

Mastering Math Facts

A Focus on Multiplication and Division

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Math Facts 2.0:

1. Understanding
2. Fluency

Exploring Twos

Read *Two of Everything* by Lily Toy Hong

Doubling Bags of Gold Coins

Students explore bags of gold coins.

How many went in?

How many came out?

Write the equation.

$$4 + 4 = 8$$

$$2 \times 4 = 8$$

After Reading: Doubling Bags of Gold Coins

$$4 + 4 = 8$$

$$2 \times 4 = 8$$

$$6 + 6 = 12$$

$$2 \times 6 = 12$$

$$3 + 3 = 6$$

$$2 \times 3 = 6$$

*What do you notice?
Why is this happening?
How are addition and
multiplication alike?
How are they different?
How does this make
learning x2 facts easier?*

Highlight the Products

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20

*What do you notice?
Do the products look familiar?
Why aren't any of the x2 products
odd numbers?*

Investigating the Commutative Property with Models

2 plates of 5 brownies



$$2 \times 5 = 10$$

5 plates of 2 brownies



$$5 \times 2 = 10$$

Investigating the Commutative Property with Models

2 plates of 5 brownies $2 \times 5 = 10$
5 plates of 2 brownies $5 \times 2 = 10$

2 plates of 3 brownies $2 \times 3 = 6$
3 plates of 2 brownies $3 \times 2 = 6$

2 plates of 4 brownies $2 \times 4 = 8$
4 plates of 2 brownies $4 \times 2 = 8$

What do you notice?

If $2 \times 7 = 14$, what is the product of 7×2 ?

Try it. Were you right?

What is the rule?

Fluency:

Rolling for Doubles

► Take turns rolling and building the equation.

► After 3 turns, add to find the sum.

► Compare sums with a partner. If your sum is greater, circle it. You win the round.



2 x ___ = ___

2 x ___ = ___

2 x ___ = ___

My Sum ___

___ x 2 = ___

___ x 2 = ___

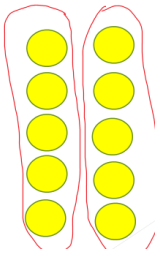
___ x 2 = ___

My Sum ___

Moving to Division

Mr. Haktak pulled out 10 coins.
How many did he put in?

$$10 \div 2 = \underline{5}$$



What do you notice?

$$2 \times 5 = 10 \quad 10 \div 2 = 5$$

$$2 \times 7 = 14 \quad 14 \div 2 = 7$$

$$2 \times 3 = 6 \quad 6 \div 2 = 3$$

$$2 \times 4 = 8 \quad 8 \div 2 = 4$$

How might knowing $\times 2$ facts help you know your division facts?

Flip It

- Put 1-10 cards face-up in a row.
- Spin a $\div 2$ spinner.
- Say the fact.
- Flip the card that shows the quotient.
- The first one to flip all 10 quotients wins!



MATH-PRACTICE

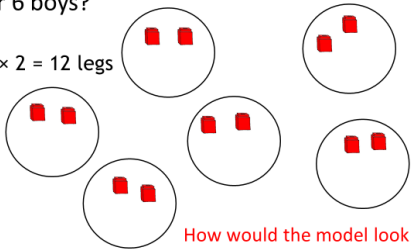
Connecting Fact Sets

Exploring $\times 4$ Facts

Read *If You Hopped Like a Frog* by David Schwartz

How many legs would there be for 6 boys?

$$6 \times 2 = 12 \text{ legs}$$

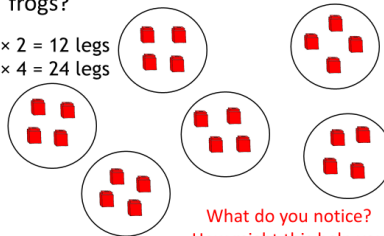


How would the model look different if it were frogs' legs?

How many legs would there be for 6 frogs?

$$6 \times 2 = 12 \text{ legs}$$

$$6 \times 4 = 24 \text{ legs}$$



What do you notice?
How might this help you know your $\times 4$ facts?

What do you notice?

x	0	1	2	3	4	5	6	7	8	9	10
0											
1											
2	0	2	4	6	8	10	12	14	16	18	20
3											
4	0	4	8	12	16	20	24	28	32	36	40
5											
6											
7											
8											
9											
10											

Move Through Fact Sets Focusing on Both Understanding and Fluency

Foundations:

$$\times/\div 2$$

$$\times/\div 10$$

$$\times/\div 5$$

$$\times/\div 1$$

$$\times/\div 0$$

Building on the Foundations:

$$\times/\div 3$$

$$\times/\div 4$$

$$\times/\div 6$$

$$\times/\div 9$$

$$\times/\div 8$$

$$\times/\div 7$$

Practice: Math Fact Games

Multi-Models

Each student gets a piece of grid paper.

Students take turns spinning a 1-10 spinner, multiplying the number spun by a specified fact (e.g., $\times 5$), and drawing an area model to show the fact. They record the fact inside the area model.

Players continue until they can't fit any more models on their paper.

The player with the most models wins the game. (Or for a variation, the player with the fewest open, or unused, grid squares wins the game.)

From *Mastering the Basic Math Facts in Multiplication and Division* by S. O'Connell and J. SanGiovanni, Heinemann

Keep It, Toss It

- Spin a 1-10 spinner and multiply by 10.
- Decide if you want to keep the product or toss it.
- You can only spin a total of 10 times. You can only keep 5 products.

4. Add the 5 products to get your score.
5. The highest score wins!

From *Mastering the Basic Math Facts in Multiplication and Division* by S. O'Connell and J. SanGiovanni. Heinemann

Merry Low Round

Spin a division spinner and say the fact.

The player with the lowest quotient wins the round and puts a counter on his board (a ten frame mat). The first player to win 10 rounds is the game winner.

From *Math in Practice*, Grade 3, Heinemann 2016

Race to 100

- Each player puts a marker on 1 on the hundred chart.
- Spin a fact, say the quotient, and move that many spaces on the hundred chart.
- Keep taking turns until someone reaches 100 on the chart.
- The first one to 100 wins!
- Then, play again!

From *Math in Practice*, Grade 3, Heinemann 2016

Options for Determining Fluency

- Observations
- Individual interviews
- Small group fact checks (observing)
- Questions to assess mental strategies

What are we assessing with the following questions?

- How could knowing the product of 3×4 help you know the product of 6×4 ? Explain your thinking.
- $4 \times 5 = 5 \times 4$
Do you agree? Prove your answer.
- Colin couldn't remember these quotients:
 $63 \div 9 = \underline{\quad}$ $42 \div 7 = \underline{\quad}$
What multiplication facts might help him? How?

Simplifying the Task

- Explore each fact set with models and problems
- Progress in an order that connects new facts to previously-explored facts
- Explore each fact set with models and problems
- Explore the number patterns in the fact set
- Revisit big ideas through each fact set (properties, inverse operations, unknowns in different positions)
- Provide interactive and engaging fluency practice

Teacher Resource Books by Sue O'Connell
Published by Heinemann (www.heinemann.com)

Math by the Book

This k-5 series shows ways to teach mathematics through the context of children's literature. It is filled with lessons that show the power of teaching mathematics through investigations, models, and math talk. It includes games to practice the math skills, word problems, and lots of talk/writing prompts, along with online resources and video coaching. To learn more, or to download a list of children's literature, visit the website at www.mathbythebook.com.

***Math in Practice* (www.mathinpractice.com)**

This series is filled with lesson ideas, instructional strategies, practice tasks, and many online printable resources to make teaching K-5 math more meaningful and more fun. There is a book for each grade level K-5 that contains a wealth of grade-specific activities, as well as a *Guide for Teachers* filled with instructional strategies to support math understanding. A *Guide for Administrators* offers tips and strategies for math coaches/administrators. Visit the website at www.mathinpractice.com to view samplers, see videos, and learn more about the series.

Putting the Practices into Action - Implementing the Common Core Standards for Mathematical Practice K-8
with John SanGiovanni

The Standards for Math Practice are the heart and soul of the Common Core State Standards. This book explains each standard in teacher-friendly terms and highlights practical activities to make the standards come alive in classrooms. It contains PLC study group questions and online resources.

Mastering the Basic Math Facts for Addition and Subtraction

Mastering the Basic Math Facts for Multiplication and Division

with John SanGiovanni

Through investigations, discussions, visual models, children's literature, and hands-on explorations, students explore the math operations, and through engaging, interactive practice achieve fluency with basic facts. It includes a wealth of online resources with customizable activities, templates, recording sheets, and teacher tools to simplify your planning and preparation. Over 450 pages of reproducible forms are included in English and Spanish translation.

The Math Process Standards Series

Each book in this series is a practical guide for helping students refine their skills in the highlighted math process (problem solving, communication, reasoning, representations, connections). You will find specific teaching strategies and tips to help all students strengthen their skills.

Introduction to Problem Solving

Introduction to Communication

Introduction to Representation

Introduction to Reasoning and Proof

Introduction to Connections

All books in this series are available for Grades PK-2, Grades 3-5, and Grades 6-8.

For more ideas:

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Or visit Sue's website at www.qualityteacherdevelopment.com