The Case of the Missing Star Pearl

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

Detective: _____ **Date:** _____

When the legendary Star Pearl vanished from the Conservatory of Coral Spire, the guards found traces of tide magic and discarded gear. Analyze the underwater evidence to reveal the culprit.

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 Sunken Bandit is _____

Possible suspects

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

NAME	TIDE MAGIC	ARTIFACT GEAR	SWIMMING STYLE	FIN TAIL PATTERN	SONIC RESONANCE
Thalassa	Coral Shielding	Prism Crystal	Left Tail Flick	Ruby Scales	Deep Bass Vibration
Oceanus	Whirlpool Call	Triton Spear	Right Tail Flick	Ruby Scales	High Frequency Pitch
Kai	Coral Shielding	Pearl Shield	Right Tail Flick	Ruby Scales	Deep Bass Vibration
Scylla	Current Bending	Kelp Net	Right Tail Flick	Sapphire Scales	High Frequency Pitch
Ariel	Coral Shielding	Kelp Net	Left Tail Flick	Sapphire Scales	High Frequency Pitch
Cressida	Tidal Surge	Conch Horn	Left Tail Flick	Ruby Scales	Deep Bass Vibration
Maren	Current Bending	Conch Horn	Right Tail Flick	Emerald Scales	Rhythmic Pulse Wave
Nerida	Tidal Surge	Kelp Net	Left Tail Flick	Ruby Scales	Deep Bass Vibration
Proteus	Current Bending	Pearl Shield	Left Tail Flick	Ruby Scales	Rhythmic Pulse Wave
Tethys	Current Bending	Conch Horn	Right Tail Flick	Ruby Scales	Deep Bass Vibration
Coralia	Whirlpool Call	Conch Horn	Left Tail Flick	Emerald Scales	Deep Bass Vibration
Triton	Whirlpool Call	Kelp Net	Left Tail Flick	Ruby Scales	Deep Bass Vibration
Naiad	Abyssal Glow	Triton Spear	Left Tail Flick	Ruby Scales	High Frequency Pitch
Zephyr	Abyssal Glow	Prism Crystal	Left Tail Flick	Sapphire Scales	Rhythmic Pulse Wave
Caspian	Coral Shielding	Kelp Net	Right Tail Flick	Ruby Scales	High Frequency Pitch
Galatea	Current Bending	Prism Crystal	Left Tail Flick	Ruby Scales	Deep Bass Vibration
Ronan	Current Bending	Kelp Net	Right Tail Flick	Ruby Scales	Deep Bass Vibration
Melusine	Whirlpool Call	Pearl Shield	Right Tail Flick	Ruby Scales	Deep Bass Vibration
Marina	Tidal Surge	Pearl Shield	Right Tail Flick	Sapphire Scales	High Frequency Pitch
Callista	Whirlpool Call	Conch Horn	Left Tail Flick	Ruby Scales	Deep Bass Vibration
Leucothea	Whirlpool Call	Triton Spear	Left Tail Flick	Emerald Scales	Deep Bass Vibration

CLUE 1 Pythagorean theorem

> To measure the direct escape route between two perpendicular reef walls, you calculate the hypotenuse distance.

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

T																		T	
13	29	65	26	74	123	123	30	74	82	40	58	65	51	82	58	13			
116	51	65	30	20	65	123	17	82	65	13									

legs 5 and 12, hypotenuse = ☐ → T

legs 27 and 120, hypotenuse = ☐ → L

legs 24 and 70, hypotenuse = ☐ → I

legs 25 and 60, hypotenuse = ☐ → E

legs 12 and 16, hypotenuse = ☐ → K

legs 24 and 45, hypotenuse = ☐ → S

legs 18 and 24, hypotenuse = ☐ → A

legs 8 and 15, hypotenuse = ☐ → P

legs 80 and 84, hypotenuse = ☐ → U

legs 10 and 24, hypotenuse = ☐ → V

legs 18 and 80, hypotenuse = ☐ → N

legs 20 and 21, hypotenuse = ☐ → H

legs 24 and 32, hypotenuse = ☐ → D

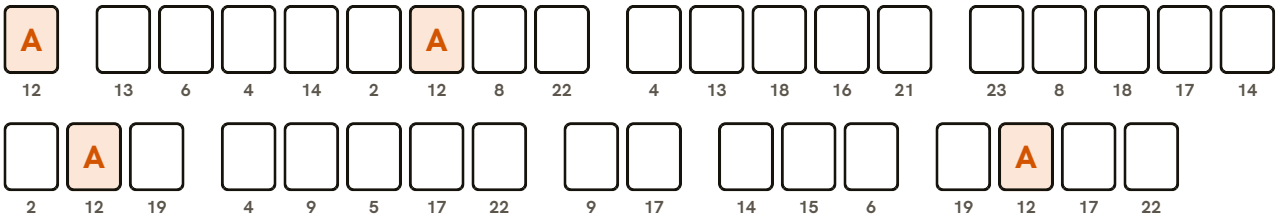
legs 40 and 42, hypotenuse = ☐ → O

Scratch space:

CLUE 2 Square roots

> The entrance to the sunken vault is sealed by a square tile grid, where finding the side length reveals the entry key.

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



sqrt(144) = ☐ → A

sqrt(169) = ☐ → L

sqrt(36) = ☐ → E

sqrt(81) = ☐ → O

sqrt(16) = ☐ → F

sqrt(64) = ☐ → R

sqrt(196) = ☐ → T

sqrt(361) = ☐ → S

sqrt(484) = ☐ → D

sqrt(441) = ☐ → K

sqrt(289) = ☐ → N

sqrt(25) = ☐ → U

sqrt(529) = ☐ → P

sqrt(324) = ☐ → I

sqrt(4) = ☐ → W

sqrt(256) = ☐ → C

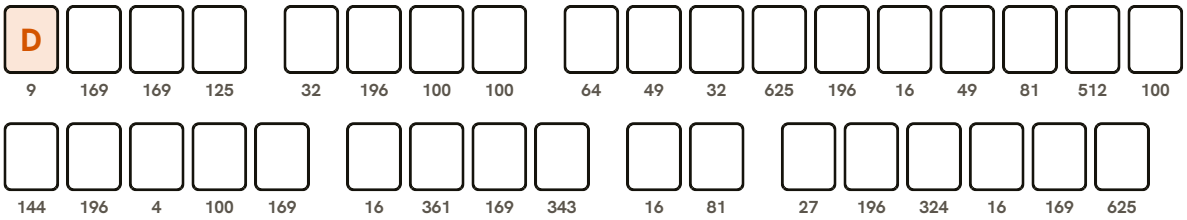
sqrt(225) = ☐ → H

Scratch space:

CLUE 3 Exponents

> Luminous plankton spores multiplied rapidly across the cavern walls, requiring exponential calculations to trace the timeline.

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



3^2 = ☐ → D

5^3 = ☐ → P

5^4 = ☐ → R

13^2 = ☐ → E

7^2 = ☐ → I

12^2 = ☐ → C

3^4 = ☐ → O

4^2 = ☐ → T

10^2 = ☐ → S

19^2 = ☐ → H

7^3 = ☐ → M

14^2 = ☐ → A

2^5 = ☐ → B

2^9 = ☐ → N

3^3 = ☐ → F

4^3 = ☐ → V

18^2 = ☐ → L

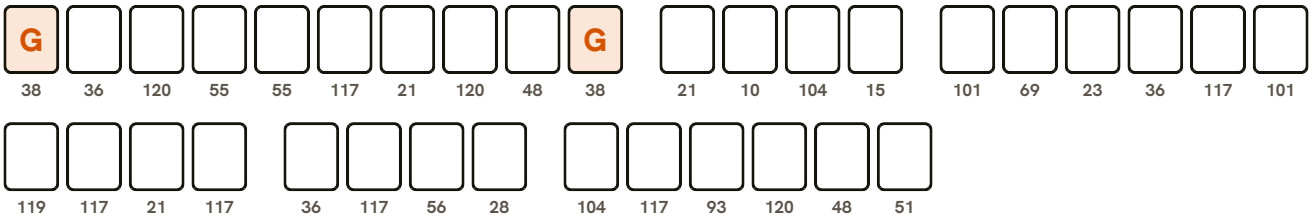
2^2 = ☐ → U

Scratch space:

CLUE 4 Order of operations

> Deciphering the multi-step potion formula carved on the trench floor requires calculating operations in strict priority order.

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



7 × 8 - 18 = ☐ → G	12 × 11 - 28 = ☐ → B	28 + 7 × 4 = ☐ → F
8 + 4 × 5 = ☐ → T	5 + 3 × 6 = ☐ → A	11 × 4 - 23 = ☐ → R
2 + 2 × 4 = ☐ → U	70 + 7 × 7 = ☐ → W	12 + 4 × 6 = ☐ → L
7 × 9 - 8 = ☐ → M	60 + 3 × 3 = ☐ → C	8 × 9 - 24 = ☐ → N
12 × 12 - 24 = ☐ → I	48 + 5 × 9 = ☐ → H	27 + 3 × 8 = ☐ → D
99 + 2 × 9 = ☐ → E	10 × 11 - 9 = ☐ → S	9 + 2 × 3 = ☐ → Y

Scratch space:

CLUE 5 Square roots - the last clue

A second security hatch operates on a square area grid where finding the principal root unveils 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(100) = ☐ sqrt(49) = ☐ sqrt(64) = ☐ sqrt(9) = ☐ sqrt(36) = ☐

sqrt(144) = ☐ sqrt(25) = ☐ sqrt(81) = ☐ sqrt(4) = ☐ sqrt(121) = ☐

sqrt(16) = ☐

Step 2 - cross out the sentence with each answer:

1. The villain released a tidal surge, then sounded a conch horn.
2. The villain flashed an abyssal glow, then sounded a conch horn.
3. The villain summoned a swirling current, then threw a kelp net.
4. The villain flashed an abyssal glow, then focused a prism crystal.
5. The villain flashed an abyssal glow, then brandished a triton spear.
6. The villain stirred up a whirlpool, then threw a kelp net.
7. The villain stirred up a whirlpool, then sounded a conch horn.
8. The villain summoned a swirling current, then focused a prism crystal.
9. The villain raised a coral shield, then threw a kelp net.
10. The villain raised a coral shield, then focused a prism crystal.
11. The villain flashed an abyssal glow, then deflected with a pearl shield.
12. The villain summoned a swirling current, then brandished a triton spear.

TEACHER / PARENT

Answer Key

The Case of the Missing Star Pearl

Culprit: Cressida

Tidal Surge · Conch Horn · Left Tail Flick · Ruby Scales · Deep Bass Vibration

Trail: Start 21 → Clue 1 15 → Clue 2 9 → Clue 3 6 → Clue 4 4 → Clue 5 1

Clue 1 (Pythagorean theorem): "THE VILLAIN DOES NOT USE A KELP NET"

legs 5 and 12, hypotenuse = 13 (T) · legs 27 and 120, hypotenuse = 123 (L) · legs 24 and 70, hypotenuse = 74 (I) · legs 25 and 60, hypotenuse = 65 (E) · legs 12 and 16, hypotenuse = 20 (K) · legs 24 and 45, hypotenuse = 51 (S) · legs 18 and 24, hypotenuse = 30 (A) · legs 8 and 15, hypotenuse = 17 (P) · legs 80 and 84, hypotenuse = 116 (U) · legs 10 and 24, hypotenuse = 26 (V) · legs 18 and 80, hypotenuse = 82 (N) · legs 20 and 21, hypotenuse = 29 (H) · legs 24 and 32, hypotenuse = 40 (D) · legs 40 and 42, hypotenuse = 58 (O)

Clue 2 (Square roots): "A LEFTWARD FLICK PRINT WAS FOUND ON THE SAND"

sqrt(144) = 12 (A) · sqrt(169) = 13 (L) · sqrt(36) = 6 (E) · sqrt(81) = 9 (O) · sqrt(16) = 4 (F) · sqrt(64) = 8 (R) · sqrt(196) = 14 (T) · sqrt(361) = 19 (S) · sqrt(484) = 22 (D) · sqrt(441) = 21 (K) · sqrt(289) = 17 (N) · sqrt(25) = 5 (U) · sqrt(529) = 23 (P) · sqrt(324) = 18 (I) · sqrt(4) = 2 (W) · sqrt(256) = 16 (C) · sqrt(225) = 15 (H)

Clue 3 (Exponents): "DEEP BASS VIBRATIONS CAUSE THEM TO FALTER"

3^2 = 9 (D) · 5^3 = 125 (P) · 5^4 = 625 (R) · 13^2 = 169 (E) · 7^2 = 49 (I) · 12^2 = 144 (C) · 3^4 = 81 (O) · 4^2 = 16 (T) · 10^2 = 100 (S) · 19^2 = 361 (H) · 7^3 = 343 (M) · 14^2 = 196 (A) · 2^5 = 32 (B) · 2^9 = 512 (N) · 3^3 = 27 (F) · 4^3 = 64 (V) · 18^2 = 324 (L) · 2^2 = 4 (U)

Clue 4 (Order of operations): "GLIMMERING RUBY SCALES WERE LEFT BEHIND"

7 × 8 - 18 = 38 (G) · 12 × 11 - 28 = 104 (B) · 28 + 7 × 4 = 56 (F) · 8 + 4 × 5 = 28 (T) · 5 + 3 × 6 = 23 (A) · 11 × 4 - 23 = 21 (R) · 2 + 2 × 4 = 10 (U) · 70 + 7 × 7 = 119 (W) · 12 + 4 × 6 = 36 (L) · 7 × 9 - 8 = 55 (M) · 60 + 3 × 3 = 69 (C) · 8 × 9 - 24 = 48 (N) · 12 × 12 - 24 = 120 (I) · 48 + 5 × 9 = 93 (H) · 27 + 3 × 8 = 51 (D) · 99 + 2 × 9 = 117 (E) · 10 × 11 - 9 = 101 (S) · 9 + 2 × 3 = 15 (Y)

Clue 5 (Square roots): surviving statement is box 1 → Cressida

sqrt(100) = 10 · sqrt(49) = 7 · sqrt(64) = 8 · sqrt(9) = 3 · sqrt(36) = 6 · sqrt(144) = 12 · sqrt(25) = 5 · sqrt(81) = 9 · sqrt(4) = 2 · sqrt(121) = 11 · sqrt(16) = 4