

## Magic with Information Theory



4	12	20	28
5	13	21	29
6	14	22	30
7	15	23	31

1	9	17	25
3	11	19	27
5	13	21	29
7	15	23	31

16	20	24	28
17	21	25	29
18	22	26	30
19	23	27	31

8	12	24	28
9	13	25	29
10	14	26	30
11	15	27	31

2	10	18	26
3	11	19	27
6	14	22	30
7	15	23	31

### Instructions:

1. Choose one number from the cards above, don't say which.
2. Think of the number and **answer** the magician's **questions**.
3. The magician **reads** your **mind** and announces your number.
4. You may **confirm it**, even though the magician is **never wrong**.
5. Get amazed, puzzled, and thinking: **What has happened?!**

And why is a mind trick at Science on Stage?



### Let's use *science* to reveal the *magic*!

#### What matters?

Which role do the **colors** play? Can we ask about the cards in a different **order**? Can we do the trick when **seeing only parts** of the cards? Or when not seeing them at all?

#### What are the sizes?

How many **numbers** are there to be chosen from? How many are on **each card**? How many cards? Which is the **smallest** and the **biggest** number? And on each card? Any numbers **missing**?

**Is it even possible** to identify one number of so many using so few questions (and telepathy)?

One answer helps us identify one of two objects, two answers one of four, ...

Ok, but is it possible to work out the number according to the answers **so magically fast**?

You don't think I am actually searching on the cards, do you? Or that I remember which number is on which card?

Why are the numbers **organized** as they are? Could they be organized differently?

Well, perhaps at least  $31!/5!-1$  more times, don't you think?

What happens under **boundary conditions**?

Can you find any **regularities** on (or among) the cards?

Can you **scale** the problem down?

Have you figured it out? Then you can create your **own cards**, with even **more numbers**!

### Are you a magician?

I have picked a number before printing this poster. I recall it every now and then. Perhaps you can read my mind remotely...

#### Here are the answers to your questions:

Is the number on the yellow card? **YES**.

Is the number on the magenta card? **YES**.

Is the number on the cyan card? **NO**.

Is the number on the green card? **NO**.

Is the number on the black card? **YES**.

So, concentrate on the number in my mind and say: **Which one is it?**

(I have conjured my number into the last row of this poster, in case you want to check it.)

### Computer Science in General Education

#### What is it?

Study of efficient information processing

#### Why to teach it?

- Substantial discipline with many **applications**
- Communication and **problem solving** skills
- Google this: "**Computational thinking**"
- Challenges and fun!

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