
BAZINGA!
FINAL BOSS
BUZZER ROUND
LOCK IN!

INSTRUCTIONS

BAZINGA!

1.Every team has a buzzer in front of them.
2.The fastest team to hit the buzzer gets the first chance to answer.
3.A correct answer gets +300 points while a wrong one gets -100.
4.The team must answer correctly within 2 seconds of pressing the buzzer to get +300 points, else they get -100.
5. If the team fails to answer correctly or hesitates, the question is displayed again and the rest of the teams can buzzzzzz.
6.If the next team buzzes incorrectly or no team manages to buzz under 2 minute of opening the question ,the question goes to the audience.

BAZINGA!

ARE YOU GUYS READY??

LETS GOOOOO!!!

BAZINGA!

SAFETY SLIDE

QUESTION 1

BAZINGA!

How many integers n satisfy $(n^2 + 2) \mid (n^6 + 74)$?

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SAFETY SLIDE

ANSWER

BAZINGA!

$$n = 0, \pm 1, \pm 2, \pm 3, \pm 8$$

$$\boxed{9}$$

When the squad discusses Number Theory but there's that one friend who doesn't even know what a Polynomial is



BAZINGA!

QUESTION 2

BAZINGA!

A 10-digit integer is written in a row of boxes numbered 0 to 9. The digit in box-0 tells you exactly how many zeroes are there in the entire 10 digit number. The digit in box-1 tells you exactly how many ones are there in the total number. This pattern continues all the way to box 9. There is only one unique 10 digit number which satisfies this rule. What is the sum of all 10 digits of this unique number?

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SAFETY SLIDE

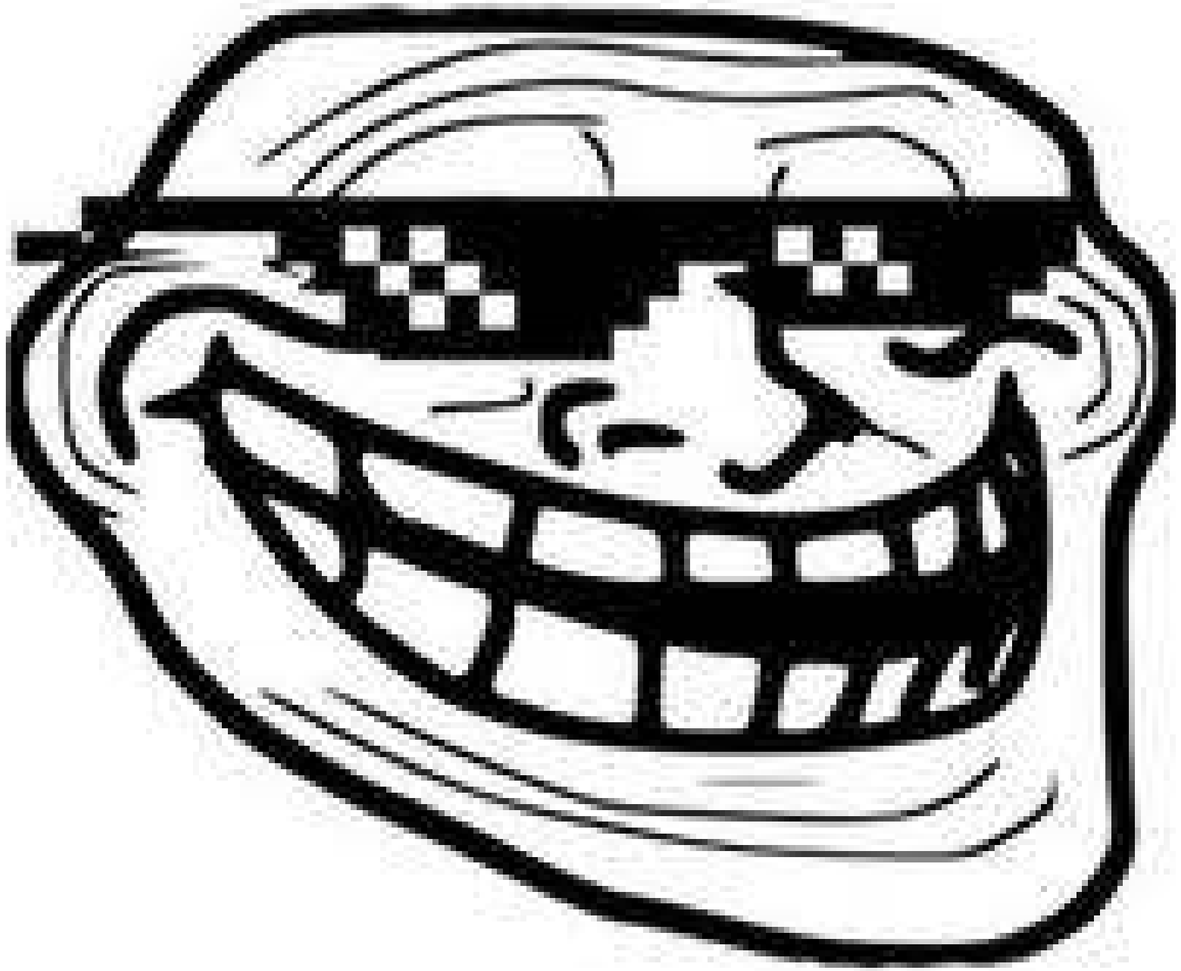
ANSWER

BAZINGA!

$$n = 6210001000(\text{not required btw})$$

$$\boxed{10}$$

BAZINGA!



QUESTION 3

BAZINGA!

Let ABC be a scalene triangle. The perpendicular bisector of BC intersects the lines AC and AB at P and Q, respectively. The tangent to the circumcircle of triangle APQ at A intersects the perpendicular bisector of BC at X. Given $BC = 13$, $CA = 14$, $AB = 15$, find AX.

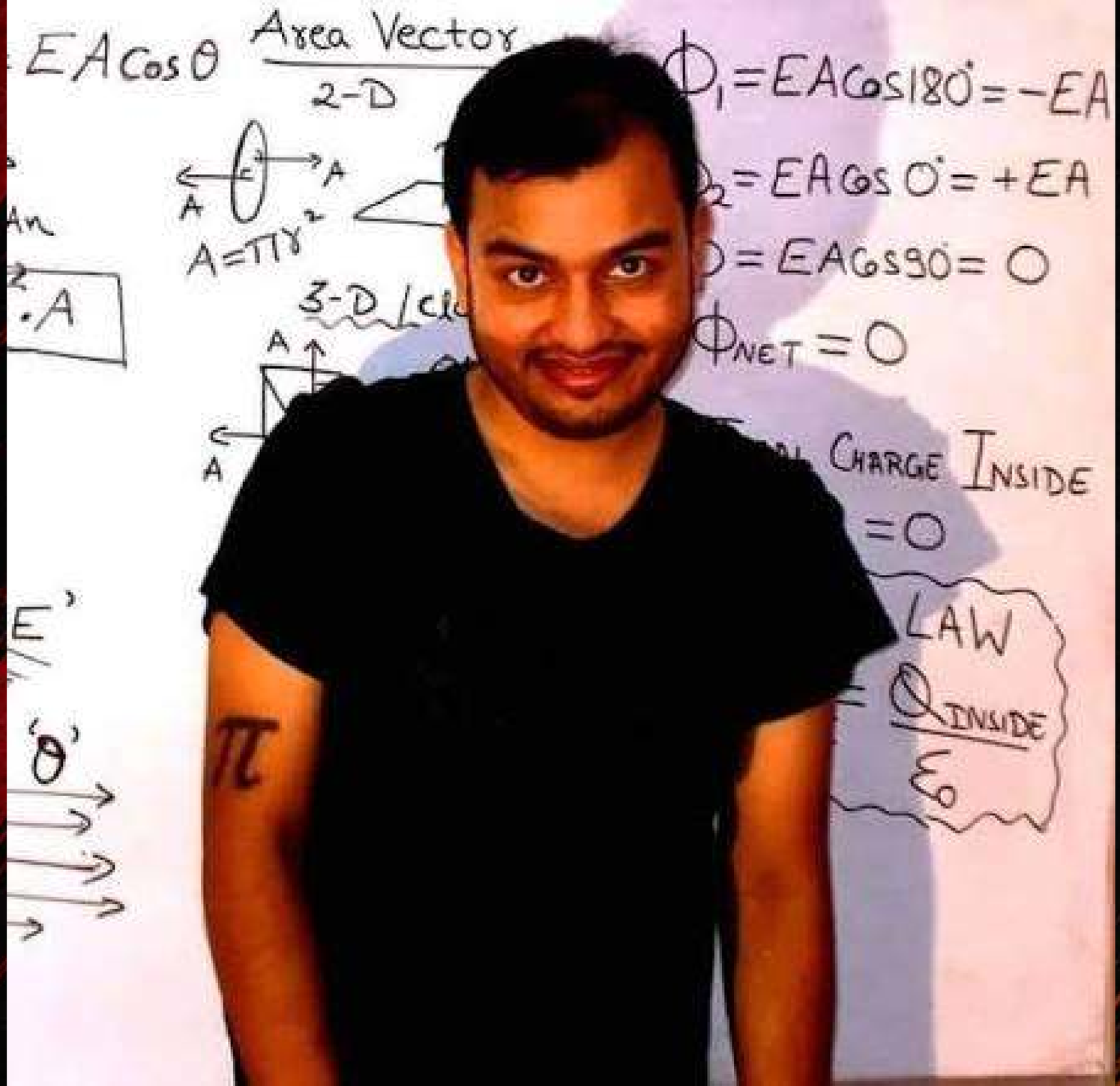
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ANSWER

BAZINGA!

$$\frac{65}{8}$$


EA Cos θ
Area Vector
2-D
A
A
A = πr²
3-D
A
A
Φ1 = EA Cos 180° = −EA
Φ2 = EA Cos 0° = +EA
Φ = EA Cos 90° = 0
Φ NET = 0
CHARGE INSIDE
= 0
LAW
Q INSIDE
ε0
E
θ
π

BAZINGA!

QUESTION 4

BAZINGA!

Find the probability that three points chosen randomly on a sphere lie on a hemisphere.

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SAFETY SLIDE

ANSWER

BAZINGA!

1

BAZINGA!



QUESTION 5

BAZINGA!

Let $S(n)$ be the sum of digits of n in base 10.

Find the second smallest positive integer n such that

$$S(n) = S(2n) = S(3n) = 18.$$

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SAFETY SLIDE

ANSWER

BAZINGA!

$$n = 99,\ 189,\ 198, \ldots$$

$$\boxed{189}$$

BAZINGA!

ALGEBRA	NUMBER THEORY
before seeing the proof	before seeing the proof
	
after seeing the proof	after seeing the proof
	

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QUESTION 6

BAZINGA!

X is a surname you would have seen often in several areas of mathematics (and even physics!), but don't be quick to assume these discoveries in a vast array of subjects were made by the same person! These were a family of 8 gifted European mathematicians, with breakthroughs in subjects ranging from limits and differential equations to probability, all three having very familiar concepts (remember!) named after *X*.

Who are we talking about?

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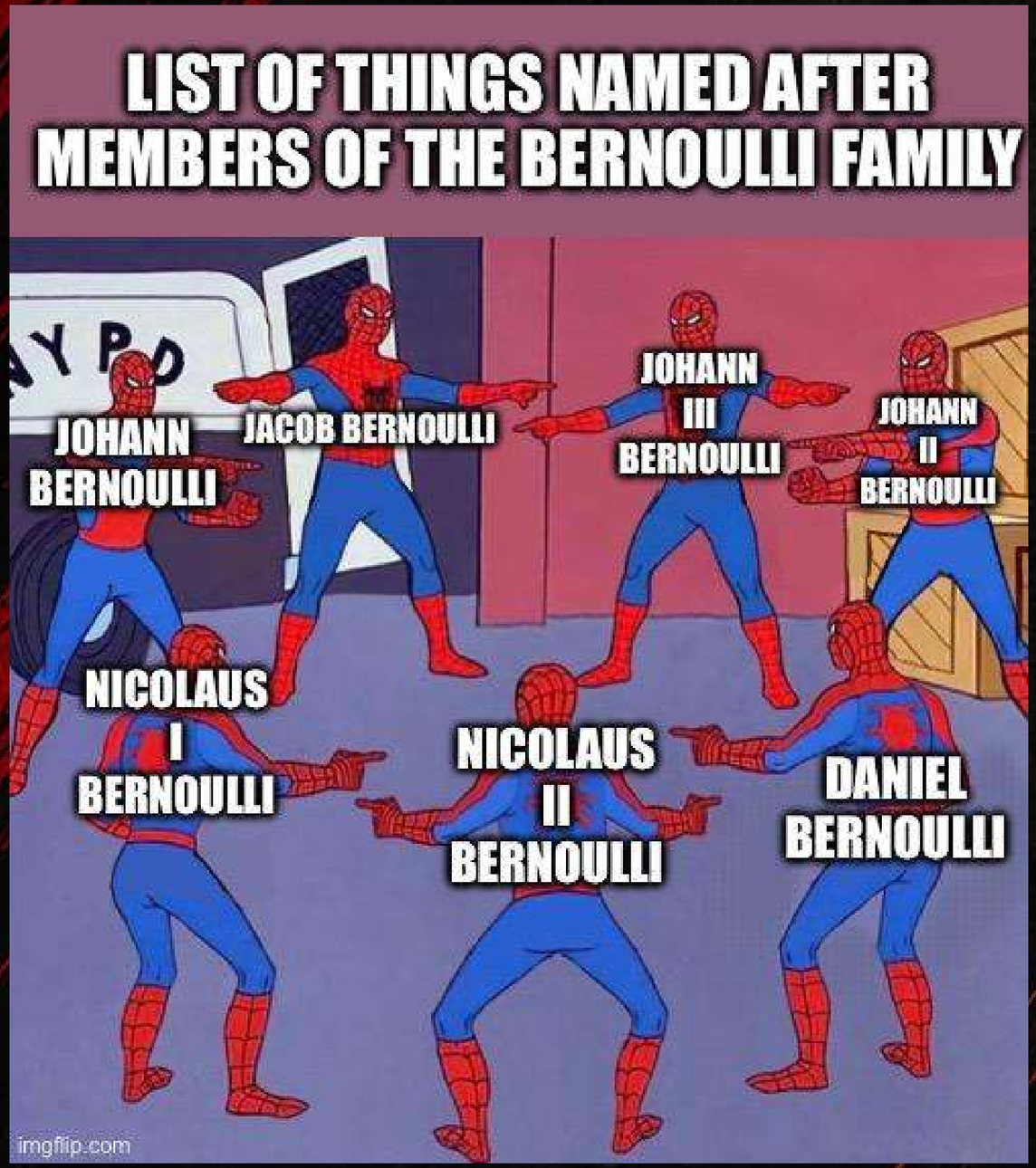
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ANSWER

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We are talking about the Bernoulli family of mathematicians. The family consisted of 8 notable European mathematicians, including Jakob Bernoulli, Johann Bernoulli, Daniel Bernoulli, and others. Concepts such as Bernoulli numbers, Bernoulli's equation, and the Bernoulli distribution are named after members of this family.

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LIST OF THINGS NAMED AFTER MEMBERS OF THE BERNOULLI FAMILY
JOHANN BERNOULLI
JACOB BERNOULLI
JOHANN III BERNOULLI
JOHANN II BERNOULLI
NICOLAUS I BERNOULLI
NICOLAUS II BERNOULLI
DANIEL BERNOULLI
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QUESTION 7

BAZINGA!

The MNP team is picking a T-shirt design. One new design idea is pitched each day for 9 days. The team keeps track of a current favorite design. On Day 1, that day's idea automatically becomes the favorite. On each later day k $(2 \le k \le 9)$, the probability that the new idea is declared better than the current favorite, causing the team to switch favorites, is

$$p_k = \frac{2}{k(k+1)}.$$

The decision made on each day is independent of the decisions on all other days. Let R be the total number of times the favorite switches over all 9 days. Day 1 counts as one switch, since the favorite is being chosen for the first time.

Find the expected value of R over these 9 days.
Express your answer as a reduced fraction $p/q,$ and report the value of $p+q$.

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SAFETY SLIDE

ANSWER

BAZINGA!

$$\mathbb{E}[R] = 1 + \sum_{k=2}^{9} \frac{2}{k(k+1)} = 1 + 2\left(\frac{1}{2} - \frac{1}{10}\right) = \frac{9}{5}$$

$$9 + 5 = \boxed{14}$$

BAZINGA!



QUESTION 8

BAZINGA!

Nuupur is studying the sequence of real numbers $\{a_n\}$ defined by $a_1 = t$ and

$$a_{n+1} = 4a_n(1 - a_n), \qquad n \geq 1.$$

She considers all real values of t for which $a_8 = 0$,
and forms the set P of all such values of t.

Let $q = |P|$, and let T be the set of all positive divisors of q.

Find $|P| + |T|$.

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SAFETY SLIDE

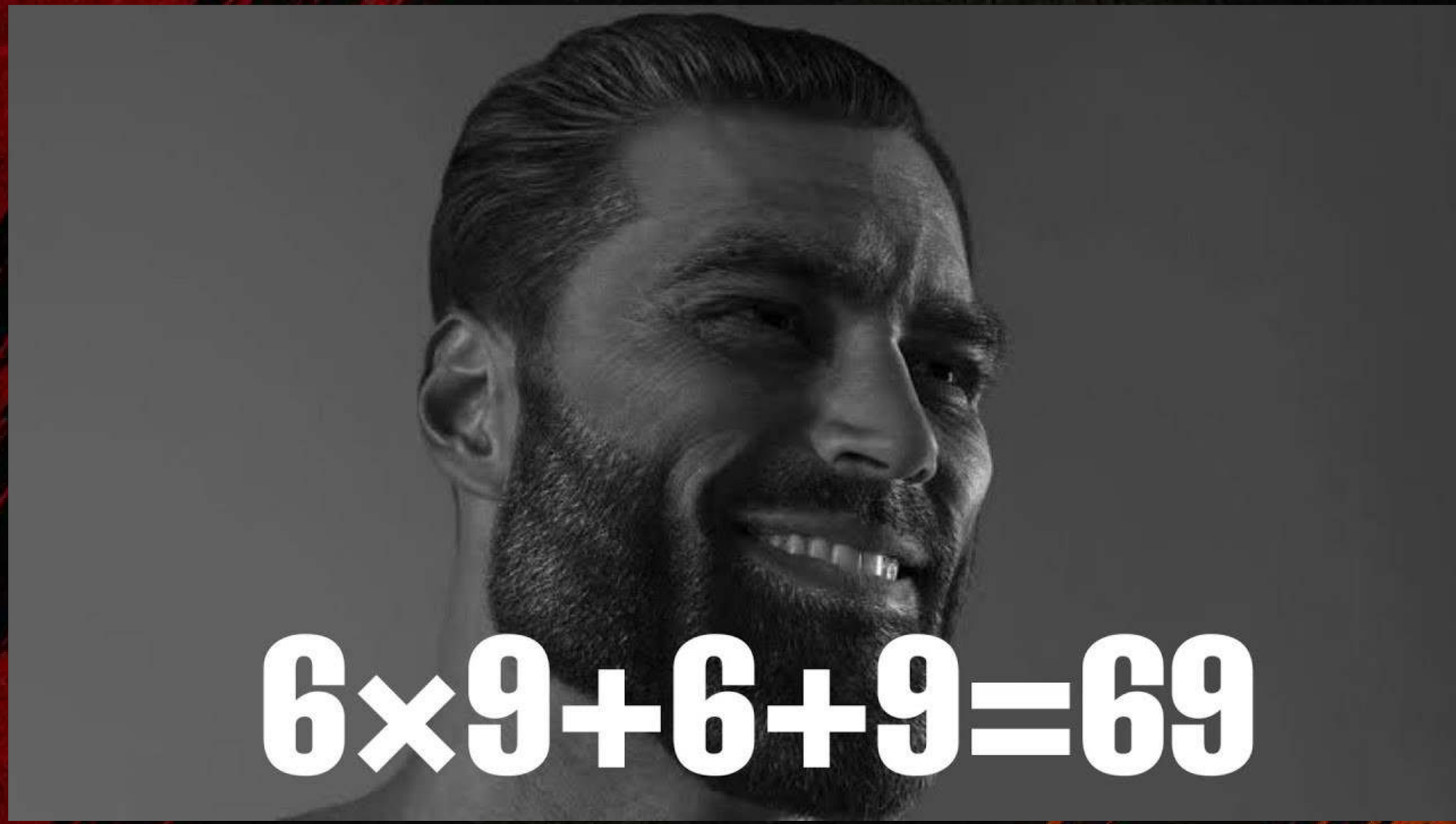
ANSWER

BAZINGA!

$$q = |P| = 65, \qquad |T| = 4$$

$$\boxed{69}$$

BAZINGA!



QUESTION 9

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You have to colour the squares of an 9×9 board,
with each square coloured either red or blue.

In how many ways can this colouring be done so that
each 2×2 square inside the board has exactly 2 reds and 2 blues?

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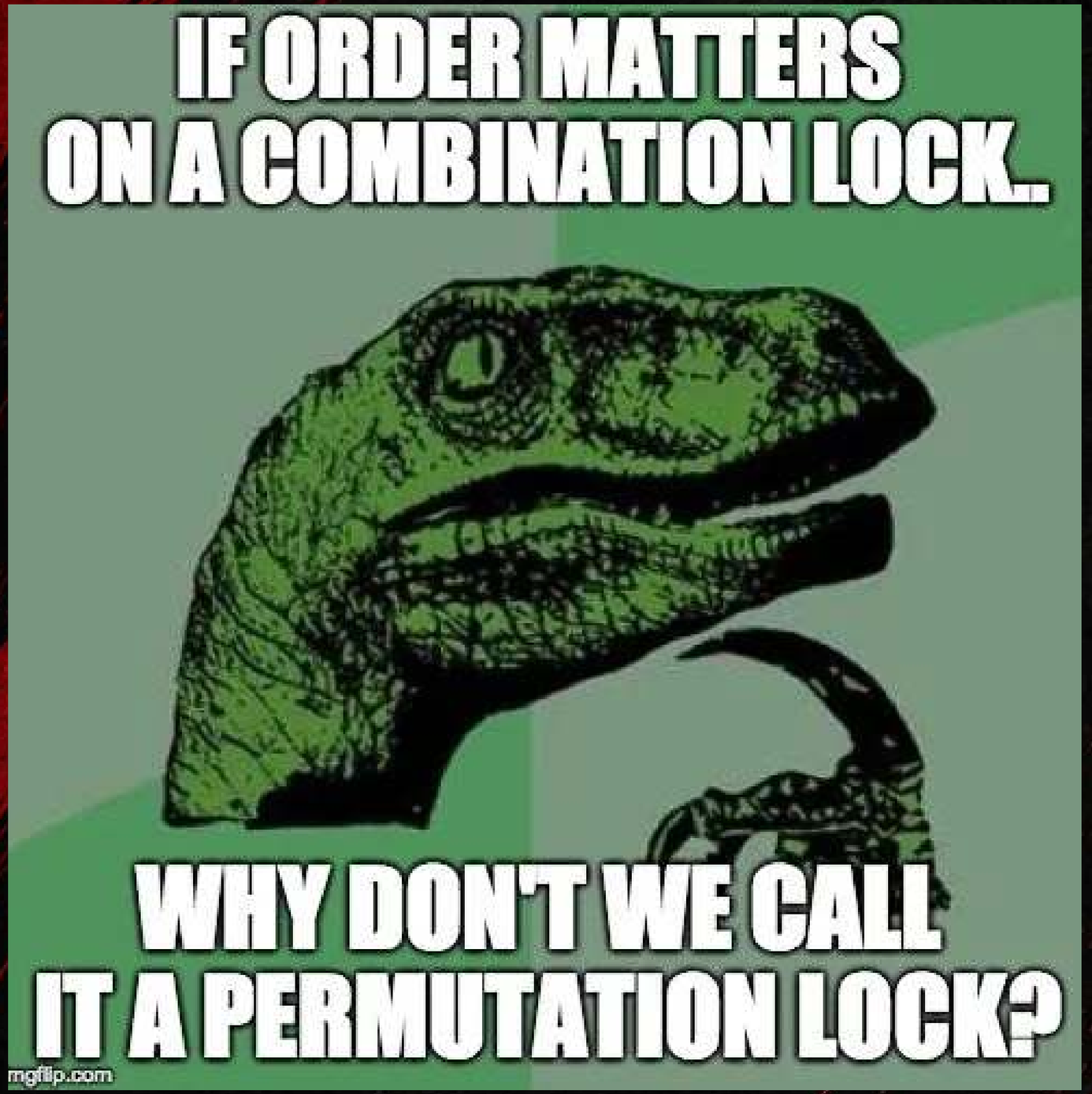
SAFETY SLIDE

ANSWER

BAZINGA!

1022

BAZINGA!


IF ORDER MATTERS
ON A COMBINATION LOCK..
WHY DON'T WE CALL
IT A PERMUTATION LOCK?
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QUESTION 10

BAZINGA!

Let $A = \begin{pmatrix} \sqrt{3}+1 & 1-\sqrt{3} \\ \sqrt{3}-1 & \sqrt{3}+1 \end{pmatrix}$.

Find $\operatorname{Tr}(A^{24})$.

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SAFETY SLIDE

ANSWER

BAZINGA!

$$2^{37}$$

BAZINGA!

Adding and subtracting matrices

Multiplying matrices



QUESTION 11

BAZINGA!

During the pizza distribution, our convenor cut the pizza his way. He picked a random point P inside a circular pizza and drew 4 straight cuts through P, each rotated exactly 45° from the previous cut, with the first cut making an angle of 70° with the line joining P to the pizza's center O. This divides the pizza into 8 slices, numbered 1 through 8 consecutively going around the circle. Slice 2 is adjacent to slices 1 and 3, slice 8 is adjacent to slices 7 and 1, and so on.

A volunteer calculated the areas of each slice:

Slice	1	2	3	4	5	6	7	8
Area	12	20	27	x	y	31	30	15

The convenor says that slices 4 and 5 together had an area of 100 cm^2.

Find $x - y$.

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ANSWER

BAZINGA!

3

BAZINGA!

Average people



"If I bend the pizza like this, it's easier to hold and get in my mouth"

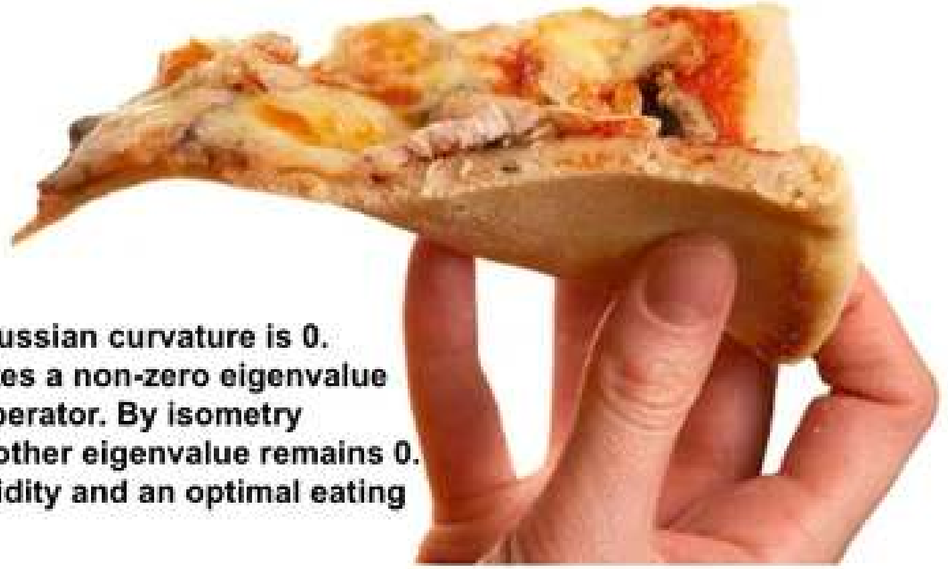


Mathematicians

@MathMatize



"The pizza's Gaussian curvature is 0. Bending it creates a non-zero eigenvalue for the shape operator. By isometry invariance, the other eigenvalue remains 0. This creates rigidity and an optimal eating experience"



QUESTION 12

BAZINGA!

Let $\Gamma_1, \Gamma_2, \Gamma_3$ be three pairwise externally tangent circles with radii $1, 2, 3$ respectively. A circle passes through the centers of Γ_2 and Γ_3 and is externally tangent to Γ_1 at P.
Suppose A and B are the centers of Γ_2 and Γ_3, respectively.

What is the value of $\dfrac{PA^2}{PB^2}$?

BAZINGA!

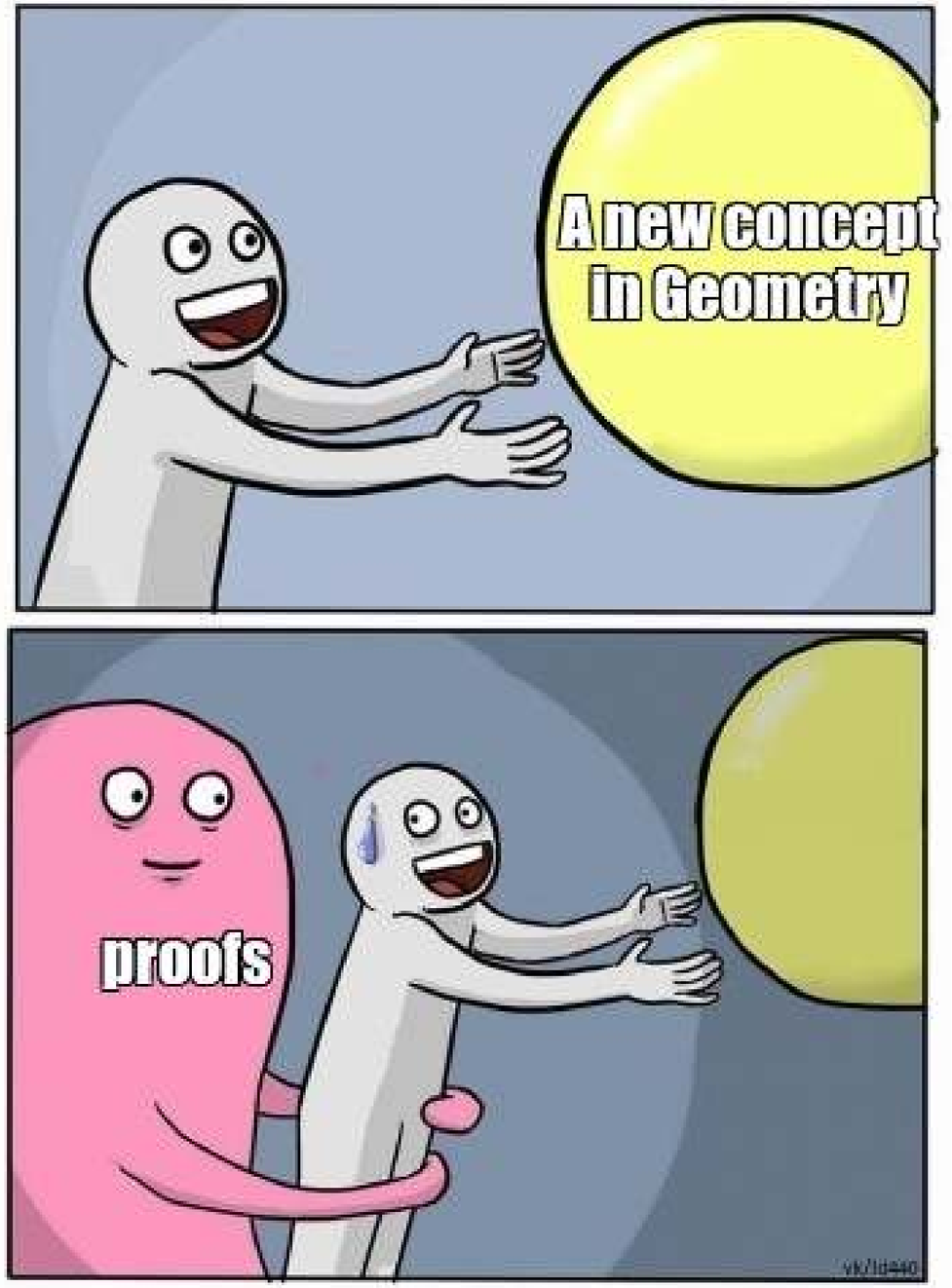
SAFETY SLIDE

ANSWER

BAZINGA!

$$\frac{8}{15}$$

BAZINGA!



meme-arsenal.ru

QUESTION 13

BAZINGA!

You can perform two operations:
(1) Combine two numbers to make a bigger number: $(a, b) \to (a + b)$,
(2) Divide a number into two equal parts if it is even: $(2k) \to (k, k)$.

What is the smallest number you could reach starting from $(15, 147, 153)$?

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SAFETY SLIDE

ANSWER

BAZINGA!

By strategically combining and splitting even numbers, we can eventually reach 9.

No number smaller than 9 can be reached.

$\boxed{9}$

BAZINGA!



QUESTION 15

BAZINGA!

Schrodinger, the one who failed performing his magic on the ITC orientation actually has 6 mischievous cats, each currently living in its own designated home box numbered 1 through 6. For his next magic trick practice, he wants to completely reshuffle which cat goes into which box such that every box receives exactly one cat .The boxes are grouped into 3 entangled pairs:

$$\text{Pair A: } \{1, 2\}, \quad \text{Pair B: } \{3, 4\}, \quad \text{Pair C: } \{5, 6\}$$

A cat cannot be placed into any box belonging to its original entangled pair:

1. A cat originally from Box 1 or Box 2 must be placed in one of the boxes $\{3, 4, 5, 6\}$.
2. A cat originally from Box 3 or Box 4 must be placed in one of the boxes $\{1, 2, 5, 6\}$.
3. A cat originally from Box 5 or Box 6 must be placed in one of the boxes $\{1, 2, 3, 4\}$.

In how many distinct ways can Schrodinger rearrange all 6 cats into the 6 boxes such that no cat ends up in a box belonging to its original entangled pair?

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SAFETY SLIDE

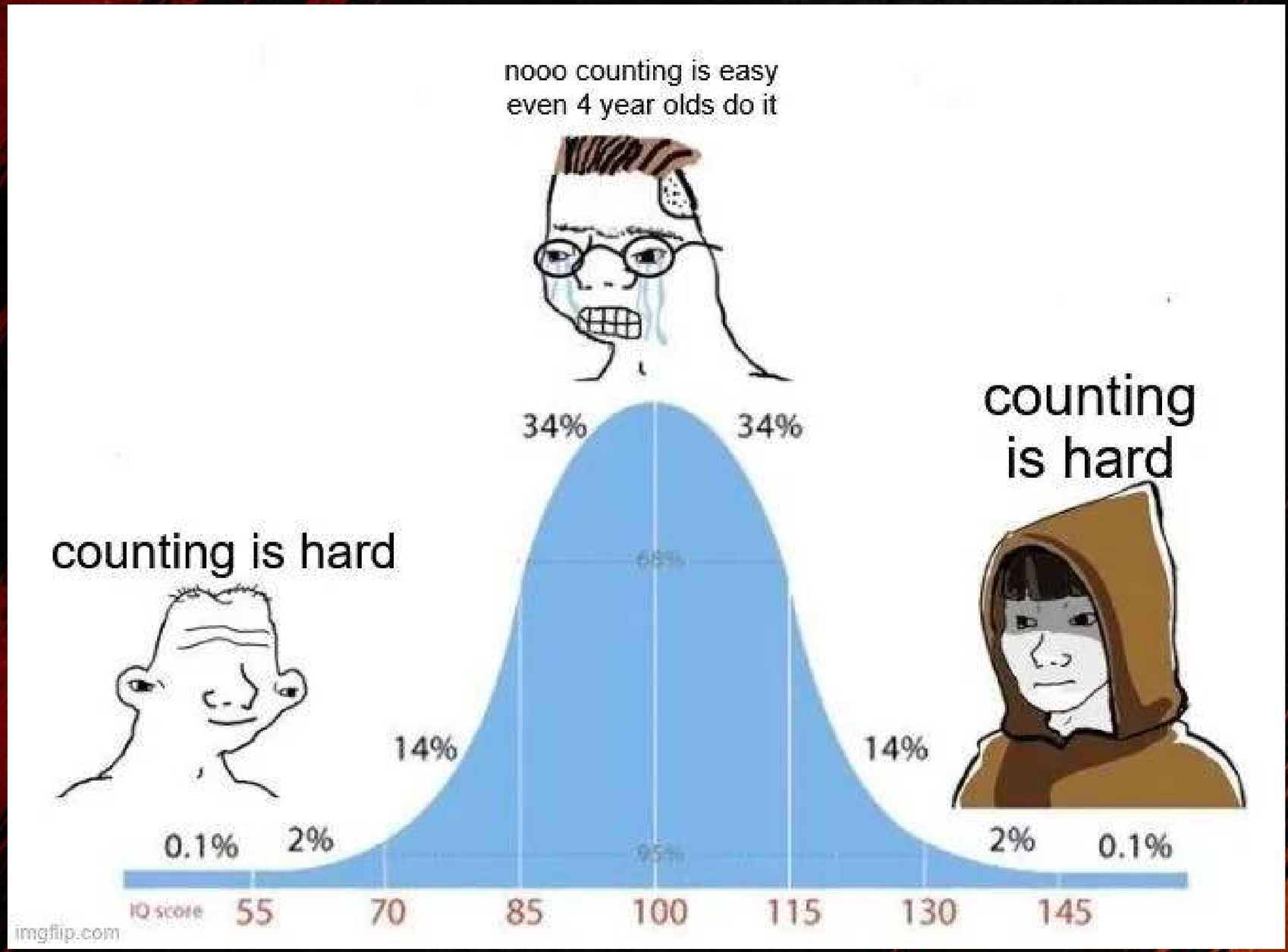
ANSWER

BAZINGA!

$$\text{Number of valid rearrangements} = 80$$

$$\boxed{80}$$

BAZINGA!


nooo counting is easy
even 4 year olds do it
34%
34%
counting is hard
counting is hard
14%
14%
0.1%
2%
2%
0.1%
IQ score
55
70
85
100
115
130
145
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BAZINGA!

THIS IS THE END!!

BAZINGA!

THANK YOU FOR ATTENDING !!

BEHOLD, THE ULTIMATE FUNNY NUMBER

