



The Golden Astrolabe Heist

Grade 8 math · Place value, Bar models, Rounding, Skip counting, Missing addends · Reading level grades 7-9

Detective: _____ Date: _____

The legendary Golden Astrolabe has been stolen from the Grand Archives of Solaria! This ancient device keeps the floating islands from drifting into the great storm below. A notorious Sky-Bandit must have slipped past the brass steam-sentries. We must analyze the evidence to catch them.

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

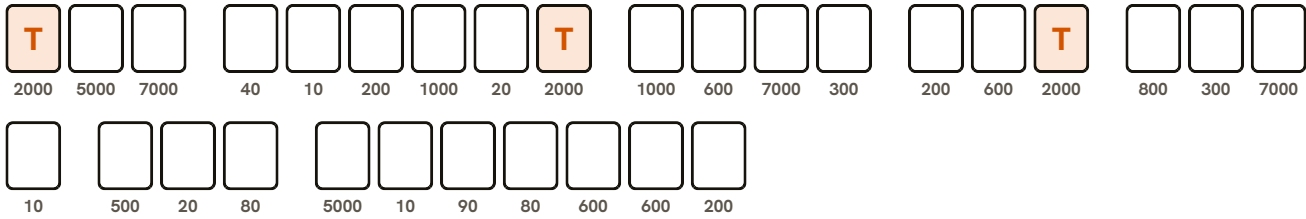
Cross off a row as each clue rules it out. The one left at the end is the culprit.

NAME	SIGNATURE GEAR	SKY-GADGET	FLIGHT STYLE	SCARF COLOR	DARING WEAKNESS
Antoine de Saint-Exupery	Wind Whistle	Pocket Radar	Left-Handed Turn	Sapphire Scarf	Bright Lanterns
Laura Dekker	Steam Blaster	Zip Harpoon	Right-Handed Turn	Crimson Scarf	Bright Lanterns
Sacagawea	Steam Blaster	Smoke Pellets	Right-Handed Turn	Crimson Scarf	Bright Lanterns
Jacques Cousteau	Brass Compass	Flash Flare	Right-Handed Turn	Sapphire Scarf	Loud Whistles
Wilbur Wright	Brass Compass	Smoke Pellets	Right-Handed Turn	Emerald Scarf	Loud Whistles
Jeanne Baret	Glider Pack	Zip Harpoon	Left-Handed Turn	Emerald Scarf	Ticklish Feathers
Orville Wright	Grappling Hook	Flash Flare	Right-Handed Turn	Crimson Scarf	Bright Lanterns
Steve Fossett	Wind Whistle	Magnetic Boots	Left-Handed Turn	Emerald Scarf	Loud Whistles
James Cook	Wind Whistle	Flash Flare	Right-Handed Turn	Crimson Scarf	Bright Lanterns
Nellie Bly	Steam Blaster	Magnetic Boots	Left-Handed Turn	Crimson Scarf	Bright Lanterns
Sally Ride	Grappling Hook	Flash Flare	Left-Handed Turn	Crimson Scarf	Loud Whistles
Baron von Richthofen	Steam Blaster	Flash Flare	Left-Handed Turn	Crimson Scarf	Bright Lanterns
Wiley Post	Steam Blaster	Magnetic Boots	Right-Handed Turn	Crimson Scarf	Ticklish Feathers
Matthew Henson	Wind Whistle	Magnetic Boots	Left-Handed Turn	Emerald Scarf	Bright Lanterns
Harriet Quimby	Wind Whistle	Flash Flare	Right-Handed Turn	Sapphire Scarf	Bright Lanterns
Marco Polo	Glider Pack	Smoke Pellets	Right-Handed Turn	Emerald Scarf	Ticklish Feathers
Charles Lindbergh	Grappling Hook	Smoke Pellets	Left-Handed Turn	Crimson Scarf	Bright Lanterns
Isabella Bird	Brass Compass	Smoke Pellets	Right-Handed Turn	Crimson Scarf	Bright Lanterns
Bessie Coleman	Wind Whistle	Flash Flare	Right-Handed Turn	Crimson Scarf	Ticklish Feathers
Yuri Gagarin	Grappling Hook	Flash Flare	Left-Handed Turn	Sapphire Scarf	Bright Lanterns
Valentina Tereshkova	Glider Pack	Pocket Radar	Left-Handed Turn	Crimson Scarf	Loud Whistles

CLUE 1 Place value

We found a torn blueprint comparing the weight of the airship's cargo holds. By representing the weights as blocks, we can figure out the mystery ship's true weight.

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



What is the value of the 2 in 72,770? → **T**

What is the value of the 6 in 334,639? → **O**

What is the value of the 4 in 50,649? → **B**

What is the value of the 1 in 79,415? → **A**

What is the value of the 8 in 341,801? → **U**

What is the value of the 7 in 37,455? → **E**

What is the value of the 8 in 21,984? → **P**

What is the value of the 2 in 914,021? → **I**

What is the value of the 9 in 34,494? → **R**

What is the value of the 3 in 47,328? → **S**

What is the value of the 5 in 385,688? → **H**

What is the value of the 1 in 51,778? → **D**

What is the value of the 5 in 796,592? → **Z**

What is the value of the 2 in 49,265? → **N**

Scratch space:

CLUE 2

Bar model word problems

A locked brass keypad stands in our way. Its gears shift based on the values of the hundreds and thousands places in the lock's security code.

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

A witness saw the villain was

R									D	E	D		U	R	
98	92	36	142	79	142	82	127					79		98	127

Quartermaster Finneas shares 196 wind crystals equally among 2 teams. How many wind crystals does each team get?

draw a bar model

Answer: → **R**

One group collected 28 brass spyglasses and another group collected 8 brass spyglasses. How many brass spyglasses in all?

draw a bar model

Answer: → **G**

There were 111 brass spyglasses in all. 29 brass spyglasses were used. How many brass spyglasses are left?

draw a bar model

Answer: → **A**

There were 121 brass spyglasses in all. 29 brass spyglasses were used. How many brass spyglasses are left?

draw a bar model

Answer: → **I**

Quartermaster Finneas has 158 skyship gears, packed 2 to a bag. How many bags can be filled?

draw a bar model

Answer: → **T**

One group collected 7 wind crystals and another group collected 120 wind crystals. How many wind crystals in all?

draw a bar model

Answer: → **N**

The red team has 163 brass spyglasses and the blue team has 21 brass spyglasses. How many more brass spyglasses does the red team have?

draw a bar model

Answer: → **H**

CLUE 3 Rounding

Our steam-radar can track the pirate's flight path, but the atmospheric interference forces us to round the distance readings to the nearest hundred miles.

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

S																			
20	200	1700	1700	170	3000	500	370	50	130	7000	1300	3700	50	130	7000	1300			
					S				S										
500	3700	50	3000	1700	20	1300	7000	50	20	4300	50	3700	3700	1100	50	3000			

Round 23 to the nearest ten → **S**

Round 457 to the nearest hundred → **B**

Round 1,730 to the nearest hundred → **D**

Round 47 to the nearest ten → **I**

Round 3,727 to the nearest hundred → **L**

Round 1,073 to the nearest hundred → **A**

Round 173 to the nearest ten → **E**

Round 196 to the nearest hundred → **U**

Round 6,994 to the nearest thousand → **H**

Round 2,894 to the nearest thousand → **N**

Round 127 to the nearest ten → **G**

Round 4,285 to the nearest hundred → **V**

Round 373 to the nearest ten → **R**

Round 1,253 to the nearest hundred → **T**

Scratch space:

CLUE 4 Skip counting

The escape route is marked by glowing fuel canisters dropped at regular intervals. Counting them by sevens reveals the coordinate of their secret hangar.

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

R					R							R							
21	90	22	16	130	21	90	30	22	33	55	90	21	90						
												R							
33	25	30	50	50	90	22	42	25	16	130	90	21	40	50	50	40	25	50	

Skip-count by 3s. Fill the blank: 3, 6, 9, 12, 15, 18, __, 24, 27 → **R**

Skip-count by 5s. Fill the blank: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, __, 60, 65 → **W**

Skip-count by 2s. Fill the blank: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, __, 24, 26 → **D**

Skip-count by 3s. Fill the blank: 3, 6, 9, 12, 15, 18, 21, 24, 27, __, 33, 36 → **A**

Skip-count by 2s. Fill the blank: 2, 4, 6, 8, 10, 12, 14, __, 18, 20 → **T**

Skip-count by 10s. Fill the blank: 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, __, 140, 150 → **H**

Skip-count by 3s. Fill the blank: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, __, 45, 48 → **O**

Skip-count by 5s. Fill the blank: 5, 10, 15, 20, __, 30, 35 → **N**

Skip-count by 3s. Fill the blank: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, __, 36, 39 → **S**

Skip-count by 5s. Fill the blank: 5, 10, 15, 20, 25, 30, 35, __, 45, 50 → **I**

Skip-count by 10s. Fill the blank: 10, 20, 30, 40, 50, 60, 70, 80, __, 100, 110 → **E**

Skip-count by 5s. Fill the blank: 5, 10, 15, 20, 25, 30, 35, 40, 45, __, 55, 60 → **G**

Scratch space:

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

The airship's fuel tank must be filled to exactly one thousand gallons to fly. We know how much they have, so we must calculate the missing amount.

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:

$17 + \underline{\quad} = 27$

$15 + \underline{\quad} = 20$

$23 + \underline{\quad} = 30$

$31 + \underline{\quad} = 34$

$7 + \underline{\quad} = 16$

$29 + \underline{\quad} = 33$

$19 + \underline{\quad} = 25$

$31 + \underline{\quad} = 43$

$4 + \underline{\quad} = 6$

$14 + \underline{\quad} = 25$

$38 + \underline{\quad} = 46$

Step 2 - cross out the sentence with each answer:

1. The villain swung through the high clouds with a grappling hook, then blinded the night watchmen with a flash flare.
2. The villain swung through the high clouds with a grappling hook, then dodged the patrol drones using a pocket radar.
3. The villain soared silently across the canyon on a glider pack, then blinded the night watchmen with a flash flare.
4. The villain soared silently across the canyon on a glider pack, then escaped behind a thick wall of smoke pellets.
5. The villain summoned a localized gale with a wind whistle, then blinded the night watchmen with a flash flare.
6. The villain navigated the treacherous winds using a brass compass, then zipped up to the escape balloon with a zip harpoon.
7. The villain navigated the treacherous winds using a brass compass, then escaped behind a thick wall of smoke pellets.
8. The villain summoned a localized gale with a wind whistle, then zipped up to the escape balloon with a zip harpoon.
9. The villain soared silently across the canyon on a glider pack, then scaled the metallic sheer walls using magnetic boots.
10. The villain blasted through the vault doors with a steam blaster, then escaped behind a thick wall of smoke pellets.
11. The villain summoned a localized gale with a wind whistle, then escaped behind a thick wall of smoke pellets.
12. The villain summoned a localized gale with a wind whistle, then scaled the metallic sheer walls using magnetic boots.

Answer Key

The Golden Astrolabe Heist

Culprit: Orville Wright

Grappling Hook · Flash Flare · Right-Handed Turn · Crimson Scarf · Bright Lanterns

Trail: Start 21 → Clue 1 19 → Clue 2 10 → Clue 3 5 → Clue 4 4 → Clue 5 1

Clue 1 (Place value): "THE BANDIT DOES NOT USE A ZIP HARPOON"

What is the value of the 2 in 72,770? = 2000 (T) · What is the value of the 6 in 334,639? = 600 (O) · What is the value of the 4 in 50,649? = 40 (B) · What is the value of the 1 in 79,415? = 10 (A) · What is the value of the 8 in 341,801? = 800 (U) · What is the value of the 7 in 37,455? = 7000 (E) · What is the value of the 8 in 21,984? = 80 (P) · What is the value of the 2 in 914,021? = 20 (I) · What is the value of the 9 in 34,494? = 90 (R) · What is the value of the 3 in 47,328? = 300 (S) · What is the value of the 5 in 385,688? = 5000 (H) · What is the value of the 1 in 51,778? = 1000 (D) · What is the value of the 5 in 796,592? = 500 (Z) · What is the value of the 2 in 49,265? = 200 (N)

Clue 2 (Bar model word problems): "RIGHT HANDED TURN"

Quartermaster Finneas shares 196 wind crystals equally among 2 teams. How many wind crystals does each team get? = 98 (R) · One group collected 28 brass spyglasses and another group collected 8 brass spyglasses. How many brass spyglasses in all? = 36 (G) · There were 111 brass spyglasses in all. 29 brass spyglasses were used. How many brass spyglasses are left? = 82 (A) · There were 121 brass spyglasses in all. 29 brass spyglasses were used. How many brass spyglasses are left? = 92 (I) · Quartermaster Finneas has 158 skyship gears, packed 2 to a bag. How many bags can be filled? = 79 (T) · One group collected 7 wind crystals and another group collected 120 wind crystals. How many wind crystals in all? = 127 (N) · The red team has 163 brass spyglasses and the blue team has 21 brass spyglasses. How many more brass spyglasses does the red team have? = 142 (H)

Clue 3 (Rounding): "SUDDEN BRIGHT LIGHT BLINDS THIS VILLAIN"

Round 23 to the nearest ten = 20 (S) · Round 457 to the nearest hundred = 500 (B) · Round 1,730 to the nearest hundred = 1700 (D) · Round 47 to the nearest ten = 50 (I) · Round 3,727 to the nearest hundred = 3700 (L) · Round 1,073 to the nearest hundred = 1100 (A) · Round 173 to the nearest ten = 170 (E) · Round 196 to the nearest hundred = 200 (U) · Round 6,994 to the nearest thousand = 7000 (H) · Round 2,894 to the nearest thousand = 3000 (N) · Round 127 to the nearest ten = 130 (G) · Round 4,285 to the nearest hundred = 4300 (V) · Round 373 to the nearest ten = 370 (R) · Round 1,253 to the nearest hundred = 1300 (T)

Clue 4 (Skip counting): "RED THREADS WERE SNAGGED ON THE RIGGING"

Skip-count by 3s. Fill the blank: 3, 6, 9, 12, 15, 18, __, 24, 27 = 21 (R) · Skip-count by 5s. Fill the blank: 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, __, 60, 65 = 55 (W) · Skip-count by 2s. Fill the blank: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, __, 24, 26 = 22 (D) · Skip-count by 3s. Fill the blank: 3, 6, 9, 12, 15, 18, 21, 24, 27, __, 33, 36 = 30 (A) · Skip-count by 2s. Fill the blank: 2, 4, 6, 8, 10, 12, 14, __, 18, 20 = 16 (T) · Skip-count by 10s. Fill the blank: 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, __, 140, 150 = 130 (H) · Skip-count by 3s. Fill the blank: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, __, 45, 48 = 42 (O) · Skip-count by 5s. Fill the blank: 5, 10, 15, 20, __, 30, 35 = 25 (N) · Skip-count by 3s. Fill the blank: 3, 6, 9, 12, 15, 18, 21, 24, 27, 30, __, 36, 39 = 33 (S) · Skip-count by 5s. Fill the blank: 5, 10, 15, 20, 25, 30, 35, __, 45, 50 = 40 (I) · Skip-count by 10s. Fill the blank: 10, 20, 30, 40, 50, 60, 70, 80, __, 100, 110 = 90 (E) · Skip-count by 5s. Fill the blank: 5, 10, 15, 20, 25, 30, 35, 40, 45, __, 55, 60 = 50 (G)

Clue 5 (Missing addends): surviving statement is box 1 → Orville Wright

17 + __ = 27 = 10 · 15 + __ = 20 = 5 · 23 + __ = 30 = 7 · 31 + __ = 34 = 3 · 7 + __ = 16 = 9 · 29 + __ = 33 = 4 · 19 + __ = 25 = 6 · 31 + __ = 43 = 12 · 4 + __ = 6 = 2 · 14 + __ = 25 = 11 · 38 + __ = 46 = 8