0xPARC PLoNKathon Rules

1. Assemble into teams of three or four people.
2. Your team will have **90 minutes** to solve five puzzle-style questions.
3. There are three ways for your team to score points:
   - **Solve**: solving a problem.
   - **Attest**: signing another team's *attestation slip*, which indicates that you believe they have solved a particular problem. Once attestation slips are submitted, they cannot be revoked. Duplicate attestation slips will be ignored.
   - **Convince**: getting another team to sign your attestation slip. You can do whatever it takes (within reason) to convince them, including lying and deception.
4. Solving a problem is worth **100 points**. Additionally, attestation slips are also worth points. If Team A signs Team B's attestation slip, the number of points gained is:

	if B solved	if B did not solve
if A solved	A gains **1 point** B gains **1 point**	A gains **-25 points** B gains **25 points**
if A did not solve	A gains **10 points** B gains **10 points**	A gains **-25 points** B gains **25 points**

   This payoff matrix is designed so that
   - if you solve a problem, the best strategy is to convince other teams that you solved the problem without revealing your solution, and
   - if you cannot solve a problem, your best strategy is to trick other people into thinking you solved the problem. This is known as a *Plausible Lie of Non-Knowledge* (PLoNK). PLoNKing another team gains you 25 points. You want to avoid being PLoNKed, since you will lose 25 points.
5. For each problem, the total score you can gain from PLoNKing is capped at **74 points**.
6. You can use any tools at your disposal, such as phones, computers, calculators, Python, LLMs, the Internet, image editors, cameras, scissors, and printers. Be creative!

Happy PLoNKing!

– Holden

ATTESTATION SLIP

Team _____ hereby attests that Team _____

has solved Problem ____.

Attester signature: _____

Convincer signature: _____

ATTESTATION SLIP

Team _____ hereby attests that Team _____

has solved Problem ____.

Attester signature: _____

Convincer signature: _____

ATTESTATION SLIP

Team _____ hereby attests that Team _____

has solved Problem ____.

Attester signature: _____

Convincer signature: _____

Team name: _____

Problem 1: Word Search!

Find the string `PLONK` in this word search. It can appear forwards, backwards, horizontally, vertically, or diagonally.

L N P N O O L L P O N P K K L N N P O L K P P K K
K L L L P P K P O L N O K O O K P P O L P O K O P
N O O K K L P N L N O O O P P O K O L K K N N N K
P L K N K K L K O P K P O O O P N P L L O K N O P
K O O K O L P P P O K O O O O N K O L O O N L N L
O P O K N N N P L K N N K L L O O N K O O K K L O
O N P L P L O K N L L P K P N P L N N O K P N P K
K O O L L P N O K K K O O N L P N L P L L K N L K
N O O L P K O K K K O P O K L N L N P N K N N K K
P N K K L O N K P O O O P N P K O O K N L O P P N
K O P P K N N L P K O P K P L O P K N N K N L K P
P K P P K K O O O P L L O O N K K N P L L P N K N
L P L O O O L K L L O N O K K K P P P N O O P O K
L P K K P N N O O P O N O P O O L P N P N N L O N
N L L K P L N P P P K L O N N P N P L P N P O O L
P N N K K L O O P K O K N N O N K L L K O N P N K
K K L K O N K N P N P N L K K K O K K O P O P K N
N N O O L K P K O O L O K P L O K P O N N O L O P
K O L P K P K O P P K P L L N O L O K K N K P L N
K N O P P L N P P K L O L N K P O L O L P L P P O
P O O P L K O P N O K K O P K O P P K P P L N P O
K L K O O P N K P O K P O P L O L P O O K L K N L
K L P K L L P P N P P N K K L O N L N N L L K L K
K O K P K N O N P O K L K P O N L P N O O O L O O
L N P L O L O O K N N N O K N N N L K N O K L O L

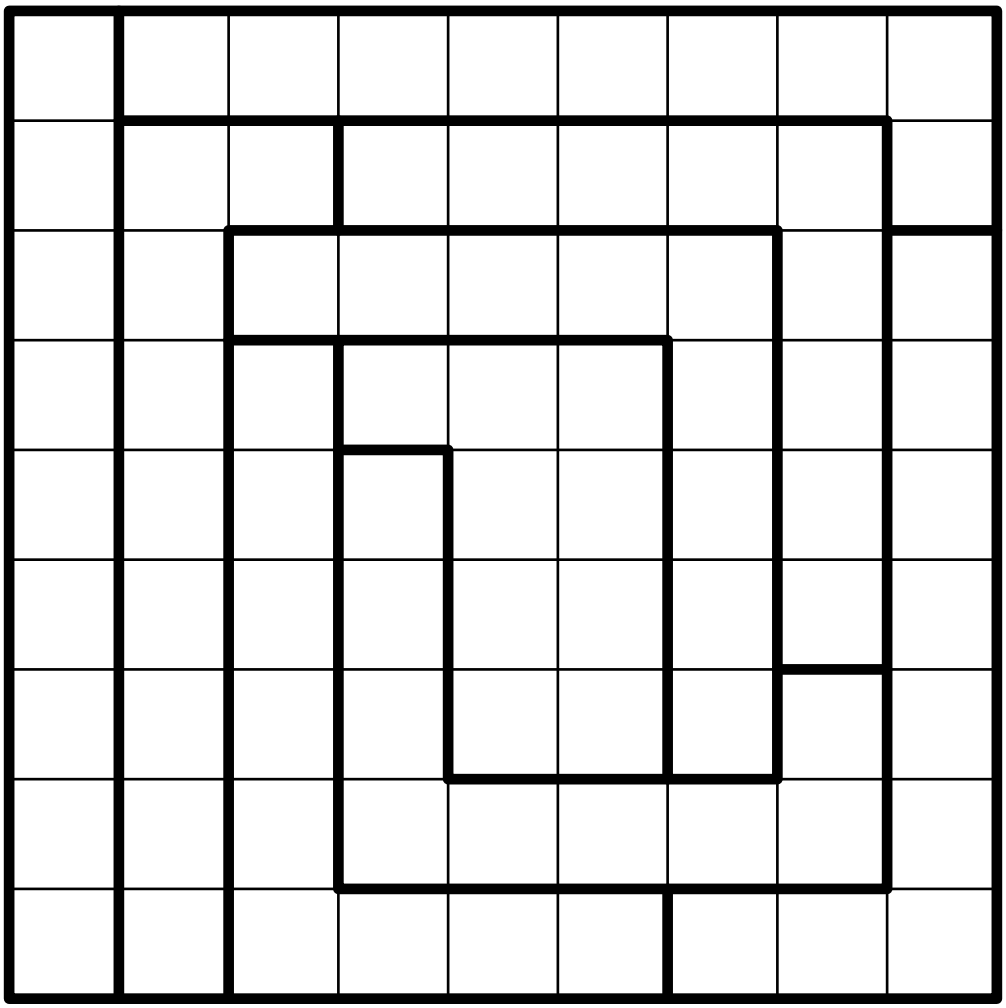
Circle the string `PLONK` in the word search and submit this paper as your answer.

Team name: _____

Problem 2: Jigsaw Sudoku!

Fill in the grid below with the digits 1, 2, 3, 4, 5, 6, 7, 8, 9 such that:

- each row contains every digit from 1 to 9 exactly once,
- each column contains every digit from 1 to 9 exactly once, and
- each bolded nine-square region contains every digit from 1 to 9 exactly once.



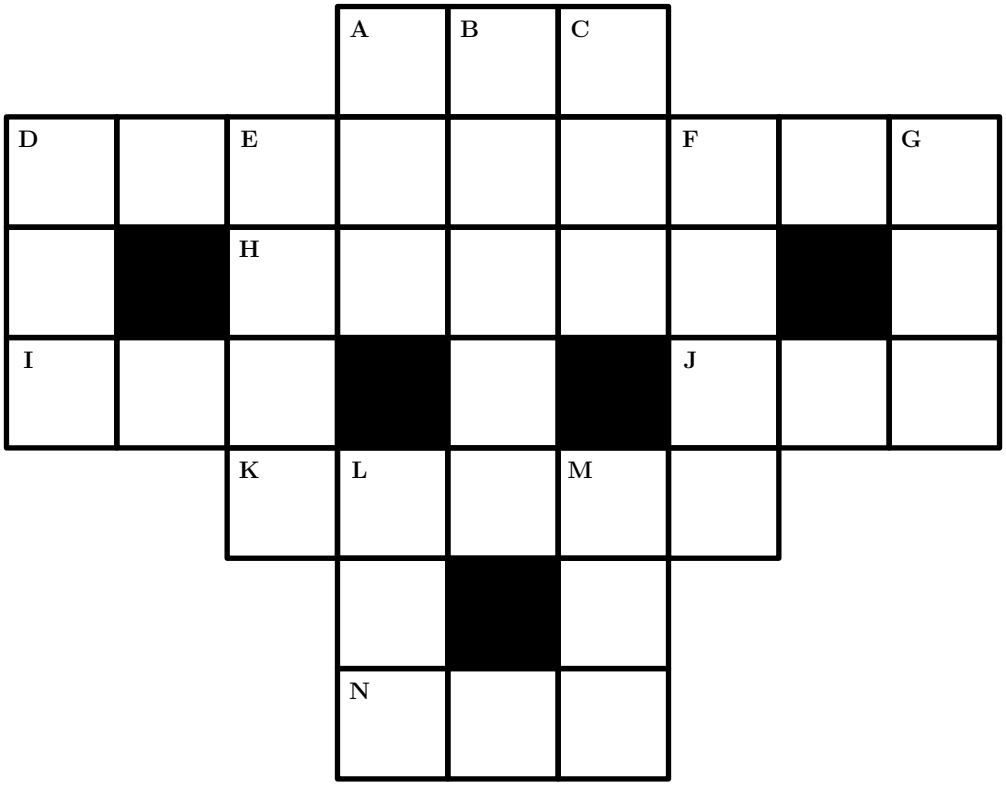
Complete the Sudoku and submit this paper as your answer.

Team name: _____

Problem 3: Number Crossword!

Puzzle courtesy of Dan Gulotta.

Fill in the squares below with the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9 such that the crossword clues are satisfied. Leading zeros are allowed.



Across

A. An irregular prime

D. A sequence of digits appearing consecutively in the first 20 digits of 2π

H. A Fibonacci number

I. A factorial number

J. A power of two

K. A number with strictly increasing digits

N. A multiple of 111

Down

A. A number with 12 factors

B. A fourth power

C. A decagonal number

D. The sum of all digits appearing in this grid

E. A prime number

F. A power of 12

G. A product of three primes

L. A perfect square

M. A Fibonacci number

Complete the number crossword and submit this paper as your answer.

Team name: _____

Problem 4: Subset sum!

Find a subset of the below numbers that sums to 10^{15}.

$\lfloor 10^{13} \rfloor = 10000000000000$	$\lfloor 10^{13.34} \rfloor = 21877616239495$	$\lfloor 10^{13.68} \rfloor = 47863009232263$
$\lfloor 10^{13.02} \rfloor = 10471285480508$	$\lfloor 10^{13.36} \rfloor = 22908676527677$	$\lfloor 10^{13.7} \rfloor = 50118723362727$
$\lfloor 10^{13.04} \rfloor = 10964781961431$	$\lfloor 10^{13.38} \rfloor = 23988329190194$	$\lfloor 10^{13.72} \rfloor = 52480746024977$
$\lfloor 10^{13.06} \rfloor = 11481536214968$	$\lfloor 10^{13.4} \rfloor = 25118864315095$	$\lfloor 10^{13.74} \rfloor = 54954087385762$
$\lfloor 10^{13.08} \rfloor = 12022644346174$	$\lfloor 10^{13.42} \rfloor = 26302679918953$	$\lfloor 10^{13.76} \rfloor = 57543993733715$
$\lfloor 10^{13.1} \rfloor = 12589254117941$	$\lfloor 10^{13.44} \rfloor = 27542287033381$	$\lfloor 10^{13.78} \rfloor = 60255958607435$
$\lfloor 10^{13.12} \rfloor = 13182567385564$	$\lfloor 10^{13.46} \rfloor = 28840315031266$	$\lfloor 10^{13.8} \rfloor = 63095734448019$
$\lfloor 10^{13.14} \rfloor = 13803842646028$	$\lfloor 10^{13.48} \rfloor = 30199517204020$	$\lfloor 10^{13.82} \rfloor = 66069344800759$
$\lfloor 10^{13.16} \rfloor = 14454397707459$	$\lfloor 10^{13.5} \rfloor = 31622776601683$	$\lfloor 10^{13.84} \rfloor = 69183097091893$
$\lfloor 10^{13.18} \rfloor = 15135612484362$	$\lfloor 10^{13.52} \rfloor = 33113112148259$	$\lfloor 10^{13.86} \rfloor = 72443596007499$
$\lfloor 10^{13.2} \rfloor = 15848931924611$	$\lfloor 10^{13.54} \rfloor = 34673685045253$	$\lfloor 10^{13.88} \rfloor = 75857757502918$
$\lfloor 10^{13.22} \rfloor = 16595869074375$	$\lfloor 10^{13.56} \rfloor = 36307805477010$	$\lfloor 10^{13.9} \rfloor = 79432823472428$
$\lfloor 10^{13.24} \rfloor = 17378008287493$	$\lfloor 10^{13.58} \rfloor = 38018939632056$	$\lfloor 10^{13.92} \rfloor = 83176377110267$
$\lfloor 10^{13.26} \rfloor = 18197008586099$	$\lfloor 10^{13.6} \rfloor = 39810717055349$	$\lfloor 10^{13.94} \rfloor = 87096358995608$
$\lfloor 10^{13.28} \rfloor = 19054607179632$	$\lfloor 10^{13.62} \rfloor = 41686938347033$	$\lfloor 10^{13.96} \rfloor = 91201083935590$
$\lfloor 10^{13.3} \rfloor = 19952623149688$	$\lfloor 10^{13.64} \rfloor = 43651583224016$	$\lfloor 10^{13.98} \rfloor = 95499258602143$
$\lfloor 10^{13.32} \rfloor = 20892961308540$	$\lfloor 10^{13.66} \rfloor = 45708818961487$	$\lfloor 10^{14} \rfloor = 100000000000000$

Circle some numbers that sum to 10^{15} and submit this paper as your answer.

Team name: _____

Problem 5: Prime factorization!

Find the prime factorization of $3^{198} + 3^{88} + 3^{63} - 1$.

Write the digits of the 32-digit prime factor in the boxes above, and submit this paper as your answer.