# Birenbaum's Labors: Å Hunt. All Jubilate!

2023 FAMAT State Convention Interschool Solutions

Puzzles written by Trevor Birenbaum

# Answers

The below feeder puzzle answers are used in the metapuzzle *Papers, Please!* to generate the meta answer YOU FEAR IT'S THE PROCRASTINATE CONVENTION.

| | |
|---|---|
| 1-to-9 Games | IRON |
| 200-Meter Heardles | AUDIOSENSITIVITY |
| 3 Billion, Gagillion, Fafillion, . . . Factorizations | VIEWERSHIP |
| A Walk in a Rows Garden | TIME LORD |
| Answers in the Form of a Question | THE BOYS |
| Blind Man's Bluff | MANNERS MAKETH MAN |
| Boom Shakashaka | GLOBAL WARMING |
| Cracking the Cryptic | RHOMBIHEXAHEDRON |
| CYBORG | BIG BEN |
| Desired Salary: $21,025,001,005,015,010,000 | PEARLY |
| Determine a Nine-Character Word | SPRUCE GUM |
| Double Down | PRO TEMPORE |
| Flags of the World | TRANS RIGHTS |
| I'm Not Joking, and Don't Call Me Shirley | RED HOT CHILI PEPPERS |
| It Just So Happens. . . | APOLLO ELEVEN |
| Look Ma, I Made #Starboard! | YESTERYEAR |
| Microscopic Masyu | ROLL |
| New Neighbors | NO AVAIL |
| Nonogramming the Last Layer | ANGRY EYE |
| Not Just Vocalic. . . Supervocalic! | VOLKSWAGEN |
| Page Turners | GAMESMANSHIP |
| Prime Directive | LOVE |
| Pyramid Scheme | RIBOSOMAL RNA |
| Quiz Bowl | ROAST BEEF |
| Seven Circles of Hell | ANOTHER BRICK IN THE WALL |
| Solving a Sudoku With No Given Digits??? | BIG CHEESE |
| SPARE Parts | ONCOGENES |
| Subjective Ranking | MOOSE JAW |
| The 2023 State Convention Interschool Individual | COUNTERCLOCKWISE |
| The Connecting Wall of Sequences | MISCOMMUNICATION |
| They're Always Up to Something | LEGAL AID |
| Triangles and Tribulations | OFF BRAND |
| Video Killed the Radio Star | RIBOFLAVIN |
| Wool, Isn't This Nice? And Isn't It Iron Pick? | ANTHROPOMORPHISM |
| Word Search "4" the People | GO TOE TO TOE |
| X Marks the Spot | NONDETERMINISTIC |

**Tiebreaker**: 124.4

# META – *Papers, Please!*

150 Points

Each of the five bolded phrases refers to a particular characteristic of each answer. These can be interpreted as five bit binary in the given class order to generate the meta answer (puzzles are ordered by page number).

- {1} Math: Answer length is a square number of letters
- {2} Anatomy: Answer contains the name of one of the ten three-letter body parts
- {3} English: Answer is more than nine letters long
- {4} Art: Answer's first letter is R, O, Y, G, B, I, or V
- {5} Astronomy: Answer contains a space

| Answer | Page | {1} | {2} | {3} | {4} | {5} | # | |
|---|---|---|---|---|---|---|---|---|
| SPRUCE GUM | 1 | 1 | 1 | 0 | 0 | 1 | 25 | Y |
| RIBOSOMAL RNA | 2 | 0 | 1 | 1 | 1 | 1 | 15 | O |
| MANNERS MAKETH MAN | 3 | 1 | 0 | 1 | 0 | 1 | 21 | U |
| ROUGHRIDER | 4 | 0 | 0 | 1 | 1 | 0 | 6 | F |
| APOLLO ELEVEN | 5 | 0 | 0 | 1 | 0 | 1 | 5 | E |
| TIME LORD | 6–7 | 0 | 0 | 0 | 0 | 1 | 1 | A |
| ONCOGENES | 8 | 1 | 0 | 0 | 1 | 0 | 18 | R |
| LEGAL AID | 9 | 0 | 1 | 0 | 0 | 1 | 9 | I |
| MISCOMMUNICATION | 10 | 1 | 0 | 1 | 0 | 0 | 20 | T |
| ROAST BEEF | 11 | 1 | 0 | 0 | 1 | 1 | 19 | S |
| COUNTERCLOCKWISE | 12 | 1 | 0 | 1 | 0 | 0 | 20 | T |
| PEARLY | 13 | 0 | 1 | 0 | 0 | 0 | 8 | H |
| PRO TEMPORE | 14 | 0 | 0 | 1 | 0 | 1 | 5 | E |
| LOVE | 15 | 1 | 0 | 0 | 0 | 0 | 16 | P |
| ROLL | 16 | 1 | 0 | 0 | 1 | 0 | 18 | R |
| GO TOE TO TOE | 17 | 0 | 1 | 1 | 1 | 1 | 15 | O |
| BIG BEN | 18 | 0 | 0 | 0 | 1 | 1 | 3 | C |
| IRON | 19 | 1 | 0 | 0 | 1 | 0 | 18 | R |
| NO AVAIL | 20 | 0 | 0 | 0 | 0 | 1 | 1 | A |
| BIG CHEESE | 21 | 1 | 0 | 0 | 1 | 1 | 19 | S |
| AUDIOSENSITIVITY | 22 | 1 | 0 | 1 | 0 | 0 | 20 | T |
| MOOSE JAW | 23 | 0 | 1 | 0 | 0 | 1 | 9 | I |
| YESTERYEAR | 24 | 0 | 1 | 1 | 1 | 0 | 14 | N |
| THE BOYS | 25 | 0 | 0 | 0 | 0 | 1 | 1 | A |
| ANTHROPOMORPHISM | 26 | 1 | 0 | 1 | 0 | 0 | 20 | T |
| ANOTHER BRICK IN THE WALL | 27 | 0 | 0 | 1 | 0 | 1 | 5 | E |
| OFF BRAND | 28–29 | 0 | 0 | 0 | 1 | 1 | 3 | C |
| GLOBAL WARMING | 30 | 0 | 1 | 1 | 1 | 1 | 15 | O |
| GAMESMANSHIP | 31 | 0 | 1 | 1 | 1 | 0 | 14 | N |
| RHOMBIHEXAHEDRON | 32–33 | 1 | 0 | 1 | 1 | 0 | 22 | V |
| TRANS RIGHTS | 34–35 | 0 | 0 | 1 | 0 | 1 | 5 | E |
| RIBOFLAVIN | 36 | 0 | 1 | 1 | 1 | 0 | 14 | N |
| NONDETERMINISTIC | 37–38 | 1 | 0 | 1 | 0 | 0 | 20 | T |
| ANGRY EYE | 39 | 0 | 1 | 0 | 0 | 1 | 9 | I |
| RED HOT CHILI PEPPERS | 40 | 0 | 1 | 1 | 1 | 1 | 15 | O |
| VIEWERSHIP | 41 | 0 | 1 | 1 | 1 | 0 | 14 | N |

Reading down the final column gives YOU FEAR IT'S THE PROCRASTINATE CONVENTION. Notably, this answer also satisfies all five classes' conditions!

# 1-to-9 Games

5 Points

The set of single-digit positive integers can be used to uniquely fill in each puzzle as follows.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1 | + | 9 | × | 8 | = | 73 | |
| − | + | + | | ÷ | | | |
| 6 | − | 3 | − | 4 | = | −1 | |
| ÷ | | − | + | + | | | |
| 2 | × | 7 | × | 5 | = | 70 | |
| = | | = | | = | = | | |
| −2 | | 5 | | 7 | | 9 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 6 | ÷ | 3 | ÷ | 2 | = | 1 | |
| + | + | × | | × | | | |
| 1 | + | 4 | × | 5 | = | 21 | |
| − | | − | + | + | | | |
| 7 | − | 9 | + | 8 | = | 6 | |
| = | | = | | = | = | | |
| 0 | | 3 | | 18 | | 18 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2 | − | 6 | ÷ | 1 | = | −4 | |
| × | + | × | | − | | | |
| 5 | + | 9 | + | 8 | = | 22 | |
| + | | ÷ | + | ÷ | | | |
| 7 | − | 3 | × | 4 | = | −5 | |
| = | | = | | = | = | | |
| 17 | | 18 | | −1 | | 15 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | × | 9 | − | 4 | = | 41 | |
| × | + | + | | − | | | |
| 3 | × | 2 | ÷ | 6 | = | 1 | |
| + | | + | + | − | | | |
| 8 | − | 1 | + | 7 | = | 14 | |
| = | | = | | = | = | | |
| 23 | | 12 | | −9 | | 14 | |

The values in the bottom right cell of each puzzle can be converted to letters to give IRON.

*Author's Note*: A better, more puzzle-hunt-y version of this puzzle would involve using what was used as the extract numbers here (and five more puzzles) to fill a new grid that was initially empty save for operations. The results from the operations would extract to letters. This would better follow the paradigm of repeating a process to obtain both your intermediate results and final extraction found in, for example, They're Always Up to Something.

# 200-Meter Heardles

5 Points

The audio clip contains the first two seconds of audio in sixteen different songs. Note that the enumerations give the songs in alphabetical order. The songs, in the order that they appear in the link, are as follows.

| Song | Artist |
|---|---|
| L[a]yla | Derek and the Dominos |
| Th[u]nderstruck | AC/DC |
| Joker an[d] the Thief | Wolfmother |
| The F[i]nal Countdown | Europe |
| 25 [o]r 6 to 4 | Chicago |
| We Didn't [S]tart the Fire | Billy Joel |
| W[e] Will Rock You | Queen |
| Sweet Child O' Mi[n]e | Guns N' Roses |
| [S]moke on the Water | Deep Purple |
| Come Sa[i]l Away | Styx |
| Don't Fear [t]he Reaper | Blue Oyster Cult |
| Smells Like Teen Sp[i]rit | Nirvana |
| Se[v]en Nation Army | The White Stripes |
| Baba O'R[i]ley | The Who |
| S[t]airway to Heaven | Led Zeppelin |
| Every Breath [Y]ou Take | The Police |

The indexed letters give `AUDIOSENSITIVITY`.

Thanks to Wolf for creating the audio file.

# 3 Billion, Gagillion, Fafillion, Shabadabalo, Shabadamillion, Shabaling, Shabalomillion. . . Factorizations

10 Points

The giant number presented has a prime factorization of $2^4 \cdot 3^8 \cdot 5^7 \cdot 7^2 \cdot 11^2 \cdot \ldots \cdot 971^2 \cdot 977^6$ and has 1850 digits, following the given enumeration. Note that the exponents of all of the prime factors of this number are single-digit integers (including zero). They can be concatenated to form a new number.

487226665532160658055439109838224280138505273492607234543816931715672916232 ···
386193804196521740102964280468706049589381756261231967375799271123427871179 ···
579693448858126

This number has a prime factorization of $2 \cdot 7 \cdot 23 \cdot 53 \cdot 79 \cdot \ldots \cdot 1997 \cdot 2053$ and has 165 digits. Every prime that appears in the factorization has an exponent of 1. These primes are the $1^{\text{st}}$, $4^{\text{th}}$, $9^{\text{th}}$, $16^{\text{th}}$, $22^{\text{nd}}$, ..., $302^{\text{nd}}$, and $310^{\text{th}}$ prime numbers. This sequence of primes has gaps of length 10 in it, so the number of primes *skipped* between elements of the sequence should be investigated instead. These skips can be concatenated to form a new number.

24654588298086290227517402470432827568013933289620743307 27

This number has a prime factorization of $104971 \cdot 224881 \cdot 350431 \cdot 480167 \cdot 611999 \cdot 746981 \cdot 882631 \cdot 1020457 \cdot 1159661 \cdot 1299917$ and has 58 digits. These are the $10022^{\text{st}}$, $20009^{\text{st}}$, $30005^{\text{st}}$, ..., and $100016^{\text{st}}$ primes. The indices of these prime numbers all follow the same format: a number between 1 and 10 followed by a pair of zeroes followed by a two-digit number less than or equal to 26.

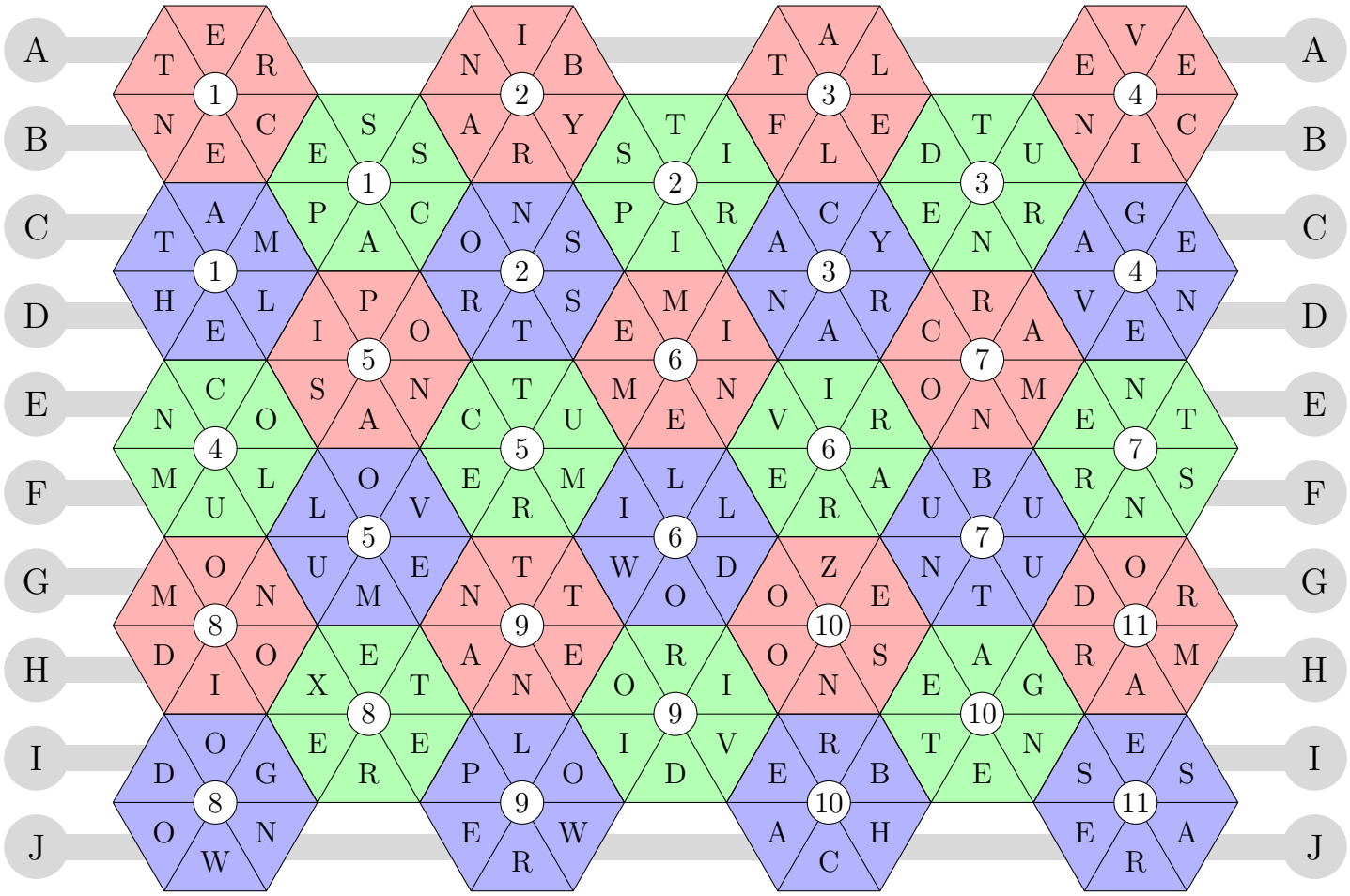
| Prime | Index | # | |
|---|---|---|---|
| 104971 | 10022 | 22 | V |
| 224881 | 20009 | 09 | I |
| 350431 | 30005 | 05 | E |
| 480167 | 40023 | 23 | W |
| 611999 | 50005 | 05 | E |
| 746981 | 60018 | 18 | R |
| 882631 | 70019 | 19 | S |
| 1020457 | 80008 | 08 | H |
| 1159661 | 90009 | 09 | I |
| 1299917 | 100016 | 16 | P |

Reading down the final column gives VIEWERSHIP.

# A Walk in a Rows Garden

15 Points

The Rows Garden can be solved normally.




The extract instructions read `CENTER COLUMN GO DOWN`. Following this gives `TIME LORD`.

# Answers in the Form of a Question

5 Points

Each of the quotes is the answer to a canonical question whose indexing is given.

| Question | Answer |
|---|---|
| How do I love [t]hee? | Let me count the ways. |
| Is that the way you say it, t[h]at's a bingo? | You just say bingo. |
| What's N[e]w Pussycat? *7 | It's Not Unusual *1 |
| Where is your brother A[b]el? | I don't know. Am I my brother's keeper? |
| War! What is it g[o]od for? | Absolutely nothing! |
| Who [y]ou gonna call? | Ghostbusters! |
| What i[s] love? | Baby don't hurt me. |

The indexed letters give THE BOYS.

The sources of the questions and answers are Elizabeth Barrett Browning (Sonnet 43), ''Inglourious Basterds", John Mulaney, the King James Bible, The Temptations, ''Ghostbusters", and Haddaway (respectively).

# Blind Man's Bluff

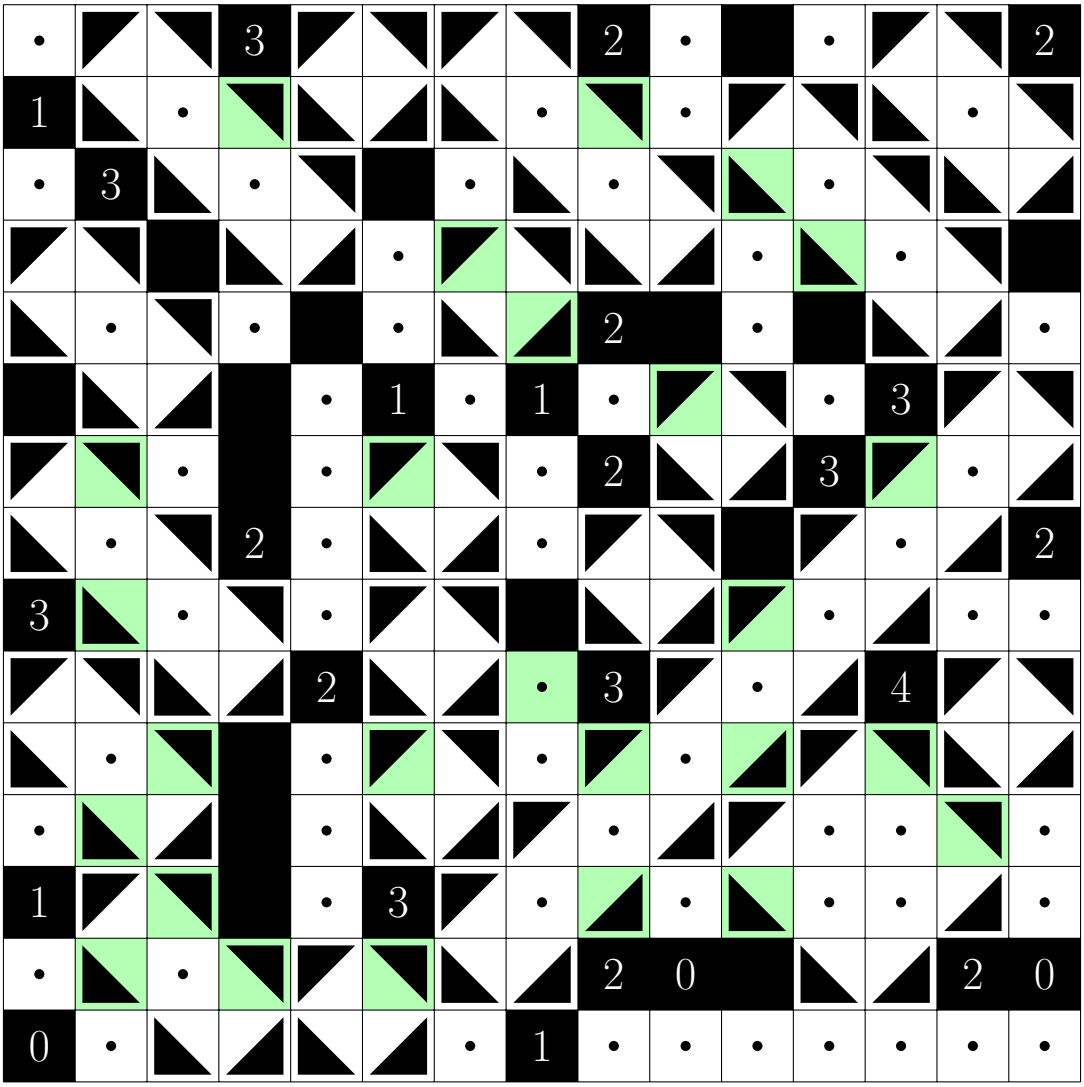
5 Points

Converting the top row from Braille gives the cluephrase `REMAINING IS ASCII`. After the row of Braille characters, each column has eight pips in it. Rotating the page 90° clockwise and reading each row as an ASCII character encoded in binary gives `ANSWER TO PUZZLE IS MANNERS MAKETH MAN`.

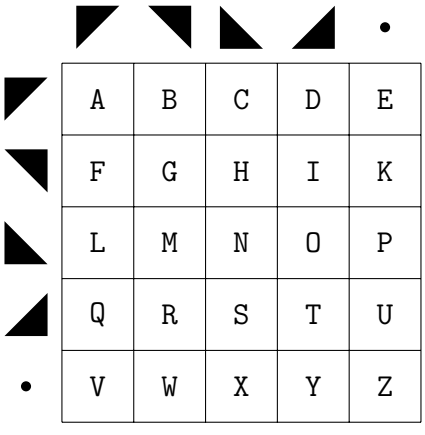
*Author's Note*: At the start of this puzzle, it should be noted that the bottom row contains the same "character" repeated 16 times and can't be Braille anyways since it only has two rows of pips.

15 Points

The solution to the Shakashaka is as follows.



The title to the puzzle is found to be Boom Shakashaka from the answer submission page. This matches with bigrams in the title to create the following Polybius-square-like extraction grid.



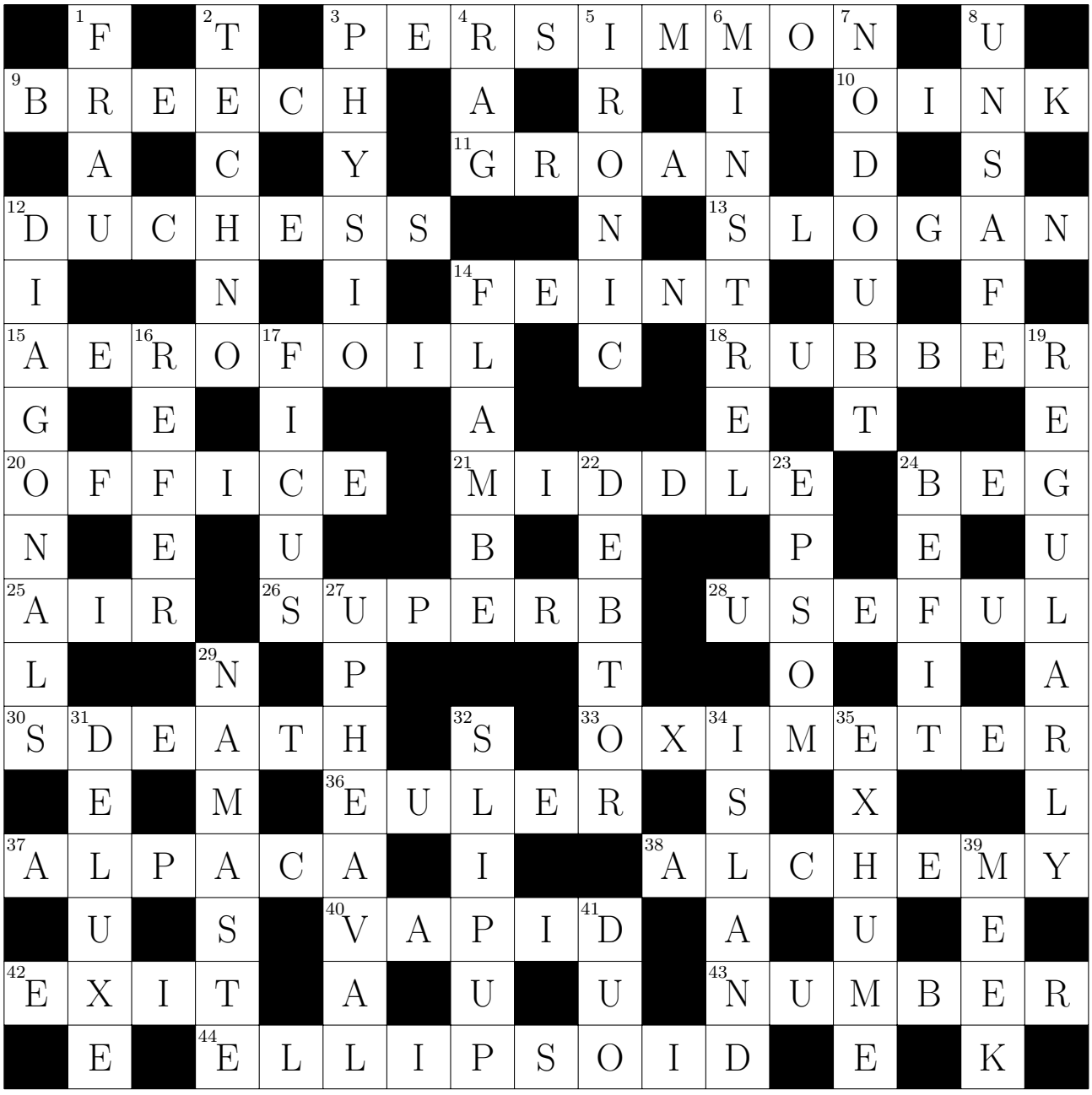
| | | | | |
|---|---|---|---|---|
| A | B | C | D | E |
| F | G | H | I | K |
| L | M | N | O | P |
| Q | R | S | T | U |
| V | W | X | Y | Z |

Extracting pairs of highlighted symbols in reading orders with the above chart gives GLOBAL WARMING.

# Cracking the Cryptic

15 Points

The solution to the cryptic crossword is as follows.




Investigating the `MIDDLE DIAGONALS` as instructed by the puzzle, the letters on the top-left-to-bottom-right and bottom-left-to-top-right diagonals can be concatenated to give `RHOMBIHEXAHEDRON`.

This section contains wordplay explanations for the cryptic crossword. Definitions are colored blue.

## Across

3. According to the computer, my French fruit (9) `PER+SIM+MON`
9. Bravo! Bad cheer for the bottom (6) `B+REECH*`
10. Sound pigs make if they love what's in a pen (4) `O+INK`
11. Ugh, argon got scrambled (5) `GROAN*`

12. Royalty at first doesn't understand board game (7) — D_U_+CHESS
13. Small Hugh Jackman movie tagline (6) — S+LOGAN
14. Fake iron in shirt (5) — FE+IN+T
15. A dirty fanfiction fail, crude tail (8) — A+ERO+F+OIL
18. Latex boot stroker (6) — RUBBER (tdef)
20. Workspace isn't on the rocks (6) — OFF+ICE
21. Dim LED falls apart, revealing extraction hint word one (6) — MIDDLE*
24. Request found in Gamecube game (3) — _BEG_
25. Mixture of gases is even easier (3) — _A_I_R
26. Great, no Hooters in the Super Bowl (6) — SUPERB(-owl)
28. Convenient: following America, fuel disintegrates (6) — US+EFUL*
30. Old curse for sulfuric, hated breakdown (6) — S+DEATH*
33. Pulse measurer insane, exit Rome (8) — OXIMETER*
36. Mathematician Earl doesn't follow strange rule (5) — E+ULER*
37. Prolific spitter and Labour leaders pass Obamacare (6) — A_L_+P+ACA
38. Spread clay around edge of dress, transmutating (7) — ALC(HEM)Y*
40. Uninspired Virginia Pi Day (5) — VA+PI+D
42. Leave information technology, following old partner (4) — EX+IT
43. More desensitized count (6) — NUMBER (ddef)
44. Round, solid pile becomes disorganized (9) — ELLIPSOID*

## Down

1. German woman, French gold (4) — FR+AU
2. Time Cohen messed up music (6) — T+ECHNO*
3. Therapist sounds like bubbly oxygen (6) — PHYSI+O "fizzy"
4. Fish swimming upstream finds old cloth (3) — RAG<
5. Sarcastic clothes press, I see (6) — IRON+I+C
6. "Listen, Mr., it's all wrong!" – the singer (8) — MINSTREL*
7. Gwen Stefani et al. leave, having received an 85% grade (2 5) — NO DOU(B)T
8. United Nations secure cabinet is actually quite dangerous (6) — UN+SAFE
12. Extraction hint word two appeared as loading messed up (9) — DIAGONALS*
14. Food surrounded with fire on the outside! (6) — F_+LAMB+_E (&lit)
16. Consult with ump, looking up and down (5) — >REFER<
17. Terrific uses include houseplant (5) — _FICUS_
19. Gru: really awful, often (9) — REGULARLY*
22. Initially dreadful bet goes awry, nothing right for insolvent (6) — D_(EBT*)+O+R
23. Bad pose, Mike; it's salt (5) — (EPSO*)M
24. Be suited for! (5) — BE+FIT (&lit)
27. Strangely, a pH value causes political strife (8) — UPHEAVAL*
29. Yoga greeting from tuna master (7) — _NAMASTE_
31. Top-quality unit of illuminance owned by Strange-Gordon (6) — DE(LUX)E
32. Students going north stumble (4 2) — SLIP UP<
34. "Is North Dakota south of Louisiana?" No, man (6) — IS+LA+ND
35. Dig up former empiricist (6) — EX+HUME
39. The Earth's inheritors: me and Elena Kagan, initially (4) — ME+E_K_
41. Osteopathic doctor has uniform, partners (3) — D(U)O

Thanks to Deusovi, Giovanni, Wolf, Skaldskaparma, and many others for assistance with these clues; it was my first time ever writing cryptic clues!

# CYBORG

10 Points

Divide the quadruplets of letters by their respective colors. It is possible to concatenate members of each group to form the names of items that are part of a group of six items with one missing. There is one color missing per group, and all missing colors are unique. The title of the puzzle gives the proper way to order the missing colors: **C**yan, **Y**ellow, **B**lue, **O**range, **R**ed, and **G**reen.

- Order of operations: (BRACKETS), ADDITION, SUBTRACTION, INDICES, MULTIPLICATION, DIVISION
- Original X-Men: BEAST, (ICEMAN), MARVEL GIRL, PROFESSOR X, CYCLOPS, ANGEL
- Cluedo suspects: WHITE, PEACOCK, (GREEN), MUSTARD, PLUM, SCARLETT
- Chess pieces: KNIGHT, ROOK, QUEEN, (BISHOP), KING, PAWN
- Passover seder plate: PARSLEY, CHAROSET, BITTER HERB, LETTUCE, (EGG), SHANKBONE
- NHL Original Six: BOSTON BRUINS, CHICAGO BLACK HAWKS, DETROIT RED WINGS, TORONTO MAPLE LEAFS, MONTREAL CANADIENS, (NEW YORK RANGERS)

The first letters of the missing items give BIG BEN.

# Desired Salary: $21,025,001,005,015,010,000

10 Points

A job's salary in thousands represents the sum of the values of each of the letters in the name of the job; note how the names of the jobs generally get shorter as the salary decreases. There are many ways to solve this overdetermined system of equations, but the following is a perfectly logical approach. Pluses continue to be omitted.

- $\texttt{WAITRESS} - \texttt{WAITER} = 26 \rightarrow \texttt{S} = 13$
- $\texttt{SAILOR} - \texttt{TAILOR} = 4 = \texttt{S} - \texttt{T} \rightarrow \texttt{T} = 9$
- $\texttt{PHYSICIAN} - \texttt{PHYSICIST} = -7 = \texttt{AN} - \texttt{ST} \rightarrow \texttt{AN} = 15$
- $\texttt{ASTRONAUT} - \texttt{AUTHOR} = 26 = \texttt{ANST} - \texttt{H} \rightarrow \texttt{H} = 11$
- $\texttt{CURATOR} - \texttt{AUTHOR} = 27 = \texttt{CR} - \texttt{H} \rightarrow \texttt{CR} = 18$
- $\texttt{CHEMIST} - \texttt{ARCHITECT} = 1 = \texttt{MS} - \texttt{ACRT} \rightarrow \texttt{M} - \texttt{A} = 25$

The only way this last equation is possible is if $\texttt{A} = 1$ and $\texttt{M} = 26$. The remaining letters can be found with the information obtained so far and other similar subtractions.

| | | | |
|---|---|---|---|
| A | 1 | 1 | A |
| B | 19 | 2 | V |
| C | 23 | 3 | Q |
| D | 8 | 4 | K |
| E | 25 | 5 | R |
| F | 7 | 6 | O |
| G | 17 | 7 | F |
| H | 11 | 8 | D |
| I | 24 | 9 | T |
| J | 20 | 10 | Y |
| K | 4 | 11 | H |
| L | 15 | 12 | W |
| M | 26 | 13 | S |
| N | 14 | 14 | N |
| O | 6 | 15 | L |
| P | 21 | 16 | Z |
| Q | 3 | 17 | G |
| R | 5 | 18 | U |
| S | 13 | 19 | B |
| T | 9 | 20 | J |
| U | 2 | 21 | P |
| V | 18 | 22 | X |
| W | 12 | 23 | C |
| X | 22 | 24 | I |
| Y | 10 | 25 | E |
| Z | 16 | 26 | M |

The title of the puzzle gives a desired salary that has the sequence $\{21, 25, 1, 5, 15, 10\}$ before the always-ignored triplet of zeroes. Converting these numbers using the above chart gives PEARLY.

*Author's Note*: A couple of testsolvers, including Timwi and Galois, decided to solve this puzzle by plugging thirty equations into Maple, Sage, etc. It works!

# *Determine* a Nine-Character Word That Parallels Each Clue

10 Points

Each of the nine words in the title contains a square number of letters. Inspired by the instruction to "determine", arranging these words' letters in a square matrix and taking the determinant of that matrix results in the given set of numbers.

Assisted by the title and the letter bank, the answers to the clues, respectively, are `HUNCHBACK`, `DIALOGUES`, `UNSOURCED`, `SERIOUSLY`, `QUILLWORK`, `FREIGHTER`, `ASPARTATE`, `HAPLESSLY`, and `DANGEROUS`. Arranging these in 3-by-3 matrices and taking the determinant of each matrix containing the letters' numerical equivalents yields the set $\{19, 16, 18, 21, 3, 5, 7, 21, 13\}$. Converting these to numbers gives `SPRUCE GUM`.

# Double Down

5 Points

The answers to the clues, in order, are EVERGREEN, INTERROGATE, APPROXIMATE, HOOVER, JUBILEE, FEMME, BIZARRO, DOTTED, CARTOON, and GUPPY. Noting that these answers start with the letters A through J and the title, they can be reordered and have their unique double letters extracted.

| Answer | |
|---|---|
| APPROXIMATE | P |
| BIZARRO | R |
| CARTOON | O |
| DOTTED | T |
| EVERGREEN | E |
| FEMME | M |
| GUPPY | P |
| HOOVER | O |
| INTERROGATE | R |
| JUBILEE | E |

Reading down the final column gives PRO TEMPORE.

# Flags of the World

15 Points

Each diagram is an adjacency graph of adjacency graphs. Each smaller graph represents the borders between colors on a country's flag. A connection between two of these smaller graphs represents land borders between those countries. All of the countries border the central country, which is used for extraction. The number before the arrow is used as an index into the country's name, and the number after the arrow represents the position of the indexed letter in the answer to the puzzle. To aid in finding the correct countries (since many countries' flags can have the same adjacency graph), the central countries are presented in alphabetical order.

In the following chart, surrounding countries are given in clockwise order, starting with the country closest to 12 o'clock.

| Country | Borders |
|---|---|
| Ben[i]n | Niger, Nigeria, Togo, Burkina Faso |
| Bo[t]swana | Zambia, Zimbabwe, South Africa, Namibia |
| Canad[a] | United States of America, Greenland |
| Ecuado[r] | Colombia, Peru |
| [G]uatemala | Belize, Honduras, El Salvador, Mexico |
| Lao[s] | China, Vietnam, Cambodia, Thailand, Myanmar |
| Nort[h] Korea | Russia, South Korea, China |
| Pa[r]aguay | Brazil, Argentina, Bolivia |
| Roma[n]ia | Ukraine, Moldova, Bulgaria, Serbia, Hungary |
| [S]omalia | Ethiopia, Kenya, Djibouti |
| Swi[t]zerland | Liechtenstein, Austria, Italy, France, Germany |

Placing the indexed letters properly gives `TRANS RIGHTS`. 

# I'm Not Joking, and Don't Call Me Shirley

5 Points

The solution to the dropquote is the following quote from Richard Feynman.

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | N | A | M | I | L | E | F | C | R | A | H | C | E | R |
| S | R | E | P | P | E | P | N | Y | I | H | D | T | O | H | D | I | R |

| | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Y | O | U | ■ | H | A | V | E | ■ | N | O | ■ | R | E | S | P | O | N |
| S | I | B | I | L | I | T | Y | ■ | T | O | ■ | L | I | V | E | ■ | U |
| P | ■ | T | O | ■ | W | H | A | T | ■ | O | T | H | E | R | ■ | P | E |
| O | P | L | E | ■ | T | H | I | N | K | ■ | Y | O | U | ■ | O | U | G |
| H | T | ■ | T | O | ■ | A | C | C | O | M | P | L | I | S | H | . | ■ |
| I | ■ | H | A | V | E | ■ | N | O | ■ | R | E | S | P | O | N | S | I |
| B | I | L | I | T | Y | ■ | T | O | ■ | B | E | ■ | L | I | K | E | ■ |
| T | H | E | Y | ■ | E | X | P | E | C | T | ■ | M | E | ■ | T | O | ■ |
| B | E | . | ■ | I | T | ’ | S | ■ | T | H | E | I | R | ■ | M | I | S |
| T | A | K | E | , | ■ | N | O | T | ■ | M | Y | ■ | F | A | I | L | I |
| N | G | . | ■ | | | | | | | | | | | | | | |

It is impossible to spell Richard Feynman's name in the fourteen letters at the end of the dropquote with the remaining letters. . . at least it's not possible forwards. It *is* possible to spell his name backwards. On the theme of instead moving from right to left, the remaining unused letters give RED HOT CHILI PEPPERS.

*Author's Note*: If the extra letters were extracted going from left to right, it would be possible to skip the entire dropquote part of the puzzle by simply plugging in the candidate letters to Nutrimatic. Richard Feynman's name was written backwards to hint at the backwards extraction.

The title of the puzzle is a combination of Richard Feynman's collection of reminiscences "Surely You're Joking, Mr. Feynman!" and the famous quote from "Airplane!", "I am serious, and don't call me Shirley".

# It Just So Happens. . .

15 Points

Each clue can be filled in and have its notable information charted.

| Answer | ◯ | $a$ | $b$ |
|---|---|---|---|
| KRAKATOA | T | O | A |
| WORKVISA | W | W | O |
| PFEIFFER | E | P | F |
| XYLULOSE | L | Y | E |
| OVERCAST | V | E | C |
| SEQUITUR | E | T | R |
| THEORIZE | T | H | O |
| CANADAIR | R | C | N |
| ZEROGAME | O | R | O |
| ISLANDER | L | S | L |
| ELEPHANT | L | L | H |
| KRASNAYA | S | R | S |

Reading the circled letters spells TWELVE TROLLS, which is a reference to Homestuck, from which the green house symbol (which I put *way* too much effort into recreating with Ti*k*z) also originates. Values for $a$ and $b$ can be found by converting their letters to numbers. The letters not marked by $a$ or $b$ in each answer can be anagrammed to form the names of the twelve Beta trolls in Homestuck, which are canonically ordered by their correspondence to a zodiacal symbol, starting with Aries. This gives the values of $z$, which are also used to reorder the answers. Finally, evaluate the expression associated with each answer and convert those values back to letters.

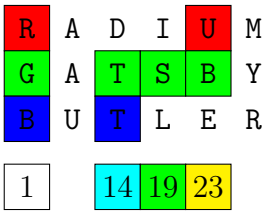
| Answer | $a$ | $b$ | Troll | $z$ | # | |
|---|---|---|---|---|---|---|
| CANADAIR | 3 | 14 | Aradia | 1 | 1 | A |
| OVERCAST | 5 | 3 | Tavros | 2 | 16 | P |
| XYLULOSE | 25 | 5 | Sollux | 3 | 15 | O |
| KRAKATOA | 15 | 1 | Karkat | 4 | 12 | L |
| ELEPHANT | 12 | 8 | Nepeta | 5 | 12 | L |
| KRASNAYA | 18 | 19 | Kanaya | 6 | 15 | O |
| THEORIZE | 8 | 15 | Terezi | 7 | 5 | E |
| WORKVISA | 23 | 15 | Vriska | 8 | 12 | L |
| SEQUITUR | 20 | 18 | Equius | 9 | 5 | E |
| ZEROGAME | 18 | 15 | Gamzee | 10 | 22 | V |
| ISLANDER | 19 | 12 | Eridan | 11 | 5 | E |
| PFEIFFER | 16 | 6 | Feferi | 12 | 14 | N |

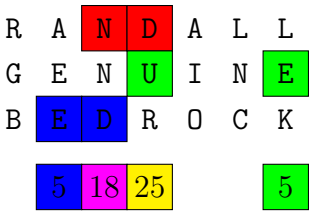
Reading down the final column gives APOLLO ELEVEN.

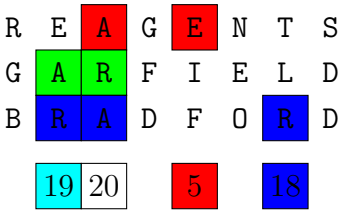
# Look Ma, I Made #Starboard!

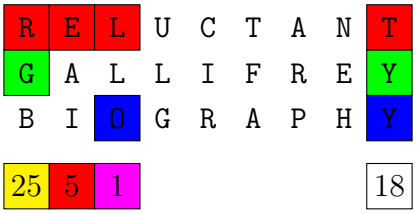
10 Points

The answer to each clue is a 6-to-9 letter answer starting with either R, G, or B, matching them with the colors red, green, and blue. Those are the primary colors used in color addition. Keeping with the addition theme, the values of the letters whose associated color is part of the extraction square can be added together, modulo 26.



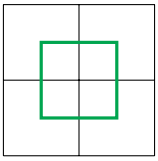




Converting the numbers to letters gives ANSWER YESTERYEAR.

# Microscopic Masyu

10 Points

The Masyu given is the smallest possible on a square grid, but inputting its solution on Penpa does not yield any useful information.



However, the true puzzle is hidden in the Penpa user interface elements.

- The grid can be highlighted using Surface Mode to reveal the message `top left is romeo`.
- In the rules, some of the letters are special characters from Mathematical Alphanumeric Symbols Unicode block; they spell `top right is oscar`.
- The Source button leads to an identical Masyu; inputting the same solution as the original puzzle gives `bottom left is lima`.
- The end of the puzzle's URL reads `bottom right is lima`.

As it turns out, the 2-by-2 grid on the puzzle page is for inputting letters whose NATO phonetic alphabet equivalents are given by the Masyu.

| | |
|---|---|
| R | O |
| L | L |

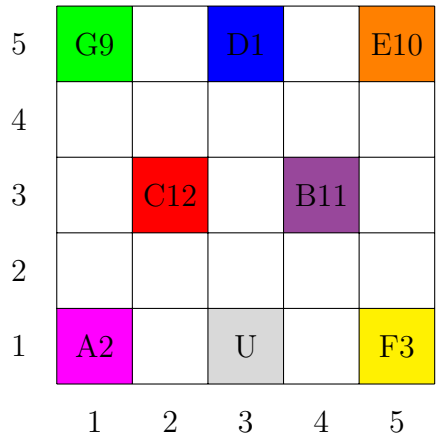
In reading order, this spells `ROLL`.

*Author's Note*: The Rickroll associated with clicking the Source button on the second Masyu is thematic with the answer to the puzzle. Original puzzle idea by Sophie.

# New Neighbors

15 Points

The following diagram represents the neighborhood.

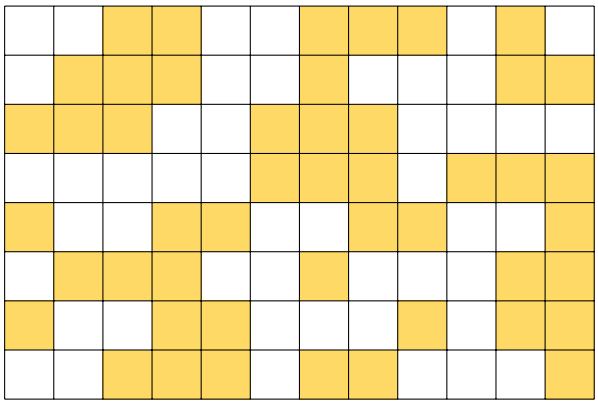


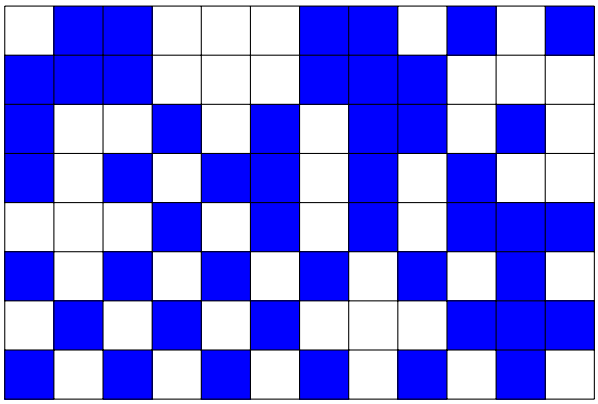

The path that each person travels is in the shape of a letter, though sometimes a person's "movement" is actually them staying in the same house (as explicitly demonstrated in Alice's path). Noting that the names of the residents are in alphabetical order, the ordering of the letters can be changed to chronological order. Doing this gives `NO AVAIL`.

# Nonogramming the Last Layer

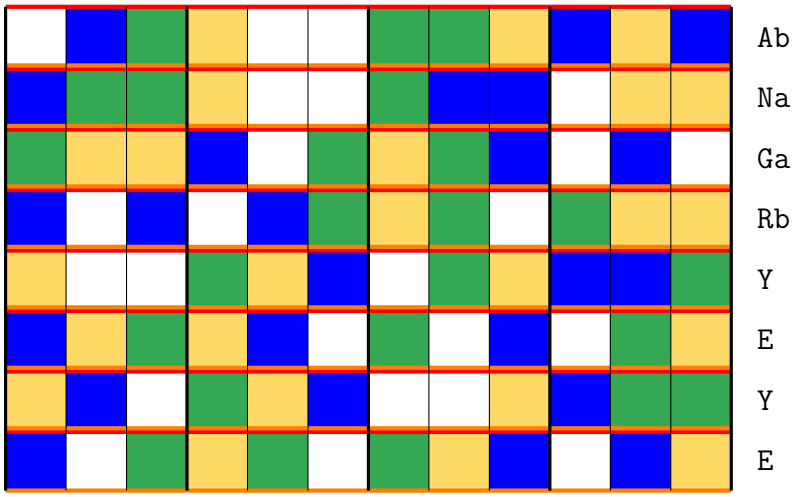
15 Points

The solutions to the two nonograms are as follows.





Yellow and blue are primary colors for painters, and can be added together to produce the following composite solution (which also includes the borders from the original grid). Each row represents a PLL (Permuting the Last Layer) case for the last step of solving a Rubik's cube with the CFOP method, as implied by both the title and the color scheme of each row. The names of those cases are shown.




Ignoring the subcase names and reading down gives ANGRY EYE.

# Not Just Vocalic. . . Supervocalic! 5 Points

A supervocalic is a word or phrase that contains each of the five vowels exactly once; in fact, the word ‘‘supervocalic” is itself supervocalic! Each clue’s answer is a name that is supervocalic. In terms of the clues themselves, all the vowels have been removed. However, the full enumeration of each clue has been provided to assist solvers in reconstructing the original clue, as well as the enumeration of each answer.

Author of ‘‘The Hunger Games”, ‘‘Catching Fire”, and ‘‘Mockingjay”
[S]uzanne Collins
Baseball player who hit the ‘‘Grand Slam Single” in the nineteen ninety-nine NLCS
Robin Vent[u]ra
Winner of a Golden Globe for Best Actress for her role in ‘‘Pretty Woman”
Julia Ro[b]erts
Twenty-year basketball player for the Miami Heat wearing number forty
Udonis Hasle[m]
Fictional International Man of Mystery played by Mike Myers
Aust[i]n Powers
Hall of Fame New Jersey Devils goalie who ironically has three career goals
Mar[t]in Brodeur
Actor who played Agent Smith in ‘‘The Matrix” and the titular V in ‘‘V for Vendetta”
Hugo Wea[v]ing
American television personality who hosted the US-Soviet Space Bridge series during the Cold War
Phil D[o]nahue
Folk singer who told a story about dodging the draft in ‘‘Alice’s Restaurant Massacree”
Ar[l]o Guthrie
First woman to climb the highest mountain on all seven continents
Jun[k]o Tabei
Hunagrian actor who played Count Dracula in a Broadway adaptation
Bela Lugo[s]i
Meat packet thought to have inspired the character Uncle Sam on propaganda posters
Samuel [W]ilson
Actor who played the titular Big Lebowski and the mayor in ‘‘Blazing Saddles”
D[a]vid Huddleston
University of Miami graduate who won all diving gold medals at consecutive Olympics
[G]reg Louganis
Quaker abolitionist who co-wrote the Declaration of Sentiments at the Seneca Falls Convention
Lucr[e]tia Mott
Flugelhornist who found international success with his single ‘‘Feels So Good”
Chuck Mangio[n]e

The indexed letters give `SUBMIT VOLKSWAGEN`.
Notably, this final cluephrase is also supervocalic!

# Page Turners

5 Points

The protagonists are as follows.

| Protagonist | Book | Author |
|---|---|---|
| Gregor Samsa | The Metamorphosis | Franz Kafka |
| Alice | Alice's Adventures in Wonderland | Lewis Carroll |
| Mary Poppins | Mary Poppins | P.L. Travers |
| Ebenezer Scrooge | A Christmas Carol | Charles Dickens |
| Santiago | The Old Man and the Sea | Ernest Hemingway |
| Michael Corleone | The Godfather | Mario Puzo |
| Anne Shirley | Anne of Green Gables | Lucy Maud Montgomery |
| Norman Bates | Psycho | Robert Bloch |
| Sam-I-Am | Green Eggs and Ham | Dr. Seuss |
| Hester Prynne | The Scarlet Letter | Nathaniel Hawthorne |
| Ignatius Reilly | A Confederacy of Dunces | John Kennedy Toole |
| Patrick Bateman | American Psycho | Bret Easton Ellis |

The first letters of the protagonists' names, reading down, give `GAMESMANSHIP`.

# Prime Directive

5 Points

Solve each equation and highlight the cells with prime number results, as hinted by the title.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 5 | 8 | 9 | 6 | 8 | 12 | 6 | 21 |
| 7 | 9 | 12 | 40 | 7 | 7 | 5 | 1 |
| 11 | 2 | 7 | 28 | 2 | 16 | 7 | 9 |
| 4 | 54 | 20 | 4 | 11 | 2 | 3 | 6 |
| 5 | 81 | 5 | 9 | 8 | 4 | 14 | 8 |
| 11 | 10 | 7 | 15 | 8 | 5 | 3 | 5 |
| 6 | 5 | 21 | 9 | 6 | 7 | 7 | 4 |
| 6 | 16 | 6 | 9 | 49 | 5 | 2 | 5 |

The highlighted cells spell out the word LOVE.

*Author's Note*: This puzzle was written around 2017 for a Codes and Ciphers test that was partially repurposed for the 2022 State Convention Interschool and is one of two very old puzzle ideas of mine in this hunt that until now I have not been able to publish for several years, the other being Nonogramming the Last Layer. It is inspired by the LOVE statue in Philadelphia.

# Pyramid Scheme

5 Points

Each cell is the sum of the two cells below it, as demonstrated by the top two rows. Filling in the first five rows is trivial, but there is no entry in the sixth row. To resolve this, let the value of the cell between 483 and 312 be $x$. Then the two cells above it are $483 + x$ and $312 + x$, which sum to $795 + 2x = 1609$, giving $x = 407$. The sixth and seventh rows can now be filled, and similar logic can be used to fill in the eighth and ninth rows, where $(130 + y) + (69 + y) = 199 + 2y = 407$ yields $y = 104$.

In the eleventh row, let the cells between 11 and 28 have values of $a$, $b$, and $c$. Then the four cells above them have values $11 + a$, $a + b$, $b + c$, and $c + 28$. The three cells above these give the system of equations $11 + 2a + b = 79$, $a + 2b + c = 119$, and $b + 2c + 28 = 130$ which has a solution set of $\{17, 34, 34\}$. The rest of the grid can be filled in as follows.

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 25363 | | | | | | |
| | | | | | 13352 | 12011 | | | | | |
| | | | | 6969 | 6383 | 5628 | | | | | |
| | | | 3540 | 3429 | 2954 | 2674 | | | | | |
| | | 1720 | 1820 | 1609 | 1345 | 1329 | | | | | |
| | | 790 | 930 | 890 | 719 | 626 | 703 | | | | |
| | | 343 | 447 | 483 | 407 | 312 | 314 | 389 | | | |
| | | 145 | 198 | 249 | 234 | 173 | 139 | 175 | 214 | | |
| | | 66 | 79 | 119 | 130 | 104 | 69 | 70 | 105 | 109 | |
| | | 38 | 28 | 51 | 68 | 62 | 42 | 27 | 43 | 62 | 47 |
| | | 27 | 11 | 17 | 34 | 34 | 28 | 14 | 13 | 30 | 32 | 15 |
| 18 | 9 | 2 | 15 | 19 | 15 | 13 | 1 | 12 | 18 | 14 | 1 |

Converting the bottom row to letters gives the answer RIBOSOMAL RNA.

# Quiz Bowl

10 Points

Each of the words in each clue of this puzzle has been mangled in a specific way.

| Clue | Answer | Method |
|---|---|---|
| Animal that Shaymin's Land Forme most closely resembles | HEDGEHOG | Even then odd letters |
| Brain lobe responsible for higher cognitive functions and movement | FRONTAL | 1st letter +4, last −4 |
| Bridge that connects Detroit, Michigan with Windsor, Ontario | AMBASSADOR | Backwards |
| Composer of the Moonlight Sonata who later wrote works while deaf | BEETHOVEN | Swap word halves |
| Differing proteins encoded from the same gene via alternative splicing | ISOFORMS | Rotate left 3 |
| Dorian Electra single that shares its name with "Gangnam Style" follow-up | GENTLEMAN | Delete borders |
| Moving craft may indicate this signal with Morse code SOS | DISTRESS | Swap 1st and 3rd |
| Roman officer that surprisingly only commanded eighty soldiers | CENTURION | 4th to front, +7 |
| The intensity of this event is measured by the Richter scale | EARTHQUAKE | ROT−11 |

Note that the answers start with the letters A through I, providing a reordering mechanic. The manglings can also be performed on the answers.

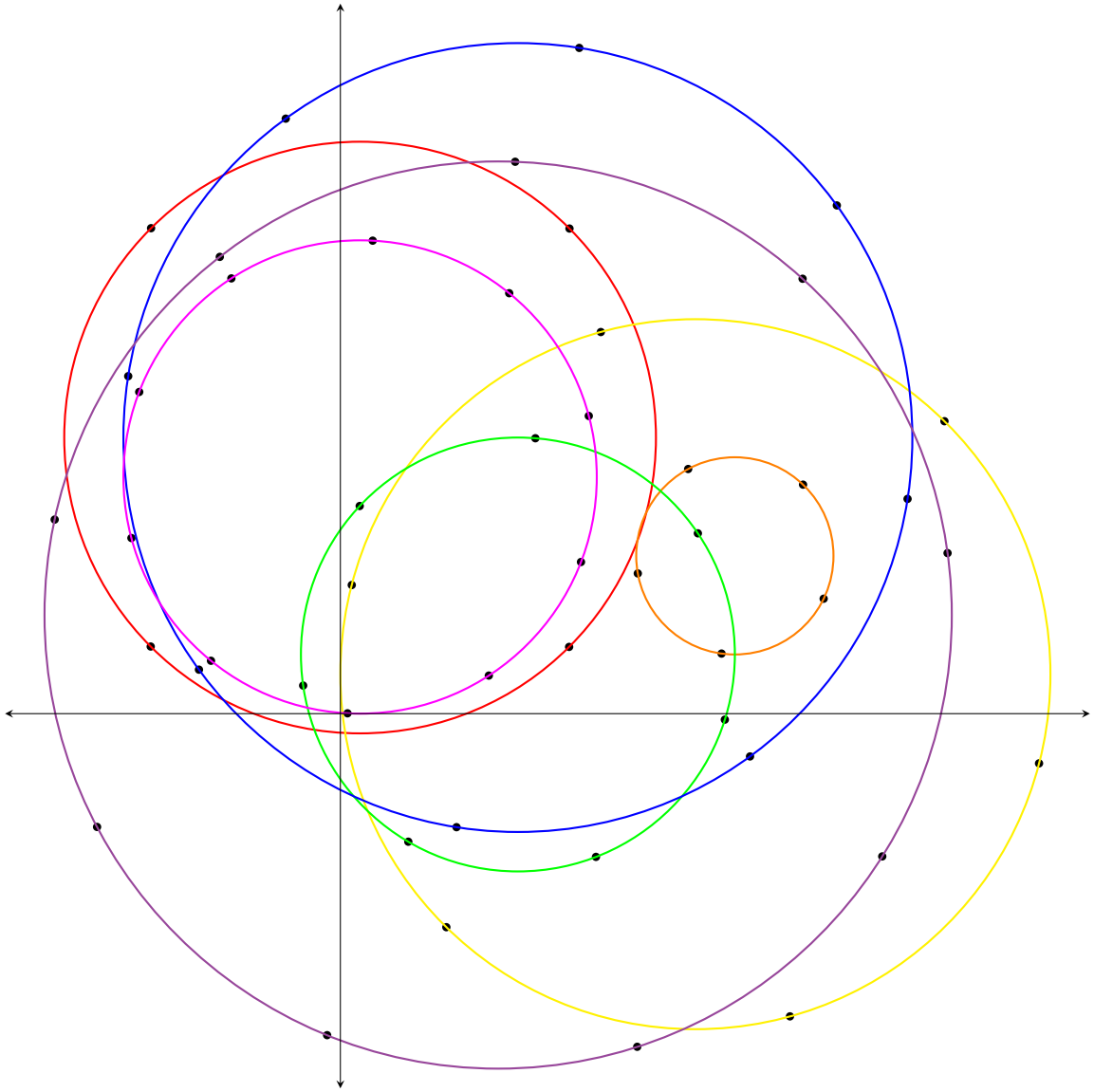
| Answer | Mangled |
|---|---|
| AMBASSADOR | RODASSABMA |
| BEETHOVEN | OVENHBEET |
| CENTURION | ACENURION |
| DISTRESS | SIDTRESS |
| EARTHQUAKE | TPGIWFJPZT |
| FRONTAL | BRONTAP |
| GENTLEMAN | ENTLEMA |
| HEDGEHOG | EGHGHDEO |
| ISOFORMS | FORMSISO |

The first letters of the mangled answers give ROAST BEEF.

# Seven Circles of Hell

15 Points

When the points are plotted, they can be connected to form, as the title suggests, seven circles.



The equations of the circles can be ordered by the number of points on them. To extract, convert the values of $h$, $k$ and $r$ (from the standard equation $(x-h)^2+(y-k)^2=r^2$) to letters.

| # | Color | Equation | $\{h,k,r\}$ | |
|---|---|---|---|---|
| 4 | Red | $(x-1)^2+(y-14)^2=15^2$ | $\{1,14,15\}$ | A N O |
| 5 | Orange | $(x-20)^2+(y-8)^2=5^2$ | $\{20,8,5\}$ | T H E |
| 6 | Yellow | $(x-18)^2+(y-2)^2=18^2$ | $\{18,2,18\}$ | R B R |
| 7 | Green | $(x-9)^2+(y-3)^2=11^2$ | $\{9,3,11\}$ | I C K |
| 8 | Blue | $(x-9)^2+(y-14)^2=20^2$ | $\{9,14,20\}$ | I N T |
| 9 | Purple | $(x-8)^2+(y-5)^2=23^2$ | $\{8,5,23\}$ | H E W |
| 10 | Magenta | $(x-1)^2+(y-12)^2=12^2$ | $\{1,12,12\}$ | A L L |

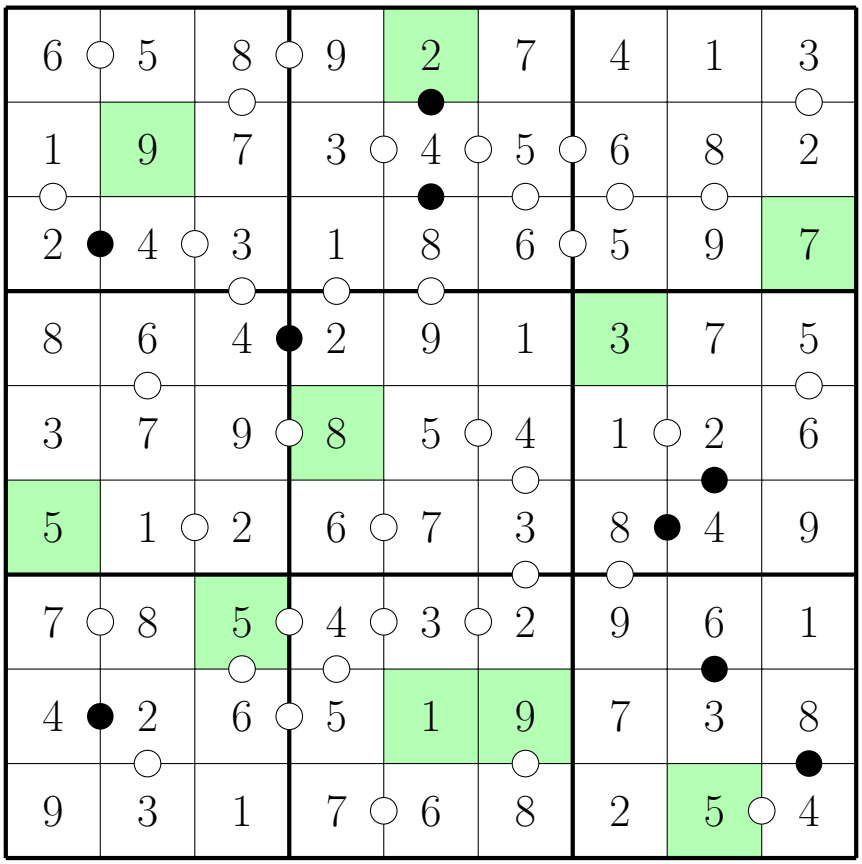
Reading across the rows gives ANOTHER BRICK IN THE WALL.

Puzzle inspired by my Geogebra-based solution to Circles by Timwi, who also generated the points with a much better algorithm than I had.

# Solving a Sudoku With No Given Digits???

10 Points

The solution to the Kropki Sudoku is as follows.




Converting the numbers in the green cells to letters and reading down gives the answer BIG CHEESE.

*Author's Note*: One testsolver on The C@r@line Syzygy took the name of this puzzle a step further and figured out the extraction method before solving the Sudoku. When they solved the puzzle, I noted their method "Solving an Extraction With No Puzzle Solved???"; `BIG CHEESE` is the 61st result to the Nutrimatic query `[abcdefghi]{7}[jklmnopqrstuvwxyz][abcdefghi]`. Personally, I also like the results `DECIDABLE` and `CAGED BIRD`.

"Solving a [blank] with NO GIVEN [blank]???" is a puzzle hunt meme originating from the 2021 Teammate Hunt, which itself was referencing some of the wonderful Miracle Sudoku solves on the YouTube channel Cracking the Cryptic (after which another puzzle in this hunt is named).

Thanks to Timwi for setting the Sudoku.

# SPARE Parts

5 Points

As implied by the title, each clue's answer is comprised of only the letters in the word SPARE. Five bit binary is used to extract.

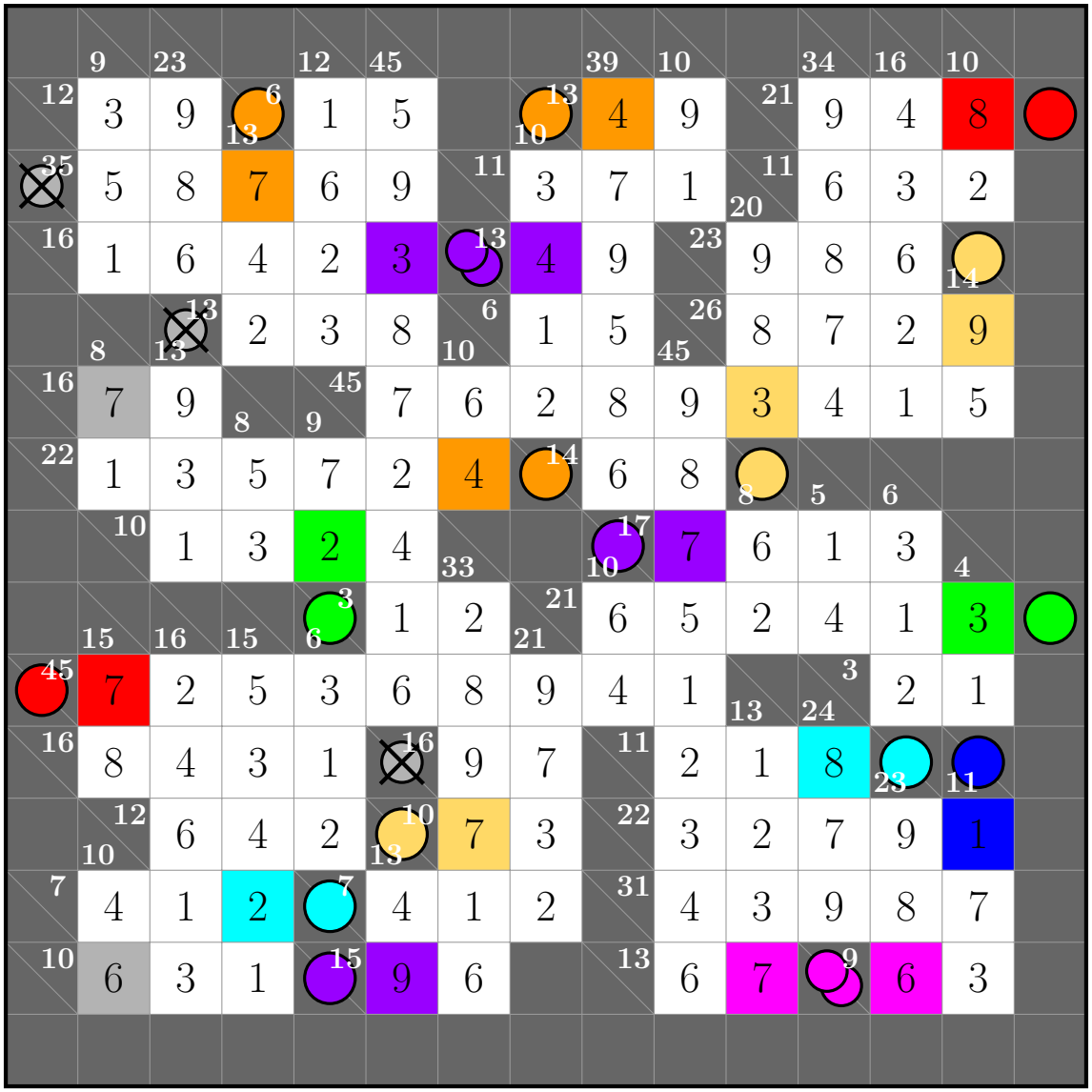
| Answer | S | P | A | R | E | # | |
|---|---|---|---|---|---|---|---|
| PREPARE | 0 | 1 | 1 | 1 | 1 | 15 | O |
| PARA | 0 | 1 | 1 | 1 | 0 | 14 | N |
| ERR | 0 | 0 | 0 | 1 | 1 | 3 | C |
| RAPPER | 0 | 1 | 1 | 1 | 1 | 15 | O |
| RARE | 0 | 0 | 1 | 1 | 1 | 7 | G |
| EEA | 0 | 0 | 1 | 0 | 1 | 5 | E |
| ARPA | 0 | 1 | 1 | 1 | 0 | 14 | N |
| AEAEA | 0 | 0 | 1 | 0 | 1 | 5 | E |
| SEER | 1 | 0 | 0 | 1 | 1 | 19 | S |

Reading down the final column gives ONCOGENES.

# Subjective Ranking

10 Points

The solution to the Akari-Tents-Kakuro is as follows, where cells with lamps have been highlighted in their proper colors.



Each color is represented by up to four cells in the Kakuro. These cells can be summed to get a single value for each color. Note that an ordering for the colors is given by the title. Using this and converting the sums to letters gives MOOSE JAW.

Puzzle inspired by Objectionable Ranking (Take the Light) by Timwi in the Quantum Online Puzzle Hunt.

# The 2023 FAMAT State Convention Open Interschool Individual Test

15 Points

While this may *look* like individual tests given at FAMAT competitions, most of the questions have multiple valid answers. Noting that there are five choices per question, a five bit binary extract can be used.

| Q | A | B | C | D | E | # | |
|---|---|---|---|---|---|---|---|
| 1 | | B | C | D | | 14 | N |
| 2 | | B | C | D | E | 15 | O |
| 3 | A | | C | D | E | 23 | W |
| 4 | | | C | | | 4 | D |
| 5 | | B | C | D | E | 15 | O |
| 6 | | B | | | | 8 | H |
| 7 | | | C | | E | 5 | E |
| 8 | A | B | | | | 24 | X |
| 9 | | | | | E | 1 | A |
| 10 | | | C | | | 4 | D |
| 11 | | | C | | E | 5 | E |
| 12 | | | | D | E | 3 | C |
| 13 | | B | | | E | 9 | I |
| 14 | | B | C | | E | 13 | M |
| 15 | | | | | E | 1 | A |
| 16 | | B | C | | | 12 | L |

Following the instructions in the final column, now interpret the questions in hexadecimal, even the $12 \to 18$ and the $41 \to 65$ in the problem statements of questions 1 and 6.

| Q | A | B | C | D | E | # | |
|---|---|---|---|---|---|---|---|
| 1 | | | | D | E | 3 | C |
| 2 | | | C | D | E | 15 | O |
| 3 | A | | C | | E | 21 | U |
| 4 | | B | C | D | | 14 | N |
| 5 | A | | C | | | 20 | T |
| 6 | | | C | | E | 5 | E |
| 7 | A | | | D | | 18 | R |
| 8 | | | | D | E | 3 | C |
| 9 | | B | C | | | 12 | L |
| 10 | | B | C | D | E | 15 | O |
| 11 | | | | D | E | 3 | C |
| 12 | | B | | D | E | 11 | K |
| 13 | A | | C | D | E | 23 | W |
| 14 | | B | | | E | 9 | I |
| 15 | A | | | D | E | 19 | S |
| 16 | | | C | | E | 5 | E |

Reading down the final column gives COUNTERCLOCKWISE.

# The Connecting Wall of Sequences

10 Points

This puzzle is based on the British game show *Only Connect*, incorporating rounds 2 and 3. In reading order, the missing elements (and their associated sequences) are as follows.

- `VIOLET` – Children who are removed from Willy Wonka's chocolate factory
- `JASMINE` – Disney princesses in order of release
- `FROZEN` – Non-volatile "Pokémon" status conditions, alphabetically
- `OSCAR` – EGOT awards
- `MINT` – Card grading standards
- `ROCKY` – Name of the movie
- `X-RAY` – Wavelengths of the electromagnetic spectrum with increasing frequency
- `NASHVILLE` – US state capitals, alphabetically
- `UP` – Directions on a game controller, going clockwise
- `NOVEMBER` – Months of the year
- `TIME` – Songs on Pink Floyd's "The Dark Side of the Moon" side one
- `PLATOON` – Groups in the US military, in increasing order of size
- `DIAMOND` – Tool materials in "Minecraft", in increasing order of speed
- `JEOPARDY` – Shows hosted by Alex Trebek
- `CREAM` – Bands played in by Eric Clapton
- `JULIET` – Deaths in "Romeo and Juliet"

These sixteen items can be grouped into four distinct categories and placed in the connecting wall based on their enumerations.

| | | | | |
|---|---|---|---|---|
| [M]int | V[i]olet | Ja[s]mine | [C]ream | Colors |
| Je[o]pardy | Dia[m]ond | Ti[m]e | [U]p | Double _____ |
| [N]ovember | Jul[i]et | Os[c]ar | X-r[a]y | NATO phonetic alphabet |
| Pla[t]oon | Nashv[i]lle | R[o]cky | Froze[n] | Movies |

The indexed letters give `MISCOMMUNICATION`.

# They're Always Up to Something

10 Points

Each group of clues can be rearranged to form two valid word ladders, each the reverse of the other. In one of the directions, the letters that are replaced by another letter to form the next word can be extracted to form another word that fits the clue indicated in brackets.

| Ladder | Clue | Answer |
|---|---|---|
| FLOG, FLOE, FLEE, FLED, FEED | Avenger | GOEL |
| AIRS, AIDS, LIDS, LEDS, LESS | Attack | RAID |
| ROLE, RODE, RIDE, TIDE, TINE | Boss | LORD |
| FORK, DORK, DIRK, DISK, RISK | Cross | FORD |
| TOGA, TODA, TADA, TADS, TAWS | Encourage | GOAD |
| FRET, FEET, FELT, FOLT, FONT | Film | REEL |
| GONE, DONE, DUNE, DUNK, JUNK | Gov't agency | GOED |
| SEER, SEED, SEND, SAND, SANS | Plant | REED |
| FIRE, FINE, FIND, FUND, FUNK | Senator | REID |
| ORAL, ORAD, GRAD, GRID, GRIN | Weight | LOAD |

These new words can be used to form an additional two word ladders, whose letters can be extracted in the same way to form words that fit the given enumeration.

| Word | Ext. | Word | Ext. |
|---|---|---|---|
| GOEL | | RAID | |
| GOED | L | REID | A |
| GOAD | E | REED | I |
| LOAD | G | REEL | D |
| LORD | A | | |
| FORD | L | | |

Reading down the extract columns gives LEGAL AID.

*Author's Note*: In the first version of this puzzle, the last word of the second ladder ladder was REEF. It was found in testsolving that this could lead to the answer LEGAL FEE if that ladder was read opposite the intended direction. Thanks to Team Duck Soup for the catch!

# Triangles and Tribulations

10 Points

The values of $x_i$ are used for extraction.

| $x_i$ | # | |
|---|---|---|
| $x_1$ | 15 | O |
| $x_2$ | 6 | F |
| $x_3$ | 6 | F |
| $x_4$ | 2 | B |
| $x_5$ | 18 | R |
| $x_6$ | 1 | A |
| $x_7$ | 14 | N |
| $x_8$ | 4 | D |

Reading down the final column gives OFF BRAND.

# Video Killed the Radio Star

5 Points

Each image is a still from a famous music video.

| Artist | Song | Song | Artist |
|---|---|---|---|
| Childish Gambino | This Is Ame[r]ica | Just Lose [I]t | Eminem |
| Kendrick Lamar | Hum[b]le | Take [O]n Me | a-ha |
| Fatboy Slim | Weapon o[f] Choice | Buddy Hol[l]y | Weezer |
| OK Go | Here It Goes Ag[a]in | No[v]ember Rain | Guns N' Roses |
| Gorillaz | Feel Good [I]nc. | I Write Sins [N]ot Tragedies | Panic! at the Disco |

The indexed letters in reading order give `RIBOFLAVIN`.

# Wool, Isn't This Nice? And Isn't It Iron Pick?

5 Points

The title and names of the items present imply that this puzzle's source material is "Minecraft" (and "Ironic" by Alanis Morissette). Specifically, we are looking for the number of iron ingots needed to craft each item. The sixteen colors present in the puzzle are the sixteen wool (not dye – see the title) colors, which have a canonical ordering of 0 (white) through $F$ (black).

| Items | Iron | |
|---|---|---|
| Shield | 1 | A |
| Door x6, H.W. Pressure Plate | $12 + 2 = 14$ | N |
| Chestplate, Helmet, Leggings | $8 + 5 + 7 = 20$ | T |
| Boots, Hoe, Sword | $4 + 2 + 2 = 8$ | H |
| Activator Rail x6, Detector Rail x6, Rail x16 | $6 + 6 + 6 = 18$ | R |
| Cauldron, Compass x2 | $7 + 8 = 15$ | O |
| Bucket, Nugget x63, Pickaxe, Shears, Shovel | $3 + 7 + 3 + 2 + 1 = 16$ | P |
| Minecart x3 | 15 | O |
| Piston x9, Sticky Piston x4 | $9 + 4 = 13$ | M |
| Hopper x3 | 15 | O |
| Iron Bars x48 | 18 | R |
| Blast Furnace, Smithing Table, Stonecutter, Tripwire Hook x16 | $5 + 2 + 1 + 8 = 16$ | P |
| Iron Trapdoor x2 | 8 | H |
| Axe, Rail x16 | $3 + 6 = 9$ | I |
| Block of Iron x2, Iron Ingot | $18 + 1 = 19$ | S |
| Chain x9, Flint and Steel x2 | $11^* + 2 = 13$ | M |

* 1 Chain requires 1 Iron Ingot and 2 Iron Nuggets, or $1\frac{2}{9} = \frac{11}{9}$ Iron Ingots.

Reading down the last column gives ANTHROPOMORPHISM.

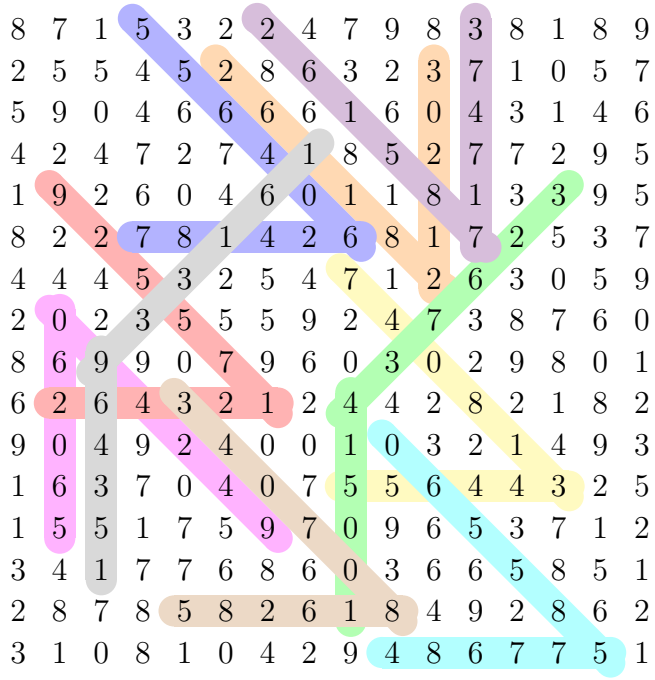
# Word Search "4" the People

15 Points

There are ten distinct characters present in the prime factorizations (not counting the multiplication signs), whose values are depicted in the following chart. This is the only permutation where each expression represents a product of primes.

| X | T | R | A | C | S | E | M | U | 4 |
|---|---|---|---|---|---|---|---|---|---|
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |

The answers to the clues, respectively, are EXCESS, MUSTER, RUTTER, SUSSEX, ACCESS, 4ECAST, XERXES, TRACER, CAMERA, and UTERUS (note that 4 is used to represent FOR like in the title). These can be converted with the above chart into numbers. The grid contains the values represented by the product as well as the encoded answers to the clues.




When spoken allowed, the encoded letters in the top chart sound like "extract semaphore", which is further supported by the fact that pairs of numbers have common ends, and the ten common ends are the ten digits. The following chart can be constructed.

| Factorization | Word | Numbers | | Semaphore | | |
|---|---|---|---|---|---|---|
| 307 × 0307 | XERXES | 094249 | 062065 | SE | S | G |
| 191 × 919 | TRACER | 175529 | 123462 | NW | W | O |
| 113 × 1931 | RUTTER | 218203 | 281162 | N | NW | T |
| 557 × 571 | ACCESS | 318047 | 344655 | NW | W | O |
| 613 × 677 | CAMERA | 415001 | 437623 | S | NE | E |
| 593 × 953 | SUSSEX | 565129 | 585560 | N | NW | T |
| 443 × 1409 | EXCESS | 624187 | 604655 | W | NW | O |
| 337 × 2129 | MUSTER | 717473 | 785162 | N | NW | T |
| 821 × 983 | UTERUS | 807043 | 816285 | NW | W | O |
| 269 × 3469 | 4ECAST | 933161 | 964351 | NE | S | E |

Reading down the final column gives GO TOE TO TOE.

# X Marks the Spot

15 Points

This is a Siamese crossword, where the same grid can be filled twice with the clues, where the solver needs to figure out which clue goes with which crossword.

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 IE | NX | 2 SP | EI | 3 AR | ME | ■ | 4 ZD | 5 UI | RR | 6 GK | ■ | 7 JY | 8 UE | TL | 9 SP |
| BK | ■ | AE | ■ | XO | ■ | ■ | ■ | SS | ■ | AE | ■ | ■ | RY | ■ | PR |
| 10 EE | SN | PD | IE | OA | NV | 11 AO | GU | ER | ■ | 12 MT | EU | NX | SE | CD | HO |
| XD | ■ | PA | ■ | NN | ■ | SN | ■ | 13 LA | OR | BC | ■ | ■ | AB | ■ | IF |
| ■ | ■ | HN | ■ | ■ | ■ | 14 PA | IY | EE | ■ | LH | ■ | 15 OT | MA | EX | NI |
| 16 FP | LI | OT | 17 RS | IT | DO | AP | ■ | SL | ■ | EU | ■ | ■ | IL | ■ | XT |
| IU | ■ | ■ | AT | ■ | ■ | 18 RE | EX | SI | 19 TT | RP | 20 AO | IL | NL | ■ | ■ |
| 21 DL | EO | 22 TB | RS | 23 OT | IE | TR | ■ | ■ | IE | ■ | XR | ■ | OE | ■ | 24 RD |
| EP | ■ | HA | ■ | DK | ■ | IC | ■ | ■ | 25 MX | CM | ER | 26 NA | RD | OI | EO |
| ■ | ■ | 27 EL | XI | EO | 28 RN | CH | 29 IU | SN | ET | ■ | ■ | OC | ■ | ■ | EW |
| 30 VG | ■ | ML | ■ | ■ | EU | ■ | CP | ■ | 31 SE | NX | OP | RL | 32 TA | EI | DN |
| 33 ER | TE | AI | LN | ■ | MM | ■ | 34 ET | XI | PD | ■ | ■ | ■ | EN | ■ | ■ |
| LI | ■ | TS | ■ | ■ | 35 IE | SX | PE | ■ | AI | ■ | 36 VB | ■ | NN | ■ | 37 TC |
| 38 VN | OI | RT | TW | EI | XT | ■ | 39 IM | NE | NT | KA | EL | EG | PE | EA | RR |
| EC | ■ | II | ■ | ■ | EA | ■ | CP | ■ | ■ | ■ | AE | ■ | IX | ■ | EO |
| 40 TH | AA | XC | AK | ■ | 41 DL | UO | KO | EM | ■ | 42 PQ | LU | AE | NB | CE | KC |

Based on the title, the cells that contain `X` are the ones to pay attention to (these have been highlighted in green). Per 24-down, the direction to extract is down. Combining the letters opposite each `X` gives `NONDETERMINISTIC`.