



The Silicon Spire Sabotage

Grade 8 math · Exponents, Square roots, Pythagorean theorem, Order of operations, Two-step equations · Reading level grades 7-9

Detective: _____ Date: _____

A rogue android has bypassed the security protocols of the Silicon Spire, stealing the master blueprint for the city's power grid. We must analyze the electronic footprint left behind and calculate our way to 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 android is _____

Possible suspects

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

NAME	PRIMARY TOOL	SECONDARY SENSOR	CHASSIS DECAL	WIRING COLOR	REBOOT SWITCH
Matrix	nanite repairing	thermal sensing	right-side port	gold wires	high frequency sounds
Einstein	nanite repairing	radar scanning	left-side port	gold wires	strong magnets
Bolt	plasma heating	infrared vision	left-side port	silver fibers	high frequency sounds
Edison	magnetic lifting	radar scanning	left-side port	copper coils	extreme cold
Widget	sonic welding	thermal sensing	left-side port	silver fibers	strong magnets
Sparky	magnetic lifting	infrared vision	right-side port	gold wires	high frequency sounds
Gearbox	sonic welding	radar scanning	left-side port	copper coils	strong magnets
Rustbolt	sonic welding	thermal sensing	left-side port	gold wires	high frequency sounds
Tesla	sonic welding	infrared vision	right-side port	silver fibers	high frequency sounds
Sprocket	laser cutting	sonar mapping	right-side port	gold wires	extreme cold
Gizmo	magnetic lifting	sonar mapping	right-side port	gold wires	strong magnets
Lovelace	plasma heating	lidar tracking	left-side port	silver fibers	strong magnets
Kepler	sonic welding	infrared vision	left-side port	gold wires	high frequency sounds
Galileo	nanite repairing	sonar mapping	left-side port	gold wires	high frequency sounds
Hopper	magnetic lifting	radar scanning	right-side port	copper coils	high frequency sounds
Vector	sonic welding	radar scanning	right-side port	copper coils	high frequency sounds
Buster	magnetic lifting	sonar mapping	right-side port	copper coils	strong magnets
Newton	laser cutting	infrared vision	right-side port	copper coils	high frequency sounds
Circuit	magnetic lifting	radar scanning	left-side port	gold wires	high frequency sounds
Pixel	magnetic lifting	lidar tracking	left-side port	silver fibers	extreme cold
Asimov	magnetic lifting	lidar tracking	left-side port	gold wires	high frequency sounds

CLUE 1 Exponents

The Silicon Spire security network logs data in exponential byte chunks. To decrypt the first data block, calculate the final storage capacity of the server array.

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

T			T						T											T						
64	125	100	64	441	361	27	100	64	243	216	100	144	16	216	64	256	144	100								
						T																				
81	343	243	441	361	64	361	441	512	196	343	16	27														

$2^6 = \square \rightarrow$ T	$3^5 = \square \rightarrow$ D	$3^3 = \square \rightarrow$ G	$14^2 = \square \rightarrow$ K
$21^2 = \square \rightarrow$ A	$2^9 = \square \rightarrow$ C	$3^4 = \square \rightarrow$ L	$6^3 = \square \rightarrow$ O
$12^2 = \square \rightarrow$ S	$2^4 = \square \rightarrow$ N	$5^3 = \square \rightarrow$ H	$16^2 = \square \rightarrow$ U
$7^3 = \square \rightarrow$ I	$19^2 = \square \rightarrow$ R	$10^2 = \square \rightarrow$ E	

Scratch space:

CLUE 2 Square roots

We found a perfectly square motherboard left behind by the intruder. Finding its side length by computing the square root of its area reveals the next lock code.

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

T			T												T
13	6	18	13	6	12	18	14	6	5	23	5	17	18	14	13
							T								
23	12	3	18	22	7	8	13								

$\text{sqrt}(169) = \square \rightarrow \text{T}$	$\text{sqrt}(324) = \square \rightarrow \text{E}$	$\text{sqrt}(529) = \square \rightarrow \text{S}$
$\text{sqrt}(9) = \square \rightarrow \text{D}$	$\text{sqrt}(484) = \square \rightarrow \text{P}$	$\text{sqrt}(64) = \square \rightarrow \text{R}$
$\text{sqrt}(25) = \square \rightarrow \text{A}$	$\text{sqrt}(144) = \square \rightarrow \text{I}$	$\text{sqrt}(49) = \square \rightarrow \text{O}$
$\text{sqrt}(289) = \square \rightarrow \text{L}$	$\text{sqrt}(36) = \square \rightarrow \text{H}$	$\text{sqrt}(196) = \square \rightarrow \text{F}$

Scratch space:

Pythagorean theorem

The thief fled diagonally across a rectangular courtyard. Solve the right triangle distance to find exactly how far the signal transmitter needs to reach.

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

H			H															
52	41	5	52	13	74	15	51	30	15	58	75	50	40	85	30	58	68	40
25	41	17	17	74	15	37	85	85	87	87	H							

legs 20 and 48, hypotenuse = $\rightarrow$ **H**

legs 20 and 21, hypotenuse = $\rightarrow$ **M**

legs 18 and 24, hypotenuse = → **U**

legs 21 and 72, hypotenuse = $\rightarrow$ **C**

legs 24 and 70, hypotenuse = → **R**

legs 24 and 45, hypotenuse = → **Q**

legs 12 and 35, hypotenuse = $\rightarrow$ **B**

legs 32 and 60, hypotenuse = $\rightarrow$ **D**

legs 9 and 40, hypotenuse = $\rightarrow$

legs 3 and 4, hypotenuse = → **G**

legs 8 and 15, hypotenuse = → **L**

legs 40 and 75, hypotenuse = → **0**

legs 60 and 63, hypotenuse = $\rightarrow$ **T**

legs 14 and 48, hypotenuse = $\rightarrow$ **Y**

legs 24 and 32, hypotenuse = → **S**

legs 5 and 12, hypotenuse = → **F**

legs 9 and 12, hypotenuse = → **E**

legs 40 and 42, hypotenuse = $\rightarrow$ **N**

legs 15 and 20, hypotenuse = $\rightarrow$ **W**

Scratch space:

CLUE 4
Order of operations

A locked console requires us to solve a multi-step equation. Remember to process multiplication before addition to unlock the terminal and reveal the clue.

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

G																		
103	19	52	43	12	110	47	53	77	12	53	47	53	52	53	62	22	120	22

22	45	53	77	90	53	106

$67 + 9 \times 4 = \square \rightarrow \text{G}$

$4 + 9 \times 2 = \square \rightarrow \text{T}$

$37 + 2 \times 3 = \square \rightarrow \text{D}$

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

$8 \times 12 - 6 = \square \rightarrow \text{C}$

$50 + 3 \times 9 = \square \rightarrow \text{S}$

$11 \times 5 - 3 = \square \rightarrow \text{L}$

$7 \times 11 - 15 = \square \rightarrow \text{F}$

$62 + 6 \times 8 = \square \rightarrow \text{I}$

$7 + 8 \times 5 = \square \rightarrow \text{R}$

$10 \times 12 - 14 = \square \rightarrow \text{N}$

$2 + 2 \times 5 = \square \rightarrow \text{W}$

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

$3 \times 10 - 11 = \square \rightarrow \text{O}$

$8 \times 8 - 19 = \square \rightarrow \text{H}$

Scratch space:

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

The security drone has a draining battery that loses charge at a steady rate. Solve the two-step equation to find how many minutes it ran before dying.

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:

$3x + 4 = 7, x = \boxed{}$

$3x + 5 = 11, x = \boxed{}$

$6x + 10 = 40, x = \boxed{}$

$3x + 5 = 26, x = \boxed{}$

$5x + 3 = 63, x = \boxed{}$

$5x + 10 = 25, x = \boxed{}$

$6x + 1 = 49, x = \boxed{}$

$2x + 10 = 30, x = \boxed{}$

$4x + 6 = 22, x = \boxed{}$

$6x + 2 = 68, x = \boxed{}$

$6x + 9 = 63, x = \boxed{}$

Step 2 - cross out the sentence with each answer:

1. The villain repaired the damaged escape drone, then navigated the dark sewer pipes.
2. The villain welded the titanium gate shut, then detected the guard patrols.
3. The villain repaired the damaged escape drone, then mapped the entire ventilation network.
4. The villain welded the titanium gate shut, then mapped the entire ventilation network.
5. The villain welded the titanium gate shut, then tracked heat signatures to escape.
6. The villain lifted the heavy vault door clean off, then located the hidden energy lines.
7. The villain repaired the damaged escape drone, then tracked heat signatures to escape.
8. The villain sliced through the security vaults, then detected the guard patrols.
9. The villain melted the central circuit boards, then detected the guard patrols.
10. The villain repaired the damaged escape drone, then located the hidden energy lines.
11. The villain welded the titanium gate shut, then located the hidden energy lines.
12. The villain welded the titanium gate shut, then navigated the dark sewer pipes.

Answer Key

The Silicon Spire Sabotage

Culprit: Circuit

magnetic lifting · radar scanning · left-side port · gold wires · high frequency sounds

Trail: Start 21 → Clue 1 18 → Clue 2 9 → Clue 3 5 → Clue 4 4 → Clue 5 1

Clue 1 (Exponents): "THE TARGET DOES NOT USE LIDAR TRACKING"

$2^6 = 64$ (T) · $3^5 = 243$ (D) · $3^3 = 27$ (G) · $14^2 = 196$ (K) · $21^2 = 441$ (A) · $2^9 = 512$ (C) · $3^4 = 81$ (L) · $6^3 = 216$ (O) · $12^2 = 144$ (S) · $2^4 = 16$ (N) · $5^3 = 125$ (H) · $16^2 = 256$ (U) · $7^3 = 343$ (I) · $19^2 = 361$ (R) · $10^2 = 100$ (E)

Clue 2 (Square roots): "THE THIEF HAS A LEFT SIDE PORT"

$\sqrt{169} = 13$ (T) · $\sqrt{324} = 18$ (E) · $\sqrt{529} = 23$ (S) · $\sqrt{9} = 3$ (D) · $\sqrt{484} = 22$ (P) · $\sqrt{64} = 8$ (R) · $\sqrt{25} = 5$ (A) · $\sqrt{144} = 12$ (I) · $\sqrt{49} = 7$ (O) · $\sqrt{289} = 17$ (L) · $\sqrt{36} = 6$ (H) · $\sqrt{196} = 14$ (F)

Clue 3 (Pythagorean theorem): "HIGH FREQUENCY SOUNDS WILL REBOOT THEM"

legs 20 and 48, hypotenuse = 52 (H) · legs 20 and 21, hypotenuse = 29 (M) · legs 18 and 24, hypotenuse = 30 (U) · legs 21 and 72, hypotenuse = 75 (C) · legs 24 and 70, hypotenuse = 74 (R) · legs 24 and 45, hypotenuse = 51 (Q) · legs 12 and 35, hypotenuse = 37 (B) · legs 32 and 60, hypotenuse = 68 (D) · legs 9 and 40, hypotenuse = 41 (I) · legs 3 and 4, hypotenuse = 5 (G) · legs 8 and 15, hypotenuse = 17 (L) · legs 40 and 75, hypotenuse = 85 (O) · legs 60 and 63, hypotenuse = 87 (T) · legs 14 and 48, hypotenuse = 50 (Y) · legs 24 and 32, hypotenuse = 40 (S) · legs 5 and 12, hypotenuse = 13 (F) · legs 9 and 12, hypotenuse = 15 (E) · legs 40 and 42, hypotenuse = 58 (N) · legs 15 and 20, hypotenuse = 25 (W)

Clue 4 (Order of operations): "GOLD WIRES WERE LEFT AT THE SCENE"

$67 + 9 \times 4 = 103$ (G) · $4 + 9 \times 2 = 22$ (T) · $37 + 2 \times 3 = 43$ (D) · $11 \times 12 - 12 = 120$ (A) · $8 \times 12 - 6 = 90$ (C) · $50 + 3 \times 9 = 77$ (S) · $11 \times 5 - 3 = 52$ (L) · $7 \times 11 - 15 = 62$ (F) · $62 + 6 \times 8 = 110$ (I) · $7 + 8 \times 5 = 47$ (R) · $10 \times 12 - 14 = 106$ (N) · $2 + 2 \times 5 = 12$ (W) · $4 + 7 \times 7 = 53$ (E) · $3 \times 10 - 11 = 19$ (O) · $8 \times 8 - 19 = 45$ (H)

Clue 5 (Two-step equations): surviving statement is box 6 → Circuit

$3x + 4 = 7, x = 1$ · $3x + 5 = 11, x = 2$ · $6x + 10 = 40, x = 5$ · $3x + 5 = 26, x = 7$ · $5x + 3 = 63, x = 12$ · $5x + 10 = 25, x = 3$ · $6x + 1 = 49, x = 8$ · $2x + 10 = 30, x = 10$ · $4x + 6 = 22, x = 4$ · $6x + 2 = 68, x = 11$ · $6x + 9 = 63, x = 9$