The Neo-City Scrap Yard Mystery

Grade 8 math · Exponents, Square roots, Pythagorean theorem, Order of operations, Two-step equations · Reading level grades 5-6

Detective: _____ **Date:** _____

The golden Core Processor has been stolen from the central laboratory! A rogue automaton is sneaking through the scrap yards trying to escape. Decode the sensor logs to catch the robot thief before they upload the stolen plans!

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 POWER	EXTRA TOOL	ARM GRIP	HEAD ANTENNA	SYSTEM WEAKNESS
Ada Lovelace	Jet Thrusters	Nano-Repair	Right-arm grip	Glass Sensor Dome	Rust Spray
Katherine Johnson	Sonic Screech	Rocket Fist	Left-arm grip	Glass Sensor Dome	Magnet Wand
Alan Turing	Laser Cutting	Stealth Camouflage	Left-arm grip	Steel Mohawk	Rust Spray
Victor Scheinman	EMP Blasts	Nano-Repair	Left-arm grip	Steel Mohawk	Magnet Wand
Linus Torvalds	Magnetism	Rocket Fist	Right-arm grip	Steel Mohawk	Water Splash
Isaac Asimov	Laser Cutting	Plasma Shield	Right-arm grip	Steel Mohawk	Magnet Wand
George Devol	Magnetism	Stealth Camouflage	Right-arm grip	Glass Sensor Dome	Magnet Wand
Arthur Clarke	Laser Cutting	Plasma Shield	Right-arm grip	Glass Sensor Dome	Rust Spray
Charles Babbage	Magnetism	Plasma Shield	Right-arm grip	Copper Antenna	Magnet Wand
Marie Curie	Sonic Screech	Plasma Shield	Left-arm grip	Glass Sensor Dome	Rust Spray
Tim Berners Lee	EMP Blasts	Rocket Fist	Right-arm grip	Copper Antenna	Magnet Wand
Richard Feynman	Magnetism	Hologram Mimic	Right-arm grip	Copper Antenna	Magnet Wand
Rachel Carson	Laser Cutting	Nano-Repair	Right-arm grip	Copper Antenna	Water Splash
Margaret Hamilton	Laser Cutting	Hologram Mimic	Right-arm grip	Copper Antenna	Magnet Wand
Nikola Tesla	EMP Blasts	Hologram Mimic	Left-arm grip	Copper Antenna	Magnet Wand
Anita Borg	Sonic Screech	Rocket Fist	Right-arm grip	Steel Mohawk	Magnet Wand
Stephen Hawking	Sonic Screech	Hologram Mimic	Right-arm grip	Copper Antenna	Magnet Wand
Albert Einstein	Laser Cutting	Hologram Mimic	Right-arm grip	Steel Mohawk	Rust Spray
Hedy Lamarr	Laser Cutting	Nano-Repair	Left-arm grip	Glass Sensor Dome	Magnet Wand
Steve Wozniak	Jet Thrusters	Nano-Repair	Right-arm grip	Steel Mohawk	Water Splash
Sally Ride	Sonic Screech	Hologram Mimic	Left-arm grip	Steel Mohawk	Rust Spray

CLUE 1 Exponents

> The lab computer shows the virus is multiplying fast. Every second, the rogue data doubles as an exponent. Solve the power level to unlock the first clue.

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

T																	T		
100	27	216	121	441	125	125	169	441	225	25	400	216	81	225	400	100			

				T							T					T			
27	169	121	216	100	27	216	49	400	512	196	216	100	36	441	81	100			

10^2 = ☐ → **T**

15^2 = ☐ → **N**

20^2 = ☐ → **O**

5^3 = ☐ → **L**

9^2 = ☐ → **S**

6^3 = ☐ → **E**

3^3 = ☐ → **H**

14^2 = ☐ → **K**

7^2 = ☐ → **R**

2^9 = ☐ → **C**

21^2 = ☐ → **I**

13^2 = ☐ → **A**

11^2 = ☐ → **V**

6^2 = ☐ → **F**

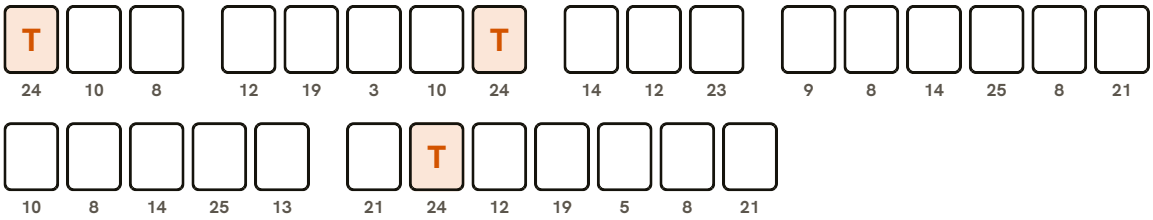
5^2 = ☐ → **D**

Scratch space:

CLUE 2 Square roots

> We found the rogue bot's square microchip burned onto the workbench. If you find the square root of the total area, you can bypass the chip lock.

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



sqrt(576) = ☐ → T

sqrt(100) = ☐ → H

sqrt(625) = ☐ → V

sqrt(25) = ☐ → P

sqrt(64) = ☐ → E

sqrt(169) = ☐ → Y

sqrt(361) = ☐ → I

sqrt(441) = ☐ → S

sqrt(9) = ☐ → G

sqrt(196) = ☐ → A

sqrt(144) = ☐ → R

sqrt(529) = ☐ → M

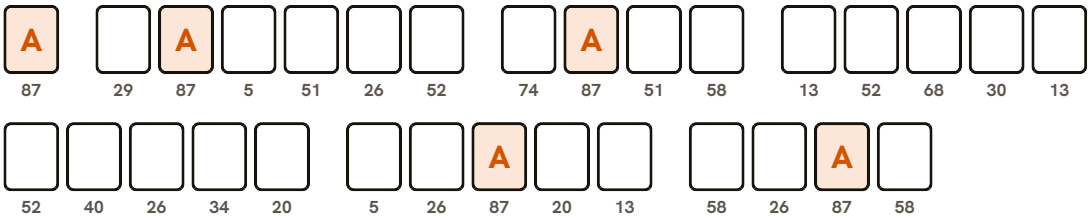
sqrt(81) = ☐ → L

Scratch space:

CLUE 3 Pythagorean theorem

> The thief ran diagonally across the square testing pad. Use the side measurements of the right triangle to calculate the shortest cable path.

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



legs 60 and 63, hypotenuse = ☐ → A

legs 32 and 60, hypotenuse = ☐ → O

legs 3 and 4, hypotenuse = ☐ → G

legs 20 and 21, hypotenuse = ☐ → M

legs 5 and 12, hypotenuse = ☐ → S

legs 10 and 24, hypotenuse = ☐ → E

legs 18 and 24, hypotenuse = ☐ → P

legs 12 and 16, hypotenuse = ☐ → R

legs 16 and 30, hypotenuse = ☐ → I

legs 24 and 70, hypotenuse = ☐ → W

legs 20 and 48, hypotenuse = ☐ → T

legs 40 and 42, hypotenuse = ☐ → D

legs 24 and 45, hypotenuse = ☐ → N

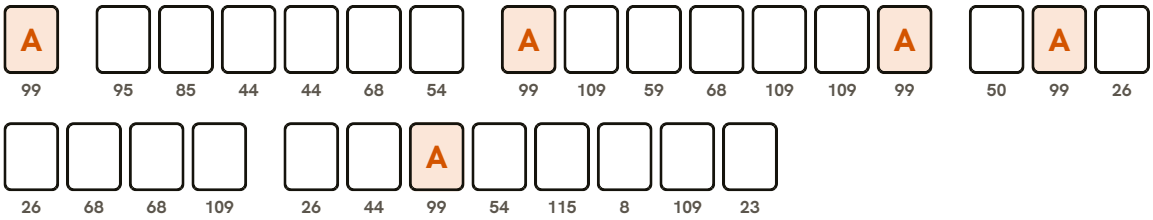
legs 24 and 32, hypotenuse = ☐ → H

Scratch space:

CLUE 4 Order of operations

> The security lock requires a precise code. Follow the strict order of operations to solve the equation and crack open the secure drawer.

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



9 × 12 - 9 = ☐ → **A**

9 × 4 - 13 = ☐ → **G**

9 × 10 - 5 = ☐ → **O**

12 × 10 - 25 = ☐ → **C**

47 + 3 × 7 = ☐ → **E**

11 × 10 - 1 = ☐ → **N**

12 × 10 - 5 = ☐ → **K**

38 + 2 × 3 = ☐ → **P**

5 × 12 - 1 = ☐ → **T**

10 × 5 - 24 = ☐ → **S**

2 + 3 × 2 = ☐ → **I**

24 + 5 × 6 = ☐ → **R**

40 + 5 × 2 = ☐ → **W**

Scratch space:

CLUE 5 Two-step equations - the last clue

> We need to find out how many battery packs the bot stole. Set up a two-step equation with the total weight and solve for the unknown variable.

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 + 8 = 53, x = ☐	3x + 9 = 15, x = ☐	3x + 3 = 15, x = ☐	5x + 5 = 35, x = ☐
5x + 9 = 34, x = ☐	3x + 8 = 11, x = ☐	4x + 11 = 39, x = ☐	6x + 11 = 77, x = ☐
2x + 12 = 18, x = ☐	4x + 8 = 40, x = ☐	6x + 8 = 80, x = ☐	

Step 2 - cross out the sentence with each answer:

1. The villain fires up their booster rocket engines, then blends into the shadows using stealth camouflage.
2. The villain activates their high-voltage magnet, then fools the security guards using a hologram mimic.
3. The villain triggers a massive electric emp blast, then blends into the shadows using stealth camouflage.
4. The villain carves a hole with a laser cutter, then fools the security guards using a hologram mimic.
5. The villain emits a deafening sonic alarm screech, then blocks the exit with a glowing plasma shield.
6. The villain activates their high-voltage magnet, then smashes the main laboratory door with a rocket fist.
7. The villain carves a hole with a laser cutter, then blocks the exit with a glowing plasma shield.
8. The villain fires up their booster rocket engines, then fixes their own broken circuits with nano-repair.
9. The villain emits a deafening sonic alarm screech, then fools the security guards using a hologram mimic.
10. The villain activates their high-voltage magnet, then blocks the exit with a glowing plasma shield.
11. The villain fires up their booster rocket engines, then smashes the main laboratory door with a rocket fist.
12. The villain activates their high-voltage magnet, then fixes their own broken circuits with nano-repair.

TEACHER / PARENT

Answer Key

The Neo-City Scrap Yard Mystery

Culprit: Charles Babbage

Magnetism · Plasma Shield · Right-arm grip · Copper Antenna · Magnet Wand

Trail: Start 21 → Clue 1 17 → Clue 2 11 → Clue 3 6 → Clue 4 4 → Clue 5 1

Clue 1 (Exponents): "THE VILLAIN DOES NOT HAVE THE ROCKET FIST"

10^2 = 100 (T) · 15^2 = 225 (N) · 20^2 = 400 (O) · 5^3 = 125 (L) · 9^2 = 81 (S) · 6^3 = 216 (E) · 3^3 = 27 (H) · 14^2 = 196 (K) · 7^2 = 49 (R) · 2^9 = 512 (C) · 21^2 = 441 (I) · 13^2 = 169 (A) · 11^2 = 121 (V) · 6^2 = 36 (F) · 5^2 = 25 (D)

Clue 2 (Square roots): "THE RIGHT ARM LEAVES HEAVY STRIPES"

sqrt(576) = 24 (T) · sqrt(100) = 10 (H) · sqrt(625) = 25 (V) · sqrt(25) = 5 (P) · sqrt(64) = 8 (E) · sqrt(169) = 13 (Y) · sqrt(361) = 19 (I) · sqrt(441) = 21 (S) · sqrt(9) = 3 (G) · sqrt(196) = 14 (A) · sqrt(144) = 12 (R) · sqrt(529) = 23 (M) · sqrt(81) = 9 (L)

Clue 3 (Pythagorean theorem): "A MAGNET WAND STOPS THEIR GEARS DEAD"

legs 60 and 63, hypotenuse = 87 (A) · legs 32 and 60, hypotenuse = 68 (O) · legs 3 and 4, hypotenuse = 5 (G) · legs 20 and 21, hypotenuse = 29 (M) · legs 5 and 12, hypotenuse = 13 (S) · legs 10 and 24, hypotenuse = 26 (E) · legs 18 and 24, hypotenuse = 30 (P) · legs 12 and 16, hypotenuse = 20 (R) · legs 16 and 30, hypotenuse = 34 (I) · legs 24 and 70, hypotenuse = 74 (W) · legs 20 and 48, hypotenuse = 52 (T) · legs 40 and 42, hypotenuse = 58 (D) · legs 24 and 45, hypotenuse = 51 (N) · legs 24 and 32, hypotenuse = 40 (H)

Clue 4 (Order of operations): "A COPPER ANTENNA WAS SEEN SPARKING"

9 × 12 - 9 = 99 (A) · 9 × 4 - 13 = 23 (G) · 9 × 10 - 5 = 85 (O) · 12 × 10 - 25 = 95 (C) · 47 + 3 × 7 = 68 (E) · 11 × 10 - 1 = 109 (N) · 12 × 10 - 5 = 115 (K) · 38 + 2 × 3 = 44 (P) · 5 × 12 - 1 = 59 (T) · 10 × 5 - 24 = 26 (S) · 2 + 3 × 2 = 8 (I) · 24 + 5 × 6 = 54 (R) · 40 + 5 × 2 = 50 (W)

Clue 5 (Two-step equations): surviving statement is box 10 → Charles Babbage

5x + 8 = 53, x = 9 · 3x + 9 = 15, x = 2 · 3x + 3 = 15, x = 4 · 5x + 5 = 35, x = 6 · 5x + 9 = 34, x = 5 · 3x + 8 = 11, x = 1 · 4x + 11 = 39, x = 7 · 6x + 11 = 77, x = 11 · 2x + 12 = 18, x = 3 · 4x + 8 = 40, x = 8 · 6x + 8 = 80, x = 12