



# Math Magic

- 9 Cards -



## Educational Goals

- ❖ Improve logical thinking
- ❖ Learn a magic trick
- ❖ Count using base 3 to place a card at a specified location in a deck

## Key Features of the Targeted Competencies

- ❖ Break down the elements of a situation/problem (C1)
- ❖ Model the problem (C1)
- ❖ Apply different strategies to create a solution (C1)
- ❖ Validate the solution (C1)
- ❖ Pinpoint the important elements of a mathematical situation (C2)
- ❖ Apply the appropriate processes and concepts for the situation (C2)

## Concepts Used

- ❖ Positions
- ❖ Change of base (base 3)

## Materials

- ❖ Video of the trick
- ❖ Decks of cards
- ❖ Paper clips
- ❖ Paper and pencils

## Recommended grade



## Skills developed



## Field of Math



## Suggested Teaching Method



## Time Required

About 35 minutes



# Suggested Process



## Step 1: Introduction (5 minutes)

If you are comfortable performing the trick yourself, begin with Step 2. Play the video of the magic trick ([www.amazingmaths.ulaval.ca](http://www.amazingmaths.ulaval.ca)).

## Step 2: Find solutions (15 minutes)

Perform the trick slowly in front of the class so the students can observe the movements of the magician closely. One student can play the part of the spectator, and the rest can offer their observations to the class.

Have the students pair up. Offer each group a deck of cards and paper clips. Ask the students to recreate the trick and understand how it works.

To guide the students, remind them that the counting system we normally use is base 10, and that other bases can be used as well. Advise them to focus on the movement of the cards throughout the trick, and draw attention to the fact that there are 3 cards in each column, and 3 cards per row.

You can guide your students with the following questions:

- How does the magician deal out the cards?
- Why does the spectator have to indicate which column contains their card?
- Does the magician pick up the cards in the same order every time?
- How does the magician find the spectator's card?
- Does the trick work for all numbers (1 to 9)?
- How does the order of the cards change throughout the trick?

## Step 3: Share solutions (5 minutes)

Return to a whole group, and have groups share their thinking and what they tried.

By referring to the *9 Cards Explanation Sheet*, reveal and explain the solution of the trick to your students. (If any students have successfully solved the trick, it would be preferable to allow them to recreate the trick for the class while explaining their solution.)

To guide the students' understanding, show the table found at the bottom of the explanatory document. Have your students explain their understanding of the table, and see if they can figure out why the trick works by looking at the table. With paper clips on the cards in the column pointed at after the first deal, perform the trick in front of the class and explain the purpose of each of the magician's movements.

Select one student to summarize the trick in front of the class and then perform it.

## Step 4: Recreate the Magic Trick (5 minutes)

If the students were initially unsuccessful in solving the trick, they may want time to recreate it now that they have seen the solution.

### Short on time?

→ Show the video of the trick at the end of class. Let your students try and find the solution as homework. Show the solution at the beginning of the next class.

→ If you have 15 minutes, show the video and have one student try and do the trick at the front of the class. The other students can help, and if they're having trouble you can help them by using the Explanation document of the trick. Initiate and guide a discussion about the trick. After a couple minutes, explain the solution.