It's Not Just Speed: Strategies for Math Fluency!

KSDE
2015

Renee' Smith
and
Tammy Fellers

Today

- KCCRS
- Mental Math & Strategies
- Number Sense and Fluency Activities
- Fluency Games

KCCRS on Fluency

According to the standards the word fluency means accurately, efficiently and with flexibility. In order for this to happen students must understand the concepts and be able to apply strategies.

- "Number sense is an emerging construct (Berch, 1998) that refers to a child's fluidity and flexibility with numbers, the sense of what numbers mean and an ability to perform mental mathematics and to look at the world and make comparisons."

\- Russell Gersten, David Chard

What is Number Sense?

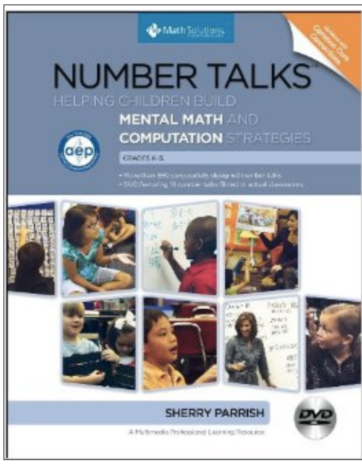
- Basic Definition: Understanding of what numbers are and how they **relate** to each other.
- Example:
  - 6 is half of 12
  - It's also 3 doubled
  - 1/3 of 18
  - 2 sets of 3
  - 3 sets of 2
  - 1 more than 5
  - 1 less than 7
  - If you add 10 you get 16.

Intentional Educator
Learn and Make a Difference!
BY THE NUMBERS

Concepts & Procedures

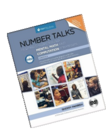
- Mathematics concepts are ideas about numbers and operations, and the relationships, connections, and patterns among them.
- Procedures or algorithms give a step-by-step prescription for generating an answer.

Intentional Educator
Learn and Make a Difference!
BY THE NUMBERS



Mental Math and Strategies

Reflection

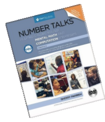


- In the videos, what did you notice students doing?
- In the videos, what was the teachers role?
- In the videos, what did you notice about students' mental math abilities?

Intentional Educator
Learn and Make a Difference!
BY THE NUMBERS

Common Addition Strategies

- Breaking Each Number into its Place Value



116 + 118

(100 + 10 + 6) + (100 + 10 + 8)

100 + 100 = 200

10 + 10 = 20

6 + 8 = 14

200 + 20 + 14 = 234

Intentional Educator
Learn and Make a Difference!

BY THE NUMBERS

Common Addition Strategies

- Making Landmark or Friendly Numbers

116 + 118

+ 2

116 + 120 = 236

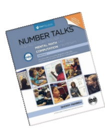
236 - 2 = 234

Intentional Educator
Learn and Make a Difference!

BY THE NUMBERS

Common Addition Strategies

- Doubles/Near Doubles



116 + 118

- 1   - 3

115 + 115 = 230

230 + 4 = 234

Intentional Educator
Learn and Make a Difference!

BY THE NUMBERS

Common Addition Strategies

- Making Tens

116 + 118

(110 + 4 + 2) + (110 + 8)

110 + 110 + (2 + 8) + 4

110 + 110 + 10 + 4

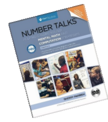
230 + 4 = 234

Intentional Educator
Learn and Make a Difference!

BY THE NUMBERS

Common Addition Strategies

- Compensation



116 + 118

- 2   + 2

114 + 120 = 234

Common Addition Strategies

- Adding up in Chunks

116 + 118

116 + (100 + 10 + 4 + 4)

116 + 100 = 216

216 + 10 = 226

226 + 4 = 230

230 + 4 = 234

Common Subtraction Strategies

- Adding Up

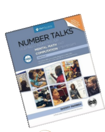
123 - 59

59 + 1 = 60

60 + 40 = 100

100 + 23 = 123

1 + 40 + 23 = 64



Common Subtraction Strategies

- Removal or Counting Back

123 - 59

123 - (20 + 30 + 3 + 6)

123 - 20 = 103

103 - 30 = 73

73 - 3 = 70

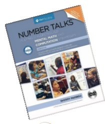
70 - 6 = 64

Common Subtraction Strategies

- Place Value and Negative Numbers

123 - 59

```
  123
-  59
  100 (100 - 0)
-  30 (20 - 50)
-   6 (3 - 9)
   64
```



Intentional Educator
Learn and Make a Difference!

BY THE NUMBERS

Common Subtraction Strategies

- Keeping Constant Difference

123 - 59

```
  123  + 1 =  124
-  59  + 1 = - 60
               64
```

Intentional Educator
Learn and Make a Difference!

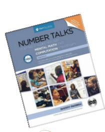
BY THE NUMBERS

Common Subtraction Strategies

- Adjusting One Number to Create an Easier Problem

123 - 59

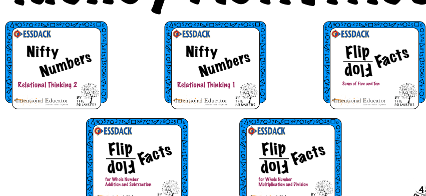
```
  123              123
-  59  + 1 =     -  60
                   63 + 1 = 64
```



Intentional Educator
Learn and Make a Difference!

BY THE NUMBERS

Number Sense & Fluency Activities



Intentional Educator
Learn and Make a Difference!

BY THE NUMBERS

Sums of 5 & 10

- Sums of 5 or 10
- Plus or Minus 1
- Plus or Minus 2
- Student Accountability for Station Activity

Intentional Educator
Learn and Make a Difference!

BY THE NUMBERS

Flip Flop Facts

- Result Unknown
- Missing Addend/Factor
- Student Accountability for Station Activity

Intentional Educator
Learn and Make a Difference!

BY THE NUMBERS

Even, Odd & Array

- Even & Odd Conjectures
- Repeated Addition & Multiplication using Arrays
- Student Accountability for Station Activity

Intentional Educator
Learn and Make a Difference!

BY THE NUMBERS

Relational Thinking

$8 + 4 = \_\_\_ + 5$

Intentional Educator
Learn and Make a Difference!

BY THE NUMBERS

Relational Thinking

$7 + 0 = 7$

$12 + 9 = 10 + 12$

$345 + 576 = 574 + 342 + d$

$15 + 15 + 45 = \_\_\_ \times 15$

- Student Accountability for Station Activity

Intentional Educator
Learn and Make a Difference!

BY THE NUMBERS

Math Games to Build Fluency and Accuracy

ESSDACK

Connect with Us:


Tammy Fellers


Renee´ Smith

Tammy Fellers	Renee´ Smith
@tjfellers	@reneesmith1
TheIntentionalEducator	ReneeSmithbythenumbers
tammyf@esssdack.org	renees@esssdack.org

Blackline Masters
http://essdk.me/nctmKSDE2015

Intentional Educator
Learn and Make a Difference!

BY THE NUMBERS

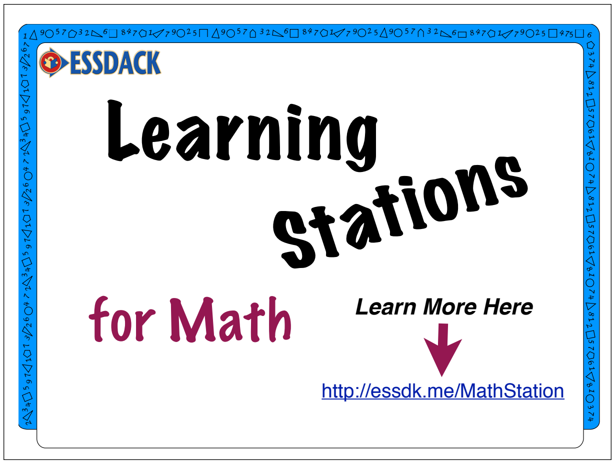
ESSDACK

PhotoSpark

My learning from today is like....
Because...

Intentional Educator
Learn and Make a Difference!

BY THE NUMBERS


ESSDACK
Learning
Stations
for Math
Learn More Here
http://essdk.me/MathStation

ESSDACK

Learning Stations for Math

Learn More Here

http://essdk.me/MathStation

Flip Flop Facts	Grades
■Sums of Five & Ten	K - 1
★Whole Number Add & Subtract	K - 2
★Whole Number Multiply & Divide	3 - 5
■Integers Addition	7 - 8
■Integers Subtraction	7 - 8
■Integers Multiply & Divide	7 - 8

Tick Tock	Grades
★Telling Time	1 - 2
◉Elapsed Time	2 - 3

Geometric Gems	Grades
■Shapes & Position	K - 1

Measurement Mix	Grades
◉Area & Perimeter	3 - 4
★Counting Coins	2 - 4

Each deck comes with a task sheet that provides direction for use, extensions, answers and possible student accountability ideas.

Fraction Action	Grades
◉Area	3 - 6
■Sets	3 - 6
■Comparison	3 - 6
◉Using Unit Fractions	3 - 6
■Problem Solving 1	5 - 6
■Problem Solving 2	5 - 6
✿Equivalencies 3rd Grade	3
✖Equivalencies 4-6 Grade	4 - 6

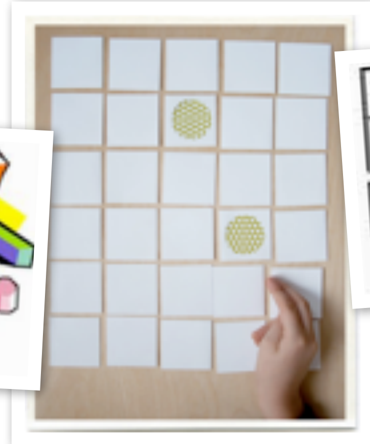
Nifty Numbers	Grades
◉Comparing Less than 20	K - 1
■Missing Numbers	K - 1
■Matching Quantities	K - 1
◉Even or Odd and Arrays	2
■Relational Thinking 1	K - 4
■Relational Thinking 2	3 - 6
◉Place Value 1	K - 2
◉Place Value 2	2 - 4
◉Place Value 3	4 - 6

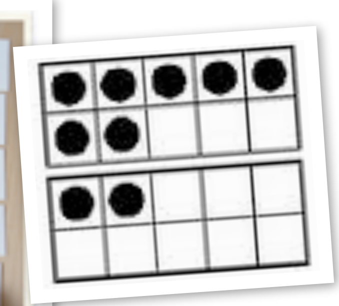
PhotoSparks $12.95	Grades
Math 1	K - 12
Math 2	K - 12

★ More than 54 cards (4.25 x 3.66) $10
◉ 24 Cards (5.5 x 4.25) $8
■ 36 Cards (4.25 x 3.66) $8
✿ 72 Cards (4.25 x 2.2) $10
✖ 150+ Cards (4.25 x 2.2) $12

ESSDACK 1500 E. 11th • Hutchinson, KS 67501
shop.essdack.org

facebook.com/ReneeSmithbythenumbers
facebook.com/theintentionaleducator





Tens Frame Match Game

Game Directions

Supplies:

set of tens frame cards per group

Directions:

2-4 player if playing in teams

(K) Shuffle all the cards and turn them upside down. Each player/team may turn over two cards and if the dots on the two tens frames is a match, the player/team places them face up in front of them. If they do not match, they are returned to their original position. Teams alternate turns finding sets of equivalent cards. The player or team who turns over the most sets is the winner.

(1-2)For older students, play using the same rules but this time instead of looking for sets that are equivalent, have students look for two cards with a sum of 10.

(3-4) Another activity for the cards is to have players draw two cards and write the equation that the tens frame represents. To score this each player could total their scores from each round.

Adaptations:

Find Your Tens Frame Partners: Hand each student one of the Tens Frame cards and have them search for their partners with the matching cards.

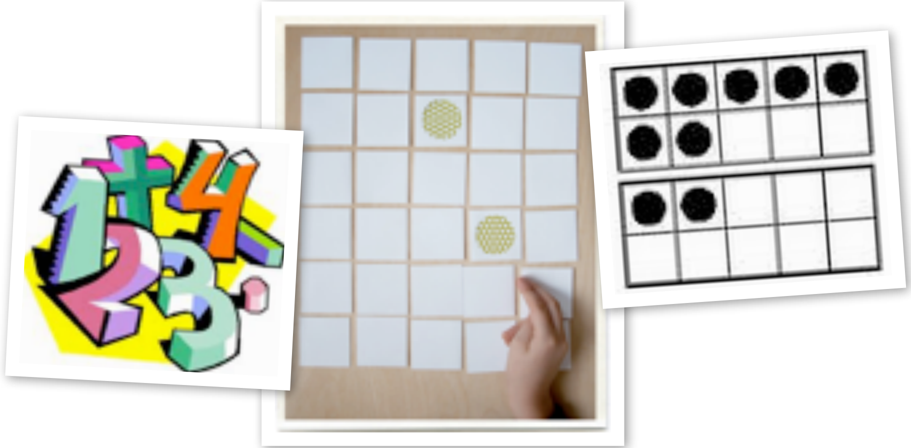
Go Fish Variation: 2-4 players. Shuffle all the cards and deal four cards to each player. The rest of the cards are spread out in between all players. The object is to get two cards which form a set. (equivalent representations of a number) As soon as you have a set of cards you get to place them down in front of you.

The first player asks any of the other players if they have another card in a set. Any player that gives away a card, draws from the draw pile so that they have four cards in their hands. If the second player does not have the requested card, they tell the first player to "Go Fish". The first player would then draw from the draw pile. If they form a set with the card they drew, they may not put the set down until their next turn.

Play continues with each player asking for a card they need from another player, until all sets have been put down on the table. The player with the most sets is the winner.

For older students, play using the same rules but this time instead of looking for sets that are equivalent, have students look for two cards with a sum of 10.

Original idea used with Permission of Michelle Flaming with Adaptations by Renee' Smith



Tens Frame Two More or Two Less

Directions

Supplies:

set of tens frame cards per student, set of counters (at least 2 more than the largest tens frame card)

Directions:

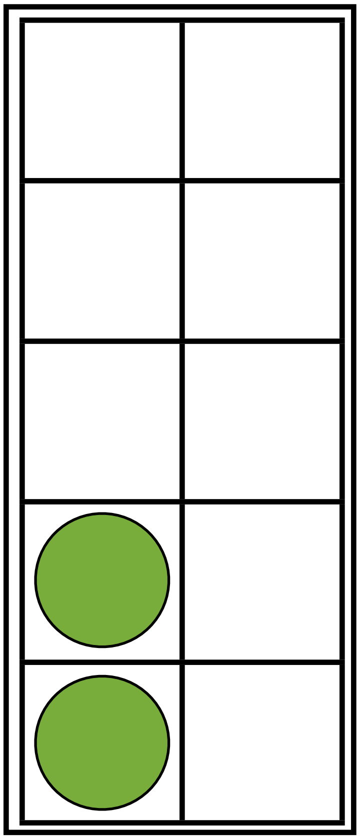
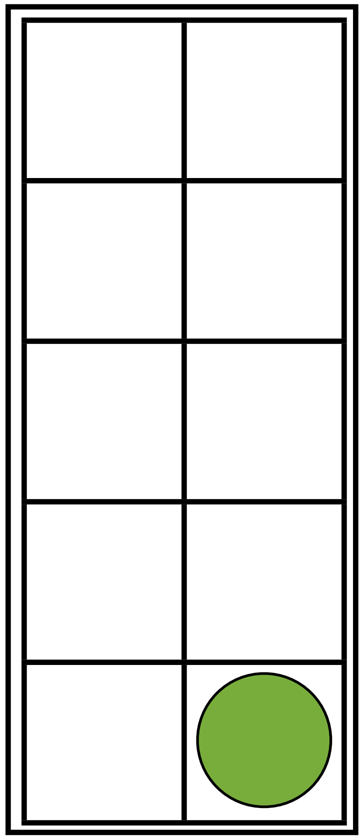
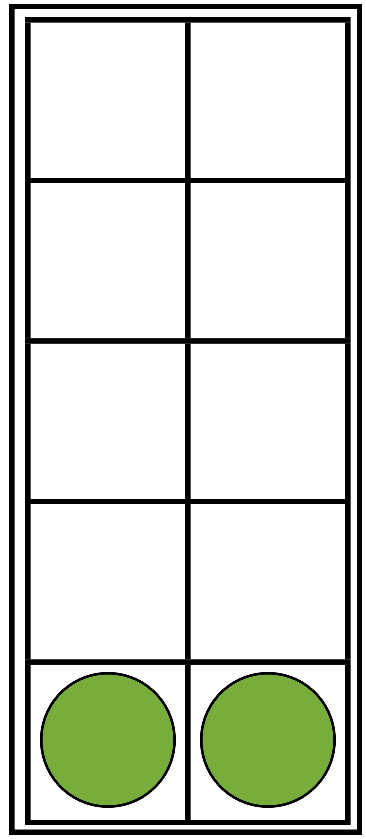
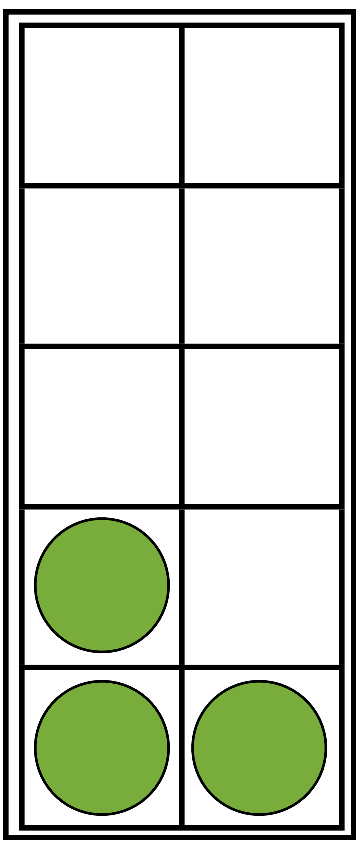
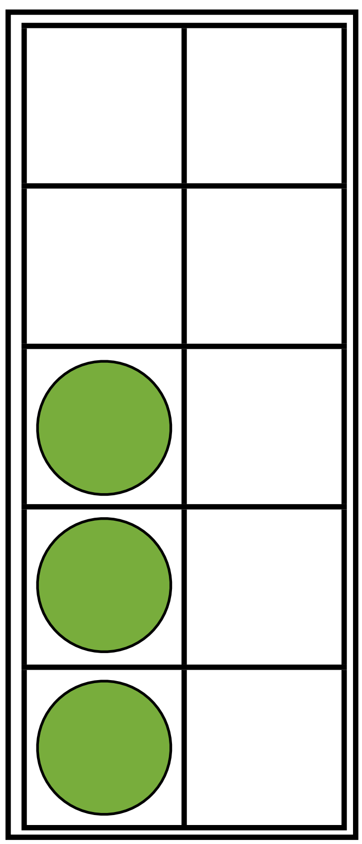
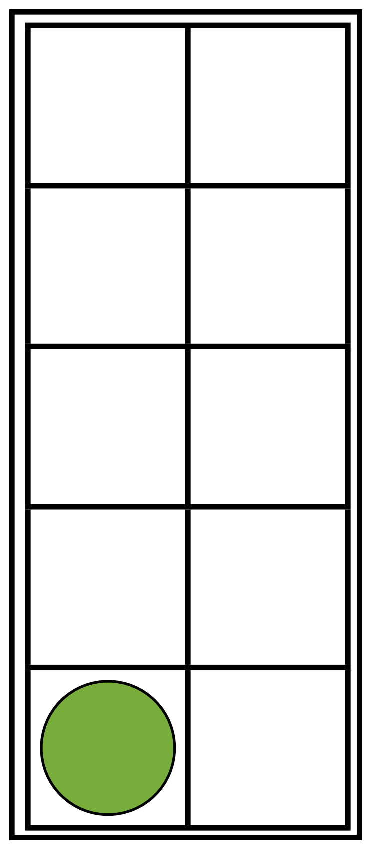
Students choose a tens frame card from their set. They then create a set of counters that are two more than the number on the tens frame card. If that number is represented on a tens frame card they find that card. If it is larger than any of their tens frame cards, introduce a double tens frame and have them draw the dots. (11 and 12).

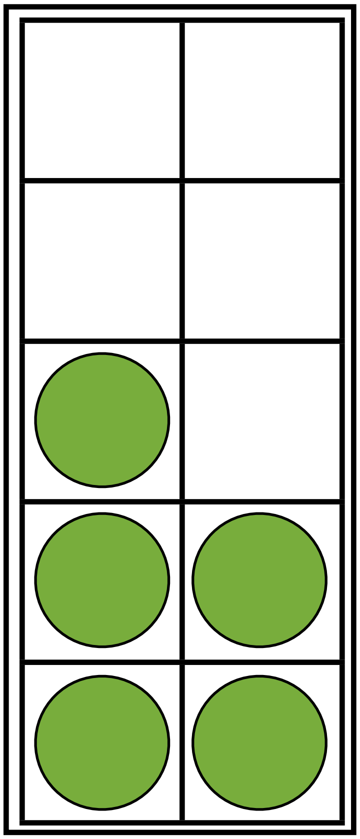
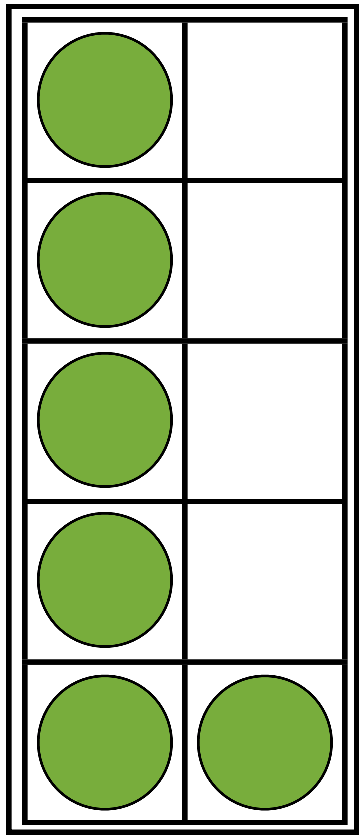
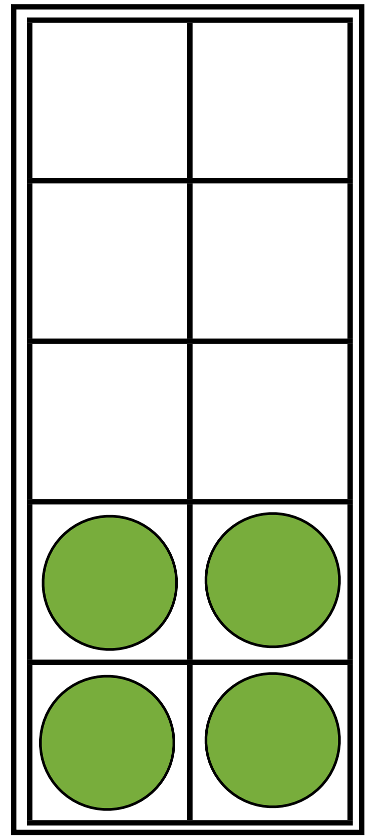
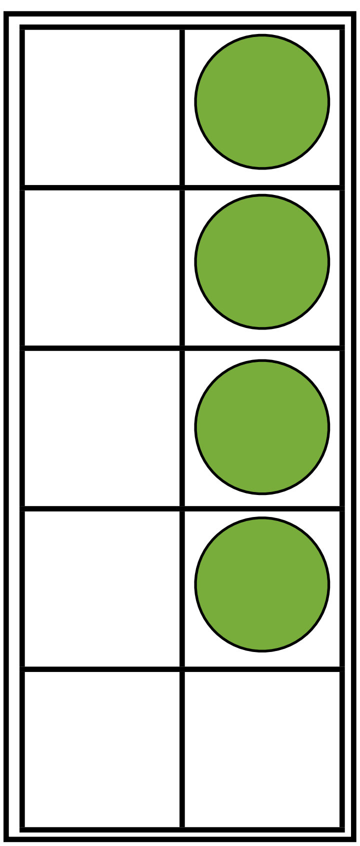
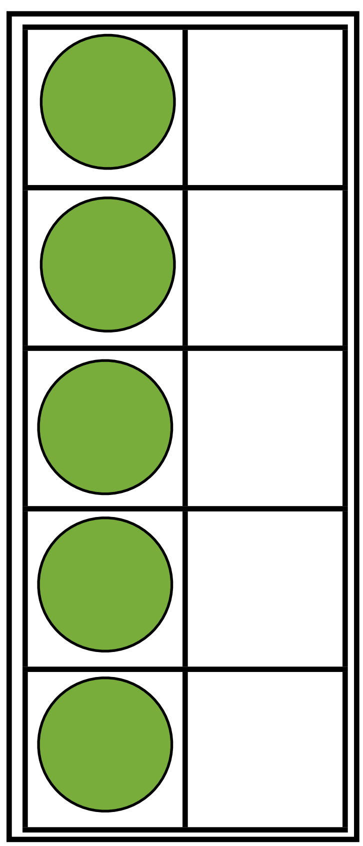
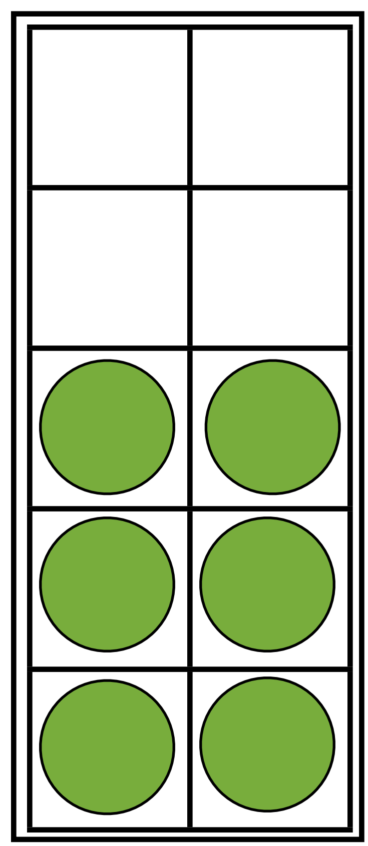
Adaptations:

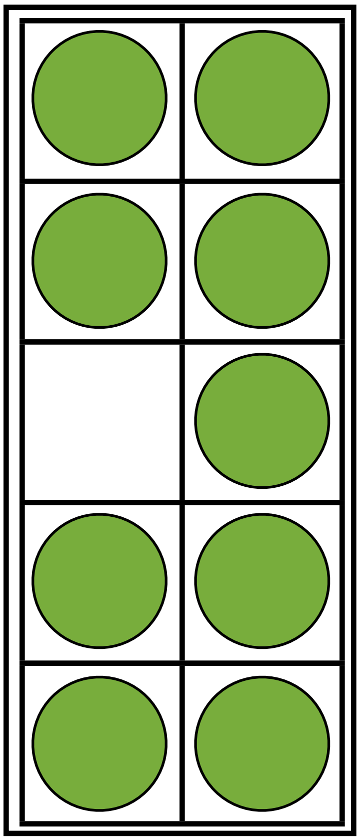
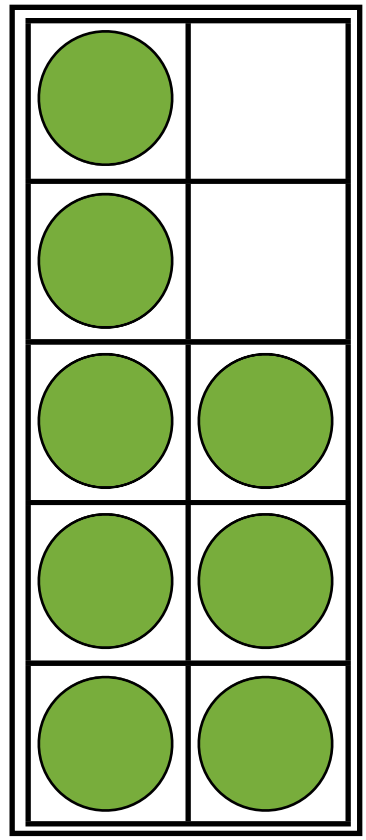
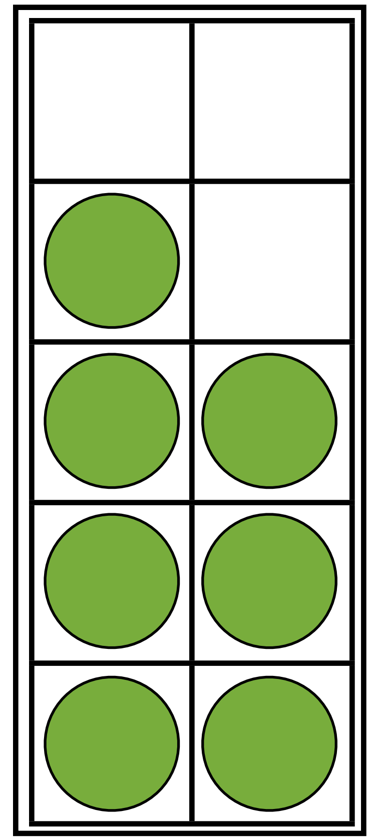
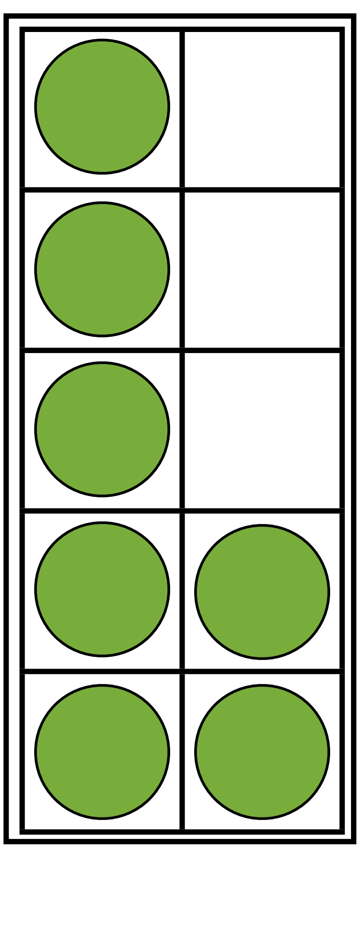
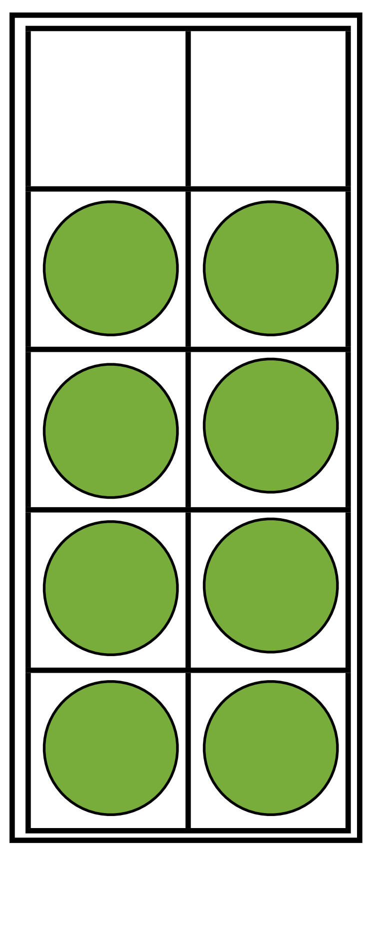
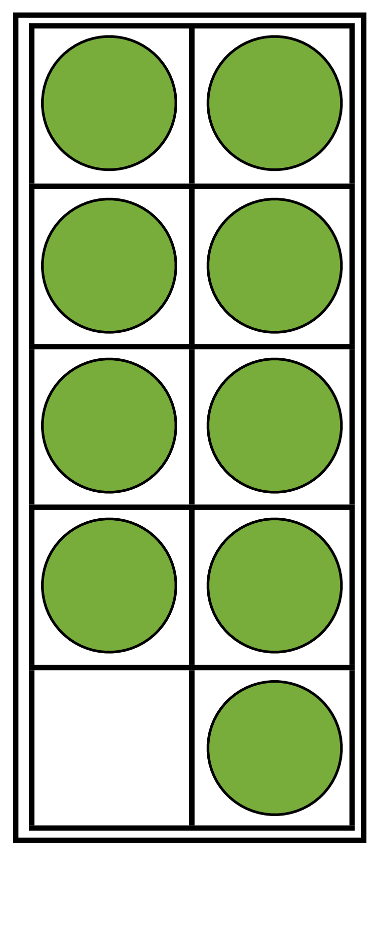
Have students write the numerals or a number sentence that represents the "Two More".

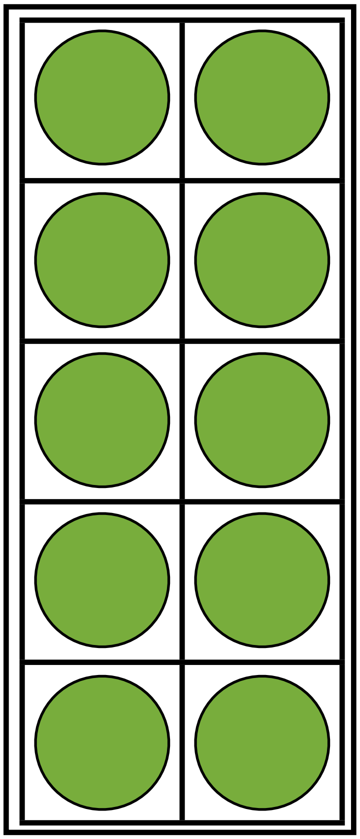
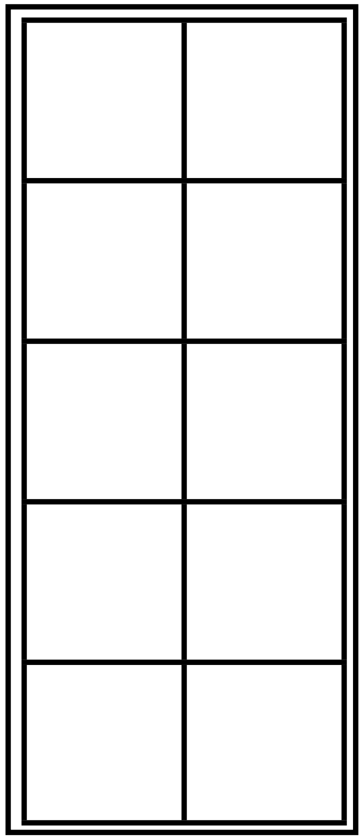
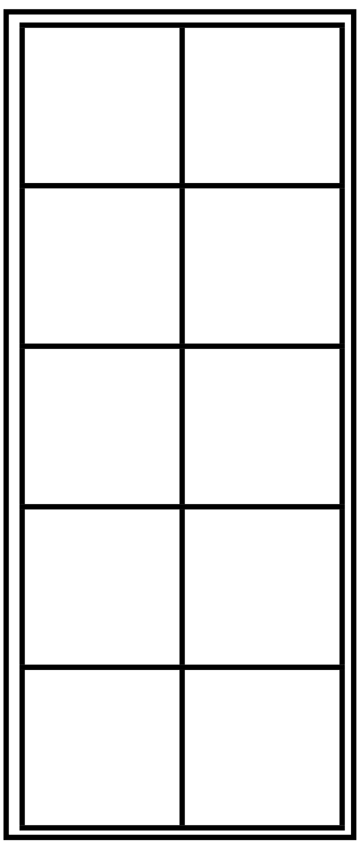
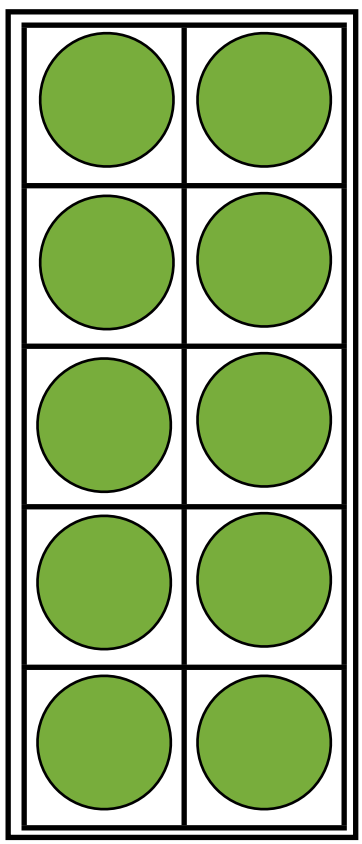
Have students create word problems that go with the numbers represented in the activity.

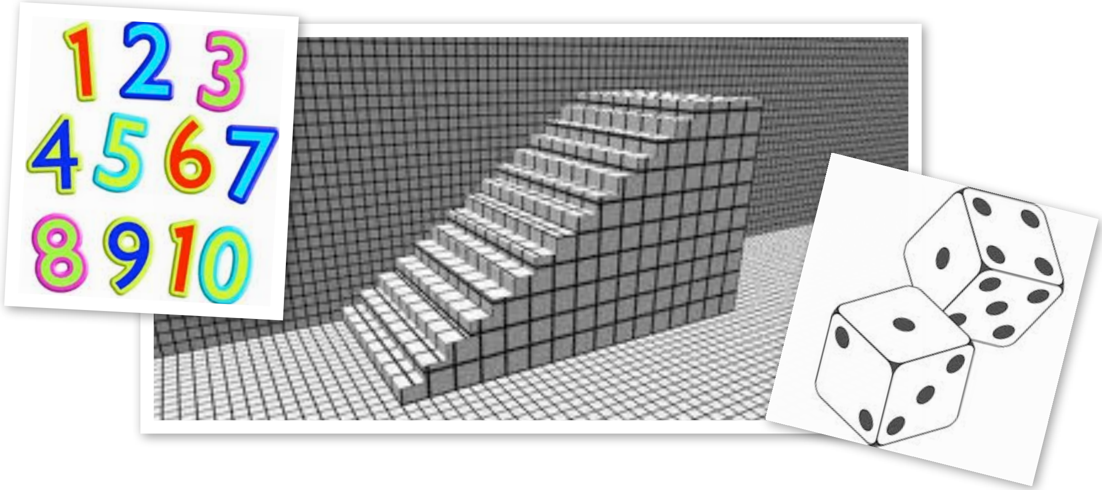
Play the Same as for Two More but have students make sets that are Two Less. (Eliminate the one and two tens frames cards).

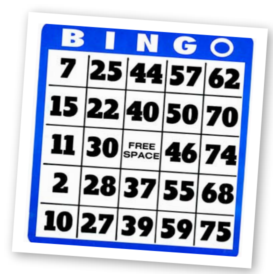









Part/Whole Bingo

Game Directions



Supplies:

Part/Whole Bingo game board, two dice, and two colors of unifix cubes for each pair of players.

Objective:

Help students learn to decompose a number into different parts.

Directions:

2 players

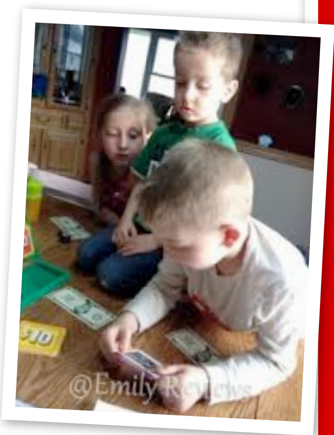
1. Play begins with player one rolling two regular dice and finding the sum of the two numbers. Player one then covers that number of spaces on the part/whole bingo board with their color of unifix cubes.
2. Special rules apply to how the rows may be covered. The sum of the dice must be used to cover at least one entire roll. If it is possible to cover two or more entire rows that is a legal move as well. Example: For a roll of 6 + 4 = 10, a player could cover the following rows: the 10; the 9 and 1; the 8 and 2; the 7 and 3; the 6 and 4; or even 1,2,3, and 5, etc.....
3. Player two then takes a turn at rolling the two dice and coving an entire row using the sum of the two dice.
4. If any player is unable to fill an entire row on their turn, they must pass.
5. The person with the most spaces covered when all have been covered is the winner.

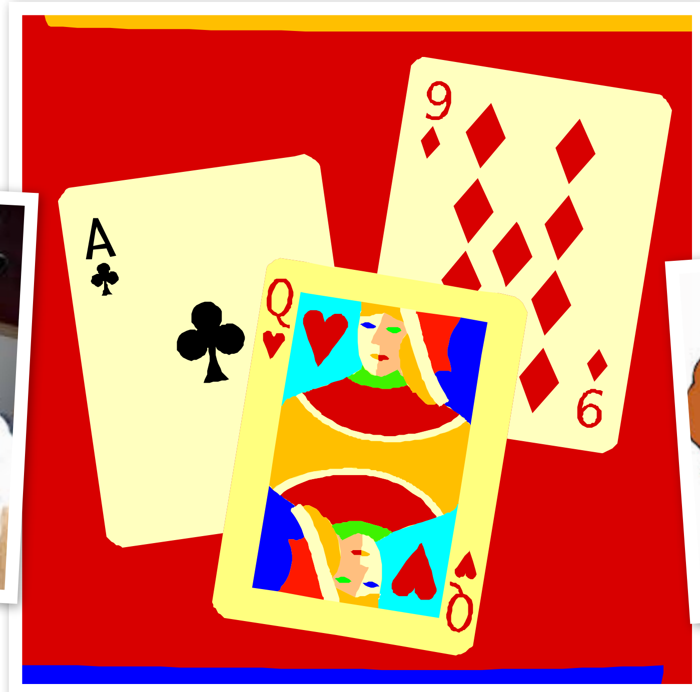
Adaptations:

1. Play as in the original game but the person with the most rows covered is the winner.
2. Play as in the original but each player has their own individual Bingo board. The player to fill their board first is the winner.

Original idea used with Permission of Michelle Flaming

Part-Whole Bingo Mat





Add/Subtract Indian Poker

Game Directions

Supplies:

A standard deck of playing cards-face cards removed
Card values:
10-2 = the value of the card
Ace = 1

Directions:

This game is for three players. Shuffle the cards

Players 1 and 2 draw a card and hold it to their forehead. They can see their opponents card but not their own.
Player 3 announces the sum of the 2 cards.
The first player to correctly say the number on his own card wins that round.
If Player 3 makes a math mistake, then no one wins that round.
Players switch roles after 5 - 10 rounds.

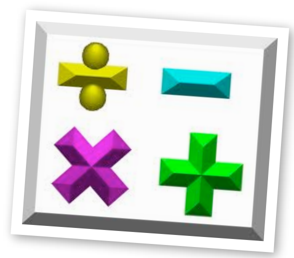
Adaptations:

Have four players play but now three draw cards and place them on their forehead without looking at their own card. Player 4 announces the sum of all three cards and the winner of the round is the first one who correctly identifies their own card's value.

Have three players play as in the original version but this time player three tells them the difference between their two cards. (not students could get two different answers when guessing their number) Let students figure out that they must also identify the player with the largest card.

Addition Math Path

Game Directions



Supplies:

2 game boards and 2 clothespins per team, 2 colors of tokens per team

Objective:

To make a stepping stone path across the game board with your tokens

Directions:

2 players

The first player attaches the two clothespins to the addends at the bottom of game board one. Both clothespins may be placed on the same addend. They then place one of their tokens on the sum of the two addends on game board two. Then player number two can move only one of the clothespins to create a new sum and place their token on the answer on game board two. The winner is the first person who completes an adjacent path across the game board in any direction (Top to bottom, side to side, straight across, or in a zigzag fashion)

Optional Methods:

Use two colors of unifix cubes for the players tokens
Have students play the game as usual but write down the equations they use to capture each square in the path. If the opposing player can create the sum using another equation (different addends) they may capture a square and place their unifix cube on top of the other player's cube (like crowning in checkers).

Create other game boards with other addends.

Create other game boards and use to practice multiplication facts.

Addition Math Path

9	12	11	8	14
11	13	12	10	9
11	7	15	10	8
6	10	14	13	12

3 4 5 6 7 8



Stepping Stone Multiplication

Game Directions

Supplies:
2 game boards and 2 clothespins per team, 2 colors of tokens per team

Objective:
To make a stepping stone path across the game board with your tokens

Directions:
2 players

The first player attaches the two clothespins to the factors at the bottom of game board one. Both clothespins may be placed on the same factor. They then place one of their tokens on the product of the two factors on game board two. Then player number two can move only one of the clothespins to create a new product and place their token on the product on game board two. The winner is the first person who completes an adjacent path across the game board in any direction (Top to bottom, side to side, straight across, or in a zigzag fashion)

Optional Methods:

Use two colors of unifix cubes for the players tokens
Have students play the game as usual but write down the equations they use to capture each square in the path. If the opposing player can create the product using another equation (different factors) they may capture a square and place their unifix cube on top of the other player's cube (like crowning in checkers).

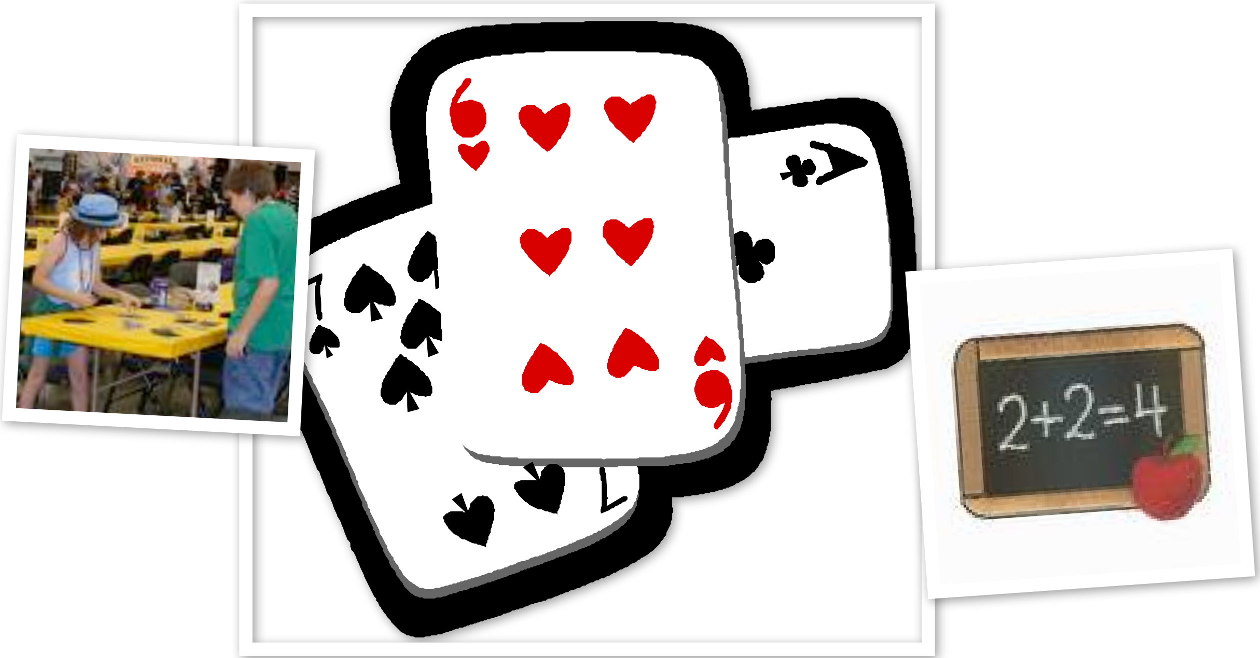
Create other game boards with other factors.

Create other game boards and use to practice addition facts.

Stepping-Stone Multiplication

18	32	24	15	48
28	40	35	64	20
30	12	56	21	16
9	25	49	42	36

3 4 5 6 7 8



Countdown

Game Directions

Supplies:

A standard deck of playing cards with face cards and jokers removed, or 4-Way Countdown Gameboard, two standard dice.

Directions:

2-4 players

If playing with the gameboard follow manufacturers directions.

With cards: Place a suit of cards ace (1)-10 in front of each player, facing up. (Ace = 1) Players roll one die and the player with the highest number goes first. Play will then rotate to the left.

The first player rolls two dice and then the two dice must be converted to one number by addition, subtraction, multiplication or division. When a player states their problem and answer, they may then turn over the card that matches their total.

Special rolls: If a player rolls a six and five and they may choose to count it as a 1 or an 11. If they choose to count it as an 11, they may choose an opponent and have them return all their cards to the original position of face-up.
If a player rolls a double six, they must return all their cards to the original position of face-up.

The player that turns all their cards face-down first is the winner.

Adaptation:

For younger children, practice using only addition and cards 2-10 only.
For younger children, practice using the numbers rolled on the dice to turn over two cards.

“Peace”

Game Directions

Supplies:

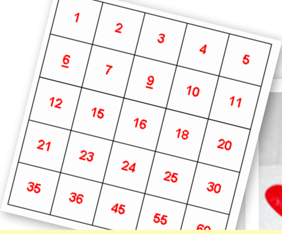
A standard deck of playing cards (no jokers)
Card values:
King = 13, 10, or 0 (teacher chooses the value of the face cards)
Queen = 12 or 10
Jack = 11 or 10
10-2 = the value of the card
Ace = 1

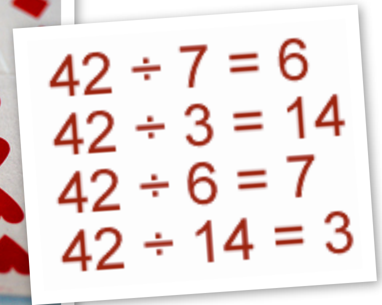
Directions:
2 players seated next to each other so they can see the cards for both players.
One student shuffles the deck and deals half the deck to each player face down. Keep the cards in the order in which they are dealt and do not look at your cards.
Each partner turns over one card.
The player with the greatest value wins both cards. These cards are placed on the bottom of the winner’s stack of cards.
In the case of a tie during a round, a "peace talk" must occur. Each player places three cards face down and one face up.
The player whose face up card has the highest value wins all the cards. If a tie occurs, repeat the "peace talk".
The object of the game is to collect all the cards in the deck or the most cards during the time allowed.

Adaptations:

Play with the same directions as above but have each player turn over two cards on each turn and add, subtract, or multiply (teacher chooses the operation) the two together. The winner is the person with the highest total.

Play with the same directions as above but have each player turn over two cards on each turn and add, subtract, or multiply (teacher chooses the operation) the two together. However, in this version, the black cards have a positive value and the red cards have a negative value. The winner is the person with the highest total.





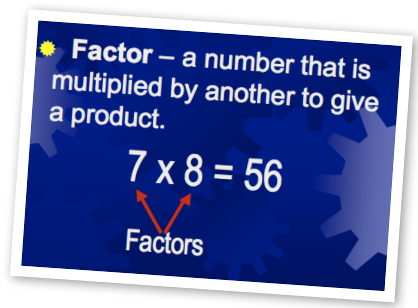
Factors

" Claim the Factors Game"

Game Directions

Supplies:

Supplies:



Standard deck of playing cards (use the Ace and 2-9 out of a standard playing deck for factor cards-one player uses a red suit and one uses a black suit), and one set of product cards for each pair of players

Directions:

2 players

Shuffle product cards and place them face down to form a draw pile. Each player places his/her factor cards face up in front of him/her.

Player 1 turns over a product card and states a pair of factors for this number. Player 1 claims his/her opponents factor cards for the product. Example: If the product card is 12, player 1 could take his/her opponents, 3 and 4 or 2 and 6. Only one pair of factor cards can be claimed on each turn.

If a product card shows a square number, one factor card may be claimed for that product. Example: If the product card is 36 only a 6 may be claimed from the opponent's stack.

Players take turns drawing product cards and claiming factor cards. If only one factor remains in the opponent's factor card pile because the other factor has been claimed, then the player only claims one card for that round. If no factors for a product remain in the opponent's factor card pile, the player must pass for that round.

The winner is the player that collects all their opponent's factor cards first.

Variation:

Play by the same rules as above but go through the product cards only once and then the game ends. A player can not only claim their opponents factor cards but may also steal back their own cards (the ones their opponent has claimed). When the game ends, the player with the most factor cards of their own and their opponent's wins.

see: Claim the Greatest Common Factor

Claim the Factors Product Cards

12	14	16	18	20
15	25	30	35	40
36	45	54	63	72
21	24	27	28	32
42	48	49	64	72
6	8			