



# The Golden Wind-Vane Mystery

Grade 9 math · Two-step equations, Exponents, Square roots, Integers · Reading level grades 3-4

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

Oh no! Someone has stolen the Golden Wind-Vane from the Sky Patrol Academy! Without it, our floating islands will drift out of control and bump into each other. Commander Leo needs you to find the sneaky Cloud Thief before they fly away forever!

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 Cloud Thief is** \_\_\_\_\_

## Possible suspects

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

| NAME           | FLIGHT GEAR     | INVENTION      | GOGGLES COLOR | HELMET PLUME         | FAVORITE SNACK |
|----------------|-----------------|----------------|---------------|----------------------|----------------|
| Val            | solar sails     | wind net       | blue goggles  | royal blue helmet    | berry tarts    |
| Captain Cooper | solar sails     | wind net       | green goggles | neon yellow helmet   | maple waffles  |
| Kai            | propeller boots | wind net       | blue goggles  | bright orange helmet | maple waffles  |
| Breezy         | propeller boots | bubble blaster | blue goggles  | neon yellow helmet   | lemon drops    |
| Flynn          | steam thrusters | magnetic claw  | green goggles | neon yellow helmet   | lemon drops    |
| Pip            | gravity boots   | magnetic claw  | green goggles | neon yellow helmet   | maple waffles  |
| Luna           | propeller boots | bubble blaster | blue goggles  | bright orange helmet | berry tarts    |
| Quinn          | propeller boots | magnetic claw  | green goggles | bright orange helmet | berry tarts    |
| Ivy            | steam thrusters | bubble blaster | green goggles | neon yellow helmet   | lemon drops    |
| Daisy          | propeller boots | wind net       | blue goggles  | neon yellow helmet   | lemon drops    |
| Gus            | turbo wings     | bubble blaster | green goggles | bright orange helmet | lemon drops    |
| Echo           | solar sails     | wind net       | green goggles | bright orange helmet | berry tarts    |
| Zane           | turbo wings     | magnetic claw  | green goggles | bright orange helmet | berry tarts    |
| Toby           | solar sails     | magnetic claw  | blue goggles  | neon yellow helmet   | berry tarts    |
| Willa          | steam thrusters | grappling hook | green goggles | neon yellow helmet   | berry tarts    |
| Otis           | propeller boots | magnetic claw  | blue goggles  | royal blue helmet    | maple waffles  |
| Skye           | steam thrusters | magnetic claw  | green goggles | bright orange helmet | berry tarts    |
| Una            | steam thrusters | fog generator  | blue goggles  | royal blue helmet    | maple waffles  |
| Ace            | solar sails     | bubble blaster | green goggles | bright orange helmet | berry tarts    |
| Jax            | steam thrusters | wind net       | blue goggles  | bright orange helmet | maple waffles  |
| Milo           | steam thrusters | fog generator  | blue goggles  | bright orange helmet | lemon drops    |

## CLUE 1

## Two-step equations

We found the Cloud Thief's empty fuel crate. The total weight of the wooden crate and several mini fuel canisters helps us calculate how many canisters they used on their getaway ship.

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

|                           |                           |                           |                           |                           |                           |                           |                           |                           |                           |                           |                           |                           |                           |                           |                          |                           |                           |
|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|--------------------------|---------------------------|---------------------------|
| <div>T</div> <div>5</div> | <div></div> <div>22</div> | <div></div> <div>17</div> | <div>T</div> <div>5</div> | <div></div> <div>22</div> | <div></div> <div>10</div> | <div></div> <div>17</div> | <div></div> <div>21</div> | <div></div> <div>7</div>  | <div></div> <div>16</div> | <div></div> <div>17</div> | <div></div> <div>19</div> | <div></div> <div>18</div> | <div></div> <div>16</div> | <div>T</div> <div>5</div> | <div></div> <div>8</div> | <div></div> <div>19</div> | <div></div> <div>17</div> |
| <div>T</div> <div>5</div> | <div></div> <div>22</div> | <div></div> <div>17</div> | <div></div> <div>14</div> | <div></div> <div>10</div> | <div></div> <div>18</div> | <div></div> <div>7</div>  | <div></div> <div>18</div> | <div></div> <div>17</div> | <div>T</div> <div>5</div> |                           |                           |                           |                           |                           |                          |                           |                           |

$2x + 6 = 16, x = \square \rightarrow \boxed{\text{T}}$

$3x + 11 = 77, x = \square \rightarrow \boxed{\text{H}}$

$8x + 10 = 178, x = \square \rightarrow \boxed{\text{F}}$

$2x + 6 = 22, x = \square \rightarrow \boxed{\text{U}}$

$5x + 9 = 89, x = \square \rightarrow \boxed{\text{O}}$

$9x + 12 = 165, x = \square \rightarrow \boxed{\text{E}}$

$7x + 4 = 137, x = \square \rightarrow \boxed{\text{S}}$

$9x + 6 = 132, x = \square \rightarrow \boxed{\text{W}}$

$6x + 2 = 110, x = \square \rightarrow \boxed{\text{N}}$

$6x + 12 = 54, x = \square \rightarrow \boxed{\text{D}}$

$7x + 9 = 79, x = \square \rightarrow \boxed{\text{I}}$

Scratch space:

## CLUE 2 Exponents

Our radar dish is tracking the runaway flight path. Each secret relay beacon triples our scanning strength, so we must calculate the final radar power using exponents.

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

|     |    |     |     |     |     |     |    |    |     |     |     |     |     |     |    |     |   |     |
|-----|----|-----|-----|-----|-----|-----|----|----|-----|-----|-----|-----|-----|-----|----|-----|---|-----|
| W   |    |     |     | W   |     |     |    |    |     |     |     |     |     |     |    |     |   |     |
| 9   | 16 | 289 | 4   | 9   | 361 | 625 | 16 | 16 | 125 | 361 | 256 | 361 | 361 | 441 | 16 | 289 | 4 | 243 |
|     |    |     |     |     |     |     |    |    |     |     |     |     |     |     |    |     |   |     |
| 243 | 81 | 16  | 289 | 196 | 16  | 125 | 16 |    |     |     |     |     |     |     |    |     |   |     |

|                                       |                                       |                                      |                                       |
|---------------------------------------|---------------------------------------|--------------------------------------|---------------------------------------|
| $3^2 = \square \rightarrow \text{W}$  | $2^4 = \square \rightarrow \text{E}$  | $5^3 = \square \rightarrow \text{N}$ | $14^2 = \square \rightarrow \text{C}$ |
| $2^8 = \square \rightarrow \text{O}$  | $17^2 = \square \rightarrow \text{S}$ | $5^4 = \square \rightarrow \text{R}$ | $21^2 = \square \rightarrow \text{L}$ |
| $19^2 = \square \rightarrow \text{G}$ | $9^2 = \square \rightarrow \text{H}$  | $3^5 = \square \rightarrow \text{T}$ | $2^2 = \square \rightarrow \text{A}$  |

Scratch space:

### CLUE 3 Square roots

The patrol team is mapping out a perfectly square grid of search tiles over the clouds. Knowing the total area of the search zone tells us the side length of our flying grid.

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

|   |    |    |   |    |    |    |    |    |    |    |    |   |    |    |    |    |   |
|---|----|----|---|----|----|----|----|----|----|----|----|---|----|----|----|----|---|
| L |    |    |   |    |    |    |    |    |    |    |    |   |    |    |    |    |   |
| 3 | 24 | 14 | 4 | 24 | 12 | 19 | 23 | 17 | 24 | 10 | 10 | 7 | 23 | 14 | 10 | 23 | 2 |

  

|    |    |    |    |    |    |    |   |    |    |
|----|----|----|----|----|----|----|---|----|----|
|    |    |    |    |    |    |    |   |    |    |
| 23 | 12 | 23 | 10 | 14 | 21 | 23 | 8 | 24 | 11 |

|                                                   |                                                   |                                                   |
|---------------------------------------------------|---------------------------------------------------|---------------------------------------------------|
| $\text{sqrt}(9) = \square \rightarrow \text{L}$   | $\text{sqrt}(121) = \square \rightarrow \text{M}$ | $\text{sqrt}(441) = \square \rightarrow \text{P}$ |
| $\text{sqrt}(16) = \square \rightarrow \text{V}$  | $\text{sqrt}(361) = \square \rightarrow \text{U}$ | $\text{sqrt}(529) = \square \rightarrow \text{T}$ |
| $\text{sqrt}(576) = \square \rightarrow \text{E}$ | $\text{sqrt}(100) = \square \rightarrow \text{R}$ | $\text{sqrt}(64) = \square \rightarrow \text{H}$  |
| $\text{sqrt}(49) = \square \rightarrow \text{Y}$  | $\text{sqrt}(4) = \square \rightarrow \text{S}$   | $\text{sqrt}(196) = \square \rightarrow \text{A}$ |
| $\text{sqrt}(144) = \square \rightarrow \text{O}$ | $\text{sqrt}(289) = \square \rightarrow \text{B}$ |                                                   |

Scratch space:

**CLUE 4**   **Integers**

The runaway airship went up into the warm air currents and then dropped down into a cold valley. Let's find their final altitude change using positive and negative integers.

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

|          |    |    |   |    |    |    |    |    |    |    |    |    |    |    |    |
|----------|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|
| <b>W</b> |    |    |   |    |    |    |    |    |    |    |    |    |    |    |    |
| 11       | 28 | 19 | 3 | 34 | 39 | 39 | 28 | 20 | 40 | 18 | 24 | 23 | 17 | 36 | 39 |
|          |    |    |   |    |    |    |    |    |    |    |    |    |    |    |    |
| 34       | 24 | 40 | 8 | 17 | 28 | 36 | 28 | 6  | 22 | 28 | 39 |    |    |    |    |

$3 - (-8) = \square \rightarrow \boxed{\text{W}}$

$(-15) + 34 = \square \rightarrow \boxed{\text{S}}$

$(-5) + 13 = \square \rightarrow \boxed{\text{N}}$

$(-10) + 30 = \square \rightarrow \boxed{\text{D}}$

$(-10) + 16 = \square \rightarrow \boxed{\text{L}}$

$(-13) + 52 = \square \rightarrow \boxed{\text{T}}$

$(-12) + 15 = \square \rightarrow \boxed{\text{P}}$

$(-5) + 41 = \square \rightarrow \boxed{\text{H}}$

$(-11) + 29 = \square \rightarrow \boxed{\text{B}}$

$(-11) + 35 = \square \rightarrow \boxed{\text{R}}$

$(-12) + 46 = \square \rightarrow \boxed{\text{O}}$

$(-13) + 30 = \square \rightarrow \boxed{\text{G}}$

$(-2) + 42 = \square \rightarrow \boxed{\text{A}}$

$(-9) + 32 = \square \rightarrow \boxed{\text{I}}$

$(-3) + 31 = \square \rightarrow \boxed{\text{E}}$

$(-4) + 26 = \square \rightarrow \boxed{\text{M}}$

Scratch space:

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

We checked the local sky shop ledger. The thief bought a map and several climbing clips for a set total price, so we must find the cost of a single clip to prove who checked out.

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:**

$7x + 5 = 82, x = \boxed{\phantom{00}}$

$2x + 12 = 18, x = \boxed{\phantom{00}}$

$9x + 5 = 59, x = \boxed{\phantom{00}}$

$4x + 9 = 49, x = \boxed{\phantom{00}}$

$3x + 7 = 10, x = \boxed{\phantom{00}}$

$8x + 12 = 68, x = \boxed{\phantom{00}}$

$6x + 7 = 55, x = \boxed{\phantom{00}}$

$5x + 11 = 71, x = \boxed{\phantom{00}}$

$6x + 7 = 31, x = \boxed{\phantom{00}}$

$6x + 11 = 65, x = \boxed{\phantom{00}}$

$6x + 1 = 31, x = \boxed{\phantom{00}}$

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

1. The villain zips past the guard tower, then swings away using a grappling hook.
2. The villain glides under the sky bridge, then snatches the prize with a magnetic claw.
3. The villain zooms over the cloud wall, then snatches the prize with a magnetic claw.
4. The villain levitates above the town square, then snatches the prize with a magnetic claw.
5. The villain levitates above the town square, then swings away using a grappling hook.
6. The villain zips past the guard tower, then shoots a sticky bubble blaster.
7. The villain glides under the sky bridge, then swings away using a grappling hook.
8. The villain glides under the sky bridge, then shoots a sticky bubble blaster.
9. The villain soars through the grand canyon, then scoops up the treasure with a wind net.
10. The villain glides under the sky bridge, then scoops up the treasure with a wind net.
11. The villain soars through the grand canyon, then snatches the prize with a magnetic claw.
12. The villain zooms over the cloud wall, then hides inside a thick fog generator cloud.

# Answer Key

## The Golden Wind-Vane Mystery

### Culprit: Zane

turbo wings · magnetic claw · green goggles · bright orange helmet · berry tarts

Trail: Start 21 → Clue 1 15 → Clue 2 9 → Clue 3 5 → Clue 4 4 → Clue 5 1

### Clue 1 (Two-step equations): "THE THIEF DOES NOT USE THE WIND NET"

$2x + 6 = 16, x = 5$  (T) ·  $3x + 11 = 77, x = 22$  (H) ·  $8x + 10 = 178, x = 21$  (F) ·  $2x + 6 = 22, x = 8$  (U) ·  $5x + 9 = 89, x = 16$  (O) ·  $9x + 12 = 165, x = 17$  (E) ·  $7x + 4 = 137, x = 19$  (S) ·  $9x + 6 = 132, x = 14$  (W) ·  $6x + 2 = 110, x = 18$  (N) ·  $6x + 12 = 54, x = 7$  (D) ·  $7x + 9 = 79, x = 10$  (I)

### Clue 2 (Exponents): "WE SAW GREEN GOGGLES AT THE SCENE"

$3^2 = 9$  (W) ·  $2^4 = 16$  (E) ·  $5^3 = 125$  (N) ·  $14^2 = 196$  (C) ·  $2^8 = 256$  (O) ·  $17^2 = 289$  (S) ·  $5^4 = 625$  (R) ·  $21^2 = 441$  (L) ·  $19^2 = 361$  (G) ·  $9^2 = 81$  (H) ·  $3^5 = 243$  (T) ·  $2^2 = 4$  (A)

### Clue 3 (Square roots): "LEAVE OUT BERRY TARTS TO TRAP THEM"

$\sqrt{9} = 3$  (L) ·  $\sqrt{121} = 11$  (M) ·  $\sqrt{441} = 21$  (P) ·  $\sqrt{16} = 4$  (V) ·  $\sqrt{361} = 19$  (U) ·  $\sqrt{529} = 23$  (T) ·  $\sqrt{576} = 24$  (E) ·  $\sqrt{100} = 10$  (R) ·  $\sqrt{64} = 8$  (H) ·  $\sqrt{49} = 7$  (Y) ·  $\sqrt{4} = 2$  (S) ·  $\sqrt{196} = 14$  (A) ·  $\sqrt{144} = 12$  (O) ·  $\sqrt{289} = 17$  (B)

### Clue 4 (Integers): "WE SPOTTED A BRIGHT ORANGE HELMET"

$3 - (-8) = 11$  (W) ·  $(-15) + 34 = 19$  (S) ·  $(-5) + 13 = 8$  (N) ·  $(-10) + 30 = 20$  (D) ·  $(-10) + 16 = 6$  (L) ·  $(-13) + 52 = 39$  (T) ·  $(-12) + 15 = 3$  (P) ·  $(-5) + 41 = 36$  (H) ·  $(-11) + 29 = 18$  (B) ·  $(-11) + 35 = 24$  (R) ·  $(-12) + 46 = 34$  (O) ·  $(-13) + 30 = 17$  (G) ·  $(-2) + 42 = 40$  (A) ·  $(-9) + 32 = 23$  (I) ·  $(-3) + 31 = 28$  (E) ·  $(-4) + 26 = 22$  (M)

### Clue 5 (Two-step equations): surviving statement is box 2 → Zane

$7x + 5 = 82, x = 11$  ·  $2x + 12 = 18, x = 3$  ·  $9x + 5 = 59, x = 6$  ·  $4x + 9 = 49, x = 10$  ·  $3x + 7 = 10, x = 1$  ·  $8x + 12 = 68, x = 7$  ·  $6x + 7 = 55, x = 8$  ·  $5x + 11 = 71, x = 12$  ·  $6x + 7 = 31, x = 4$  ·  $6x + 11 = 65, x = 9$  ·  $6x + 1 = 31, x = 5$