



The Mystery of the Golden Compass

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

Detective: _____ Date: _____

The legendary Golden Compass of the Ancients has been snatched from the central pedestal at Base Camp Alpha! The thief bypassed complex security systems and vanished into the dense jungle canopy. As the junior tracker, you must decode the clues left behind to identify the culprit before they escape the island.

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 Explorer 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	POCKET GEAR	GLOVE PREFERENCE	HAIR EVIDENCE	KNOWN WEAKNESS
Jacques Cousteau	machete tool	brass compass	right handed glove	fiery red strand	fear of heights
Indiana Jones	climbing spikes	brass compass	left handed glove	bright blonde strand	dislike of water
Matthew Henson	paraglider wing	pocket radio	right handed glove	dark brown strand	allergy to pollen
Gertrude Bell	flare launcher	magnifying lens	right handed glove	dark brown strand	allergy to pollen
Mary Kingsley	paraglider wing	silver whistle	right handed glove	fiery red strand	dislike of water
Nellie Bly	climbing spikes	pocket radio	right handed glove	dark brown strand	dislike of water
Roald Amundsen	grappling hook	brass compass	right handed glove	dark brown strand	dislike of water
Marco Polo	grappling hook	magnifying lens	left handed glove	dark brown strand	dislike of water
Percy Fawcett	machete tool	leather journal	right handed glove	bright blonde strand	allergy to pollen
Charles Darwin	paraglider wing	pocket radio	right handed glove	dark brown strand	dislike of water
Ernest Shackleton	paraglider wing	leather journal	right handed glove	fiery red strand	fear of heights
Ibn Battuta	paraglider wing	silver whistle	right handed glove	fiery red strand	allergy to pollen
Lara Croft	machete tool	brass compass	right handed glove	bright blonde strand	dislike of water
Isabella Bird	climbing spikes	silver whistle	right handed glove	fiery red strand	dislike of water
Sally Ride	paraglider wing	silver whistle	left handed glove	bright blonde strand	fear of heights
Amelia Earhart	grappling hook	leather journal	right handed glove	dark brown strand	fear of heights
James Cook	paraglider wing	leather journal	right handed glove	bright blonde strand	allergy to pollen
Hiram Bingham	climbing spikes	silver whistle	right handed glove	dark brown strand	dislike of water
Roy Chapman Andrews	paraglider wing	leather journal	right handed glove	dark brown strand	dislike of water
Harriet Tubman	paraglider wing	pocket radio	right handed glove	fiery red strand	fear of heights
Alexander Humboldt	machete tool	magnifying lens	left handed glove	bright blonde strand	allergy to pollen

CLUE 1 Exponents

To access the first security log on the base computer, you must calculate the total power surge of the server grid, which doubles exponentially with each backup loop.

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

T																T		
729	324	27	512	216	81	81	441	216	125	343	25	27	400	125	25	729		
															T			
9	441	36	36	361	441	400	216	81	512	27	36	16	324	216	400	729	81	27

$9^3 = \square \rightarrow$ T	$18^2 = \square \rightarrow$ H	$5^3 = \square \rightarrow$ N	$19^2 = \square \rightarrow$ Y
$21^2 = \square \rightarrow$ A	$5^2 = \square \rightarrow$ O	$6^2 = \square \rightarrow$ R	$6^3 = \square \rightarrow$ I
$8^3 = \square \rightarrow$ V	$9^2 = \square \rightarrow$ L	$2^4 = \square \rightarrow$ W	$3^2 = \square \rightarrow$ C
$20^2 = \square \rightarrow$ S	$7^3 = \square \rightarrow$ D	$3^3 = \square \rightarrow$ E	

Scratch space:

CLUE 2 Square roots

You locate a hidden stone hatch on the jungle floor. To find the side length of this perfectly square stone tile, you must calculate the square root of its total area.

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

The diagram illustrates a sequence of numbers arranged in two rows of five boxes each. The top row contains the following numbers: 16, 20, 4, 15, 11, 15, 7, 14, 24, 8, 24, 4, 16, 20, 12, 3, 7, 16, 25, 6. The bottom row contains the following numbers: 22, 8, 16, 8, 17, 14, 11, 15, 8, 19, 8, 9, 8, 16. In both rows, the box containing the number 16 is highlighted in orange.

sqrt(256) = → **R**

sqrt(400) = →

sqrt(9) = → **M**

sqrt(36) = → **S**

sqrt(16) = → **G**

sqrt(225) = → **H**

$$\text{sqrt}(361) = \boxed{} \rightarrow \boxed{\text{L}}$$

sqrt(289) = → **0**

$$\text{sqrt}(484) = \boxed{} \rightarrow \boxed{\mathbf{w}}$$

sqrt(49) = → **A**

sqrt(576) = → **D**

sqrt(144) = → **P**

sqrt(64) = → **E**

sqrt(196) = → **N**

sqrt(625) = → **K**

sqrt(81) = → **V**

sqrt(121) = → **T**

Scratch space:

CLUE 3

The runaway took a diagonal shortcut across the rectangular ancient courtyard. You need to use the Pythagorean theorem on the known wall lengths to find the distance they ran.

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

87 41 65 51 82 50 25 13 25 17 51 65 74 82 34 65 37 87 30

34 13 75 26 25 15 51 30 34 34 87 41 65 51 75 85 65 51

legs 60 and 63, hypotenuse = $\rightarrow$ **T**

legs 9 and 40, hypotenuse = $\rightarrow$ **H**

legs 18 and 80, hypotenuse = $\rightarrow$ **U**

legs 14 and 48, hypotenuse = → **N**

legs 16 and 30, hypotenuse = $\rightarrow$ **S**

legs 24 and 70, hypotenuse = $\rightarrow$ **F**

legs 40 and 75, hypotenuse = $\rightarrow$ **V**

legs 24 and 45, hypotenuse = $\rightarrow$ **R**

legs 8 and 15, hypotenuse = → **Y**

legs 18 and 24, hypotenuse = $\rightarrow$

legs 25 and 60, hypotenuse = → **E**

legs 21 and 72, hypotenuse = $\rightarrow$

legs 7 and 24, hypotenuse = $\rightarrow$ **A**

legs 10 and 24, hypotenuse = → **M**

legs 12 and 35, hypotenuse = $\rightarrow$ **D**

legs 5 and 12, hypotenuse = $\rightarrow$ **W**

legs 9 and 12, hypotenuse = $\rightarrow$ **C**

Scratch space:

CLUE 4 Order of operations

You discover a brass mechanical lock with rotating dials. To release the mechanism, you must solve the equation etched on the front by following the strict order of operations.

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

B																	
68	6	116	33	7	43	55	79	6	33	55	32	97	52	106	69	116	7
69	43	52	55	7	41	79	52	7	69	32	69	116	7	52			

$$40 + 4 \times 7 = \boxed{} \rightarrow \boxed{\text{B}}$$

$$2 + 2 \times 2 = \boxed{} \rightarrow \boxed{\text{R}}$$

$$43 + 6 \times 6 = \boxed{} \rightarrow \boxed{\text{I}}$$

$$3 + 2 \times 2 = \boxed{} \rightarrow \boxed{\text{N}}$$

$$94 + 3 \times 4 = \boxed{} \rightarrow \boxed{\text{F}}$$

$$21 + 3 \times 4 = \boxed{} \rightarrow \boxed{\text{W}}$$

$$10 \times 12 - 4 = \boxed{} \rightarrow \boxed{\text{O}}$$

$$12 + 5 \times 4 = \boxed{} \rightarrow \boxed{\text{S}}$$

$$6 \times 10 - 17 = \boxed{} \rightarrow \boxed{\text{H}}$$

$$7 \times 9 - 22 = \boxed{} \rightarrow \boxed{\text{C}}$$

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

$$12 \times 7 - 15 = \boxed{} \rightarrow \boxed{\text{T}}$$

$$76 + 3 \times 7 = \boxed{} \rightarrow \boxed{\text{L}}$$

$$7 \times 8 - 1 = \boxed{} \rightarrow \boxed{\text{A}}$$

Scratch space:

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

A supply scale near the escape path holds several identical heavy metal crates. To find the weight of a single cargo crate, you must solve a two-step equation using the total scale weight.

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:

$5x + 2 = 57, x = \boxed{}$

$4x + 8 = 20, x = \boxed{}$

$5x + 12 = 72, x = \boxed{}$

$3x + 3 = 21, x = \boxed{}$

$3x + 3 = 24, x = \boxed{}$

$3x + 7 = 13, x = \boxed{}$

$5x + 2 = 27, x = \boxed{}$

$3x + 6 = 36, x = \boxed{}$

$2x + 8 = 26, x = \boxed{}$

$6x + 4 = 28, x = \boxed{}$

$2x + 4 = 6, x = \boxed{}$

Step 2 - cross out the sentence with each answer:

1. The villain hacked through the thick vines, then examined the ancient symbols with the magnifying lens.
2. The villain hacked through the thick vines, then blew a sharp signal on the silver whistle.
3. The villain soared over the jungle canopy, then relayed coordinates over the pocket radio.
4. The villain scaled the sheer cliff face, then checked their heading on the brass compass.
5. The villain fired a bright beacon into the night sky, then scribbled notes in the leather journal.
6. The villain soared over the jungle canopy, then blew a sharp signal on the silver whistle.
7. The villain swung across the deep chasm, then scribbled notes in the leather journal.
8. The villain soared over the jungle canopy, then scribbled notes in the leather journal.
9. The villain swung across the deep chasm, then examined the ancient symbols with the magnifying lens.
10. The villain fired a bright beacon into the night sky, then examined the ancient symbols with the magnifying lens.
11. The villain scaled the sheer cliff face, then relayed coordinates over the pocket radio.
12. The villain swung across the deep chasm, then checked their heading on the brass compass.

Answer Key

The Mystery of the Golden Compass

Culprit: Roy Chapman Andrews

paraglider wing · leather journal · right handed glove · dark brown strand · dislike of water

Trail: Start 21 → Clue 1 16 → Clue 2 13 → Clue 3 5 → Clue 4 4 → Clue 5 1

Clue 1 (Exponents): "THE VILLAIN DOES NOT CARRY A SILVER WHISTLE"

$9^3 = 729$ (T) · $18^2 = 324$ (H) · $5^3 = 125$ (N) · $19^2 = 361$ (Y) · $21^2 = 441$ (A) · $5^2 = 25$ (O) · $6^2 = 36$ (R) · $6^3 = 216$ (I) · $8^3 = 512$ (V) · $9^2 = 81$ (L) · $2^4 = 16$ (W) · $3^2 = 9$ (C) · $20^2 = 400$ (S) · $7^3 = 343$ (D) · $3^3 = 27$ (E)

Clue 2 (Square roots): "RIGHT HANDED GRIP MARKS WERE ON THE LEVER"

$\sqrt{256} = 16$ (R) · $\sqrt{400} = 20$ (I) · $\sqrt{9} = 3$ (M) · $\sqrt{36} = 6$ (S) · $\sqrt{16} = 4$ (G) · $\sqrt{225} = 15$ (H) · $\sqrt{361} = 19$ (L) · $\sqrt{289} = 17$ (O) · $\sqrt{484} = 22$ (W) · $\sqrt{49} = 7$ (A) · $\sqrt{576} = 24$ (D) · $\sqrt{144} = 12$ (P) · $\sqrt{64} = 8$ (E) · $\sqrt{196} = 14$ (N) · $\sqrt{625} = 25$ (K) · $\sqrt{81} = 9$ (V) · $\sqrt{121} = 11$ (T)

Clue 3 (Pythagorean theorem): "THE RUNAWAY REFUSED TO SWIM ACROSS THE RIVER"

legs 60 and 63, hypotenuse = 87 (T) · legs 9 and 40, hypotenuse = 41 (H) · legs 18 and 80, hypotenuse = 82 (U) · legs 14 and 48, hypotenuse = 50 (N) · legs 16 and 30, hypotenuse = 34 (S) · legs 24 and 70, hypotenuse = 74 (F) · legs 40 and 75, hypotenuse = 85 (V) · legs 24 and 45, hypotenuse = 51 (R) · legs 8 and 15, hypotenuse = 17 (Y) · legs 18 and 24, hypotenuse = 30 (O) · legs 25 and 60, hypotenuse = 65 (E) · legs 21 and 72, hypotenuse = 75 (I) · legs 7 and 24, hypotenuse = 25 (A) · legs 10 and 24, hypotenuse = 26 (M) · legs 12 and 35, hypotenuse = 37 (D) · legs 5 and 12, hypotenuse = 13 (W) · legs 9 and 12, hypotenuse = 15 (C)

Clue 4 (Order of operations): "BROWN HAIR WAS LEFT ON THE ANCIENT STONE"

$40 + 4 \times 7 = 68$ (B) · $2 + 2 \times 2 = 6$ (R) · $43 + 6 \times 6 = 79$ (I) · $3 + 2 \times 2 = 7$ (N) · $94 + 3 \times 4 = 106$ (F) · $21 + 3 \times 4 = 33$ (W) · $10 \times 12 - 4 = 116$ (O) · $12 + 5 \times 4 = 32$ (S) · $6 \times 10 - 17 = 43$ (H) · $7 \times 9 - 22 = 41$ (C) · $7 + 9 \times 5 = 52$ (E) · $12 \times 7 - 15 = 69$ (T) · $76 + 3 \times 7 = 97$ (L) · $7 \times 8 - 1 = 55$ (A)

Clue 5 (Two-step equations): surviving statement is box 8 → Roy Chapman Andrews

$5x + 2 = 57, x = 11$ · $4x + 8 = 20, x = 3$ · $5x + 12 = 72, x = 12$ · $3x + 3 = 21, x = 6$ · $3x + 3 = 24, x = 7$ · $3x + 7 = 13, x = 2$ · $5x + 2 = 27, x = 5$ · $3x + 6 = 36, x = 10$ · $2x + 8 = 26, x = 9$ · $6x + 4 = 28, x = 4$ · $2x + 4 = 6, x = 1$