The Mystery of the Skyward Compass

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

Detective: _____ **Date:** _____

During a midnight flight over the Cloud Peaks, someone broke into the vault of the Skyward Airship Academy and stole the Celestial Compass. Detective Cadets must examine the navigation deck evidence to unmask the culprit before the airship lands.

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 Pirate is _____

Possible suspects

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

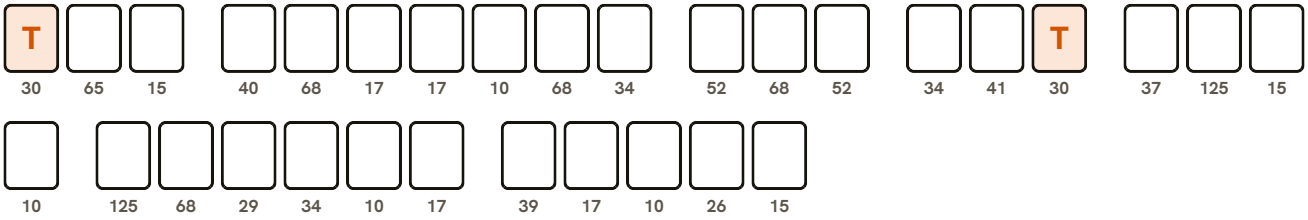
NAME	FLIGHT GEAR	GADGET	STANCE	HEADWEAR	DISTRACTION
Commander Jax	Sky Board	Magnet Rope	Left Handed	Leather Helmet	Heavy Fog
Pilot Quinn	Jet Boots	Smoke Bomb	Left Handed	Leather Helmet	Loud Whistles
Cadet Mercer	Glider Wings	Smoke Bomb	Left Handed	Leather Helmet	Bright Lights
Navigator Skye	Jet Boots	Signal Flare	Left Handed	Officer Cap	Bright Lights
Cadet Piper	Propeller Pack	Smoke Bomb	Left Handed	Leather Helmet	Bright Lights
Navigator Lyle	Grapple Hook	Signal Flare	Left Handed	Leather Helmet	Bright Lights
Engineer Nova	Glider Wings	Pocket Chronometer	Left Handed	Officer Cap	Heavy Fog
Officer Flint	Grapple Hook	Pocket Chronometer	Left Handed	Wool Beanie	Loud Whistles
Captain Drake	Sky Board	Brass Goggles	Right Handed	Officer Cap	Heavy Fog
Pilot Rowan	Jet Boots	Smoke Bomb	Right Handed	Officer Cap	Bright Lights
Specialist Blair	Jet Boots	Signal Flare	Left Handed	Officer Cap	Heavy Fog
Officer Thorne	Glider Wings	Brass Goggles	Right Handed	Wool Beanie	Loud Whistles
Pilot Finch	Propeller Pack	Magnet Rope	Left Handed	Officer Cap	Heavy Fog
Specialist Devon	Glider Wings	Pocket Chronometer	Right Handed	Leather Helmet	Heavy Fog
Engineer Wren	Jet Boots	Pocket Chronometer	Left Handed	Wool Beanie	Bright Lights
Cadet Iris	Sky Board	Magnet Rope	Right Handed	Wool Beanie	Loud Whistles
Officer Vale	Sky Board	Brass Goggles	Right Handed	Officer Cap	Bright Lights
Captain Reese	Propeller Pack	Magnet Rope	Left Handed	Leather Helmet	Bright Lights
Specialist Gage	Sky Board	Smoke Bomb	Right Handed	Leather Helmet	Bright Lights
Navigator Ray	Glider Wings	Smoke Bomb	Right Handed	Officer Cap	Bright Lights
Captain Vance	Sky Board	Smoke Bomb	Left Handed	Leather Helmet	Bright Lights

make your own at mathcrackers.com

CLUE 1 Pythagorean theorem

> Cadet Piper calculated supply inventory totals to decode the encrypted vault message.

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



legs 18 and 24, hypotenuse = ☐ → T

legs 6 and 8, hypotenuse = ☐ → A

legs 12 and 35, hypotenuse = ☐ → U

legs 16 and 30, hypotenuse = ☐ → N

legs 35 and 120, hypotenuse = ☐ → S

legs 10 and 24, hypotenuse = ☐ → R

legs 20 and 48, hypotenuse = ☐ → D

legs 9 and 12, hypotenuse = ☐ → E

legs 24 and 32, hypotenuse = ☐ → V

legs 32 and 60, hypotenuse = ☐ → I

legs 8 and 15, hypotenuse = ☐ → L

legs 9 and 40, hypotenuse = ☐ → O

legs 15 and 36, hypotenuse = ☐ → F

legs 25 and 60, hypotenuse = ☐ → H

legs 20 and 21, hypotenuse = ☐ → G

Scratch space:

CLUE 2 Word problems

Navigator Ray measured the diagonal escape route across the flight deck grid.

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

A witness saw the villain was

L							D		D
88	9	41	71	58	14	8		9	

.

Chief Engineer found 18 leather strap yesterday and 70 more today. How many leather strap in all?

Answer: ☐ → L

There were 86 altimeter gage. 15 were used up. How many altimeter gage are left?

Answer: ☐ → T

Chief Engineer found 9 sky lantern yesterday and 5 more today. How many sky lantern in all?

Answer: ☐ → A

There were 18 leather strap. 9 were used up. How many leather strap are left?

Answer: ☐ → E

Chief Engineer found 30 compass rose yesterday and 11 more today. How many compass rose in all?

Answer: ☐ → F

There were 60 leather strap. 2 were used up. How many leather strap are left?

Answer: ☐ → H

Chief Engineer lined up 4 rows of 2 brass gear. How many brass gear in all?

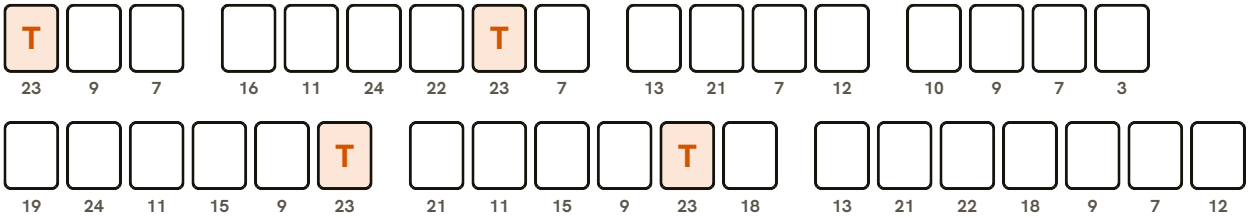
Answer: ☐ → N

Scratch space:

CLUE 3 Square roots

> Commander Jax calculated the side lengths of a square deck panel to locate dropped evidence.

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



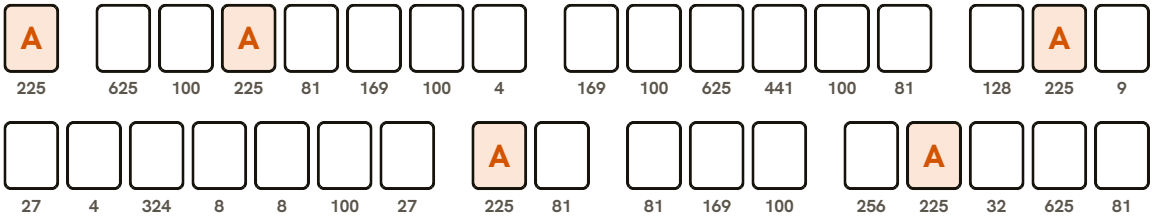
sqrt(529) = ☐ → T	sqrt(144) = ☐ → D	sqrt(121) = ☐ → I
sqrt(81) = ☐ → H	sqrt(576) = ☐ → R	sqrt(100) = ☐ → W
sqrt(169) = ☐ → F	sqrt(9) = ☐ → N	sqrt(225) = ☐ → G
sqrt(324) = ☐ → S	sqrt(49) = ☐ → E	sqrt(256) = ☐ → P
sqrt(484) = ☐ → A	sqrt(361) = ☐ → B	sqrt(441) = ☐ → L

Scratch space:

CLUE 4 Exponents

> Engineer Nova plotted the power consumption curve on the engine room grid.

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



15^2 = ☐ → A

5^4 = ☐ → L

21^2 = ☐ → M

13^2 = ☐ → H

2^5 = ☐ → U

3^3 = ☐ → D

10^2 = ☐ → E

2^7 = ☐ → W

18^2 = ☐ → O

2^2 = ☐ → R

3^2 = ☐ → S

3^4 = ☐ → T

2^3 = ☐ → P

4^4 = ☐ → V

Scratch space:

CLUE 5

Square roots - the last clue

Officer Thorne simplified the wind velocity formula to track the pirate's exit path.

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(81) = ☐ sqrt(1) = ☐ sqrt(100) = ☐ sqrt(144) = ☐ sqrt(25) = ☐

sqrt(36) = ☐ sqrt(64) = ☐ sqrt(9) = ☐ sqrt(121) = ☐ sqrt(49) = ☐

sqrt(16) = ☐

Step 2 - cross out the sentence with each answer:

1. The villain buzzed past the watchtower, then dropped a smoke bomb.
2. The villain surfed the thermal drafts, then dropped a smoke bomb.
3. The villain buzzed past the watchtower, then fired a signal flare.
4. The villain swung from the rigging, then checked a pocket chronometer.
5. The villain surfed the thermal drafts, then fired a signal flare.
6. The villain boosted over the railing, then tangled the magnet rope.
7. The villain glided across the deck, then adjusted their brass goggles.
8. The villain swung from the rigging, then fired a signal flare.
9. The villain buzzed past the watchtower, then tangled the magnet rope.
10. The villain glided across the deck, then dropped a smoke bomb.
11. The villain swung from the rigging, then adjusted their brass goggles.
12. The villain glided across the deck, then checked a pocket chronometer.

TEACHER / PARENT

Answer Key

The Mystery of the Skyward Compass

Culprit: Captain Vance

Sky Board · Smoke Bomb · Left Handed · Leather Helmet · Bright Lights

Trail: Start 21 → Clue 1 18 → Clue 2 10 → Clue 3 5 → Clue 4 4 → Clue 5 1

Clue 1 (Pythagorean theorem): "THE VILLAIN DID NOT USE A SIGNAL FLARE"

legs 18 and 24, hypotenuse = 30 (T) · legs 6 and 8, hypotenuse = 10 (A) · legs 12 and 35, hypotenuse = 37 (U) · legs 16 and 30, hypotenuse = 34 (N) · legs 35 and 120, hypotenuse = 125 (S) · legs 10 and 24, hypotenuse = 26 (R) · legs 20 and 48, hypotenuse = 52 (D) · legs 9 and 12, hypotenuse = 15 (E) · legs 24 and 32, hypotenuse = 40 (V) · legs 32 and 60, hypotenuse = 68 (I) · legs 8 and 15, hypotenuse = 17 (L) · legs 9 and 40, hypotenuse = 41 (O) · legs 15 and 36, hypotenuse = 39 (F) · legs 25 and 60, hypotenuse = 65 (H) · legs 20 and 21, hypotenuse = 29 (G)

Clue 2 (Word problems): "LEFT HANDED"

Chief Engineer found 18 leather strap yesterday and 70 more today. How many leather strap in all? = 88 (L) · There were 86 altimeter gage. 15 were used up. How many altimeter gage are left? = 71 (T) · Chief Engineer found 9 sky lantern yesterday and 5 more today. How many sky lantern in all? = 14 (A) · There were 18 leather strap. 9 were used up. How many leather strap are left? = 9 (E) · Chief Engineer found 30 compass rose yesterday and 11 more today. How many compass rose in all? = 41 (F) · There were 60 leather strap. 2 were used up. How many leather strap are left? = 58 (H) · Chief Engineer lined up 4 rows of 2 brass gear. How many brass gear in all? = 8 (N)

Clue 3 (Square roots): "THE PIRATE FLED WHEN BRIGHT LIGHTS FLASHED"

sqrt(529) = 23 (T) · sqrt(144) = 12 (D) · sqrt(121) = 11 (I) · sqrt(81) = 9 (H) · sqrt(576) = 24 (R) · sqrt(100) = 10 (W) · sqrt(169) = 13 (F) · sqrt(9) = 3 (N) · sqrt(225) = 15 (G) · sqrt(324) = 18 (S) · sqrt(49) = 7 (E) · sqrt(256) = 16 (P) · sqrt(484) = 22 (A) · sqrt(361) = 19 (B) · sqrt(441) = 21 (L)

Clue 4 (Exponents): "A LEATHER HELMET WAS DROPPED AT THE VAULT"

15^2 = 225 (A) · 5^4 = 625 (L) · 21^2 = 441 (M) · 13^2 = 169 (H) · 2^5 = 32 (U) · 3^3 = 27 (D) · 10^2 = 100 (E) · 2^7 = 128 (W) · 18^2 = 324 (O) · 2^2 = 4 (R) · 3^2 = 9 (S) · 3^4 = 81 (T) · 2^3 = 8 (P) · 4^4 = 256 (V)

Clue 5 (Square roots): surviving statement is box 2 → Captain Vance

sqrt(81) = 9 · sqrt(1) = 1 · sqrt(100) = 10 · sqrt(144) = 12 · sqrt(25) = 5 · sqrt(36) = 6 · sqrt(64) = 8 · sqrt(9) = 3 · sqrt(121) = 11 · sqrt(49) = 7 · sqrt(16) = 4