



# The Lost Compass of the Sky-Isles

Grade 7 math · Integers, Percentages, Order of operations, Exponents, Two-step equations · Reading level grades 5-6

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

Someone has stolen the legendary Windstone Compass from the floating archives of Zephyr Valley! Without it, our airships will get lost in the endless storm clouds. The Chief Cartographer needs your help to track down 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 sky-pirate 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          | SKY-SHIP BADGE         | MAP CASE STRAP       | GOGGLE BAND COLOR | FEAR OF                   |
|-----------------|-----------------------|------------------------|----------------------|-------------------|---------------------------|
| Finn            | Magnetic Harpoon      | Ruby Lightning Badge   | Right shoulder strap | Neon orange band  | High-voltage static       |
| Orville         | Magnetic Harpoon      | Golden Anchor Badge    | Left shoulder strap  | Forest green band | Strong lemon juice        |
| Aero Alice      | Solar-Sail Parachute  | Silver Propeller Badge | Right shoulder strap | Neon orange band  | Strong lemon juice        |
| Sterling        | Wind-Powered Glider   | Silver Propeller Badge | Right shoulder strap | Neon orange band  | High-voltage static       |
| Sienna          | Magnetic Harpoon      | Ruby Lightning Badge   | Left shoulder strap  | Forest green band | Strong lemon juice        |
| Zephyr Jack     | Solar-Sail Parachute  | Emerald Feather Badge  | Left shoulder strap  | Neon orange band  | Strong lemon juice        |
| Cyrus           | Wind-Powered Glider   | Golden Anchor Badge    | Left shoulder strap  | Forest green band | High-voltage static       |
| Marina          | Brass Grappling Hook  | Silver Propeller Badge | Left shoulder strap  | Forest green band | Strong lemon juice        |
| Gale            | Solar-Sail Parachute  | Bronze Compass Badge   | Left shoulder strap  | Forest green band | Strong lemon juice        |
| Daisy           | Magnetic Harpoon      | Bronze Compass Badge   | Left shoulder strap  | Sky blue band     | Squeaking mechanical bats |
| Wilbur          | Wind-Powered Glider   | Silver Propeller Badge | Left shoulder strap  | Forest green band | Strong lemon juice        |
| Hudson          | Magnetic Harpoon      | Golden Anchor Badge    | Left shoulder strap  | Neon orange band  | Squeaking mechanical bats |
| Jet             | Solar-Sail Parachute  | Emerald Feather Badge  | Right shoulder strap | Sky blue band     | Strong lemon juice        |
| Skye            | Solar-Sail Parachute  | Silver Propeller Badge | Right shoulder strap | Forest green band | High-voltage static       |
| Pilot Pete      | Magnetic Harpoon      | Emerald Feather Badge  | Left shoulder strap  | Neon orange band  | Strong lemon juice        |
| Baron Von Cloud | Magnetic Harpoon      | Bronze Compass Badge   | Right shoulder strap | Forest green band | Strong lemon juice        |
| Breezy Blake    | Solar-Sail Parachute  | Silver Propeller Badge | Right shoulder strap | Sky blue band     | High-voltage static       |
| Captain Amelia  | Brass Grappling Hook  | Emerald Feather Badge  | Left shoulder strap  | Forest green band | High-voltage static       |
| Nimbus Nick     | Steam-Charged Jetpack | Silver Propeller Badge | Left shoulder strap  | Neon orange band  | Squeaking mechanical bats |
| Earhart         | Wind-Powered Glider   | Golden Anchor Badge    | Left shoulder strap  | Neon orange band  | Squeaking mechanical bats |
| Willa           | Wind-Powered Glider   | Ruby Lightning Badge   | Left shoulder strap  | Sky blue band     | Squeaking mechanical bats |

## CLUE 1 Integers

We checked the main altitude log to find where the thief boarded. Add and subtract these positive and negative elevations to find our first real clue.

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

|    |    |    |    |    |    |    |    |    |    |    |   |   |    |    |    |
|----|----|----|----|----|----|----|----|----|----|----|---|---|----|----|----|
| T  |    |    | T  |    |    |    |    |    |    |    |   |   | T  |    |    |
| 18 | 24 | 25 | 18 | 24 | 13 | 25 | 19 | 20 | 23 | 14 | 3 | 2 | 18 | 24 | 25 |
|    |    |    |    |    |    |    |    |    |    |    |   |   |    |    |    |
| 6  | 16 | 4  | 27 | 20 | 13 | 5  | 24 | 18 | 7  | 13 | 7 | 5 | 4  | 23 | 29 |

|                                             |                                            |                                             |
|---------------------------------------------|--------------------------------------------|---------------------------------------------|
| $17 - (-1) = \square \rightarrow$ <b>T</b>  | $11 - (-9) = \square \rightarrow$ <b>L</b> | $(-11) + 36 = \square \rightarrow$ <b>E</b> |
| $(-4) + 11 = \square \rightarrow$ <b>N</b>  | $(-9) + 14 = \square \rightarrow$ <b>G</b> | $2 - (-11) = \square \rightarrow$ <b>I</b>  |
| $1 - (-2) = \square \rightarrow$ <b>K</b>   | $2 - (-12) = \square \rightarrow$ <b>C</b> | $21 - (-3) = \square \rightarrow$ <b>H</b>  |
| $(-15) + 44 = \square \rightarrow$ <b>D</b> | $(-1) + 3 = \square \rightarrow$ <b>S</b>  | $(-3) + 26 = \square \rightarrow$ <b>A</b>  |
| $(-14) + 41 = \square \rightarrow$ <b>Y</b> | $3 - (-13) = \square \rightarrow$ <b>U</b> | $(-7) + 13 = \square \rightarrow$ <b>R</b>  |
| $(-1) + 5 = \square \rightarrow$ <b>B</b>   | $11 - (-8) = \square \rightarrow$ <b>F</b> |                                             |

Scratch space:

**CLUE 2**

## Percentages

The runaway glider left a trail of spent fuel cells. Figure out what percentage of the tank was used so we can narrow down our search grid.

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

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| T  |    |    |    | T  |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 48 | 55 | 38 | 17 | 48 | 42 | 18 | 49 | 50 | 18 | 17 | 50 | 60 | 42 | 28 | 60 | 28 |  |
| T  |    |    |    |    |    | T  |    |    |    |    |    |    |    |    |    |    |  |
| 48 | 55 | 38 | 27 | 38 | 53 | 48 | 17 | 55 | 60 | 33 | 27 | 31 | 38 | 42 |    |    |  |

$40\% \text{ of } 120 = \square \rightarrow \boxed{\text{T}}$

$40\% \text{ of } 70 = \square \rightarrow \boxed{\text{N}}$

$10\% \text{ of } 310 = \square \rightarrow \boxed{\text{D}}$

$10\% \text{ of } 180 = \square \rightarrow \boxed{\text{A}}$

$20\% \text{ of } 210 = \square \rightarrow \boxed{\text{R}}$

$20\% \text{ of } 135 = \square \rightarrow \boxed{\text{L}}$

$10\% \text{ of } 500 = \square \rightarrow \boxed{\text{W}}$

$25\% \text{ of } 220 = \square \rightarrow \boxed{\text{H}}$

$10\% \text{ of } 380 = \square \rightarrow \boxed{\text{E}}$

$20\% \text{ of } 165 = \square \rightarrow \boxed{\text{U}}$

$10\% \text{ of } 170 = \square \rightarrow \boxed{\text{S}}$

$75\% \text{ of } 80 = \square \rightarrow \boxed{\text{O}}$

$20\% \text{ of } 245 = \square \rightarrow \boxed{\text{P}}$

$50\% \text{ of } 106 = \square \rightarrow \boxed{\text{F}}$

Scratch space:

**CLUE 3**
**Order of operations**

Our deckhand found a scrambled lockbox on the floor. Follow the strict order of mathematical operations to unlock the box and read the note inside.

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

|    |     |    |    |    |    |    |    |    |    |     |     |    |    |    |    |    |    |    |     |  |
|----|-----|----|----|----|----|----|----|----|----|-----|-----|----|----|----|----|----|----|----|-----|--|
| T  |     |    |    |    |    |    |    |    |    |     |     |    | T  |    |    |    |    |    |     |  |
| 50 | 119 | 16 | 13 | 31 | 99 | 90 | 83 | 46 | 16 | 109 | 100 | 50 | 38 | 73 | 90 | 74 | 74 | 16 | 109 |  |
|    |     |    |    |    |    |    |    |    |    |     |     |    |    |    |    |    |    |    |     |  |
| 74 | 16  | 85 | 70 | 83 | 64 | 8  | 90 | 31 | 16 |     |     |    |    |    |    |    |    |    |     |  |

$34 + 2 \times 8 = \square \rightarrow \text{[T]}$

$82 + 6 \times 3 = \square \rightarrow \text{[A]}$

$10 \times 8 - 16 = \square \rightarrow \text{[J]}$

$10 \times 10 - 30 = \square \rightarrow \text{[O]}$

$74 + 9 \times 5 = \square \rightarrow \text{[H]}$

$3 + 4 \times 7 = \square \rightarrow \text{[C]}$

$39 + 7 \times 5 = \square \rightarrow \text{[L]}$

$4 + 2 \times 2 = \square \rightarrow \text{[U]}$

$51 + 4 \times 8 = \square \rightarrow \text{[N]}$

$12 \times 5 - 22 = \square \rightarrow \text{[S]}$

$3 + 2 \times 5 = \square \rightarrow \text{[Y]}$

$2 \times 12 - 8 = \square \rightarrow \text{[E]}$

$8 \times 7 - 10 = \square \rightarrow \text{[G]}$

$27 + 8 \times 9 = \square \rightarrow \text{[R]}$

$10 \times 9 - 17 = \square \rightarrow \text{[P]}$

$10 \times 11 - 1 = \square \rightarrow \text{[D]}$

$11 \times 9 - 14 = \square \rightarrow \text{[M]}$

$8 \times 12 - 6 = \square \rightarrow \text{[I]}$

Scratch space:

## CLUE 4 Exponents

The thief used a signal jammer that doubles its power with every extra antenna. Solve this exponent problem to locate the signal source.

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

|   |     |     |     |     |     |     |     |     |     |     |     |     |     |    |     |     |     |     |
|---|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|
| W |     |     |     |     |     |     |     |     |     |     |     |     |     |    |     |     |     |     |
| 9 | 216 | 49  | 27  | 169 | 128 | 100 | 32  | 289 | 324 | 216 | 216 | 128 | 361 | 32 | 128 | 100 | 125 | 128 |
|   |     |     |     |     |     |     |     |     |     |     |     |     |     |    |     |     |     |     |
| 8 | 343 | 216 | 243 | 32  | 361 | 125 | 128 |     |     |     |     |     |     |    |     |     |     |     |

|                                       |                                       |                                       |                                       |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| $3^2 = \square \rightarrow \text{W}$  | $18^2 = \square \rightarrow \text{R}$ | $7^3 = \square \rightarrow \text{H}$  | $13^2 = \square \rightarrow \text{U}$ |
| $6^3 = \square \rightarrow \text{E}$  | $5^3 = \square \rightarrow \text{I}$  | $17^2 = \square \rightarrow \text{G}$ | $10^2 = \square \rightarrow \text{D}$ |
| $19^2 = \square \rightarrow \text{B}$ | $2^7 = \square \rightarrow \text{N}$  | $7^2 = \square \rightarrow \text{F}$  | $2^5 = \square \rightarrow \text{A}$  |
| $2^3 = \square \rightarrow \text{T}$  | $3^5 = \square \rightarrow \text{C}$  | $3^3 = \square \rightarrow \text{O}$  |                                       |

Scratch space:

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

We found a balanced cargo scale with heavy gear left on one side. Solve this two-step equation to determine the exact weight of the thief's gear.

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:**

$3x + 11 = 44, x = \boxed{\phantom{00}}$

$5x + 6 = 56, x = \boxed{\phantom{00}}$

$3x + 6 = 9, x = \boxed{\phantom{00}}$

$6x + 2 = 50, x = \boxed{\phantom{00}}$

$4x + 1 = 13, x = \boxed{\phantom{00}}$

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

$2x + 12 = 20, x = \boxed{\phantom{00}}$

$4x + 10 = 46, x = \boxed{\phantom{00}}$

$6x + 5 = 47, x = \boxed{\phantom{00}}$

$5x + 1 = 11, x = \boxed{\phantom{00}}$

$2x + 12 = 36, x = \boxed{\phantom{00}}$

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

1. The villain swung through the cargo hatch, then sailed away on a fast skiff.
2. The villain snagged the compass with a hook, then zipped down a zipline to safety.
3. The villain snagged the compass with a hook, then sailed away on a fast skiff.
4. The villain snagged the compass with a hook, then leaped onto a passing airship.
5. The villain floated in through the skylight, then sailed away on a fast skiff.
6. The villain drifted down on a glider, then sailed away on a fast skiff.
7. The villain swung through the cargo hatch, then zipped down a zipline to safety.
8. The villain drifted down on a glider, then leaped onto a passing airship.
9. The villain swung through the cargo hatch, then vanished over the horizon.
10. The villain floated in through the skylight, then leaped onto a passing airship.
11. The villain snagged the compass with a hook, then escaped into the storm clouds.
12. The villain swung through the cargo hatch, then escaped into the storm clouds.

# Answer Key

## The Lost Compass of the Sky-Isles

### Culprit: Wilbur

Wind-Powered Glider · Silver Propeller Badge · Left shoulder strap · Forest green band · Strong lemon juice

Trail: Start 21 → Clue 1 18 → Clue 2 12 → Clue 3 6 → Clue 4 4 → Clue 5 1

#### Clue 1 (Integers): "THE THIEF LACKS THE RUBY LIGHTNING BADGE"

$17 - (-1) = 18$  (T) ·  $11 - (-9) = 20$  (L) ·  $(-11) + 36 = 25$  (E) ·  $(-4) + 11 = 7$  (N) ·  $(-9) + 14 = 5$  (G) ·  $2 - (-11) = 13$  (I) ·  $1 - (-2) = 3$  (K) ·  $2 - (-12) = 14$  (C) ·  $21 - (-3) = 24$  (H) ·  $(-15) + 44 = 29$  (D) ·  $(-1) + 3 = 2$  (S) ·  $(-3) + 26 = 23$  (A) ·  $(-14) + 41 = 27$  (Y) ·  $3 - (-13) = 16$  (U) ·  $(-7) + 13 = 6$  (R) ·  $(-1) + 5 = 4$  (B) ·  $11 - (-8) = 19$  (F)

#### Clue 2 (Percentages): "THE STRAP WAS WORN ON THE LEFT SHOULDER"

40% of 120 = 48 (T) · 40% of 70 = 28 (N) · 10% of 310 = 31 (D) · 10% of 180 = 18 (A) · 20% of 210 = 42 (R) · 20% of 135 = 27 (L) · 10% of 500 = 50 (W) · 25% of 220 = 55 (H) · 10% of 380 = 38 (E) · 20% of 165 = 33 (U) · 10% of 170 = 17 (S) · 75% of 80 = 60 (O) · 20% of 245 = 49 (P) · 50% of 106 = 53 (F)

#### Clue 3 (Order of operations): "THEY CRINGED AT SPILLED LEMON JUICE"

$34 + 2 \times 8 = 50$  (T) ·  $82 + 6 \times 3 = 100$  (A) ·  $10 \times 8 - 16 = 64$  (J) ·  $10 \times 10 - 30 = 70$  (O) ·  $74 + 9 \times 5 = 119$  (H) ·  $3 + 4 \times 7 = 31$  (C) ·  $39 + 7 \times 5 = 74$  (L) ·  $4 + 2 \times 2 = 8$  (U) ·  $51 + 4 \times 8 = 83$  (N) ·  $12 \times 5 - 22 = 38$  (S) ·  $3 + 2 \times 5 = 13$  (Y) ·  $2 \times 12 - 8 = 16$  (E) ·  $8 \times 7 - 10 = 46$  (G) ·  $27 + 8 \times 9 = 99$  (R) ·  $10 \times 9 - 17 = 73$  (P) ·  $10 \times 11 - 1 = 109$  (D) ·  $11 \times 9 - 14 = 85$  (M) ·  $8 \times 12 - 6 = 90$  (I)

#### Clue 4 (Exponents): "WE FOUND A GREEN BAND IN THE CABIN"

$3^2 = 9$  (W) ·  $18^2 = 324$  (R) ·  $7^3 = 343$  (H) ·  $13^2 = 169$  (U) ·  $6^3 = 216$  (E) ·  $5^3 = 125$  (I) ·  $17^2 = 289$  (G) ·  $10^2 = 100$  (D) ·  $19^2 = 361$  (B) ·  $2^7 = 128$  (N) ·  $7^2 = 49$  (F) ·  $2^5 = 32$  (A) ·  $2^3 = 8$  (T) ·  $3^5 = 243$  (C) ·  $3^3 = 27$  (O)

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

$3x + 11 = 44, x = 11$  ·  $5x + 6 = 56, x = 10$  ·  $3x + 6 = 9, x = 1$  ·  $6x + 2 = 50, x = 8$  ·  $4x + 1 = 13, x = 3$  ·  $2x + 2 = 12, x = 5$  ·  $2x + 12 = 20, x = 4$  ·  $4x + 10 = 46, x = 9$  ·  $6x + 5 = 47, x = 7$  ·  $5x + 1 = 11, x = 2$  ·  $2x + 12 = 36, x = 12$