

Where should I sit?

If you have a K-2 Student,
please find a seat at a K-2
table.

If you have a 3-5
student, then please find
a seat at a 3-5 table.

If you have both 😊 Lucky you, you can decide.

Math Facts through Conceptual Understanding

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Making the Case...

Focus on number sense!

- Research indicates that **early number sense** predicts school success more than other measures of cognition like verbal, spatial or memory skills or reading ability.

Jordoan, Kaplan, Locuniak, and Ramineni, 2007

Fluency Without Fear: Research Evidence on the Best Ways to Learn Math Facts

By Jo Boaler

Each take a paragraph. What stood out. Highlight, underline, mark up...Be prepared to share your M.I.P.

Professor of Mathematics Education, co-founder youcubed
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What is Mastery of Basic Facts:

Multiply and divide within 100.

3.OA.C.7

Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

See related [worksheets](#), [workbooks](#), [games](#), [exercises](#), [lesson plans](#)

Addition and subtraction by
the end of 2nd grade

Multiplication and division
by 3rd grade

Fact fluency leads to other
math fluent skills...

Guided Intervention

<https://bhi61nm2cr3mkgk1dtaov18-wpengine.netdna-ssl.com/wp-content/uploads/2017/03/Day-3-Speed.mp4>

Fact mastery will not magically happen.

- *“Time is a poor intervention.”*

Parents can help, by showing your children your active strategies, and your thinking aloud.

Developmental Nature of Basic Fact Mastery



Phase 1:



Counting Strategies

Counting strategies-

- using concrete objects
- verbal counting

Example includes:

- $5 + 1 =$ count on starting at 5, 6
- $5 + 2 =$ 5, 6, 7
- $4 + 7 =$ 7 then 8, 9, 10, 11



Reasoning Strategy

Phase 2:

Reasoning Strategy:

- using known information to logically determine an unknown combination
- $4 + 7$, student knows $3 + 7 = 10$ so just adds on 1 more.
- 10×8 is 80 half of that is 5×8 is 40

Phase 3:



Mastery

Producing answers efficiently

- just knows it
- $4 + 7 = 11$

Retrieval within 3 seconds

Grade appropriate strategy

Efficient

Knowing Facts from Memory- “Passive Storage View”

Thinking that students will learn their facts if they just practice enough

What does this mean-

- 100 isolated addition facts
- 100 isolated multiplication facts
- Also having to memorize subtraction and division- well over 300 pieces of information to remember
- Not only having to memorize, but to keep practicing as well.

Effects of not knowing facts fluently...

Lack of basic fact automaticity has been shown:

- Limit participation in math class discussions
- Impede successful problem solving
- Severely impair the development of the standard algorithms for multiple-digit addition and subtraction, long division and fractions
- Misapply facts and not seeing reasonableness of answers
- Inflexible thinking skills

Struggling Learners and Students with Disabilities:

Have difficulty memorizing so many isolated facts (but can be successful with strategies)

Drill creates, in a majority of students, unnecessary anxiety

Undermine student interest and confidence in mathematics

Parent Supports

- Scaffold the Language, but not the mathematic strategies. Explain the vocabulary they don't know, in simpler terms, but don't "dumb down" the mathematics.
- Subitizing
- Use Realia and Models
- Use Graphic Organizers
- Use gestures for together, take apart, groups etc.
- As long as they understand the concept (arrays, etc.) allow them to use a tool for homework at home. Multiplication chart, calculator. The fluency will come.

Explicit Strategy Instruction:

Strategies can be effective to learning math facts.

Supports students thinking rather than give the students something new to remember.

Key: Help students see possibilities and let them choose strategies that help them get to a solution without counting.

Addition FACT Strategies

Count On

- Count On 1
- Count On Turnarounds
- Count On 2
- Count On 3
- Count On 0

Use Doubles

- Double
- Double Plus 1
- Double Plus 2

Bridge to 10

All Facts

Prepare...
Before
teaching
strategies
students
need to
know...

Subitizing

Subitizing

Subitizing

Subitizing

The ability to instantly recognize the total quantity of objects in a group without counting

1. Introduce
Concept
Through Real
Objects
Transitioning
to Model

Counting bottles

Cubes in a cup

Addition stories

Count on 1 Cards

2. Reinforce Through Models



Count on Cards



Cube Trains



Count on Cards with Numeral Cards



Does This Make Sense?



Moving from physical models to semi-abstract models to symbolic models (with numbers)

3: Practice through Games

01

Spin, Count On 1,
Record Fact

02

Reinforce with Count
On Flash Cards

03

Count On 1 Bingo

- Total and Expression
- Subitizing games/Other resources: Youcubed.org
- <http://teachmath.openschoolnetwork.ca/grade-1/number-sense/subitizing/>

<https://www.pinterest.com/explore/subitizing/?lp=true>

Multiplication Strategies

Use Tens

- Five Facts

Doubling

- Two's Facts
- Four's Facts
- Eight's Facts

Use a Rule

- One's Facts
- Zero's Facts

Build Down and Build Up

- Nine's Facts
- Six's Facts

Last Facts

What to Do When Teaching Basic Math Facts

Ask students to self-monitor

Focus on self-improvement

Drill in short time segments

Work on facts over time

Use technology

Did we?

Identify fact fluency is a developmental process.

Identify research based strategies that help develop fact fluency

Understand strategies that are ineffective for fact fluency development

Learn specific strategies that help develop fact fluency

Contact Information

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