The Mystery of the Cloud Fortress

Grade 10 math · Pythagorean theorem, Word problems, Square roots, Exponents · Reading level grades 7-9

Detective: _____ **Date:** _____

Someone sabotaged the Sky Citadel's main compass during the annual cloud festival! The Master Navigator needs your detective skills to analyze field notes, calculate flight distances, and identify the culprit before they escape into the upper atmosphere.

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.

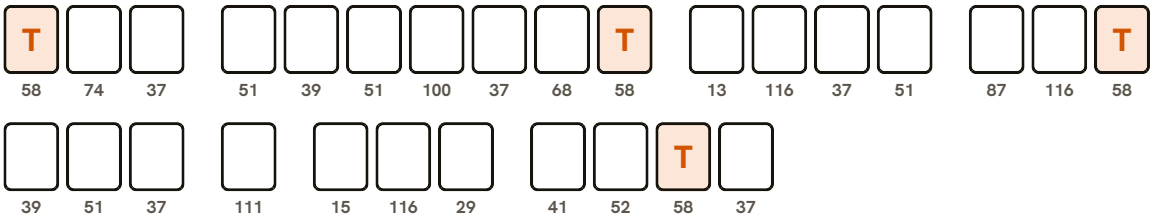
NAME	PRIMARY TOOL	GLIDER TYPE	DOMINANT HAND	GOGGLE COLOR	FEARS
Beatrice Cloud	Steam Cannon	Jet Parasol	Left Handed	Amber Lenses	High Gusts
Amelia Airhart	Sonic Whistle	Jet Parasol	Right Handed	Emerald Lenses	Bright Flash
Nova Breeze	Steam Cannon	Box Kite	Right Handed	Amber Lenses	Bright Flash
Oswald Cirrus	Pulse Lantern	Delta Wing	Left Handed	Amber Lenses	High Gusts
Silas Drake	Sonic Whistle	Solar Wings	Right Handed	Amber Lenses	High Gusts
Rosalind Horizon	Steam Cannon	Solar Wings	Right Handed	Emerald Lenses	High Gusts
Quinn Nimbus	Sonic Whistle	Delta Wing	Left Handed	Amber Lenses	Loud Thunder
Mara Sterling	Wind Banner	Jet Parasol	Left Handed	Amber Lenses	Loud Thunder
Felix Gale	Brass Grapple	Delta Wing	Right Handed	Amber Lenses	High Gusts
Lyra Falcon	Steam Cannon	Bat Glider	Right Handed	Cobalt Lenses	High Gusts
Eliza Windham	Wind Banner	Jet Parasol	Right Handed	Amber Lenses	High Gusts
Ignatius Skye	Wind Banner	Box Kite	Right Handed	Amber Lenses	High Gusts
Penelope Vane	Brass Grapple	Solar Wings	Left Handed	Amber Lenses	Loud Thunder
Gideon Frost	Steam Cannon	Box Kite	Left Handed	Emerald Lenses	High Gusts
Corbin Sterling	Steam Cannon	Solar Wings	Right Handed	Amber Lenses	Bright Flash
Jasper Vance	Wind Banner	Delta Wing	Left Handed	Amber Lenses	Bright Flash
Zephyr Finch	Brass Grapple	Box Kite	Right Handed	Cobalt Lenses	Loud Thunder
Thaddeus Soar	Sonic Whistle	Box Kite	Right Handed	Amber Lenses	High Gusts
Juliet Ridge	Wind Banner	Solar Wings	Right Handed	Emerald Lenses	High Gusts
Vesper Wing	Brass Grapple	Box Kite	Right Handed	Amber Lenses	High Gusts
Magnus Zenith	Wind Banner	Bat Glider	Right Handed	Amber Lenses	High Gusts

make your own at mathcrackers.com

CLUE 1 Pythagorean theorem

> You review the logbook entries recording supply distribution before the sabotage to track the suspect's movements.

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



legs 40 and 42, hypotenuse = ☐ → T

legs 20 and 21, hypotenuse = ☐ → X

legs 9 and 40, hypotenuse = ☐ → K

legs 5 and 12, hypotenuse = ☐ → D

legs 9 and 12, hypotenuse = ☐ → B

legs 24 and 70, hypotenuse = ☐ → H

legs 24 and 45, hypotenuse = ☐ → S

legs 60 and 63, hypotenuse = ☐ → N

legs 28 and 96, hypotenuse = ☐ → P

legs 15 and 36, hypotenuse = ☐ → U

legs 80 and 84, hypotenuse = ☐ → O

legs 32 and 60, hypotenuse = ☐ → C

legs 36 and 105, hypotenuse = ☐ → A

legs 12 and 35, hypotenuse = ☐ → E

legs 20 and 48, hypotenuse = ☐ → I

Scratch space:

CLUE 2 Word problems

> To pinpoint where the pirate launched, calculate the hypotenuse between the fortress watchtowers and the airship deck.

Solve each problem, then write its letter in the boxes to fill in the missing word.

A witness saw the villain was

R								D	E	D
11	33	104	74	29	74	31	50			

.

Sky scout found 3 spyglasses yesterday and 8 more today. How many spyglasses in all?

Answer: ☐ → **R**

There were 89 brass gears. 39 were used up. How many brass gears are left?

Answer: ☐ → **N**

There were 142 spyglasses. 38 were used up. How many spyglasses are left?

Answer: ☐ → **G**

Sky scout found 14 brass gears yesterday and 60 more today. How many brass gears in all?

Answer: ☐ → **H**

There were 68 signal flares. 39 were used up. How many signal flares are left?

Answer: ☐ → **T**

Sky scout found 7 spyglasses yesterday and 24 more today. How many spyglasses in all?

Answer: ☐ → **A**

There were 36 compasses. 3 were used up. How many compasses are left?

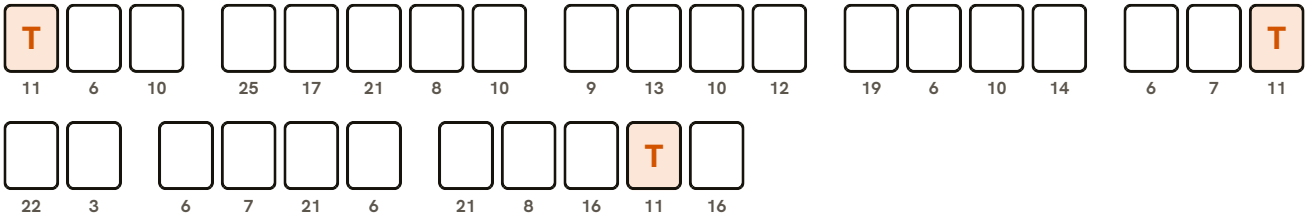
Answer: ☐ → **I**

Scratch space:

CLUE 3 Square roots

> Analyzing the area of the damaged hull grid reveals an exact square, leading to a crucial root value.

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



sqrt(121) = ☐ → T

sqrt(169) = ☐ → L

sqrt(196) = ☐ → N

sqrt(81) = ☐ → F

sqrt(441) = ☐ → G

sqrt(484) = ☐ → B

sqrt(144) = ☐ → D

sqrt(49) = ☐ → I

sqrt(36) = ☐ → H

sqrt(64) = ☐ → U

sqrt(9) = ☐ → Y

sqrt(361) = ☐ → W

sqrt(289) = ☐ → O

sqrt(256) = ☐ → S

sqrt(100) = ☐ → E

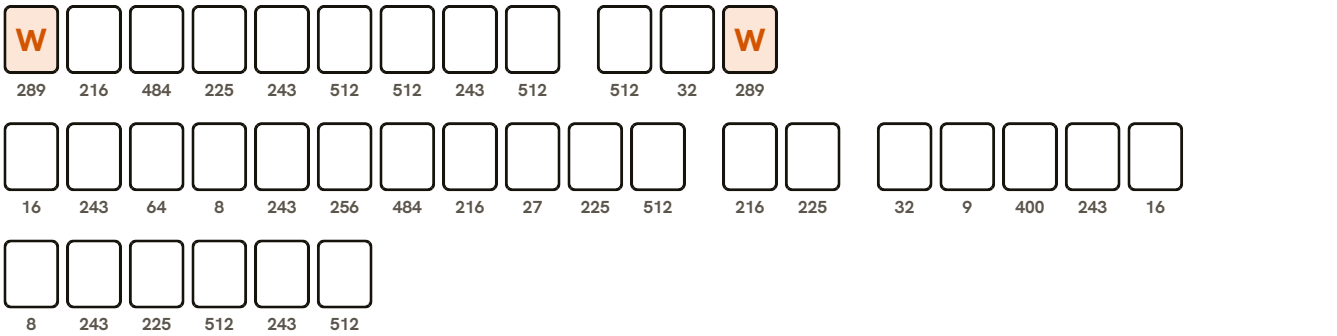
sqrt(625) = ☐ → R

Scratch space:

CLUE 4 Exponents

> The rogue's power source surged exponentially during the escape, requiring exponential equations to decode the energy signature.

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



17^2 = ☐ → W

20^2 = ☐ → B

8^3 = ☐ → S

22^2 = ☐ → T

6^3 = ☐ → I

2^3 = ☐ → L

2^4 = ☐ → R

4^3 = ☐ → F

3^2 = ☐ → M

2^8 = ☐ → C

15^2 = ☐ → N

2^5 = ☐ → A

3^3 = ☐ → O

3^5 = ☐ → E

Scratch space:

CLUE 5 Square roots - the last clue

> A second grid of flight trajectory coordinates forms another perfect square that yields the final hidden coordinate root.

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:

sqrt(1) = ☐ sqrt(25) = ☐ sqrt(16) = ☐ sqrt(49) = ☐ sqrt(121) = ☐

sqrt(144) = ☐ sqrt(100) = ☐ sqrt(9) = ☐ sqrt(4) = ☐ sqrt(64) = ☐

sqrt(81) = ☐

Step 2 - cross out the sentence with each answer:

1. The villain disrupted signals with a sonic whistle, then escaped on solar wings.
2. The villain blasted the vault door with a steam cannon, then floated down on a box kite.
3. The villain disrupted signals with a sonic whistle, then floated down on a box kite.
4. The villain swung in using a brass grapple, then glided off with a delta wing.
5. The villain signaled the crew with a wind banner, then vanished under a jet parasol.
6. The villain signaled the crew with a wind banner, then soared away using a bat glider.
7. The villain swung in using a brass grapple, then vanished under a jet parasol.
8. The villain signaled the crew with a wind banner, then escaped on solar wings.
9. The villain blasted the vault door with a steam cannon, then vanished under a jet parasol.
10. The villain blinded guards with a pulse lantern, then soared away using a bat glider.
11. The villain blinded guards with a pulse lantern, then glided off with a delta wing.
12. The villain blinded guards with a pulse lantern, then escaped on solar wings.

TEACHER / PARENT

Answer Key

The Mystery of the Cloud Fortress

Culprit: Magnus Zenith

Wind Banner · Bat Glider · Right Handed · Amber Lenses · High Gusts

Trail: Start 21 → Clue 1 15 → Clue 2 9 → Clue 3 7 → Clue 4 4 → Clue 5 1

Clue 1 (Pythagorean theorem): "THE SUSPECT DOES NOT USE A BOX KITE"

legs 40 and 42, hypotenuse = 58 (T) · legs 20 and 21, hypotenuse = 29 (X) · legs 9 and 40, hypotenuse = 41 (K) · legs 5 and 12, hypotenuse = 13 (D) · legs 9 and 12, hypotenuse = 15 (B) · legs 24 and 70, hypotenuse = 74 (H) · legs 24 and 45, hypotenuse = 51 (S) · legs 60 and 63, hypotenuse = 87 (N) · legs 28 and 96, hypotenuse = 100 (P) · legs 15 and 36, hypotenuse = 39 (U) · legs 80 and 84, hypotenuse = 116 (O) · legs 32 and 60, hypotenuse = 68 (C) · legs 36 and 105, hypotenuse = 111 (A) · legs 12 and 35, hypotenuse = 37 (E) · legs 20 and 48, hypotenuse = 52 (I)

Clue 2 (Word problems): "RIGHT HANDED"

Sky scout found 3 spyglasses yesterday and 8 more today. How many spyglasses in all? = 11 (R) · There were 89 brass gears. 39 were used up. How many brass gears are left? = 50 (N) · There were 142 spyglasses. 38 were used up. How many spyglasses are left? = 104 (G) · Sky scout found 14 brass gears yesterday and 60 more today. How many brass gears in all? = 74 (H) · There were 68 signal flares. 39 were used up. How many signal flares are left? = 29 (T) · Sky scout found 7 spyglasses yesterday and 24 more today. How many spyglasses in all? = 31 (A) · There were 36 compasses. 3 were used up. How many compasses are left? = 33 (I)

Clue 3 (Square roots): "THE ROGUE FLED WHEN HIT BY HIGH GUSTS"

sqrt(121) = 11 (T) · sqrt(169) = 13 (L) · sqrt(196) = 14 (N) · sqrt(81) = 9 (F) · sqrt(441) = 21 (G) · sqrt(484) = 22 (B) · sqrt(144) = 12 (D) · sqrt(49) = 7 (I) · sqrt(36) = 6 (H) · sqrt(64) = 8 (U) · sqrt(9) = 3 (Y) · sqrt(361) = 19 (W) · sqrt(289) = 17 (O) · sqrt(256) = 16 (S) · sqrt(100) = 10 (E) · sqrt(625) = 25 (R)

Clue 4 (Exponents): "WITNESSES SAW REFLECTIONS IN AMBER LENSES"

17^2 = 289 (W) · 20^2 = 400 (B) · 8^3 = 512 (S) · 22^2 = 484 (T) · 6^3 = 216 (I) · 2^3 = 8 (L) · 2^4 = 16 (R) · 4^3 = 64 (F) · 3^2 = 9 (M) · 2^8 = 256 (C) · 15^2 = 225 (N) · 2^5 = 32 (A) · 3^3 = 27 (O) · 3^5 = 243 (E)

Clue 5 (Square roots): surviving statement is box 6 → Magnus Zenith

sqrt(1) = 1 · sqrt(25) = 5 · sqrt(16) = 4 · sqrt(49) = 7 · sqrt(121) = 11 · sqrt(144) = 12 · sqrt(100) = 10 · sqrt(9) = 3 · sqrt(4) = 2 · sqrt(64) = 8 · sqrt(81) = 9