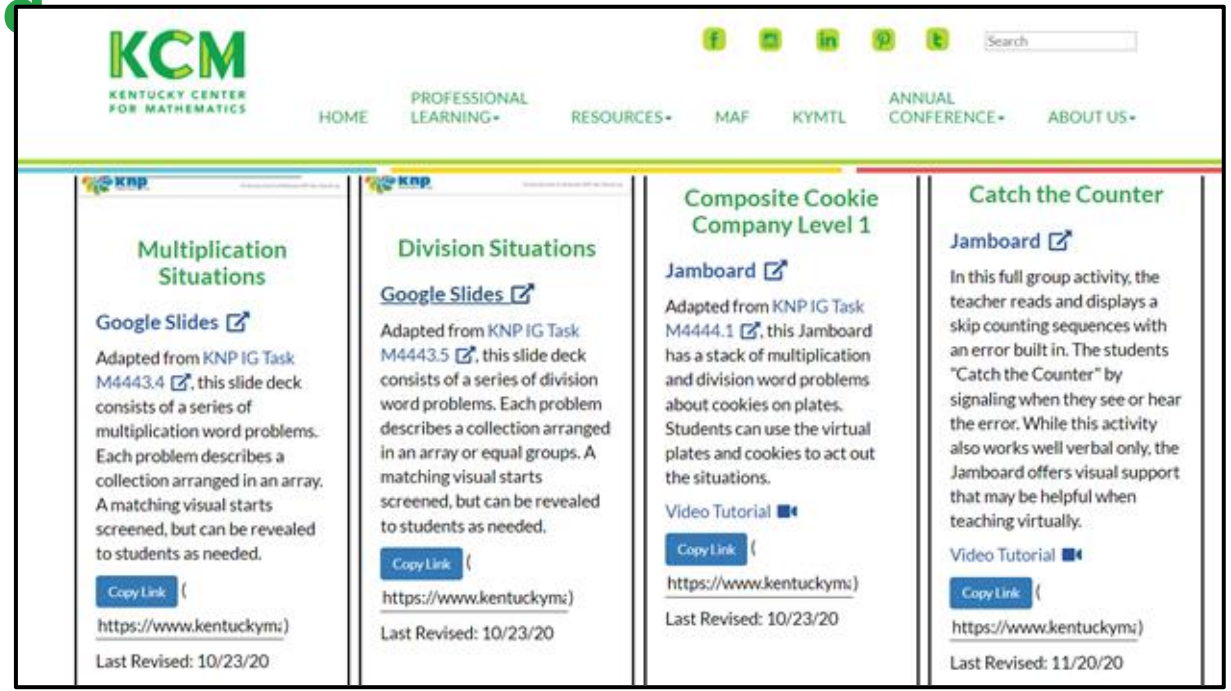
28	70	60	25	15
40	56	1	10	64
9	49	FREE	100	32
30	48	20	21	72
5	80	36	30	42


Math Fact Fluency
Companion Website
Home Games Assessments Authors Contact Us
Book
Resources
Chapter 1. The Five Fundamentals
Chapter 2. Foundational Addition and Subtraction Facts
Chapter 3. Derived Fact Strategies for Addition and Subtraction
Chapter 4. Foundational Multiplication and Division Facts
Chapter 5. Derived Fact Strategies for Multiplication and Division
Chapter 6. Assessing Foundational Facts
Chapter 7. Assessing Derived Fact Strategies and All Facts
Chapter 8. Families and Facts
Math Fact Fluency Companion Website
Math Fact Fluency
60+ GAMES AND ASSESSMENT TOOLS TO SUPPORT LEARNING AND RETENTION
BY JENNIFER BAY-WILLIAMS AND GINA KLING
MATH FACT FLUENCY
BUY THE BOOK NOW!
Buy from ASCD
Buy from NCTM
On this site, you will find about 40% of the basic fact games and assessment tools found in the Math Fact Fluency book in easy-to-use, printable formats. Just click on a chapter at the left to reveal its associated games or assessment tools or use the Games Alphabetical Index or Assessment Tools Alphabetical Index to find what you need.

Digital Games

Multiplication and Division

KCM
KENTUCKY CENTER FOR MATHEMATICS



A Little About Me ...

Tammy Leslie
Designer of Professional Learning
tammy.leslie@aplc.ab.ca

Consortium Survey

Supporting every educator
in every classroom

Survey Link
https://aplc.ca/survey/?id=15077