



The Canopy Kingdom Heist

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

Detective: _____ **Date:** _____

The Golden Astrolabe has been stolen from the high Canopy Guild observatory! This ancient navigation instrument is the only tool that can guide our sky-boats safely through the upcoming storm. A mysterious Sky Bandit was spotted ziplining away from the scene. It is up to you to crack the clues, examine the evidence, and identify the thief before the weather turns dangerous.

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 Sky Bandit is _____

Possible suspects

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

NAME	ESCAPE METHOD	SPECIAL GADGET	OBSERVED PRINT	HAIR STYLE	FOIL WEAPON
Ivy	Zipline Speed Dash	Flash Powder Blind	Right-Handed Glove	Spiky Neon Green Hair	Sneeze Powder Reaction
Zoe	Zipline Speed Dash	Flash Powder Blind	Right-Handed Glove	Bright Orange Ponytail	Bright Flashlight Glare
Nova	Glider Pack Flight	Night Vision Goggles	Right-Handed Glove	Curly Silver Buzzcut	Sneeze Powder Reaction
Finn	Glider Pack Flight	Flash Powder Blind	Right-Handed Glove	Spiky Neon Green Hair	Bright Flashlight Glare
Zack	Rope Bridge Acrobatics	Flash Powder Blind	Right-Handed Glove	Bright Orange Ponytail	Loud Whistle Startle
Ruby	Glider Pack Flight	Flash Powder Blind	Left-Handed Glove	Bright Orange Ponytail	Bright Flashlight Glare
Hugo	Zipline Speed Dash	Sonic Distraction Device	Left-Handed Glove	Bright Orange Ponytail	Bright Flashlight Glare
Chloe	Grappling Hook Swing	Smoke Bomb Decoy	Right-Handed Glove	Curly Silver Buzzcut	Bright Flashlight Glare
Skye	Grappling Hook Swing	Sonic Distraction Device	Right-Handed Glove	Spiky Neon Green Hair	Bright Flashlight Glare
Ryder	Grappling Hook Swing	Flash Powder Blind	Right-Handed Glove	Spiky Neon Green Hair	Bright Flashlight Glare
Sienna	Grappling Hook Swing	Sonic Distraction Device	Right-Handed Glove	Curly Silver Buzzcut	Sneeze Powder Reaction
Maya	Canopy Tree Climbing	Sonic Distraction Device	Right-Handed Glove	Bright Orange Ponytail	Loud Whistle Startle
Jasper	Canopy Tree Climbing	Night Vision Goggles	Left-Handed Glove	Bright Orange Ponytail	Bright Flashlight Glare
Leo	Glider Pack Flight	Smoke Bomb Decoy	Left-Handed Glove	Spiky Neon Green Hair	Sneeze Powder Reaction
Piper	Grappling Hook Swing	Night Vision Goggles	Right-Handed Glove	Spiky Neon Green Hair	Bright Flashlight Glare
Sadie	Zipline Speed Dash	Night Vision Goggles	Right-Handed Glove	Spiky Neon Green Hair	Bright Flashlight Glare
Clara	Rope Bridge Acrobatics	Sonic Distraction Device	Left-Handed Glove	Spiky Neon Green Hair	Loud Whistle Startle
Zane	Grappling Hook Swing	Decoy Whistle Call	Left-Handed Glove	Spiky Neon Green Hair	Sneeze Powder Reaction
Toby	Rope Bridge Acrobatics	Night Vision Goggles	Right-Handed Glove	Curly Silver Buzzcut	Loud Whistle Startle
Luna	Glider Pack Flight	Flash Powder Blind	Right-Handed Glove	Bright Orange Ponytail	Bright Flashlight Glare
Axel	Rope Bridge Acrobatics	Smoke Bomb Decoy	Left-Handed Glove	Spiky Neon Green Hair	Bright Flashlight Glare

CLUE 1 Exponents

The Sky Bandit left an encrypted signal booster on the high platform. The signal strength multiplies exponentially for every meter of height. Let us evaluate the total power to decrypt the first suspect file.

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

T 9	196	225	T 9	100	729	289	225	T 9	441	16	225	4	8	16	T 9	128	4	225
T 9	196	225	4	16	8	36	125	441	225	81	36	125	225					

$3^2 = \square \rightarrow \text{T}$	$17^2 = \square \rightarrow \text{G}$	$2^3 = \square \rightarrow \text{N}$	$4^2 = \square \rightarrow \text{O}$
$3^4 = \square \rightarrow \text{V}$	$3^6 = \square \rightarrow \text{R}$	$15^2 = \square \rightarrow \text{E}$	$5^3 = \square \rightarrow \text{C}$
$6^2 = \square \rightarrow \text{I}$	$2^7 = \square \rightarrow \text{U}$	$14^2 = \square \rightarrow \text{H}$	$2^2 = \square \rightarrow \text{S}$
$10^2 = \square \rightarrow \text{A}$	$21^2 = \square \rightarrow \text{D}$		

Scratch space:

CLUE 2 Square roots

We found a square map grid sketched in the damp moss. The total area of the search grid is known, and we must find the root length of one side to pinpoint the bandit escape path.

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

R													R				
15	16	12	21	20	21	25	23	10	7	10	11	15	16	23	20		
10	7	20	7	17	20	7	10	5	23	20	21	7	4	7	10	12	7

$$\sqrt{225} = \square \rightarrow \boxed{\text{R}}$$

$$\sqrt{100} = \square \rightarrow \boxed{\text{D}}$$

$$\sqrt{289} = \square \rightarrow \boxed{\text{C}}$$

$$\sqrt{16} = \square \rightarrow \boxed{\text{L}}$$

$$\sqrt{49} = \square \rightarrow \boxed{\text{E}}$$

$$\sqrt{144} = \square \rightarrow \boxed{\text{G}}$$

$$\sqrt{25} = \square \rightarrow \boxed{\text{O}}$$

$$\sqrt{625} = \square \rightarrow \boxed{\text{A}}$$

$$\sqrt{400} = \square \rightarrow \boxed{\text{T}}$$

$$\sqrt{529} = \square \rightarrow \boxed{\text{N}}$$

$$\sqrt{441} = \square \rightarrow \boxed{\text{H}}$$

$$\sqrt{121} = \square \rightarrow \boxed{\text{P}}$$

$$\sqrt{256} = \square \rightarrow \boxed{\text{I}}$$

Scratch space:

CLUE 3

Pythagorean theorem

The bandit zipped diagonally from a tall watchtower down to a tree platform. We know the height of the tower and the distance across the ground. Let us use the Pythagorean theorem to find the exact length of the zipline they used.

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

B																	
20	37	39	13	40	82	29	51	30	5	40	51	39	13	40	82	5	
						B											
50	39	51	51	20	51	39	15	25	82	40	39	5	29	26	85		

legs 12 and 16, hypotenuse = → **B**

legs 20 and 21, hypotenuse = → **F**

legs 3 and 4, hypotenuse = → **S**

legs 10 and 24, hypotenuse = → **O**

legs 7 and 24, hypotenuse = → **D**

legs 18 and 24, hypotenuse = → **A**

legs 40 and 75, hypotenuse = → **E**

legs 12 and 35, hypotenuse = → **R**

legs 5 and 12, hypotenuse = → **G**

legs 18 and 80, hypotenuse = → **T**

legs 9 and 12, hypotenuse = → **N**

legs 15 and 36, hypotenuse = → **I**

legs 30 and 40, hypotenuse = → **W**

legs 24 and 32, hypotenuse = → **H**

legs 24 and 45, hypotenuse = → **L**

Scratch space:

CLUE 4

Order of operations

We recovered a coded notebook near the canopy bridge, but the lock requires a correct sequence. To open the notebook without wiping the data, we must carefully evaluate this numerical expression using the correct order of operations.

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

N			N					N					N								
68	44	110	68	76	69	44	44	68	66	11	69	6	68	52	66	31	44	98	11		
	N							N													
110	68	11	89	44	67	69	6	68	92	89											

$8 \times 12 - 28 = \square \rightarrow \boxed{\text{N}}$

$8 \times 12 - 7 = \square \rightarrow \boxed{\text{H}}$

$58 + 3 \times 3 = \square \rightarrow \boxed{\text{B}}$

$68 + 8 \times 3 = \square \rightarrow \boxed{\text{C}}$

$2 + 2 \times 2 = \square \rightarrow \boxed{\text{A}}$

$10 \times 7 - 1 = \square \rightarrow \boxed{\text{R}}$

$40 + 9 \times 4 = \square \rightarrow \boxed{\text{G}}$

$24 + 5 \times 4 = \square \rightarrow \boxed{\text{E}}$

$54 + 3 \times 4 = \square \rightarrow \boxed{\text{S}}$

$16 + 3 \times 5 = \square \rightarrow \boxed{\text{L}}$

$11 \times 12 - 22 = \square \rightarrow \boxed{\text{O}}$

$8 \times 3 - 13 = \square \rightarrow \boxed{\text{T}}$

$7 + 9 \times 5 = \square \rightarrow \boxed{\text{D}}$

$70 + 7 \times 4 = \square \rightarrow \boxed{\text{F}}$

Scratch space:

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

A local tree merchant recalls selling safety gear to a suspicious customer. The total bill included a flat platform tax plus a set price per heavy carabiner. Solve this two-step equation to determine exactly how many carabiners the suspect purchased.

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:

$2x + 3 = 25, x = \boxed{}$

$2x + 4 = 12, x = \boxed{}$

$4x + 2 = 14, x = \boxed{}$

$6x + 3 = 51, x = \boxed{}$

$4x + 9 = 17, x = \boxed{}$

$5x + 9 = 34, x = \boxed{}$

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

$2x + 5 = 7, x = \boxed{}$

$6x + 8 = 44, x = \boxed{}$

$2x + 2 = 26, x = \boxed{}$

$6x + 9 = 69, x = \boxed{}$

Step 2 - cross out the sentence with each answer:

1. The villain swings through the air using a high-tech grappling hook, then deploys a sonic distraction device to cause panic.
2. The villain scales giant ancient redwoods using specialized climbing spikes, then blows a decoy whistle to confuse the scouts.
3. The villain swings through the air using a high-tech grappling hook, then throws flash powder to blind the guards.
4. The villain glides silently between branches using a glider pack, then throws flash powder to blind the guards.
5. The villain speeds down the main line with a custom zipline harness, then drops a thick smoke bomb to escape.
6. The villain speeds down the main line with a custom zipline harness, then blows a decoy whistle to confuse the scouts.
7. The villain flips across high-altitude rope bridges with ease, then deploys a sonic distraction device to cause panic.
8. The villain glides silently between branches using a glider pack, then drops a thick smoke bomb to escape.
9. The villain speeds down the main line with a custom zipline harness, then activates night vision goggles to navigate the dark.
10. The villain swings through the air using a high-tech grappling hook, then blows a decoy whistle to confuse the scouts.
11. The villain swings through the air using a high-tech grappling hook, then activates night vision goggles to navigate the dark.
12. The villain glides silently between branches using a glider pack, then blows a decoy whistle to confuse the scouts.

Answer Key

The Canopy Kingdom Heist

Culprit: Sadie

Zipline Speed Dash · Night Vision Goggles · Right-Handed Glove · Spiky Neon Green Hair · Bright Flashlight Glare

Trail: Start 21 → Clue 1 16 → Clue 2 11 → Clue 3 7 → Clue 4 4 → Clue 5 1

Clue 1 (Exponents): "THE TARGET DOES NOT USE THE SONIC DEVICE"

$3^2 = 9$ (T) · $17^2 = 289$ (G) · $2^3 = 8$ (N) · $4^2 = 16$ (O) · $3^4 = 81$ (V) · $3^6 = 729$ (R) · $15^2 = 225$ (E) · $5^3 = 125$ (C) · $6^2 = 36$ (I) · $2^7 = 128$ (U) · $14^2 = 196$ (H) · $2^2 = 4$ (S) · $10^2 = 100$ (A) · $21^2 = 441$ (D)

Clue 2 (Square roots): "RIGHT HANDED PRINT DETECTED ON THE LEDGE"

$\sqrt{225} = 15$ (R) · $\sqrt{100} = 10$ (D) · $\sqrt{289} = 17$ (C) · $\sqrt{16} = 4$ (L) · $\sqrt{49} = 7$ (E) · $\sqrt{144} = 12$ (G) · $\sqrt{25} = 5$ (O) · $\sqrt{625} = 25$ (A) · $\sqrt{400} = 20$ (T) · $\sqrt{529} = 23$ (N) · $\sqrt{441} = 21$ (H) · $\sqrt{121} = 11$ (P) · $\sqrt{256} = 16$ (I)

Clue 3 (Pythagorean theorem): "BRIGHT FLASHLIGHTS WILL BLIND THIS FOE"

legs 12 and 16, hypotenuse = 20 (B) · legs 20 and 21, hypotenuse = 29 (F) · legs 3 and 4, hypotenuse = 5 (S) · legs 10 and 24, hypotenuse = 26 (O) · legs 7 and 24, hypotenuse = 25 (D) · legs 18 and 24, hypotenuse = 30 (A) · legs 40 and 75, hypotenuse = 85 (E) · legs 12 and 35, hypotenuse = 37 (R) · legs 5 and 12, hypotenuse = 13 (G) · legs 18 and 80, hypotenuse = 82 (T) · legs 9 and 12, hypotenuse = 15 (N) · legs 15 and 36, hypotenuse = 39 (I) · legs 30 and 40, hypotenuse = 50 (W) · legs 24 and 32, hypotenuse = 40 (H) · legs 24 and 45, hypotenuse = 51 (L)

Clue 4 (Order of operations): "NEON GREEN STRANDS LEFT ON THE BRANCH"

$8 \times 12 - 28 = 68$ (N) · $8 \times 12 - 7 = 89$ (H) · $58 + 3 \times 3 = 67$ (B) · $68 + 8 \times 3 = 92$ (C) · $2 + 2 \times 2 = 6$ (A) · $10 \times 7 - 1 = 69$ (R) · $40 + 9 \times 4 = 76$ (G) · $24 + 5 \times 4 = 44$ (E) · $54 + 3 \times 4 = 66$ (S) · $16 + 3 \times 5 = 31$ (L) · $11 \times 12 - 22 = 110$ (O) · $8 \times 3 - 13 = 11$ (T) · $7 + 9 \times 5 = 52$ (D) · $70 + 7 \times 4 = 98$ (F)

Clue 5 (Two-step equations): surviving statement is box 9 → Sadie

$2x + 3 = 25, x = 11$ · $2x + 4 = 12, x = 4$ · $4x + 2 = 14, x = 3$ · $6x + 3 = 51, x = 8$ · $4x + 9 = 17, x = 2$ · $5x + 9 = 34, x = 5$ · $6x + 5 = 47, x = 7$ · $2x + 5 = 7, x = 1$ · $6x + 8 = 44, x = 6$ · $2x + 2 = 26, x = 12$ · $6x + 9 = 69, x = 10$