



# The Sunken Vault Sabotage

Grade 8 math · Rounding, Fractions of a number, Bar models, Exponents, Missing addends · Reading level grades 7-9

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

An unknown rogue sabotaged the deep-sea vault research lab and snatched the ancient abyssal artifact! Use your detective skills and decode the clues to identify the culprit before their submarine slips away into the trench.

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 Deep Sea Rogue is** \_\_\_\_\_

## Possible suspects

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

| NAME            | PRIMARY GEAR   | SECONDARY GEAR | DOMINANT HAND | HAIR STYLE          | DEFENSE WEAPON |
|-----------------|----------------|----------------|---------------|---------------------|----------------|
| Captain Vance   | grappling hook | mini drone     | left handed   | neon green braid    | loud whistle   |
| Crewman Ruby    | stealth cloak  | mini drone     | left handed   | spiked black mohawk | cold spray     |
| Dr Elena        | stealth cloak  | shock shield   | left handed   | shaved silver buzz  | loud whistle   |
| Engineer Cora   | stealth cloak  | bio scanner    | right handed  | spiked black mohawk | cold spray     |
| Crewman Jax     | stealth cloak  | anchor winch   | right handed  | shaved silver buzz  | loud whistle   |
| Engineer Maya   | plasma cutter  | anchor winch   | right handed  | neon green braid    | cold spray     |
| Captain Seth    | sonic pulse    | mini drone     | right handed  | neon green braid    | loud whistle   |
| Diver Hugo      | grappling hook | bio scanner    | right handed  | shaved silver buzz  | cold spray     |
| Specialist Troy | stealth cloak  | anchor winch   | right handed  | neon green braid    | cold spray     |
| Diver Leah      | stealth cloak  | mini drone     | right handed  | spiked black mohawk | cold spray     |
| Tech Nora       | jet booster    | thermal flare  | right handed  | shaved silver buzz  | loud whistle   |
| Specialist Leo  | plasma cutter  | mini drone     | right handed  | spiked black mohawk | cold spray     |
| Specialist Zane | sonic pulse    | thermal flare  | right handed  | spiked black mohawk | cold spray     |
| Pilot Kai       | jet booster    | shock shield   | right handed  | neon green braid    | loud whistle   |
| Cadet Liam      | grappling hook | shock shield   | left handed   | shaved silver buzz  | loud whistle   |
| Pilot Owen      | stealth cloak  | thermal flare  | right handed  | shaved silver buzz  | loud whistle   |
| Officer Bryce   | jet booster    | anchor winch   | right handed  | shaved silver buzz  | loud whistle   |
| Officer Clara   | stealth cloak  | bio scanner    | right handed  | neon green braid    | loud whistle   |
| Officer Nina    | sonic pulse    | shock shield   | right handed  | spiked black mohawk | cold spray     |
| Tech Ezra       | grappling hook | thermal flare  | right handed  | neon green braid    | bright flash   |
| Diver Ross      | sonic pulse    | mini drone     | right handed  | spiked black mohawk | loud whistle   |

**CLUE 1**
**Rounding**

The sonar terminal only displays distance measurements rounded to the nearest ten meters.

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

|      |      |     |      |      |      |      |      |      |      |      |      |      |      |     |     |    |
|------|------|-----|------|------|------|------|------|------|------|------|------|------|------|-----|-----|----|
| T    |      |     |      |      |      |      |      |      |      |      |      |      |      |     |     | T  |
| 20   | 500  | 130 | 50   | 2000 | 1100 | 1100 | 2900 | 2000 | 70   | 200  | 700  | 130  | 3000 | 70  | 700 | 20 |
|      |      |     |      |      |      |      |      |      |      |      |      |      |      |     |     |    |
| 2300 | 3000 | 130 | 2900 | 20   | 500  | 130  | 300  | 1700 | 2900 | 1100 | 5000 | 1100 | 2900 | 300 | 130 |    |

Round 21 to the nearest ten  → **T**

Round 2,086 to the nearest thousand  → **I**

Round 128 to the nearest ten  → **E**

Round 1,734 to the nearest hundred  → **M**

Round 1,149 to the nearest hundred  → **L**

Round 2,308 to the nearest hundred  → **U**

Round 471 to the nearest hundred  → **H**

Round 50 to the nearest ten  → **V**

Round 738 to the nearest hundred  → **O**

Round 2,857 to the nearest hundred  → **A**

Round 3,211 to the nearest thousand  → **S**

Round 69 to the nearest ten  → **N**

Round 191 to the nearest hundred  → **D**

Round 300 to the nearest hundred  → **R**

Round 4,521 to the nearest thousand  → **F**

Scratch space:

**CLUE 2**
**Fractions of a number**

To open the emergency hatch, you must calculate the fractional fuel ratio needed for the backup engine.

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

|          |    |    |    |    |    |    |    |    |          |    |    |    |   |   |    |
|----------|----|----|----|----|----|----|----|----|----------|----|----|----|---|---|----|
| <b>W</b> |    |    |    |    |    |    |    |    | <b>W</b> |    |    |    |   |   |    |
| 47       | 24 | 46 | 28 | 29 | 23 | 23 | 23 | 37 | 47       | 37 | 38 | 24 | 8 | 2 | 46 |

  

|   |    |    |    |    |    |    |    |    |    |    |    |    |    |
|---|----|----|----|----|----|----|----|----|----|----|----|----|----|
|   |    |    |    |    |    |    |    |    |    |    |    |    |    |
| 2 | 37 | 28 | 57 | 29 | 57 | 49 | 39 | 29 | 38 | 37 | 46 | 49 | 38 |

$1/3 \text{ of } 141 = \square \rightarrow \boxed{\text{W}}$

$1/2 \text{ of } 4 = \square \rightarrow \boxed{\text{H}}$

$7/8 \text{ of } 56 = \square \rightarrow \boxed{\text{O}}$

$1/2 \text{ of } 92 = \square \rightarrow \boxed{\text{T}}$

$3/6 \text{ of } 74 = \square \rightarrow \boxed{\text{A}}$

$4/8 \text{ of } 114 = \square \rightarrow \boxed{\text{D}}$

$1/5 \text{ of } 145 = \square \rightarrow \boxed{\text{E}}$

$2/3 \text{ of } 12 = \square \rightarrow \boxed{\text{G}}$

$1/2 \text{ of } 48 = \square \rightarrow \boxed{\text{I}}$

$3/6 \text{ of } 46 = \square \rightarrow \boxed{\text{S}}$

$7/8 \text{ of } 32 = \square \rightarrow \boxed{\text{N}}$

$2/8 \text{ of } 152 = \square \rightarrow \boxed{\text{R}}$

$3/4 \text{ of } 52 = \square \rightarrow \boxed{\text{P}}$

Scratch space:

## CLUE 3

## Bar model word problems

The energy grid balance board compares total power bars across the submarine sectors.

Draw a bar model to solve each word problem, then write its letter in the boxes to fill in the missing word.

Someone scared the villain off with

**C**        **A** **Y** .

81 16 85 17 24 89 29

Submarine Navigator has 162 repair kits, packed 2 to a bag. How many bags can be filled?

draw a bar model

Answer:  → **C**

One group collected 10 depth gauges and another group collected 7 depth gauges. How many depth gauges in all?

draw a bar model

Answer:  → **D**

Submarine Navigator has 2 times as many depth gauges as a teammate. The teammate has 12 depth gauges. How many depth gauges does Submarine Navigator have?

draw a bar model

Answer:  → **S**

There were 40 sonar beacons in all. 24 sonar beacons were used. How many sonar beacons are left?

draw a bar model

Answer:  → **O**

Submarine Navigator used  $\frac{2}{5}$  of the pressure valves on the first day. The other 51 pressure valves were used the next day. How many pressure valves were there in all?

draw a bar model

Answer:  → **L**

Submarine Navigator has 145 sonar beacons, packed 5 to a bag. How many bags can be filled?

draw a bar model

Answer:  → **R**

Submarine Navigator shares 178 repair kits equally among 2 teams. How many repair kits does each team get?

draw a bar model

Answer:  → **P**

## CLUE 4 Exponents

Analyzing the exponential growth pattern of the vault alarm signal reveals key coordinates.

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

|          |     |     |     |     |     |     |    |    |   |     |     |    |     |     |     |   |
|----------|-----|-----|-----|-----|-----|-----|----|----|---|-----|-----|----|-----|-----|-----|---|
| <b>F</b> |     |     |     |     |     |     |    |    |   |     |     |    |     |     |     |   |
| 9        | 625 | 128 | 169 | 324 | 225 | 289 | 27 | 32 | 4 | 729 | 324 | 16 | 121 | 225 | 400 | 4 |

  

|     |     |    |     |     |   |     |    |     |     |     |     |     |
|-----|-----|----|-----|-----|---|-----|----|-----|-----|-----|-----|-----|
|     |     |    |     |     |   |     |    |     |     |     |     |     |
| 125 | 625 | 49 | 225 | 343 | 4 | 225 | 81 | 289 | 400 | 729 | 169 | 729 |

|                                         |                                         |                                         |                                         |
|-----------------------------------------|-----------------------------------------|-----------------------------------------|-----------------------------------------|
| $3^2 = \square \rightarrow \mathbf{F}$  | $7^3 = \square \rightarrow \mathbf{W}$  | $9^3 = \square \rightarrow \mathbf{E}$  | $2^5 = \square \rightarrow \mathbf{I}$  |
| $2^4 = \square \rightarrow \mathbf{B}$  | $18^2 = \square \rightarrow \mathbf{D}$ | $2^7 = \square \rightarrow \mathbf{U}$  | $11^2 = \square \rightarrow \mathbf{L}$ |
| $3^3 = \square \rightarrow \mathbf{P}$  | $20^2 = \square \rightarrow \mathbf{C}$ | $17^2 = \square \rightarrow \mathbf{S}$ | $2^2 = \square \rightarrow \mathbf{K}$  |
| $5^3 = \square \rightarrow \mathbf{M}$  | $5^4 = \square \rightarrow \mathbf{O}$  | $7^2 = \square \rightarrow \mathbf{H}$  | $3^4 = \square \rightarrow \mathbf{T}$  |
| $15^2 = \square \rightarrow \mathbf{A}$ | $13^2 = \square \rightarrow \mathbf{N}$ |                                         |                                         |

Scratch space:

**CLUE 5****Missing addends - the last clue**

The pressure valve control requires finding the missing total force to stabilize the airlock.

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:**

$34 + \underline{\quad} = 42$

$31 + \underline{\quad} = 40$

$16 + \underline{\quad} = 20$

$1 + \underline{\quad} = 4$

$6 + \underline{\quad} = 7$

$14 + \underline{\quad} = 24$

$26 + \underline{\quad} = 37$

$29 + \underline{\quad} = 34$

$10 + \underline{\quad} = 16$

$4 + \underline{\quad} = 16$

$22 + \underline{\quad} = 24$

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

1. The villain sliced through with a plasma cutter, then deployed a thermal flare.
2. The villain blasted off with a jet booster, then deployed a thermal flare.
3. The villain activated a sonic pulse, then scanned with a bio scanner.
4. The villain vanished using a stealth cloak, then scanned with a bio scanner.
5. The villain activated a sonic pulse, then launched a mini drone.
6. The villain fired a grappling hook, then scanned with a bio scanner.
7. The villain activated a sonic pulse, then raised a shock shield.
8. The villain sliced through with a plasma cutter, then launched a mini drone.
9. The villain vanished using a stealth cloak, then launched a mini drone.
10. The villain vanished using a stealth cloak, then wound up an anchor winch.
11. The villain fired a grappling hook, then launched a mini drone.
12. The villain vanished using a stealth cloak, then raised a shock shield.

# Answer Key

## The Sunken Vault Sabotage

### Culprit: Officer Nina

sonic pulse · shock shield · right handed · spiked black mohawk · cold spray

Trail: Start 21 → Clue 1 17 → Clue 2 13 → Clue 3 7 → Clue 4 4 → Clue 5 1

### Clue 1 (Rounding): "THE VILLAIN DOES NOT USE A THERMAL FLARE"

Round 21 to the nearest ten = 20 (T) · Round 2,086 to the nearest thousand = 2000 (I) · Round 128 to the nearest ten = 130 (E) · Round 1,734 to the nearest hundred = 1700 (M) · Round 1,149 to the nearest hundred = 1100 (L) · Round 2,308 to the nearest hundred = 2300 (U) · Round 471 to the nearest hundred = 500 (H) · Round 50 to the nearest ten = 50 (V) · Round 738 to the nearest hundred = 700 (O) · Round 2,857 to the nearest hundred = 2900 (A) · Round 3,211 to the nearest thousand = 3000 (S) · Round 69 to the nearest ten = 70 (N) · Round 191 to the nearest hundred = 200 (D) · Round 300 to the nearest hundred = 300 (R) · Round 4,521 to the nearest thousand = 5000 (F)

### Clue 2 (Fractions of a number): "WITNESS SAW A RIGHT HANDED OPERATOR"

$\frac{1}{3}$  of 141 = 47 (W) ·  $\frac{1}{2}$  of 4 = 2 (H) ·  $\frac{7}{8}$  of 56 = 49 (O) ·  $\frac{1}{2}$  of 92 = 46 (T) ·  $\frac{3}{6}$  of 74 = 37 (A) ·  $\frac{4}{8}$  of 114 = 57 (D) ·  $\frac{1}{5}$  of 145 = 29 (E) ·  $\frac{2}{3}$  of 12 = 8 (G) ·  $\frac{1}{2}$  of 48 = 24 (I) ·  $\frac{3}{6}$  of 46 = 23 (S) ·  $\frac{7}{8}$  of 32 = 28 (N) ·  $\frac{2}{8}$  of 152 = 38 (R) ·  $\frac{3}{4}$  of 52 = 39 (P)

### Clue 3 (Bar model word problems): "COLD SPRAY"

Submarine Navigator has 162 repair kits, packed 2 to a bag. How many bags can be filled? = 81 (C) · One group collected 10 depth gauges and another group collected 7 depth gauges. How many depth gauges in all? = 17 (D) · Submarine Navigator has 2 times as many depth gauges as a teammate. The teammate has 12 depth gauges. How many depth gauges does Submarine Navigator have? = 24 (S) · There were 40 sonar beacons in all. 24 sonar beacons were used. How many sonar beacons are left? = 16 (O) · Submarine Navigator used  $\frac{2}{5}$  of the pressure valves on the first day. The other 51 pressure valves were used the next day. How many pressure valves were there in all? = 85 (L) · Submarine Navigator has 145 sonar beacons, packed 5 to a bag. How many bags can be filled? = 29 (R) · Submarine Navigator shares 178 repair kits equally among 2 teams. How many repair kits does each team get? = 89 (P)

### Clue 4 (Exponents): "FOUND A SPIKED BLACK MOHAWK AT SCENE"

$3^2 = 9$  (F) ·  $7^3 = 343$  (W) ·  $9^3 = 729$  (E) ·  $2^5 = 32$  (I) ·  $2^4 = 16$  (B) ·  $18^2 = 324$  (D) ·  $2^7 = 128$  (U) ·  $11^2 = 121$  (L) ·  $3^3 = 27$  (P) ·  $20^2 = 400$  (C) ·  $17^2 = 289$  (S) ·  $2^2 = 4$  (K) ·  $5^3 = 125$  (M) ·  $5^4 = 625$  (O) ·  $7^2 = 49$  (H) ·  $3^4 = 81$  (T) ·  $15^2 = 225$  (A) ·  $13^2 = 169$  (N)

### Clue 5 (Missing addends): surviving statement is box 7 → Officer Nina

$34 + \underline{\quad} = 42 = 8$  ·  $31 + \underline{\quad} = 40 = 9$  ·  $16 + \underline{\quad} = 20 = 4$  ·  $1 + \underline{\quad} = 4 = 3$  ·  $6 + \underline{\quad} = 7 = 1$  ·  $14 + \underline{\quad} = 24 = 10$  ·  $26 + \underline{\quad} = 37 = 11$  ·  $29 + \underline{\quad} = 34 = 5$  ·  $10 + \underline{\quad} = 16 = 6$  ·  $4 + \underline{\quad} = 16 = 12$  ·  $22 + \underline{\quad} = 24 = 2$