

ALLOTEY MATHS CAMP 2024

CARD GAME RULES



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Intro: How a deck of cards works

A standard deck of cards is made of fifty-two cards, plus two additional jokers (that are usually – but not always – removed from the deck before playing). The fifty-two cards present four suits and thirteen ranks. The suits are:

- Hearts ♥
- Diamonds ♦
- Clubs ♣
- Spades ♠

The ranks are: (A,) 2, 3, 4, 5, 6, 7, 8, 9, 10, J, Q, K, (A). Notice that the ace A is used as the lowest rank in some games, and the highest rank in others. J stands for Jack (not to be confused with the jokers), Q for Queen, and K for King.

It is good practice to shuffle a deck of cards before playing. Since we are at a maths camp, here's a curious fact. There are people who have dedicated their life to research in a branch of mathematics at the intersection of probability and group theory: the mathematics of shuffling cards!

Game: The President

The President is a popular classic card game. In this game, aces A are high cards (higher than Kings K). Do not remove the two jokers for this game.

- Goal: In each round, getting rid of all the cards in your hand as soon as possible. The sooner, the better.
- Number of players: 4 to 7 players.
- First round: A dealer is chosen randomly. The dealer distributes the cards evenly among the players, with any remaining cards being placed aside. Once the dealer has dealt the cards, the player to their left starts the first hand by placing any card face up in the middle, to form a central stack. The hand proceeds in a clockwise direction, with each player placing a card face up with an equal or higher value over the one currently on the table, on top of the stack. The hand terminates when no other player can place a higher or equal card on top of the central stack. The central stack is removed, and the player who played the last card starts a new hand. Players with no cards left are out of the round (it's good for you if it happens soon!). The round terminates when no player has any cards left in their hands.
- Exception: 2s and jokers are cut cards. A player can play a 2 in the central stack on top of a card of any rank (but not on top of another 2, nor on top of a joker). If a 2 is played, the hand ends immediately, and the next hand starts from the player who played the 2. Unless somebody plays a joker on top of the 2, and in this case the hand ends immediately, and the next hand starts from the player who played the joker. Jokers can also be played as cut cards on top of any other cards, and

can't be beaten.

- End of a round: The first player to get rid of their cards is declared the President, the second the Vice-President, the second to last the Loser, and the very last the Big Loser.
 - Any other round: The other rounds are similar to the first, except for one detail. Cards are dealt to the players. Before the first hand begins, the President exchanges two cards with the Big Loser: the Big Loser gives their two best cards to the President, while the President gets to choose two of their cards to hand to the Big Loser (they can be the very worst cards in their hand, or the President may be somehow magnanimous). Vice-President and Loser do the same, but with one card only.
 - Scoring: There's not really a scoring system for this game. Maybe try to be the President when the game ends!
 - Variants:
 - o If a card of equal value to the one on the table is played, the next player skips one turn.
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Game: WinMax

WinMax is a card game designed by Francesco Viganò, one of the volunteers of this year's camp. To play this game, you need pen and paper (to keep track of the points), and a couple of dice. You only need 10 cards to play this game: cards ace A to 10 of the same suit. The ace has low value (that is, lower than 2).

- Goal: Maximizing your number of points at the end of the game.
- Number of players: 3 to 6 players.
- Setup: On a piece of paper, write down 0 initial points per each player. Decide on a final number of points to reach (for instance, the first player to reach at least 100 points wins), or a time interval you are going to play for (for instance, whoever has more points in 15 minutes from now wins).
- Round: Somebody shuffles the cards and deals one per player. Each player looks at their card without revealing it to the other players. Then, somebody rolls the two dice. The number of points that can be won in this round is the sum of the two dice.

Each player decides whether they want to play the round or not: simultaneously, on a signal, they show "thumb up" if they want to play, and "thumb down" if they don't want to. Players who play the round lose one point (a player's number of points can be negative). Players who don't play the round don't lose any points.

Now, all cards are revealed (including the cards belonging to players who opted out), compared, and everyone focuses on the highest card. If the player with the highest card decided to play, then they win a number of points equal to the sum of the two dice (Max Wins at Win Max!). Otherwise, if said player decided not to play, nobody wins anything. The round ends, and another one begins.

- Curious fact: You can sit down, do the maths, and compute the optimal strategy to play this game! Maybe you won't win all the times following this strategy (as some randomness is involved, and you might not get lucky). But this is mathematically the best you can do!

- Variants:
 - o Instead of simultaneously revealing whether they want to play or not, players take turns to communicate this information. The first player to thumb up or down changes from round to round, rotating by one at each round.

Game: The Mind

The Mind is a card game designed by Wolfgang Warsch and distributed by Pandasaurus. Here we propose a way to play it with a standard deck of cards (no jokers). There are two cool things about this game: it is cooperative, and it has limited communication (you cannot talk to your teammates while you play!).

- Number of players: 3 to 6 players.

- Goal: Getting rid of as many cards as possible, in a cooperative way, as a team.

- Setup: Deal some of the cards to the players and keep the others aside:
 - o With 3 players, deal 10 cards each.
 - o With 4 players, deal 8 cards each.
 - o With 5 players, deal 6 cards each.
 - o With 6 players, deal 5 cards each.

In this game, cards are ordered. To determine which between two cards is higher, first look at their ranks. If they are different, the card with the higher rank is higher than the other. Aces are low cards (that is, lower than 2). If the rank is the same, look at the suit. From lowest to highest, the suits are ordered as: Spades ♠, Clubs ♣, Diamonds ♦, Hearts ♥. If it helps, write down the suit order to remember it throughout the game. So, the ordered cards start with Ace of Spades ♠, A of Clubs ♣, A of Diamonds ♦, A of Hearts ♥, 2 of Spades ♠, 2 of Clubs ♣ ... and they go on until ... Q of Diamonds ♦, Q of Hearts ♥, K of Spades ♠, K of Clubs ♣, K of Diamonds ♦, K of Hearts ♥.

- **Rules:** When they start the game, players can't communicate anymore. No words, no signs, no tricks of any kind. At some point, whenever they want, a player plays a card to form a central stack. And then, at some point, whenever they want, a player (possibly the same player) plays another card on top of the central stack. The only rule to follow is this: cards must be played in ascending order, accordingly to the specified order. At some point, you will have been staring at each other for a while. That's probably the sign that nobody can play any cards anymore, and the game ends.
 - **Scoring:** Count how many cards you played as a team. That's your score! Can you beat that?
 - **Variants:**
 - o You can deal a different number of cards (more, or less) than the one specified by the rules. Always make sure to leave some cards aside. And then you can ask yourselves: how does the game change? Is it easier, harder?
 - o You can set a time limit (for instance, one minute) for the game to be played, and no cards are allowed to be played when the time is up.
 - o The game is intrinsically cooperative, but you can form multiple teams and have a team competition!
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Game: Whist

Whist is a popular classic card game, and it was already proposed at Allotey Maths Camp 2022. In this game, aces A are high cards (that is, higher than K).

- **Number of players:** 3 to 7 players.
- **Goal:** Winning as many tricks as possible in each round.
- **Rules of each round:** The dealer deals seven cards to each player and one card is turned up and placed in the centre, to indicate that its suit is the trump suit for the current round. The remaining cards are kept aside. The trump remains the same for a whole round (not only for a single trick). A trump suit beats all cards of other suits.

The player to the dealer's left leads (that is, starts) the first trick: they may play any card they like, and place it face up in front of them. The suit of this card is the leading suit for this trick. Play proceeds clockwise, with each player playing a card face up in front of them. The other players must play a card of the leading suit, if they have any. A player with no cards of the leading suit may play any card they like.

If at least one player played a card of the trump suit, the highest card of the trump suit wins the trick. Otherwise, the highest card of the leading suit wins the

trick. The winner of the trick takes the played cards, and places them face down in front of them. The winner of the trick then leads the next trick, possibly changing the leading suit (but not the trump). This continues until all seven cards are played.

- Scoring: At the end of each round the scores for each player are noted – one point per trick won. You then play again, with the dealer rotating clockwise. The player with the highest score at the end of playing several rounds wins.
- Variants:
 - No one can lead with a trump suit card until a player plays a trump suit card over a different leading suit, unless you only have trump suit cards in your hand.