



The Quantum Lab Sabotage

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

Detective: _____ Date: _____

A high-tech experiment was interrupted at the Subatomic Research Facility! A rogue researcher snuck into the central core, jammed the core containment grid, and vanished into the steam pipes. Clues left behind around the laboratory will help identify the culprit.

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 Researcher is _____

Possible suspects

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

NAME	PRIMARY DEVICE	SECONDARY GEAR	DOMINANT HAND	HAIR COLOR	SYSTEM WEAKNESS
Louis Pasteur	Laser Cutter	Surveillance Drone	Right Handed	Raven Hair	Neon Light
Chien Shiung Wu	Plasma Torch	Miniature Jetpack	Right Handed	Silver Hair	Neon Light
Erwin Schrodinger	Sonic Disruptor	Handheld Scanner	Right Handed	Silver Hair	Copper Shield
Barbara McClintock	Magnet Array	Miniature Jetpack	Left Handed	Chestnut Hair	Salt Water
Isaac Newton	Magnet Array	Handheld Scanner	Right Handed	Silver Hair	Neon Light
Carl Sagan	Plasma Torch	Surveillance Drone	Right Handed	Chestnut Hair	Neon Light
Galileo Galilei	Magnet Array	Miniature Jetpack	Left Handed	Silver Hair	Neon Light
Marie Curie	Freeze Ray	Miniature Jetpack	Right Handed	Silver Hair	Neon Light
Dorothy Hodgkin	Laser Cutter	Power Glove	Right Handed	Silver Hair	Copper Shield
Charles Darwin	Laser Cutter	Surveillance Drone	Right Handed	Chestnut Hair	Salt Water
Alan Turing	Freeze Ray	Surveillance Drone	Left Handed	Chestnut Hair	Neon Light
Stephen Hawking	Magnet Array	Power Glove	Right Handed	Raven Hair	Salt Water
Nikola Tesla	Plasma Torch	Surveillance Drone	Right Handed	Silver Hair	Neon Light
Katherine Johnson	Plasma Torch	Power Glove	Right Handed	Silver Hair	Neon Light
Rachel Carson	Plasma Torch	Power Glove	Left Handed	Raven Hair	Copper Shield
Albert Einstein	Laser Cutter	Surveillance Drone	Left Handed	Raven Hair	Copper Shield
Dmitry Mendeleev	Laser Cutter	Thermal Goggles	Right Handed	Silver Hair	Salt Water
Alexander Fleming	Sonic Disruptor	Surveillance Drone	Right Handed	Silver Hair	Salt Water
Lise Meitner	Freeze Ray	Miniature Jetpack	Left Handed	Chestnut Hair	Neon Light
Rosalind Franklin	Laser Cutter	Power Glove	Left Handed	Chestnut Hair	Neon Light
Michael Faraday	Magnet Array	Miniature Jetpack	Left Handed	Chestnut Hair	Neon Light

CLUE 1

Exponents

Bacterial culture counts double exponentially each hour on the terminal display.

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

T																T
289	625	484	36	81	256	256	324	81	243	225	8	484	4	243	8	289
16	4	484	324	400	8	361	484	216	729	256	8	36	484			

$17^2 = \square \rightarrow \text{**T**}$

$4^4 = \square \rightarrow \text{**L**}$

$2^3 = \square \rightarrow \text{**O**}$

$20^2 = \square \rightarrow \text{**P**}$

$6^2 = \square \rightarrow \text{**V**}$

$19^2 = \square \rightarrow \text{**W**}$

$5^4 = \square \rightarrow \text{**H**}$

$22^2 = \square \rightarrow \text{**E**}$

$6^3 = \square \rightarrow \text{**R**}$

$3^6 = \square \rightarrow \text{**G**}$

$9^2 = \square \rightarrow \text{**I**}$

$18^2 = \square \rightarrow \text{**A**}$

$15^2 = \square \rightarrow \text{**D**}$

$3^5 = \square \rightarrow \text{**N**}$

$2^4 = \square \rightarrow \text{**U**}$

$2^2 = \square \rightarrow \text{**S**}$

Scratch space:

CLUE 2 Square roots

Calculating the grid length of the containment room requires taking the square root of the floor area.

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

T									T						T		
7	8	15	2	18	2	3	15	6	7	8	15	11	14	7	8	15	
									T							T	
16	15	25	19	15	22	17	5	7	8	15	17	22	22	17	9	8	7
8	25	5	14														

$\sqrt{49} = \square \rightarrow \boxed{\text{T}}$

$\sqrt{4} = \square \rightarrow \boxed{\text{S}}$

$\sqrt{36} = \square \rightarrow \boxed{\text{C}}$

$\sqrt{324} = \square \rightarrow \boxed{\text{U}}$

$\sqrt{361} = \square \rightarrow \boxed{\text{K}}$

$\sqrt{256} = \square \rightarrow \boxed{\text{B}}$

$\sqrt{9} = \square \rightarrow \boxed{\text{P}}$

$\sqrt{64} = \square \rightarrow \boxed{\text{H}}$

$\sqrt{196} = \square \rightarrow \boxed{\text{D}}$

$\sqrt{25} = \square \rightarrow \boxed{\text{N}}$

$\sqrt{625} = \square \rightarrow \boxed{\text{A}}$

$\sqrt{484} = \square \rightarrow \boxed{\text{R}}$

$\sqrt{81} = \square \rightarrow \boxed{\text{G}}$

$\sqrt{289} = \square \rightarrow \boxed{\text{I}}$

$\sqrt{225} = \square \rightarrow \boxed{\text{E}}$

$\sqrt{121} = \square \rightarrow \boxed{\text{L}}$

Scratch space:

CLUE 3

Pythagorean theorem

Finding the direct distance between two diagonal laser sensors requires using the Pythagorean theorem.

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

T									
15	65	82	74	82	75	52	58	82	

							T									
41	25	10	39	50	17	58	15	52	85	17	51	50	17	74	82	40

								T
17	82	85	17	10	52	34	65	15

legs 9 and 12, hypotenuse = → **T**

legs 40 and 42, hypotenuse = → **C**

legs 6 and 8, hypotenuse = → **L**

legs 24 and 70, hypotenuse = → **D**

legs 15 and 36, hypotenuse = → **F**

legs 14 and 48, hypotenuse = → **U**

legs 21 and 72, hypotenuse = → **V**

legs 24 and 32, hypotenuse = → **R**

legs 9 and 40, hypotenuse = → **M**

legs 8 and 15, hypotenuse = → **N**

legs 7 and 24, hypotenuse = → **A**

legs 16 and 30, hypotenuse = → **G**

legs 24 and 45, hypotenuse = → **S**

legs 25 and 60, hypotenuse = → **H**

legs 40 and 75, hypotenuse = → **O**

legs 18 and 80, hypotenuse = → **E**

legs 20 and 48, hypotenuse = → **I**

Scratch space:

CLUE 4
Order of operations

Unlocking the automated chemical mixer requires evaluating expressions using the correct order of operations.

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

S										S						S
74	70	67	10	65	25	23	62	70	25	74	29	25	62	82	14	74
27	65	25	65	63	68	71	82	14	68	82	29	23	65	67	62	60
59	68	62	29													

$8 \times 11 - 14 = \square \rightarrow \text{S}$

$10 \times 8 - 18 = \square \rightarrow \text{A}$

$52 + 6 \times 5 = \square \rightarrow \text{N}$

$1 + 7 \times 4 = \square \rightarrow \text{T}$

$10 + 3 \times 5 = \square \rightarrow \text{R}$

$11 \times 7 - 12 = \square \rightarrow \text{E}$

$51 + 3 \times 3 = \square \rightarrow \text{B}$

$7 \times 9 - 4 = \square \rightarrow \text{C}$

$8 \times 11 - 20 = \square \rightarrow \text{O}$

$1 + 3 \times 3 = \square \rightarrow \text{V}$

$42 + 7 \times 4 = \square \rightarrow \text{I}$

$7 \times 8 - 29 = \square \rightarrow \text{W}$

$3 \times 9 - 4 = \square \rightarrow \text{H}$

$12 \times 7 - 13 = \square \rightarrow \text{U}$

$10 \times 3 - 16 = \square \rightarrow \text{D}$

$53 + 7 \times 2 = \square \rightarrow \text{L}$

$8 \times 8 - 1 = \square \rightarrow \text{F}$

Scratch space:

CLUE 5**Two-step equations - the last clue**

Solving for the unknown voltage across the main power bus requires setting up a two step equation.

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:

$5x + 12 = 37, x = \boxed{}$

$6x + 11 = 29, x = \boxed{}$

$5x + 3 = 23, x = \boxed{}$

$2x + 11 = 13, x = \boxed{}$

$3x + 8 = 29, x = \boxed{}$

$5x + 10 = 40, x = \boxed{}$

$2x + 8 = 32, x = \boxed{}$

$2x + 3 = 21, x = \boxed{}$

$4x + 11 = 19, x = \boxed{}$

$4x + 1 = 33, x = \boxed{}$

$6x + 3 = 69, x = \boxed{}$

Step 2 - cross out the sentence with each answer:

1. The villain melts the security door with a plasma torch, then calibrates a handheld scanner.
2. The villain disrupts the sensors with a magnet array, then activates a miniature jetpack.
3. The villain melts the security door with a plasma torch, then activates a miniature jetpack.
4. The villain melts the security door with a plasma torch, then deploys a surveillance drone.
5. The villain disrupts the sensors with a magnet array, then calibrates a handheld scanner.
6. The villain shatters the glass casing with a sonic disruptor, then adjusts thermal goggles.
7. The villain blasts the reactor with a laser cutter, then charges up a power glove.
8. The villain freezes the coolant tanks with a freeze ray, then calibrates a handheld scanner.
9. The villain melts the security door with a plasma torch, then charges up a power glove.
10. The villain freezes the coolant tanks with a freeze ray, then activates a miniature jetpack.
11. The villain shatters the glass casing with a sonic disruptor, then deploys a surveillance drone.
12. The villain melts the security door with a plasma torch, then adjusts thermal goggles.

Answer Key

The Quantum Lab Sabotage

Culprit: Marie Curie

Freeze Ray · Miniature Jetpack · Right Handed · Silver Hair · Neon Light

Trail: Start 21 → Clue 1 16 → Clue 2 10 → Clue 3 6 → Clue 4 4 → Clue 5 1

Clue 1 (Exponents): "THE VILLAIN DOES NOT USE A POWER GLOVE"

$17^2 = 289$ (T) · $4^4 = 256$ (L) · $2^3 = 8$ (O) · $20^2 = 400$ (P) · $6^2 = 36$ (V) · $19^2 = 361$ (W) · $5^4 = 625$ (H) · $22^2 = 484$ (E) · $6^3 = 216$ (R) · $3^6 = 729$ (G) · $9^2 = 81$ (I) · $18^2 = 324$ (A) · $15^2 = 225$ (D) · $3^5 = 243$ (N) · $2^4 = 16$ (U) · $2^2 = 4$ (S)

Clue 2 (Square roots): "THE SUSPECT HELD THE BEAKER IN THEIR RIGHT HAND"

$\sqrt{49} = 7$ (T) · $\sqrt{4} = 2$ (S) · $\sqrt{36} = 6$ (C) · $\sqrt{324} = 18$ (U) · $\sqrt{361} = 19$ (K) · $\sqrt{256} = 16$ (B) · $\sqrt{9} = 3$ (P) · $\sqrt{64} = 8$ (H) · $\sqrt{196} = 14$ (D) · $\sqrt{25} = 5$ (N) · $\sqrt{625} = 25$ (A) · $\sqrt{484} = 22$ (R) · $\sqrt{81} = 9$ (G) · $\sqrt{289} = 17$ (I) · $\sqrt{225} = 15$ (E) · $\sqrt{121} = 11$ (L)

Clue 3 (Pythagorean theorem): "THE DEVICE MALFUNCTIONS UNDER NEON LIGHT"

legs 9 and 12, hypotenuse = 15 (T) · legs 40 and 42, hypotenuse = 58 (C) · legs 6 and 8, hypotenuse = 10 (L) · legs 24 and 70, hypotenuse = 74 (D) · legs 15 and 36, hypotenuse = 39 (F) · legs 14 and 48, hypotenuse = 50 (U) · legs 21 and 72, hypotenuse = 75 (V) · legs 24 and 32, hypotenuse = 40 (R) · legs 9 and 40, hypotenuse = 41 (M) · legs 8 and 15, hypotenuse = 17 (N) · legs 7 and 24, hypotenuse = 25 (A) · legs 16 and 30, hypotenuse = 34 (G) · legs 24 and 45, hypotenuse = 51 (S) · legs 25 and 60, hypotenuse = 65 (H) · legs 40 and 75, hypotenuse = 85 (O) · legs 18 and 80, hypotenuse = 82 (E) · legs 20 and 48, hypotenuse = 52 (I)

Clue 4 (Order of operations): "SILVER HAIR STRANDS WERE FOUND ON THE LAB COAT"

$8 \times 11 - 14 = 74$ (S) · $10 \times 8 - 18 = 62$ (A) · $52 \div 6 \times 5 = 82$ (N) · $1 + 7 \times 4 = 29$ (T) · $10 \div 3 \times 5 = 25$ (R) · $11 \times 7 - 12 = 65$ (E) · $51 \div 3 \times 3 = 60$ (B) · $7 \times 9 - 4 = 59$ (C) · $8 \times 11 - 20 = 68$ (O) · $1 \div 3 \times 3 = 10$ (V) · $42 \div 7 \times 4 = 70$ (I) · $7 \times 8 - 29 = 27$ (W) · $3 \times 9 - 4 = 23$ (H) · $12 \times 7 - 13 = 71$ (U) · $10 \times 3 - 16 = 14$ (D) · $53 \div 7 \times 2 = 67$ (L) · $8 \times 8 - 1 = 63$ (F)

Clue 5 (Two-step equations): surviving statement is box 10 → Marie Curie

$5x + 12 = 37, x = 5$ · $6x + 11 = 29, x = 3$ · $5x + 3 = 23, x = 4$ · $2x + 11 = 13, x = 1$ · $3x + 8 = 29, x = 7$ · $5x + 10 = 40, x = 6$ · $2x + 8 = 32, x = 12$ · $2x + 3 = 21, x = 9$ · $4x + 11 = 19, x = 2$ · $4x + 1 = 33, x = 8$ · $6x + 3 = 69, x = 11$