



# MATHEMAGIC

*- X-RAY -*



## Educational Goals

- ❖ Develop logic
- ❖ Adopt a magic trick
- ❖ Highlight the playful potential of mathematics
- ❖ Practice mental calculation

## Key Features of the Targeted Competencies

- ❖ To decode the elements of the situational problem
- ❖ To model the situational problem
- ❖ To apply different strategies to work out a solution
- ❖ To validate the solution
- ❖ To justify actions or statements by referring to mathematical concepts and processes
- ❖ To define the elements of the mathematical situation
- ❖ To apply appropriate mathematical processes to the situation

## Concepts Used

- ❖ Arithmetic operations (addition, multiplication, subtraction)
- ❖ Natural numbers (develop mental calculation strategies)
- ❖ Sense of arithmetic operations (complementarity)

## Materials

- ❖ Magic trick video
- ❖ 3 dice

**Targeted Academic Levels**  
Grades 3 to 6

**Mathematical Field Concerned**



**Suggested Teaching Method**



**Time Required**  
Approximately 35 minutes





# SUGGESTED PROCESS



The goal of the activity is to let the students discover the magician's trick.

## Step 1: Introduction (5 minutes)

Play the magic trick video once ([www.amazingmaths.ulaval.ca](http://www.amazingmaths.ulaval.ca)).

## Step 2: Recreate the magic trick (10 minutes)

It is your turn to do the trick in front of your students! In the "X-Ray" Explanation Sheet you will find the steps to follow to perform the trick.

It is better to use 3 large dice for the magic trick in order to see what is happening more clearly.

## Step 3: Find the solution (15 minutes)

Solve the problem the whole class together.

To begin, ask the students to make their hypotheses about the way the trick works and what they believe they noticed.

Based on the answers given by the students, explain the solution or deepen their reflections.

The important aspects of the trick are as follows:

### Aspect 1:

Dice have a particular property; the sum of two opposite sides is always 7.

*Lines of interrogations:*

If time allows it, have each student build dice so that they all have one and can manipulate it. This will help them to find out the die's particularity.

It is suggested to do the trick again. This time, do not add the sides as in the video, but rather start with the side that is completely below and stop after the addition of two sides. Repeat the addition for the next 2 sides. From this, help the students with the following questions:

- Which particular sides of a die have we added? (*A pair of opposite sides*)
- Was there anything special about the 2 additions made? (*The sum is 7*)
- Does the sum of the opposite sides of a die always give 7? (*Yes, check with the built dice*)



## SUGGESTED PROCESS (CONTINUED)



### Aspect 2:

We have 3 pairs of opposite sides which sum is 21. We subtract the top side from 21.

*Lines of interrogations:*

- How many dice did we stack together? (3)
- How many pairs of opposite sides are stacked? (3)
- If we add 3 pairs of opposite sides, what does it make? ( $3 \times 7 = 21$ )
- How would you find the unknown sum if we knew the sum from the top? ( $21 - \text{the value of the top side}$ )

Note: there is another way to see the trick. In fact, it is also possible to add 14 to the complement of the top side in order to obtain 7. For example, if the value of the side on the top is 3, we know that its complement (the opposite side) is 4 since the sum of a pair of opposite sides is always 7 ( $7 - 3 = 4$ ). All that is left to do is add 14 and 4 to find the answer.

### To go further!

If we had 4 dice, what would the magician's trick be in order to calculate the sum?  
What if we had 5, 6, or 8 dice?