



The Alexandria Ink-Spire Heist

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

Detective: _____ Date: _____

A mysterious rogue has broken into the Restricted Archives of the Great Alexandria Ink-Spires, mixing up the plots of famous novels and stealing the legendary Golden Quill. We must use our detective skills to identify the suspect before the stories fade away 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 Ink-Thief is _____

Possible suspects

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

NAME	SIGNATURE GENRE	ENCHANTED QUILL	WRITING HAND	INK STAIN COLOR	LITERARY FOIL
Gaiman	Gothic Horror	Copper Stylus	Right-Handed Writer	Magenta Smudge	Cliché Tropes
Lewis	Classic Drama	Gold Dip Pen	Left-Handed Writer	Black Smudge	Bad Grammar
Hemingway	Fantasy	Bronze Rollerball	Right-Handed Writer	Black Smudge	Plot Holes
Wells	Gothic Horror	Bronze Rollerball	Left-Handed Writer	Cyan Smudge	Cliché Tropes
Dahl	Fantasy	Gold Dip Pen	Right-Handed Writer	Black Smudge	Plot Holes
Christie	Sci-Fi	Gold Dip Pen	Right-Handed Writer	Black Smudge	Bad Grammar
Angelou	Classic Drama	Iron Quill	Right-Handed Writer	Magenta Smudge	Bad Grammar
Morrison	Sci-Fi	Gold Dip Pen	Left-Handed Writer	Black Smudge	Bad Grammar
Dickens	Fantasy	Copper Stylus	Left-Handed Writer	Black Smudge	Bad Grammar
King	Mystery	Iron Quill	Left-Handed Writer	Magenta Smudge	Bad Grammar
Twain	Mystery	Iron Quill	Left-Handed Writer	Cyan Smudge	Bad Grammar
Alcott	Mystery	Iron Quill	Right-Handed Writer	Cyan Smudge	Cliché Tropes
Bronte	Fantasy	Copper Stylus	Right-Handed Writer	Black Smudge	Cliché Tropes
Fitzgerald	Gothic Horror	Copper Stylus	Right-Handed Writer	Cyan Smudge	Cliché Tropes
Tolkien	Sci-Fi	Copper Stylus	Right-Handed Writer	Cyan Smudge	Cliché Tropes
Orwell	Sci-Fi	Bronze Rollerball	Left-Handed Writer	Black Smudge	Plot Holes
Woolf	Classic Drama	Bronze Rollerball	Right-Handed Writer	Black Smudge	Bad Grammar
Faulkner	Mystery	Copper Stylus	Left-Handed Writer	Cyan Smudge	Bad Grammar
Baldwin	Sci-Fi	Copper Stylus	Left-Handed Writer	Black Smudge	Bad Grammar
Verne	Classic Drama	Bronze Rollerball	Left-Handed Writer	Black Smudge	Bad Grammar
Rowling	Sci-Fi	Iron Quill	Left-Handed Writer	Black Smudge	Bad Grammar

CLUE 1 Exponents

To decode the secret vault code, we must study how the corrupted pages multiply. Each minute, the rogue's cursed ink doubles in volume. Calculating the exponential growth of these pages will unlock the first clue.

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

T																	
81	128	4	343	64	343	16	4	400	81	729	256	4	343	32	256	81	
64	343	4	243	400	256	16	16	4	125	343	81	169	121	64	343		

$3^4 = \square \rightarrow \text{T}$	$5^3 = \square \rightarrow \text{R}$	$4^2 = \square \rightarrow \text{P}$	$8^2 = \square \rightarrow \text{U}$
$2^2 = \square \rightarrow \text{E}$	$3^5 = \square \rightarrow \text{A}$	$20^2 = \square \rightarrow \text{C}$	$11^2 = \square \rightarrow \text{L}$
$4^4 = \square \rightarrow \text{O}$	$13^2 = \square \rightarrow \text{Y}$	$7^3 = \square \rightarrow \text{S}$	$3^6 = \square \rightarrow \text{D}$
$2^5 = \square \rightarrow \text{N}$	$2^7 = \square \rightarrow \text{H}$		

Scratch space:

CLUE 2 Square roots

The stolen manuscripts were hidden inside a perfectly square storage grid in the archives. By calculating the square root of the grid's total area, we can find the exact shelf number and recover the next piece of evidence.

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

T					T							T	T			
18	4	10	16	6	18	10	20	8	3	20	12	2	18	18	10	16
		T						T	T			T				
20	2	18	4	8	9	10	17	18	18	2	9	18				

$\text{sqrt}(324) = \square \rightarrow \boxed{\text{T}}$	$\text{sqrt}(4) = \square \rightarrow \boxed{\text{I}}$	$\text{sqrt}(64) = \square \rightarrow \boxed{\text{A}}$
$\text{sqrt}(144) = \square \rightarrow \boxed{\text{R}}$	$\text{sqrt}(289) = \square \rightarrow \boxed{\text{F}}$	$\text{sqrt}(16) = \square \rightarrow \boxed{\text{H}}$
$\text{sqrt}(36) = \square \rightarrow \boxed{\text{O}}$	$\text{sqrt}(100) = \square \rightarrow \boxed{\text{E}}$	$\text{sqrt}(256) = \square \rightarrow \boxed{\text{N}}$
$\text{sqrt}(9) = \square \rightarrow \boxed{\text{S}}$	$\text{sqrt}(81) = \square \rightarrow \boxed{\text{L}}$	$\text{sqrt}(400) = \square \rightarrow \boxed{\text{W}}$

Scratch space:

CLUE 3 Pythagorean theorem

The rogue escaped by climbing a ladder leaned against the giant bookshelf. We know the height of the shelf and the distance from its base. Using the Pythagorean theorem, we can find the exact length of the ladder to trace their path.

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

Two rows of number boxes for a math activity. The top row has 15 boxes with numbers 68, 85, 20, 13, 82, 20, 39, 52, 74, 87, 29, 20, 34, 17, and 68. The first and last boxes are orange with a 'T' and are connected by a line. The bottom row has 15 boxes with numbers 68, 20, 52, 52, 74, 25, 75, 20, 34, 41, 20, 75, 75, 74, 87, and 29. The first box is orange with a 'T'.

legs 32 and 60, hypotenuse = $\rightarrow$ **T**

legs 12 and 16, hypotenuse = → **E**

legs 20 and 21, hypotenuse = → **G**

legs 20 and 48, hypotenuse = → **R**

legs 8 and 15, hypotenuse = → **A**

legs 15 and 20, hypotenuse = $\rightarrow$ **B**

legs 16 and 30, hypotenuse = → **S**

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

legs 40 and 75, hypotenuse = → **H**

legs 18 and 80, hypotenuse = →

legs 21 and 72, hypotenuse = → **L**

legs 24 and 70, hypotenuse = $\rightarrow$

legs 5 and 12, hypotenuse = → **F**

legs 15 and 36, hypotenuse = → **C**

legs 60 and 63, hypotenuse = → **N**

Scratch space:

CLUE 4

Order of operations

We found a scrambled catalog index left behind by the thief. We must solve the numerical expression in the correct order of operations to decipher the locked message on the screen.

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

W																	
92	110	30	110	17	110	25	17	110	30	25	113	109	87	25	58	109	40
33	40	109	25	11	102	67	11	58	67	17	113	110	111	109	91	110	

$82 + 2 \times 5 = \square \rightarrow \boxed{\text{W}}$

$8 + 5 \times 5 = \square \rightarrow \boxed{\text{B}}$

$11 \times 12 - 23 = \square \rightarrow \boxed{\text{A}}$

$10 \times 9 - 3 = \square \rightarrow \boxed{\text{R}}$

$11 \times 11 - 11 = \square \rightarrow \boxed{\text{E}}$

$12 \times 9 - 17 = \square \rightarrow \boxed{\text{G}}$

$10 \times 6 - 2 = \square \rightarrow \boxed{\text{O}}$

$13 + 6 \times 2 = \square \rightarrow \boxed{\text{C}}$

$11 \times 3 - 3 = \square \rightarrow \boxed{\text{D}}$

$84 + 3 \times 6 = \square \rightarrow \boxed{\text{I}}$

$66 + 5 \times 9 = \square \rightarrow \boxed{\text{P}}$

$7 \times 9 - 23 = \square \rightarrow \boxed{\text{L}}$

$12 \times 11 - 19 = \square \rightarrow \boxed{\text{H}}$

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

$9 \times 8 - 5 = \square \rightarrow \boxed{\text{N}}$

$11 + 2 \times 3 = \square \rightarrow \boxed{\text{T}}$

Scratch space:

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

The thief loaded several crates of stolen folios onto an airship, leaving twelve loose books behind. To find the total weight of the crates, we must solve a two-step algebraic equation representing the cargo.

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:

$3x + 3 = 18, x = \boxed{}$

$2x + 12 = 24, x = \boxed{}$

$2x + 3 = 7, x = \boxed{}$

$4x + 12 = 60, x = \boxed{}$

$2x + 11 = 33, x = \boxed{}$

$3x + 3 = 15, x = \boxed{}$

$5x + 4 = 19, x = \boxed{}$

$6x + 7 = 49, x = \boxed{}$

$6x + 12 = 72, x = \boxed{}$

$5x + 4 = 44, x = \boxed{}$

$4x + 11 = 47, x = \boxed{}$

Step 2 - cross out the sentence with each answer:

1. The villain recites a tragic monologue, then sketches maps with a gold dip pen.
2. The villain projects a neon hologram, then scratches notes with an iron quill.
3. The villain recites a tragic monologue, then engraves runes using a copper stylus.
4. The villain manifests a chilling fog, then scratches notes with an iron quill.
5. The villain projects a neon hologram, then sketches maps with a gold dip pen.
6. The villain recites a tragic monologue, then scribbles quickly with a bronze rollerball.
7. The villain projects a neon hologram, then engraves runes using a copper stylus.
8. The villain leaves behind cryptic riddles, then sketches maps with a gold dip pen.
9. The villain summons a small paper dragon, then scratches notes with an iron quill.
10. The villain leaves behind cryptic riddles, then writes with a shining silver nib.
11. The villain recites a tragic monologue, then writes with a shining silver nib.
12. The villain projects a neon hologram, then writes with a shining silver nib.

Answer Key

The Alexandria Ink-Spire Heist

Culprit: Lewis

Classic Drama · Gold Dip Pen · Left-Handed Writer · Black Smudge · Bad Grammar

Trail: Start 21 → Clue 1 14 → Clue 2 8 → Clue 3 6 → Clue 4 4 → Clue 5 1

Clue 1 (Exponents): "THE SUSPECT DOES NOT USE A COPPER STYLUS"

$3^4 = 81$ (T) · $5^3 = 125$ (R) · $4^2 = 16$ (P) · $8^2 = 64$ (U) · $2^2 = 4$ (E) · $3^5 = 243$ (A) · $20^2 = 400$ (C) · $11^2 = 121$ (L) · $4^4 = 256$ (O) · $13^2 = 169$ (Y) · $7^3 = 343$ (S) · $3^6 = 729$ (D) · $2^5 = 32$ (N) · $2^7 = 128$ (H)

Clue 2 (Square roots): "THE NOTE WAS WRITTEN WITH A LEFT TILT"

$\sqrt{324} = 18$ (T) · $\sqrt{4} = 2$ (I) · $\sqrt{64} = 8$ (A) · $\sqrt{144} = 12$ (R) · $\sqrt{289} = 17$ (F) · $\sqrt{16} = 4$ (H) · $\sqrt{36} = 6$ (O) · $\sqrt{100} = 10$ (E) · $\sqrt{256} = 16$ (N) · $\sqrt{9} = 3$ (S) · $\sqrt{81} = 9$ (L) · $\sqrt{400} = 20$ (W)

Clue 3 (Pythagorean theorem): "THE FOE CRINGES AT TERRIBLE SPELLING"

legs 32 and 60, hypotenuse = 68 (T) · legs 12 and 16, hypotenuse = 20 (E) · legs 20 and 21, hypotenuse = 29 (G) · legs 20 and 48, hypotenuse = 52 (R) · legs 8 and 15, hypotenuse = 17 (A) · legs 15 and 20, hypotenuse = 25 (B) · legs 16 and 30, hypotenuse = 34 (S) · legs 9 and 40, hypotenuse = 41 (P) · legs 40 and 75, hypotenuse = 85 (H) · legs 18 and 80, hypotenuse = 82 (O) · legs 21 and 72, hypotenuse = 75 (L) · legs 24 and 70, hypotenuse = 74 (I) · legs 5 and 12, hypotenuse = 13 (F) · legs 15 and 36, hypotenuse = 39 (C) · legs 60 and 63, hypotenuse = 87 (N)

Clue 4 (Order of operations): "WE DETECTED CHARCOAL BLACK INK ON THE PAGE"

$82 + 2 \times 5 = 92$ (W) · $8 + 5 \times 5 = 33$ (B) · $11 \times 12 - 23 = 109$ (A) · $10 \times 9 - 3 = 87$ (R) · $11 \times 11 - 11 = 110$ (E) · $12 \times 9 - 17 = 91$ (G) · $10 \times 6 - 2 = 58$ (O) · $13 + 6 \times 2 = 25$ (C) · $11 \times 3 - 3 = 30$ (D) · $84 + 3 \times 6 = 102$ (I) · $66 + 5 \times 9 = 111$ (P) · $7 \times 9 - 23 = 40$ (L) · $12 \times 11 - 19 = 113$ (H) · $2 + 3 \times 3 = 11$ (K) · $9 \times 8 - 5 = 67$ (N) · $11 + 2 \times 3 = 17$ (T)

Clue 5 (Two-step equations): surviving statement is box 1 → Lewis

$3x + 3 = 18, x = 5$ · $2x + 12 = 24, x = 6$ · $2x + 3 = 7, x = 2$ · $4x + 12 = 60, x = 12$ · $2x + 11 = 33, x = 11$ · $3x + 3 = 15, x = 4$ · $5x + 4 = 19, x = 3$ · $6x + 7 = 49, x = 7$ · $6x + 12 = 72, x = 10$ · $5x + 4 = 44, x = 8$ · $4x + 11 = 47, x = 9$