



# The Titan Foundry Heist

Grade 7 math · Integers, Percentages, Order of operations, Exponents, Two-step equations · Reading level grades 7-9

Detective: \_\_\_\_\_ Date: \_\_\_\_\_

A rogue automaton has hijacked the main assembly mainframe at the Neon Foundry, locking the Chief Systems Engineer in the server closet and escaping with the master quantum core. Use your deductive skills to analyze the technical data and isolate the suspect unit before it uploads the stolen schematics.

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 synth is** \_\_\_\_\_

## Possible suspects

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

NAME	CHASSIS ARMOR	AUXILIARY TOOL	ACTIVE INDICATOR LED	FIBER OPTIC CABLE COLOR	SYSTEM VULNERABILITY
Anita Borg	reinforced steel	plasma welder	green blinking light	red cables	overheating
Grace Hopper	brass casing	laser cutter	green blinking light	silver cables	static shock
Marc Raibert	carbon fiber shell	plasma welder	green blinking light	red cables	overheating
Steve Wozniak	graphene coating	laser cutter	amber steady glow	silver cables	magnetism
Nikola Tesla	graphene coating	laser cutter	green blinking light	silver cables	magnetism
Arthur Clarke	reinforced steel	sonar array	green blinking light	silver cables	magnetism
Alan Turing	carbon fiber shell	sonar array	green blinking light	red cables	static shock
Ayanna Howard	brass casing	plasma welder	amber steady glow	silver cables	overheating
William Gibson	titanium plating	sonar array	green blinking light	red cables	overheating
Cynthia Breazeal	graphene coating	sonar array	green blinking light	blue cables	overheating
Philip Dick	graphene coating	sonar array	green blinking light	silver cables	static shock
Joseph Engelberger	carbon fiber shell	magnetic clamp	green blinking light	silver cables	magnetism
Isaac Asimov	titanium plating	magnetic clamp	green blinking light	blue cables	static shock
Rodney Brooks	graphene coating	magnetic clamp	green blinking light	silver cables	overheating
John von Neumann	brass casing	magnetic clamp	green blinking light	blue cables	magnetism
Margaret Hamilton	titanium plating	plasma welder	green blinking light	silver cables	magnetism
George Devol	reinforced steel	plasma welder	green blinking light	silver cables	static shock
Timnit Gebru	graphene coating	hydraulic drill	green blinking light	red cables	static shock
Fei Fei Li	brass casing	hydraulic drill	amber steady glow	red cables	static shock
Radia Perlman	titanium plating	magnetic clamp	green blinking light	silver cables	magnetism
Claude Shannon	brass casing	plasma welder	green blinking light	red cables	magnetism

## CLUE 1 Integers

We analyze the temperature logs of the server room. The temperature dropped way below zero during the breach, leaving a clear digital trail of positive and negative integer spikes.

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

<input type="text" value="T"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text" value="T"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
9	24	2	8	13	8	9	2	19	24	12	8	1	22	8	22	1	12	3	
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>															
12	3	3	12	13															

$$8 - (-1) = \boxed{\phantom{00}} \rightarrow \boxed{\text{T}}$$

$$17 - (-2) = \boxed{\phantom{00}} \rightarrow \boxed{\text{M}}$$

$$(-9) + 33 = \boxed{\phantom{00}} \rightarrow \boxed{\text{H}}$$

$$(-7) + 9 = \boxed{\phantom{00}} \rightarrow \boxed{\text{E}}$$

$$(-11) + 24 = \boxed{\phantom{00}} \rightarrow \boxed{\text{Y}}$$

$$(-9) + 31 = \boxed{\phantom{00}} \rightarrow \boxed{\text{O}}$$

$$(-10) + 13 = \boxed{\phantom{00}} \rightarrow \boxed{\text{R}}$$

$$(-8) + 20 = \boxed{\phantom{00}} \rightarrow \boxed{\text{A}}$$

$$3 - (-5) = \boxed{\phantom{00}} \rightarrow \boxed{\text{S}}$$

$$(-6) + 7 = \boxed{\phantom{00}} \rightarrow \boxed{\text{N}}$$

Scratch space:

**CLUE 2** Percentages

The backup power cell was only partially drained. By calculating the exact percentage level of remaining power, we can narrow down the electrical footprint of the rogue unit's chassis armor.

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

<b>T</b>			<b>T</b>					<b>T</b>													
60	17	5	60	49	48	21	5	60	17	49	12	49	21	48	5	5	52				
												<b>T</b>									
24	33	47	52	43	47	52	21	33	47	21	17	60									

20% of 300 = <input type="text"/> → <b>T</b>	25% of 172 = <input type="text"/> → <b>K</b>	10% of 520 = <input type="text"/> → <b>N</b>
10% of 330 = <input type="text"/> → <b>L</b>	25% of 68 = <input type="text"/> → <b>H</b>	5% of 940 = <input type="text"/> → <b>I</b>
60% of 20 = <input type="text"/> → <b>S</b>	10% of 240 = <input type="text"/> → <b>B</b>	20% of 25 = <input type="text"/> → <b>E</b>
20% of 105 = <input type="text"/> → <b>G</b>	25% of 196 = <input type="text"/> → <b>A</b>	75% of 64 = <input type="text"/> → <b>R</b>

Scratch space:

**CLUE 3**

**Order of operations**

To unlock the encrypted security camera feed, we must execute the central mainframe commands in the exact order of operations to bypass the corrupt video files.

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

<b>T</b>					<b>T</b>				<b>T</b>								<b>T</b>	
59	47	49	118	29	59	117	47	83	59	117	54	29	106	46	106	41	59	47
					<b>T</b>													
70	62	73	46	49	59	41	117	70										

$10 \times 7 - 11 = \square \rightarrow$ <b>T</b>	$66 + 5 \times 8 = \square \rightarrow$ <b>W</b>	$25 + 3 \times 8 = \square \rightarrow$ <b>E</b>
$5 \times 10 - 21 = \square \rightarrow$ <b>O</b>	$25 + 4 \times 4 = \square \rightarrow$ <b>I</b>	$12 \times 10 - 3 = \square \rightarrow$ <b>S</b>
$61 + 2 \times 6 = \square \rightarrow$ <b>G</b>	$11 \times 6 - 19 = \square \rightarrow$ <b>H</b>	$12 \times 6 - 26 = \square \rightarrow$ <b>N</b>
$91 + 9 \times 3 = \square \rightarrow$ <b>B</b>	$46 + 4 \times 2 = \square \rightarrow$ <b>D</b>	$51 + 8 \times 4 = \square \rightarrow$ <b>U</b>
$10 \times 10 - 30 = \square \rightarrow$ <b>M</b>	$22 + 8 \times 5 = \square \rightarrow$ <b>A</b>	

Scratch space:

**CLUE 4 Exponents**

The rogue unit cloned its memory files exponentially across multiple processing cores, and we need to use exponents to determine the total size of the digital signature.

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

<input type="text" value="T"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text" value="T"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	
81	25	100	343	27	81	144	256	361	25	256	243	243	25	49	125	8
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
243	49	144	169	100	196	36	256	121	144	100	243					

$3^4 = \square \rightarrow$ <input type="text" value="T"/>	$2^8 = \square \rightarrow$ <input type="text" value="A"/>	$13^2 = \square \rightarrow$ <input type="text" value="V"/>	$2^3 = \square \rightarrow$ <input type="text" value="Y"/>
$6^2 = \square \rightarrow$ <input type="text" value="C"/>	$5^2 = \square \rightarrow$ <input type="text" value="H"/>	$11^2 = \square \rightarrow$ <input type="text" value="B"/>	$3^3 = \square \rightarrow$ <input type="text" value="U"/>
$14^2 = \square \rightarrow$ <input type="text" value="R"/>	$7^3 = \square \rightarrow$ <input type="text" value="O"/>	$12^2 = \square \rightarrow$ <input type="text" value="L"/>	$19^2 = \square \rightarrow$ <input type="text" value="W"/>
$5^3 = \square \rightarrow$ <input type="text" value="N"/>	$7^2 = \square \rightarrow$ <input type="text" value="I"/>	$10^2 = \square \rightarrow$ <input type="text" value="E"/>	$3^5 = \square \rightarrow$ <input type="text" value="S"/>

Scratch space:

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

To isolate the transmission frequency of the rogue unit, we must solve a two-step algebraic equation to balance the receiver antenna's input and output channels.

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:

$2x + 6 = 18, x = \boxed{\phantom{00}}$

$5x + 7 = 47, x = \boxed{\phantom{00}}$

$2x + 1 = 3, x = \boxed{\phantom{00}}$

$6x + 12 = 54, x = \boxed{\phantom{00}}$

$6x + 8 = 80, x = \boxed{\phantom{00}}$

$6x + 5 = 65, x = \boxed{\phantom{00}}$

$3x + 2 = 11, x = \boxed{\phantom{00}}$

$4x + 2 = 18, x = \boxed{\phantom{00}}$

$6x + 11 = 77, x = \boxed{\phantom{00}}$

$5x + 4 = 14, x = \boxed{\phantom{00}}$

$6x + 4 = 34, x = \boxed{\phantom{00}}$

### Step 2 - cross out the sentence with each answer:

1. The villain disables the high voltage generator, then safeguards the backup hard drive.
2. The villain disables the high voltage generator, then locks the hangar doors.
3. The villain reprograms the welding drones, then vents the cooling chamber.
4. The villain disables the high voltage generator, then wipes the central database.
5. The villain drains the main power coupling, then safeguards the backup hard drive.
6. The villain disables the high voltage generator, then escapes through the exhaust shaft.
7. The villain reprograms the welding drones, then escapes through the exhaust shaft.
8. The villain overrides the perimeter lock, then safeguards the backup hard drive.
9. The villain drains the main power coupling, then vents the cooling chamber.
10. The villain drains the main power coupling, then wipes the central database.
11. The villain overrides the perimeter lock, then escapes through the exhaust shaft.
12. The villain reprograms the welding drones, then safeguards the backup hard drive.

# Answer Key

## The Titan Foundry Heist

### Culprit: Nikola Tesla

graphene coating · laser cutter · green blinking light · silver cables · magnetism

Trail: Start 21 → Clue 1 16 → Clue 2 13 → Clue 3 6 → Clue 4 4 → Clue 5 1

#### Clue 1 (Integers): "THE SYSTEM HAS NO SONAR ARRAY"

$8 - (-1) = 9$  (T) ·  $17 - (-2) = 19$  (M) ·  $(-9) + 33 = 24$  (H) ·  $(-7) + 9 = 2$  (E) ·  $(-11) + 24 = 13$  (Y) ·  $(-9) + 31 = 22$  (O) ·  $(-10) + 13 = 3$  (R) ·  $(-8) + 20 = 12$  (A) ·  $3 - (-5) = 8$  (S) ·  $(-6) + 7 = 1$  (N)

#### Clue 2 (Percentages): "THE TARGET HAS A GREEN BLINKING LIGHT"

20% of 300 = 60 (T) · 25% of 172 = 43 (K) · 10% of 520 = 52 (N) · 10% of 330 = 33 (L) · 25% of 68 = 17 (H) · 5% of 940 = 47 (I) · 60% of 20 = 12 (S) · 10% of 240 = 24 (B) · 20% of 25 = 5 (E) · 20% of 105 = 21 (G) · 25% of 196 = 49 (A) · 75% of 64 = 48 (R)

#### Clue 3 (Order of operations): "THE BOT SHUTS DOWN WITH MAGNETISM"

$10 \times 7 - 11 = 59$  (T) ·  $66 + 5 \times 8 = 106$  (W) ·  $25 + 3 \times 8 = 49$  (E) ·  $5 \times 10 - 21 = 29$  (O) ·  $25 + 4 \times 4 = 41$  (I) ·  $12 \times 10 - 3 = 117$  (S) ·  $61 + 2 \times 6 = 73$  (G) ·  $11 \times 6 - 19 = 47$  (H) ·  $12 \times 6 - 26 = 46$  (N) ·  $91 + 9 \times 3 = 118$  (B) ·  $46 + 4 \times 2 = 54$  (D) ·  $51 + 8 \times 4 = 83$  (U) ·  $10 \times 10 - 30 = 70$  (M) ·  $22 + 8 \times 5 = 62$  (A)

#### Clue 4 (Exponents): "THE OUTLAW HAS SHINY SILVER CABLES"

$3^4 = 81$  (T) ·  $2^8 = 256$  (A) ·  $13^2 = 169$  (V) ·  $2^3 = 8$  (Y) ·  $6^2 = 36$  (C) ·  $5^2 = 25$  (H) ·  $11^2 = 121$  (B) ·  $3^3 = 27$  (U) ·  $14^2 = 196$  (R) ·  $7^3 = 343$  (O) ·  $12^2 = 144$  (L) ·  $19^2 = 361$  (W) ·  $5^3 = 125$  (N) ·  $7^2 = 49$  (I) ·  $10^2 = 100$  (E) ·  $3^5 = 243$  (S)

#### Clue 5 (Two-step equations): surviving statement is box 9 → Nikola Tesla

$2x + 6 = 18, x = 6$  ·  $5x + 7 = 47, x = 8$  ·  $2x + 1 = 3, x = 1$  ·  $6x + 12 = 54, x = 7$  ·  $6x + 8 = 80, x = 12$  ·  $6x + 5 = 65, x = 10$  ·  $3x + 2 = 11, x = 3$  ·  $4x + 2 = 18, x = 4$  ·  $6x + 11 = 77, x = 11$  ·  $5x + 4 = 14, x = 2$  ·  $6x + 4 = 34, x = 5$