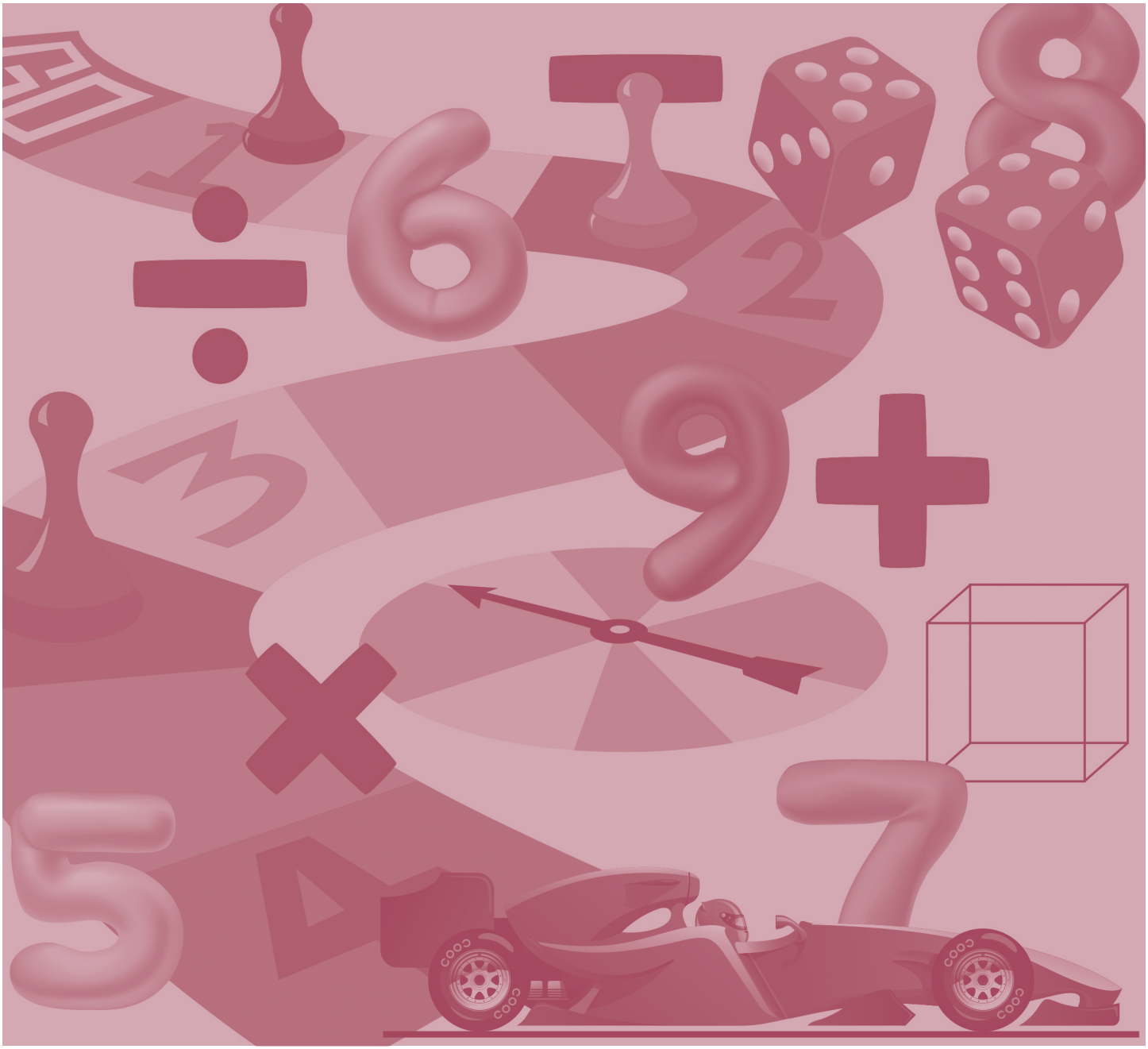
GRADE
3

Building Conceptual Understanding and Fluency Through Games

FOR THE COMMON CORE STATE STANDARDS IN MATHEMATICS



PUBLIC SCHOOLS OF NORTH CAROLINA
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K-12 MATHEMATICS
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Building Conceptual Understanding and Fluency Through Games

Developing fluency requires a balance and connection between conceptual understanding and computational proficiency. Computational methods that are over-practiced without understanding are forgotten or remembered incorrectly. Conceptual understanding without fluency can inhibit the problem solving process. – NCTM, *Principles and Standards for School Mathematics*, pg. 35

WHY PLAY GAMES?

People of all ages love to play games. They are fun and motivating. Games provide students with opportunities to explore fundamental number concepts, such as the counting sequence, one-to-one correspondence, and computation strategies. Engaging mathematical games can also encourage students to explore number combinations, place value, patterns, and other important mathematical concepts. Further, they provide opportunities for students to deepen their mathematical understanding and reasoning. Teachers should provide repeated opportunities for students to play games, and let the mathematical ideas emerge as they notice new patterns, relationships, and strategies. Games are an important tool for learning. Here are some advantages for integrating games into elementary mathematics classrooms:

- Playing games encourages strategic mathematical thinking as students find different strategies for solving problems and it deepens their understanding of numbers.
- Games, when played repeatedly, support students' development of computational fluency.
- Games provide opportunities for practice, often without the need for teachers to provide the problems. Teachers can then observe or assess students, or work with individual or small groups of students.
- Games have the potential to develop familiarity with the number system and with "benchmark numbers" – such as 10s, 100s, and 1000s and provide engaging opportunities to practice computation, building a deeper understanding of operations.
- Games provide a school to home connection. Parents can learn about their children's mathematical thinking by playing games with them at home.

BUILDING FLUENCY

Developing computational fluency is an expectation of the Common Core State Standards. Games provide opportunity for meaningful practice. The research about how students develop fact mastery indicates that drill techniques and timed tests do not have the power that mathematical games and other experiences have. Appropriate mathematical activities are essential building blocks to develop mathematically proficient students who demonstrate computational fluency (Van de Walle & Lovin, *Teaching Student-Centered Mathematics Grades K-3,* pg. 94). Remember, computational fluency includes efficiency, accuracy, and flexibility with strategies (Russell, 2000).

The kinds of experiences teachers provide to their students clearly play a major role in determining the extent and quality of students' learning. Students' understanding can be built by actively engaging in tasks and experiences designed to deepen and connect their knowledge. Procedural fluency and conceptual understanding can be developed through problem solving, reasoning, and argumentation (NCTM, P*rinciples and Standards for School Mathematics,* pg. 21). Meaningful practice is necessary to develop fluency with basic number combinations and strategies with multi-digit numbers. Practice should be purposeful and should focus on developing thinking strategies and a knowledge of number relationships rather than drill isolated facts (NCTM, *Principles and Standards for School Mathematics,* pg. 87). Do *not* subject any student to computation drills unless the student has developed an efficient strategy for the facts included in the drill (Van de Walle & Lovin, *Teaching Student-Centered Mathematics Grades K-3,* pg. 117). Drill can strengthen strategies with which students feel comfortable – ones they "own" – and will help to make these strategies increasingly automatic. Therefore, drill of strategies will allow students to use them with increased efficiency, even to the point of recalling the fact without being conscious of using a strategy. Drill without an efficient strategy present offers no assistance (Van de Walle & Lovin, *Teaching Student-Centered Mathematics Grades K-3,* pg. 117).

CAUTIONS

Sometimes teachers use games solely to practice number facts. These games usually do not engage children for long because they are based on students' recall or memorization of facts. Some students are quick to memorize, while others need a few moments to use a related fact to compute. When students are placed in situations in which recall speed determines success, they may infer that being "smart" in mathematics means getting the correct answer quickly instead of valuing the process of thinking. Consequently, students may feel incompetent when they use number patterns or related facts to arrive at a solution and may begin to dislike mathematics because they are not fast enough.

For students to become fluent in arithmetic computation, they must have efficient and accurate methods that are supported by an understanding of numbers and operations. "Standard" algorithms for arithmetic computation are one means of achieving this fluency.

– NCTM, *Principles and Standards for School Mathematics,* pg. 35

Overemphasizing fast fact recall at the expense of problem solving and conceptual experiences gives students a distorted idea of the nature of mathematics and of their ability to do mathematics.

– Seeley, *Faster Isn't Smarter: Messages about Math, Teaching, and Learning in the 21st Century,* pg. 95

Computational fluency refers to having efficient and accurate methods for computing. Students exhibit computational fluency when they demonstrate flexibility in the computational methods they choose, understand and can explain these methods, and produce accurate answers efficiently.

– NCTM, *Principles and Standards for School Mathematics,* pg. 152

Fluency refers to having efficient, accurate, and generalizable methods (algorithms) for computing that are based on well-understood properties and number relationships.

– NCTM, *Principles and Standards for School Mathematics,* pg. 144

INTRODUCE A GAME

A good way to introduce a game to the class is for the teacher to play the game against the class. After briefly explaining the rules, ask students to make the class's next move. Teachers may also want to model their strategy by talking aloud for students to hear his/her thinking. "I placed my game marker on 6 because that would give me the largest number."

Games are fun and can create a context for developing students' mathematical reasoning. Through playing and analyzing games, students also develop their computational fluency by examining more efficient strategies and discussing relationships among numbers. Teachers can create opportunities for students to explore mathematical ideas by planning questions that prompt students to reflect about their reasoning and make predictions. Remember to always vary or modify the game to meet the needs of your leaners. Encourage the use of the Standards for Mathematical Practice.

HOLDING STUDENTS ACCOUNTABLE

While playing games, have students record mathematical equations or representations of the mathematical tasks. This provides data for students and teachers to revisit to examine their mathematical understanding.

After playing a game, have students reflect on the game by asking them to discuss questions orally or write about them in a mathematics notebook or journal:

1. What skill did you review and practice?
2. What strategies did you use while playing the game?
3. If you were to play the game a second time, what different strategies would you use to be more successful?
4. How could you tweak or modify the game to make it more challenging?

A Special Thank-You

The development of the NC Department of Public Instruction Document, *Building Conceptual Understanding and Fluency Through Games* was a collaborative effort with a diverse group of dynamic teachers, coaches, administrators, and NCDPI staff. We are very appreciative of all of the time, support, ideas, and suggestions made in an effort to provide North Carolina with quality support materials for elementary level students and teachers. The North Carolina Department of Public Instruction appreciates any suggestions and feedback, which will help improve upon this resource. Please send all correspondence to **Kitty Rutherford** (kitty.rutherford@dpi.nc.gov) or **Denise Schulz** (denise.schulz@dpi.nc.gov)

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Third Grade – Standards

1. **Developing understanding of multiplication and division and strategies for multiplication and division within 100** – Students develop an understanding of the meanings of multiplication and division of whole numbers through activities and problems involving equal-sized groups, arrays, and area models; multiplication is finding an unknown product, and division is finding an unknown factor in these situations. For equal-sized group situations, division can require finding the unknown number of groups or the unknown group size. Students use properties of operations to calculate products of whole numbers, using increasingly sophisticated strategies based on these properties to solve multiplication and division problems involving single-digit factors. By comparing a variety of solution strategies, students learn the relationship between multiplication and division.
2. **Developing understanding of fractions, especially unit fractions (fractions with numerator 1)** – Students develop an understanding of fractions, beginning with unit fractions. Students view fractions in general as being built out of unit fractions, and they use fractions along with visual fraction models to represent parts of a whole. Students understand that the size of a fractional part is relative to the size of the whole. For example, 1/2 of the paint in a small bucket could be less paint than 1/3 of the paint in a larger bucket; but 1/3 of a ribbon is longer than 1/5 of the same ribbon because when the ribbon is divided into 3 equal parts, the parts are longer than when the ribbon is divided into 5 equal parts. Students are able to use fractions to represent numbers equal to, less than, and greater than one. They solve problems that involve comparing fractions by using visual fraction models and strategies based on noticing equal numerators or denominators.
3. **Developing understanding of the structure of rectangular arrays and of area** – Students recognize area as an attribute of two-dimensional regions. They measure the area of a shape by finding the total number of same-size units of area required to cover the shape without gaps or overlaps, a square with sides of unit length being the standard unit for measuring area. Students understand that rectangular arrays can be decomposed into identical rows or into identical columns. By decomposing rectangles into rectangular arrays of squares, students connect area to multiplication, and justify using multiplication to determine the area of a rectangle.
4. **Describing and analyzing two-dimensional shapes** – Students describe, analyze, and compare properties of two-dimensional shapes. They compare and classify shapes by their sides and angles, and connect these with definitions of shapes. Students also relate their fraction work to geometry by expressing the area of part of a shape as a unit fraction of the whole.

MATHEMATICAL PRACTICES

1. **Make sense of problems and persevere in solving them.**
2. **Reason abstractly and quantitatively.**
3. **Construct viable arguments and critique the reasoning of others.**
4. **Model with mathematics.**
5. **Use appropriate tools strategically.**
6. **Attend to precision.**
7. **Look for and make use of structure.**
8. **Look for and express regularity in repeated reasoning.**

OPERATIONS AND ALGEBRAIC THINKING

Represent and solve problems involving multiplication and division.

3.OA.1 Interpret products of whole numbers, e.g., interpret 5×7 as the total number of objects in 5 groups of 7 objects each. *For example, describe a context in which a total number of objects can be expressed as 5×7.*

3.OA.2 Interpret whole-number quotients of whole numbers, e.g., interpret $56 \div 8$ as the number of objects in each share when 56 objects are partitioned equally into 8 shares, or as a number of shares when 56 objects are partitioned into equal shares of 8 objects each. *For example, describe a context in which a number of shares or a number of groups can be expressed as $56 \div 8$.*

3.OA.3 Use multiplication and division within 100 to solve word problems in situations involving equal groups, arrays, and measurement quantities, e.g., by using drawings and equations with a symbol for the unknown number to represent the problem. (Note: See Glossary, Table 2.)

3.OA.4 Determine the unknown whole number in a multiplication or division equation relating three whole numbers. *For example, determine the unknown number that makes the equation true in each of the equations $8 \times ? = 48$, $5 = \square \div 3$, $6 \times 6 = ?$.*

Understand properties of multiplication and the relationship between multiplication and division.

3.OA.5 Apply properties of operations as strategies to multiply and divide. (Note: Students need not use formal terms for these properties.) *Examples: If $6 \times 4 = 24$ is known, then $4 \times 6 = 24$ is also known. (Commutative property of multiplication.) $3 \times 5 \times 2$ can be found by $3 \times 5 = 15$, then $15 \times 2 = 30$, or by $5 \times 2 = 10$, then $3 \times 10 = 30$. (Associative property of multiplication.) Knowing that $8 \times 5 = 40$ and $8 \times 2 = 16$, one can find 8×7 as $8 \times (5 + 2) = (8 \times 5) + (8 \times 2) = 40 + 16 = 56$. (Distributive property.)*

3.OA.6 Understand division as an unknown-factor problem. *For example, find $32 \div 8$ by finding the number that makes 32 when multiplied by 8.*

Multiply and divide within 100.

3.OA.7 Fluently multiply and divide within 100, using strategies such as the relationship between multiplication and division (e.g., knowing that $8 \times 5 = 40$, one knows $40 \div 5 = 8$) or properties of operations. By the end of Grade 3, know from memory all products of two one-digit numbers.

Solve problems involving the four operations, and identify and explain patterns in arithmetic.

3.OA.8 Solve two-step word problems using the four operations. Represent these problems using equations with a letter standing for the unknown quantity. Assess the reasonableness of answers using mental computation and estimation strategies including rounding. (Note: This standard is limited to problems posed with whole numbers and having whole-number answers; students should know how to perform operations in the conventional order when there are no parentheses to specify a particular order – Order of Operations.)

3.OA.9 Identify arithmetic patterns (including patterns in the addition table or multiplication table), and explain them using properties of operations. *For example, observe that 4 times a number is always even, and explain why 4 times a number can be decomposed into two equal addends.*

NUMBER AND OPERATIONS IN BASE TEN

Use place value understanding and properties of operations to perform multi-digit arithmetic. (Note: A range of algorithms may be used.)

3.NBT.1 Use place value understanding to round whole numbers to the nearest 10 or 100.

3.NBT.2 Fluently add and subtract within 1000 using strategies and algorithms based on place value, properties of operations, and/or the relationship between addition and subtraction.

3.NBT.3 Multiply one-digit whole numbers by multiples of 10 in the range 10-90 (e.g., 9×80, 5×60) using strategies based on place value and properties of operations.

NUMBER AND OPERATIONS - FRACTIONS

Note: Grade 3 expectations in this domain are limited to fractions with denominators 2, 3, 4, 6, and 8.

Develop understanding of fractions as numbers.

3.NF.1 Understand a fraction $1/b$ as the quantity formed by 1 part when a whole is partitioned into b equal parts; understand a fraction a/b as the quantity formed by a parts of size $1/b$.

3.NF.2 Understand a fraction as a number on the number line; represent fractions on a number line diagram.

a. Represent a fraction 1/*b* on a number line diagram by defining the interval from 0 to 1 as the whole and partitioning it into b equal parts. Recognize that each part has size 1/*b* and that the endpoint of the part based at 0 locates the number 1/*b* on the number line.

b. Represent a fraction *a/b* on a number line diagram by marking off a lengths 1/*b* from 0. Recognize that the resulting interval has size *a/b* and that its endpoint locates the number *a/b* on the number line.

3.NF.3 Explain equivalence of fractions in special cases, and compare fractions by reasoning about their size.

a. Understand two fractions as equivalent (equal) if they are the same size, or the same point on a number line.

b. Recognize and generate simple equivalent fractions, e.g., 1/2 = 2/4, 4/6 = 2/3). Explain why the fractions are equivalent, e.g., by using a visual fraction model.

c. Express whole numbers as fractions, and recognize fractions that are equivalent to whole numbers. *Examples: Express 3 in the form 3 = 3/1; recognize that 6/1 = 6; locate 4/4 and 1 at the same point of a number line diagram.*

d. Compare two fractions with the same numerator or the same denominator by reasoning about their size. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with the symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

MEASUREMENT AND DATA

Solve problems involving measurement and estimation of intervals of time, liquid volumes, and masses of objects.

3.MD.1 Tell and write time to the nearest minute and measure time intervals in minutes. Solve word problems involving addition and subtraction of time intervals in minutes, e.g., by representing the problem on a number line diagram.

3.MD.2 Measure and estimate liquid volumes and masses of objects using standard units of grams (g), kilograms (kg), and liters (l). (Note: Excludes compound units such as cm3 and finding the geometric volume of a container.) Add, subtract, multiply, or divide to solve one-step word problems involving masses or volumes that are given in the same units, e.g., by using drawings (such as a beaker with a measurement scale) to represent the problem. (Note: Excludes multiplicative comparison problems – problems involving notions of "times as much"; see Glossary, Table 2.)

Represent and interpret data.

3.MD.3 Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *For example, draw a bar graph in which each square in the bar graph might represent 5 pets.*

3.MD.4 Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units – whole numbers, halves, or quarters.

Geometric measurement: understand concepts of area and relate area to multiplication and to addition.

3.MD.5 Recognize area as an attribute of plane figures and understand concepts of area measurement.

a. A square with side length 1 unit, called "a unit square," is said to have "one square unit" of area, and can be used to measure area.

b. A plane figure which can be covered without gaps or overlaps by *n* unit squares is said to have an area of *n* square units.

3.MD.6 Measure areas by counting unit squares (square cm, square m, square in, square ft, and improvised units).

3.MD.7 Relate area to the operations of multiplication and addition.

a. Find the area of a rectangle with whole-number side lengths by tiling it, and show that the area is the same as would be found by multiplying the side lengths.

b. Multiply side lengths to find areas of rectangles with whole-number side lengths in the context of solving real world and mathematical problems, and represent whole-number products as rectangular areas in mathematical reasoning.

c. Use tiling to show in a concrete case that the area of a rectangle with whole-number side lengths a and $b + c$ is the sum of $a \times b$ and $a \times c$. Use area models to represent the distributive property in mathematical reasoning.

d. Recognize area as additive. Find areas of rectilinear figures by decomposing them into non-overlapping rectangles and adding the areas of the non-overlapping parts, applying this technique to solve real world problems.

Geometric measurement: recognize perimeter as an attribute of plane figures and distinguish between linear and area measures.

3.MD.8 Solve real world and mathematical problems involving perimeters of polygons, including finding the perimeter given the side lengths, finding an unknown side length, and exhibiting rectangles with the same perimeter and different areas or with the same area and different perimeters.

GEOMETRY

Reason with shapes and their attributes.

3.G.1 Understand that shapes in different categories (e.g., rhombuses, rectangles, and others) may share attributes (e.g., having four sides), and that the shared attributes can define a larger category (e.g., quadrilaterals). Recognize rhombuses, rectangles, and squares as examples of quadrilaterals, and draw examples of quadrilaterals that do not belong to any of these subcategories.

3.G.2 Partition shapes into parts with equal areas. Express the area of each part as a unit fraction of the whole. *For example, partition a shape into 4 parts with equal area, and describe the area of each part as 1/4 of the area of the shape.*

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Number and Operations – Fractions

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REVIEW

Online Games for Each Category

Double Up!

Building Fluency: multiply within 100

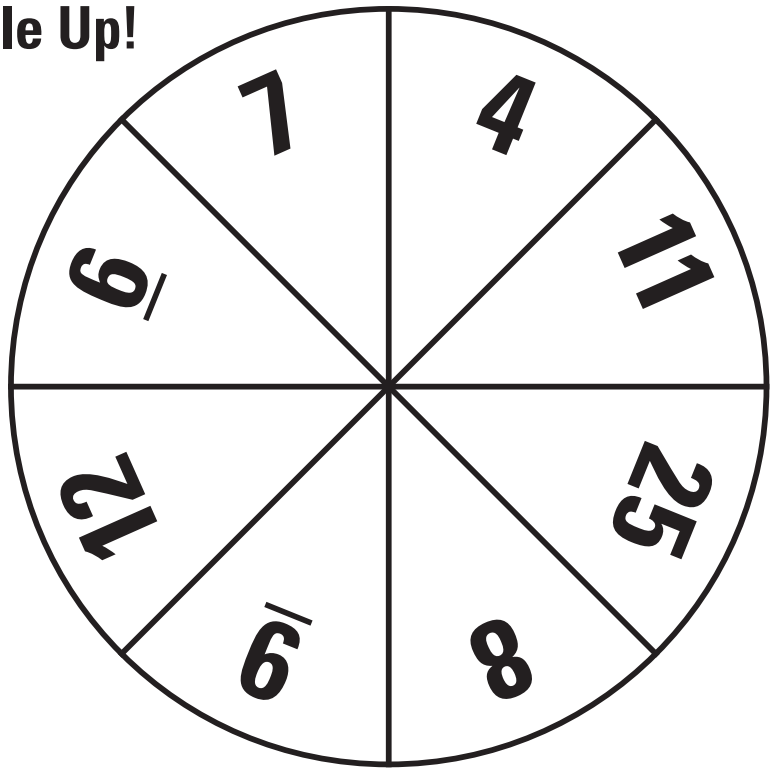
Materials: gameboard, spinner (paper clip and pencil), 8 game markers - different color for each player

Number of Players: 2

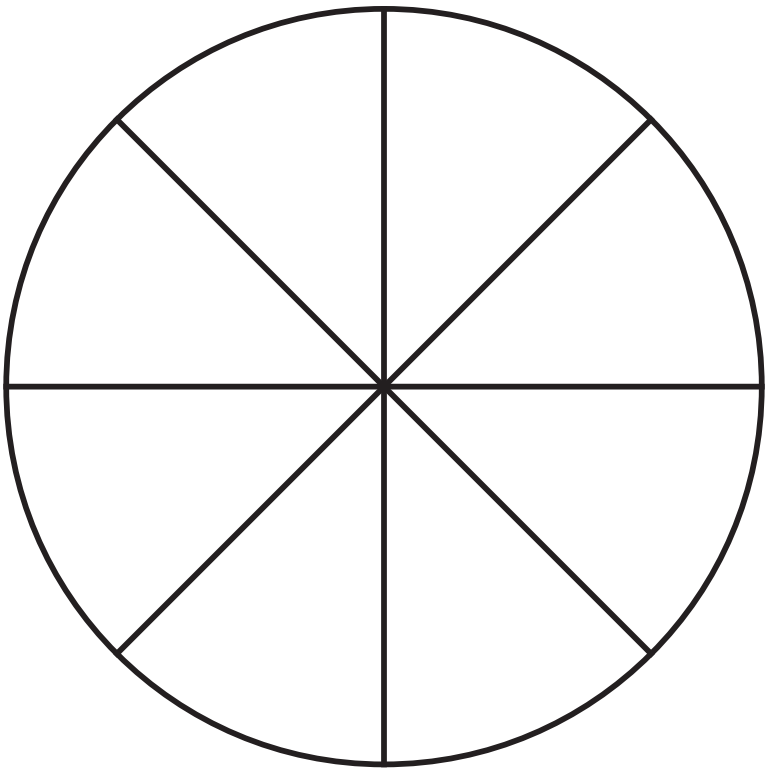
Directions:

1. Spin and double the number (multiply by 2)
2. Cover the product on the gameboard.
3. If the spinner lands on a line, spin again.
4. The first player to cover three products in a row wins.

Variation/Extension: Students create their own spinner game with products, an example might be having players spin two factors and multiply and cover the products on the board.



8	18	12	14	16
16	50	8	50	18
22	14	22	12	24
8	24	12	18	16
50	18	14	24	22



Tic-Tac-Toe Array

Building Fluency: products of whole numbers and their relationship to rectangular arrays

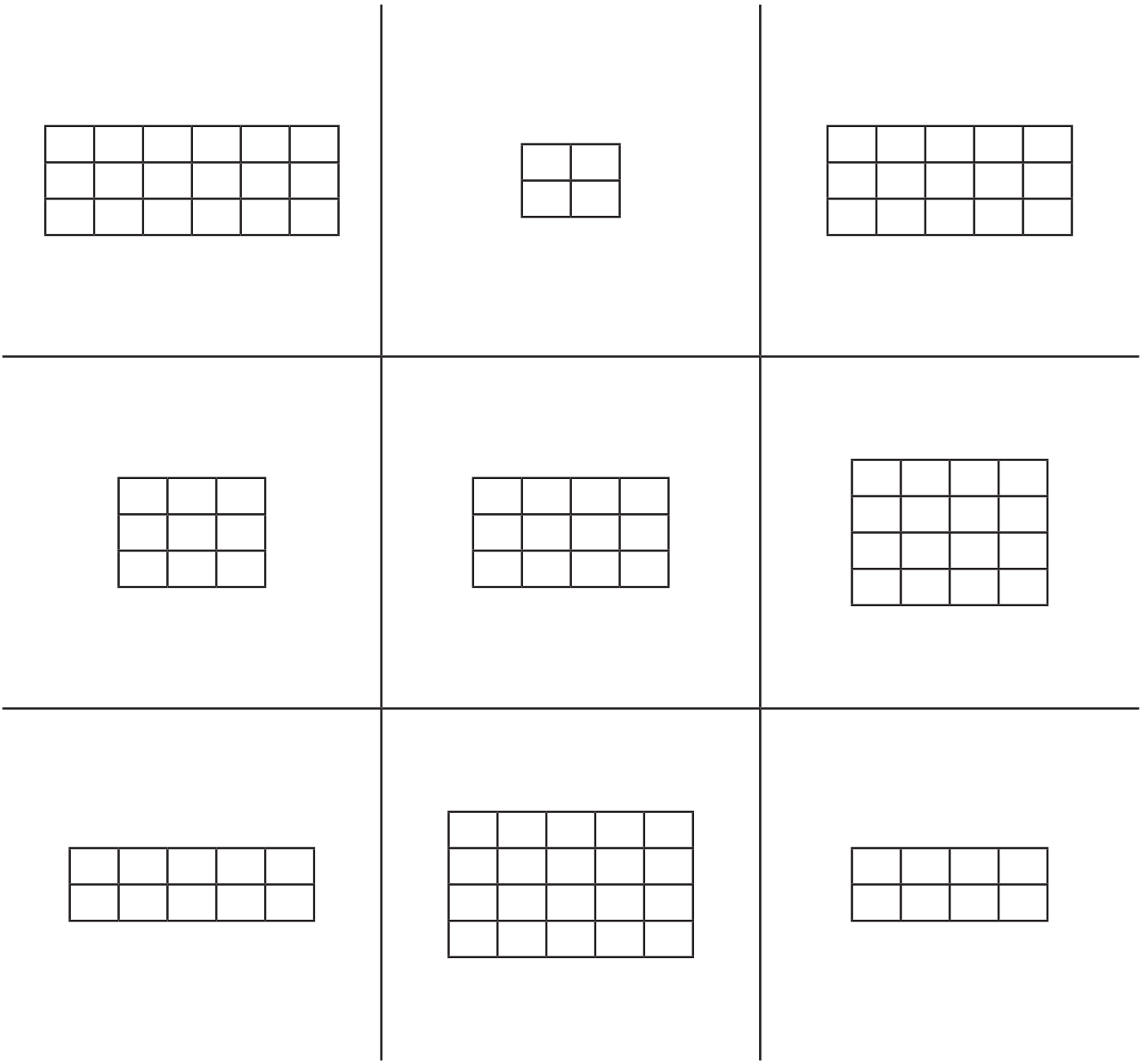
Materials: gameboard, pile of centimeter cubes (at least 20), 5 game markers - different color for each player, a spinner (your choice)

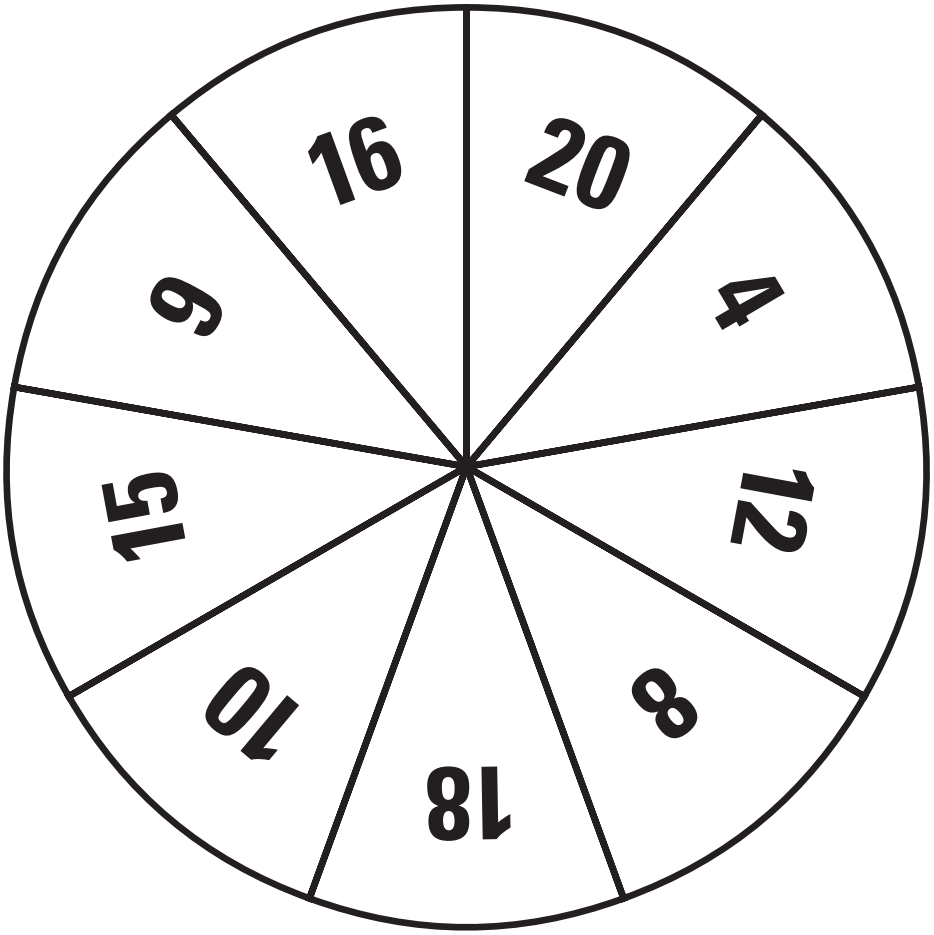
Number of Players: 2

Directions:

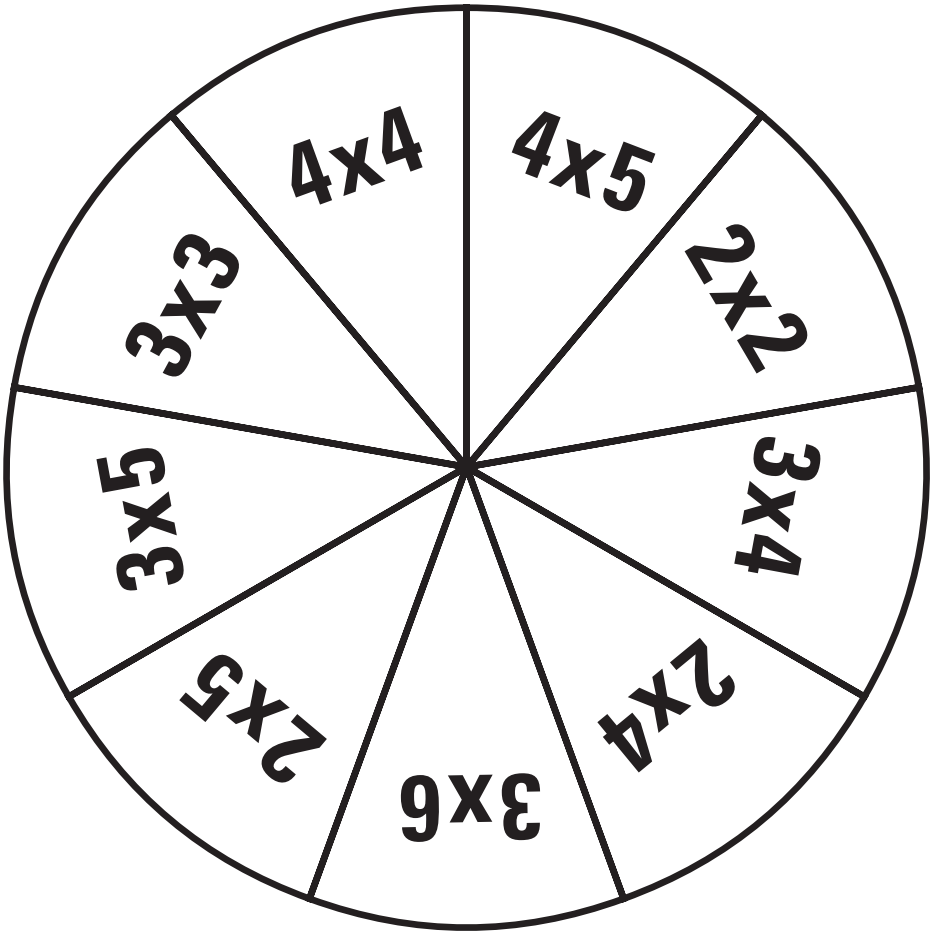
1. Players take turns spinning the spinner. The player takes the number of cubes shown on the spinner.
2. The player uses the cubes to build one of the rectangles shown on the gameboard & says the equation used to build the rectangle.
3. The player puts the cubes back in the pile and places a marker on the rectangle.
4. The winner is the first player to have three markers in a row.

Variation/Extension: Player may win by being the first to cover four adjacent rectangles to form a box. Use the second spinner. Player will multiply and use those dimensions to make the rectangle.





Variation #2
Spinner



Sakes Alive, Go For Fives!!

Building Fluency: multiply within 100

Materials: gameboard, pair of dice, 20 game markers - different color for each player

Number of Players: 2 or 3

Directions:

1. Players take turns rolling dice. Player covers the product or the two factors with game markers.
2. If the player is not able to cover a number, the turn is lost.
3. The first player to cover five squares in a row, vertically, horizontally, or diagonally wins the game.

Variation/Extension: Play a "doubles" variation. When a player cannot play the factors or the product, they may play a double of the product. Example: Player rolls 2 and 5. 10 is not available. Player calls "double" and covers the 20.

24	5	16	3	18	2	20	12	4
4	8	6	12	4	3	25	5	8
18	1	36	4	30	5	24	3	2
12	18	2	5	16	6	1	9	4
25	3	2	20	4	5	3	8	25
5	9	1	15	5	18	6	12	1
8	3	5	4	24	3	2	24	6
2	30	25	6	2	8	4	9	3
15	1	20	9	18	3	6	24	36

Raging Rectangles

Building Fluency: products of whole numbers and their relationship to rectangular arrays; relate area to operations of multiplication

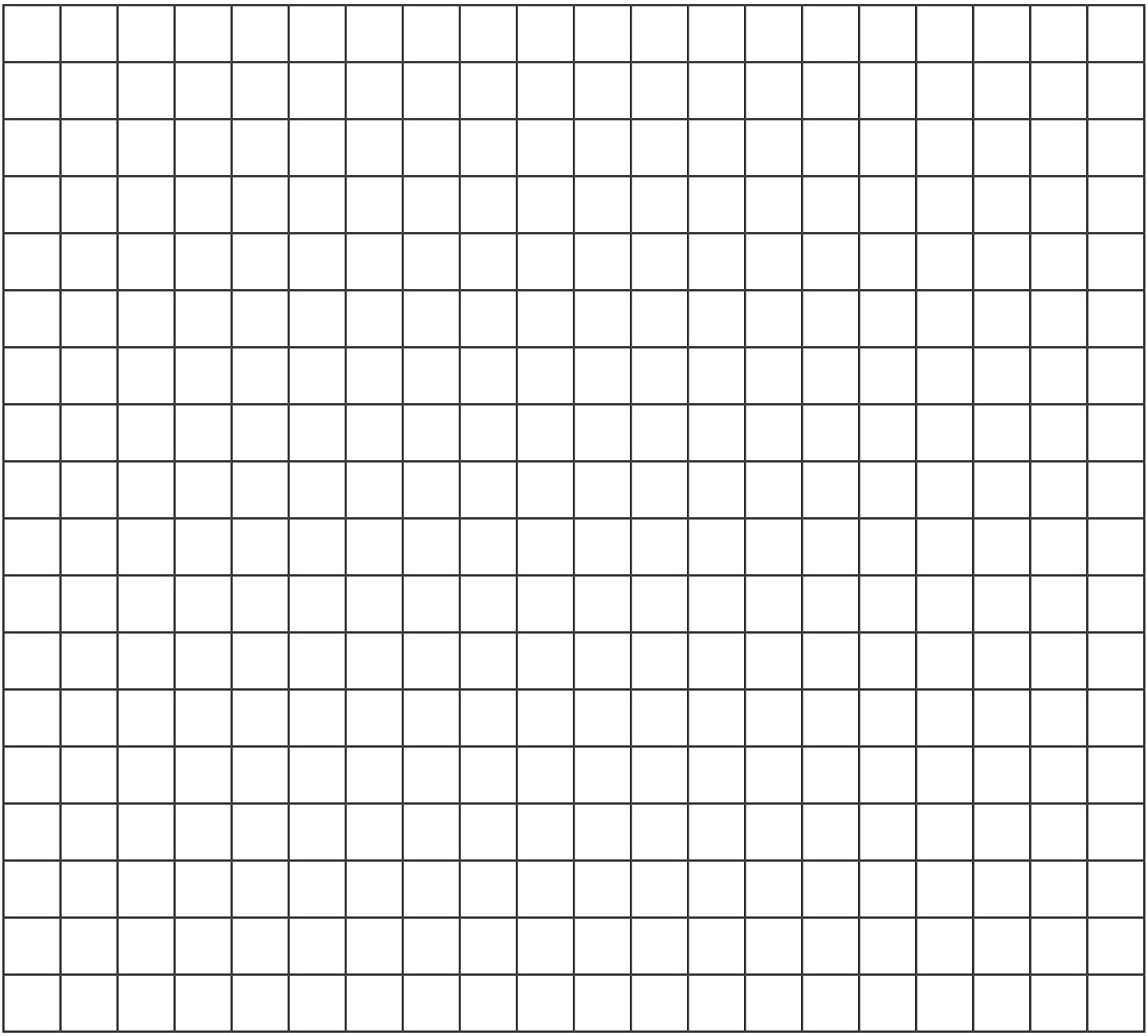
Materials: gameboard, pair of dice, 1 crayon - different color per player

Number of Players: 2

Directions:

1. Each player takes a turn rolling the dice to get two factors.
2. The player outlines and colors a rectangle on the gameboard to match the pair of factors. Example: a roll of 6 and 3 is colored as a 6 x 3 rectangle or a 3 x 6 rectangle.
3. The player writes the equation (area) inside the rectangle.
4. A player loses a turn when the rectangle cannot be drawn on the gameboard.
5. The winner is the player with the most area colored.

Variation/Extension: Students can add the two numbers on the dice for the first factor and then use 2, 5 or 10 as the second factor.



Multiple Madness

Building Fluency: multiply within 100

Materials: gameboard, 8 game markers – different color for each player, 2 paperclips

Number of Players: 2

Directions:

1. The first player places the two paperclips on any factors at the bottom of the page. Both paperclips may be on the same factor.
2. The player covers the product of the two factors with a game marker.
3. The second player moves one of the paperclips then places a game marker on the new product.
4. Players alternate moving a paperclip and marking a product.
5. The winner is the first to cover four products in a row.

Variation/Extension: Multiple Madness II is a variation

1	2	3	4	5	6
8	9	10	12	15	16
20	25	1	2	3	4
5	6	8	9	10	12
15	16	20	25	1	2
3	4	5	6	8	10

FACTORS: 1 2 3 4 5

Multiple Madness II

Building Fluency: products of whole numbers

Materials: gameboard, 8 game markers – different color for each player, 2 paperclips

Number of Players: 2

Directions:

1. The first player places the two paperclips on any factors at the bottom of the page. Both paperclips may be on the same factor.
2. The player covers the product of the two factors with a game marker.
3. The second player moves one of the paperclips and places a game marker on the new product.
4. Players alternate moving a paperclip and marking a product.
5. The winner is the first to cover four products in a row.

Variation/Extension: Multiple Madness is a variation

1	2	3	4	5	6
7	8	9	10	12	14
15	16	18	20	21	24
25	27	28	30	32	35
36	40	42	45	48	49
54	56	63	64	72	81

FACTORS: 1 2 3 4 5 6 7 8 9

No Leftovers Wanted!

Building Fluency: products of whole numbers and their relationship to rectangular arrays

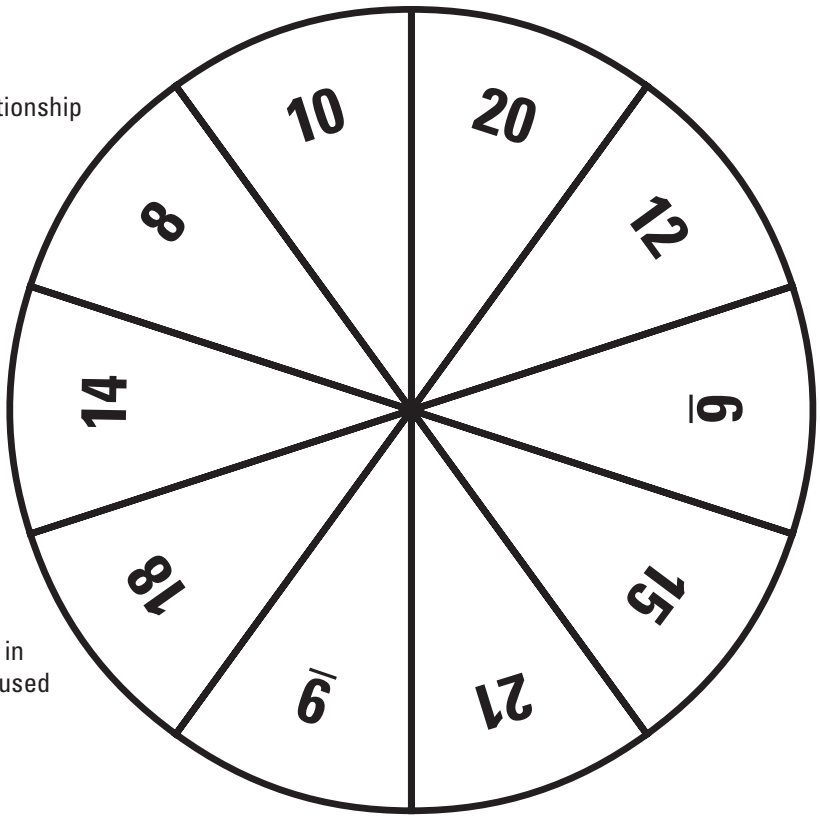
Materials: gameboard, a die, spinner (pencil and paperclip), 21 color tiles, cubes, or counters

Number of Players: 2

Directions:

1. Player spins the spinner and takes that number of counters.
2. Player rolls the die to see how many equal rows will be in the array. Then the player builds the array.
3. The number of counters in one row is the player's score. The player's score is doubled if there are no leftovers.
4. Players record their score after each turn.
5. The winner has the highest score after six rounds.

Variation/Extension: Use the area or number of blocks used in the array to be the score. Use the area or number of blocks used in the array minus the leftovers to be the score.



PLAYER 1

Turn	# of Counters	# of Equal Rows	# in Each Row	# of Leftovers	Score
1					
2					
3					
4					
5					
6					

PLAYER 2

Turn	# of Counters	# of Equal Rows	# in Each Row	# of Leftovers	Score
1					
2					
3					
4					
5					
6					

Whose Winning Products?

Building Fluency: multiply within 100

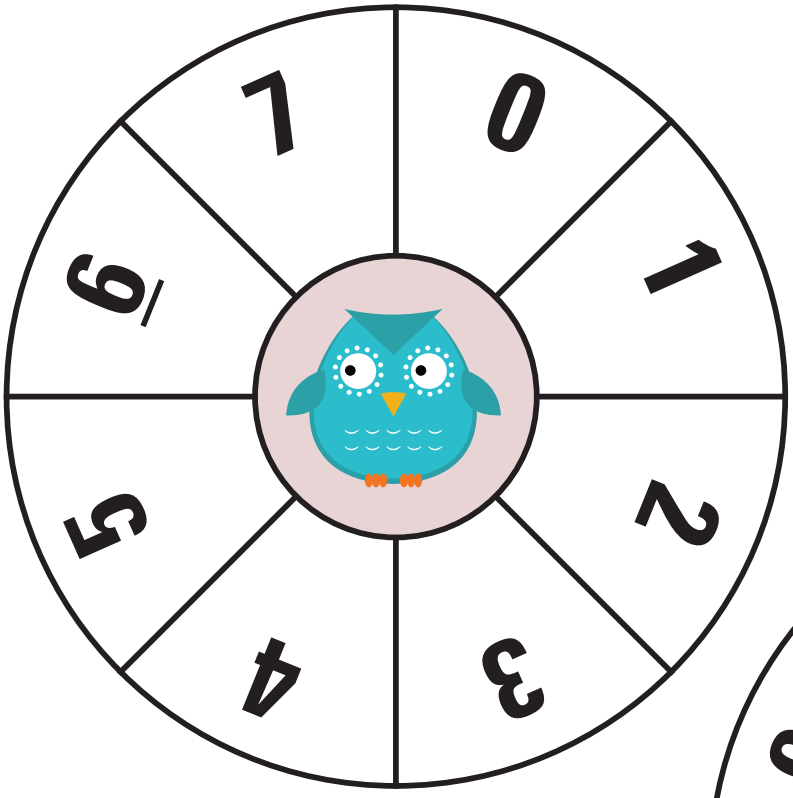
Materials: gameboard for each player, spinners (pencil and paper clip), 25 game markers for each player

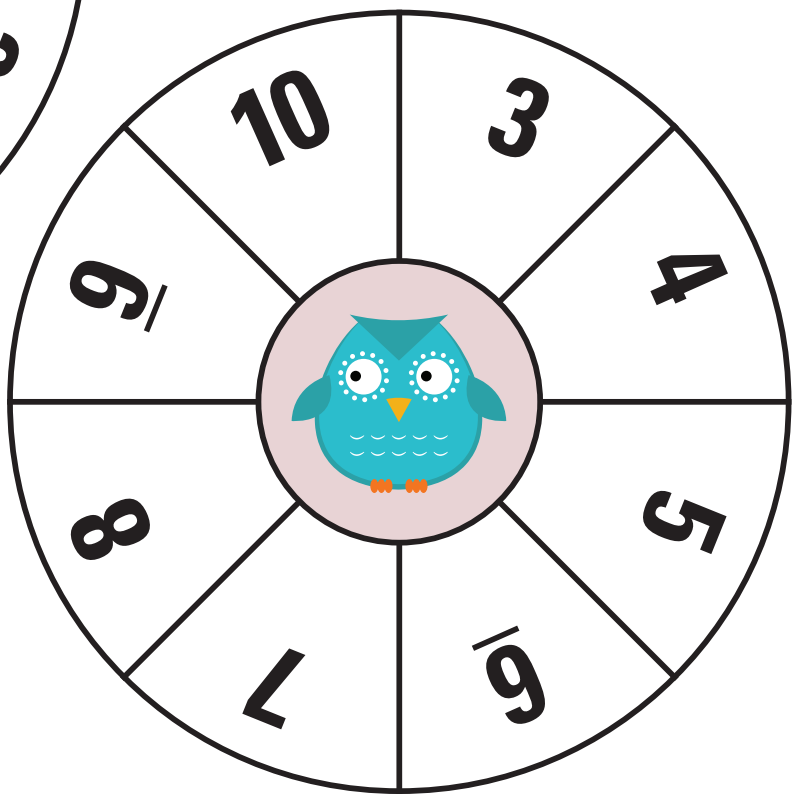
Number of Players: any number

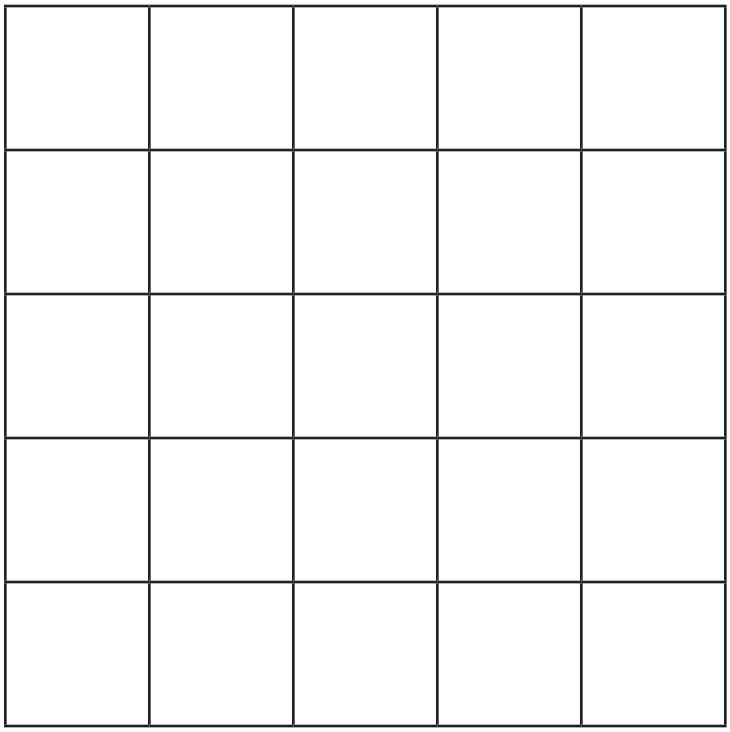
Directions:

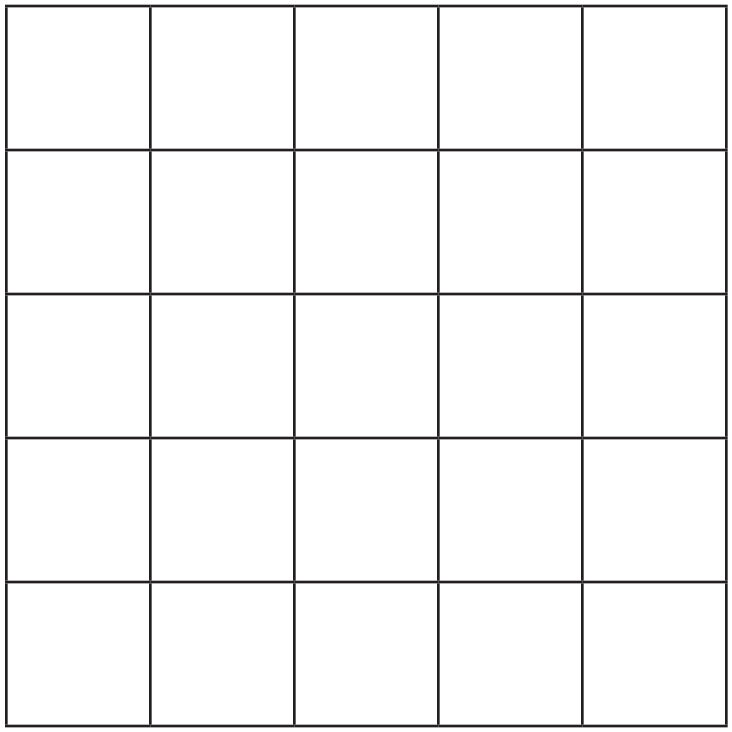
1. Each player completes their gameboard with possible products.
2. Player 1 spins the spinners to find two factors.
3. Find the product and place game marker on the square on the gameboard.
4. In turn, each player spins and multiplies.
5. All players cover the product if it appears on their gameboards.
6. First player to cover 5 in any direction wins.

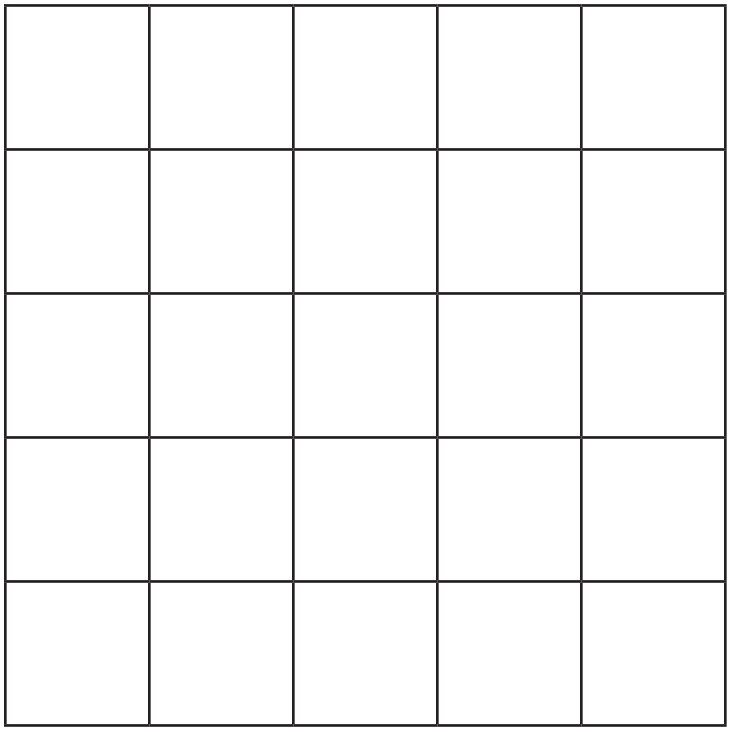
Variation/Extension: This could be played with a larger group using a document camera. Place the spinner under the document camera and let players take turns spinning and multiplying.

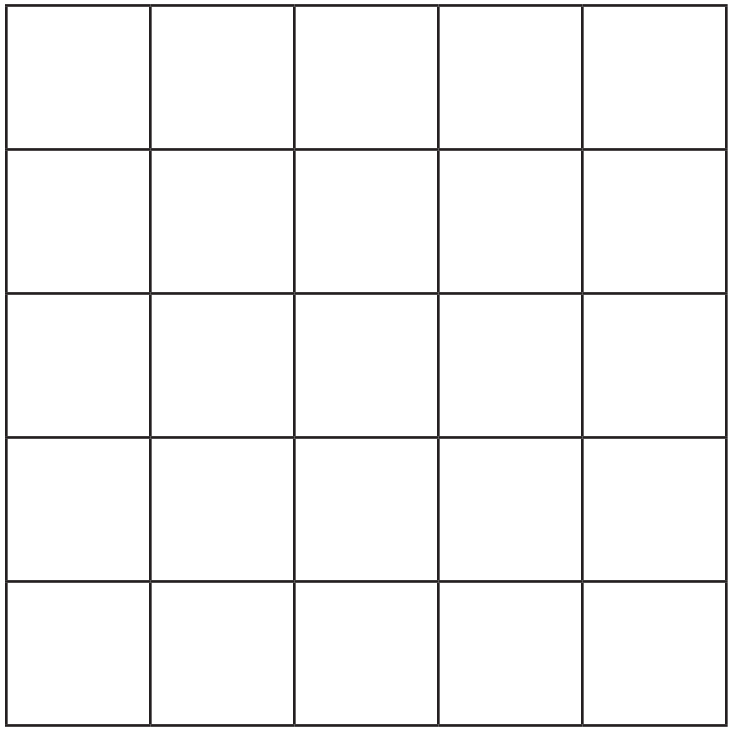












Murphy to Manteo

Building Fluency: fluently divide within 100

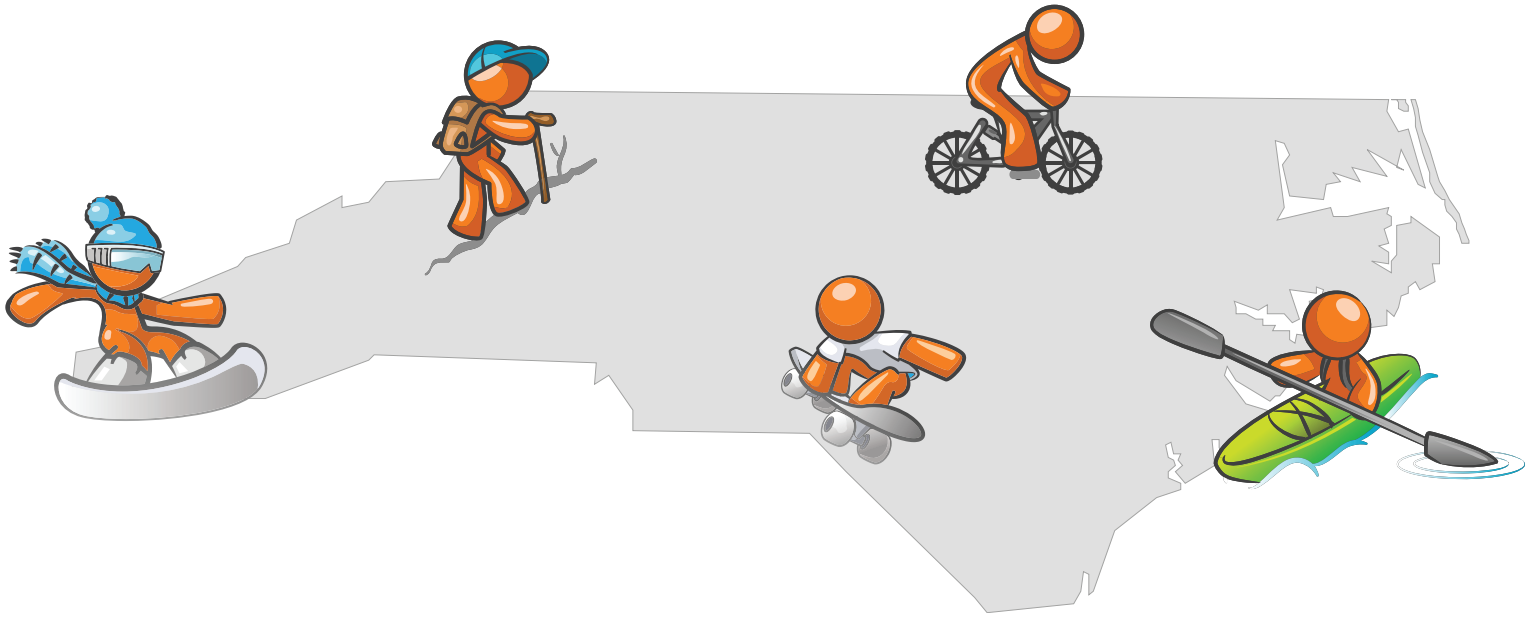
Materials: gameboard, a die, game marker

Number of Players: 2

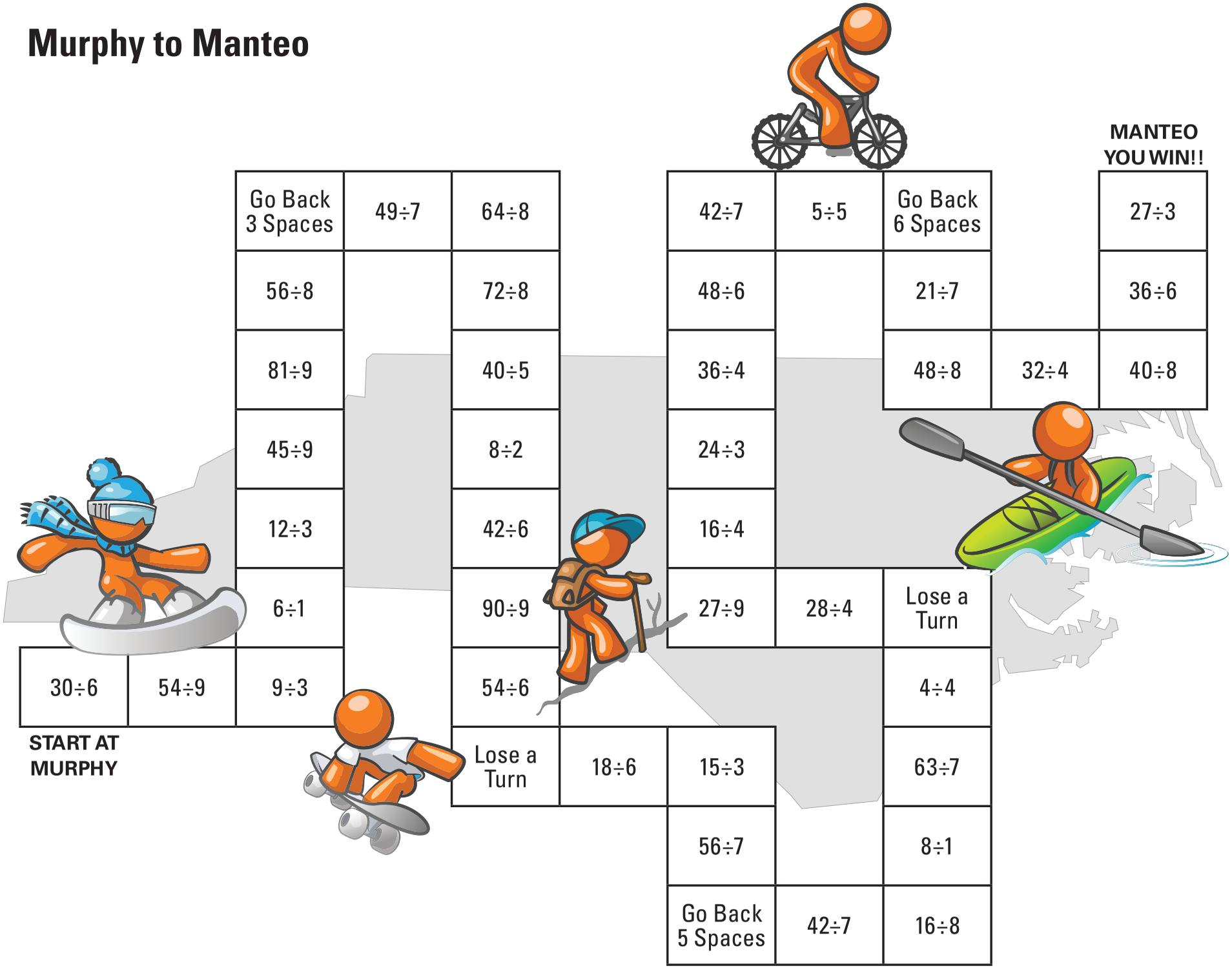
Directions:

1. Players take turns rolling the die to determine how many spaces to move.
2. Player must give the correct answer in each block before moving forward. If an error is made, the player returns to the starting place for that turn.
3. The first player who crosses the state and gets to Manteo wins.

Variation/Extension: If a player misses a question, the other player may answer it correctly and receive a pass for the next penalty space (go back or lose a turn). For some students, teachers may want to provide a division chart or a calculator to resolve arguments about answers.



Murphy to Manteo



Out of this World Operations!

Building Fluency: addition, subtraction, multiplication and division

Materials: an operation card per player, and a set of game cards

Number of Players: 4

Directions:

1. Each of the 4 players chooses an operation card.
2. Each player takes turn selecting and reading the game cards.
3. The player with the correct operation to solve the equation takes the card and records it on their recording sheet.
4. The first player to record and collect 10 cards wins.

Variation/Extension: Once students understand the game then they can record they work in their math notebook. This could be played with 1 or 2 players as a sorting game.

OPERATION CARD ADDITION (+)

	Equation
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

OPERATION CARD SUBTRACTION (-)

	Equation
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

OPERATION CARD MULTIPLICATION (x)

	Equation
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

OPERATION CARD DIVISION (÷)

	Equation
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	

x	+	−
48 ? 6 = 8	8 ? 4 = 32	÷
6 ? 8 = 48	8 ? 6 = 2	3 ? 8 = 24
8 ? 4 = 12	7 ? 7 = 0	8 ? 4 = 4
7 ? 7 = 14	7 ? 7 = 49	8 ? 1 = 8
16 ? 2 = 8	8 ? 2 = 16	8 ? 1 = 9

5 ? 4 = 20	6 ? 2 = 12	6 ? 8 = 14
6 ? 2 = 8	6 ? 2 = 4	32 ? 4 = 8
36 ? 6 = 6	6 ? 6 = 12	8 ? 8 = 0
6 ? 6 = 0	24 ? 6 = 4	8 ? 8 = 1
21 ? 3 = 7	5 ? 4 = 9	5 ? 4 = 1
8 ? 7 = 1	6 ? 2 = 12	20 ? 5 = 4

7 ? 3 = 21	8 ? 7 = 15	56 ? 8 = 7
7 ? 4 = 3	7 ? 3 = 10	8 ? 7 = 15
9 ? 8 = 1	8 ? 9 = 17	9 ? 2 = 7
2 ? 9 = 18	9 ? 4 = 5	8 ? 9 = 72
8 ? 7 = 56	6 ? 6 = 1	4 ? 6 = 2
18 ? 2 = 9	6 ? 4 = 10	6 ? 4 = 2

12 ? 2 = 6	6 ? 6 = 36	9 ? 5 = 14
9 ? 7 = 2	45 ? 9 = 5	7 ? 2 = 9
7 ? 2 = 5	6 ? 5 = 30	6 ? 5 = 1
6 ? 5 = 11	30 ? 6 = 5	6 ? 3 = 3
5 ? 5 = 0	5 ? 5 = 25	5 ? 3 = 15
25 ? 5 = 5	5 ? 5 = 10	18 ? 3 = 6

2 ? 9 = 11	9 ? 4 = 13	72 ? 9 = 8
9 ? 7 = 16	5 ? 9 = 45	9 ? 5 = 4
63 ? 7 = 9	5 ? 3 = 8	9 ? 7 = 63
7 ? 2 = 14	6 ? 3 = 9	49 ? 7 = 7
14 ? 2 = 7	6 ? 7 = 42	6 ? 7 = 13
15 ? 3 = 5	42 ? 6 = 7	7 ? 6 = 1

8 ? 5 = 3	7 ? 5 = 12	42 ? 6 = 7
40 ? 8 = 5	8 ? 3 = 5	3 ? 8 = 11
8 ? 2 = 6	8 ? 2 = 10	5 ? 8 = 13
5 ? 8 = 40	24 ? 3 = 8	9 ? 6 = 3
8 ? 8 = 16	6 ? 9 = 15	36 ? 9 = 4
54 ? 9 = 6	8 ? 8 = 0	4 ? 9 = 36

6 ? 9 = 54	7 ? 7 = 1	7 ? 5 = 35
8 ? 8 = 1		

Find the Unknown Number

Building Fluency: understand division as an unknown factor problem

Materials: a recording sheet for each player, unknown number game cards

Number of Players: 2

Directions:

1. Spread out the missing number game cards.
2. Players take turns picking a card and telling the unknown number.
3. The player keeps all cards correctly answered & writes the equation as both a multiplication & division equation on their recording sheet.

   Example: 4 x $\boxed{7}$ = 28; 28 ÷ 4 = $\boxed{7}$
4. If the player answers incorrectly, the card is placed back in the pile.
5. Play until all cards are picked and the player with the most cards wins.

Variation/Extension: When a player misses a question, the other player may answer correctly and keep the card. This game could be played by an individual just picking and recording equations. A multiplication chart may be needed to solve any disagreements.

PLAYER 1

Multiplication	Division
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.
7.	7.
8.	8.
9.	9.
10.	10.

PLAYER 2

Multiplication	Division
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.
7.	7.
8.	8.
9.	9.
10.	10.

1 x ___ = 5	1 x ___ = 4	1 x __ = 3	1 x ___ = 2
2 x ____ = 10	2 x ____ = 8	2 x ____ = 6	2 x ____ = 4
3 x ___ = 15	3 x ___ = 12	3 x ___ = 9	3 x ___ = 6
4 x ___ = 20	4 x ___ = 16	4 x ___ = 12	4 x ___ = 8

5 x ___ = 25	5 x ___ = 20	5 x ___ = 15	5 x ___ = 10
1 x ____ = 9	1 x ____ = 8	1 x ____ = 7	1 x ____ = 6
2 x ___ = 18	2 x ___ = 16	2 x ___ = 14	2 x___ = 12
3 x ___= 27	3 x ___= 24	3 x ___ = 21	3 x ___ = 18

1 x ____ = 10	3 x ___= 30	6 x ___ = 18	6 x ___ = 12
2 x ____ = 20	4 x ___= 40	5 x ___= 50	7x ___ = 14
4 x ___= 36	4 x ___= 32	4 x ___ = 28	4 x ___ = 24
5 x ___= 45	5 x ___= 40	5 x ___ = 35	5 x ___ = 30

7 x ___ = 70	7 x ___ = 63	7 x ___ = 56	7 x ___ = 49
8 x ___ = 80	8 x ___ = 72	8 x ___ = 64	8 x ___ = 56
9 x ___ = 90	9 x ___ = 81	9 x ___ = 72	9 x ___ = 63
10 x ___ = 100	10 x ___ = 90	10x ___ = 80	10x ___ = 70

7 x ___ = 42	7 x ___ = 35	7 x ___ = 28	7 x ___ = 21
8 x ___ = 48	8 x ___ = 40	8 x ___ = 32	8 x ___ = 24
9 x ___ = 54	9 x ___ = 45	9 x ___ = 36	9 x ___ = 27
10 x ___ = 60	10x ___ = 50	10 x ___ = 40	10x ___ = 30

6 x ___ = 42	6 x ___ = 24	8x ___ = 16	9x ___ = 18
6 x ___ = 48	6 x ___ = 30	10x ___ = 20	6 x ___ = 60
6 x ___ = 54	6 x ___ = 36		

Charlotte Speedway Race

Building Fluency: fluently multiply within 100

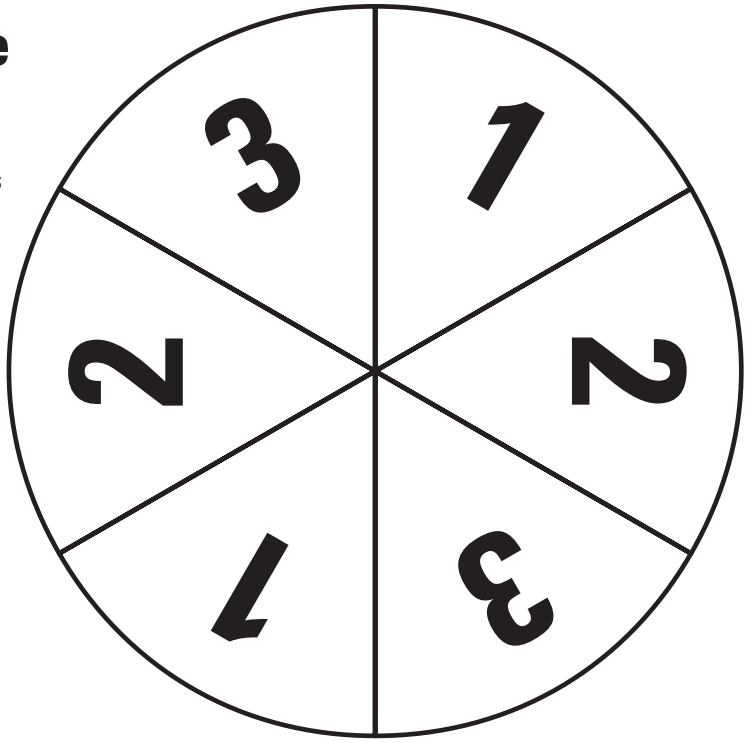
Materials: gameboard, spinner (paperclip and pencil), game markers

Number of Players: 2

Directions:

1. Each player takes a turn and spins the spinner.
2. Move the number of spaces shown on the spinner.
3. Player must give a multiplication fact for the product in the space using 2 or 5 as one of the factors.
4. If an incorrect answer is given, the player loses the turn and returns to the previous position.
5. The winner is the first to cross the finish line.

Variation/Extension: A player may tell a second factor pair to make that product and move an extra space.



0	PIT STOP	24	25	15	30	18	20	START
55								
14								
2								
Trouble on the Curve – Go Back 2 Spaces								
35								
10	15	20	16	Your Tire Blows Out – Lose a Turn	35	40	8	18

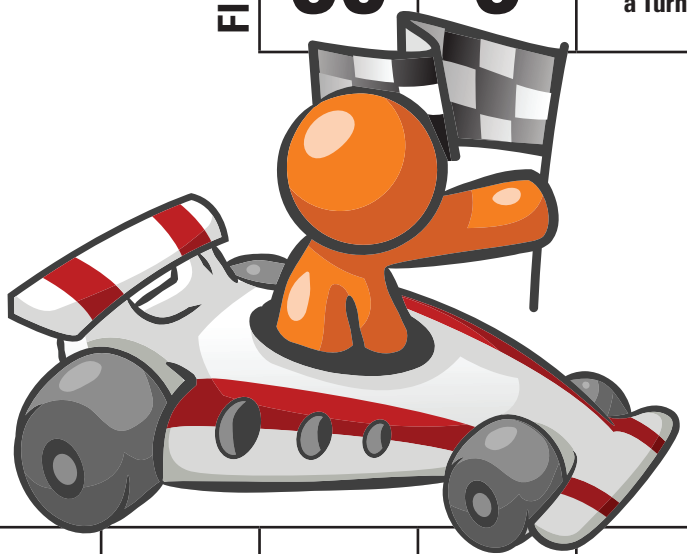
FINISH

60 6 Stop for Gas – Lose a Turn 45 12 4

30

Car Stalls – Lose a Turn

50



Division Duel

Building Fluency: division within 100

Materials: gameboard, division cards, game markers (small cube)

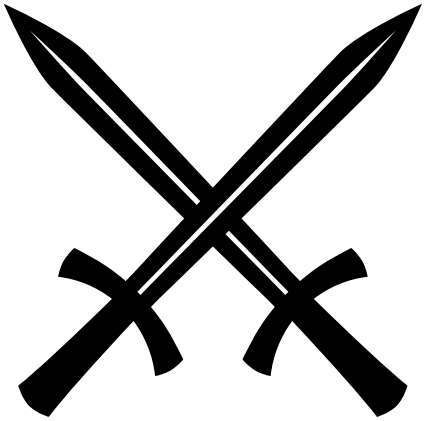
Number of Players: 2

Directions:

1. Place the cards face down in the center of the gameboard.
2. Each player takes a card from the stack and answers the problem.
3. The winner of the round is the player whose answer is the larger number.
4. The winner places the marker on the number grid at the bottom of the gameboard and moves the marker each time a point is scored.
5. The champion is the first player to win 14 rounds.

Variation/Extension: Students could make card sets with the division facts they most need to work on.

Place Division Cards Face Down Here



PLAYER 1

1	2	3	4	5	6	7
8	9	10	11	12	13	14

PLAYER 2

1	2	3	4	5	6	7
8	9	10	11	12	13	14

$8\overline{)48}$	$8\overline{)24}$	$6\overline{)36}$
$4\overline{)32}$	$6\overline{)42}$	$9\overline{)63}$
$3\overline{)24}$	$7\overline{)35}$	$9\overline{)81}$
$9\overline{)36}$	$8\overline{)72}$	$5\overline{)30}$
$9\overline{)54}$	$8\overline{)56}$	$5\overline{)40}$
$9\overline{)27}$	$8\overline{)40}$	$6\overline{)48}$

$6\overline{)54}$	$6\overline{)24}$	$9\overline{)45}$
$6\overline{)30}$	$7\overline{)56}$	$7\overline{)28}$
$4\overline{)24}$	$8\overline{)64}$	$8\overline{)32}$
$7\overline{)49}$	$5\overline{)35}$	$7\overline{)42}$
$4\overline{)28}$	$9\overline{)72}$	$4\overline{)36}$
$7\overline{)63}$	$3\overline{)27}$	$5\overline{)45}$

Four Quotients

Building Fluency: division within 100

Materials: gameboard, pair of dice, division grid, 15 game markers - different color for each player,

Number of Players: 2

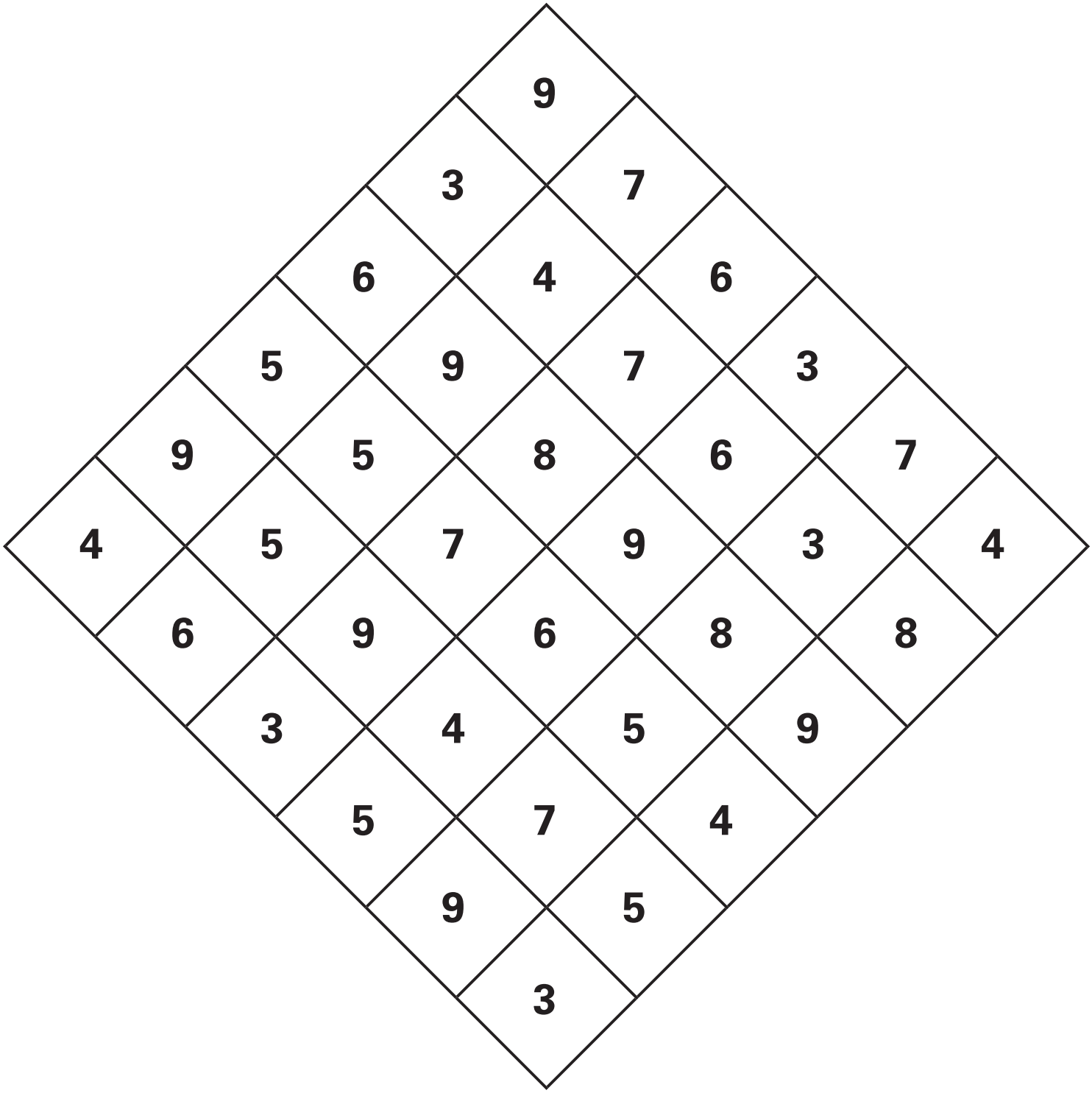
Directions:

1. Player rolls the pair of dice and locates the spaces on the grid named by them.
   Example: A roll of a 3 and a 5 could be space (3,5) or space (5,3).
2. The player answers the division problem and places a game marker on that number on the gameboard.
3. The first player to get 4 spaces in a row is the winner.

Variation/Extension: Players could pick a space on the gameboard and give a division fact to match it in order to place a marker on the board. Example: I pick 7. 42÷6 = 7. The winner could fill an entire row.

	1	2	3	4	5	6
1	$8\overline{)48}$	$8\overline{)24}$	$6\overline{)36}$	$6\overline{)54}$	$6\overline{)24}$	$9\overline{)45}$
2	$4\overline{)32}$	$6\overline{)42}$	$9\overline{)63}$	$6\overline{)30}$	$7\overline{)56}$	$7\overline{)28}$
3	$3\overline{)24}$	$7\overline{)35}$	$9\overline{)81}$	$4\overline{)24}$	$8\overline{)64}$	$8\overline{)32}$
4	$9\overline{)36}$	$8\overline{)72}$	$5\overline{)30}$	$7\overline{)49}$	$5\overline{)35}$	$7\overline{)42}$
5	$9\overline{)54}$	$8\overline{)56}$	$5\overline{)40}$	$4\overline{)28}$	$9\overline{)72}$	$4\overline{)36}$
6	$9\overline{)27}$	$8\overline{)40}$	$6\overline{)48}$	$7\overline{)63}$	$3\overline{)27}$	$5\overline{)45}$

Four Quotients



Race to the Resort

Building Fluency: division within 100

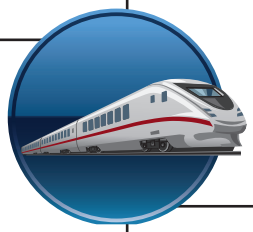
Materials: a die, gameboard, a game marker – different color for each player

Number of Players: 2

Directions:

1. Players take turns rolling a die and move that many spaces answering all of the facts along the way. If the player misses a fact, the player returns to the previous position.
2. If a player lands on the same space as the other player, the other player goes back to the beginning. The winner is the first to finish the game.

Variation/Extension: If a player misses an equation, the other player may answer it correctly and receive a pass for the next time they land on a penalty space.



				START		
				$6 \overline{)42}$		
				$9 \overline{)72}$		
				$64 \div 4$	**Out of Gas: Lose a Turn**	
	$3 \overline{)36}$	$64 \div 8$	**No Wind: Move Back 3 Spaces**		$4 \overline{)28}$	
$7 \overline{)49}$	$48 \div 6$		$54 \div 9$	$5 \overline{)35}$	$24 \div 8$	
$49 \div 7$			$6 \overline{)30}$	$36 \div 9$		
YOU WIN!!		**Low on Fuel: Lose a Turn**	$20 \div 5$	**Bonus: Move Ahead 1 Space**	$9 \overline{)81}$	
		$10 \overline{)100}$			$6 \overline{)18}$	
$4 \overline{)32}$	$56 \div 8$	$4 \overline{)36}$		$5 \overline{)25}$	**Flat Tire: Lose a Turn**	$16 \div 4$
Stormy Seas: Move Back 2 Spaces				$24 \div 4$		
$6 \overline{)42}$	$48 \div 8$	$3 \overline{)15}$	$8 \overline{)72}$	**Ship Ran Aground: Move Back 3 Spaces**		

The Big "Z"

Building Fluency: place value and rounding to nearest 10 and 100

Materials: gameboard, a die, game marker, scrap paper and pencil

Number of Players: 2-4

Directions:

1. A player rolls the die and moves one space vertically, horizontally, or diagonally to any space that contains the number on the die.
2. Points are determined by the value of the number and records on scrap paper. Example: Player is on 542 and rolls a 6. If the player moves to 461, the score is 60. If the player moves to 625, the score is 600.
3. Players total their scores on paper and at the end of the game, player with the highest score wins.

Variation/Extension: Players roll the die and travel that many spaces. If the number of the die is even (2, 4, 6) the player rounds the number in the space landed on to the nearest 10. If the number on the die is odd (1, 3, 5), the player rounds the number to the nearest hundred.

342	423	364	132	453	361	534
234	536	425	241	421	613	362
625	461	653	423	362	425	241
542	124	315	532	641	253	364
		453	265	154	635	126
		241	643	435	514	243
		532	356	643	351	436
		324	413	534	165	513	234	652
		143	365	413	243	351	146	425
		651	543	564	136	562	251	536
		425	264	132	653	351	413	624

Corn Shucks

Building Fluency: review place value - compare multi-digit numbers

Materials: recording sheet, digit cards (or 0-9 die)

Number of Players: 2-4

Directions:

1. The first player selects 4 digit cards and makes the largest possible four-digit number with those digits. Example: cards show these digits: 6, 4, 3, 3, this order makes the largest possible number for those digits.
2. The player writes that number on line 1.
3. The second player selects 4 digit cards and makes the smallest possible number for those digits.
4. The player writes that number on line 10.
5. The next player selects 4 digit cards and must make a number that falls between the other two. They can choose any line to place that number on.
6. The next player selects 4 digit cards and makes a number using those digits that could be placed on an empty line between any two existing numbers.
7. Game continues until a number is correctly placed on each line. (All 10 lines contain a number and they are in the correct order), OR players cannot place a number correctly on any of the empty lines.

Variation/Extension: Once students understand the game they can create their own recording sheet in their math notebook. Teacher can modify this game by changing the number of digits or number of lines.

1 _____

2 _____

3 _____

4 _____

5 _____

6 _____

7 _____

8 _____

9 _____

10 _____

0	1	2	3
4	5	6	7
8	9	0	1
2	3	4	5
6	7	8	9

Rounding to the Tens/Hundreds Showdown

Building Fluency: rounding to nearest ten and nearest hundred

Materials: recording sheet, deck of standard playing cards (remove 10's and face cards) or digit cards

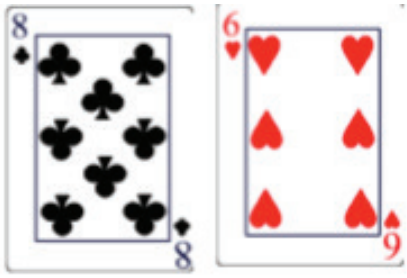
Number of Players: 2

Directions:

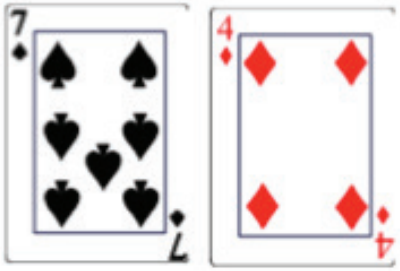
1. Each player takes two cards from the deck and places them on the table in the order drawn. Each player rounds their number to the nearest ten. Players may use a number line to help in rounding. Players should record their cards drawn and the rounded number on the recording sheet.
2. The player with the largest rounded number takes all 4 cards. In the event of a tie, draw new cards and the winner gets all 8 cards.
3. Continue until all cards are drawn.
4. The player with the most cards at the end wins.

Example: Player 1 wins the round!

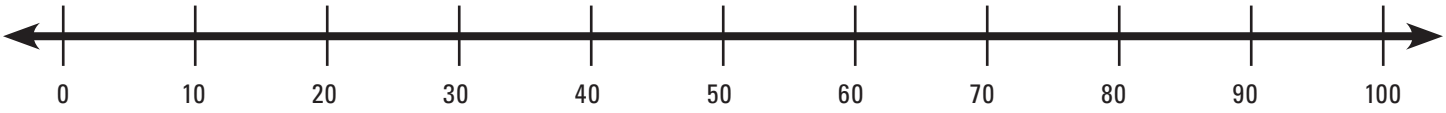
PLAYER 1

Cards Drawn	Rounded Number
 86	90

PLAYER 2

Cards Drawn	Rounded Number
 74	70

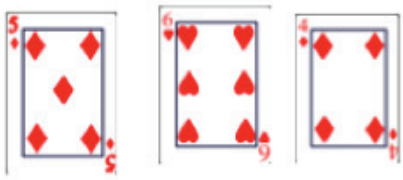
Use the number line to help you round!



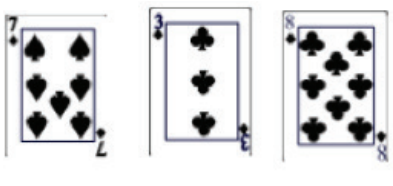
Variation/Extension: Each player takes 3 cards from the deck and places them in the order drawn. Players round the numbers to the nearest HUNDRED. The player with the largest number takes all 6 cards.

Example: Player 2 wins the round!

PLAYER 1

Cards Drawn	Rounded Number
 564	600

PLAYER 2

Cards Drawn	Rounded Number
 738	700

Use the number line to help you round!

Cards Drawn	Rounded Number

Cards Drawn	Rounded Number

Cards Drawn	Rounded Number

Cards Drawn	Rounded Number

Take Your Places!

Building Fluency: use place value to understand rounding to the nearest 10 or 100

Materials: spinner 0-9 (pencil and paperclip), recording sheet

Number of Players: 2-4

Directions:

1. First player spins, tells the number and says, "Take your places."
2. Each player writes the number on their recording sheet in any place in the first round. A number cannot be moved after it is written. If you choose not to use the number then it can be placed in the "Trash" column, only 1 number per round.
3. Players in turn spin and announce numbers for all players to place on their sheets.
4. After 4 spins, each player rounds to the nearest hundred.
5. The player with the highest number earns 2 points. If the numbers are the same, each player earns a point.
6. The player with the highest score after 6 rounds wins.

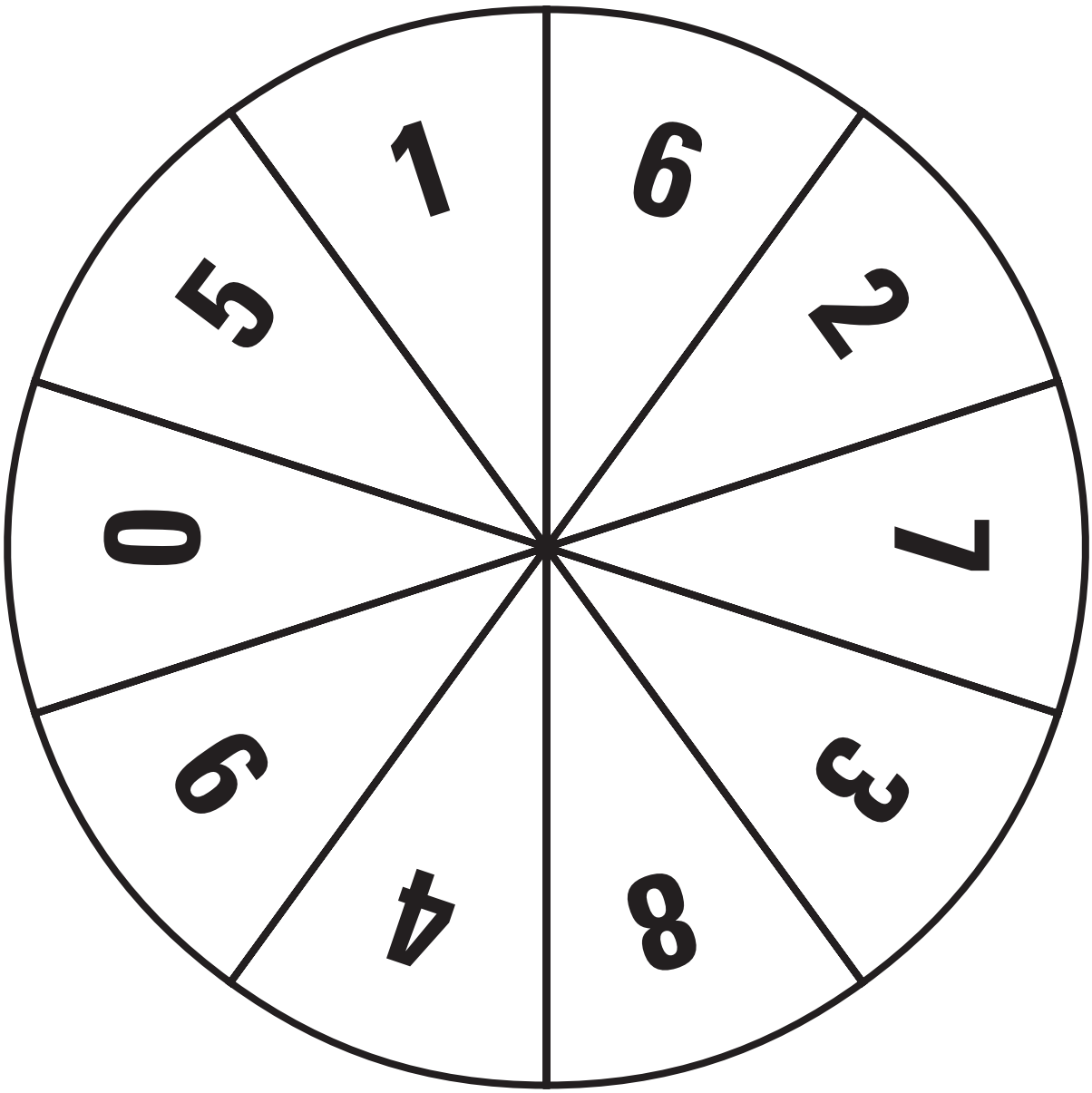
Variation/Extension: Round to the nearest 10. Once students understand the game they can create their own recording sheet in their math notebook.

PLAYER 1		HUNDREDS	TENS	ONES	TRASH	ROUNDED NUMBER	POINTS EARNED
	1.						
	2.						
	3.						
	4.						
	5.						
	6.						

PLAYER 2		HUNDREDS	TENS	ONES	TRASH	ROUNDED NUMBER	POINTS EARNED
	1.						
	2.						
	3.						
	4.						
	5.						
	6.						

PLAYER 3		HUNDREDS	TENS	ONES	TRASH	ROUNDED NUMBER	POINTS EARNED
	1.						
	2.						
	3.						
	4.						
	5.						
	6.						

PLAYER 4		HUNDREDS	TENS	ONES	TRASH	ROUNDED NUMBER	POINTS EARNED
	1.						
	2.						
	3.						
	4.						
	5.						
	6.						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1,000 Close Enough 1,000

Building Fluency: Add and subtract within 1000.

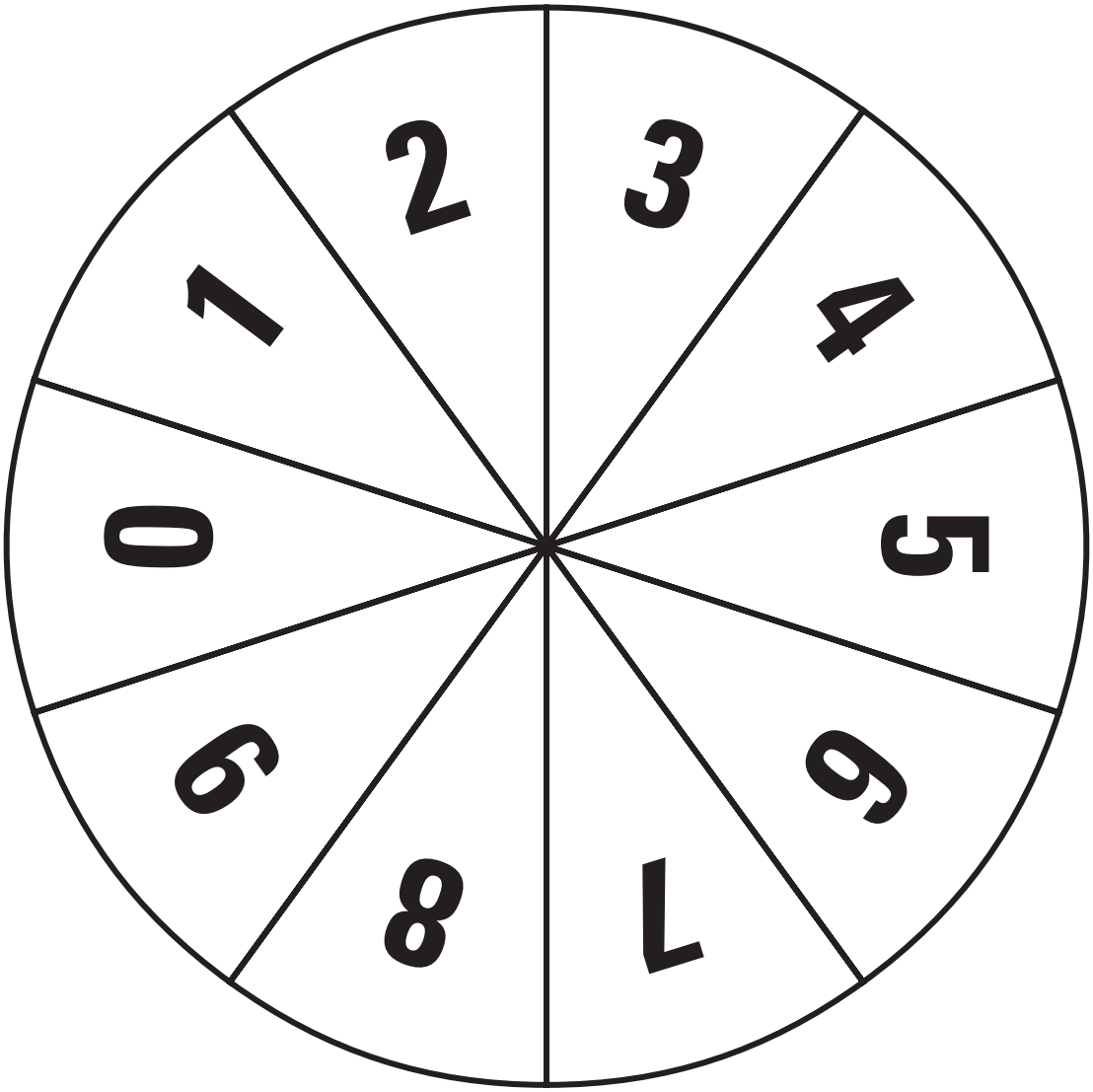
Materials: Spinner (pencil and paper clip), base ten blocks (ones, tens, and hundreds), recording sheet

Number of Players: 2-4

Directions:

1. A player spins and takes either that number of ones, tens, or hundreds blocks
2. The player records the number on their recording sheet. Example: a spin of 4 may be recorded as 4, 40, or 400.
3. Players take turns spinning, collecting blocks, and recording their numbers.
4. After six spins, the player with the total closest to 1000, but not more than 1000, wins the game.

Variation/Extension: Once students understand how to play the game, they can record their work in their math notebook students could vary the game by changing the desired final number.



PLAYER 1

SPIN	NUMBER
1	
2	
3	
4	
5	
6	
TOTAL	

PLAYER 2

SPIN	NUMBER
1	
2	
3	
4	
5	
6	
TOTAL	

PLAYER 3

SPIN	NUMBER
1	
2	
3	
4	
5	
6	
TOTAL	

PLAYER 4

SPIN	NUMBER
1	
2	
3	
4	
5	
6	
TOTAL	

Money Wheel

Building Fluency: multiply one-digit whole numbers by multiples of 10

Materials: spinners (pencil and paperclip), paper, money (optional)

Number of Players: 2-4

Directions:

1. Players take turns spinning the "How Many?" spinner and the "How Much?" spinner.
2. Record the product and describe the strategy to the other players.
   Example: I spun 8 and 50 cents. I know that 8 times 5 is 40 so 8 times 50 is 400 cents.
   (Student could use play money to represent the amount spun.)
3. After each player has had 5 turns, total the value. The player with the most money wins.

Variation/Extension: Change the amounts on the spinners; spinner could be changed to have 80 cents and 90 cents instead of 10 cents and 20 cents.

PLAYER 1

	How Many?	How Much?	Amount of Money
1			
2			
3			
4			
5			
		TOTAL	

PLAYER 2

	How Many?	How Much?	Amount of Money
1			
2			
3			
4			
5			
		TOTAL	

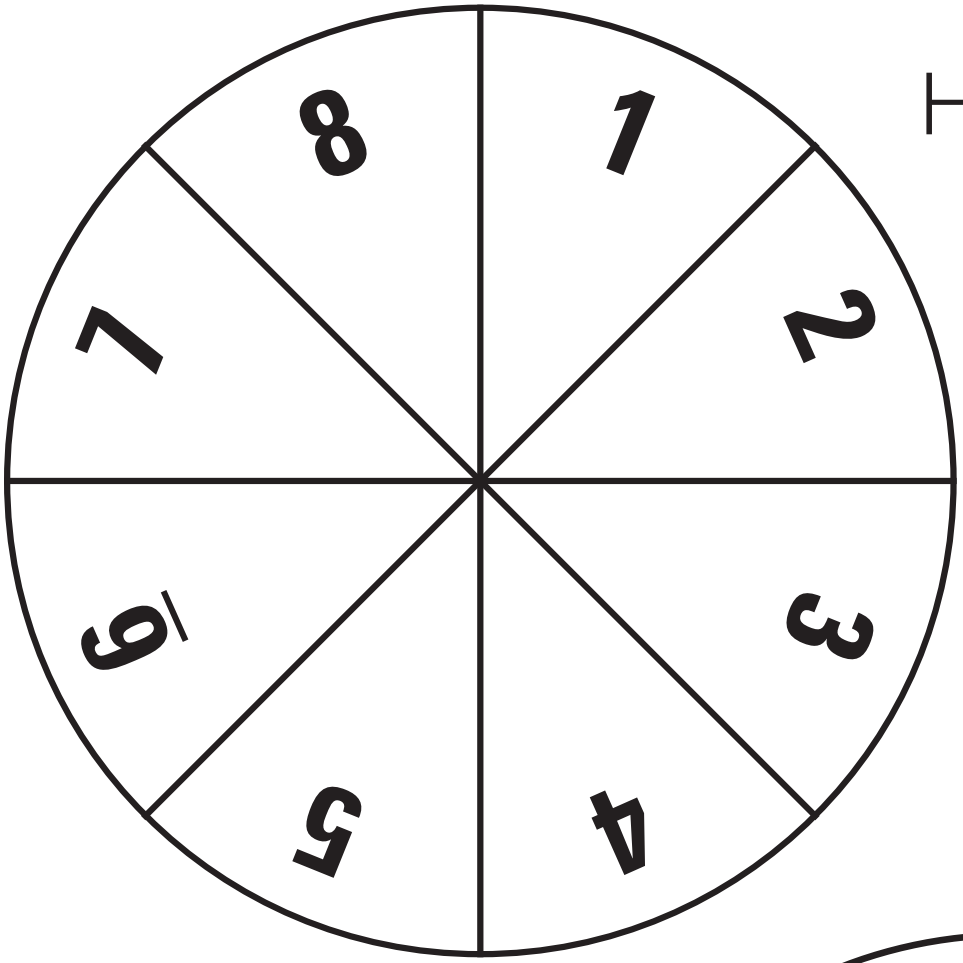
PLAYER 3

	How Many?	How Much?	Amount of Money
1			
2			
3			
4			
5			
		TOTAL	

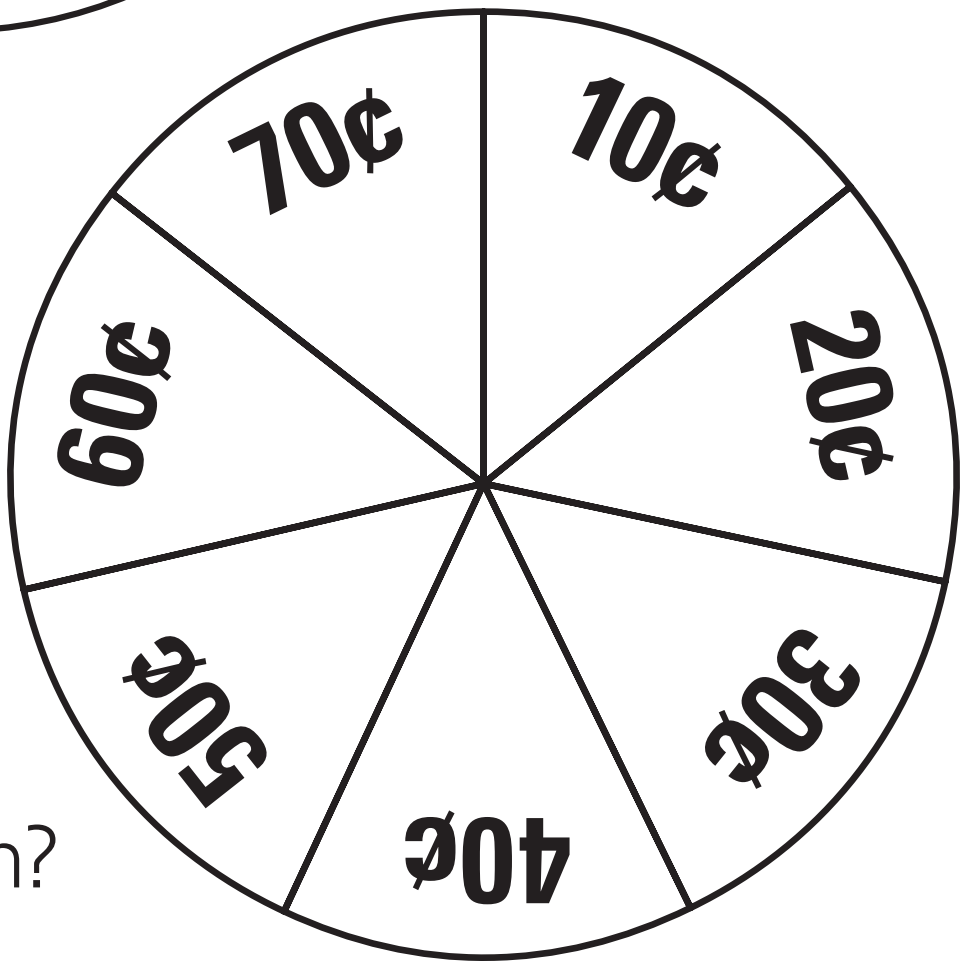
PLAYER 4

	How Many?	How Much?	Amount of Money
1			
2			
3			
4			
5			
		TOTAL	

How Many?



How Much?



Race to 300

Building Fluency: multiply one-digit whole numbers by multiples of ten

Materials: a die, recording sheet

Number of Players: 1-4

Directions:

1. Each player rolls a die in turn. The player multiplies that number by 10 and records the answer.
2. Add the numbers after each turn.
3. The first player to reach or pass 300 wins.

Variation/Extension: Once students understand how to play the game they can record their work in their math notebook. Students could play 10 rounds and see who has the lowest score. Students change the goal number and make it a higher or lower.

Example:

NUMBER ROLLED	NUMBER X 10	TOTAL SUM
3	3 x 10= 30	30
6	6 x 10= 60	30 + 60=90
4	4 x 10= 40	90 + 40= 130
5	5 x 10= 50	130 + 50= 180
2	2 x 10 = 20	180 + 20=200
6	6 x 10= 60	200 + 60= 260
5	5 x 10= 50	260 + 50= 310 – GOAL REACHED

NUMBER ROLLED	NUMBER X 10	TOTAL SUM

NUMBER ROLLED	NUMBER X 10	TOTAL SUM

NUMBER ROLLED	NUMBER X 10	TOTAL SUM

NUMBER ROLLED	NUMBER X 10	TOTAL SUM

NUMBER ROLLED	NUMBER X 10	TOTAL SUM

NUMBER ROLLED	NUMBER X 10	TOTAL SUM

NUMBER ROLLED	NUMBER X 10	TOTAL SUM

NUMBER ROLLED	NUMBER X 10	TOTAL SUM

Fraction Match-Up

Building Fluency: understand fractions and how they are represented on the number line

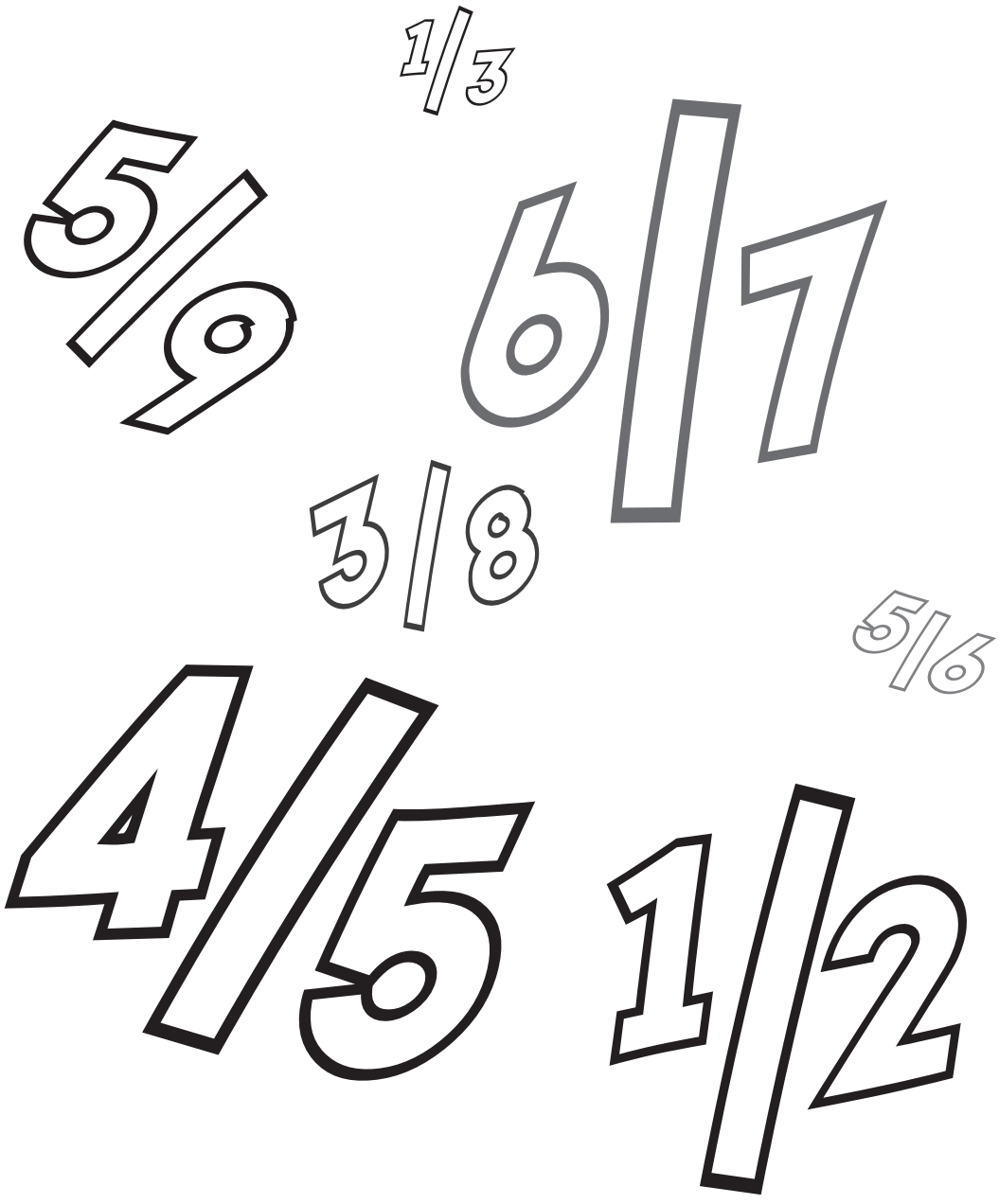
Materials: fraction bar cards and number lines cards

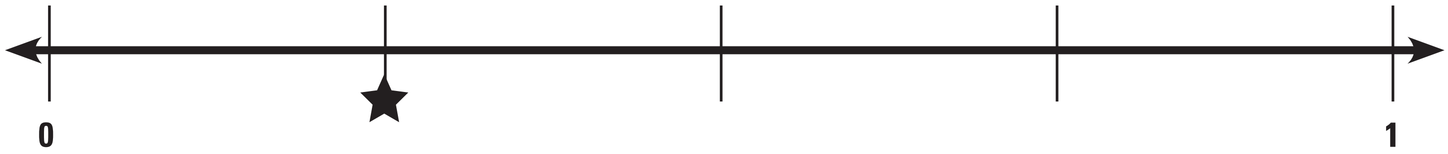
Number of Players: 2

Directions:

1. Mix up the fraction bar cards and place them face down on one side of the game area. Mix up the number line cards and put them face down on the other side.
2. Players take turns turning up one card from each area. If the cards represent the same fraction, the player takes the cards. If they do not match, the player turns the cards back over.
3. The player with the most matches wins.

Variation/Extension: Have students make different representations of fractions (shaded circles or rectangles) and play the game matching those to number lines.

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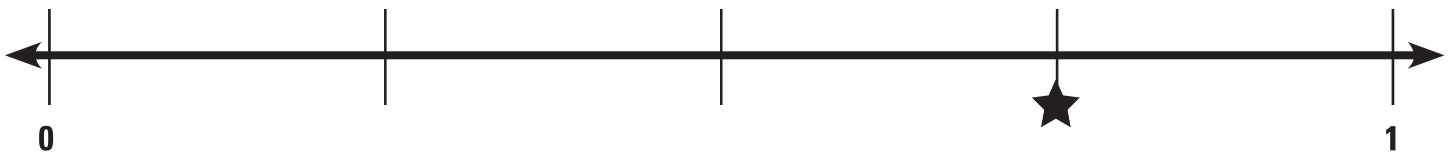
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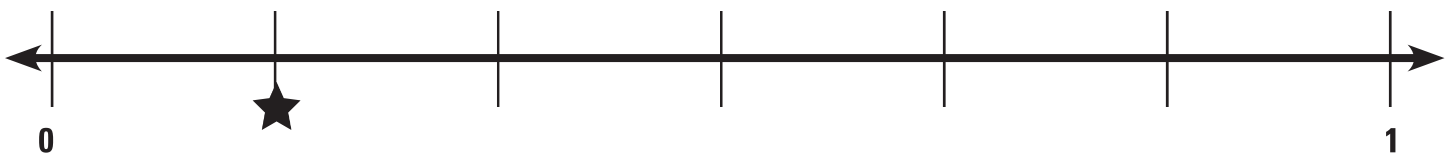
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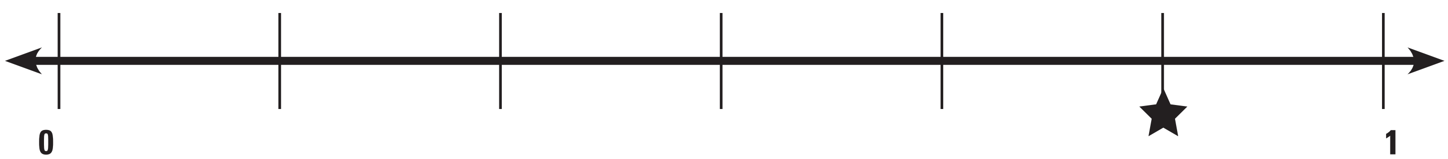
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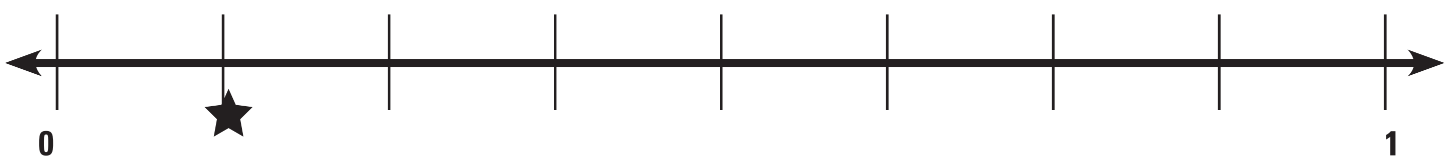
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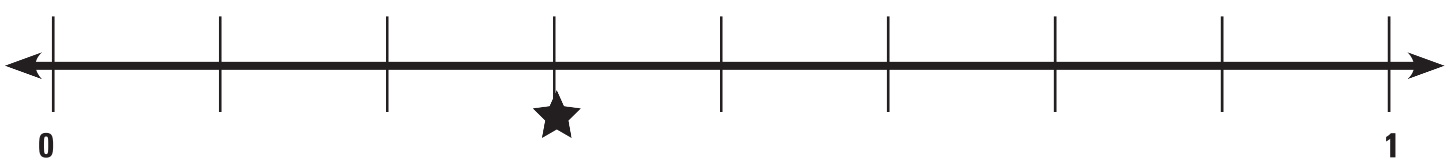
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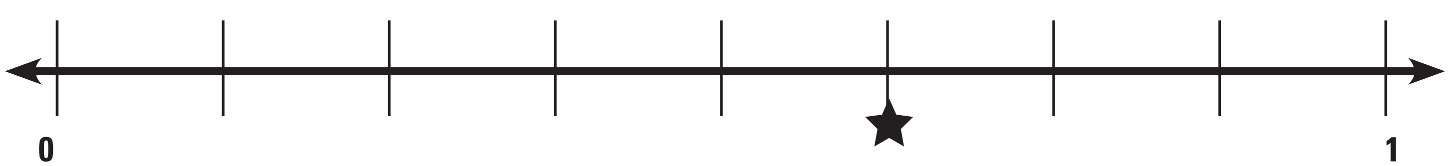
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Fraction Roll'Em

Building Fluency: understand fractions as parts of a whole

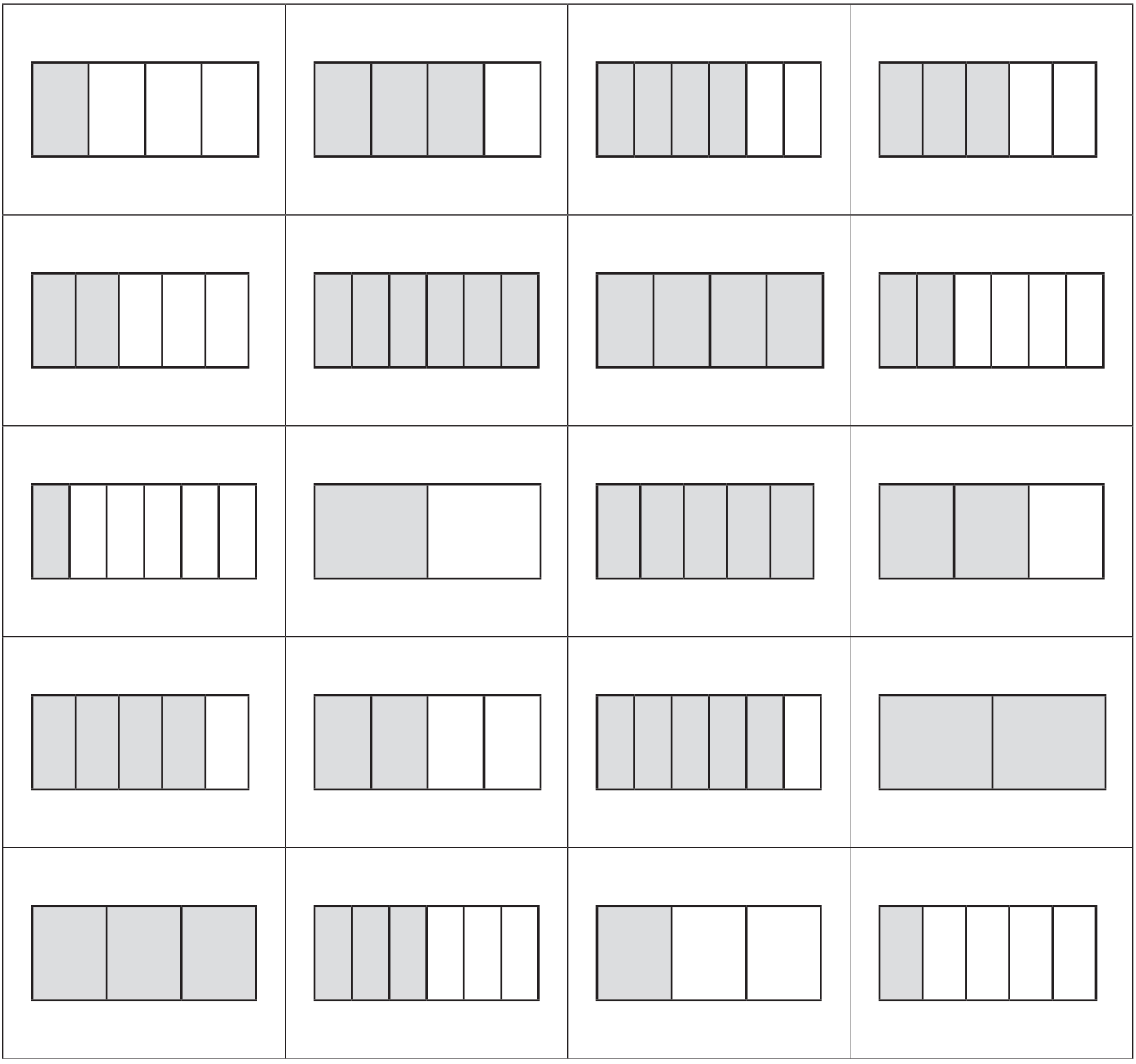
Materials: gameboard, pair of dice, game markers - different color for each player

Number of Players: 2

Directions:

1. Each player takes turns rolling dice to create a fraction.
2. The smaller number is the numerator and the larger number is the denominator.
3. The player finds the fraction on the gameboard and covers it with a marker.
4. If the fraction is already covered the player loses that turn.
5. The player with the most markers on the board wins.

Variation/Extension: Have students create other fraction gameboards with different representations such as circles or number lines. An additional gameboard has been added for your convenience.



Figuring Fourths

Building Fluency: understand fractions

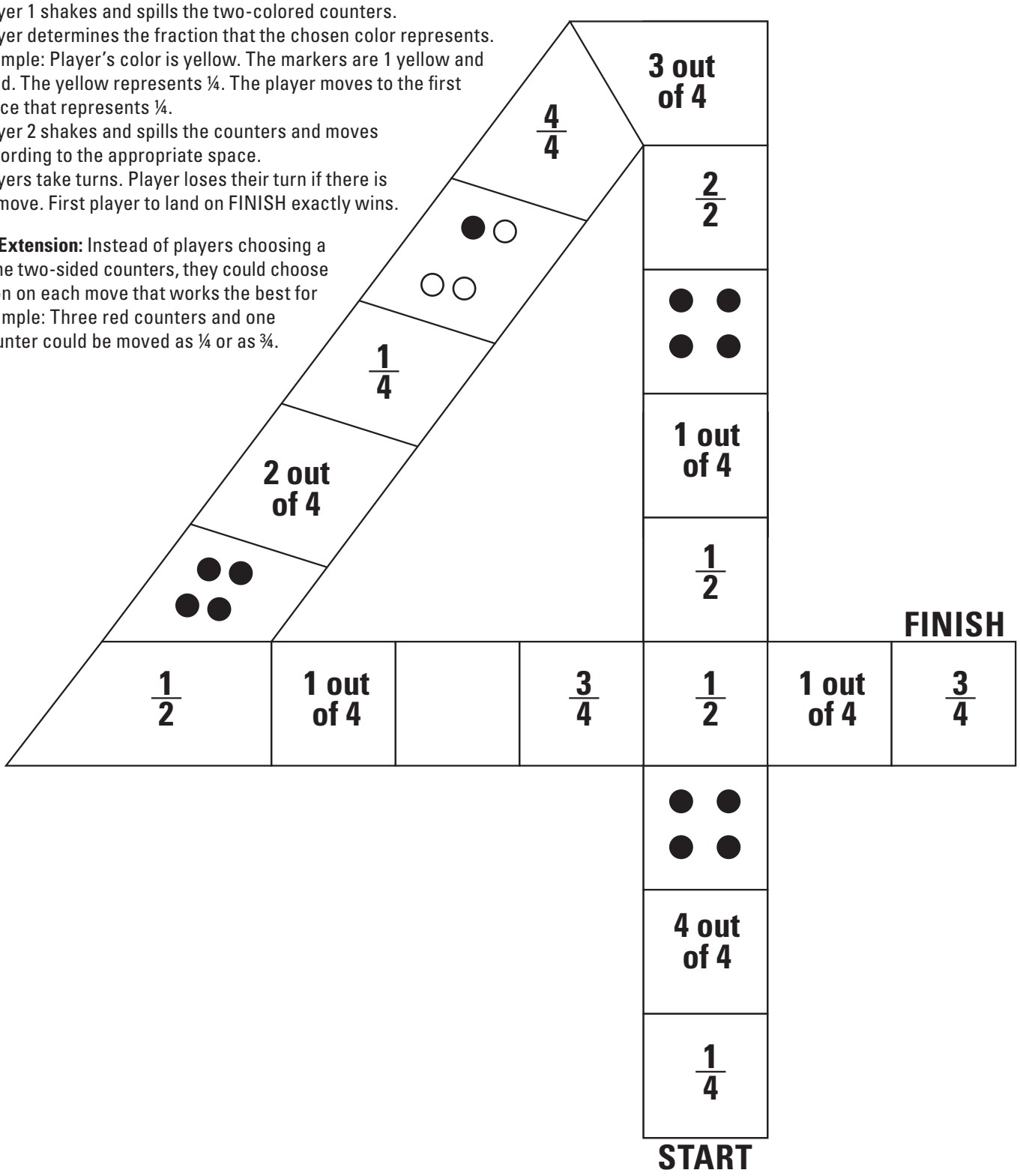
Materials: gameboard, four two-color counters, one small cup, game markers

Number of Players: 2

Directions:

1. Each player choose one of the colors from the two color counters.
2. Player 1 shakes and spills the two-colored counters.
3. Player determines the fraction that the chosen color represents. Example: Player's color is yellow. The markers are 1 yellow and 3 red. The yellow represents ¼. The player moves to the first space that represents ¼.
4. Player 2 shakes and spills the counters and moves according to the appropriate space.
5. Players take turns. Player loses their turn if there is no move. First player to land on FINISH exactly wins.

Variation/Extension: Instead of players choosing a color for the two-sided counters, they could choose the fraction on each move that works the best for them. Example: Three red counters and one yellow counter could be moved as ¼ or as ¾.



Three in a Row Gameboard

Building Fluency: understand fractions

Materials: gameboard, game cards, nine game markers per player.

Number of Players: 2-6

Directions:

1. Choose an answer board for each round.
2. Shuffle the Three-In-A-Row game cards and place them face down.
3. Turn over the top card.
4. All players cover the fraction with a game marker if it appears on their board.
5. Three in a row is a winner, horizontally, vertically or diagonally.

Variation/Extension: Players play using the same gameboard but take turns turning cards with only one player marking the play for each turn. Players could cover the entire board.

$\frac{1}{6}$	$\frac{3}{4}$	$\frac{5}{6}$
$\frac{1}{2}$	$\frac{3}{3}$	$\frac{3}{8}$
$\frac{3}{5}$	$\frac{7}{8}$	$\frac{1}{4}$

$\frac{1}{6}$	$\frac{3}{4}$	$\frac{5}{6}$
$\frac{1}{2}$	$\frac{3}{3}$	$\frac{3}{8}$
$\frac{3}{5}$	$\frac{7}{8}$	$\frac{1}{4}$

$\frac{5}{8}$	$\frac{2}{3}$	$\frac{1}{4}$
$\frac{3}{4}$	$\frac{2}{5}$	$\frac{2}{8}$
$\frac{3}{3}$	$\frac{1}{2}$	$\frac{5}{6}$

$\frac{5}{8}$	$\frac{1}{2}$	$\frac{3}{6}$
$\frac{2}{3}$	$\frac{3}{8}$	$\frac{4}{4}$
$\frac{7}{8}$	$\frac{2}{5}$	$\frac{1}{3}$

$\frac{4}{8}$	$\frac{5}{6}$	$\frac{1}{2}$
$\frac{1}{6}$	$\frac{3}{5}$	$\frac{2}{8}$
$\frac{2}{3}$	$\frac{6}{6}$	$\frac{1}{4}$

$\frac{2}{8}$	$\frac{1}{3}$	$\frac{5}{6}$
$\frac{2}{5}$	$\frac{4}{4}$	$\frac{2}{3}$
$\frac{1}{2}$	$\frac{7}{8}$	$\frac{1}{4}$

$\frac{1}{2}$	$\frac{3}{5}$	$\frac{6}{6}$
$\frac{2}{3}$	$\frac{1}{8}$	$\frac{3}{4}$
$\frac{4}{6}$	$\frac{1}{3}$	$\frac{4}{8}$

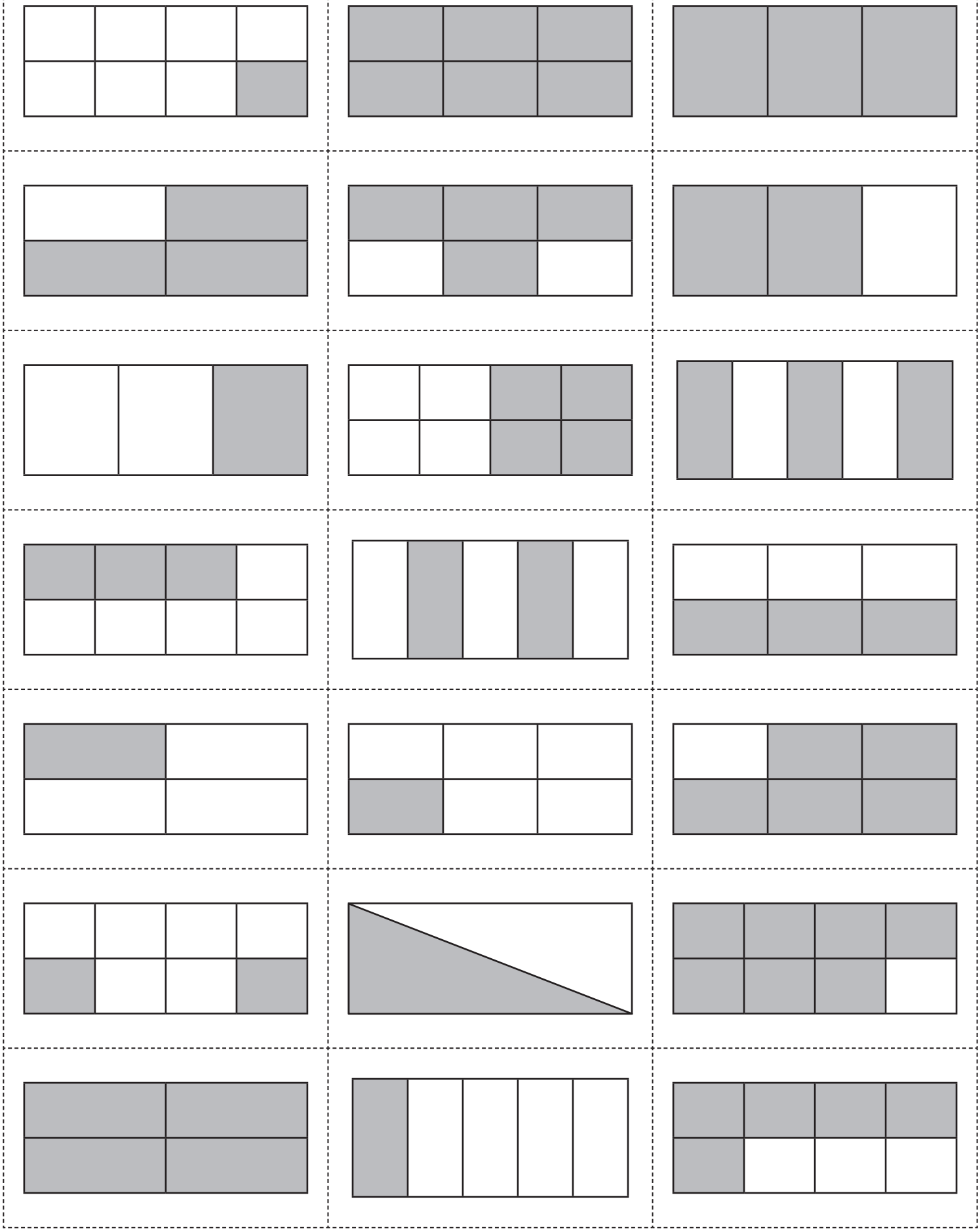


Figure Eighths

Building Fluency: understand fractions

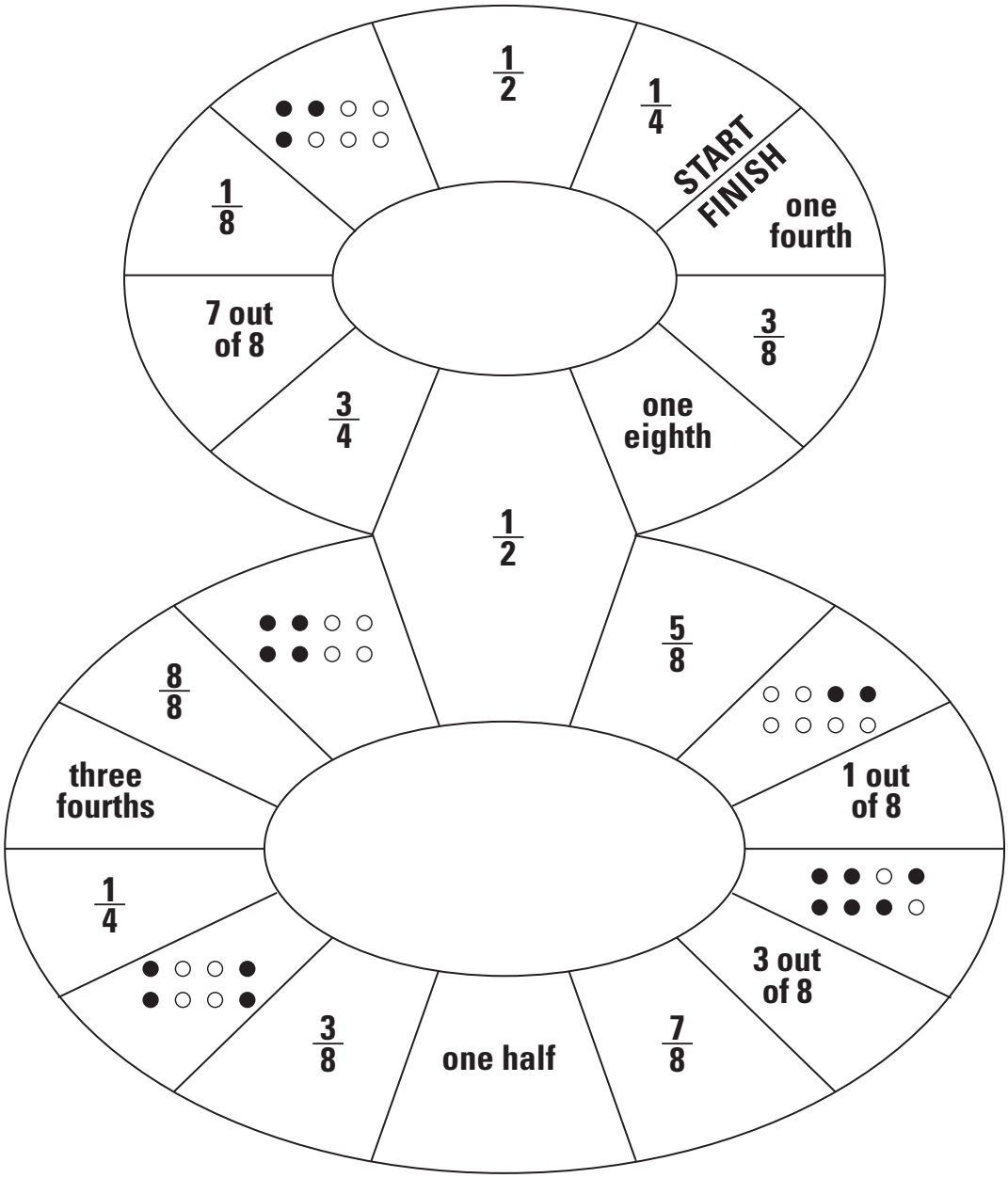
Materials: gameboard, eight two-color counters, one small cup, game markers

Number of Players: 2

Directions:

1. Each player chooses one color of the two-colored counters and chooses a game marker.
2. Player 1 shakes and spills the two-colored counters. Player determines the fraction that the chosen color represents. Each player moves on every spill. Example: Player's color is yellow. The markers are 2 yellow and 6 red. The yellow represents ¼. The player moves to the first space that represents ¼. Player 2 has red. The red represents ¾. Player 2 moves to the first space that represents ¾.
3. Player 2 shakes and spills the counters and each player moves to the appropriate space. Players move in a continuous pattern to form a figure eight. Player loses a turn if there is no move.
4. First player to land on FINISH exactly wins.

Variation/Extension: Players take turns spilling and moving and choose the fraction that works best for that turn.



"I Have" Fraction Cards

Building Fluency: Understand a fraction as a number on the number line.

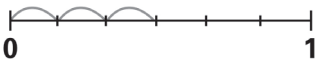
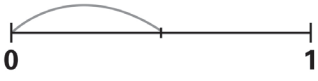
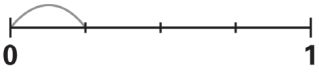
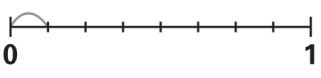
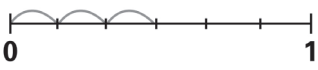
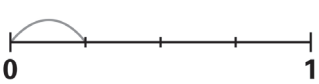
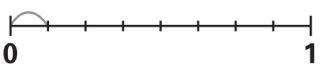
Materials: 2 sets of "I Have" cards

Number of Players: 2

Directions:

1. Shuffle cards. Each player has one set of the cards below.
2. First player draws a card saying, "Who has ___?" or the fraction on the card that is drawn by the first player. The second player finds the card that shows ___ and explains how the number line shows ___. If correct, the second player says, "Who has ___?"
3. Player #1 finds the card with a number line that shows ___. Player one explains how the number line represents the fraction. Once card is used they place the card face up on the table. Continue until all cards have been played by both players.

Variation/Extension: Students might work with partners to create more cards. Teacher and class may create more cards together. Additional cards have been added for your convenience.

I have  Who has $\frac{3}{4}$?	I have  Who has $\frac{1}{4}$?	I have  Who has $\frac{6}{8}$?	I have  Who has $\frac{1}{8}$?
I have  Who has $\frac{2}{3}$?	I have  Who has $\frac{2}{2}$?	I have  Who has $\frac{3}{6}$?	I have  Who has $\frac{1}{2}$?
I have  Who has $\frac{3}{4}$?	I have  Who has $\frac{1}{4}$?	I have  Who has $\frac{6}{8}$?	I have  Who has $\frac{1}{8}$?
I have  Who has $\frac{2}{3}$?	I have  Who has $\frac{2}{2}$?	I have  Who has $\frac{3}{6}$?	I have  Who has $\frac{1}{2}$?

I have 0 ——— 1 **Who has ___ ?**	**I have** 0 ——— 1 **Who has ___ ?**	**I have** 0 ——— 1 **Who has ___ ?**	**I have** 0 ——— 1 **Who has ___ ?**
I have 0 ——— 1 **Who has ___ ?**	**I have** 0 ——— 1 **Who has ___ ?**	**I have** 0 ——— 1 **Who has ___ ?**	**I have** 0 ——— 1 **Who has ___ ?**
I have 0 ——— 1 **Who has ___ ?**	**I have** 0 ——— 1 **Who has ___ ?**	**I have** 0 ——— 1 **Who has ___ ?**	**I have** 0 ——— 1 **Who has ___ ?**
I have 0 ——— 1 **Who has ___ ?**	**I have** 0 ——— 1 **Who has ___ ?**	**I have** 0 ——— 1 **Who has ___ ?**	**I have** 0 ——— 1 **Who has ___ ?**
I have 0 ——— 1 **Who has ___ ?**	**I have** 0 ——— 1 **Who has ___ ?**	**I have** 0 ——— 1 **Who has ___ ?**	**I have** 0 ——— 1 **Who has ___ ?**

Number Line Madness!

Number of Players: 1-2

Building Fluency: understand fractions on the number line

Materials: gameboard, game cards, and game marker

Number of Players: 2

Directions:

1. Each player in turn draws a card to see where to jump on the number line.
2. The player places the marker in the correct location.
3. Some cards move forward and others move backward. If the card requires a player to move lower than 0, the player loses the turn.
4. The player who lands exactly on 1 is the winner.

Variation/Extension: Play with the plus fraction cards only. Have each player draw a card. Compare fractions. Player with the larger fraction plays. Continue to draw with only one player moving each turn.

PLAYER 1

PLAYER 2

$+\frac{1}{8}$	$-\frac{1}{8}$	$+\frac{2}{8}$	$-\frac{2}{8}$
$-\frac{3}{8}$	$+\frac{4}{8}$	$-\frac{4}{8}$	$+\frac{5}{8}$
$+\frac{6}{8}$	$-\frac{6}{8}$	$+\frac{7}{8}$	$-\frac{7}{8}$
$-\frac{1}{2}$	$+\frac{1}{4}$	$-\frac{1}{4}$	$+\frac{3}{4}$
$+\frac{3}{8}$	$-\frac{5}{8}$	$+\frac{1}{2}$	$-\frac{3}{4}$

Capturing Hexagons

Building Fluency: understanding fractions

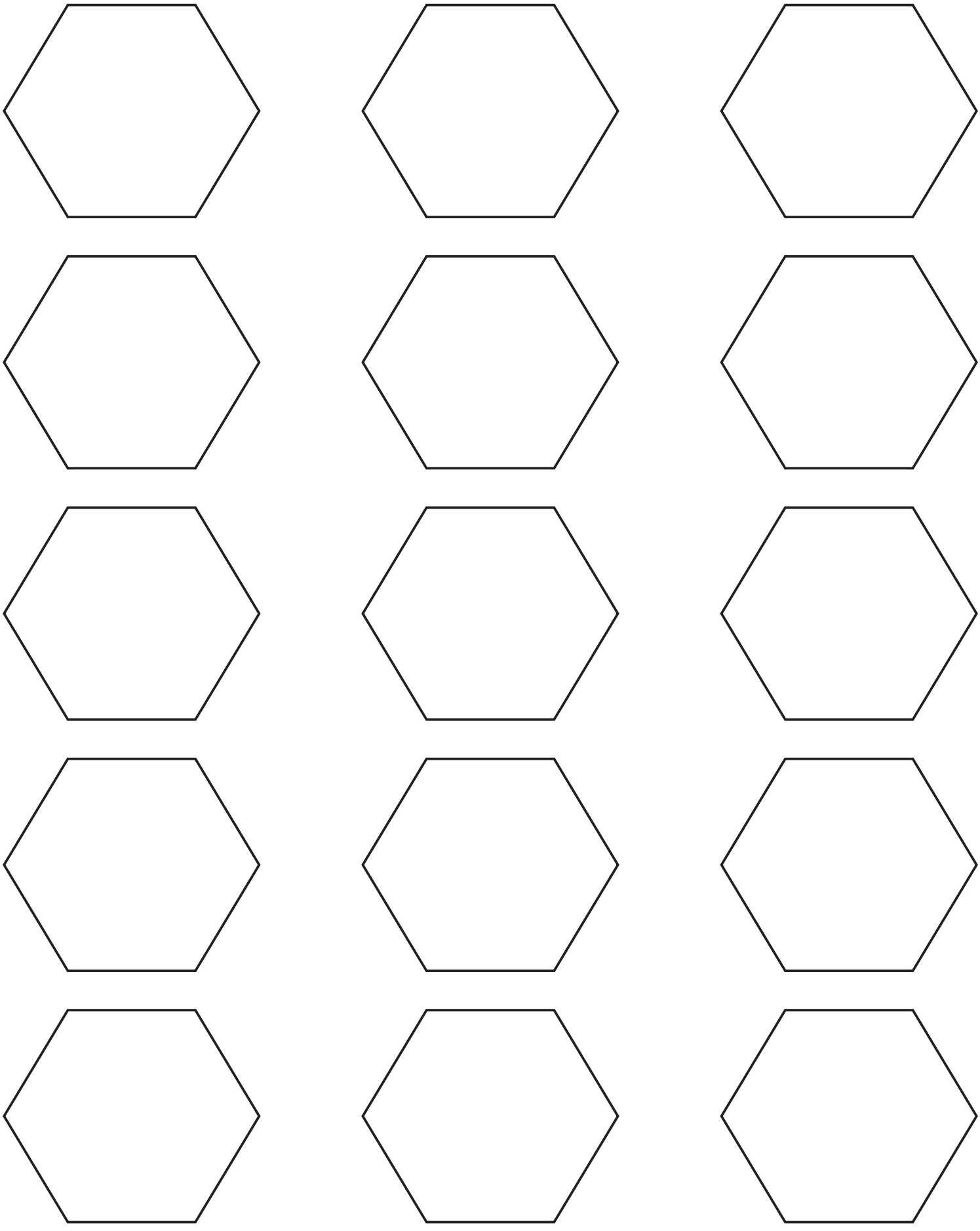
Materials: gameboard per player, spinner (pencil and paperclip), and pattern blocks (hexagons, triangles, trapezoids, and rhombuses)

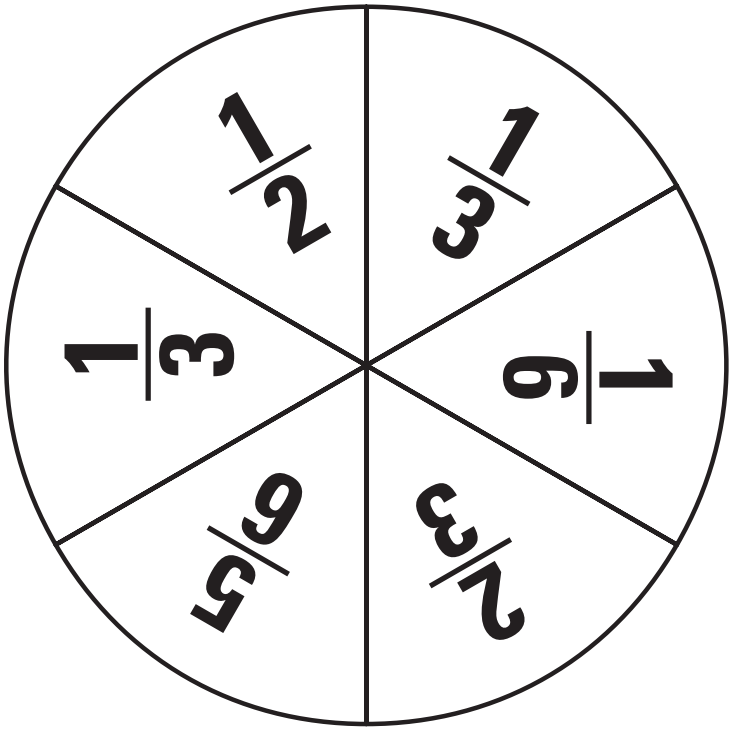
Number of Players: 2-4

Directions:

1. Players take turns spinning the spinner and placing the pattern blocks on the gameboard. Players should be encouraged to trade up whenever possible.
2. When a player captures an entire hexagon, the shape is covered with a hexagon.
3. The winner is the first player to capture all of the hexagons on the gameboard.

Variation/Extension: The spinner contains two 1/3 opportunities. Label one of these as "take away".

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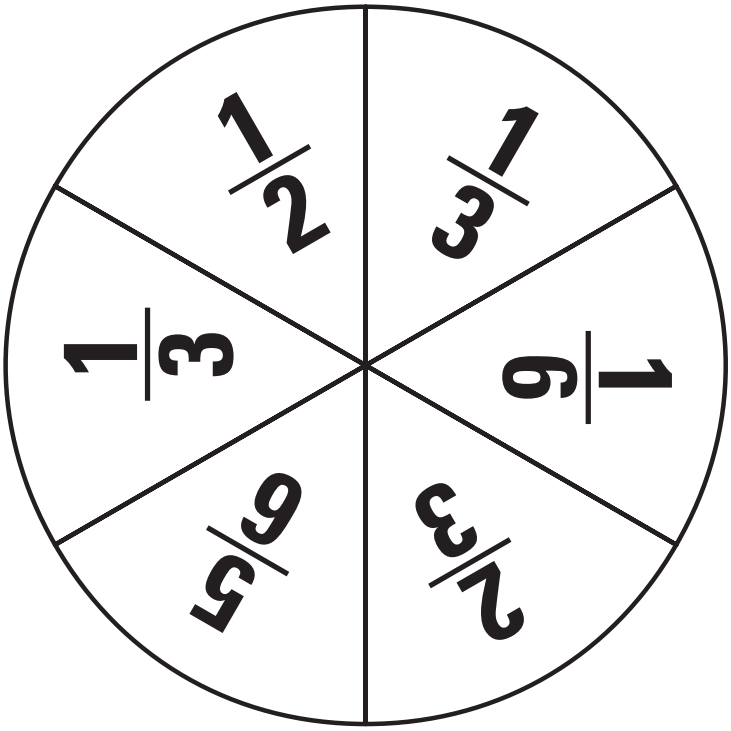
1/3
1/6
1/3
5/6
7/3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1/3
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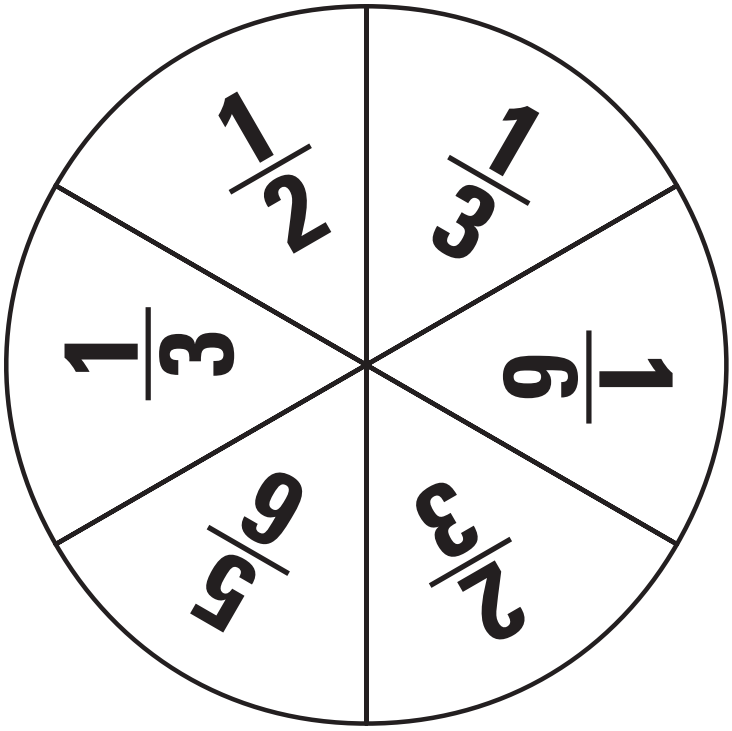
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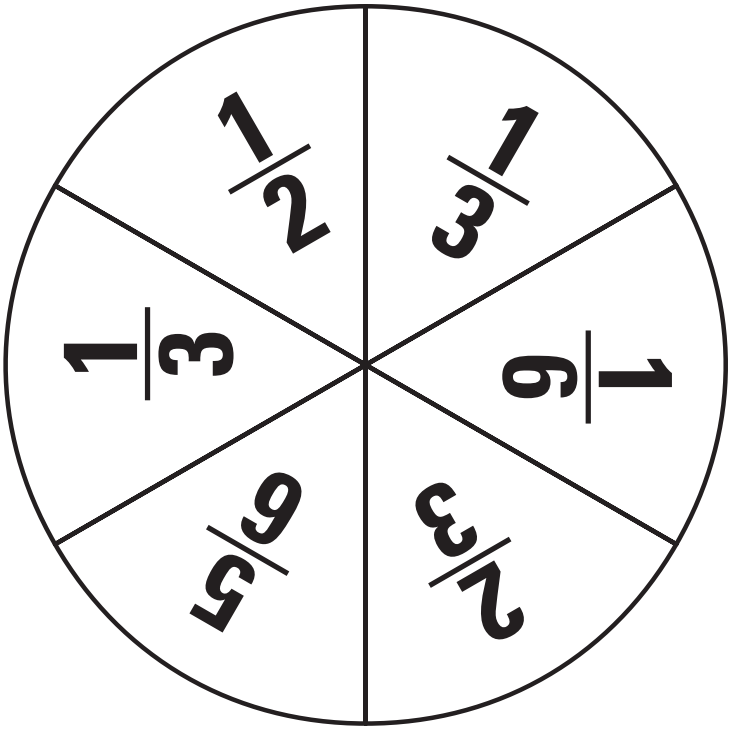
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1/3
5/6
7/3

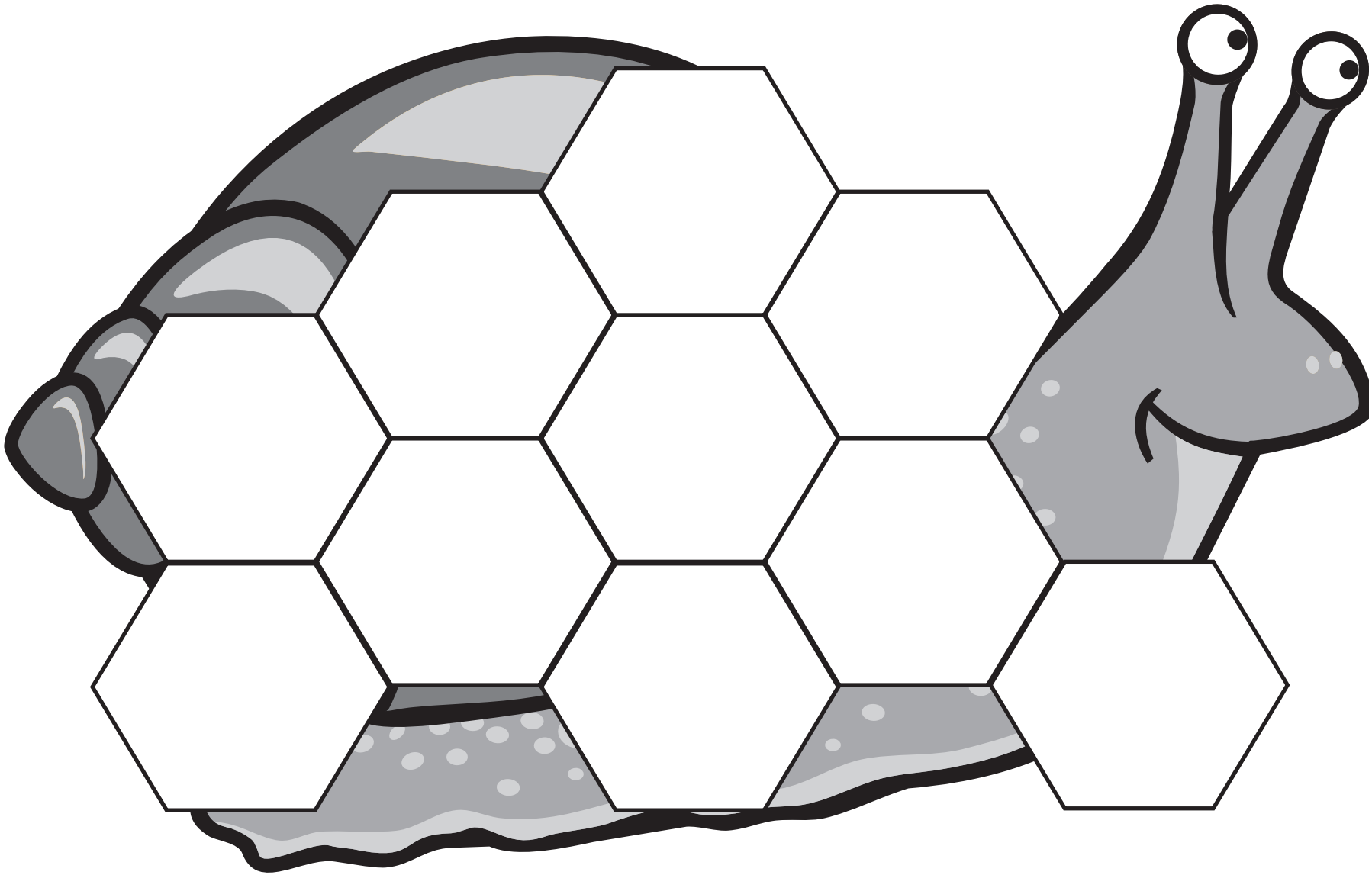
Snail Nim

Building Fluency: equivalent fractions **Materials:** gameboard and pattern blocks (triangles, parallelograms, trapezoids, hexagons) **Number of Players:** 2

Directions:

1. Players take turns placing pattern blocks on the snail. The player announces the fraction being placed. Example: Player places a triangle on the board and says "This is 1/6 of the hexagon." Player places a trapezoid on the board and says "This is ½ of the hexagon."
2. The person who places the last block on the gameboard loses the game.

Variation/Extension: The winner places the last piece or players may not cover adjoining hexagons in the same way. Example: If a player covers one hexagon with 2 trapezoids, the adjoining hexagons must have at least two different shapes.



Race to Midnight

Building Fluency: telling time

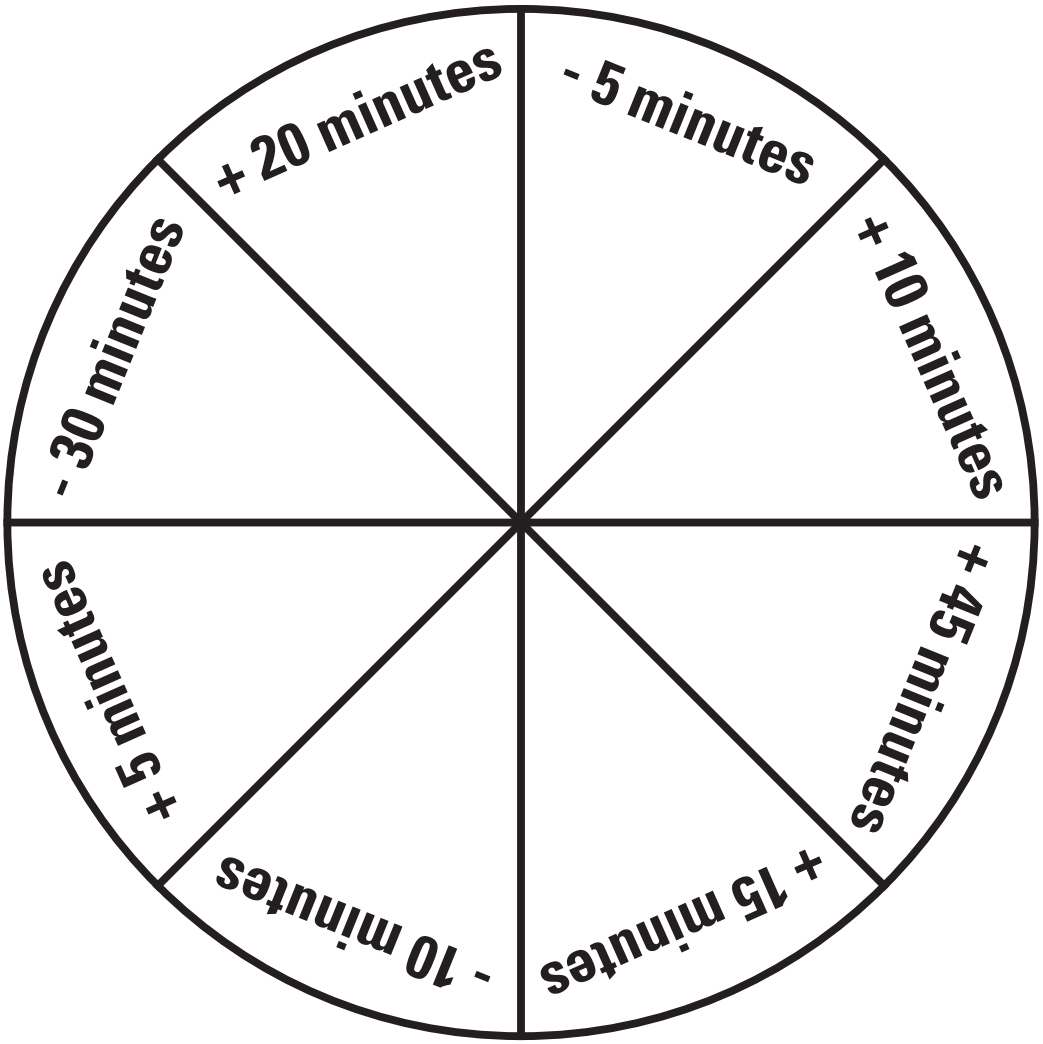
Materials: gameboard, spinner (pencil and paperclip), number line for each player

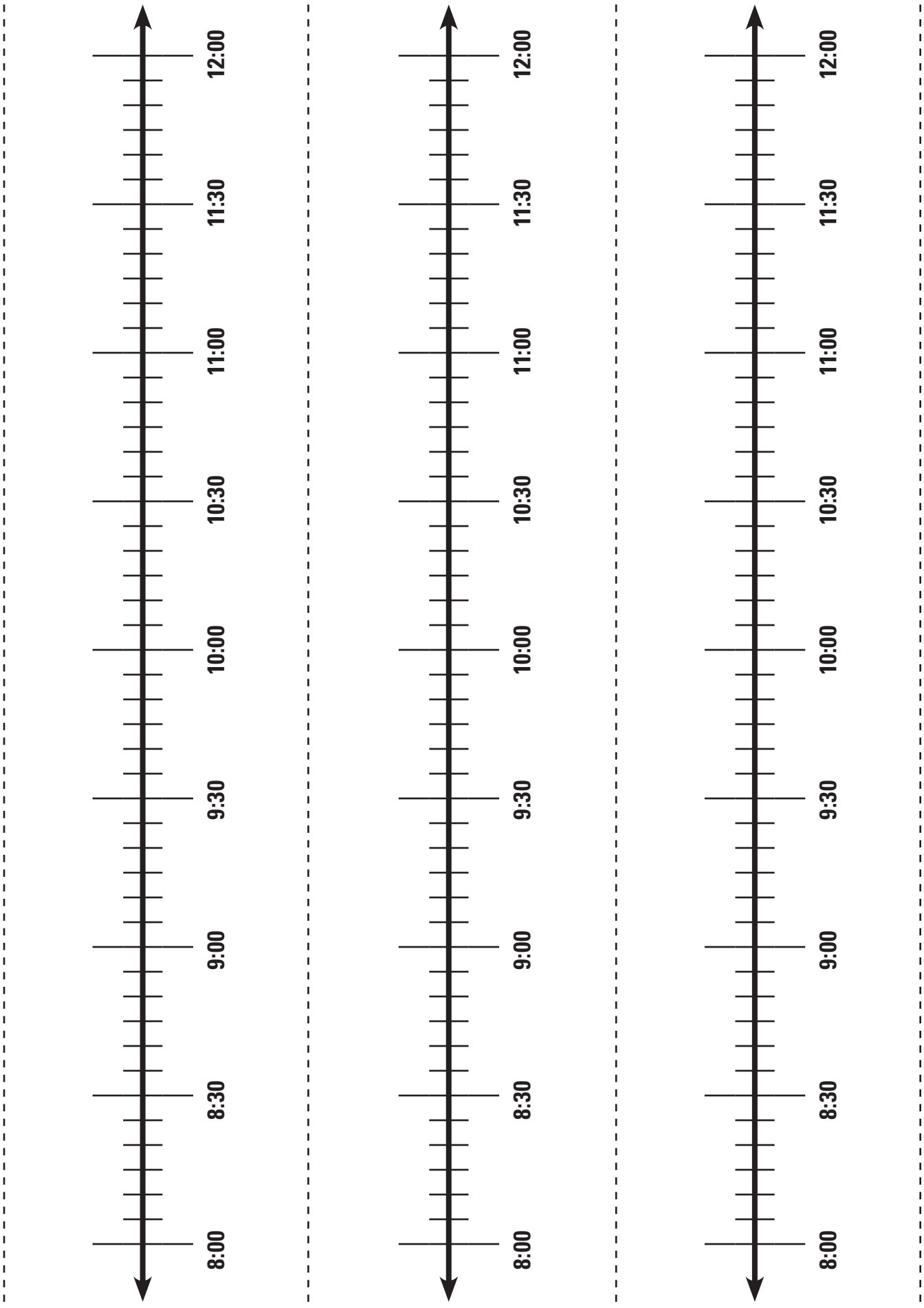
Number of Players: 2 or 3

Directions:

1. Each player will have a number line and begin at 8:00.
2. In turn, players spin and add or subtract the time indicated on the spinner and record on the number line.
3. The winner is the first player to reach 12:00 midnight.

Variation/Extension: Students can create their own number lines using different begin and end times.

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Metric Measure Up

Building Fluency: understand metric measurement

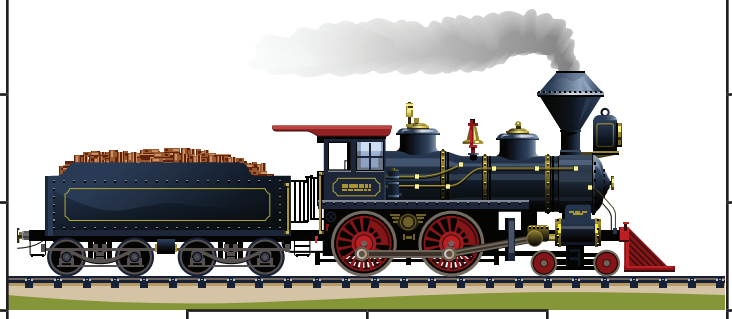
Materials: gameboard, a die, game marker, metric unit cards

Number of Players: 2-4

Directions:

1. Each player places game markers on "Start".
2. Player 1 draws the top card from the deck and reads it. Then player 2 fills in the correct unit of measure.
3. If the player answers correctly, the player rolls the die and moves that many spaces. If the player answers incorrectly, the turn is over.
4. Play continues to the right with one player reading and the next player answering and moving.
5. The winner is the first player to reach "Finish".

Variation/Extension: Cards can be dealt out to each player. In turn a player can turn over a card, read it and answer it. Teacher may want to start with length cards, then weight, etc...



START

Move Back 2 Spaces

Lose a Turn

FINISH

Lose a Turn

Move Ahead 1 Space

Roll Again

A fish tank holds about 5 _____ of water. (liters)	A juice box holds about 350 _____ of juice. (milliliters)	A ladle contains about 100 _____ of soup. (milliliters)
A pail contains about 2 _____ of water. (liters)	Eyeglasses can weigh about 60 _____. (grams)	A watermelon is about 8 _____ (kilograms)
A milk jug contains about _____ of milk. (liters)	An eye dropper contains about 5 _____ of liquid. (milliliters)	A washing machine can hold about 6 _____ of water. (liters)
A bathtub contains about 115 _____ of water. (liters)	A drinking glass holds about 250 _____ of soda. (milliliters)	A tennis ball weighs about 55 _____. (grams)

A necktie is about 122 _____ long. **(centimeters)**	**A Blue Whale is about 3,000_____ long.** **(centimeters)**	**A dictionary weighs about one _____ .** **(kilogram)**
A necktie weighs about 62 _____ . **(grams)**	**A dictionary is about 25 _____ long.** **(centimeters)**	**A Blue Whale weighs about 164,000_____.** **(kilograms)**
A large bottle of soda holds about two ___. **(liters)**	**A broom is about 137_____ long.** **(centimeters)**	**An airplane weighs about 300,000 _____.** **(kilograms)**
An airplane is about 69 _____ long. **(meters)**	**A new pencil is about 20 _____ long.** **(centimeters)**	**A broom weighs about 1,000_____.** **(grams)**

A hotdog is about 15 _____ long . **(centimeters)**	**A ladder weighs about ten _____.** **(kilograms)**	**A hotdog weighs about 60 _____.** **(grams)**
A roll of 50 pennies weighs about 120_____. **(grams)**	**A motorcycle weighs about 220 _____.** **(kilograms)**	**A ladder is about two _____ long.** **(meters)**
A medium sized dog weighs about 15 ___ . **kilograms**	**A roll of 50 pennies in about 10 _____ long.** **(centimeters)**	**A motorcycle is about 180 ____ long.** **(centimeters)**
A piano weighs about 240_____. **(kilograms)**	**A medium sized dog is about 30 _____ long.** **(centimeters)**	**The keyboard on a piano is about two _____ long.** **(meters)**

Cut a Rug

Building Fluency: understand area and perimeter

Materials: pair of dice, recording sheet, centimeter grid paper

Number of Players: 2

Directions:

1. Player tosses the dice, finds the sum and puts the total in the length box. The player tosses the dice again to find the width.
2. Using the length and width, the player creates a rectangle on the grid paper and records the perimeter and area on the recording sheet. Then Player 2 does the same.
3. After each round the players look at their numbers together. Which player has the greater area? Which player has the greater perimeter? Is the perimeter always bigger? Always smaller? Can they be the same?
4. After 4 rounds, players total their perimeters and their areas. The winner has the highest total area.

Variation/Extension: Once students understand how to play this game they can create their own table in their math notebook. "I Get Around" is a variation of this game.

PLAYER 1

Round	Length	Width	Perimeter	Area
1				
2				
3				
4				
			Total Score	

PLAYER 2

Round	Length	Width	Perimeter	Area
1				
2				
3				
4				
			Total Score	

Geo-Matchup

Building Fluency: reason with shapes and their attributes

Materials: a set of Geo-Matchup cards per player

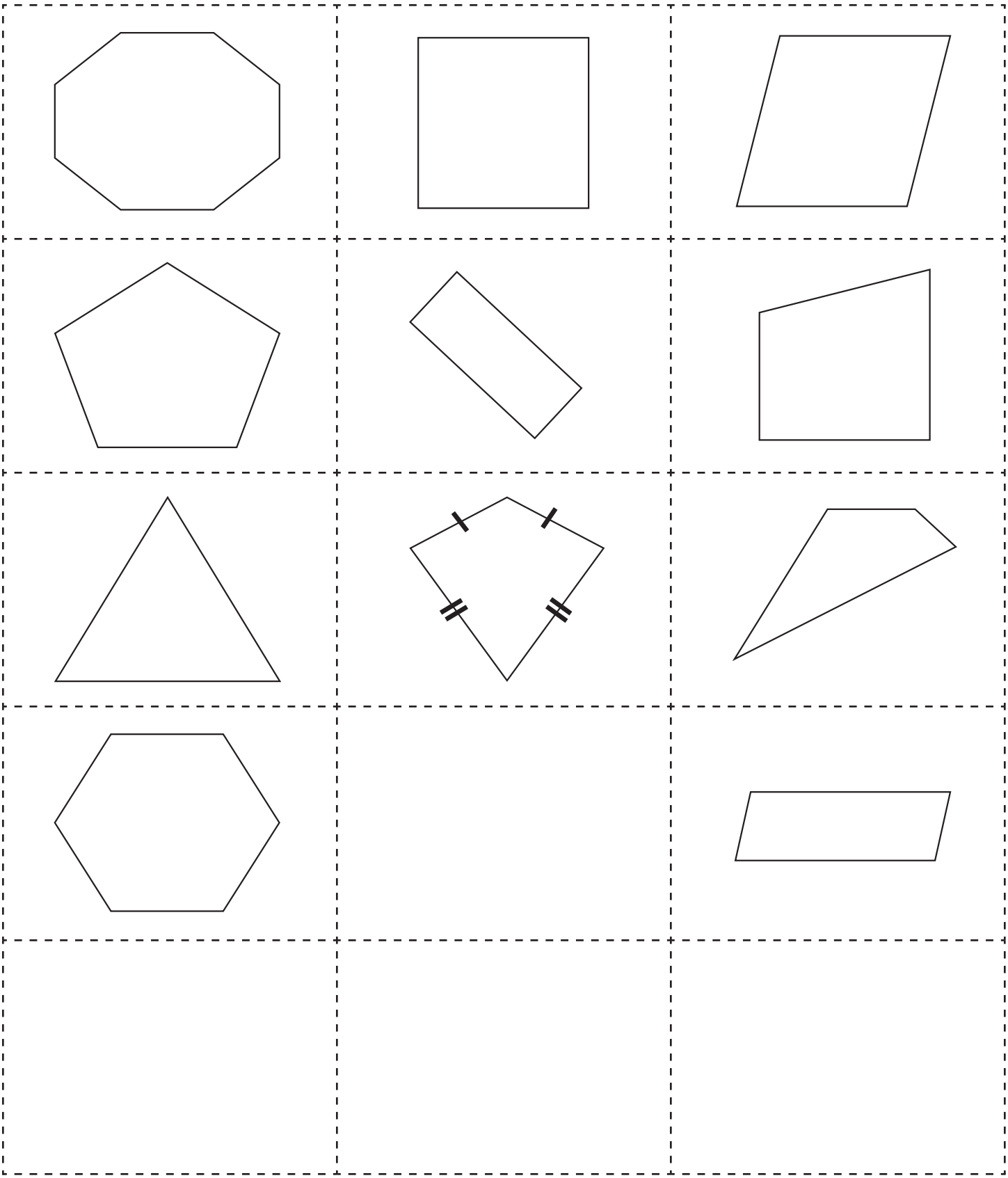
Number of Players: 2-4

Directions:

1. Each player has a set of cards.
2. Players match up their cards.
3. Players compare their answers and agree or disagree.
4. Players defend and prove their answers until all players agree.

Variation/Extension: Play as a memory game. First player turns over two cards. If they match, the player takes the cards and plays again. If not, the player turns the cards back over and play passes to the next player. Players can create additional cards.

A polygon with 8 sides and 8 angles	**A quadrilateral with 2 pairs of parallel sides, all right angles, and all sides equal**	**A quadrilateral with 4 sides equal and 2 pairs of parallel sides, no right angles**
A polygon with 5 sides and 5 angles	**A quadrilateral with 2 pairs of parallel sides and all right angles. All sides are not congruent**	**A quadrilateral with one pair of parallel sides**
A polygon with 3 sides and 3 angles	**A quadrilateral with two pairs of adjacent equal sides. The four sides do not all have the same length.**	**A polygon with 4 sides and 4 angles**
A polygon with 6 sides and 6 angles		**A quadrilateral with two pairs of parallel sides**



Spin and Review

Building Fluency: review of multiple concepts

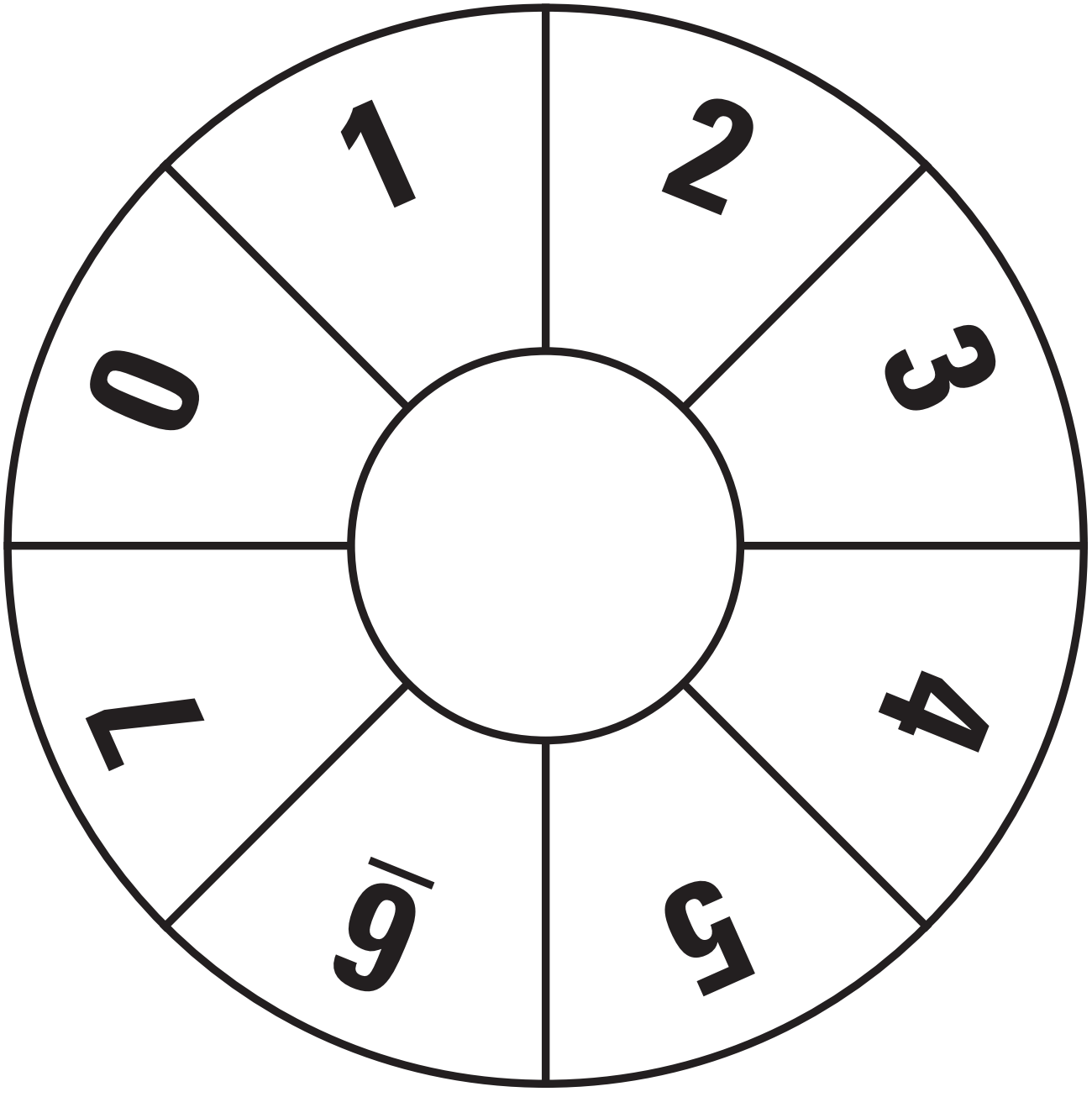
Materials: spinner (pencil and paper clip), game cards, approximately 50 counters

Number of Players: 3-4

Directions:

1. Cards are shuffled and placed face down. Then the first player draws a card and reads it to player 2.
2. If the player answers correctly, the player spins the spinner and takes that number of counters. The game card is placed in a discard pile.
3. If the player answers incorrectly the card is placed at the bottom of the pile and no spin is taken.
4. Player 2 reads a card for Player 3 and play continues around.
5. When all of the cards have been answered, the player with the most counters wins.

Variation/Extension: Students can write more questions for this game.

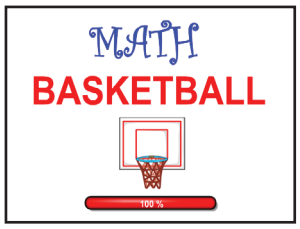


Ellen has 5 groups of bracelets. There are 6 bracelets in each group. What equation expresses this? (A. 5 x 6)	8 x ___ = 48 What is the missing factor? (A. 6)	John cut a brownie into two parts. He ate one part. What fraction of the brownie did he eat? (A. ½)
Alan began jogging at 9:15. He jogged until 10:00. How long did he jog? (A. 45 minutes)	Mary has 7 packs of gum, each pack has 10 pieces. How many total pieces of gum does Mary have? (A. 70 pieces)	John has 3 bags of candy. Each bag contains 4 pieces. Caroline has 4 bags of candy. Each bag contains 2 pieces. Who has more candy? (A. John)
Which digit is in the tens place in 843? (A. 4)	Would two quarters, one dime and five pennies be the same amount of money as six dimes and one nickel? (A. yes, 65¢)	If you were skip counting by 3's, would you say the number 15? (A. yes)
Name a polygon with four congruent sides and four congruent angles. (A. Square)	Jake drew the numbers 3, 5 and 2 out of a bag of number tiles. What is the largest number he can make using all three numbers only once? (A. 532)	Marcus traced his hand on a piece of paper. What do we call the measurment of space on the inside of his drawing? (A. Area)
Suckers are 15¢ each. Mary bought six. How much did she spend? What operation would you use to solve this problem? (A. Multiplication or Addition)	John measured the distance around the entire outside of his desk. What do we call this measurement around an entire object? (A. Perimeter)	Lamont was building a cube. He used six of the same polygon. What polygon did he use? (A. Square)
Tina collects dimes. She had 198 dimes and gave her brother 36. How many did she then have? What operation would you use to solve this problem? (A. Subtraction)	Susie works in a flower shop. She received a shipment of tulips and roses. She received 38 tulips. She received 50 more roses than tulips. How many roses did she receive? What operation should you use? (A. Addition)	There were eight clowns at the circus. Each clown was juggling four bowling pins. How many bowling pins were there? What operation would you use to solve this problem? (A. Multiplication or Addition)

Tyler drew a closed figure with six sides. What was the name of this figure? (A. Hexagon)	200 + 40 + 3 is an example of...? (A. Expanded Notation)	A closed figure with three or more straight sides is called a ____? (A. Polygon)
Round 432 to the tens place. (A. 430)	Does a 3 cm x 6 cm rectangle and a 2 cm x 9 cm rectangle cover the same amount of space? (A. Yes)	What unit of measure would yo use to give the weight of a paper clip? Grams or Liters? (A. Grams)
What is x? 3 x 2 = 2x (A. 3)	Katie buys a shirt for $7.99 and a belt for $5.49. She paid with a $20.00 bill. How much change will she receive? How many operational steps will it take to solve this problem? (A. 2)	Would three dimes, two nickels and ten pennies be the same amount of money as two quarters? (A. yes)
Blake ordered a medium pizza and ate one half and Ernest ordered a medium pizza and ate one half. How much pizza did they have left all together? (A. One Whole Pizza)	Judy arrived at school at 8:15. LuAnn arrived 20 minutes later. What time did LuAnn arrive at school? (A. 8:35)	

Online Games Available

Operations and Algebraic Thinking



Math Basketball

http://www.math-play.com/math-basketball-properties-of-multiplication/math-basketball-properties-of-multiplication.html

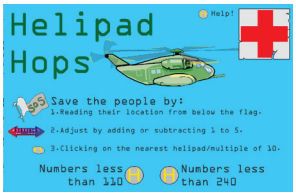
3.OA.5 – please add a description here... a few lines about how this game will help or how is works.

Number and Operations in Base Ten

Estimate Whole Numbers

http://studyjams.scholastic.com/studyjams/jams/math/numbers/nestimate-whole-numbers.htm

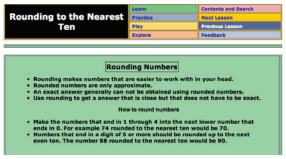
3.NBT.1 – please add a description here... a few lines about how this game will help or how is works.



Helipad Hops

http://www.ictgames.com/helipad%20hops7.html

3.NBT.1 – Students need to land the helicopter in the correct rounded number pad.



Rounding to the Nearest 10

http://www.aaamath.com/est32_x2.htm

3.NBT.1 – Basic rounding to nearest ten, gives student feedback.

Rounding to the Nearest 100

http://www.aaamath.com/est32_x3.htm

3.NBT.1 – Basic rounding to nearest hundred, gives student feedback

Match Up Defense Basic

http://www.mathnook.com/math/mathpup-defense-basic.html

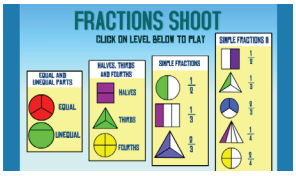
3.NBT.1 – Defense Pup Basic: Students need to use their rounding skills to the nearest ten to defend their house. They "shoot" the attacker with the correct rounded answer. Allows students to level up if they do well.

Match Up Defense Advanced

http://www.mathnook.com/math/mathpup-defense-advanced.html

3.NBT.1 – Students need to use their rounding skills to the nearest hundred to defend their house. They "shoot" the attacker with the correct rounded answer. Allows students to level up if they do well.

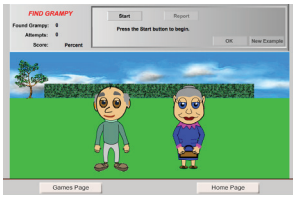
Number and Operations – Fractions



Fractions Shoot

http://www.sheppardsoftware.com/mathgames/earlymath/fractions_shoot.htm

3.NF. 1 – A great introduction game to fractions. Students need to touch the fraction identified by the game. Students can pick relaxed mode, timed mode, and which fractions they can play with.



Find Grampy

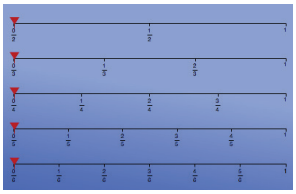
http://www.visualfractions.com/FindGrampy/findgrampy.html

3. NF. 2 – Students need to identify the location of "Grampy" when he goes behind some bushes. Set up in a fraction bar/number line. It gives students clues where to go if they do not respond correctly the first time:

Fraction Track -- WEBSITE DID NOT WORK

http://illuminations.nctm.org/ActivityDetail.aspx?ID=18

3.NF.2 and 3.NF.3 – Students need to get their pieces to the end of the track with the least amount of moves. The game corrects the students if they are incorrect. Equivalent fractions are also allowed to be used on the track. Denominators go up to 12ths.



Fraction Track 2

http://www.curriculumsupport.education.nsw.gov.au/countmein/children_fraction_track.html

3.NF.2 and 3.NF.3 – Students need to get their pieces to the end of the track with the least amount of moves. The game corrects the students if they are incorrect. Equivalent fractions are also allowed to be used on the track. Denominators go up to 10ths.

Tony's Fraction Pizza Shop

http://mrnussbaum.com/pizza_game/

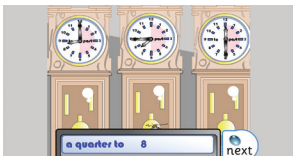
3.NF.1 and 3.NF.3 – The computer gives a pizza order, listing the size of pizza and what toppings. Students need to select the correct toppings with the correct fractional amount. Students receive earnings for each pizza done correctly. Some pizzas are listed with equivalent fractions.

Measurement and Data

Willy The Watch Dog -- Can you take a screen capture for me?

http://www.harcourtschool.com/activity/willy/willy.html

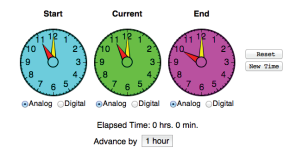
3.MD.1 – An online board game for 1-2 players. Students need to move the clock to the time identified.



Hickory Clock

http://www.ictgames.com/hickory4.html

3.MD.1 – Students need to identify the correct time so the mouse can get the cheese. If they are incorrect, a cat comes in.



Elapsed Time

http://www.shodor.org/interactivate/activities/ElapsedTime/

3.MD.1 – Students need to advance the time to see how much time as passed. Multiple levels available.

Line Plots

http://studyjams.scholastic.com/studyjams/jams/math/data-analysis/line-plots.htm

3.MD.4 – please add a description here... a few lines about how this game will help or how is works.