Fractured Fractions

In this game for 2 to 4 players, work your way around the game board by using visual representations to fracture fractions and whole numbers.

Strands:

Number & Quantity	X
Algebra	
Functions	
Geometry	
Statistics & Probability	

Materials Needed:

- *Fractured Fractions* game boards (Round 1 & Round 2)
- Game piece, 1 per player
- *Fractured Fractions* Workspace, 1 per player
- *Fractured Fractions* spinner
- Paperclip
- Pencil
- One die
- Page protector, 1 per player
- Dry erase markers and erasers, 1 per player

Where:

Outside	
Inside	X
On-line	
On-site	

Set-Up:

- To begin, place one marker for each player on START on the Round 1 board.

Object of the Game: Solve whole number and unit fraction division problems using visual representations. Explain your drawings.

Pre-Game Play:

- Before Round 1, represent whole numbers divided by unit fractions using the *Fractured Fractions* Workspace. For example, represent $3 \div \frac{1}{2}$ by identifying 3 wholes and examining how many one-half pieces there are in 3 wholes. In this example, 3 is the dividend and $\frac{1}{2}$ is the divisor.
- Before Round 2, represent unit fractions divided by whole numbers using the *Fractured Fractions* Workspace. For example, represent $\frac{1}{2} \div 3$ by identifying 1 whole, finding half, of it, then determining the size of the region when $\frac{1}{2}$ is divided into 3 parts. In this example, $\frac{1}{2}$ is the dividend and 3 is the divisor.

Playing the Game:

<u>Round 1</u>: Whole number ÷ Fraction = Whole number
Dividend ÷ Divisor = Quotient

1. Use the game board showing whole numbers on each space.
2. On your turn, use the die to determine the whole number dividend and the spinner to determine the fraction divisor.
3. Use the *Fractured Fractions* Workspace to solve the fraction division problem.
4. Move your marker to the quotient (your solution) on the board and verbalize what your solution represents.
5. If you are on a space and cannot move forward anymore, find the closest space labeled with the quotient you found.
6. Play moves to the left.
7. Repeat Steps 1 through 6 until a player lands exactly on the last 12.

<u>Round Two</u>: Fraction ÷ Whole-number = Fraction
Dividend ÷ Divisor = Quotient

1. Use the game board with the fraction quotients.
2. On your turn, use the spinner to determine the fraction dividend and the die to determine the whole-number divisor.
3. Use the *Fractured Fractions* Workspace to solve the fraction division problem.
4. Move your marker to the quotient (your solution) on the board and verbalize what your solution represents.
5. If you're on a space and can't move forward anymore, then find the closest spot you can move to. You have to land exactly on the last $\frac{1}{12}$ to win.
6. Play moves to the left.
7. Repeat Steps 1 through 6 until a player lands exactly on the last $\frac{1}{12}$.

To Win: Be the first player to reach the end of the game board, landing exactly on 12 in Round 1 or $\frac{1}{12}$ in Round 2.

Think About It:

1. What divisors and dividends resulted in smaller quotients? Why? Larger quotients? Why?
2. In each round, which quotients are you most likely to land on? Why do you think so?
3. What does a solution on your workspace represent?
4. As you drew representations, did your pictures remind you of mathematics you have done before? Explain.
5. How is division of whole numbers by unit fractions related to multiplication?
6. How is division of unit fractions by whole numbers related to multiplication?

Variations:

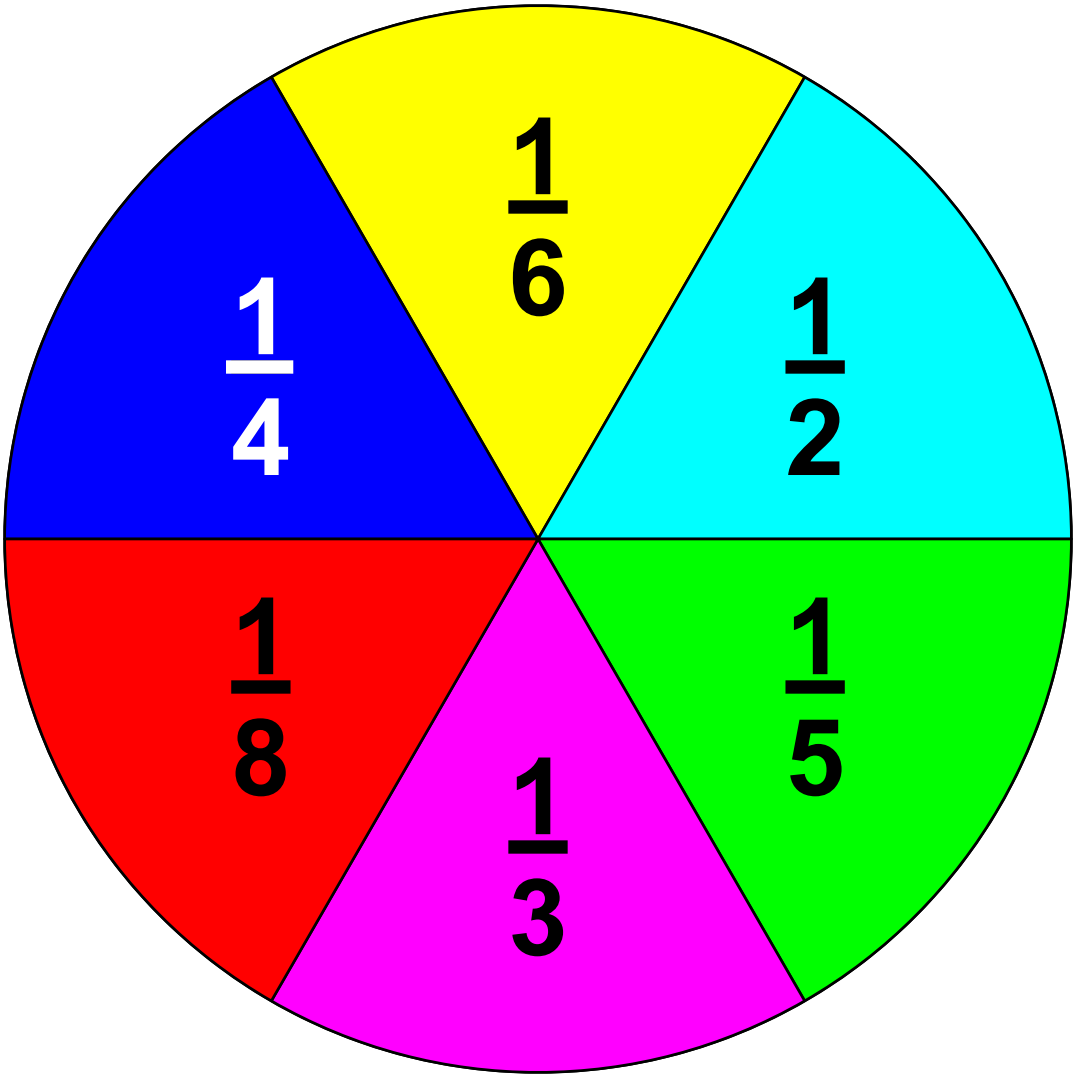
Fractured Pictionary: On your turn, another player secretly rolls and spins to determine the whole-number and fraction. The player represents the fraction division problem and shows the solution visually. It's your job to label the values that complete the equation. If you correctly identify the divisor, dividend, and quotient, move to the quotient space on the game board.

Divide by Other Fractions: Play *Fractured Pictionary* using fractions that are double or triple the numbers on the spinner. Spin again if the doubled or tripled fraction is a whole number. How does each new quotient relate to the original quotient? For example, compare the quotient of $4 \div \frac{1}{3}$ with the quotient of $4 \div \frac{2}{3}$. Compare the quotient of $\frac{1}{3} \div 4$ with the quotient of $\frac{2}{3} \div 4$.

Candy Fractions: Think of the whole number as a whole number of candy bars. Think of the divisor as the size of each piece into which you want to split the candy bar. For example, $4 \div \frac{1}{3}$ can be thought of as 4 candy bars with each candy bar being cut into one-third size pieces. How many pieces will you have? Replay Round 1 thinking about this context.

Helpful Hints:

- When solving a fraction division on your workspace, start by representing the dividend.
- When determining the quotient, think about:
  - If the divisor is smaller than the dividend, how many times does the divisor "fit" into the dividend?
  - If the divisor is a whole number, what fractional part of the whole is the final piece once the fraction is divided into that many sections?



To use the spinner: Place the tip of a pencil through the loop of a paper clip with the point of the pencil at the center of the spinner. Flick the paper clip to spin it. If the paperclip lands on a line, spin again.