

Using Cards & Dice to Strengthen Students' Understanding of Key Mathematics Concepts

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How often do you spend reviewing the basic facts? Do you find that students never seem to have enough practice comparing numbers? An often forgotten but simple tool to practice key mathematics concepts is through the use of a regular deck of playing cards and dice. I've found that students love to work with them and are very engaged in the games played with them. Are you curious yet? Excellent. Below you will find a collection of some of my favorite games I've gathered in my travels. Be sure to recruit another player before you read on!

****Games presented at a workshop sponsored by *Box Cars & One-Eyed Jacks* (@1989/90 Shuffling into Math and All Hands on Deck)**

SNAP- This game is a fast-paced way to practice the basic facts of addition and multiplication. It's appropriate as a review or as a practice of new material. You can even send this home to be practiced with a family member.

Materials

1 regular deck of playing cards with no jokers

Instructions

There are 2 options for cards you'll use. You can remove the face cards from the deck so only the values 2 through 10 are represented. The other option is to leave the deck with all cards and assign values to the non-numerical cards, A=1, K=0, Q=12, and J=11.

This game is designed for two players. Once students are in teams choose what operation you're going to use then follow the steps below:

1. Deal the cards out so each player gets half of the deck.
2. To begin, both players pull one card and place it face up in the center of the playing area.
3. The first to announce the correct sum/product of the two cards drawn wins both cards. If it can't be decided who was first or if neither player is correct then each player draws a second card. The first to announce the correct sum/product of these two new cards wins all cards used for that round.
4. Players continue the game using the same procedure until there are no more cards to draw.
5. The player with the most cards wins the game.

****If adults play with younger children, the adult should silently count to five before responding with the sum/product.**

ODD or EVEN? This card game provides students with practice identifying odd and even numbers, finding the sum of a set of numbers, and recognizing equivalent values.

Materials

1 or 2 dice

1 regular deck of playing cards with no jokers

Instructions

There are two ways you can play this game. To make the game easier only use the cards Ace through Six. In this case you will only need one die. For more of a challenge use all cards except the Kings. Assign values to the remaining face cards: J=11 and Q=12. With values up to 12, you will need two dice.

This game is meant for two players. Once the players have been identified one should serve as the dealer. The game then goes as follows:

1. The dealer draws eight cards from a shuffled deck and places them face up in a 2 by 4 array. (See Figure 1.) Put the rest of the deck aside. They are not needed until the next round.
2. Before actual play begins, each player predicts which row is most likely to be removed first. Explain that cards are removed by rolling one or two dice (depending on what cards were used). If one of the eight cards showing matches the number on the face of die (if only one is used) or matches the sum of two dice (if face cards are included), the card is removed. Once each player has made a prediction, move to the next step.

3. The first play is by the player who did not deal. The player rolls one or two dice. As stated above, if the value rolled (for one die) or sum of the values rolled (for two dice) matches one of the eight cards it is removed. If there is no matching value, the player loses his/her turn and gives the dice to the dealer. Prior to removing the card the player should identify the card value as odd or even!

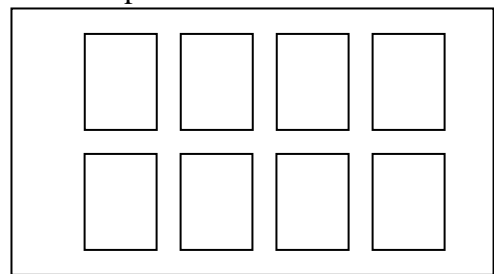


Figure 1. Card Setup for Odd or Even?

4. The player that dealt now gets to go again following the same process. Cards that are removed should go face down in a discard pile.
5. Play continues until all cards from one of the rows are removed. The player that takes the last card from the row wins. The player is awarded 10 points. If his/her prediction of which row would be eliminated first is correct he/she receives 5 bonus points.
6. Once scores are tallied, the players switch roles with the dealer now going first and the other player serving as the dealer. The dealer clears all used cards and places them in a discard pile. The dealer then pulls eight new cards from the remaining unused cards of the deck using the same array. Play begins again.
7. Continue the game until no more cards remain. Tally points won. The player with the most points is the final winner.

SANDWICH – This card game is designed to provide students with practice comparing quantities (less than, greater than, or equal to).

Materials

1 set of regular playing cards with no jokers

Instructions

There are two options for cards you'll use. You can remove the face cards from the deck so only the values 2 through 10 are represented. The other option is to keep all cards and assign values to the non-numerical cards: A=1, K=0, Q=12, and J=11.

This game is meant for two players. Once players have been selected, you are ready to play. Follow these instructions:

1. Shuffle the deck of cards and put it in the center of the play area to serve as the pull pile. Players should decide who goes first.
2. The first player begins by taking two cards from the pull pile and placing them side by side with enough space in the middle to place a third card. These cards serve as the “bread” of the sandwich. (See Figure 2.) Now the player pulls a third card and places it in the middle of the other two. This would be the “peanut butter and jelly” of the sandwich.
3. If the face value of the middle card is greater than the card on the left and less than the card on the right the player receives one point. If the middle card is equal to one of the cards or not between the two values of the outer cards, the player does not get any points. When done, the player can place the cards to the left to serve as a discard pile.
4. Now player 2 pulls three cards. This player follows the same process making their “sandwich”. Once he/she determined whether they won a point, the cards are placed in the discard pile.
5. Play continues with each player taking a turn until there are not enough cards to play a round. The player with the most points after all rounds is the winner.

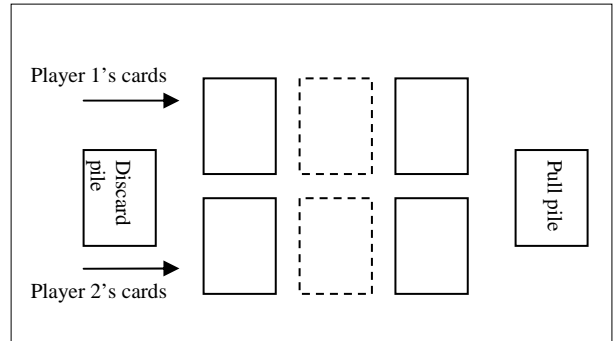


Figure 2. Card Setup for Sandwich

Star Traveler- This game, played in teams of four or more, allows students to practice all of their basic facts.

Materials

- 1 regular deck of playing cards with Kings, Queens, Jacks, and any jokers removed
- 2 dice

Instructions

This game is played as a group. You can split students into teams of 4 or more or play as a class. It can even be played individually once students are good at the game. The process for the game is as follows:

1. Shuffle the deck of cards then pull from this pile 24 cards placing them in a 6 by 4 array. (See Figure 3.) Somewhere near the array or on the chalkboard, a star is drawn using the typical method a child would use (using one continuous pen stroke, crossing lines drawn).
2. The object of this game will be to remove all the cards from each of the rows of the array. Each time you lose a round though, a region of the star drawn is filled in. If the star is

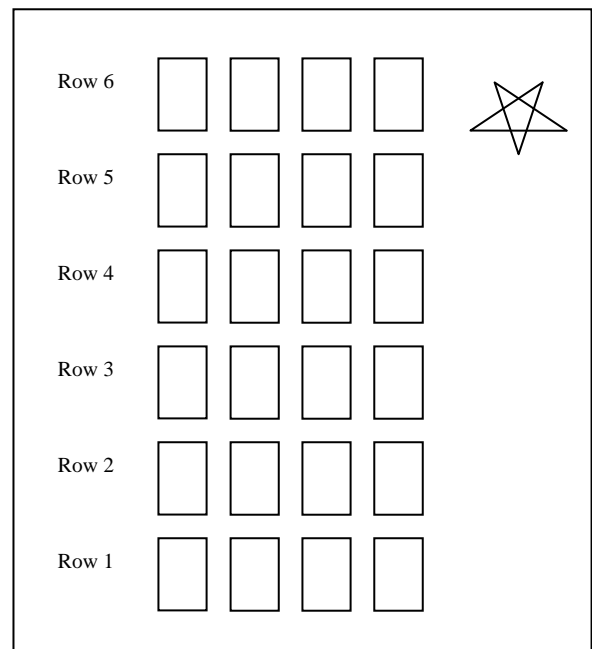


Figure 3. Card set up for Star Traveler

- filled in before you remove all of the cards, you lose and don't get to be a "star traveler".
- With the array laid out play begins. Have one person roll the set of dice and find their sum. (Remember for the next step that Aces have a value of one.) Using any combination of the values of one to four cards of the array and any of the four operations (one or more times), try to calculate the sum rolled. When successful, these cards are removed. HINT: Due to the nature of the game, it is wise to work from the bottom and slowly rise upward. Otherwise, the game can be difficult! If no one can calculate the sum of the dice using the values of the cards shown, you lose the round and one of the interior regions of the star is colored in. (Start by coloring in the triangular regions, leaving the pentagonal region for last.)

Here's an example of what the first round might look like:

Let's say the bottom row has the cards 4, 8, A, and 10. You then roll a four and one on the dice. Your task then is to try and combine one to four of the values of the cards to get the sum of five. A possible solution would be $4+1$ using two of the cards from the bottom row. However, you use only two cards. Can you use more? (This is wise if you can.) Success! You can do $(10-8) + (4-1)$. That removes all four cards!

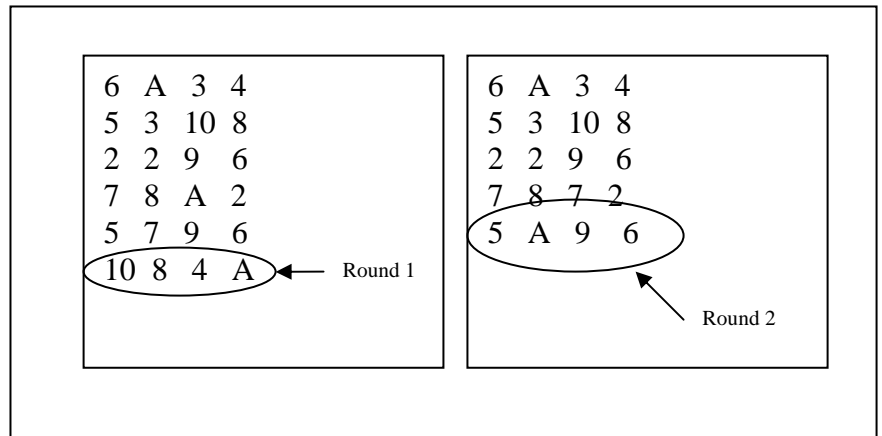


Figure 4. Example rounds of star traveler

- The next round begins by having a new player roll the pair of dice. You now follow the same process trying to use between one and four cards to calculate the sum of the numbers rolled.

Let's look back at Figure 4 for what round two might look like:

The player rolls 5 and 4. Thus, you need to try and use one to four cards to calculate 9. You might choose to take only the 9 but you're only using one card. Try to use more. How about using an Ace and the 9 for $1*9$? Now you use two cards. Focus on removing as many as possible from the bottom up. (It is not wise to pull from the row above the bottom! It makes other rounds harder!) Hopefully you see how to use all four, $(9-5) + (6-A)$! Once you come up with a solution remove those cards and move on!

- Play continues with players taking turns rolling the pair of dice. As a team you try and calculate a correct sum using the cards in the array. Remember if you cannot get the sum rolled on the dice using one to four cards in the array you MUST fill in a region of the star. Your job is to try and remove ALL the cards using the process described before you fill in the entire star. Happy traveling!