



Strategies + Understanding = Fluency

SCCTM Conference 2021

Kristy Lomantini
k_lomantini@origomath.com

Rob Nickerson
r_nickerson@origomath.com

Number Fact Strategies

ADDITION

- Count on 1, 2 and 0
- Doubles and Near Doubles
- Make Ten

SUBTRACTION

- Think Addition

MULTIPLICATION

- Use Tens (5s facts)
- Use Doubles (2s, 4s, and 8s facts)
- Use a Rule (1s and 0s facts)
- Build Up and Build Down (9s and 6s facts)

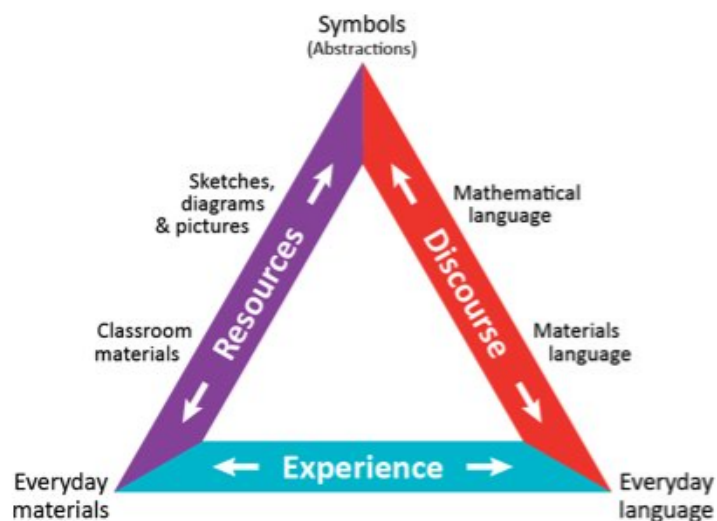
DIVISION

- Think Multiplication

The ORIGO Approach for Teaching Skills

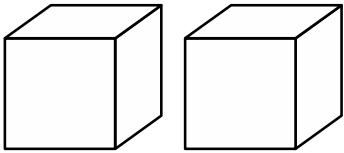


The ORIGO Approach for Teaching Concepts

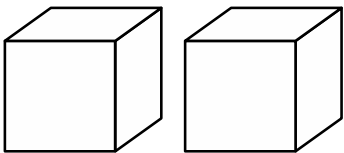


REINFORCE: Count on 1 and 2

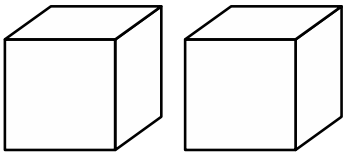
- Roll your number cubes and count on 1 or 2.
- Find your answer below.
- Write your numbers on the number cubes. Write the number fact.



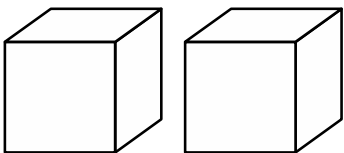
$$\underline{\quad} + \underline{\quad} = 11$$



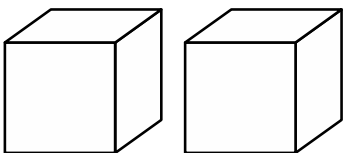
$$\underline{\quad} + \underline{\quad} = 5$$



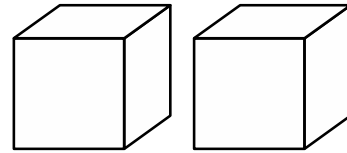
$$\underline{\quad} + \underline{\quad} = 9$$



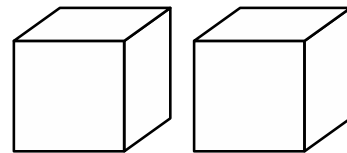
$$\underline{\quad} + \underline{\quad} = 8$$



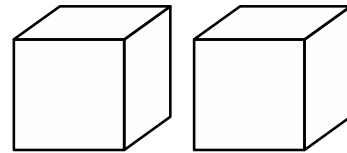
$$\underline{\quad} + \underline{\quad} = 7$$



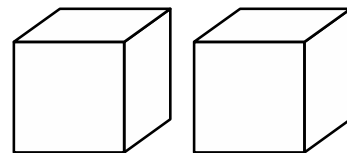
$$\underline{\quad} + \underline{\quad} = 6$$



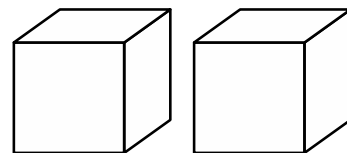
$$\underline{\quad} + \underline{\quad} = 8$$



$$\underline{\quad} + \underline{\quad} = 7$$



$$\underline{\quad} + \underline{\quad} = 6$$



$$\underline{\quad} + \underline{\quad} = 10$$

Cube A: 4, 5, 6, 7, 8, 9

Cube B: 

REINFORCE: Double plus 1

| | | | |
|----|----|----|----|
| 11 | 19 | 13 | 15 |
| 13 | 9 | 17 | 19 |
| 17 | 11 | 15 | 9 |

Cube: 4, 5, 6, 7, 8, 9 (Same as previous game)

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.





| |
|---|
| $10 + 6 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$ |
| $10 + 5 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$ |
| $10 + 5 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$ |
| $10 + 4 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$ |
| $10 + 4 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$ |
| $10 + 3 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$ |
| $10 + 3 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$ |
| $10 + 2 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$ |
| $10 + 1 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$ |

| |
|---|
| $10 + 6 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$ |
| $10 + 5 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$ |
| $10 + 5 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$ |
| $10 + 4 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$ |
| $10 + 4 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$ |
| $10 + 3 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$ |
| $10 + 3 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$ |
| $10 + 2 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$ |
| $10 + 1 = \underline{\quad}$ $\underline{\quad} + \underline{\quad} = \underline{\quad}$ |

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

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

Cat and Mice

| | | | | | | |
|-----------|---|-----------|---|-----------|---|-----------|
| 5 |  | 1 |  | 5 |  | 1 |
| 4 | 3 | 2 | 3 | 4 | 3 | 2 |
| 2 | 1 | 3 | 1 | 2 | 1 | 3 |
| 1 | 4 | 2 | 5 | 3 | 4 | 1 |
| 2 | 1 | 3 | 1 | 2 | 1 | 3 |
| 4 | 1 | 2 | 3 | 4 | 1 | 4 |
| 2 | 3 | 1 |  | 5 | 3 | 2 |
| 1 HOME | 4 HOME | 2 HOME | 3 HOME | 2 HOME | 4 HOME | 1 HOME |

Materials: 2 standard dice

Directions for the Games

Count on 1 or 2

Focus:

Adding 1 or 2 using the count on strategy

Materials:

Two number cubes configured as follows:

Cube A: 4, 5, 6, 7, 8, 9

Cube B: 1, 1, 1, 2, 2, 2

Colored pencil or marker for each student in different colors

Game board

Directions:

The player who completes the most equations is the winner.

How to Play:

Player 1 rolls, finds the matching equation with the matching sum and fills in the dice and equation on the game board in his/her color.

Next player rolls and fills in dice and equation in his/her color.

If a player rolls a sum that is already filled, he/she misses a turn.

Play continues until board is filled or time runs out.

Example:

Gertrude rolls a numeral six and 2 dots. She says, Six count on 2 is seven, eight. I will fill in one of the equations with the sum of 8 and fill in the dice to match my roll.

Doubles plus 1

Focus:

Using doubles facts to solve a doubles plus 1 equation

Materials:

Doubles add one game board

Once cube showing the numerals 4, 5, 6, 7, 8, 9

Four counters per player, each player has a different color counter

Directions:

The player who places all four counters on the board first, wins.

How to Play:

First player rolls the number cube and doubles the number rolled, then adds one to it.

Player claims the sum by covering it with a counter. If that sum is already covered, the player misses a turn.

Other players have a turn.

Example:

Carla rolls a 7 and says, "I know that double 7 is 14, so 7 add 8, must be one more, that's 15."

For ideas on how to bring out the mathematics in this game, see Fundamentals Yellow, pp 56-57.

Bridge to Ten

Focus:

Reinforce the Bridge-to-Ten strategy for addition

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."

REINFORCE Tens or Fives

Tens Or Fives

| | | | | |
|---|---|---|---|---|
| $2 \times 10 = \underline{\quad}$ $2 \times 5 = \underline{\quad}$ | $4 \times 10 = \underline{\quad}$ $4 \times 5 = \underline{\quad}$ | $7 \times 10 = \underline{\quad}$ $7 \times 5 = \underline{\quad}$ | $3 \times 10 = \underline{\quad}$ $3 \times 5 = \underline{\quad}$ | $2 \times 10 = \underline{\quad}$ $2 \times 5 = \underline{\quad}$ |
| $6 \times 10 = \underline{\quad}$ $6 \times 5 = \underline{\quad}$ | $2 \times 10 = \underline{\quad}$ $2 \times 5 = \underline{\quad}$ | $8 \times 10 = \underline{\quad}$ $8 \times 5 = \underline{\quad}$ | $5 \times 10 = \underline{\quad}$ $5 \times 5 = \underline{\quad}$ | $1 \times 10 = \underline{\quad}$ $1 \times 5 = \underline{\quad}$ |
| $9 \times 10 = \underline{\quad}$ $9 \times 5 = \underline{\quad}$ | $8 \times 10 = \underline{\quad}$ $8 \times 5 = \underline{\quad}$ | $3 \times 10 = \underline{\quad}$ $3 \times 5 = \underline{\quad}$ | $7 \times 10 = \underline{\quad}$ $7 \times 5 = \underline{\quad}$ | $5 \times 10 = \underline{\quad}$ $5 \times 5 = \underline{\quad}$ |
| $3 \times 10 = \underline{\quad}$ $3 \times 5 = \underline{\quad}$ | $7 \times 10 = \underline{\quad}$ $7 \times 5 = \underline{\quad}$ | $6 \times 10 = \underline{\quad}$ $6 \times 5 = \underline{\quad}$ | $2 \times 10 = \underline{\quad}$ $2 \times 5 = \underline{\quad}$ | $9 \times 10 = \underline{\quad}$ $9 \times 5 = \underline{\quad}$ |
| $8 \times 10 = \underline{\quad}$ $8 \times 5 = \underline{\quad}$ | $1 \times 10 = \underline{\quad}$ $1 \times 5 = \underline{\quad}$ | $9 \times 10 = \underline{\quad}$ $9 \times 5 = \underline{\quad}$ | $4 \times 10 = \underline{\quad}$ $4 \times 5 = \underline{\quad}$ | $7 \times 10 = \underline{\quad}$ $7 \times 5 = \underline{\quad}$ |

Cube A: 1, 2, 3, 4, 5, 6

Cube B: 9, 9, 8, 8, 7, 7

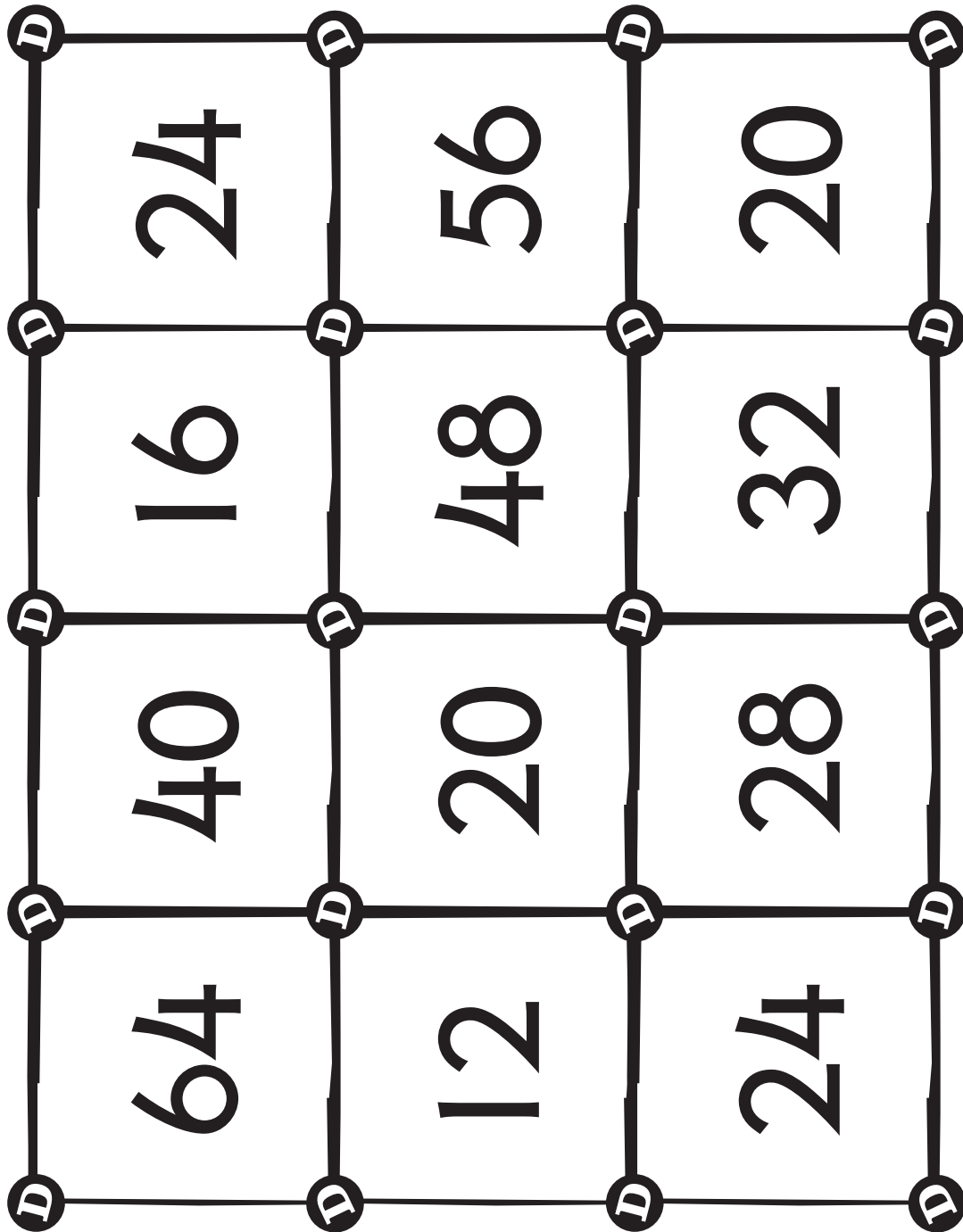
PRACTICE: Five and Tens Facts

Times Tussle

| | | | | | |
|----|----|----|-----|----|-----|
| 20 | 50 | 25 | 50 | 10 | 30 |
| 70 | 30 | 10 | 90 | 45 | 80 |
| 35 | 40 | 25 | 40 | 15 | 45 |
| 80 | 15 | 50 | 100 | 90 | 35 |
| 45 | 25 | 20 | 40 | 50 | 100 |
| 45 | 25 | 30 | 20 | 30 | 15 |
| 70 | 60 | 35 | 60 | 20 | 40 |

REINFORCE: Use Doubles

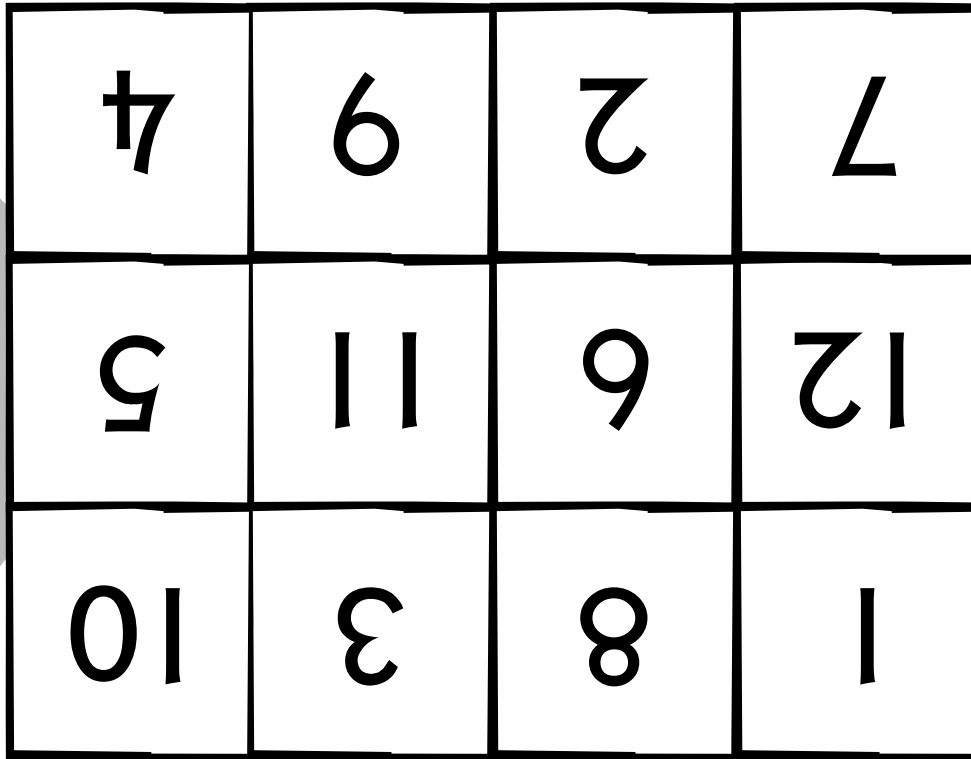
Do the *D*s



Cube A: 3, 4, 5, 6, 7, 8

Cube B: , , , , ,

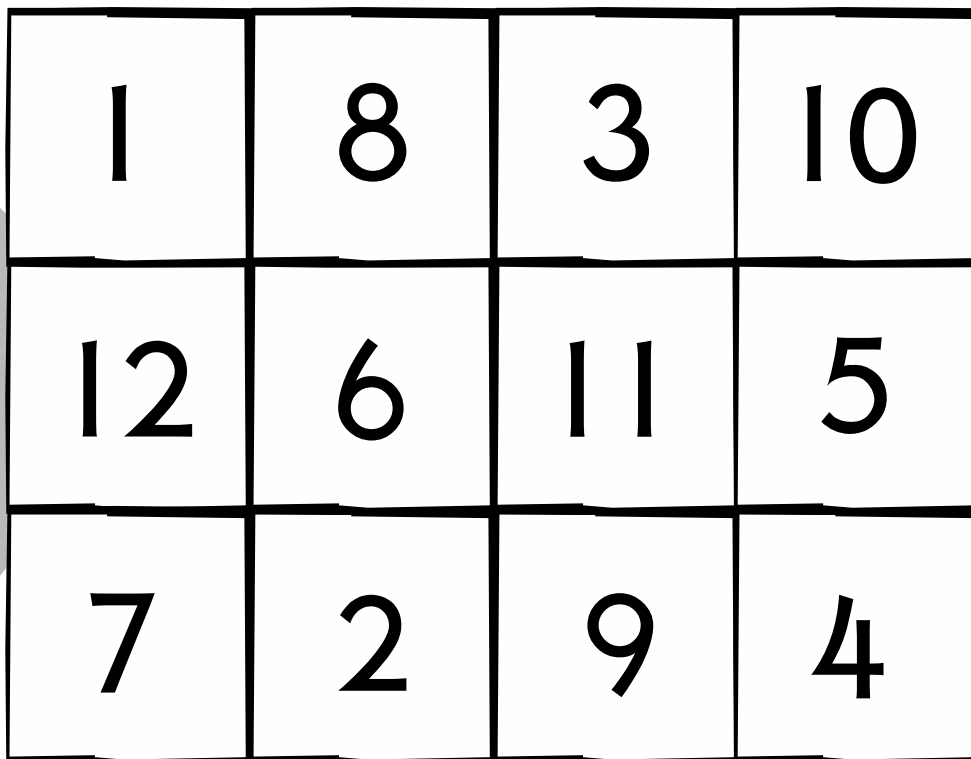
Half and Half



| | | | |
|----|----|---|----|
| 4 | 9 | 2 | 7 |
| 5 | 11 | 6 | 12 |
| 10 | 3 | 8 | 1 |

Player Two

Player One



| | | | |
|----|---|----|----|
| 1 | 8 | 3 | 10 |
| 12 | 6 | 11 | 5 |
| 7 | 2 | 9 | 4 |

Tens or Fives

Focus:

Reinforce using tens facts to multiply by five

Materials:

2 cubes with the following configuration Cube

A: 1, 2, 3, 4, 5, 6

Cube B: 7, 7, 8, 8, 9, 9

Game board

Each player will need a colored pencil or marker of a different color

Directions:

The winner is the first to build a winning sequence of four adjacent counters in a horizontal, vertical, or diagonal line, or to make a box of four.

How to Play:

Roll both cubes.

Choose to multiply the number on cube A or B by 10. Find that fact on the board and fill in the product for multiplying the chosen number by ten and by five. Four in any direction wins.

Some numbers appear more than once on the gameboard. Players must decide whether to build a winning sequence or block the other player.

If both possible numbers are not available, the player misses a turn. Play continues until one player builds a winning sequence.

Directions for the Games

Tens or Fives

Focus:

Using tens facts to multiply by five

Materials:

2 cubes with the following configuration

Cube A: 1, 2, 3, 4, 5, 6

Cube B: 7, 7, 8, 8, 9, 9

Game board

Each player will need a colored pencil or marker of a different color

Directions:

The winner is the first to build a winning sequence of four adjacent counters in a horizontal, vertical, or diagonal line, or to make a box of four.

How to Play:

Roll both cubes.

Choose to multiply the number on cube A or B by 10. Find that fact on the board and fill in the product for multiplying the chosen number by ten and by five. Four in any direction wins.

Some numbers appear more than once on the gameboard. Players must decide whether to build a winning sequence or block the other player.

If both possible numbers are not available, the player misses a turn.

Play continues until one player builds a winning sequence.

Times Tussle

Focus:

Multiplying numbers two to ten by five and ten

Materials:

3 cubes with the following configuration: cube A should be one color; B & C should be the same color as each other, but a different color than cube A.

Cube A: 5, 5, 5, 10, 10, 10

Cube B: 2, 3, 4, 5, 6, 7

Cube C: 5, 6, 7, 8, 9, 10

Each player will need 14 transparent counters (different color for each player)

Directions:

The winner is the first player to build a winning sequence four adjacent counters in a horizontal, vertical, or diagonal line.

How to Play:

Roll all cubes and choose Cube A and one other cube.

Multiply and cover the product. Four in row, any direction wins.

Some numbers appear more than once on the game board. You must decide whether to build a winning sequence or block the other player.

If both possible answers are not available, you miss a turn.

Play continues in turns until one player builds a winning sequence.

For ideas on how to bring out the mathematics in this game, see Fundamentals (Purple) pp. 28-31.

Do the Ds

Focus:

Use a doubling strategy to practice fours and eights facts.

Materials:

Do the Ds game board

One doubling cube labeled with DD on 3 faces (for double, double) and labeled with DDD on 3 faces (for double, double, double)

One cube labeled with numerals 3, 4, 5, 6, 7, 8

Four color counters for each player (a different color for each player)

Directions:

The winner is the player who is the first to place all four counters on the game board.

How to Play:

Player 1 rolls the cubes and follows the instruction, doubling the number two or three times.

The player claims the answer on the game board by covering it with a counter. If an answer is unavailable, the player misses a turn.

Each of the other players has a turn.

The first player to place all four counters on the game board is the winner.

Example:

Lily rolls 4 and DDD. She says, "Double 4 is 8, double 8 is 16, double 16 is 32. Four multiplied by 8 is 32." Lily places her counter on the 32 and claims that space.

For ideas on how to bring out the mathematics in this game, see Fundamentals Purple (pp.52-53)

Half and Half

Focus:

Dividing by two and four

Materials:

Each pair will need: Half and Half game board and one set of Half and Half numeral cards

Each player will need: ten counters (a different color for each player)

Directions:

The winner is the first player to arrange three counters adjacently in a horizontal, vertical, or diagonal line.

How to Play:

Shuffle the Half and Half numeral cards and place them face down in a stack.

Player 1 draws a card from the top and either halves the number or halves and halves it again to obtain an answer available on the game board.

The player chooses and claims the answer on the game board by covering with a counter. If the answer is unavailable the player misses a turn.

If an odd number is drawn, the player misses a turn, as odd numbers cannot be halved or quartered to produce a whole number.

The card is returned to the bottom of the stack.

The other player has a turn.

The first player to make a line of three adjacent counters is the winner.

Example:

Sasha draws a 36. She can halve it to make 18 (36 divided by 2 is 18) or halve and halve it again to make 9 (36 divided by 4 is 9). Sasha can decide if she wants to cover 18 or 9.

For ideas on how to bring out the mathematics in this game, see Fundamentals Purple (pp.60-61)

Addition and Subtraction Strategies Videos

Introducing the ORIGO Model for Teaching Skills

ORIGO One: <https://vimeo.com/202679104>

Using Five- and Ten- Frames to Represent Numbers

ORIGO One: <https://vimeo.com/291989318>

Teaching the Count-On Strategy for Addition

ORIGO One: <https://vimeo.com/181656043>

GS13: Exploring Doubles in the Real World

Gem Stones: <https://www.youtube.com/watch?v=qfuWSb5CixY>

GS14: Doubling Numbers Less Than 10

Gem Stones: <https://www.youtube.com/watch?v=JZt2P4OdGx8>

Teaching the use Doubles Strategy for Addition

ORIGO One: <https://vimeo.com/181656042>

GS15: Using Doubles to Add “Next Door” Numbers (Doubles-Plus-1 facts)

Gem Stones: <https://www.youtube.com/watch?v=KMfqfZHzh8I&t=26s>

Using Doubles to Add Nearby Numbers (Doubles-Plus-2 facts)

Gem Stones: <https://youtu.be/OQcCVR6Yqus>

GS4: Exploring combinations that make 10

Gemstone: <https://youtu.be/o6ZkDCE5BWc>

Using the Make-Ten or Bridge-to-ten Strategy for Addition

ORIGO One: <https://vimeo.com/181656039>

Making a Ten to Add Basic Facts

Gem Stones: <https://youtu.be/ROuWdXdQ11g>

GS7: Making a Ten to add a 2 digit number and activity

Gem Stones: <https://youtu.be/kq1meaJDirA>

Teaching the Think-Addition Strategy for Subtraction

ORIGO One: <https://vimeo.com/181656037>

Multiplication and Division Strategies Videos

Introducing the ORIGO Model for Teaching Skills ORIGO One:

<https://vimeo.com/202679104>

Teaching the Use-Tens Strategy for Multiplication ORIGO One:

<https://vimeo.com/181662318>

GS9: Exploring a strategy to Multiple by Five Gem Stones:

<https://www.youtube.com/watch?v=g0qNTyY8yz8>

GS8: Using arrays to explore turn around facts for Multiplication Gem Stones:

<https://youtu.be/WhXryzUmX5Y>

Teaching the Doubling Strategy for Multiplication ORIGO One:

<https://vimeo.com/181656033>

Teaching the Build-Up Strategy for Multiplication ORIGO One:

<https://vimeo.com/181656041>

Teaching the Build-Down Strategy for Multiplication ORIGO One:

<https://vimeo.com/181656036>

GS21: Building Down from a Known “tens” Facts to Multiply by 9 Gem Stones:

<https://www.youtube.com/watch?v=GDwhFy5PsGM>

Teaching the Think-Multiplication Division Strategy ORIGO One:

<https://vimeo.com/181656040>

Resources

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Kilpatrick, Jeremy, et al. *Adding it up: Helping Children Learn Mathematics*. National Academy Press, 2001.

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