



The Magic Kingdom Archive Caper

Grade 10 math · Pythagorean theorem, Square roots, Exponents, Order of operations · Reading level grades 7-9

Detective: _____ Date: _____

A mysterious Ink-Blot Phantom has snuck into the Great Disney Archives, splashing dark ink over the legendary storyboards! The Chief Archivist needs you to crack the codes and restore the magic before the stories are lost 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-Blot Phantom is _____

Possible suspects

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

NAME	SIGNATURE SPELL	ENCHANTED RELIC	CASTING HAND	INK SPLATTER COLOR	SILLY WEAKNESS
Jafar	Create Illusions	Enchanted Rose	Left-handed	Teal Ink	Silly Jokes
Kristoff	Control Shadows	Poison Apple	Left-handed	Gold Ink	Bright Mirrors
Quasimodo	Freeze Time	Glass Slipper	Right-handed	Gold Ink	Bright Mirrors
Peter Pan	Create Illusions	Glass Slipper	Right-handed	Magenta Ink	Silly Jokes
Gaston	Summon Vines	Glass Slipper	Right-handed	Gold Ink	Bright Mirrors
Iago	Summon Vines	Spinning Wheel	Left-handed	Magenta Ink	Clock Chimes
Mulan	Summon Vines	Spinning Wheel	Left-handed	Gold Ink	Silly Jokes
Elsa	Summon Vines	Poison Apple	Right-handed	Gold Ink	Clock Chimes
Yzma	Summon Vines	Enchanted Rose	Right-handed	Magenta Ink	Bright Mirrors
Belle	Control Shadows	Glass Slipper	Left-handed	Teal Ink	Bright Mirrors
Simba	Spit Fire	Magic Carpet	Left-handed	Gold Ink	Bright Mirrors
Cinderella	Control Shadows	Poison Apple	Right-handed	Magenta Ink	Silly Jokes
Tiana	Create Illusions	Poison Apple	Right-handed	Magenta Ink	Bright Mirrors
Vidian	Freeze Time	Poison Apple	Right-handed	Magenta Ink	Bright Mirrors
Woody	Create Illusions	Poison Apple	Right-handed	Magenta Ink	Clock Chimes
Lilo	Summon Vines	Magic Carpet	Right-handed	Gold Ink	Bright Mirrors
Naveen	Create Illusions	Enchanted Rose	Right-handed	Magenta Ink	Clock Chimes
Aladdin	Create Illusions	Glass Slipper	Right-handed	Gold Ink	Bright Mirrors
Ursula	Summon Vines	Spinning Wheel	Left-handed	Magenta Ink	Silly Jokes
Donald Duck	Freeze Time	Enchanted Rose	Right-handed	Gold Ink	Bright Mirrors
Rapunzel	Spit Fire	Glass Slipper	Right-handed	Teal Ink	Bright Mirrors

CLUE 1

Pythagorean theorem

The archive guards traced the diagonal path of the intruder across the square vault room. By calculating the hypotenuse of their triangle path, we found a scrap of parchment.

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

T								T											T
52	50	85	100	50	58	17	52	20	37	111	20	85	10	17	20	52			
				T															
50	58	29	85	52	50	85	25	20	10	85									

legs 20 and 48, hypotenuse = → **T**

legs 8 and 15, hypotenuse = → **N**

legs 40 and 42, hypotenuse = → **A**

legs 40 and 75, hypotenuse = → **E**

legs 12 and 16, hypotenuse = → **O**

legs 20 and 21, hypotenuse = → **V**

legs 12 and 35, hypotenuse = → **M**

legs 28 and 96, hypotenuse = → **P**

legs 15 and 20, hypotenuse = → **R**

legs 6 and 8, hypotenuse = → **S**

legs 36 and 105, hypotenuse = → **D**

legs 30 and 40, hypotenuse = → **H**

Scratch space:

CLUE 2 Square roots

We discovered a square storage grid of magical inkpots. The total number of pots was a perfect square, and finding the root revealed which row held the next clue.

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

T								T								
21	8	7	14	8	20	19	21	18	22	17	9	7	3	20		
				T										T		
13	11	4	8	21	8	20	19	3	7	3	5	20	9	21		

$\sqrt{441} = \square \rightarrow \boxed{\text{T}}$

$\sqrt{289} = \square \rightarrow \boxed{\text{U}}$

$\sqrt{121} = \square \rightarrow \boxed{\text{I}}$

$\sqrt{196} = \square \rightarrow \boxed{\text{P}}$

$\sqrt{169} = \square \rightarrow \boxed{\text{R}}$

$\sqrt{49} = \square \rightarrow \boxed{\text{E}}$

$\sqrt{81} = \square \rightarrow \boxed{\text{S}}$

$\sqrt{324} = \square \rightarrow \boxed{\text{O}}$

$\sqrt{361} = \square \rightarrow \boxed{\text{N}}$

$\sqrt{16} = \square \rightarrow \boxed{\text{G}}$

$\sqrt{400} = \square \rightarrow \boxed{\text{A}}$

$\sqrt{484} = \square \rightarrow \boxed{\text{M}}$

$\sqrt{64} = \square \rightarrow \boxed{\text{H}}$

$\sqrt{9} = \square \rightarrow \boxed{\text{D}}$

$\sqrt{25} = \square \rightarrow \boxed{\text{C}}$

Scratch space:

CLUE 3

The ink blots are multiplying rapidly by powers of two every minute. We calculated the exponential growth to find the exact time the suspect entered.

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

9 64 625 4 64 343 324 9 32 243 16 64 25 343 324 169 361 25 32 243

9 64 625 16 64 144 324 100 243 144 25 25 32 25

$3^2 = \square \rightarrow \text{T}$	$10^2 = \square \rightarrow \text{Y}$	$18^2 = \square \rightarrow \text{N}$	$4^2 = \square \rightarrow \text{S}$
$8^2 = \square \rightarrow \text{H}$	$5^4 = \square \rightarrow \text{E}$	$12^2 = \square \rightarrow \text{I}$	$5^2 = \square \rightarrow \text{R}$
$13^2 = \square \rightarrow \text{K}$	$7^3 = \square \rightarrow \text{A}$	$2^5 = \square \rightarrow \text{O}$	$3^5 = \square \rightarrow \text{M}$
$2^2 = \square \rightarrow \text{P}$	$19^2 = \square \rightarrow \text{F}$		

Scratch space:

CLUE 4 Order of operations

A spell lock requires solving a complex scroll of math. Following the correct order of operations unlocked a secret chest containing a witness report.

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

T																
91	45	10	13	22	34	11	10	46	13	10	86	10	18	57	46	
			T					T								
85	95	46	91	10	85	18	34	91	45	115	14	69	85	34	86	75

$8 \times 12 - 5 = \square \rightarrow$ T	$54 + 3 \times 5 = \square \rightarrow$ L	$7 \times 8 - 11 = \square \rightarrow$ H
$2 + 6 \times 2 = \square \rightarrow$ O	$10 + 6 \times 2 = \square \rightarrow$ R	$9 \times 11 - 13 = \square \rightarrow$ N
$5 \times 11 - 21 = \square \rightarrow$ I	$3 \times 5 - 5 = \square \rightarrow$ E	$59 + 8 \times 2 = \square \rightarrow$ K
$80 + 5 \times 3 = \square \rightarrow$ U	$10 \times 4 - 22 = \square \rightarrow$ W	$10 \times 11 - 25 = \square \rightarrow$ D
$99 + 8 \times 2 = \square \rightarrow$ G	$4 \times 4 - 5 = \square \rightarrow$ M	$8 \times 8 - 18 = \square \rightarrow$ S
$5 + 4 \times 2 = \square \rightarrow$ C	$8 \times 9 - 15 = \square \rightarrow$ A	

Scratch space:

CLUE 5**Square roots - the last clue**

The suspect fled through a square garden of glowing roses. Finding the square root of the garden area gave us the side length and pointed us to the final clue.

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:

$\sqrt{16} = \boxed{}$

$\sqrt{64} = \boxed{}$

$\sqrt{144} = \boxed{}$

$\sqrt{100} = \boxed{}$

$\sqrt{81} = \boxed{}$

$\sqrt{49} = \boxed{}$

$\sqrt{121} = \boxed{}$

$\sqrt{36} = \boxed{}$

$\sqrt{9} = \boxed{}$

$\sqrt{1} = \boxed{}$

$\sqrt{4} = \boxed{}$

Step 2 - cross out the sentence with each answer:

1. The villain summons a fake castle, then drops a shiny poison apple.
2. The villain blots out the reading lights, then flies away on a magic carpet.
3. The villain freezes the library clock, then flies away on a magic carpet.
4. The villain tangles the bookshelves with vines, then flies away on a magic carpet.
5. The villain summons a fake castle, then escapes on a glass slipper.
6. The villain blots out the reading lights, then drops a shiny poison apple.
7. The villain tangles the bookshelves with vines, then leaves a single enchanted rose.
8. The villain freezes the library clock, then escapes on a glass slipper.
9. The villain breathes blue fire, then escapes on a glass slipper.
10. The villain tangles the bookshelves with vines, then drops a shiny poison apple.
11. The villain blots out the reading lights, then hides behind a spinning wheel.
12. The villain tangles the bookshelves with vines, then escapes on a glass slipper.

Answer Key

The Magic Kingdom Archive Capers

Culprit: Aladdin

Create Illusions · Glass Slipper · Right-handed · Gold Ink · Bright Mirrors

Trail: Start 21 → Clue 1 17 → Clue 2 11 → Clue 3 7 → Clue 4 4 → Clue 5 1

Clue 1 (Pythagorean theorem): "THE PHANTOM DOES NOT HAVE THE ROSE"

legs 20 and 48, hypotenuse = 52 (T) · legs 8 and 15, hypotenuse = 17 (N) · legs 40 and 42, hypotenuse = 58 (A) · legs 40 and 75, hypotenuse = 85 (E) · legs 12 and 16, hypotenuse = 20 (O) · legs 20 and 21, hypotenuse = 29 (V) · legs 12 and 35, hypotenuse = 37 (M) · legs 28 and 96, hypotenuse = 100 (P) · legs 15 and 20, hypotenuse = 25 (R) · legs 6 and 8, hypotenuse = 10 (S) · legs 36 and 105, hypotenuse = 111 (D) · legs 30 and 40, hypotenuse = 50 (H)

Clue 2 (Square roots): "THE PHANTOM USED A RIGHT HANDED CAST"

$\sqrt{441} = 21$ (T) · $\sqrt{289} = 17$ (U) · $\sqrt{121} = 11$ (I) · $\sqrt{196} = 14$ (P) · $\sqrt{169} = 13$ (R) · $\sqrt{49} = 7$ (E) · $\sqrt{81} = 9$ (S) · $\sqrt{324} = 18$ (O) · $\sqrt{361} = 19$ (N) · $\sqrt{16} = 4$ (G) · $\sqrt{400} = 20$ (A) · $\sqrt{484} = 22$ (M) · $\sqrt{64} = 8$ (H) · $\sqrt{9} = 3$ (D) · $\sqrt{25} = 5$ (C)

Clue 3 (Exponents): "THE PHANTOM SHRANK FROM THE SHINY MIRROR"

$3^2 = 9$ (T) · $10^2 = 100$ (Y) · $18^2 = 324$ (N) · $4^2 = 16$ (S) · $8^2 = 64$ (H) · $5^4 = 625$ (E) · $12^2 = 144$ (I) · $5^2 = 25$ (R) · $13^2 = 169$ (K) · $7^3 = 343$ (A) · $2^5 = 32$ (O) · $3^5 = 243$ (M) · $2^2 = 4$ (P) · $19^2 = 361$ (F)

Clue 4 (Order of operations): "THE CRIME SCENE WAS DUSTED WITH GOLD INK"

$8 \times 12 - 5 = 91$ (T) · $54 + 3 \times 5 = 69$ (L) · $7 \times 8 - 11 = 45$ (H) · $2 + 6 \times 2 = 14$ (O) · $10 + 6 \times 2 = 22$ (R) · $9 \times 11 - 13 = 86$ (N) · $5 \times 11 - 21 = 34$ (I) · $3 \times 5 - 5 = 10$ (E) · $59 + 8 \times 2 = 75$ (K) · $80 + 5 \times 3 = 95$ (U) · $10 \times 4 - 22 = 18$ (W) · $10 \times 11 - 25 = 85$ (D) · $99 + 8 \times 2 = 115$ (G) · $4 \times 4 - 5 = 11$ (M) · $8 \times 8 - 18 = 46$ (S) · $5 + 4 \times 2 = 13$ (C) · $8 \times 9 - 15 = 57$ (A)

Clue 5 (Square roots): surviving statement is box 5 → Aladdin

$\sqrt{16} = 4$ · $\sqrt{64} = 8$ · $\sqrt{144} = 12$ · $\sqrt{100} = 10$ · $\sqrt{81} = 9$ · $\sqrt{49} = 7$ · $\sqrt{121} = 11$ · $\sqrt{36} = 6$ · $\sqrt{9} = 3$ · $\sqrt{1} = 1$ · $\sqrt{4} = 2$