The Robo-Expo Blackout

Grade 9 math · Two-step equations, Exponents, Square roots, Integers · Reading level grades 7-9

Detective: _____ **Date:** _____

A Rogue Automaton has stolen the experimental Master Spark from the main laboratory, plunging the entire city into darkness. The Chief Inventor needs your help to scan the suspect logs and identify the culprit before the backup battery drains completely.

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

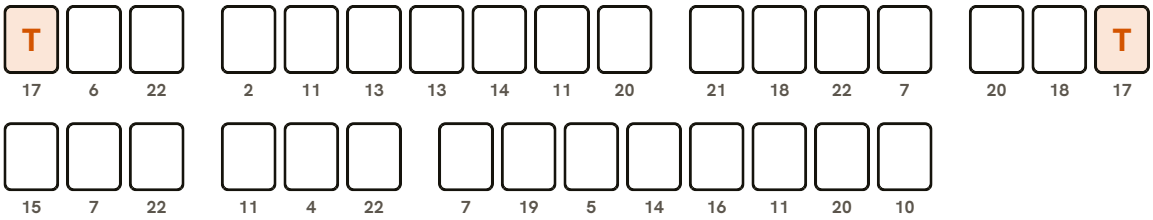
Cross off a row as each clue rules it out. The one left at the end is the culprit.

NAME	MAIN UTILITY	SUB-ROUTINE	ACTIVE PORT	FIBER-OPTIC COLOR	SYSTEM VULNERABILITY
Ada Lovelace	Turbo Propulsion	Nano Repairing	Right-Sided Port	Blue Fiber Optics	Magnet Clamps
Steve Wozniak	Hydraulic Smashing	Solar Shielding	Left-Sided Port	Red Fiber Optics	Rust Solvent
Thomas Edison	Hydraulic Smashing	Thermal Imaging	Left-Sided Port	Red Fiber Optics	Rust Solvent
Albert Einstein	Laser Welding	Solar Shielding	Left-Sided Port	Blue Fiber Optics	Rust Solvent
Isaac Asimov	Laser Welding	Hologram Projection	Right-Sided Port	Red Fiber Optics	Water Splashes
Marie Curie	Turbo Propulsion	Hologram Projection	Left-Sided Port	Red Fiber Optics	Magnet Clamps
Hedy Lamarr	Laser Welding	Nano Repairing	Left-Sided Port	Red Fiber Optics	Rust Solvent
Charles Babbage	Sonic Screaming	Solar Shielding	Right-Sided Port	Red Fiber Optics	Rust Solvent
Arthur Clarke	Laser Welding	Ice Spraying	Left-Sided Port	Red Fiber Optics	Rust Solvent
Seymour Cray	Hydraulic Smashing	Hologram Projection	Left-Sided Port	Red Fiber Optics	Water Splashes
Norbert Wiener	Magnetic Hover	Hologram Projection	Left-Sided Port	Red Fiber Optics	Rust Solvent
Jules Verne	Magnetic Hover	Solar Shielding	Left-Sided Port	Green Fiber Optics	Magnet Clamps
Margaret Hamilton	Turbo Propulsion	Ice Spraying	Right-Sided Port	Green Fiber Optics	Water Splashes
Ursula Le Guin	Magnetic Hover	Solar Shielding	Right-Sided Port	Red Fiber Optics	Magnet Clamps
Tim Berners Lee	Laser Welding	Nano Repairing	Left-Sided Port	Green Fiber Optics	Rust Solvent
Claude Shannon	Hydraulic Smashing	Thermal Imaging	Left-Sided Port	Blue Fiber Optics	Water Splashes
George Eastman	Turbo Propulsion	Thermal Imaging	Left-Sided Port	Green Fiber Optics	Rust Solvent
Nikola Tesla	Sonic Screaming	Solar Shielding	Left-Sided Port	Green Fiber Optics	Water Splashes
Philip Dick	Hydraulic Smashing	Thermal Imaging	Left-Sided Port	Green Fiber Optics	Magnet Clamps
Rachel Carson	Sonic Screaming	Hologram Projection	Right-Sided Port	Green Fiber Optics	Water Splashes
Alan Turing	Hydraulic Smashing	Nano Repairing	Left-Sided Port	Green Fiber Optics	Water Splashes

CLUE 1 Two-step equations

> The main vault door is locked, but a digital screen displays a two-step algebra puzzle. Solving for the missing power variable decodes the first data log.

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



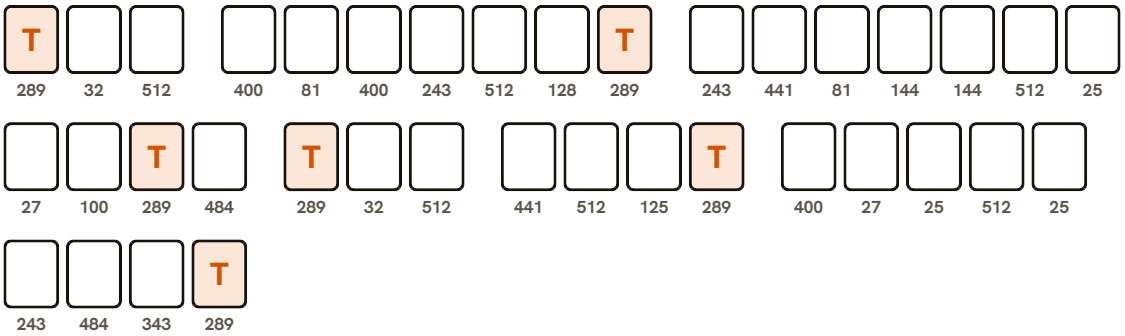
5x + 7 = 92, x = ☐ → T	2x + 7 = 39, x = ☐ → Y	5x + 3 = 28, x = ☐ → R
4x + 3 = 31, x = ☐ → S	6x + 8 = 134, x = ☐ → D	4x + 10 = 70, x = ☐ → U
4x + 2 = 82, x = ☐ → N	8x + 3 = 35, x = ☐ → C	4x + 1 = 89, x = ☐ → E
6x + 12 = 78, x = ☐ → I	9x + 6 = 123, x = ☐ → L	6x + 10 = 46, x = ☐ → H
8x + 12 = 28, x = ☐ → V	7x + 2 = 128, x = ☐ → O	9x + 12 = 138, x = ☐ → A
5x + 11 = 106, x = ☐ → P	3x + 10 = 40, x = ☐ → G	

Scratch space:

CLUE 2 Exponents

> A memory unit is multiplying its error packets exponentially. Calculating the power of the base number allows you to restore the sector and read the file.

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



17^2 = ☐ → T

2^9 = ☐ → E

3^3 = ☐ → I

3^5 = ☐ → P

10^2 = ☐ → N

7^3 = ☐ → R

2^7 = ☐ → C

20^2 = ☐ → S

12^2 = ☐ → G

22^2 = ☐ → O

21^2 = ☐ → L

3^4 = ☐ → U

2^5 = ☐ → H

5^2 = ☐ → D

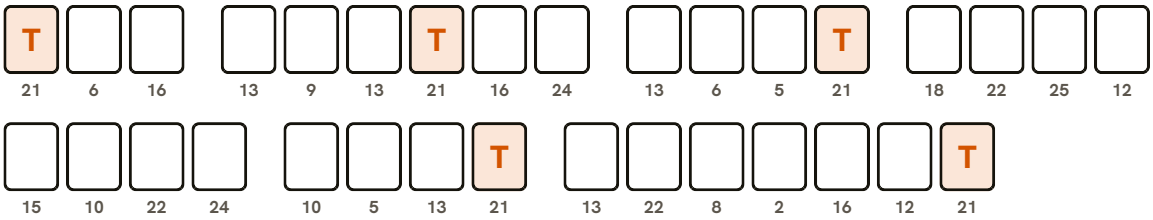
5^3 = ☐ → F

Scratch space:

CLUE 3 Square roots

> We locate a square circuit board dropped on the floor. Finding the square root of the total grid area gives us the exact coordinates of the suspect's track.

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



sqrt(441) = ☐ → T

sqrt(576) = ☐ → M

sqrt(324) = ☐ → D

sqrt(484) = ☐ → O

sqrt(625) = ☐ → W

sqrt(169) = ☐ → S

sqrt(256) = ☐ → E

sqrt(144) = ☐ → N

sqrt(36) = ☐ → H

sqrt(225) = ☐ → F

sqrt(25) = ☐ → U

sqrt(81) = ☐ → Y

sqrt(4) = ☐ → V

sqrt(100) = ☐ → R

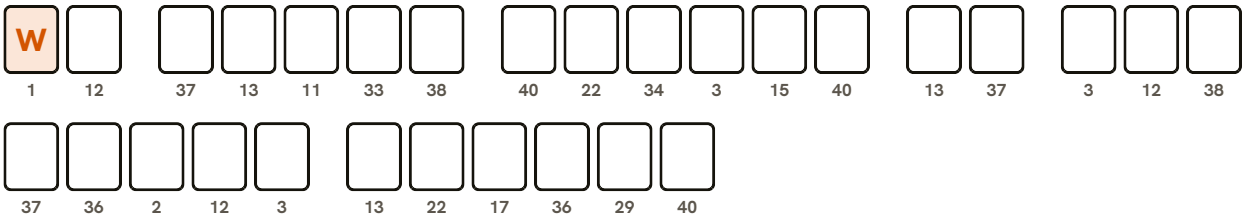
sqrt(64) = ☐ → L

Scratch space:

CLUE 4 Integers

> The target fled through the sublevels, moving up and down between positive and negative floors. Tracking the total integer change reveals a hidden log.

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



(-1) + 2 = ☐ → W

(-15) + 49 = ☐ → A

9 - (-3) = ☐ → E

9 - (-6) = ☐ → K

(-15) + 52 = ☐ → F

(-5) + 41 = ☐ → I

18 - (-15) = ☐ → N

25 - (-15) = ☐ → S

(-6) + 19 = ☐ → O

18 - (-11) = ☐ → C

12 - (-5) = ☐ → T

(-15) + 53 = ☐ → D

(-11) + 22 = ☐ → U

(-14) + 16 = ☐ → B

8 - (-14) = ☐ → P

(-11) + 14 = ☐ → R

Scratch space:

CLUE 5 Two-step equations - the last clue

> The final security node is protected by a two-step signal equation. Balancing the formula filters out the electric static so we can decode the final message.

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:

5x + 9 = 69, x = ☐	2x + 1 = 13, x = ☐	4x + 12 = 24, x = ☐	6x + 5 = 47, x = ☐
9x + 10 = 46, x = ☐	2x + 7 = 17, x = ☐	7x + 2 = 79, x = ☐	7x + 11 = 25, x = ☐
7x + 12 = 75, x = ☐	7x + 11 = 18, x = ☐	4x + 11 = 51, x = ☐	

Step 2 - cross out the sentence with each answer:

1. The villain blasts a laser welding beam, then creates a hologram projection.
2. The villain smashes through with hydraulic power, then fixes itself with nano repairing.
3. The villain blasts a laser welding beam, then fixes itself with nano repairing.
4. The villain escapes with turbo propulsion, then freezes the lock with ice spraying.
5. The villain escapes with turbo propulsion, then creates a hologram projection.
6. The villain hovers with magnetic fields, then creates a hologram projection.
7. The villain blasts a laser welding beam, then scans with thermal imaging.
8. The villain smashes through with hydraulic power, then scans with thermal imaging.
9. The villain hovers with magnetic fields, then freezes the lock with ice spraying.
10. The villain smashes through with hydraulic power, then freezes the lock with ice spraying.
11. The villain blasts a laser welding beam, then activates solar shielding.
12. The villain smashes through with hydraulic power, then activates solar shielding.

TEACHER / PARENT

Answer Key

The Robo-Expo Blackout

Culprit: Thomas Edison

Hydraulic Smashing · Thermal Imaging · Left-Sided Port · Red Fiber Optics · Rust Solvent

Trail: Start 21 → Clue 1 19 → Clue 2 14 → Clue 3 7 → Clue 4 4 → Clue 5 1

Clue 1 (Two-step equations): "THE VILLAIN DOES NOT USE ICE SPRAYING"

5x + 7 = 92, x = 17 (T) · 2x + 7 = 39, x = 16 (Y) · 5x + 3 = 28, x = 5 (R) · 4x + 3 = 31, x = 7 (S) · 6x + 8 = 134, x = 21 (D) · 4x + 10 = 70, x = 15 (U) · 4x + 2 = 82, x = 20 (N) · 8x + 3 = 35, x = 4 (C) · 4x + 1 = 89, x = 22 (E) · 6x + 12 = 78, x = 11 (I) · 9x + 6 = 123, x = 13 (L) · 6x + 10 = 46, x = 6 (H) · 8x + 12 = 28, x = 2 (V) · 7x + 2 = 128, x = 18 (O) · 9x + 12 = 138, x = 14 (A) · 5x + 11 = 106, x = 19 (P) · 3x + 10 = 40, x = 10 (G)

Clue 2 (Exponents): "THE SUSPECT PLUGGED INTO THE LEFT SIDED PORT"

17^2 = 289 (T) · 2^9 = 512 (E) · 3^3 = 27 (I) · 3^5 = 243 (P) · 10^2 = 100 (N) · 7^3 = 343 (R) · 2^7 = 128 (C) · 20^2 = 400 (S) · 12^2 = 144 (G) · 22^2 = 484 (O) · 21^2 = 441 (L) · 3^4 = 81 (U) · 2^5 = 32 (H) · 5^2 = 25 (D) · 5^3 = 125 (F)

Clue 3 (Square roots): "THE SYSTEM SHUT DOWN FROM RUST SOLVENT"

sqrt(441) = 21 (T) · sqrt(576) = 24 (M) · sqrt(324) = 18 (D) · sqrt(484) = 22 (O) · sqrt(625) = 25 (W) · sqrt(169) = 13 (S) · sqrt(256) = 16 (E) · sqrt(144) = 12 (N) · sqrt(36) = 6 (H) · sqrt(225) = 15 (F) · sqrt(25) = 5 (U) · sqrt(81) = 9 (Y) · sqrt(4) = 2 (V) · sqrt(100) = 10 (R) · sqrt(64) = 8 (L)

Clue 4 (Integers): "WE FOUND SPARKS OF RED FIBER OPTICS"

(-1) + 2 = 1 (W) · (-15) + 49 = 34 (A) · 9 - (-3) = 12 (E) · 9 - (-6) = 15 (K) · (-15) + 52 = 37 (F) · (-5) + 41 = 36 (I) · 18 - (-15) = 33 (N) · 25 - (-15) = 40 (S) · (-6) + 19 = 13 (O) · 18 - (-11) = 29 (C) · 12 - (-5) = 17 (T) · (-15) + 53 = 38 (D) · (-11) + 22 = 11 (U) · (-14) + 16 = 2 (B) · 8 - (-14) = 22 (P) · (-11) + 14 = 3 (R)

Clue 5 (Two-step equations): surviving statement is box 8 → Thomas Edison

5x + 9 = 69, x = 12 · 2x + 1 = 13, x = 6 · 4x + 12 = 24, x = 3 · 6x + 5 = 47, x = 7 · 9x + 10 = 46, x = 4 · 2x + 7 = 17, x = 5 · 7x + 2 = 79, x = 11 · 7x + 11 = 25, x = 2 · 7x + 12 = 75, x = 9 · 7x + 11 = 18, x = 1 · 4x + 11 = 51, x = 10