

Counting

ON MONDAY in math class,

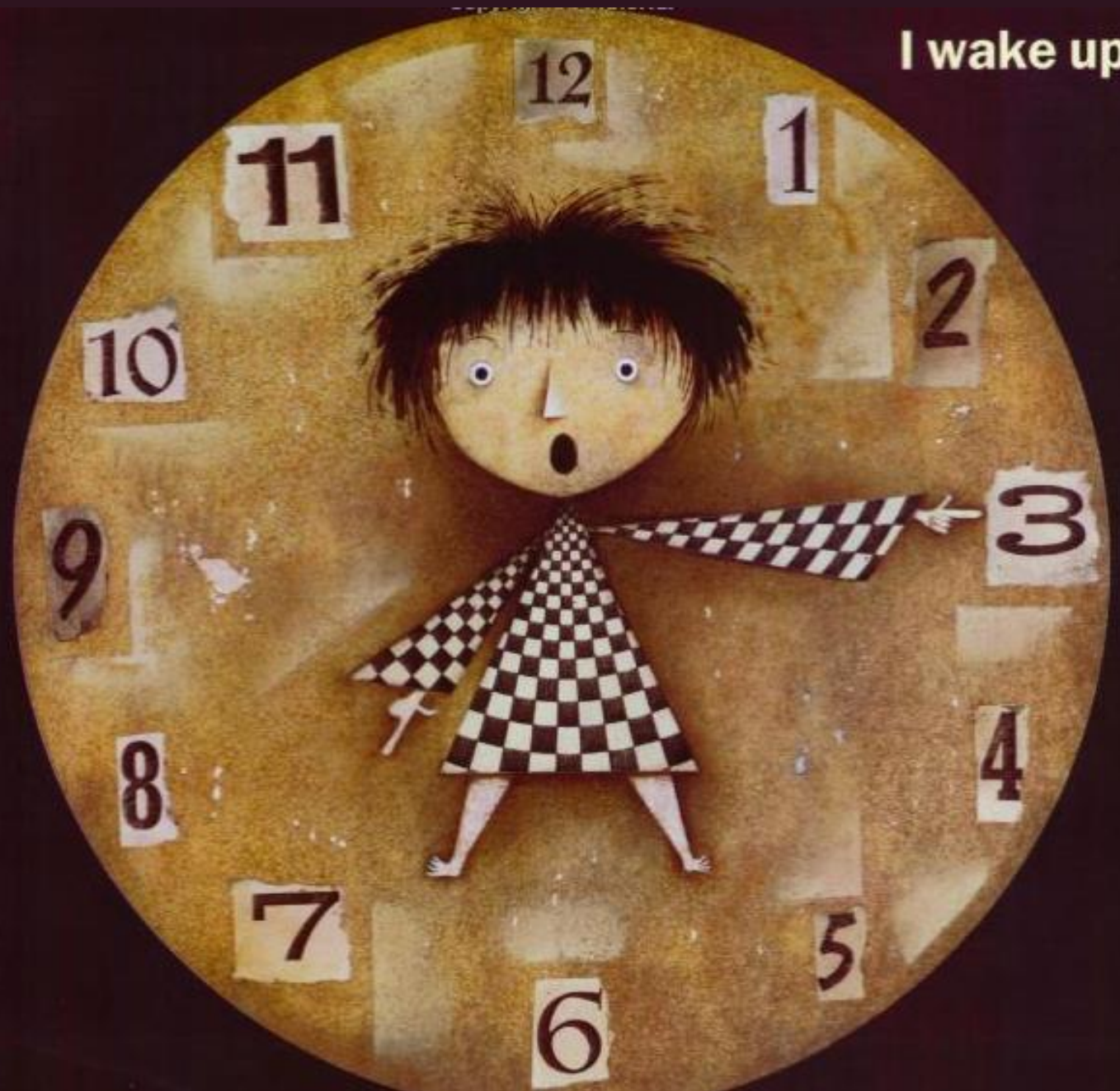


Mrs. Fibonacci says,

**“YOU KNOW, you can think
of almost everything
as a math problem.”**

On Tuesday I start having problems.

I wake up



at 7:15. It takes me 10 minutes to get dressed,
15 minutes to eat my breakfast,
and 1 minute to brush my teeth.

SUDDENLY, it's a problem:

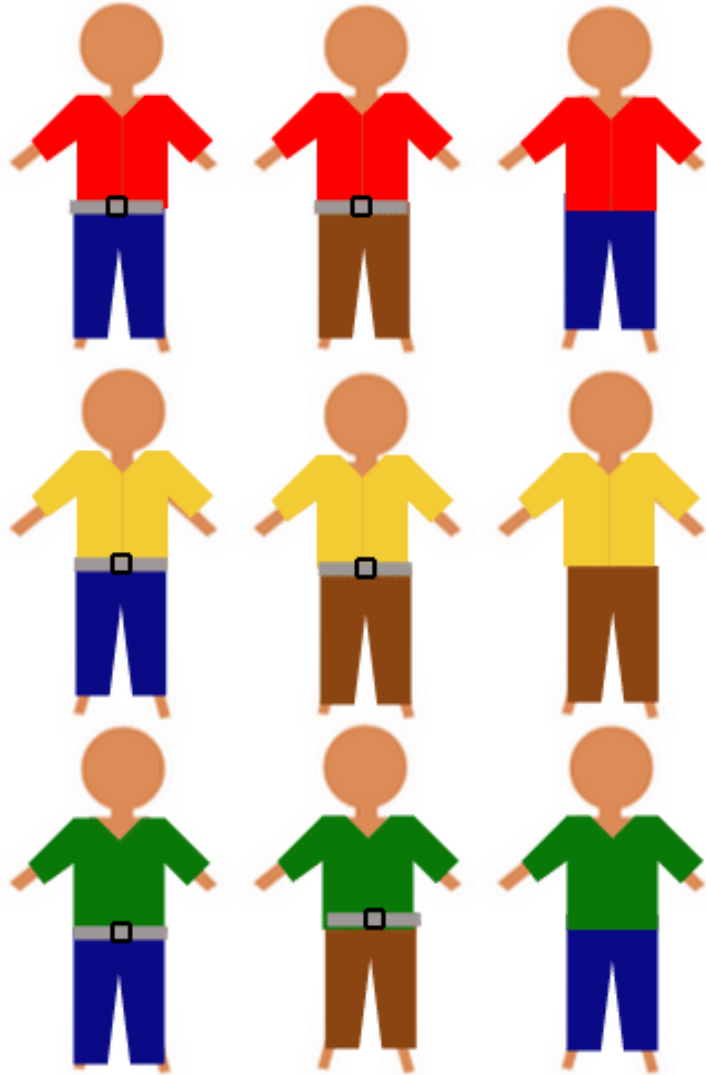
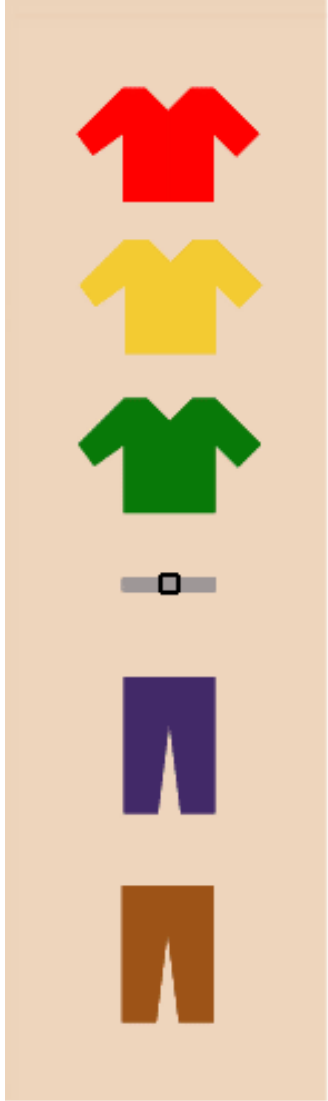
- 1** If my bus leaves at 8:00, will I make it on time?
- 2** How many minutes in 1 hour?
- 3** How many teeth in 1 mouth?

I look in my closet, and the problems get worse:

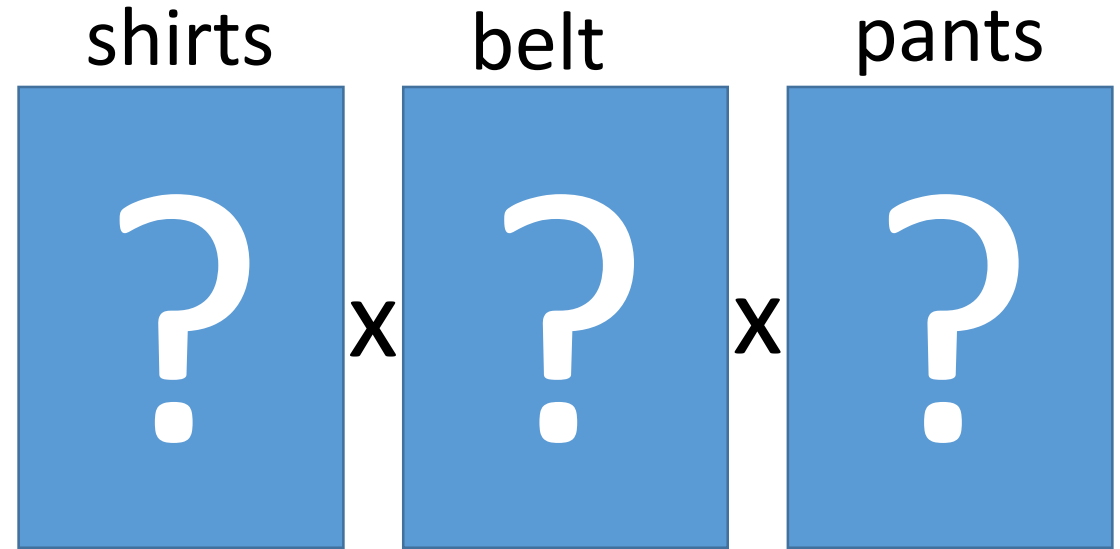
I have 1 white shirt, 3 blue shirts, 3 striped shirts, and that 1 ugly plaid shirt my Uncle Zeno sent me.

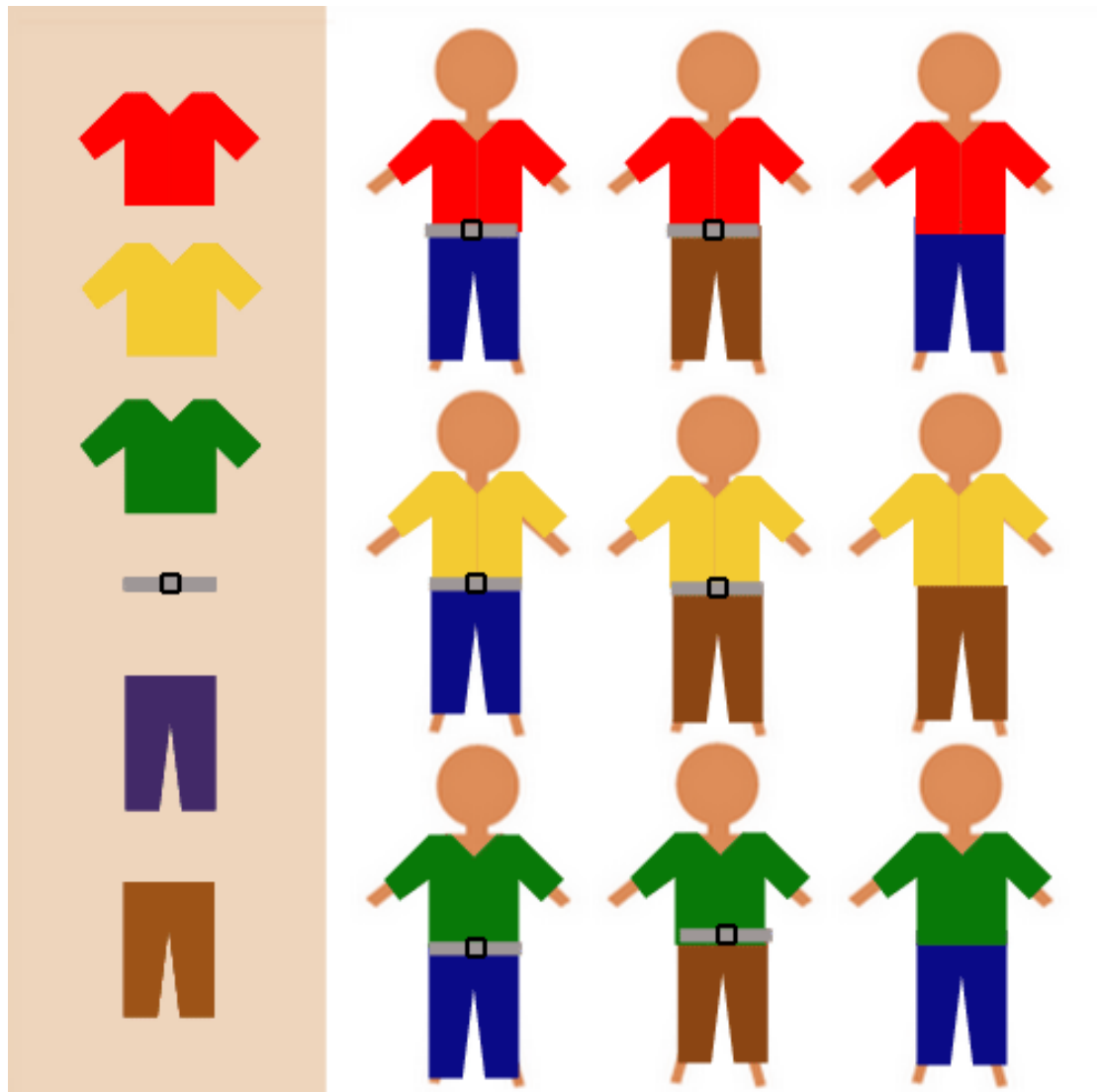
- 1** How many shirts is that all together?
- 2** How many shirts would I have if I threw away that awful plaid shirt?
- 3** When will Uncle Zeno quit sending me such ugly shirts?

I'M GETTING a little worried.
Everything seems to be a problem.



How many outfits can I make if I have 3 shirts, a belt and 2 pants?





How many outfits can I make if I have 3 shirts, a belt and 2 pants?

shirts belt pants

$$3 \times 2 \times 2$$

=12 outfits

Fundamental Counting Principle:

Rule of Product:

If the first event can be performed in n ways

And the second event can be performed in m ways,

Together they are performed in $n \times m$ ways.

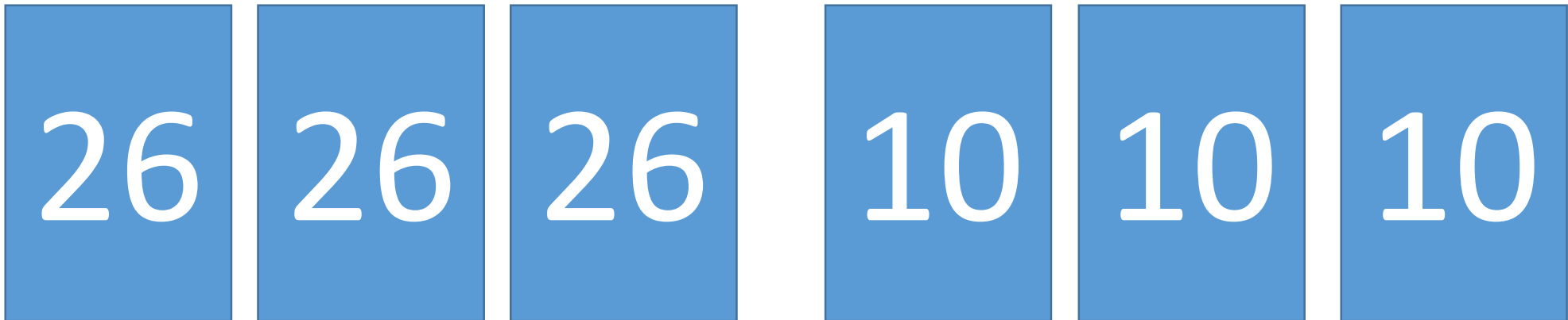
Rule of Sum

If we have A ways of doing something and B ways of doing another thing and we can not do both at the same time,
Then there are $A + B$ ways to choose one of the actions.

How many
licence
plates did
we have?



How many
licence
plates did
we have?



17,576,000 or 17.6 million. We have 14.32 million people in Ontario.

Now how many do we have?



35,152,000 or 35.2 million. We have 14.32 million people in Ontario.

Now how many do we have?



26

26

26

26

10

10

10

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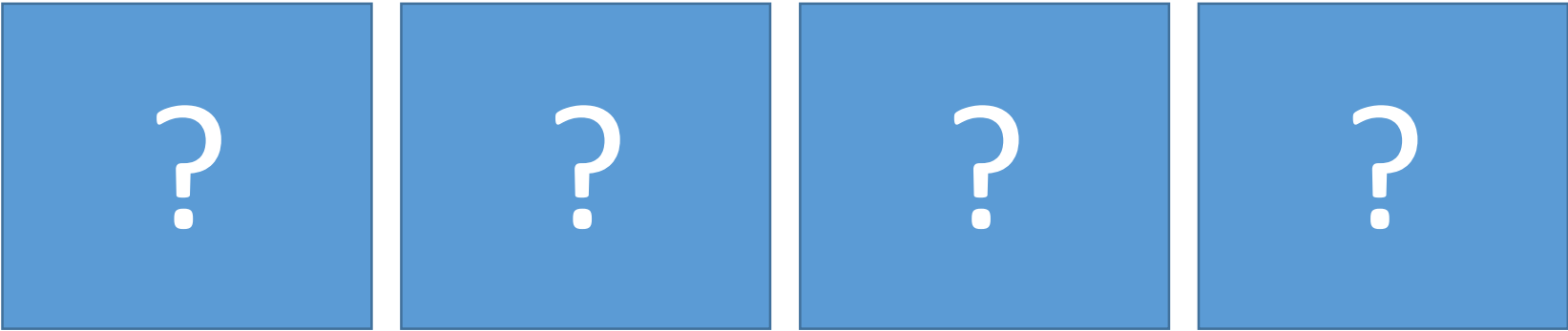
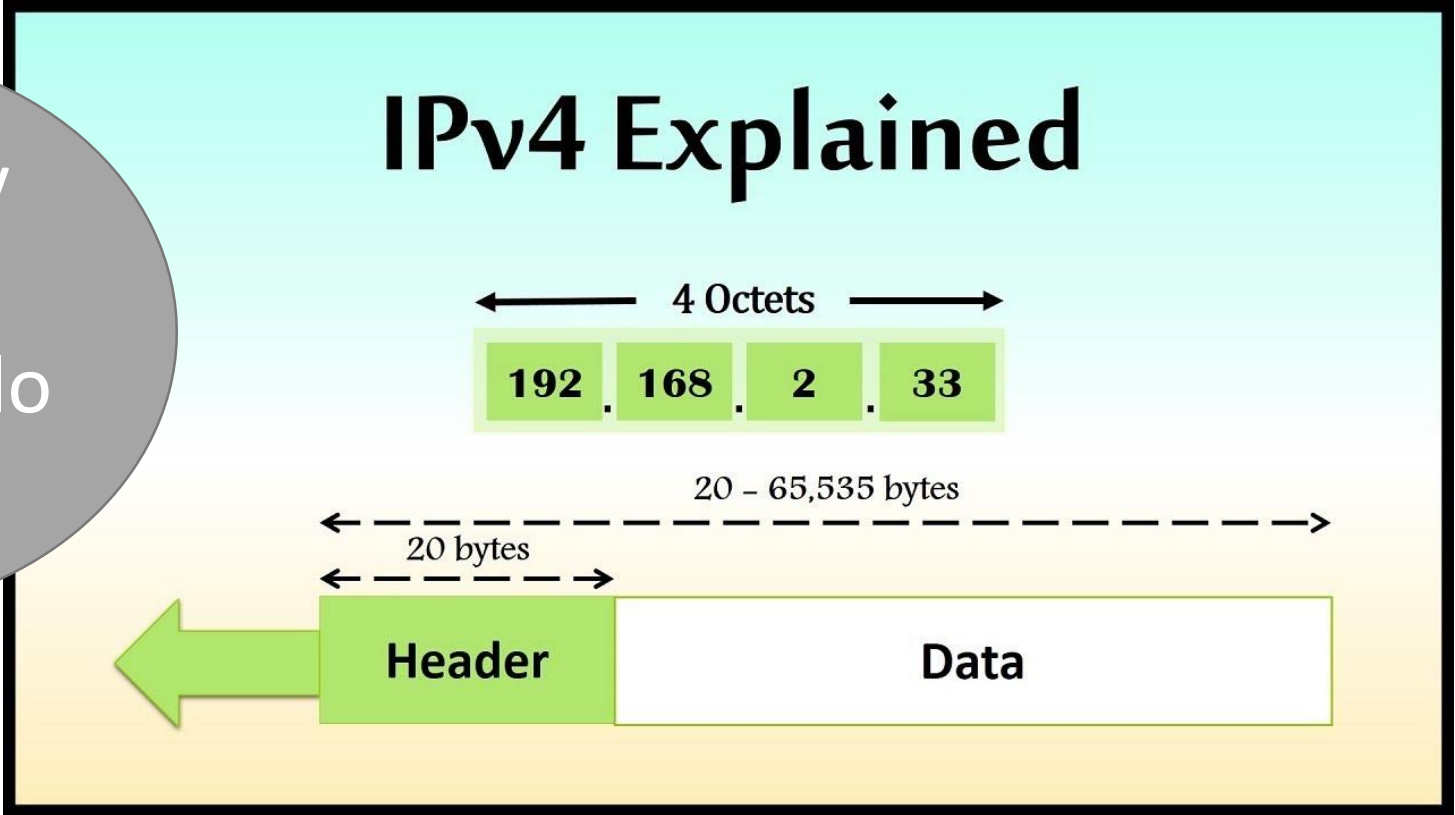
Counting Questions:

1. A couple has narrowed down the choice of a name for their baby to four first names and 3 middle names. How many first-middle name choices will they have to choose from?
2. How many basic options of homes in a subdivision are available if the builder offers 5 basic floor plans, 3 roof styles and two exterior finishes?
3. How many outcomes are possible if a coin is tossed 5 times in succession?

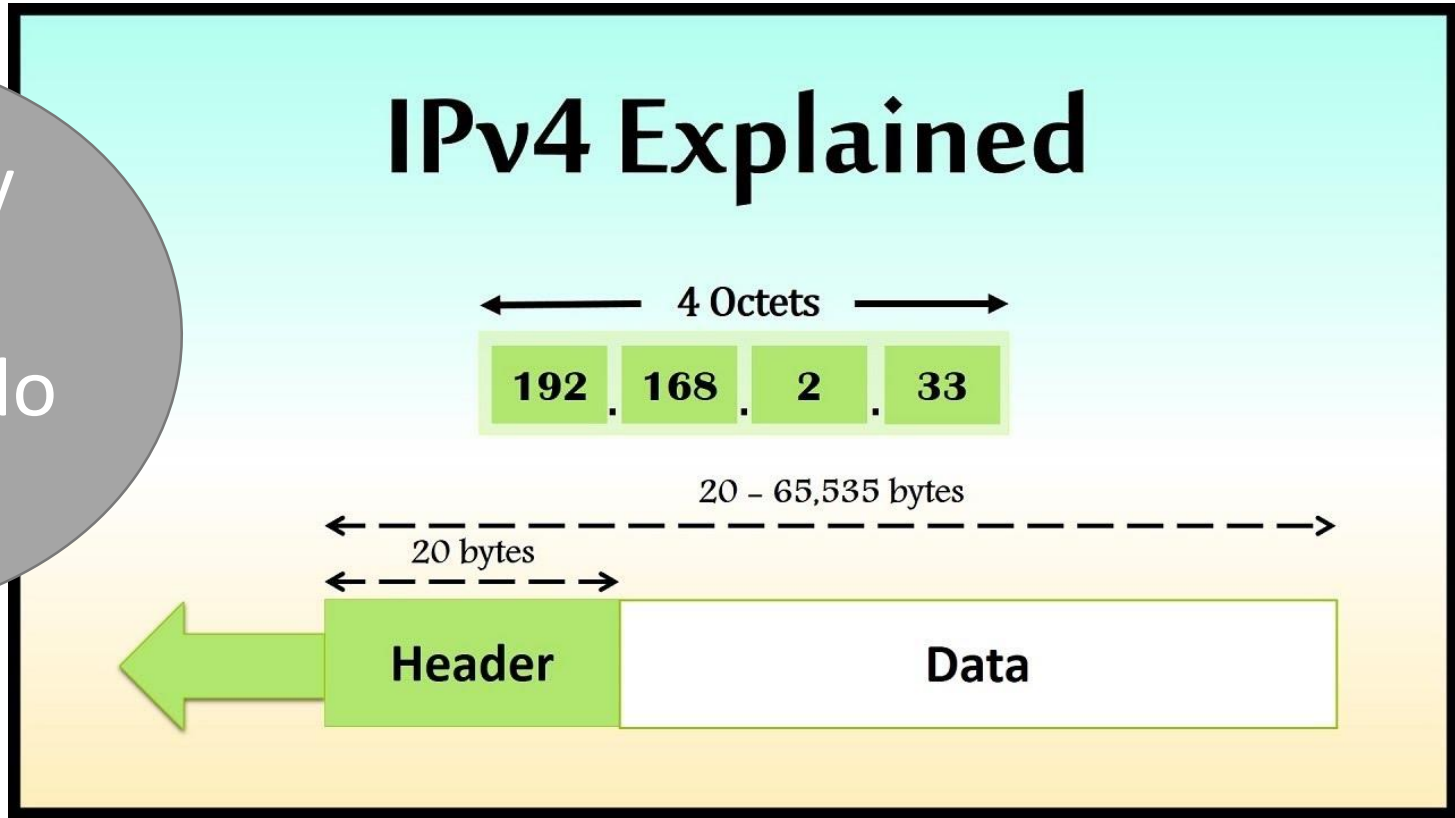
With restrictions:

1. How many 7 digit numbers are possible if the first two digits cannot be 1 or 0?
2. A combination lock has 60 positions. To open the lock, you turn the dial to three numbers. No two consecutive numbers can be the same. How many combinations exist?
3. How many postal codes can exist?

How many internet addresses do we have?



How many internet addresses do we have?



256 256 256 256

4,294,967,296 or 4.3 billion. Currently 7 billion devices.

IPV6

128 bits each

total range = 340 undecillion
possible addresses

2001:db8::ff00:42:8329

IPV4

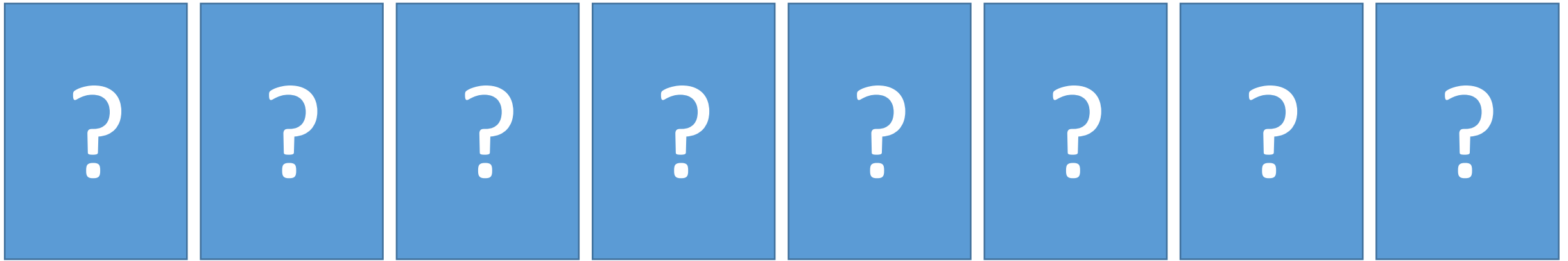
4 bytes each

total range = 4.3 billion
possible addresses

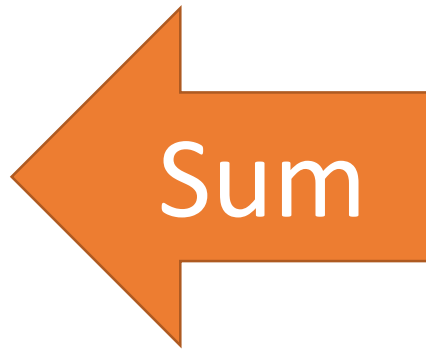
123.45.67.89

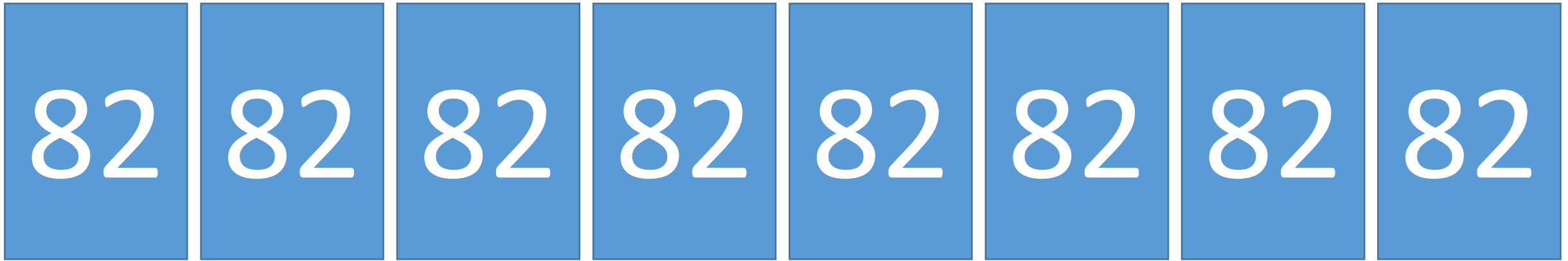
VS

One address for each grain of sand on Earth.



26 upper case
26 lower case
20 special characters
10 numbers
=82
(94 is technical)





26 upper case

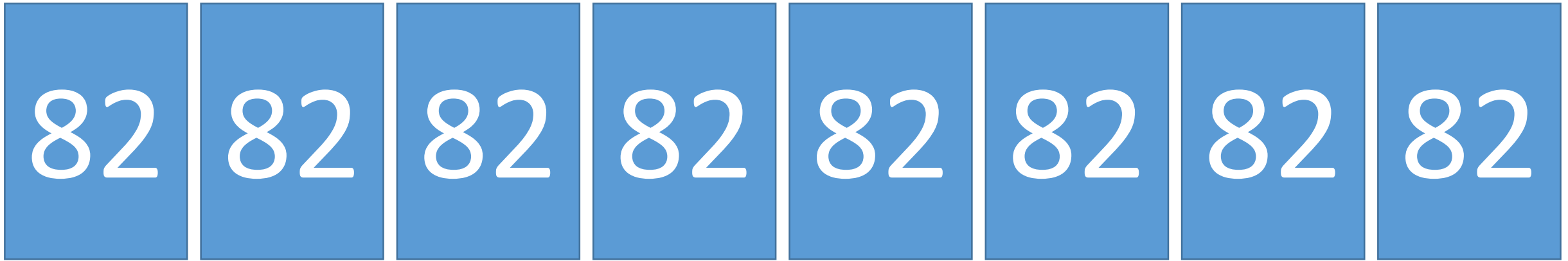
26 lower case

20 special characters

10 numbers

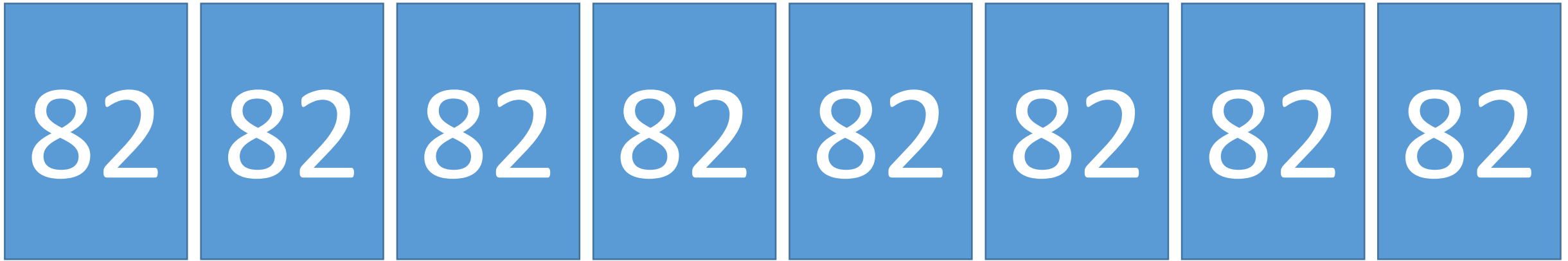
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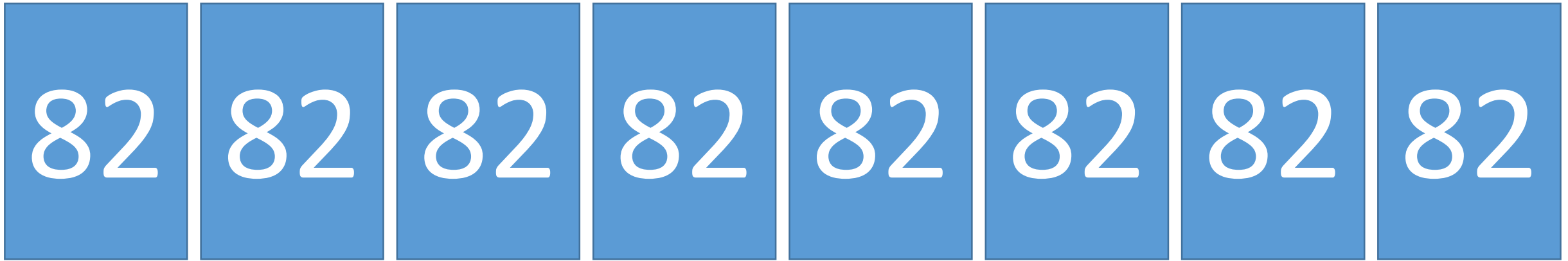
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If selected randomly:
2,000,000,000,000,000 possible passwords



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If selected randomly:
2,000,000,000,000,000 possible passwords
2,800,000,000 per second by 2011 computer
730,050 seconds to crack
202 hours
8 days.



26 upper case

26 lower case

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If selected randomly:

2,000,000,000,000,000 possible passwords

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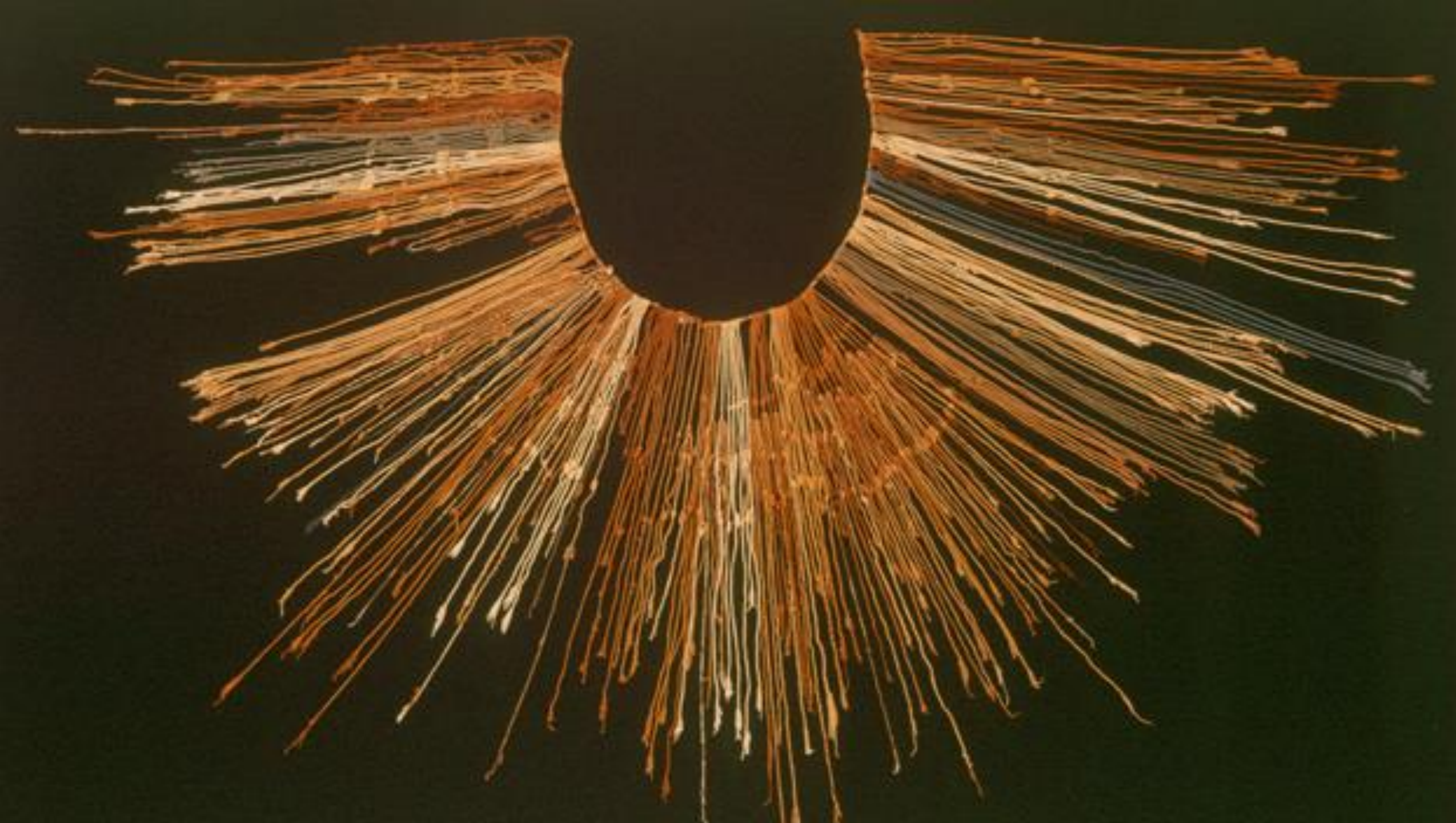
730,050 seconds to crack

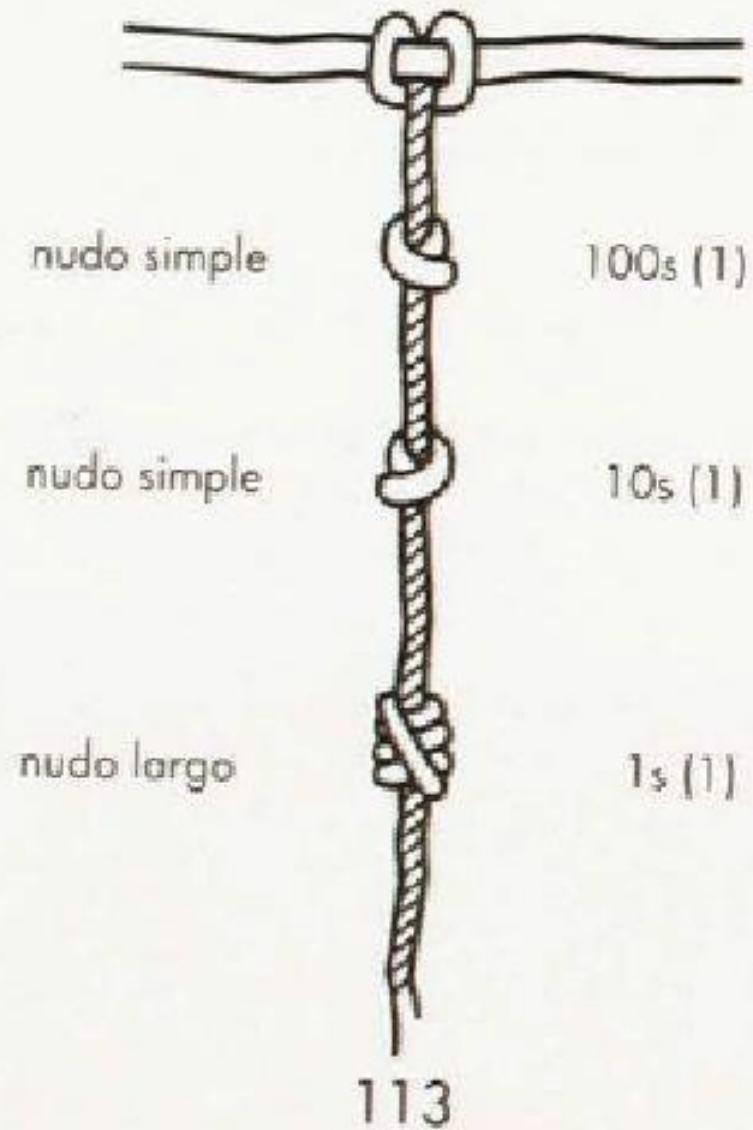
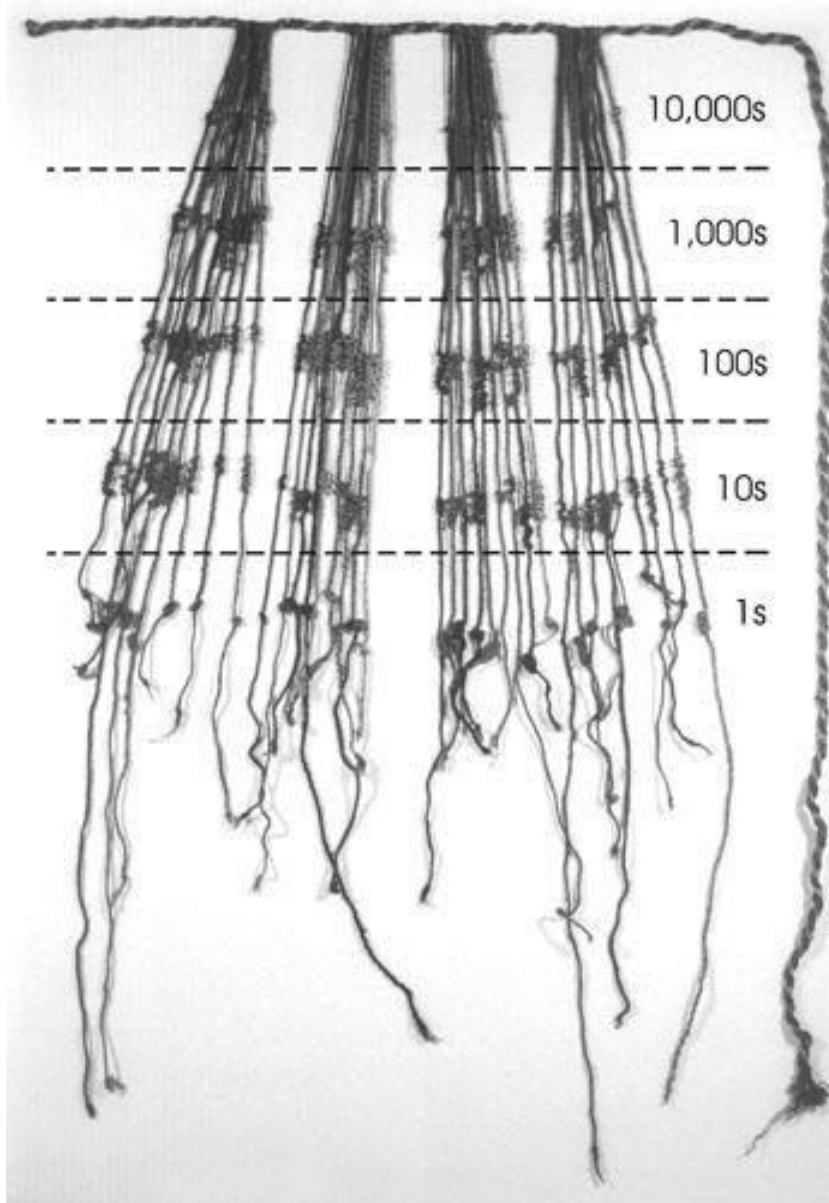
202 hours

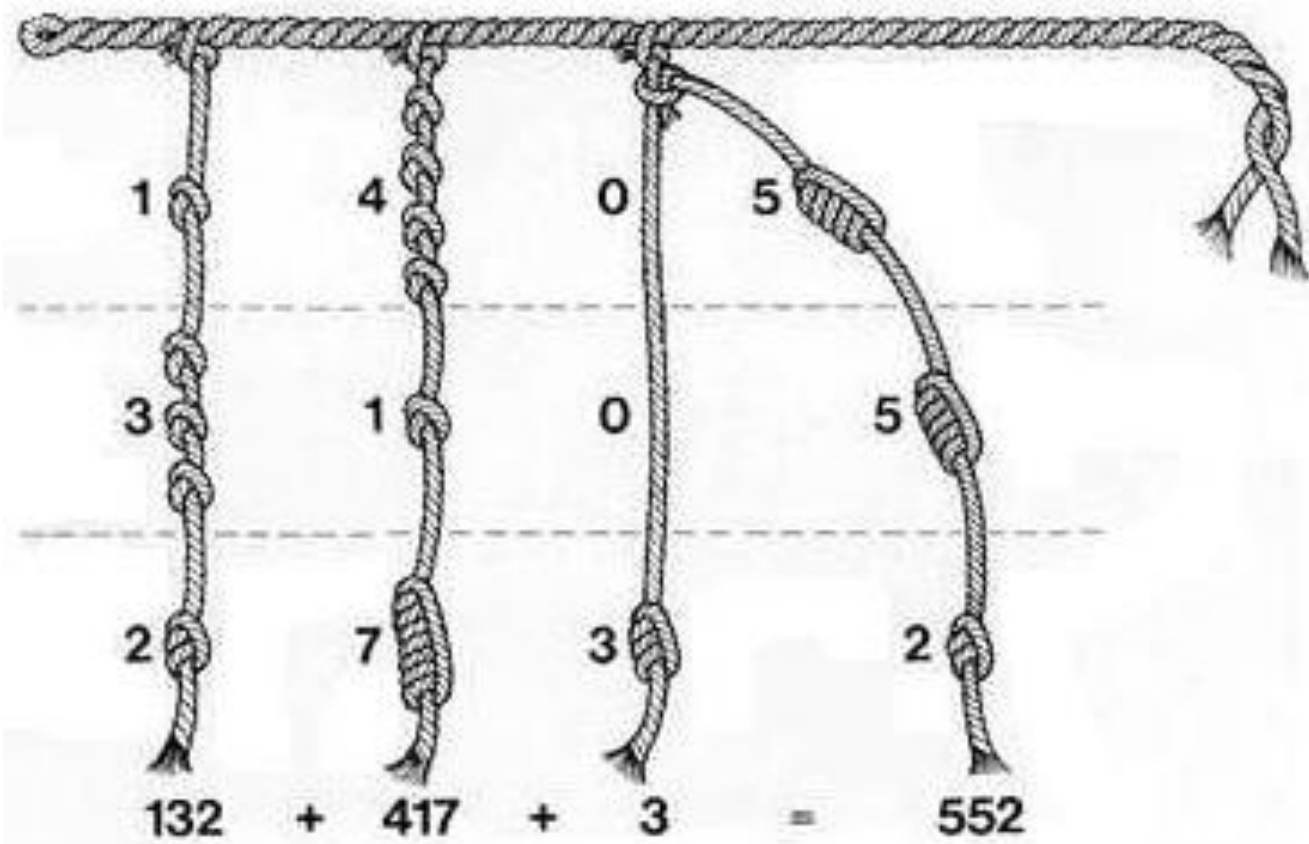
8 days.

2012 demo did it in 6 hours.

2017 demo did it in 2.2 hours.







CÔTADOR MAIORITEZORERO
TAVANTMSVIOQVIPOC
CYRACA·COM DOR·CHAVA



con labor ytegnave con ta dor

How many symbols exist?



- Types of knots
- single
- long (10 different)
- E knots

- Wrap
- Z
- S

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TAVANTISVIOQVIPOC
CYRACA·COM DOR·CHAVA



con labor ytegnave con ta dor

How many symbols exist?

12

2

- Types of knots
- single
 - long (10 different)
 - E knots

- Wrap
- Z
 - S

Also:

- 14 colours. Can be mixed in groups of 2.
- Variations in spacing.
- Seems to be a title cord.

Think they have found a name:

- Puruchuco – 3 knot “ZIP code”