The Mystery of the Starlight Sanctuary

Grade 7 math · Integers, Percentages, Order of operations, Exponents, Two-step equations · Reading level grades 7-9

Detective: _____ **Date:** _____

Someone broke into the Starlight Purrnicorn Sanctuary vault and snatched the legendary Moon Gem! The culprit left behind magical traces, strange pawprints, and glitter dust across the grounds. Analyze the evidence to unmask the villain.

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 Moonlight Prowler is _____

Possible suspects

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

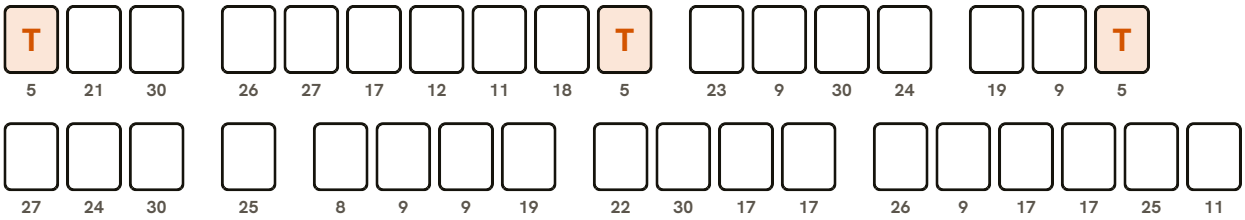
NAME	MAGIC ABILITY	ENCHANTED GEAR	PAW BAND	MANE STYLE	DISTRACTION ITEM
Cordelia	Starlight Teleport	Catnip Wand	Left Paw Band	Flowing Waves	Jingle Bell Ball
Sterling	Starlight Teleport	Moon Bell Collar	Right Paw Band	Spiky Star Cut	Mist Spray Bottle
Beatrix	Rainbow Blast	Silver Horseshoes	Left Paw Band	Spiky Star Cut	Jingle Bell Ball
Percival	Starlight Teleport	Velvet Harness	Left Paw Band	Braided Sparkles	Jingle Bell Ball
Balthazar	Starlight Teleport	Catnip Wand	Right Paw Band	Spiky Star Cut	Jingle Bell Ball
Cleopatra	Prism Shield	Velvet Harness	Left Paw Band	Flowing Waves	Jingle Bell Ball
Genevieve	Lunar Leap	Velvet Harness	Right Paw Band	Flowing Waves	Mist Spray Bottle
Seraphina	Solar Flare	Moon Bell Collar	Right Paw Band	Flowing Waves	Red Laser Pointer
Gideon	Rainbow Blast	Crystal Horn	Right Paw Band	Spiky Star Cut	Jingle Bell Ball
Desmond	Solar Flare	Silver Horseshoes	Left Paw Band	Spiky Star Cut	Jingle Bell Ball
Calliope	Prism Shield	Crystal Horn	Left Paw Band	Spiky Star Cut	Jingle Bell Ball
Thaddeus	Starlight Teleport	Velvet Harness	Left Paw Band	Spiky Star Cut	Jingle Bell Ball
Ignatius	Lunar Leap	Crystal Horn	Left Paw Band	Spiky Star Cut	Mist Spray Bottle
Evangeline	Lunar Leap	Moon Bell Collar	Right Paw Band	Braided Sparkles	Mist Spray Bottle
Clementine	Solar Flare	Moon Bell Collar	Right Paw Band	Braided Sparkles	Red Laser Pointer
Ambrose	Lunar Leap	Catnip Wand	Right Paw Band	Spiky Star Cut	Jingle Bell Ball
Felix	Prism Shield	Moon Bell Collar	Left Paw Band	Spiky Star Cut	Jingle Bell Ball
Aurelia	Lunar Leap	Silver Horseshoes	Right Paw Band	Flowing Waves	Jingle Bell Ball
Jasper	Solar Flare	Crystal Horn	Left Paw Band	Spiky Star Cut	Red Laser Pointer
Barnaby	Solar Flare	Catnip Wand	Left Paw Band	Spiky Star Cut	Red Laser Pointer
Penelope	Starlight Teleport	Moon Bell Collar	Left Paw Band	Spiky Star Cut	Jingle Bell Ball

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CLUE 1 Integers

> Checking the vault elevation logs using positive and negative integer readings revealed a key detail about the culprit.

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



(-9) + 14 = ☐ → T

(-11) + 29 = ☐ → I

12 - (-12) = ☐ → S

9 - (-12) = ☐ → H

(-7) + 34 = ☐ → U

(-3) + 12 = ☐ → O

16 - (-3) = ☐ → N

9 - (-8) = ☐ → L

(-11) + 19 = ☐ → M

(-10) + 35 = ☐ → A

18 - (-4) = ☐ → B

25 - (-5) = ☐ → E

2 - (-10) = ☐ → P

(-5) + 16 = ☐ → R

(-2) + 25 = ☐ → D

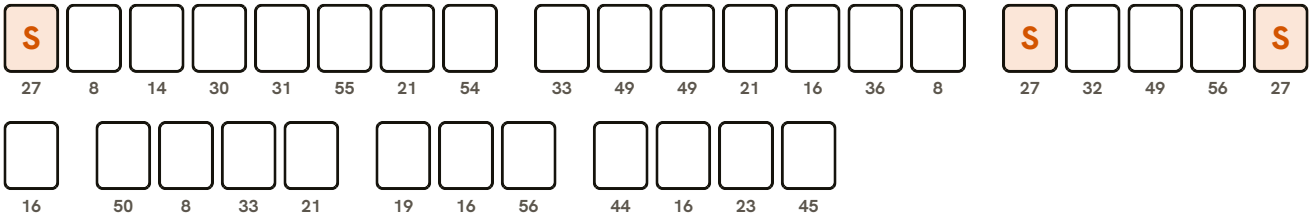
14 - (-12) = ☐ → C

Scratch space:

CLUE 2 Percentages

Calculating the exact percentage of magic residue found on the display case eliminated a suspect piece of gear.

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



10% of 270 = ☐ → S

20% of 245 = ☐ → O

40% of 135 = ☐ → Y

60% of 60 = ☐ → G

5% of 640 = ☐ → H

50% of 62 = ☐ → R

20% of 70 = ☐ → C

50% of 16 = ☐ → E

60% of 75 = ☐ → D

20% of 250 = ☐ → L

40% of 140 = ☐ → W

25% of 76 = ☐ → P

10% of 210 = ☐ → T

25% of 220 = ☐ → I

50% of 60 = ☐ → U

10% of 230 = ☐ → N

20% of 80 = ☐ → A

40% of 110 = ☐ → B

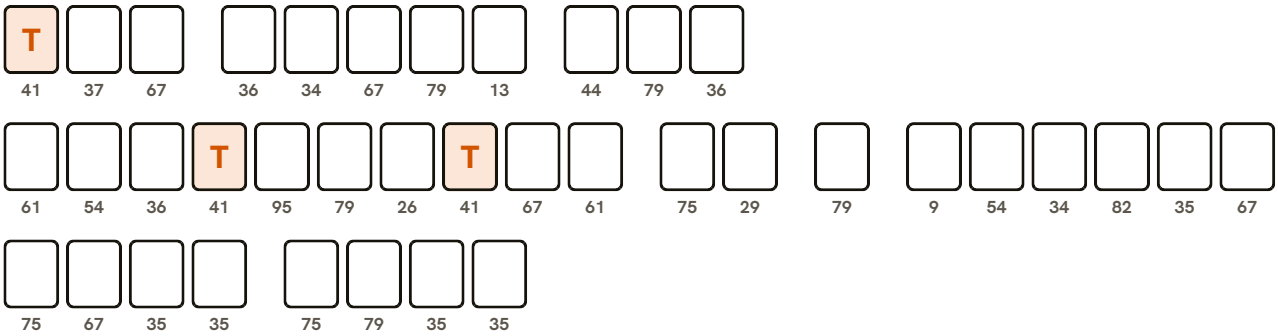
25% of 132 = ☐ → F

Scratch space:

CLUE 3 Order of operations

> Evaluating the multi-step security keypad sequence using order of operations pinpointed which paw band the intruder wore.

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



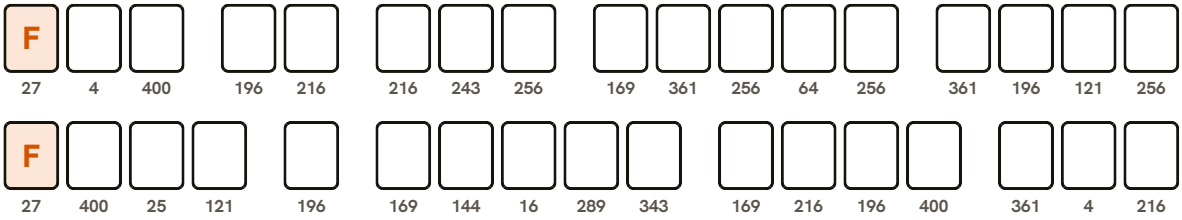
11 + 5 × 6 = ☐ → T	59 + 4 × 2 = ☐ → E	6 × 8 - 22 = ☐ → C
20 + 3 × 5 = ☐ → L	66 + 8 × 2 = ☐ → G	9 × 11 - 20 = ☐ → A
9 × 4 - 27 = ☐ → J	21 + 8 × 5 = ☐ → D	12 × 7 - 9 = ☐ → B
42 + 4 × 3 = ☐ → I	4 × 6 - 11 = ☐ → K	28 + 2 × 4 = ☐ → S
12 × 9 - 13 = ☐ → R	4 × 12 - 11 = ☐ → H	18 + 2 × 8 = ☐ → N
13 + 8 × 2 = ☐ → Y	7 × 10 - 26 = ☐ → W	

Scratch space:

CLUE 4 Exponents

Exponential growth formulas applied to hair strand counts under the microscope matched a specific mane style.

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



3^3 = ☐ → F	3^5 = ☐ → H	14^2 = ☐ → A	2^2 = ☐ → U
2^4 = ☐ → I	4^4 = ☐ → E	6^3 = ☐ → T	12^2 = ☐ → P
13^2 = ☐ → S	19^2 = ☐ → C	20^2 = ☐ → R	17^2 = ☐ → K
2^6 = ☐ → N	11^2 = ☐ → M	7^3 = ☐ → Y	5^2 = ☐ → O

Scratch space:

CLUE 5 Two-step equations - the last clue

Solving two-step equations to balance the security trap trigger weights revealed the intruder's main weakness.

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 + 9 = 45, x = ☐	5x + 1 = 36, x = ☐	4x + 1 = 21, x = ☐	5x + 4 = 59, x = ☐
4x + 2 = 34, x = ☐	2x + 2 = 14, x = ☐	4x + 7 = 43, x = ☐	4x + 5 = 17, x = ☐
4x + 7 = 23, x = ☐	4x + 9 = 17, x = ☐	6x + 7 = 13, x = ☐	

Step 2 - cross out the sentence with each answer:

1. The villain blasted bright rainbows, then polished their crystal horn.
2. The villain teleported through star portals, then polished their crystal horn.
3. The villain flashed a blinding solar flare, then polished their crystal horn.
4. The villain teleported through star portals, then waved a magical catnip wand.
5. The villain cast a glowing prism shield, then polished their crystal horn.
6. The villain leaped high onto the sanctuary roof, then polished their crystal horn.
7. The villain blasted bright rainbows, then clattered silver horseshoes.
8. The villain leaped high onto the sanctuary roof, then adjusted a velvet harness.
9. The villain teleported through star portals, then rang a moon bell collar.
10. The villain flashed a blinding solar flare, then clattered silver horseshoes.
11. The villain leaped high onto the sanctuary roof, then waved a magical catnip wand.
12. The villain teleported through star portals, then adjusted a velvet harness.

TEACHER / PARENT

Answer Key

The Mystery of the Starlight Sanctuary

Culprit: Desmond

Solar Flare · Silver Horseshoes · Left Paw Band · Spiky Star Cut · Jingle Bell Ball

Trail: Start 21 → Clue 1 15 → Clue 2 10 → Clue 3 7 → Clue 4 4 → Clue 5 1

Clue 1 (Integers): "THE CULPRIT DOES NOT USE A MOON BELL COLLAR"

(-9) + 14 = 5 (T) · (-11) + 29 = 18 (I) · 12 - (-12) = 24 (S) · 9 - (-12) = 21 (H) · (-7) + 34 = 27 (U) · (-3) + 12 = 9 (O) · 16 - (-3) = 19 (N) · 9 - (-8) = 17 (L) · (-11) + 19 = 8 (M) · (-10) + 35 = 25 (A) · 18 - (-4) = 22 (B) · 25 - (-5) = 30 (E) · 2 - (-10) = 12 (P) · (-5) + 16 = 11 (R) · (-2) + 25 = 23 (D) · 14 - (-12) = 26 (C)

Clue 2 (Percentages): "SECURITY FOOTAGE SHOWS A LEFT PAW BAND"

10% of 270 = 27 (S) · 20% of 245 = 49 (O) · 40% of 135 = 54 (Y) · 60% of 60 = 36 (G) · 5% of 640 = 32 (H) · 50% of 62 = 31 (R) · 20% of 70 = 14 (C) · 50% of 16 = 8 (E) · 60% of 75 = 45 (D) · 20% of 250 = 50 (L) · 40% of 140 = 56 (W) · 25% of 76 = 19 (P) · 10% of 210 = 21 (T) · 25% of 220 = 55 (I) · 50% of 60 = 30 (U) · 10% of 230 = 23 (N) · 20% of 80 = 16 (A) · 40% of 110 = 44 (B) · 25% of 132 = 33 (F)

Clue 3 (Order of operations): "THE SNEAK WAS DISTRACTED BY A JINGLE BELL BALL"

11 + 5 × 6 = 41 (T) · 59 + 4 × 2 = 67 (E) · 6 × 8 - 22 = 26 (C) · 20 + 3 × 5 = 35 (L) · 66 + 8 × 2 = 82 (G) · 9 × 11 - 20 = 79 (A) · 9 × 4 - 27 = 9 (J) · 21 + 8 × 5 = 61 (D) · 12 × 7 - 9 = 75 (B) · 42 + 4 × 3 = 54 (I) · 4 × 6 - 11 = 13 (K) · 28 + 2 × 4 = 36 (S) · 12 × 9 - 13 = 95 (R) · 4 × 12 - 11 = 37 (H) · 18 + 2 × 8 = 34 (N) · 13 + 8 × 2 = 29 (Y) · 7 × 10 - 26 = 44 (W)

Clue 4 (Exponents): "FUR AT THE SCENE CAME FROM A SPIKY STAR CUT"

3^3 = 27 (F) · 3^5 = 243 (H) · 14^2 = 196 (A) · 2^2 = 4 (U) · 2^4 = 16 (I) · 4^4 = 256 (E) · 6^3 = 216 (T) · 12^2 = 144 (P) · 13^2 = 169 (S) · 19^2 = 361 (C) · 20^2 = 400 (R) · 17^2 = 289 (K) · 2^6 = 64 (N) · 11^2 = 121 (M) · 7^3 = 343 (Y) · 5^2 = 25 (O)

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

3x + 9 = 45, x = 12 · 5x + 1 = 36, x = 7 · 4x + 1 = 21, x = 5 · 5x + 4 = 59, x = 11 · 4x + 2 = 34, x = 8 · 2x + 2 = 14, x = 6 · 4x + 7 = 43, x = 9 · 4x + 5 = 17, x = 3 · 4x + 7 = 23, x = 4 · 4x + 9 = 17, x = 2 · 6x + 7 = 13, x = 1