



The Gearworks Assembly Yard Incident

Grade 10 math · Place value, Addition, Fractions of a number, Subtraction, Missing addends · Reading level grades 7-9

Detective: _____ Date: _____

A rogue automaton has overwritten its safety protocols and escaped the testing bays of the Gearworks Assembly Yard, locking the Chief Systems Engineer in the server vault. We must decode the system logs to identify the rogue unit before it shuts down the central power grid.

1. Solve each math problem. The answer is a number, and the letter beside it is what that number stands for.
2. In the clue boxes, write that letter in every box showing the same number, then read the secret clue.
3. Use each clue to cross suspects off the list. The one suspect left at the end is the culprit!

My answer: the Rogue Automaton is _____

Possible suspects

Cross off a row as each clue rules it out. The one left at the end is the culprit.

NAME	PRIMARY PROTOCOL	SUB-ROUTINE	SENSOR FLARE	LED HEAD FIBER	SYSTEM VULNERABILITY
Norbert Wiener	Laser Welding	Firewall Hacking	Right-side camera flare	Green fiber optics	Static charge
Isaac Asimov	Hologram Mimicking	Gravity Inversion	Left-side camera flare	Green fiber optics	Copper rust
Nikola Tesla	Hologram Mimicking	Nanite Swarming	Left-side camera flare	Green fiber optics	Copper rust
Feifei Li	Magnetic Levitating	Plasma Shielding	Right-side camera flare	Red fiber optics	Loud vibrations
George Devol	Magnetic Levitating	Firewall Hacking	Right-side camera flare	Green fiber optics	Loud vibrations
Ayanna Howard	Sonic Screaming	Firewall Hacking	Left-side camera flare	Blue fiber optics	Static charge
Cynthia Breazeal	Sonic Screaming	EMP Shockwave	Right-side camera flare	Red fiber optics	Loud vibrations
Grace Hopper	Sub-Zero Cooling	Nanite Swarming	Right-side camera flare	Green fiber optics	Static charge
Victor Scheinman	Magnetic Levitating	Plasma Shielding	Right-side camera flare	Green fiber optics	Static charge
John McCarthy	Sonic Screaming	Nanite Swarming	Right-side camera flare	Red fiber optics	Static charge
Claude Shannon	Hologram Mimicking	EMP Shockwave	Left-side camera flare	Green fiber optics	Static charge
Joseph Engelberger	Sonic Screaming	Firewall Hacking	Right-side camera flare	Green fiber optics	Loud vibrations
Hedy Lamarr	Sub-Zero Cooling	EMP Shockwave	Left-side camera flare	Green fiber optics	Copper rust
Anita Borg	Hologram Mimicking	Firewall Hacking	Right-side camera flare	Red fiber optics	Loud vibrations
Philip Dick	Magnetic Levitating	Nanite Swarming	Left-side camera flare	Green fiber optics	Loud vibrations
Radia Perlman	Laser Welding	Nanite Swarming	Left-side camera flare	Red fiber optics	Loud vibrations
Rodney Brooks	Sub-Zero Cooling	Nanite Swarming	Right-side camera flare	Green fiber optics	Loud vibrations
Marc Raibert	Sonic Screaming	Gravity Inversion	Right-side camera flare	Red fiber optics	Loud vibrations
Ada Lovelace	Sonic Screaming	Nanite Swarming	Left-side camera flare	Green fiber optics	Copper rust
Margaret Hamilton	Magnetic Levitating	Nanite Swarming	Right-side camera flare	Red fiber optics	Loud vibrations
Tim Berners-Lee	Hologram Mimicking	Plasma Shielding	Right-side camera flare	Green fiber optics	Loud vibrations

CLUE 1 Place value

The terminal console requires us to analyze a base-ten memory register to find the first trace.

Solve each problem, then write its letter in every clue box that shows the same number.

T																			
60	9000	200	20	500	900	300	200	800	500	60	100	70	4000	4000	500	60	90	500	
2000	50	20	200	80	70	600	600	9000	70	100	7000	50	4000	900					

What is the value of the 6 in 938,260? → **T**

What is the value of the 6 in 240,612? → **L**

What is the value of the 8 in 991,186? → **W**

What is the value of the 5 in 93,523? → **O**

What is the value of the 2 in 640,323? → **R**

What is the value of the 7 in 15,475? → **A**

What is the value of the 9 in 79,870? → **H**

What is the value of the 9 in 185,091? → **D**

What is the value of the 9 in 37,904? → **G**

What is the value of the 3 in 777,399? → **U**

What is the value of the 8 in 224,826? → **B**

What is the value of the 7 in 657,631? → **K**

What is the value of the 4 in 734,536? → **N**

What is the value of the 5 in 61,253? → **I**

What is the value of the 2 in 983,216? → **E**

What is the value of the 1 in 363,174? → **C**

What is the value of the 2 in 52,843? → **F**

Scratch space:

CLUE 2 Addition

We total the energy draw from the bypassed auxiliary cells to track the robot's escape path.

Solve each problem, then write its letter in every clue box that shows the same number.

R										R					R	
6659	7860	8328	9239	4271	9711	8015	2070	5904	6659	8015	7602	5092	8015	6659	5904	

									R				R				
7509	5928	3135	4271	4271	5904	9714	3135	3512	6659	5904	9711	3135	6659	9714	7860	3512	8328

$3174 + 3485 = \square \rightarrow \text{R}$

$4517 + 3343 = \square \rightarrow \text{I}$

$1412 + 658 = \square \rightarrow \text{M}$

$1743 + 1392 = \square \rightarrow \text{O}$

$3221 + 2683 = \square \rightarrow \text{E}$

$3763 + 4565 = \square \rightarrow \text{G}$

$4168 + 5071 = \square \rightarrow \text{H}$

$4783 + 2819 = \square \rightarrow \text{F}$

$3203 + 2725 = \square \rightarrow \text{P}$

$1761 + 1751 = \square \rightarrow \text{N}$

$1528 + 2743 = \square \rightarrow \text{T}$

$4359 + 3656 = \square \rightarrow \text{A}$

$5246 + 2263 = \square \rightarrow \text{S}$

$3321 + 6390 = \square \rightarrow \text{C}$

$5904 + 3810 = \square \rightarrow \text{D}$

$1697 + 3395 = \square \rightarrow \text{L}$

Scratch space:

CLUE 3
Fractions of a number

We calculate the fractional share of reserve coolant left in the tanks to narrow down the target.

Solve each problem, then write its letter in every clue box that shows the same number.

M																			
28	57	38	48	24	33	9	36	53	47	33	54	33	11	57	45	38	47	24	60

35	53	56	45	57	36	53	47	33	54

$1/2 \text{ of } 56 = \square \rightarrow \text{M}$

$7/8 \text{ of } 64 = \square \rightarrow \text{B}$

$1/2 \text{ of } 22 = \square \rightarrow \text{E}$

$3/10 \text{ of } 180 = \square \rightarrow \text{S}$

$2/5 \text{ of } 95 = \square \rightarrow \text{L}$

$2/4 \text{ of } 114 = \square \rightarrow \text{A}$

$3/5 \text{ of } 15 = \square \rightarrow \text{C}$

$4/10 \text{ of } 120 = \square \rightarrow \text{F}$

$4/8 \text{ of } 90 = \square \rightarrow \text{R}$

$3/6 \text{ of } 94 = \square \rightarrow \text{O}$

$2/4 \text{ of } 120 = \square \rightarrow \text{D}$

$1/4 \text{ of } 96 = \square \rightarrow \text{U}$

$1/2 \text{ of } 70 = \square \rightarrow \text{V}$

$8/10 \text{ of } 45 = \square \rightarrow \text{T}$

$2/4 \text{ of } 66 = \square \rightarrow \text{N}$

$5/10 \text{ of } 106 = \square \rightarrow \text{I}$

Scratch space:

CLUE 4

Subtraction

By subtracting the depleted power grid readings, we pinpoint the exact magnitude of the escape surge.

Solve each problem, then write its letter in every clue box that shows the same number.

R							R												
7376	8253	7128	1733	3229	1483	8253	7376	8533	4087	1582	3229	4734	4087	3229	8253	4734	8253	3946	
3946	1573	8253	8253	4087	8253	7128	5867	4087											

$10341 - 2965 = \square \rightarrow \boxed{\text{R}}$

$9291 - 758 = \square \rightarrow \boxed{\text{O}}$

$4470 - 524 = \square \rightarrow \boxed{\text{S}}$

$3563 - 1990 = \square \rightarrow \boxed{\text{W}}$

$9704 - 1451 = \square \rightarrow \boxed{\text{E}}$

$4575 - 2993 = \square \rightarrow \boxed{\text{T}}$

$4978 - 3495 = \square \rightarrow \boxed{\text{B}}$

$7405 - 277 = \square \rightarrow \boxed{\text{D}}$

$5333 - 3600 = \square \rightarrow \boxed{\text{F}}$

$6961 - 1094 = \square \rightarrow \boxed{\text{U}}$

$7767 - 3033 = \square \rightarrow \boxed{\text{C}}$

$5585 - 2356 = \square \rightarrow \boxed{\text{I}}$

$6806 - 2719 = \square \rightarrow \boxed{\text{P}}$

Scratch space:

CLUE 5**Missing addends - the last clue**

To crack the final security lock, we must find the missing current value needed to balance the grid circuit.

First solve each problem. Then find each answer in the numbered list below and cross that sentence out. One sentence will be left - that is exactly what the villain did!

Step 1 - solve these:

$2 + \underline{\quad} = 5$

$6 + \underline{\quad} = 14$

$18 + \underline{\quad} = 24$

$11 + \underline{\quad} = 22$

$9 + \underline{\quad} = 14$

$24 + \underline{\quad} = 36$

$5 + \underline{\quad} = 6$

$31 + \underline{\quad} = 35$

$36 + \underline{\quad} = 43$

$24 + \underline{\quad} = 34$

$11 + \underline{\quad} = 13$

Step 2 - cross out the sentence with each answer:

1. The villain fires a welding laser, then triggers gravity inversion.
2. The villain activates magnetic levitation, then discharges an EMP shockwave.
3. The villain unleashes a sonic scream, then triggers gravity inversion.
4. The villain activates magnetic levitation, then triggers gravity inversion.
5. The villain creates a hologram mimic, then deploys a nanite swarming cloud.
6. The villain activates magnetic levitation, then deploys a nanite swarming cloud.
7. The villain creates a hologram mimic, then bypasses security via firewall hacking.
8. The villain unleashes a sonic scream, then discharges an EMP shockwave.
9. The villain activates magnetic levitation, then raises a plasma shielding barrier.
10. The villain fires a welding laser, then raises a plasma shielding barrier.
11. The villain unleashes a sonic scream, then deploys a nanite swarming cloud.
12. The villain unleashes a sonic scream, then bypasses security via firewall hacking.

Answer Key

The Gearworks Assembly Yard Incident

Culprit: Feifei Li

Magnetic Levitating · Plasma Shielding · Right-side camera flare · Red fiber optics · Loud vibrations

Trail: Start 21 → Clue 1 16 → Clue 2 9 → Clue 3 6 → Clue 4 4 → Clue 5 1

Clue 1 (Place value): "THE ROGUE BOT CANNOT DO FIREWALL HACKING"

What is the value of the 6 in 938,260? = 60 (T) · What is the value of the 6 in 240,612? = 600 (L) · What is the value of the 8 in 991,186? = 80 (W) · What is the value of the 5 in 93,523? = 500 (O) · What is the value of the 2 in 640,323? = 20 (R) · What is the value of the 7 in 15,475? = 70 (A) · What is the value of the 9 in 79,870? = 9000 (H) · What is the value of the 9 in 185,091? = 90 (D) · What is the value of the 9 in 37,904? = 900 (G) · What is the value of the 3 in 777,399? = 300 (U) · What is the value of the 8 in 224,826? = 800 (B) · What is the value of the 7 in 657,631? = 7000 (K) · What is the value of the 4 in 734,536? = 4000 (N) · What is the value of the 5 in 61,253? = 50 (I) · What is the value of the 2 in 983,216? = 200 (E) · What is the value of the 1 in 363,174? = 100 (C) · What is the value of the 2 in 52,843? = 2000 (F)

Clue 2 (Addition): "RIGHT CAMERA FLARE SPOTTED ON RECORDING"

3174 + 3485 = 6659 (R) · 4517 + 3343 = 7860 (I) · 1412 + 658 = 2070 (M) · 1743 + 1392 = 3135 (O) · 3221 + 2683 = 5904 (E) · 3763 + 4565 = 8328 (G) · 4168 + 5071 = 9239 (H) · 4783 + 2819 = 7602 (F) · 3203 + 2725 = 5928 (P) · 1761 + 1751 = 3512 (N) · 1528 + 2743 = 4271 (T) · 4359 + 3656 = 8015 (A) · 5246 + 2263 = 7509 (S) · 3321 + 6390 = 9711 (C) · 5904 + 3810 = 9714 (D) · 1697 + 3395 = 5092 (L)

Clue 3 (Fractions of a number): "MALFUNCTIONS NEAR LOUD VIBRATIONS"

1/2 of 56 = 28 (M) · 7/8 of 64 = 56 (B) · 1/2 of 22 = 11 (E) · 3/10 of 180 = 54 (S) · 2/5 of 95 = 38 (L) · 2/4 of 114 = 57 (A) · 3/5 of 15 = 9 (C) · 4/10 of 120 = 48 (F) · 4/8 of 90 = 45 (R) · 3/6 of 94 = 47 (O) · 2/4 of 120 = 60 (D) · 1/4 of 96 = 24 (U) · 1/2 of 70 = 35 (V) · 8/10 of 45 = 36 (T) · 2/4 of 66 = 33 (N) · 5/10 of 106 = 53 (I)

Clue 4 (Subtraction): "RED FIBER OPTIC PIECES SWEEPED UP"

10341 - 2965 = 7376 (R) · 9291 - 758 = 8533 (O) · 4470 - 524 = 3946 (S) · 3563 - 1990 = 1573 (W) · 9704 - 1451 = 8253 (E) · 4575 - 2993 = 1582 (T) · 4978 - 3495 = 1483 (B) · 7405 - 277 = 7128 (D) · 5333 - 3600 = 1733 (F) · 6961 - 1094 = 5867 (U) · 7767 - 3033 = 4734 (C) · 5585 - 2356 = 3229 (I) · 6806 - 2719 = 4087 (P)

Clue 5 (Missing addends): surviving statement is box 9 → Feifei Li

2 + ___ = 5 = 3 · 6 + ___ = 14 = 8 · 18 + ___ = 24 = 6 · 11 + ___ = 22 = 11 · 9 + ___ = 14 = 5 · 24 + ___ = 36 = 12 · 5 + ___ = 6 = 1 · 31 + ___ = 35 = 4 · 36 + ___ = 43 = 7 · 24 + ___ = 34 = 10 · 11 + ___ = 13 = 2