

short activity

A Half; More or Less

with James Russo

Overview

Benchmarking is an important strategy for comparing the size of fractions. In addition, knowing whether a given fraction is greater or less than a particular benchmark (e.g., one-half) can support students with accurately locating the fraction on a number line. This game-based activity engages students in discussions around benchmarking to one-half and equivalent fractions, whilst also exposing students to the procedure for converting fractions into decimals. A Half; More or Less is a two-player game suitable for students in upper primary school (Years 4 to 6). The game requires a standard deck of playing cards. Before beginning, remove all picture cards from the deck.

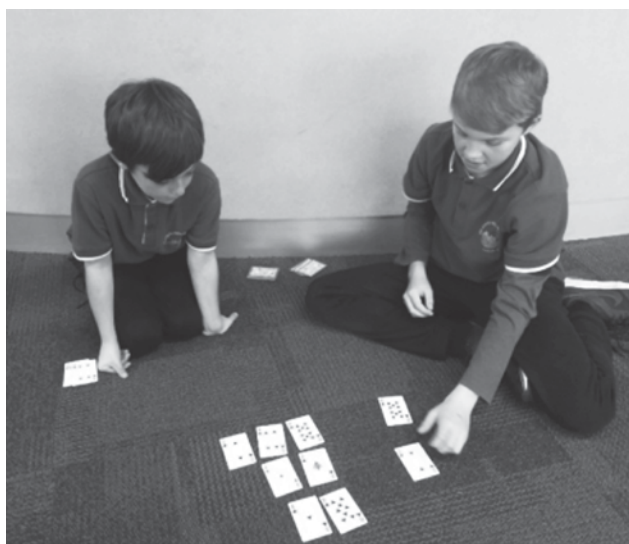


Figure 1. Players engaged in a game of A Half; More or Less.

How to play

- A round begins by dealing nine cards in a 3-by-3 grid. The two players then play a round of rock-paper-scissors to decide who gets to be in control. The player in control (Player 1) decides whether players will create proper fractions greater than

one-half or less than one-half for that round.

Note that players cannot create fractions exactly equal to one-half.

- Player 1 uses two of the cards to create a proper fraction that meets the criterion they established. For example, if needing to create fractions less than one-half, the player in control may use the 2 and 10 card to create $\frac{2}{10}$ (see Figure 1). They may reason that $\frac{2}{10}$ is less than $\frac{5}{10}$, which is equivalent to one-half.
- Player 2 then has a choice. They can either accept Player 1's play or challenge it (see below). If the play is accepted, Player 1 wins the two cards, and play passes to Player 2.
- Player 2 now needs to create a proper fraction that meets the criterion established by Player 1 from the remaining seven cards. Possibilities for Player 2 from the game demonstrated in Figure 1 may be $\frac{1}{4}$, $\frac{1}{8}$ or $\frac{2}{8}$.
- If, on any turn, a player cannot play, they can pass. Once both players pass their turn, it is the end of the round. The remaining cards are returned to the bottom of the deck, and nine new cards are dealt out in another 3-by-3 grid. Players play another game of rock-paper-scissors, with the winner again deciding whether players will be creating fractions greater than one-half or less than one-half for that round. The player with the most cards after all the cards in the deck are exhausted is the winner.

Challenging a play

Using a calculator, the player divides the denominator into the numerator to convert the fraction to a decimal. This involves students thinking about fractions as division, and as a number that can be plotted on a number line. The resultant decimal (greater than 0.5 or less than 0.5) will indicate whether the challenge was successful. In our example, $\frac{2}{10} = 0.2$, which is less than 0.5.

A challenge to Player 1 would have been unsuccessful, as 0.2 is indeed less than 0.5.

If a challenge is successful, the challenger wins the two cards the player used to create the fraction. However, if the challenge is unsuccessful, the player wins the two cards, and the challenger has to pay an additional one card penalty to the player.

Mastering the game

A Half; More or Less becomes increasingly tactical as students become more familiar with the game. In particular, the player in control learns to make decisions to pursue fractions either greater than or less than one-half based on the particular cards available. For example, consider the cards in Figure 2. The only possibility for creating a fraction less than one-half is to use the two of diamonds as the numerator and any one of the other

cards as the denominator. Consequently, the student who wins rock-paper-scissors and takes control would benefit from deciding that, on this round, players must create fractions less than one-half, as this would effectively stop their opponent from earning any cards for that round.

In addition, students who can flexibly apply knowledge of equivalent fractions will tend to have more success in the game. For example, a student who can recognise that $\frac{3}{7}$ is equivalent to $\frac{6}{14}$, which is less than one-half ($\frac{7}{14}$), will be in a strong position to both create an appropriate proper fraction and successfully challenge opponent plays.

In my experience, A Half; More or Less is both highly engaging and a useful vehicle for generating meaningful discussion amongst students about how to estimate and compare the size of fractions. I hope teachers find it a useful activity to pursue in their classrooms.

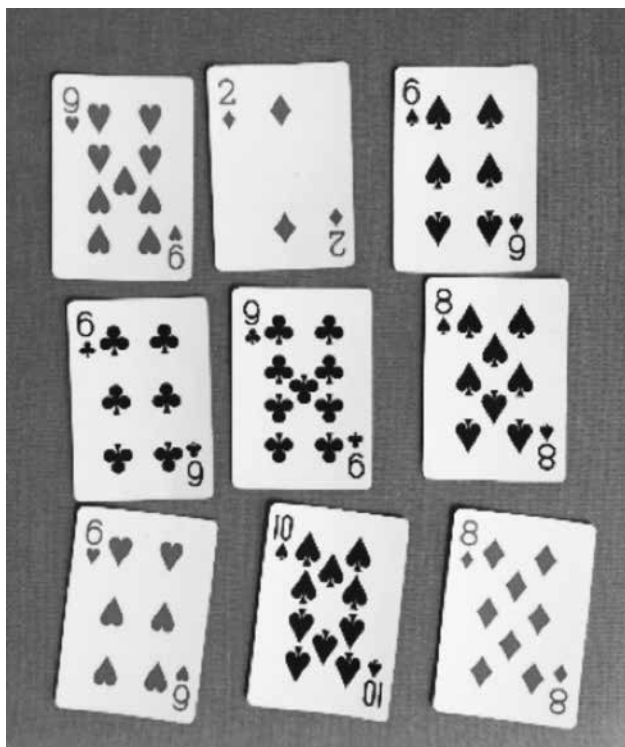


Figure 2. An example where there is only one opportunity to create a fraction less than one-half.