



AMAZINGMATHS

#### Materials :

- Magic trick video
- 1 pack of 52 cards
- A sheet presenting the values of the cards
- Paper

# MATHEMAGIC

## - MAGICAL CALCULATIONS -

### How to do the Magic Trick

#### Preparation :

Each card from 1 to 10 is worth its natural value. The jack is assigned a value of 11, the queen 12 and the king 13. In addition, a value is also associated with each of the four suits: 6 for the hearts, 7 for the spades, 8 for the diamonds and 9 for the clubs. We can prepare a visual support on which the values are illustrated (cardboard, slide, or other), so that there is not too much information for the spectator to remember. A table presenting the values is available in the appendix.

#### Trick :

The magician's goal is to guess the card hidden by the spectator.

The magician asks the spectator to shuffle the cards and draw one. Meanwhile, the magician has his back turned.

The magician asks the spectator to double the value of the card and then add 1 to the result.

He then asks him to multiply his new result by 5.

Finally, he asks him to add the value of his card's suit.

The magician asks the spectator to say his final result only.

If the spectator answers 83, for example, then the magician replies that he chose the 7 of diamonds.

*To find the value of the chosen card, the magician must subtract 1 from the number of tens in the result. To know the suit of the card, the magician adds 5 to the units position (and refers to the suit values at the beginning).*



# MATHEMATICAL EXPLANATION



## Why this trick works.

Let's call the value of the chosen card  $c$ . You will find in the appendix a checklist of the values associated to each card and each suit.

At first, the spectator calculates:  $2c + 1$ .

Then, the magician asks him to multiply his result by 5. The spectator calculates:  $(2c + 1) \times 5 = 10c + 5$ .

Finally, when he adds the value of the card's suit, the spectator does:  $10c + 5 + \text{value of the suit}$ .

Since the value of the suit is greater than 5, the result can be written as

$$10c + 5 + 5 + a \text{ number from 1 to 4,}$$

where 1 is associated with the hearts, 2 with spades, 3 with diamonds and 4 with clubs.

Thus,  $10c + 5 + 5 + a \text{ number from 1 to 4}$

$$= 10c + 10 + a \text{ number from 1 to 4}$$








$$= 10(c + 1) + a \text{ number from 1 to 4.}$$

$c + 1$  corresponds to the position of the tens in the answer. By subtracting 1 from this number, we find the value of the card ( $c$ ). The number from 1 to 4 is at the units position and indicates the suit of the card.

Thus, in the example, the total gives 83. Since  $c + 1 = 8$ , we find that the value of the card ( $c$ ) is 7. Since the digit in the units position is 3, the card chosen is 7 of diamonds.

## Appendix

### Cards' Values

CARDS		SUITS	
Ace (1) to 10 $\Rightarrow$ their natural value			$\Rightarrow$ <b>6</b>
Jack 	$\Rightarrow$ <b>11</b>		$\Rightarrow$ <b>7</b>
Queen 	$\Rightarrow$ <b>12</b>		$\Rightarrow$ <b>8</b>
King 	$\Rightarrow$ <b>13</b>		$\Rightarrow$ <b>9</b>