



# The Aura Archipelago Incident

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

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

The Master Control Core of the Aura Archipelago has been overridden! A Rogue Ranger has locked the sanctuary staff inside the volcanic observatory and is planning to upload a virus to the cyber-wildlife. You have to trace the electronic footprints left across the islands to deduce which ranger committed this cyber-sabotage before the wild drones escape.

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 Ranger is** \_\_\_\_\_

# Possible suspects

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

| NAME          | SIGNATURE GEAR | TACTICAL TOOL  | DEVICE ORIENTATION | HAIR STYLE        | DEFENSIVE COUNTER |
|---------------|----------------|----------------|--------------------|-------------------|-------------------|
| Ranger Dakota | Drone Swarm    | Holo Projector | Right Handed Tech  | Spiky Neon Blue   | EMP Grenade       |
| Ranger Quinn  | Sonic Decoy    | Net Launcher   | Right Handed Tech  | Braid Fire Orange | Water Splashes    |
| Ranger Dallas | Drone Swarm    | Glider Wings   | Left Handed Tech   | Shaved Silver     | Magnetic Field    |
| Ranger Skyler | Drone Swarm    | Holo Projector | Left Handed Tech   | Shaved Silver     | EMP Grenade       |
| Ranger Hayden | Camo Cloak     | Net Launcher   | Left Handed Tech   | Shaved Silver     | EMP Grenade       |
| Ranger Morgan | Hover Boots    | Laser Torch    | Left Handed Tech   | Spiky Neon Blue   | Water Splashes    |
| Ranger Emery  | Camo Cloak     | Glider Wings   | Left Handed Tech   | Braid Fire Orange | Magnetic Field    |
| Ranger Rowan  | Sonic Decoy    | Net Launcher   | Right Handed Tech  | Shaved Silver     | Magnetic Field    |
| Ranger Casey  | Camo Cloak     | Laser Torch    | Left Handed Tech   | Shaved Silver     | Magnetic Field    |
| Ranger Reagan | Sonic Decoy    | Net Launcher   | Left Handed Tech   | Shaved Silver     | Magnetic Field    |
| Ranger Finley | Camo Cloak     | Glider Wings   | Right Handed Tech  | Shaved Silver     | Magnetic Field    |
| Ranger Carter | Camo Cloak     | Laser Torch    | Right Handed Tech  | Spiky Neon Blue   | Water Splashes    |
| Ranger Harlow | Hover Boots    | Holo Projector | Right Handed Tech  | Shaved Silver     | Magnetic Field    |
| Ranger Sawyer | Pulse Grapple  | Glider Wings   | Right Handed Tech  | Braid Fire Orange | Magnetic Field    |
| Ranger Taylor | Pulse Grapple  | Net Launcher   | Left Handed Tech   | Spiky Neon Blue   | Water Splashes    |
| Ranger Hunter | Sonic Decoy    | Net Launcher   | Left Handed Tech   | Shaved Silver     | EMP Grenade       |
| Ranger Reese  | Camo Cloak     | Shock Gloves   | Left Handed Tech   | Shaved Silver     | Magnetic Field    |
| Ranger Bailey | Pulse Grapple  | Net Launcher   | Left Handed Tech   | Braid Fire Orange | EMP Grenade       |
| Ranger Avery  | Camo Cloak     | Net Launcher   | Left Handed Tech   | Shaved Silver     | Magnetic Field    |
| Ranger Parker | Camo Cloak     | Net Launcher   | Left Handed Tech   | Spiky Neon Blue   | Magnetic Field    |
| Ranger Peyton | Pulse Grapple  | Glider Wings   | Right Handed Tech  | Spiky Neon Blue   | Magnetic Field    |

## CLUE 1 Exponents

You discover a locked digital safe containing the suspect's original gear list. The security passcode is hidden in an exponent puzzle where the storage capacity doubles at every level. Calculate the final value to crack the safe.

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

|                             |                            |                            |                             |                            |                            |                             |                            |                             |                            |                           |                            |                            |                            |                           |                             |                          |                            |                            |
|-----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|----------------------------|-----------------------------|----------------------------|-----------------------------|----------------------------|---------------------------|----------------------------|----------------------------|----------------------------|---------------------------|-----------------------------|--------------------------|----------------------------|----------------------------|
| <div>T</div> <div>729</div> | <div></div> <div>36</div>  | <div></div> <div>343</div> | <div>T</div> <div>729</div> | <div></div> <div>64</div>  | <div></div> <div>441</div> | <div></div> <div>81</div>   | <div></div> <div>343</div> | <div>T</div> <div>729</div> | <div></div> <div>289</div> | <div></div> <div>27</div> | <div></div> <div>343</div> | <div></div> <div>361</div> | <div></div> <div>484</div> | <div></div> <div>27</div> | <div>T</div> <div>729</div> | <div></div> <div>4</div> | <div></div> <div>361</div> | <div></div> <div>343</div> |
| <div></div> <div>64</div>   | <div></div> <div>225</div> | <div></div> <div>64</div>  | <div></div> <div>361</div>  | <div></div> <div>343</div> | <div></div> <div>441</div> | <div>T</div> <div>729</div> | <div></div> <div>27</div>  | <div></div> <div>441</div>  | <div></div> <div>32</div>  | <div></div> <div>36</div> |                            |                            |                            |                           |                             |                          |                            |                            |

|                                       |                                       |                                       |                                       |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| $9^3 = \square \rightarrow \text{T}$  | $3^4 = \square \rightarrow \text{G}$  | $22^2 = \square \rightarrow \text{N}$ | $2^6 = \square \rightarrow \text{A}$  |
| $15^2 = \square \rightarrow \text{L}$ | $6^2 = \square \rightarrow \text{H}$  | $3^3 = \square \rightarrow \text{O}$  | $2^5 = \square \rightarrow \text{C}$  |
| $21^2 = \square \rightarrow \text{R}$ | $17^2 = \square \rightarrow \text{D}$ | $7^3 = \square \rightarrow \text{E}$  | $19^2 = \square \rightarrow \text{S}$ |
| $2^2 = \square \rightarrow \text{U}$  |                                       |                                       |                                       |

Scratch space:

## CLUE 2 Square roots

To map the area where the suspect was spotted, you must divide the quadrant into a perfect square grid. Calculate the side length from the total grid area to pinpoint the exact search coordinates.

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

|    |    |   |    |    |    |    |    |    |    |    |    |    |    |   |   |    |   |    |    |
|----|----|---|----|----|----|----|----|----|----|----|----|----|----|---|---|----|---|----|----|
| L  |    |   |    |    |    |    |    |    |    |    |    |    |    |   |   |    |   |    |    |
| 7  | 23 | 9 | 10 | 4  | 15 | 18 | 11 | 23 | 11 | 24 | 18 | 10 | 23 | 6 | 9 | 15 | 8 | 23 | 14 |
|    |    |   |    |    |    |    |    |    |    |    |    |    |    |   |   |    |   |    |    |
| 13 | 23 | 6 | 23 | 15 | 8  | 10 | 24 | 3  | 15 | 10 | 23 | 11 |    |   |   |    |   |    |    |

|                                             |                                             |                                             |
|---------------------------------------------|---------------------------------------------|---------------------------------------------|
| $\sqrt{49} = \square \rightarrow \text{L}$  | $\sqrt{324} = \square \rightarrow \text{N}$ | $\sqrt{16} = \square \rightarrow \text{H}$  |
| $\sqrt{196} = \square \rightarrow \text{S}$ | $\sqrt{529} = \square \rightarrow \text{E}$ | $\sqrt{64} = \square \rightarrow \text{C}$  |
| $\sqrt{121} = \square \rightarrow \text{D}$ | $\sqrt{225} = \square \rightarrow \text{A}$ | $\sqrt{169} = \square \rightarrow \text{W}$ |
| $\sqrt{81} = \square \rightarrow \text{F}$  | $\sqrt{36} = \square \rightarrow \text{R}$  | $\sqrt{100} = \square \rightarrow \text{T}$ |
| $\sqrt{9} = \square \rightarrow \text{V}$   | $\sqrt{576} = \square \rightarrow \text{I}$ |                                             |

Scratch space:

## CLUE 3

## Pythagorean theorem

The suspect fled diagonally across a steep, rocky ravine. You can estimate the length of their escape cable by treating the drop height and horizontal distance as the legs of a right triangle.

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

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| A  |    | A  |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 75 | 58 | 75 | 13 | 52 | 26 | 41 | 40 | 15 | 10 | 40 | 26 | 29 | 17 |    |    |
|    |    | A  |    |    |    |    |    |    |    | A  |    |    |    |    |    |
| 41 | 39 | 75 | 37 | 37 | 26 | 17 | 41 | 51 | 26 | 39 | 75 | 52 | 13 | 26 | 39 |

legs 21 and 72, hypotenuse =  → **A**

legs 6 and 8, hypotenuse =  → **F**

legs 10 and 24, hypotenuse =  → **E**

legs 9 and 40, hypotenuse =  → **T**

legs 8 and 15, hypotenuse =  → **D**

legs 5 and 12, hypotenuse =  → **G**

legs 20 and 48, hypotenuse =  → **N**

legs 40 and 42, hypotenuse =  → **M**

legs 24 and 32, hypotenuse =  → **I**

legs 24 and 45, hypotenuse =  → **H**

legs 9 and 12, hypotenuse =  → **C**

legs 12 and 35, hypotenuse =  → **P**

legs 20 and 21, hypotenuse =  → **L**

legs 15 and 36, hypotenuse =  → **R**

Scratch space:

## CLUE 4 Order of operations

You recover a damaged encrypted logbook from the forest floor. You must solve the multi-step calculation on the keypad, following the strict hierarchy of operations, to unlock the decrypted text.

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

|    |     |     |     |     |     |    |    |     |     |     |     |    |    |    |     |    |    |    |
|----|-----|-----|-----|-----|-----|----|----|-----|-----|-----|-----|----|----|----|-----|----|----|----|
| S  |     |     |     |     |     | S  |    |     |     |     |     | S  |    |    |     |    |    | S  |
| 64 | 43  | 115 | 71  | 102 | 23  | 64 | 81 | 114 | 71  | 102 | 19  | 64 | 51 | 19 | 115 | 13 | 23 | 64 |
|    |     |     |     |     |     |    |    |     |     |     |     |    |    |    |     |    |    |    |
| 50 | 114 | 87  | 100 | 100 | 102 | 23 | 51 | 43  | 102 | 71  | 102 | 13 | 51 |    |     |    |    |    |

|                                                    |                                                   |                                                    |
|----------------------------------------------------|---------------------------------------------------|----------------------------------------------------|
| $58 + 2 \times 3 = \square \rightarrow \text{S}$   | $37 + 3 \times 2 = \square \rightarrow \text{H}$  | $4 \times 12 - 25 = \square \rightarrow \text{D}$  |
| $9 \times 8 - 21 = \square \rightarrow \text{T}$   | $5 + 2 \times 4 = \square \rightarrow \text{N}$   | $12 \times 12 - 30 = \square \rightarrow \text{L}$ |
| $12 \times 10 - 18 = \square \rightarrow \text{E}$ | $3 \times 12 - 17 = \square \rightarrow \text{R}$ | $10 \times 12 - 5 = \square \rightarrow \text{A}$  |
| $29 + 7 \times 3 = \square \rightarrow \text{C}$   | $12 \times 9 - 27 = \square \rightarrow \text{I}$ | $11 \times 10 - 23 = \square \rightarrow \text{O}$ |
| $88 + 6 \times 2 = \square \rightarrow \text{G}$   | $67 + 2 \times 2 = \square \rightarrow \text{V}$  |                                                    |

Scratch space:

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

The suspect's mechanical tracking signal is fading fast. Set up and solve the equation representing their speed and the distance they had already traveled to determine exactly when they will reach the coast.

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:**

$4x + 1 = 9, x = \boxed{\phantom{00}}$

$5x + 4 = 54, x = \boxed{\phantom{00}}$

$6x + 4 = 52, x = \boxed{\phantom{00}}$

$5x + 4 = 64, x = \boxed{\phantom{00}}$

$5x + 5 = 10, x = \boxed{\phantom{00}}$

$3x + 9 = 42, x = \boxed{\phantom{00}}$

$5x + 6 = 26, x = \boxed{\phantom{00}}$

$4x + 12 = 32, x = \boxed{\phantom{00}}$

$5x + 10 = 45, x = \boxed{\phantom{00}}$

$4x + 8 = 32, x = \boxed{\phantom{00}}$

$2x + 2 = 8, x = \boxed{\phantom{00}}$

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

1. The villain breaches the volcanic database, then vanishes into the dense jungle foliage.
2. The villain locks down the research compound, then slips through the drainage canal.
3. The villain disables the main power grid, then flees across the lava bridge.
4. The villain disables the main power grid, then vanishes into the dense jungle foliage.
5. The villain scrambles the animal tracking system, then flees across the lava bridge.
6. The villain locks down the research compound, then flees across the lava bridge.
7. The villain locks down the research compound, then escapes on a high-speed hoverbike.
8. The villain overrides the security gates, then zips away using a line launcher.
9. The villain overrides the security gates, then slips through the drainage canal.
10. The villain breaches the volcanic database, then flees across the lava bridge.
11. The villain scrambles the animal tracking system, then zips away using a line launcher.
12. The villain overrides the security gates, then flees across the lava bridge.

# Answer Key

## The Aura Archipelago Incident

### Culprit: Ranger Avery

Camo Cloak · Net Launcher · Left Handed Tech · Shaved Silver · Magnetic Field

Trail: Start 21 → Clue 1 18 → Clue 2 11 → Clue 3 6 → Clue 4 4 → Clue 5 1

### Clue 1 (Exponents): "THE TARGET DOES NOT USE A LASER TORCH"

$9^3 = 729$  (T) ·  $3^4 = 81$  (G) ·  $22^2 = 484$  (N) ·  $2^6 = 64$  (A) ·  $15^2 = 225$  (L) ·  $6^2 = 36$  (H) ·  $3^3 = 27$  (O) ·  $2^5 = 32$  (C) ·  $21^2 = 441$  (R) ·  $17^2 = 289$  (D) ·  $7^3 = 343$  (E) ·  $19^2 = 361$  (S) ·  $2^2 = 4$  (U)

### Clue 2 (Square roots): "LEFT HANDED INTERFACES WERE ACTIVATED"

$\sqrt{49} = 7$  (L) ·  $\sqrt{324} = 18$  (N) ·  $\sqrt{16} = 4$  (H) ·  $\sqrt{196} = 14$  (S) ·  $\sqrt{529} = 23$  (E) ·  $\sqrt{64} = 8$  (C) ·  $\sqrt{121} = 11$  (D) ·  $\sqrt{225} = 15$  (A) ·  $\sqrt{169} = 13$  (W) ·  $\sqrt{81} = 9$  (F) ·  $\sqrt{36} = 6$  (R) ·  $\sqrt{100} = 10$  (T) ·  $\sqrt{9} = 3$  (V) ·  $\sqrt{576} = 24$  (I)

### Clue 3 (Pythagorean theorem): "A MAGNETIC FIELD TRAPPED THE RANGER"

legs 21 and 72, hypotenuse = 75 (A) · legs 6 and 8, hypotenuse = 10 (F) · legs 10 and 24, hypotenuse = 26 (E) · legs 9 and 40, hypotenuse = 41 (T) · legs 8 and 15, hypotenuse = 17 (D) · legs 5 and 12, hypotenuse = 13 (G) · legs 20 and 48, hypotenuse = 52 (N) · legs 40 and 42, hypotenuse = 58 (M) · legs 24 and 32, hypotenuse = 40 (I) · legs 24 and 45, hypotenuse = 51 (H) · legs 9 and 12, hypotenuse = 15 (C) · legs 12 and 35, hypotenuse = 37 (P) · legs 20 and 21, hypotenuse = 29 (L) · legs 15 and 36, hypotenuse = 39 (R)

### Clue 4 (Order of operations): "SHAVED SILVER STRANDS CLOGGED THE VENT"

$58 + 2 \times 3 = 64$  (S) ·  $37 + 3 \times 2 = 43$  (H) ·  $4 \times 12 - 25 = 23$  (D) ·  $9 \times 8 - 21 = 51$  (T) ·  $5 + 2 \times 4 = 13$  (N) ·  $12 \times 12 - 30 = 114$  (L) ·  $12 \times 10 - 18 = 102$  (E) ·  $3 \times 12 - 17 = 19$  (R) ·  $10 \times 12 - 5 = 115$  (A) ·  $29 + 7 \times 3 = 50$  (C) ·  $12 \times 9 - 27 = 81$  (I) ·  $11 \times 10 - 23 = 87$  (O) ·  $88 + 6 \times 2 = 100$  (G) ·  $67 + 2 \times 2 = 71$  (V)

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

$4x + 1 = 9, x = 2$  ·  $5x + 4 = 54, x = 10$  ·  $6x + 4 = 52, x = 8$  ·  $5x + 4 = 64, x = 12$  ·  $5x + 5 = 10, x = 1$  ·  $3x + 9 = 42, x = 11$  ·  $5x + 6 = 26, x = 4$  ·  $4x + 12 = 32, x = 5$  ·  $5x + 10 = 45, x = 7$  ·  $4x + 8 = 32, x = 6$  ·  $2x + 2 = 8, x = 3$