



The Echo Caverns Robbery

Grade 9 math · Two-step equations, Exponents, Square roots, Integers · Reading level grades 7-9

Detective: _____ **Date:** _____

Someone has raided the central vault of the Echo Caverns and swiped the legendary Crystal Compass! The Head Archeologist needs your help. You must analyze the evidence left behind, solve the math puzzles to unlock the secure databases, and identify the rogue explorer before they escape the caverns forever!

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	SPECIAL GEAR	OBSERVED GRIP	LEFTOVER HAIR EVIDENCE	EFFECTIVE DEFENSE
Jack Hunter	decoding tablet	climbing spikes	left-handed grip	bright orange hair	bright flashlights
Alan Grant	decoding tablet	jet boots	right-handed grip	bright orange hair	bright flashlights
Carmen Sandiego	laser cutter	climbing spikes	left-handed grip	bright orange hair	sticky mud traps
Charles Lindbergh	sonic blaster	portable zipline	right-handed grip	dusty brown hair	bright flashlights
Ellie Sattler	decoding tablet	climbing spikes	right-handed grip	bright orange hair	sticky mud traps
Robert Peary	grappling hook	jet boots	right-handed grip	bright orange hair	sticky mud traps
Mary Kingsley	drone controller	night vision visor	left-handed grip	bright orange hair	loud whistles
Dirk Pitt	decoding tablet	jet boots	left-handed grip	dusty brown hair	bright flashlights
Jacques Cousteau	drone controller	night vision visor	right-handed grip	bright orange hair	bright flashlights
Benjamin Gates	decoding tablet	night vision visor	right-handed grip	bright orange hair	sticky mud traps
Roy Chapman	grappling hook	jet boots	right-handed grip	bright orange hair	loud whistles
Nellie Bly	drone controller	stealth cloak	right-handed grip	dusty brown hair	loud whistles
Rick OConnell	grappling hook	stealth cloak	right-handed grip	neon blue hair	loud whistles
Nathan Drake	decoding tablet	stealth cloak	left-handed grip	neon blue hair	loud whistles
Hiram Bingham	drone controller	stealth cloak	right-handed grip	bright orange hair	sticky mud traps
Lara Croft	grappling hook	night vision visor	right-handed grip	neon blue hair	sticky mud traps
Sacagawea	drone controller	climbing spikes	right-handed grip	neon blue hair	sticky mud traps
Sly Cooper	sonic blaster	jet boots	right-handed grip	dusty brown hair	bright flashlights
Steve Irwin	decoding tablet	jet boots	right-handed grip	dusty brown hair	bright flashlights
Amelia Earhart	drone controller	night vision visor	right-handed grip	neon blue hair	loud whistles
Percy Fawcett	decoding tablet	jet boots	right-handed grip	bright orange hair	sticky mud traps

CLUE 1

Two-step equations

To crack the ancient pressure-pad door, we must balance the weight equation of the stone blocks.

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

T																T
11	9	15	16	18	4	4	8	18	2	17	10	15	12	2	10	11
5	12	15	8	12	11	15	8	4	11	9	7	4	10	8	22	

$3x + 6 = 39, x = \square \rightarrow \boxed{\text{T}}$

$7x + 10 = 122, x = \square \rightarrow \boxed{\text{V}}$

$8x + 5 = 61, x = \square \rightarrow \boxed{\text{C}}$

$2x + 6 = 30, x = \square \rightarrow \boxed{\text{S}}$

$8x + 3 = 83, x = \square \rightarrow \boxed{\text{O}}$

$2x + 11 = 41, x = \square \rightarrow \boxed{\text{E}}$

$3x + 2 = 29, x = \square \rightarrow \boxed{\text{H}}$

$6x + 6 = 138, x = \square \rightarrow \boxed{\text{K}}$

$9x + 8 = 26, x = \square \rightarrow \boxed{\text{N}}$

$3x + 5 = 56, x = \square \rightarrow \boxed{\text{D}}$

$5x + 11 = 36, x = \square \rightarrow \boxed{\text{U}}$

$5x + 11 = 31, x = \square \rightarrow \boxed{\text{L}}$

$6x + 10 = 118, x = \square \rightarrow \boxed{\text{I}}$

$7x + 2 = 58, x = \square \rightarrow \boxed{\text{A}}$

Scratch space:

CLUE 2 Exponents

A colony of cave scarabs is multiplying fast, and we need to calculate their exponential growth to clear the path.

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

T									T				T	
484	49	729	144	8	144	361	729	25	484	27	729	441	484	125

				T										
36	100	243	49	484	49	125	64	256	729	256	243	36	100	361

$22^2 = \square \rightarrow \text{T}$	$2^6 = \square \rightarrow \text{N}$	$5^2 = \square \rightarrow \text{C}$	$9^3 = \square \rightarrow \text{E}$
$7^2 = \square \rightarrow \text{H}$	$12^2 = \square \rightarrow \text{S}$	$10^2 = \square \rightarrow \text{I}$	$3^3 = \square \rightarrow \text{L}$
$2^3 = \square \rightarrow \text{U}$	$19^2 = \square \rightarrow \text{P}$	$21^2 = \square \rightarrow \text{F}$	$5^3 = \square \rightarrow \text{A}$
$6^2 = \square \rightarrow \text{R}$	$4^4 = \square \rightarrow \text{D}$	$3^5 = \square \rightarrow \text{G}$	

Scratch space:

CLUE 3 Square roots

The security laser grid is shaped like a perfect square, so finding its side length will let us slip through safely.

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

T						T		T						
10	3	18	13	17	6	10	11	10	5	4	23	15	20	
	T							T						
11	10	15	4	23	13	25	5	9	10	19	14	16	11	

$\text{sqrt}(100) = \square \rightarrow \text{T}$	$\text{sqrt}(225) = \square \rightarrow \text{I}$	$\text{sqrt}(9) = \square \rightarrow \text{H}$
$\text{sqrt}(16) = \square \rightarrow \text{C}$	$\text{sqrt}(529) = \square \rightarrow \text{K}$	$\text{sqrt}(289) = \square \rightarrow \text{G}$
$\text{sqrt}(169) = \square \rightarrow \text{Y}$	$\text{sqrt}(400) = \square \rightarrow \text{N}$	$\text{sqrt}(25) = \square \rightarrow \text{U}$
$\text{sqrt}(36) = \square \rightarrow \text{O}$	$\text{sqrt}(121) = \square \rightarrow \text{S}$	$\text{sqrt}(196) = \square \rightarrow \text{A}$
$\text{sqrt}(625) = \square \rightarrow \text{M}$	$\text{sqrt}(256) = \square \rightarrow \text{P}$	$\text{sqrt}(361) = \square \rightarrow \text{R}$
$\text{sqrt}(324) = \square \rightarrow \text{E}$	$\text{sqrt}(81) = \square \rightarrow \text{D}$	

Scratch space:

CLUE 4

We are descending deep into the freezing sub-zero caverns, where we must track our changing elevation in negative integers.

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

Two rows of 15 boxes each, representing a 15x2 grid. The top row has boxes 1-15 with values 21, 20, 1, 39, 32, 1, 7, 1, 32, 35, 7, 21, 34, 10, 7, 1, 30. The bottom row has boxes 16-30 with values 2, 28, 10, 4, 20, 21, 35, 28, 34, 7, 4, 1, 20, 34, 10, 28. Boxes containing 'T' are highlighted in orange.

$$15 - (-6) = \boxed{} \rightarrow \boxed{\text{T}}$$

$$(-14) + 21 = \boxed{} \rightarrow \boxed{\text{N}}$$

$$2 - (-8) = \boxed{} \rightarrow \boxed{}$$

$$13 - (-15) = \boxed{} \rightarrow \boxed{\text{R}}$$

$$15 - (-5) = \boxed{} \rightarrow \boxed{\text{H}}$$

$$15 - (-15) = \boxed{} \rightarrow \boxed{\mathbf{D}}$$

$$(-9) + 11 = \boxed{} \rightarrow \boxed{\mathbf{B}}$$

$$(-10) + 11 = \boxed{} \rightarrow \boxed{\mathbf{E}}$$

$$(-11) + 15 = \boxed{} \rightarrow \mathbf{G}$$

$$(-10) + 49 = \boxed{} \rightarrow \boxed{\text{S}}$$

$$(-9) + 41 = \boxed{} \rightarrow \boxed{\text{C}}$$

$$(-9) + 44 = \boxed{} \rightarrow \boxed{0}$$

$$(-8) + 42 = \boxed{} \rightarrow \boxed{\mathbf{A}}$$

Scratch space:

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

To power up the escape minecart, we need to solve the dual-stage fuel mixture equation before the countdown ends.

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:

$6x + 9 = 45, x = \boxed{}$

$6x + 11 = 41, x = \boxed{}$

$3x + 12 = 39, x = \boxed{}$

$3x + 2 = 35, x = \boxed{}$

$6x + 6 = 78, x = \boxed{}$

$7x + 10 = 24, x = \boxed{}$

$4x + 5 = 9, x = \boxed{}$

$4x + 12 = 24, x = \boxed{}$

$8x + 3 = 59, x = \boxed{}$

$2x + 3 = 19, x = \boxed{}$

$2x + 8 = 16, x = \boxed{}$

Step 2 - cross out the sentence with each answer:

1. The villain shatters the crystalline barrier with a sonic blaster, then fades into the shadows with a stealth cloak.
2. The villain bypasses the digital security lock with a decoding tablet, then slides down to the lower basin on a portable zipline.
3. The villain swings across the cavern chasm with a grappling hook, then navigates the pitch-black tunnels with a night vision visor.
4. The villain slices through the heavy steel vault doors with a laser cutter, then fades into the shadows with a stealth cloak.
5. The villain bypasses the digital security lock with a decoding tablet, then navigates the pitch-black tunnels with a night vision visor.
6. The villain bypasses the digital security lock with a decoding tablet, then rockets over the lava pool with jet boots.
7. The villain scouts the escape route using a drone controller, then scales the sheer rock wall using climbing spikes.
8. The villain shatters the crystalline barrier with a sonic blaster, then rockets over the lava pool with jet boots.
9. The villain bypasses the digital security lock with a decoding tablet, then scales the sheer rock wall using climbing spikes.
10. The villain swings across the cavern chasm with a grappling hook, then rockets over the lava pool with jet boots.
11. The villain shatters the crystalline barrier with a sonic blaster, then slides down to the lower basin on a portable zipline.
12. The villain swings across the cavern chasm with a grappling hook, then slides down to the lower basin on a portable zipline.

Answer Key

The Echo Caverns Robbery

Culprit: Robert Peary

grappling hook · jet boots · right-handed grip · bright orange hair · sticky mud traps

Trail: Start 21 → Clue 1 17 → Clue 2 13 → Clue 3 6 → Clue 4 4 → Clue 5 1

Clue 1 (Two-step equations): "THE VILLAIN DOES NOT USE A STEALTH CLOAK"

$3x + 6 = 39, x = 11$ (T) · $7x + 10 = 122, x = 16$ (V) · $8x + 5 = 61, x = 7$ (C) · $2x + 6 = 30, x = 12$ (S) · $8x + 3 = 83, x = 10$ (O) · $2x + 11 = 41, x = 15$ (E) · $3x + 2 = 29, x = 9$ (H) · $6x + 6 = 138, x = 22$ (K) · $9x + 8 = 26, x = 2$ (N) · $3x + 5 = 56, x = 17$ (D) · $5x + 11 = 36, x = 5$ (U) · $5x + 11 = 31, x = 4$ (L) · $6x + 10 = 118, x = 18$ (I) · $7x + 2 = 58, x = 8$ (A)

Clue 2 (Exponents): "THE SUSPECT LEFT A RIGHTHANDED GRIP"

$22^2 = 484$ (T) · $2^6 = 64$ (N) · $5^2 = 25$ (C) · $9^3 = 729$ (E) · $7^2 = 49$ (H) · $12^2 = 144$ (S) · $10^2 = 100$ (I) · $3^3 = 27$ (L) · $2^3 = 8$ (U) · $19^2 = 361$ (P) · $21^2 = 441$ (F) · $5^3 = 125$ (A) · $6^2 = 36$ (R) · $4^4 = 256$ (D) · $3^5 = 243$ (G)

Clue 3 (Square roots): "THEY GOT STUCK IN STICKY MUD TRAPS"

$\sqrt{100} = 10$ (T) · $\sqrt{225} = 15$ (I) · $\sqrt{9} = 3$ (H) · $\sqrt{16} = 4$ (C) · $\sqrt{529} = 23$ (K) · $\sqrt{289} = 17$ (G) · $\sqrt{169} = 13$ (Y) · $\sqrt{400} = 20$ (N) · $\sqrt{25} = 5$ (U) · $\sqrt{36} = 6$ (O) · $\sqrt{121} = 11$ (S) · $\sqrt{196} = 14$ (A) · $\sqrt{625} = 25$ (M) · $\sqrt{256} = 16$ (P) · $\sqrt{361} = 19$ (R) · $\sqrt{324} = 18$ (E) · $\sqrt{81} = 9$ (D)

Clue 4 (Integers): "THE SCENE CONTAINED BRIGHT ORANGE HAIR"

$15 - (-6) = 21$ (T) · $(-14) + 21 = 7$ (N) · $2 - (-8) = 10$ (I) · $13 - (-15) = 28$ (R) · $15 - (-5) = 20$ (H) · $15 - (-15) = 30$ (D) · $(-9) + 11 = 2$ (B) · $(-10) + 11 = 1$ (E) · $(-11) + 15 = 4$ (G) · $(-10) + 49 = 39$ (S) · $(-9) + 41 = 32$ (C) · $(-9) + 44 = 35$ (O) · $(-8) + 42 = 34$ (A)

Clue 5 (Two-step equations): surviving statement is box 10 → Robert Peary

$6x + 9 = 45, x = 6$ · $6x + 11 = 41, x = 5$ · $3x + 12 = 39, x = 9$ · $3x + 2 = 35, x = 11$ · $6x + 6 = 78, x = 12$ · $7x + 10 = 24, x = 2$ · $4x + 5 = 9, x = 1$ · $4x + 12 = 24, x = 3$ · $8x + 3 = 59, x = 7$ · $2x + 3 = 19, x = 8$ · $2x + 8 = 16, x = 4$