

## Frac Jack

A fraction comparison game

There are a variety of versions of Frac Jack (also spelled Frack Jack) online. This version is a bit more challenging than a number of these.

This is a game for 2, 3, or 4 players, using a standard card deck. The deck is shuffled and players each receive 6 cards.

Players play two cards face down at the same time; when all have placed their cards they are all turned over simultaneously. The two cards are interpreted as a fraction, the smaller number card being the numerator and the larger the denominator. The goal is to play the largest fraction and win the hand.

Aces count as 1, tens and jacks count as 10, and queens and kings count as 12.

If a player plays two cards with the same value, that counts not as 1, but as 0, and is a losing hand. This is to prevent large numbers of 1s being played.

The winner of the hand takes the cards played in that hand and places them in a win-pile, not to be played any more in that game. In case of a tie, the cards are split among the winners. (If there are 4 players and 3 winners, then everyone gets two cards and the remaining two are mixed back in the deck.) At the end of the game the player with the most won cards wins the game.

After each round each player takes two more cards from the shuffled deck.

The mathematical goal is to practice fraction comparisons, if possible without using paper and pencil, technology, or finding a least common denominator. Players must be able to explain the to the other players the reason the winning fraction in a round is the largest.

For example, here's a sample strategy:

Suppose you want to decide which is larger,  $7/9$  or  $6/7$ , without finding a common denominator or converting to decimals.

Note that  $7/9 = 1 - 2/9$  and  $6/7 = 1 - 1/7 = 1 - 2/14$ . Since  $2/9 > 2/14$ , it must be the case that  $1 - 2/9 < 1 - 2/14$ , so  $7/9 < 6/7$ .

Students may discover and employ other simple strategies. For example, in the example above, since  $(6)(9) > (7)(7)$ , it must be that  $6/7 > 7/9$ . (Can you explain why that method works?)