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## TABLE OF CONTENTS

| Introduction |  |  | 1 |
| :---: | :---: | :---: | :---: |
| Games That Build The Brain "Matter" |  |  | 2 |
| How To Use This Book |  |  | 3 |
| General Classroom Management |  |  | 4 |
| Using Games As A Teaching Strategy |  |  | 5 |
| Materials |  |  | 7 |
| Math Games Journal |  |  | 9 |
| Double Regular Dice Warm Ups |  |  | 13 |
| Three-In-A-Cube Dice Warm Ups |  |  | 16 |
| 10 Sided Double Dice Warm Ups |  |  | 18 |
| 12 Sided Double Dice Warm Ups |  |  | 21 |
| GAME TITLE | LEVEL | CONCEPTS |  |
| Whole Class Stand Up | Grade 2-3 | ordering and comparing place value to 100's, 100 000's with variations | 23 |
| Whole Class Stand Up Recording Sheet Hundreds |  |  | 26 |
| Whole Class Stand Up Recording Sheet Hundred Thousands |  |  | 27 |
| Roll \& Chunk Place Value Strategy |  |  | 28 |
| I Love Doubles And Doubles +1 | Grade 2-3 | fact fluency, learning doubles to 12,18 or 24 ; adding with regrouping, data analysis | 29 |
| Doubles / Doubles +1 Combinations |  |  | 30 |
| I Love Doubles Recording Sheet |  |  | 31 |
| Dashing Doubles | Grade 3-5 | fact fluency addition, subtraction, multiplication and division; probability, mean median, mode | 32 |
| Dashing Doubles 0-18 Graph |  |  | 34 |
| Dashing Doubles 0-24 Graph |  |  | 35 |
| Missing You | Grade 2-4 | missing addends, subtraction, addition with regrouping | 36 |
| Missing You Recording Sheet |  |  | 37 |
| Double Dare Solitaire | Grade 3-5 | fact fluency addition, subtraction, multiplication, division, mixed operations, middle years - PEMDAS, operations with integers | 38 |
| Double Dare Solitaire Recording Sheet |  |  | 39 |


| Double Up Multiplication Grade 3-5 | fact fluency, products to 36 ; variation products to 81, to 144 , outcomes chart, probability, analyzing data | 40 |
| :---: | :---: | :---: |
| Double Up Multiplication Middle Years |  | 41 |
| Double Up Addition Primary | fact fluency addition to 12; probability | 42 |
| Addition Outcome Grids |  | 43 |
| Double Up Gameboards |  | 44 |
| Double Dicey Decisions Grade 3-8 | probability, determining theoretical probability | 46 |
| Double Dicey Decisions Gameboard |  | 48 |
| Fair Game Multiplication Grade 3-5 | multiplication products to 144 , odd/even products, data analysis, theoretical vs experimental probability | 49 |
| Fair Game Multiplication Recording Sheet |  | 51 |
| Multiplication Grid |  | 52 |
| Multiplication Table To 144 |  | 53 |
| Square Golf Grade 3 | fact fluency, multiplication, products to 36 | 54 |
| Square Golf Score Card |  | 56 |
| Back To Square One Grade 3-6 | multiplication, square numbers, addition with re-grouping | 57 |
| Back To Square One Recording Sheet |  | 59 |
| Back To Square One Primary | practicing doubles, addition | 60 |
| Back To Square One Primary Recording Sheet |  | 61 |
| Betweeners Grade 3-4 | ordering whole numbers and decimals, analytical thinking; <br> Variation - order of operations, PEDMAS | 62 |
| Cubic Mystery Grade 3-4 | ordering whole numbers and decimals, analytical thinking | 64 |
| Betweeners \& Cubic Mystery Recording Sheet |  | 65 |
| Tick Tock Roll A Clock Grade 3-5 | mixed operations, addition, subtraction, multiplication, division; PEDMAS | 66 |
| Tick Tock Roll A Clock Primary | fact fluency, addition facts to 12, subtraction facts from 6, tallying | 68 |
| Tick Tock Roll A Clock Recording Sheet |  | 69 |
| Double Dare You Grade 3-5 | fact fluency, addition, multiple addend addition with regrouping, probability | 70 |
| Double Dare You Gameboard |  | 73 |
| Double Dare You Recording Sheet |  | 74 |


| Double Dice Dilemma | Grade 3-4 | operations, probability, problem-solving, analyzing outcomes | 75 |
| :---: | :---: | :---: | :---: |
| Double Dice Dilemma Outcomes Chart |  |  | 78 |
| Double Dice Dilemma Recording Sheet |  |  | 79 |
| Double Dice Dilemma Primary |  | addition, subtraction, addition with regrouping, probability, problem solving | 80 |
| Double Dice Dilemma Primary Recording Sheet |  |  | 82 |
| Order Up Equations | Grade 4-5 | order of operations, problem solving | 83 |
| Order Up Equations Recording Sheet |  |  | 85 |
| Perimeters Are 2 Times The Fun | Grade 2-4 | determining perimeter of rectangles | 86 |
| Perimeters Are 2 Times The Fun Recording Sheet |  |  | 88 |
| In The Area | Grade 3-4 | determining area of rectangles | 89 |
| In The Area Recording Sheet |  |  | 91 |
| Three Times The Volume | Grade 4-6 | determining volume of rectangular prisms, classifying rectangular prisms, square prisms and cubes | 92 |
| Three Times The Volume Recording Sheet |  |  | 94 |
| Area / Perimeter / Volume Building Grid |  |  | 95 |
| Order In The Court | Grade 3-5 | ordering fractions, equivalent fractions, fractions less than one and greater than one, analytical thinking | 96 |
| Order In The Court Recording Sheet |  |  | 98 |
| Simply Fractions | Grade 3-5 | rename fractions to simplest forms | 99 |
| Simply Fractions Recording Sheet |  |  | 101 |
| It's A Balancing Act | Grade 5 \& up | creating balanced equations, order of operations, analytical thinking, PEDMAS | 102 |
| It's A Balancing Act Recording Sheet |  |  | 104 |
| That's Not Probable | Grade 6 \& up | comparing theoretical probability and experimental probability, graphing | 105 |
| That's Not Probable Recording Sheet |  |  | 108 |
| Plotting Along | Grade 4-6 | plotting ordered pairs ( $\mathrm{x}, \mathrm{y}$ ), coordinate geometry, slope | 109 |
| Plotting Along Recording Sheet |  |  | 112 |
| "X"Cellent Solution | Grade 5-6 | beginning Algebra, solving for x | 113 |

## BETWEENERS

## LEVEL:

## CONCEPTS:

## PLAYERS:

## Grade 3-4

ordering whole numbers and decimals, analytical thinking;
VARIATION - order of operations, PEDMAS
3 or 4
EQUIPMENT:
$1 \times 3$-in-a-cube die per player, 1 recording sheet per player

## GOAL:

to have a between number in each round

## GETTING STARTED:

To begin, each player records the names of all the players in the round on their recording sheets. All players shake their 3-in-a-cube die. On STOP players peek at their die, mentally figure all possible 3-digit numbers they can make from their roll and then record one of the possibilities next to their name on their recording sheet. Players then announce their numbers and record every player's number next to that player's name on their gameboard. Players compare all the recorded numbers in the round.

## EXAMPLE:

## STRATEGIZING...



John: "456 is the least I can make but has the best chance to be the between number for the round."

| PLAyER | Roll | Number |
| :--- | :---: | :---: |
| John | $4,5,6$ | 456 |
| Jane | $1,2,3$ | 321 |
| Norm | $1,4,5$ | 415 |

Jane: "321 is the
 greatest I can make but has the best chance to be the between number for the round."

Norm: "541 is too large to win, 145 is too small to win, my best chance is either 451 or 415.415 is closer to the middle and is my best chance to be the between number.
"John's 456 is greatest. Jane's 321 is LeAst. Norm's 415 is Between 321 and 456 ." Players circle 415 and Norm earns a point for the round.


1. Four Player Version - Rules and scoring remain the same, however there can be two between numbers in a round, with two players earning points if their numbers fall between the greatest and least for the round.
2. Students must place a decimal point in their number (eg roll 4,6,1:46.1, 4.61, .461) Rules and scoring remain the same.

## BETWEENERS

1. Players must make the largest number they can with their roll. They compare their numbers and the BETWEEN number wins a point.
2. Players roll one 10 sided double dice and play a 10's and 1's version. Players must decide which die (inside or outside) will represent the 10's and 1's place. Rules and scoring remain the same.

3. Players use their three numbers in a math sentence with the goal of having their answer being between the answers of their opponents.

## EXAMPLE:



Jane: " 3,2 and 1 are small numbers so I need to maximize the answer I can get with them."


Norm: "Answers around 7 or 8 have been winners in the past few rounds so I want an answer close to those."


John: " I first subtracted 4 from 6 so I had to place that in parentheses. I then multiplied the difference of (6-4) by 5 to get an answer of $10 . "$
Jane: "I placed 2+1 in parentheses because I wanted to have that done first so I could multiply the sum of $(2+1)$ by 3 to give me a product of 9 for an answer."
Norm: "I added $5+4$ to get 9 then subtracted the 1 to get a final answer of 8."
Jane scores 1 point for having the "between answer".

## JOURNAL WORK \& EXTENSIONS:

1. Explain what would be the ideal between number if you used two 10 -sided double dice?

## BETWEENERS \& CUBIC MYSTERY RECORDING SHEET

| PLAYER | NUMBER | PLAYER | NUMBER | PLAYER | NUMBER |
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| ๑ Box Cars and Ond Eyyed Jacks |  |


| PLAYER | NUMBER |
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# TICK TOCK ROLL A CLOCK 

## LEVEL:

## CONCEPTS:

PLAYERS:

## EQUIPMENT:

## GOAL:

Grade 3-5
mixed operations, addition, subtraction, multiplication, division; PEDMAS

2 cooperatively; or solitaire
$1 \times 3$-in-a-cube die, recording sheet
to cross off all numbers on the clock in twelve rolls

## GETTING STARTED:



Players either draw a clock or use the recording sheet. Play begins by rolling the 3 -in-a-cube die and recording the numbers. Players must use all three numbers in a math sentence who's solution eliminates one of the numbers on their clock. Players can use,,$+- \times$ and $\div$. All numbers rolled must be used, and can only be used once.

Example: 102 Players can decide to: $6 \div(2-1)=6$ or $6+2+1=9$ or $6 \div 2+1=4$ etc.
Only one clock number can be crossed off per roll. Players continue to roll for new combinations, each time analyzing all possibilities, and crossing off their best open number. If players are unable to find a combination for any remaining numbers, they must record an extra roll.


As students become more proficient with the strategy and probability in the game, change the GOAL. Replay with the following challenge:

Players can cross off as many numbers as possible with each roll. All numbers must be used and used only once. $\boldsymbol{A S K}$ - What's the fewest number of rolls that allow you to cross off all the numbers on your clock? Allow all operations, exponents, integer values.

Example:


$$
3+4+2=9
$$

$(-3) \times(-2)+4=10$

$$
\begin{aligned}
& (4-1)-2=1 \\
& (4 \times 1)+2=6 \\
& (3-2)+4=5 \\
& (3-2) \times 4=4
\end{aligned}
$$

TICK TUCK ROLL A CLOCK

JOURNAL WORK \& EXTENSIONS:

1. Can you find a combination that will allow you to cross off all twelve numbers in one roll?

2. Are there certain numbers that are more difficult to cross off? Explain or give examples.

3. $3 \times 2-5=\square$
4. $5 \times 1-3=2$
5. $4:(5 \div 5)=3$
$4.5+5-6=4$
My numbers
My numbers
6. $4+4-3=5$
7. $\frac{5+5-1}{5+4+1}=9$
8. $6 \div 3+4=610 \cdot \frac{5+4+1}{}=10$
9. $(4 \div 4)+6=7$ 11. $\frac{4+5+2}{5+2+1}=11$
10. $5+2+1=812.3 \times 2+6=12$

11. $(5-2)-1=2$
12. $(5-2) \times 1=3$
$4 .(5-2)+1=4$
in one Roll (i) Heal
13. $\frac{\text { MY numbers }}{(2-1) \times 5}=5$
14. $\frac{(5-1)+2}{(5) \times 6} 10 \cdot \frac{5 \times 2) \times 1}{5 \times 2)}=\frac{10}{10}$
15. $(5+2) \times 1=711 .(5 \times 2)+1=11$
16. $(5-1) \times 2=812 .(5+1) \times 2=12$

CONCEPTS: fact fluency, addition facts to 12 , subtraction facts from 6 , tallying $\mathrm{HH}=5$
EQUIPMENT: 1 x double regular dice, recording sheet
GOAL: to cross off all numbers on the clock in as few rolls as possible

## GETTING STARTED:

Players roll the double die and record the two numbers. Player can choose to either add the two for a sum and cross off that answer or subtract the two and cross off the difference.
Example:


Player may cross off $6+2=8$ OR $6-2=4$

Players tally after each roll. If a player cannot cross off any number, they still must tally and count it as a roll.

## JOURNAL WORK AND EXTENSIONS:

1. Have students total the number of tallies (rolls) it took them to cross off their clock. Students can add their data to a class graph. As a class they can get a sense of approximately how many rolls it takes to cross off all numbers.
2. Discuss with students which rolls should definitely be used for addition. Have them justify their thinking, eg $6+5=11$; there is only one way to make 11 , and that is with addition, whereas there would be many ways to cross off a difference of 1: 6-5 = 1, 5-4=1,
 $4-3=1,3-2=1,2-1=1$, many options.
3. With students, construct an outcomes chart of all addition combinations and an outcomes chart for all subtraction combinations using a 6 sided die.
4. Primary students needing an extra challenge can use the 3-in-a-cube die. The goal is to still try to cross off the clock in 12 rolls, then later in as few rolls as possible. Players can use addition and subtraction only as follows:


Roll | 6 | $6+4+1=11$ |
| :---: | :---: | :---: | :---: |

Roll $2466+4-2=\mathbf{8}$ etc.

## TICK TOCK ROLL A CLOCK RECORDING SHEET



My numbers
My numbers
5.
5. $工=\square$
$=$

6.
$\square=$

10. $\qquad$ $=$

$=$ $\square$ 11

1. $\qquad$ $=$ $\square$
2. $\qquad$ $=$ $\square$ 12. $\qquad$ $=\square$

Extra Rolls


Extra Rolls


Extra Rolls


Extra Rolls

# ORDER IN THE COURT 

## LEVEL:

CONCEPTS:

## PLAYERS:

## EQUIPMENT:

## GOAL:

Grade 3-5
ordering fractions, equivalent fractions, fractions less than one and greater than one, analytical thinking
VARIATION: Primary - naming fractions to $1 / 6$, Middle Years - decimal equivalents, mixed numbers

1 vs 1
$1 x$ double regular die per player, 1 recording sheet per player
to order a series of 5 fractions from least to greatest

## GETTING STARTED:

Player One rolls the die and uses the two numbers to create a fraction less than one, then records it on an open space in the Least to Greatest gameboard. Students may use fraction pieces or the Fraction Decimal Percent Chart on page 100 to help them make decisions. Player Two takes their turn rolling the die, creating a fraction less than one and recording it on their gameboard. Players record their fractions as rolled. If they roll a 4 and a 6 , they record $4 / 6$. Teachers may choose to have students convert their fractions to equivalent fractions with smaller denominators ( $4 / 6$ rolled, $2 / 3$ recorded). If a player's roll creates a fraction that is equivalent to one already on their gameboard, they have to record it in the "rejects" section of their gameboard. Players continue taking turns. A player wins the round if, at the end of equal turns, they are the first to have recorded, in order from least to greatest, five non-equivalent fractions. A player "strikes out" if they roll a third reject. The player who wins the most rounds wins the game.




1. Use 12-sided double dice.
2. Allow fractions greater than one to be used by designating the outside (top) number of a double regular die as the numerator and the inside (bottom) number as the denominator.

3. Use a 3-in-a-cube die to create mixed numbers such as $31 / 2$.

Roll five double regular dice at once and build proper fractions. Players line them up from least to greatest, stacking equivalent fractions on top of each other. Record the rolls on PRIMARY the gameboard, circling equivalent fractions.


## ORDER IN THE COURT

Players record the decimal equivalent (to 2 places) on the gameboard just below the

ROLL

" $1 / 2$ is equivalent to 50 hundredths or 0.50 "


ROLL

$2 \div 3$ gives a quotient of $0.666 \ldots$ which rounds to 0.67 or 67 hundredths

" $2 / 3$ is equivalent to about 67 hundredths or . 666 repeating"


ROLL 3-in-a-cube


2 and $2 \div 5$ is 2 and 40 hundredths or 2.40


# ORDER IN THE COURT RECORDING SHEET 



REJECTS

ROUND TWO PLAYER ONE
LEAST

|  |  |  |  |  |
| :--- | :--- | :--- | :--- | :--- |
| - | - | - | - | - |

REJECTS


ROUND THREE PLAYER ONE


REJECTS


ROUND FOUR PLAYER ONE LEAST

|  | - |  |  | - |
| :--- | :--- | :--- | :--- | :--- |
|  |  | - |  | - |

REJECTS

$\square$ REJECTS

