Developing Fluency with Basic Facts: A Marathon, Not a Sprint

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Procedural Fluency is skill in carrying out procedures flexibly, accurately, efficiently and appropriately.

(NGA Center & CCSSO, 2010; NCTM, 2014; NRC, 2001)

Phases of Basic Fact Mastery (Baroody, 2006)

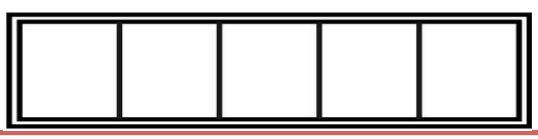
Phase 1: Counting
(counts with objects or mentally)

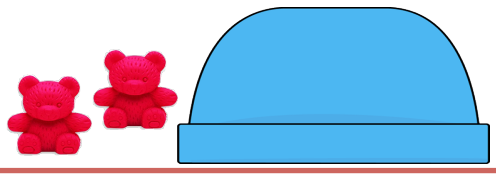
Phase 2: Deriving
(uses reasoning strategies based on known facts)

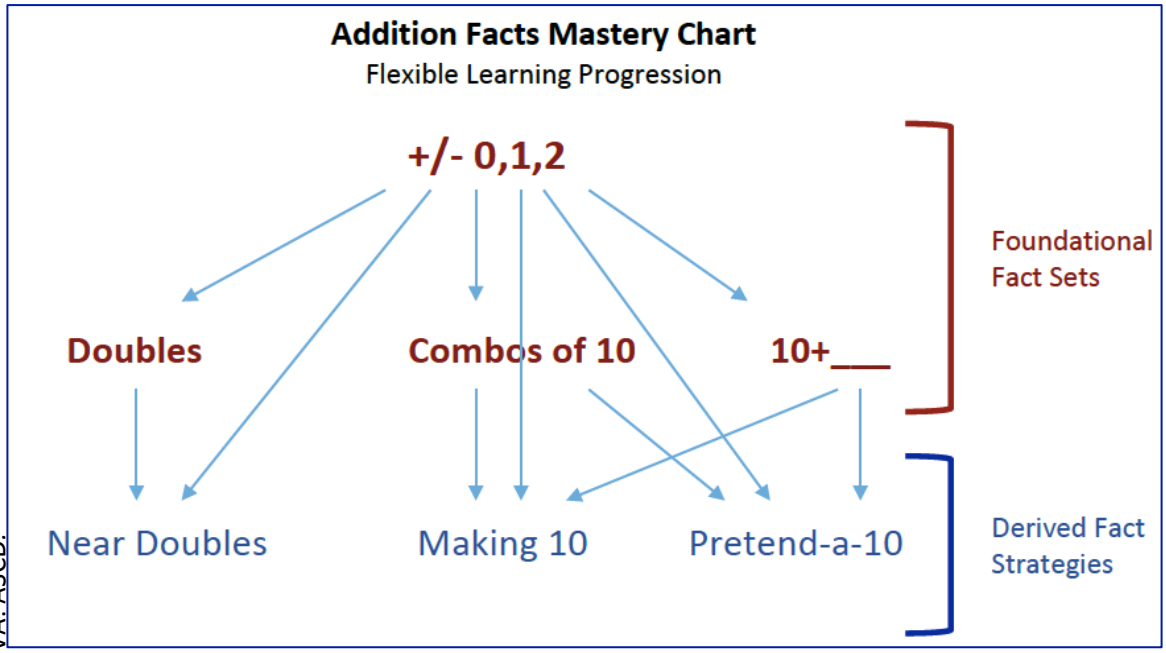
Phase 3: Mastery
(efficient production of answers)

Game #1: Sleeping Bears
Materials: 5 teddy bear counters, 1 bowl per pair of students

One child hides some bears in the 'cave' and leaves the others on the table. The other child figures out how many bears are 'sleeping' in the cave. A 5-Frame can be used to help students think about combinations that equal 5.





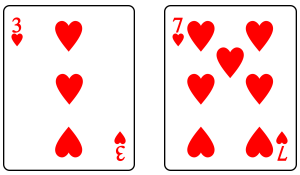


Bay-Williams, J. M. & Kling, G. G. (in development). *5 Fundamentals for Basic Fact Fluency.* Alexandria, VA: ASCD.

Game #2: Go Fish…For 10s

For Groups of 2-4 children you need: Deck of cards (A = 1; Q = 0; Remove Js, Ks)

Play Go Fish, except that instead of asking for a match, you ask for the card that will give you a sum of 10.



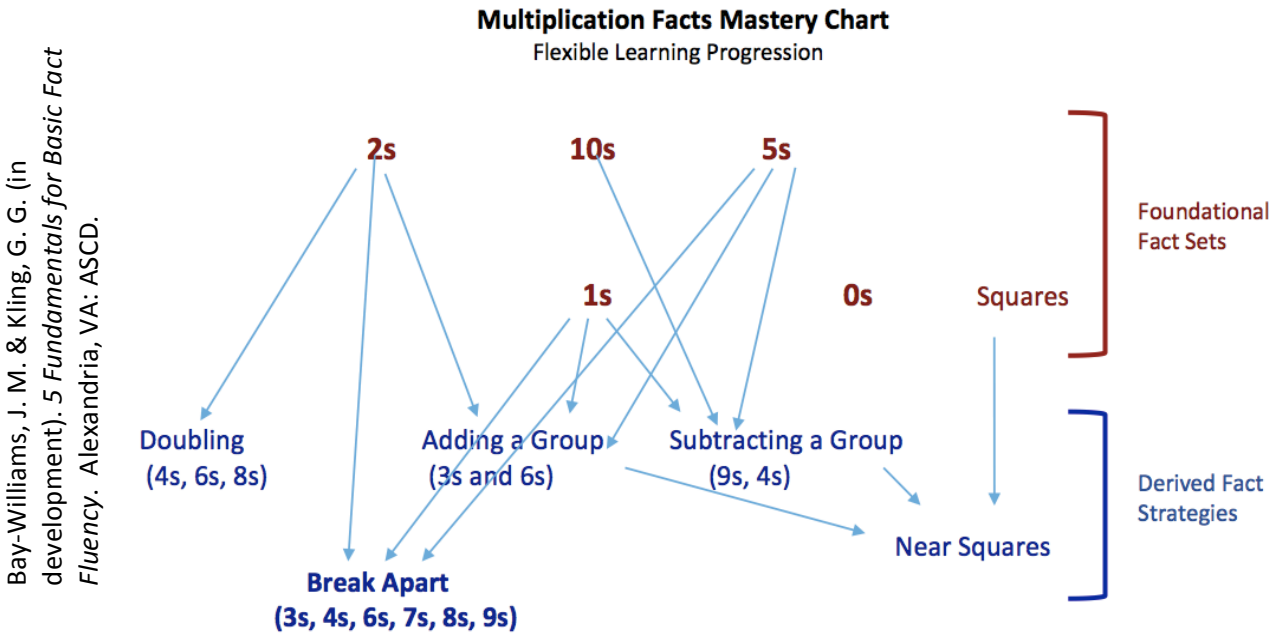
Game #3: Teen Wipe Out

For groups of 2-4 children you need: 3 10-sided dice (or a deck of cards), game board and marker or beans for each child (or use their notebooks/scrap paper).

Each player rolls 3 dice and picks two of them to add and 'wipe out' one of the teens. First person to wipe out all of their teens wins.

13	14	15	16	17	18	19

Games from ASCD QRG: Games & Tools for Teaching Addition Facts (Bay-Williams & Kling, 2017)



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Game #4: Squares Bingo

For each person in the class you need: A blank 4 × 4 bingo card and bingo chips. The teacher needs one deck of cards with numbers 0-10 (Ace = 1, Q = 0, remove Js, Ks). Post a list of the squares: 0, 1, 4, 9, 16, 25, 36, 49, 64, 81, 100. Each student fills in a blank 4 × 4 bingo card using these numbers. Note that some numbers will need to be repeated, and not all numbers have to be used.

The leader (teacher) draws a card from the deck. Students use that value to make a multiplication square. For example, if a 4 is drawn, students find the answer to 4 × 4 = ? and cover that square product on their bingo cards (16). Only one space can be covered each turn, and students cannot move a bingo chip after it has been placed. Four-in-a-row (horizontally, diagonally, or vertically) is a Bingo!

Game from ASCD QRG: Games & Tools for Teaching Multiplication Facts (Kling & Bay-Williams, 2018)

Game #5: Multiplication Pathways
For partners you need: two paper clips; 4 × 6 game board, such as the one pictured here focused on foundational facts; counters (or pencil).

Multiplication Pathways

Start						Finish
	0	40	20	3	2	5
	8	10	5	30	0	10
	5	20	8	50	6	20
	10	4	0	10	30	12

0 1 2 3 4 5 6 10

Work as a team to find a pathway across the game board from left to right. To begin, players place each paper clip on a different number from the list below the table to make a product. They then shade or cover that box of the game board. Next, they decide which clip (only one!) to move in order to get a product that is to the right of their square (horizontally or diagonally). This continues as they try to make it all the way across the game board. If you get stuck, return to start and try again!

Game from ASCD QRG: Games & Tools for Teaching Multiplication Facts (Kling & Bay-Williams, 2018)

Assessing Basic Fact Mastery

Interview Protocols

Focus on 4 components of fluency:

1. What is the answer to 9 + 5?
2. What strategy did you use?
3. If your friend was having trouble remembering this fact, what strategy might you suggest to her/him?

Focus on flexibility and **strategy selection.**

1. What is 4 × 8?
2. How can you use 2 × 8 to help you solve 4 × 8?
3. What is the relationship between 4 × 8 and 5 × 8?

Writing/Interview Prompts

Flexibility	Accuracy
Solve 8 + 7 using one strategy. Now try solving it using a different strategy.	What is the answer to 9 × 4? How do you know it is correct (how might you check it)?
Efficiency	**Appropriate Strategy Selection**
Which facts do you "just know"? Which facts do you use a strategy to solve?	Emily solved 6 + 8 by changing it in her mind to 4 + 10. What did she do? Is this a good strategy? Tell why or why not.

Student Fluency Records

Use interviews and a student fluency record to learn which *strategies* students prefer and which *facts* are mastered. Silently count 3 seconds to assess automaticity.

Multiplication Fluency Record

Instructions: Have facts written on notecards. Show one at a time. For each, wait for an answer, then ask "How did you solve it?"

4 × 6		6 × 7		7 × 8		8 × 4		6 × 9		9 × 3	

Mastery Codes (record below each fact. Use a *silent* count)

✕ incorrect ✔ accurate * accurate + automatic (within 3 seconds)

Strategy Codes (record in space to the right of each fact as student explains how). Strategies can be simply coded with S, or coded by which strategy is used.

C= Skip Counts

S = Strategy **D**= Doubling **G**= Add/Subtract a Group **NS** = Near Square **BA**= Break Apart

K = Just Knew (Recall)