

Examples of Playing FRAX

For now, we suggest that games of FRAX involve groups of three to six people. Also, while the improvement of mental arithmetic skills is one of the aims of this game, we recommend that when you start playing FRAX, every player should have some paper and something to write with. There are two types of games that can be played with the FRAX cards. A simultaneous game, and a turn-based, or serial, game. In each style of game, the main goal remains the same, so we'll describe that first, and then how each of those games are played, and how they are scored, below.

The Goal of FRAX

In any style of FRAX game, there are three different types of cards: FRAX, GOAL, and BONUS. Pictured below are the backs of these cards you can find in your deck.



The fronts have images like this:



When you are constructing your FRAX decks for play (see the document for the how-to on that), make sure you keep the GOAL cards separate from the FRAX cards and the BONUS cards.

In either style of FRAX game, the same general steps happen:

- A GOAL card is laid down. You can think of this as how much money is currently on the table.
- Every player then makes a bid for how much of that money they want by putting down the card representing their bid.
- Once all of the bids have been made, if the sum of the bids is **less than or equal to** the amount on the GOAL card, everyone adds their card to their *score*.
- If the sum of the bids is **more than** the amount on the GOAL card, no one gets anything and they have to discard their bids. No one's score is increased in this case.
- To encourage fraction arithmetic practice, the first person to say whether the sum is below or exceeds the GOAL, and **can show why they are correct**, gets a BONUS card added to their score pile. More on the BONUS card below.

A quick example: in the course of the game, imagine we have three players around the table, each with five cards in their hand.

Player 1 has $\frac{1}{6}, \frac{2}{5}, \frac{3}{5}, \frac{2}{5}, \frac{4}{6}$

Player 2 has $\frac{1}{5}, \frac{1}{5}, \frac{1}{3}, \frac{3}{3}, \frac{3}{3}$

Player 3 has $\frac{1}{6}, \frac{1}{2}, \frac{1}{2}, \frac{1}{6}, \frac{4}{6}$

The next round, a GOAL card is laid down:



Player 1 decides that she wants $\frac{3}{5}$ of that GOAL, so she plays that card. Player 2 decides that he wants $\frac{1}{5}$, so he puts down that card. Player 3 decides that she wants $\frac{1}{6}$, so she puts down that card. Player 3 is the first one to add them all up, and she yells out “SCORE!”. Player 1 then asks to her show how she knows for sure. Player 3 shows her calculations:

$$\frac{3}{5} + \frac{1}{5} + \frac{1}{6} = \frac{18}{30} + \frac{6}{30} + \frac{5}{30} = \frac{29}{30} < 1\frac{1}{5}$$

Because the sum of their bids is less than the GOAL card, each person adds *their own bid* to their score pile. So Player 1 gets adds $\frac{3}{5}$ to her score, Player 2 adds $\frac{1}{5}$ to his score, and Player 3 adds $\frac{1}{6}$ to her score. Player 3 also adds a BONUS card to her score pile, worth $\frac{1}{20}$. Players can either keep their score on paper, or in a pile of cards to one side. The game should also have a *discard pile*, where bids from failed attempts go.

The winner of the game is the player with the highest score at the end of the game.

The BONUS Card

The BONUS card is an attempt to encourage players in FRAX to do fraction arithmetic. We suggest the following rules for the BONUS card during the game.

- A player gets a BONUS card if they correctly guess, and then show that they are right, whether the sum of the bids is less than, equal to, or greater than the GOAL card value.
- If a player has no BONUS cards, there is no penalty for being wrong, or being unable to show why they are right.
- If a player guesses wrong about the sum of the bids, or can't show why they are right, and they have at least one BONUS card, they must place one of their BONUS cards back in the BONUS pile.
- If that same player guesses wrong, or can't show why they are right, twice in a row, they are not allowed to guess for the next three rounds. This is to stop players from just blurting out guesses and stealing other people's chances to make a guess about the score.

These are just suggested rules. For players who are more advanced, stiffer penalties may be in order for guessing wrong. Perhaps giving up two BONUS cards, or a penalty of five rounds for guessing wrong twice in a row.

Simultaneous FRAX

Simultaneous FRAX involves players playing their cards facedown at the same time. This game is interesting because there is some higher level strategic thinking involved. A player must look at the GOAL card, think about their own bid, and all of the other bids by the other players. Here is how a simultaneous game is played:

- The ending condition of the game must be stated before you begin. It can be a player reaching a predetermined score value, like 4 for example, or after a certain number of rounds. Feel free to get creative if you have advanced students.
- In the first round, each player is dealt five cards, which they should not show to the other players.
- A GOAL card is placed face up.
- Each player places their bid face down in front of them, and once every player has laid down a bid, all players turn their cards over.
- (Optional) Before all of the cards are turned over, players may make a statement about the value of their card in an attempt to make other players change their bid.
- Once a player knows whether or not the bids sum up to less than the GOAL card or not, he or she yells out “SCORE!” or “NO SCORE!”, and must show why they are right. A player can use a verbal argument, or show on a piece of paper.
- Players each get a new card, so a player should have 5 cards in their hand at all time.
- Repeat from: A GOAL card is placed face up.

The game ends when the predetermined condition has happened.

Turn-based FRAX

Turn-based FRAX is less about bluffing and more about being able to do fraction calculations to maximize your score every round, or ruining someone else's high bid. Here is how the turn-based game is played:

- The ending condition is a given number of rounds. Since going last in the turn-based game is a huge advantage, each the number of rounds should be a multiple of the number of players. For example, if there are four players, then you should play 8, 12, 16, etc rounds.
- In the first round, each player is dealt five cards, which they should not show to the other players. One of the players is selected as the starting bidder.
- A GOAL card is placed face up.
- The starting bidder puts his or her card face up on the table.
- The player to the left of the starting bidder puts their card on the table. Then the player to the left puts their bid down, and so on until the last player.
- The last player puts down their card, and then anyone at the table can call "Score!" or "No score!", and must prove why they are right.
- Each player gets a new card, and the player to the left of the starting bidder now becomes the starting bidder.
- Repeat from: A GOAL card is placed face up.

Optional Rules

For students and players of FRAX who have a very strong comfort level with fraction arithmetic, we encourage trying out the following optional rules:

- Add a "multiplier" option to either the simultaneous or the serial game. Once all of the cards are laid down, players can place one additional card beside any card that is currently laying on the table, with the exception of the GOAL card. Any FRAX cards that have another

card beside them have their values multiplied, the result now becomes that player's bid. So for example, if two people are playing FRAX and Player 1 has a $\frac{1}{2}$ in front of them and Player 2 lays down a $\frac{1}{6}$ beside Player 1's card, Player 1's bid is treated as if it is worth $\frac{1}{12}$, since $\frac{1}{2} \times \frac{1}{6} = \frac{1}{12}$. If the sums of all of the new bids now total less than the GOAL card, Player 1 would add $\frac{1}{12}$ to their score, not $\frac{1}{2}$. You can also put a multiplier beside your own card.

- More optional rules to follow!