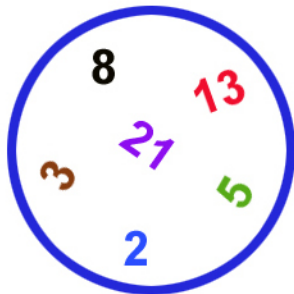


# Fibonacci Card Games



Card games inspired by a thirteenth century Italian mathematician and a pair of rabbits.

WATCH THE VIDEO AT [WWW.FIBONACCIGAME.COM](http://WWW.FIBONACCIGAME.COM).  
IT IS THE EASIEST WAY TO LEARN THE GAME!

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The card deck which accompanies this booklet uses the Fibonacci series 2, 3, 5, 8, 13 and 21. This deck, Deck 21©, is used to play [Fibonacci 21©](#). Cards are removed to play the simpler games [Fibonacci 13©](#) and [Fibonacci 8©](#). The rules are essentially the same for all of the games.

An advanced players deck will be available based on the Fibonacci series 8, 13, 21, 34, 55 and 89. This is Deck 89© used to play [Fibonacci 89©](#).

Please visit [www.FibonacciGame.com](http://www.FibonacciGame.com) to learn more. A paperback book "Fibonacci Card Games" by Robin Andrews can be purchased from that site or from [www.Lulu.com](http://www.Lulu.com).

# Fibonacci Game 21©

## Overview:

Fibonacci card games are games of chance and skill for one to four players using a special deck of cards. They are "draw and discard" rummy style games. The objective is to form the cards in one's hand into sets putting them face up on the table in "melds", to be the first player to complete six sets and then to "go out" with no cards left over. Players score by completing melds and by going out.

There are 89 cards in Fibonacci Deck 21© and, except for three wild cards and two bonus cards, each card is identified with one of six numbers in the Fibonacci series. In the Fibonacci Game 21© the numbers in a completed set of cards have to add to 21. A set can be simply one card, (card 21) or as many as eight cards for example: 2, 2, 2, 3, 3, 3, 3 and 3.

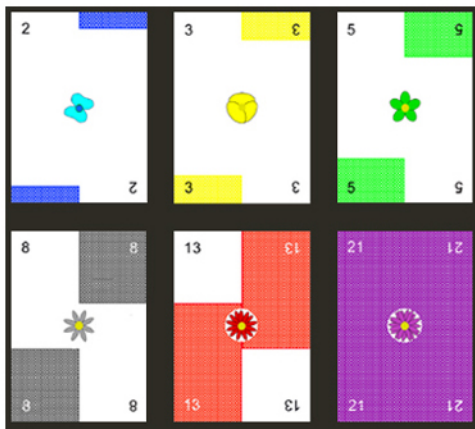
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# The Cards in Deck 21©

Each standard card is identified with one of six numbers in the series, which are **2, 3, 5, 8, 13 and 21**.



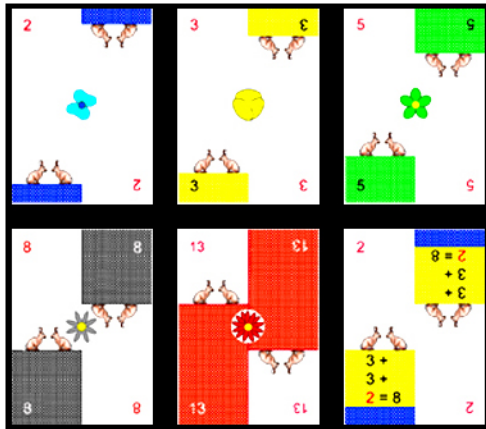
A unique feature of the series is that each number is equal to the sum of the two preceding lower numbers. For example  $8 = 3 + 5$  and  $21 = 13 + 8$ .

The heights and areas of the colored portions on each card are proportional to the number.

The colored areas on a set of cards whose numbers add to 21 would exactly fill a card.

The number of petals on the flower in the center of a card is equal to the Fibonacci number on the card.

Certain cards in the deck are designated as “base cards”. Each set must start with a base card. The base cards are identified by the rabbits and the red number on the top left corner of the card.



A bonus card, bottom right, provides a base 2 card and two number 3's on a single card. The Fibonacci Card on the right below is a wild card. It can be used in place of any other base or standard card.



Deck 21© consists of four base cards each of 2, 3, 5, 8 and 13, four of card 21, twelve standard cards each of 2, 3, 5, 8 and 13, three wild cards and two bonus cards, for a deck of 89 cards.

## How to Play Fibonacci 21©

Players draw a card from the deck to determine who should deal.

The player with the highest number deals seven cards to all players.

The rest of the deck is placed in the center of the table. The top card is overturned and placed to one side to create the discard pile.

The player clockwise to the dealer starts by picking up two cards, one of which can be the top card in the discard pile.

During a turn a player can put cards on the table. The turn finishes with the player discarding one card. Players take turns clockwise.

At least three of the base cards and card 21 must be collected and put down in sequence in front of the player during a turn before other cards can be added toward making a set. A wild card or #2 bonus card can be used to start a set.

Only one set starting with each base card is allowed per player.

When a set of cards adding to 21 is completed it can be "closed" by gathering up the cards and turning the set over or it can be left open.

Sets can only be closed during a players turn.

Between turns a player can move cards from one open set to another but not from the players hand to the table or from the table to the players hand.

Cards can only be moved between the players hand and the table during a players turn.

Wild cards can be used in place of any other numbered card. The player must assign a number to the card when it is placed but only 2, 3, 5, 8, 13 or 21.

A wild card can be assigned a new number to make a set total to 21 but only 2, 3, 5, 8, or 13. Wild cards can be moved from one open set to another open set at any time.

## 6

Base cards cannot be moved but a wild card used as a base card can be exchanged for its base card during a players turn.

Base cards can only be used to start a set not add to a set.

If a second base card of the same number is drawn it has to be discarded before the player can go out.

A player who has completed all six sets, no longer picks up cards but must discard one card on each successive turn until all surplus cards are discarded.

All sets must be closed before the last card is discarded.

The player is then said to have “gone out” and wins the round providing no other player finishes earlier.

Play then stops for the round and players tally their scores.



# Scoring

The player who goes out, i.e. completes and closes all six sets with no cards remaining in the hand, scores 80 for going out and 20 per closed set, a total of 200.

Other players:

Score 20 for each closed set, minus the sum of all the numbers in open sets, minus twice the sum of all numbers in the hand.

Wild cards count as minus 50 in an open set. Wild cards count as minus 100 in the hand.

Bonus #2 card counts as minus 8 in an open set. Bonus #2 card counts as minus 16 in the hand.

Variation. Allow a limited number of sets to be started and completed with a standard card in place of a base card. Closed non-rabbit sets score 10.

## How to Play Fibonacci 13©

Remove all base 21 and standard 21 cards from deck. This creates Deck 13 having 73 cards. Play same rules as Fibonacci 21 except sets now have to add to 13. At least two of the base cards plus card 13 must be put down before a player can start melding. A player can start to go out once four sets and card 13 have been collected. In this game there are 15 possible different sets as compared to 38 possible different sets in Fibonacci 21.

## How to Play Fibonacci 8©

Remove all base 21,13 and standard 21,13 cards from deck. This creates Deck 8 having 67 cards. Play same rules as Fibonacci 21 except sets now have to add to 8. Only one of the base cards plus card 8 must be put down before a player can start melding. A player can start to go out once three sets and card 8 have been collected. In this game there are only 5 possible different sets.

## Strategy - Fibonacci 21©

A player's first goal is to get all of the required base cards and card 21 on the table. The number 2 bonus card and wild cards can be used to get the six card base.

With the base in place, the player can turn over card 21, closing that one card set, and start adding to the base cards to make sets. If a wild card has been used for card 21 that one card set can be left open.

Cards can be moved from one open set to another at any time. However, cards can only be placed in an open set from a player's hand or returned from an open set to a player's hand during a player's turn.

Cards in closed sets cannot be moved. Sets can only be closed during a player's turn.

A player can slow down the following player by delaying the discard of a base card that the next player appears to need.

The longest sets can be created with base cards 2 and 3. These sets consist of eight cards, three 2's and five 3's including the base card. The shortest set is, of course, card 21.

The number of possible combinations for the base cards 2, 3, 5, 8, 13 and 21 is 9, 12, 7, 6, 3, and 1 respectively.

A set starting with base card 2 must contain at least one card 3 in order to add to 21.

With experience a player will start remembering all the combinations that "work" for each base card.

Cards in a player's hand and in open sets count against a player's score if another player goes out. Players should meld these cards and close sets if it appears that another player is about to go out.

High number cards allow sets to be completed faster. For example card 13 on top of base card 8 immediately creates a set.

Lower numbered cards in a players hand have either to be melded or discarded before a player can go out.

Replacing a higher numbered card in an open set with several lower numbered cards in a players hand reduces the number of cards to be discarded. This is a good move if the player is planning to go out or if another player has closed all six sets and is discarding cards on the way to going out.

The number of cards in a players hand can also be reduced by lowering the designated number of a wild card in an open set (e.g. from 13 to 8) and adding a card (e.g. 5) from the hand to the set.

Cards can be stacked on the table in an open set with the lower edge on top of the colored area of the card below. This acts as a visual aid to set collection.

The game involves: (i) luck in being dealt or in drawing useful cards, and (ii) skill in choosing combinations that build sets while minimizing the number of cards to be discarded.

# About Fibonacci

The Fibonacci numbers first appeared in a work written in ancient India sometime between 450 and 200 BC. The 13th century Italian mathematician Leonardo Pisano described the series in his work *Liber Abbaci*.

Leonardo was given the nickname Fibonacci in the nineteenth century and he and the series are now known by that name. Leonardo Fibonacci's statue can be seen today in Pisa.

In Leonardo's mathematical treatise *Liber Abbaci* he described a hypothetical problem and its solution as follows. A pair of rabbits produce another pair in a single month and at the end of the second month the new pair also produce a pair of rabbits. This continues each month for each pair of rabbits. At the end of the first month there are two pairs of rabbits, the second month three pair, the third month five pair, the fourth month eight pair, the fifth month thirteen pair and so on to create the Fibonacci series 1, 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, etc..

In the Fibonacci series each number is equal to the sum of the previous two numbers. In the Fibonacci game the two rabbits on a base card illustrate the possibility of a new set (of cards, not rabbits).

The ratio of one number to the prior number as the series becomes longer approaches an irrational number known as Phi, which is close to 1.618. For example  $13/8 = 1.625$  and  $144/89 = 1.618$ . Phi is also known as the Golden Ratio or the Divine Proportion. The Golden Ratio occurs in nature and across the universe and is believed to create order in the relationship of one thing to another. It has been used by architects, sculptors, painters and designers to create pleasing proportions in their work for many centuries. The number of petals on many flowers is often a Fibonacci number. In this game, the ratio can be seen in the relationship of the colored area of one playing card to that in the next higher numbered card.

The Golden ratio first appeared in Euclid's Elements written around 350 BC. The connection between the Golden Ratio and the Fibonacci series was first verified in the nineteenth century.

A great deal of information is available on the internet about the Fibonacci series, the Golden Ratio and related matters. Search with the word Fibonacci in a search engine and on YouTube.

The Fibonacci Association, incorporated in 1963, “focuses on Fibonacci numbers and related mathematics, emphasizing new results, research proposals, challenging problems, and new proofs of old ideas”. The association’s website is:

[www.mscs.dal.ca/Fibonacci/](http://www.mscs.dal.ca/Fibonacci/)

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