Building Fact Fluency Through Strategies and Games

NCTM 2019 Annual Meeting

ORIGO EDUCATION

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Number Fact Strategies

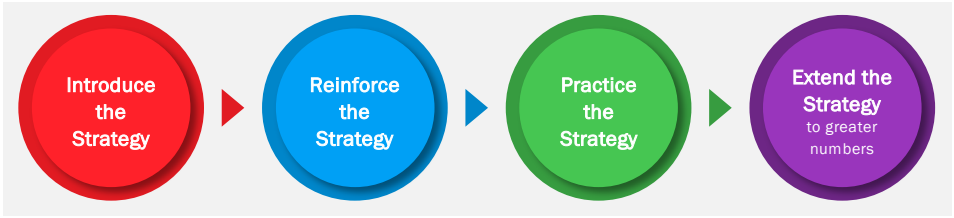
ADDITION

- Count-on 1, 2 and 0
- Doubles and near doubles
- Bridge to ten

SUBTRACTION

- Think addition

The Teaching Sequence



The best strategies are:

- **Efficient**
  (They have few steps.)
- **Flexible**
  (They will be varied.)
- **Generalizable**
  (They can be used to operate on greater numbers efficiently.)

Addition Facts

+	0	1	2	3	4	5	6	7	8	9
0	0	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9	10
2	2	3	4	5	6	7	8	9	10	11
3	3	4	5	6	7	8	9	10	11	12
4	4	5	6	7	8	9	10	11	12	13
5	5	6	7	8	9	10	11	12	13	14
6	6	7	8	9	10	11	12	13	14	15
7	7	8	9	10	11	12	13	14	15	16
8	8	9	10	11	12	13	14	15	16	17
9	9	10	11	12	13	14	15	16	17	18

☐ Count-On

☐ Doubles & Near Doubles

☐ Bridge to Ten

Name _____ Date _____

How Many Ways Can We Make 10?

Red	+	White	=	10
	+		=	10
	+		=	10
	+		=	10
	+		=	10
	+		=	10
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	+		=	10

REINFORCE: Bridge to Ten

- Roll your number cubes and write the fact below the example in the grid that will help you figure out the answer.
- Write the answer to both facts.

10 + 6 = ____ ____ + ____ = ____	10 + 6 = ____ ____ + ____ = ____
10 + 5 = ____ ____ + ____ = ____	10 + 5 = ____ ____ + ____ = ____
10 + 5 = ____ ____ + ____ = ____	10 + 5 = ____ ____ + ____ = ____
10 + 4 = ____ ____ + ____ = ____	10 + 4 = ____ ____ + ____ = ____
10 + 4 = ____ ____ + ____ = ____	10 + 4 = ____ ____ + ____ = ____
10 + 3 = ____ ____ + ____ = ____	10 + 3 = ____ ____ + ____ = ____
10 + 3 = ____ ____ + ____ = ____	10 + 3 = ____ ____ + ____ = ____
10 + 2 = ____ ____ + ____ = ____	10 + 2 = ____ ____ + ____ = ____
10 + 1 = ____ ____ + ____ = ____	10 + 1 = ____ ____ + ____ = ____

Cube A: 8, 8, 8, 9, 9, 9

Cube B: 3, 4, 5, 5, 6, 7

Directions for the Game

Bridge to Ten

Focus:
Reinforce the Bridge to Ten strategy for multiplication

Materials:
Two number cubes configured as follows:
Cube A: 8, 8, 8, 9, 9, 9
Cube B: 3, 4, 5, 5, 6, 7
Colored pencil or marker for each student in different colors
Game board

Directions:
The player who completes the most equations in their color is the winner. One player plays the left side of the board, one plays the right side. It is possible to add another player or two. In that case, each player would use the entire board and count the equations completed in his/her color at the end of the game.

How to Play:
First player rolls both cubes.
Player finds the tens fact that corresponds to the 8 or 9s fact that is rolled.
Player fills in the sum of the tens fact and the equation for the 8 or nines fact.
Next player has a turn.
Play continues until one player fills a side (in a two-player game), or the board is filled (if more than two are playing), or until time runs out.
Player with the most equations in his/her color is the winner.

Example:
Jorge rolls a 9 and a 5. He says, “I know that 9 is one away from ten. Nine add 5 has the same value as 10 add 4. That’s 14. So I will fill in the space with 10 add 4 and add the equation 9 add 5 equals 14.

Fluency vs. Speed

Fluency does not equate with timed testing.

Timed tests have been proven to create anxiety.

Math anxiety begins as early as age 5 and causes learning difficulties as students get older.

Mathematicians point out that speed in math is irrelevant.

Jo Boaler (2012) *Timed Tests and the Development of Math Anxiety*
Laurent Schwartz (2001) *A Mathematician Grappling with his Century*