



The Cosmic Tide Caper

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

Detective: _____ **Date:** _____

A rogue cosmic mermaid has disrupted the orbital deep-sea research station, sabotaging the flux core and escaping into the alien ocean trenches. The Starlight Guard needs your math skills to decode the sensor logs and unmask 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 Starlight Rogue is _____

Possible suspects

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

NAME	SWIM PROPULSION	STAR GADGET	DOMINANT FIN	TAIL GLOW	SONAR FREQUENCY
Marina Sol	Hydro Jet	Nebula Net	Left Fin	Neon Cyan	Echo Pulse
Nerida Cross	Gravity Glide	Comet Laser	Right Fin	Solar Gold	Low Rumble
Cordelia Drift	Gravity Glide	Nebula Net	Left Fin	Deep Violet	High Pitch
Tycho Abyss	Hydro Jet	Solar Shield	Right Fin	Neon Cyan	Low Rumble
Callisto Wave	Plasma Tail	Void Prism	Right Fin	Deep Violet	Low Rumble
Orion Reef	Plasma Tail	Nebula Net	Right Fin	Solar Gold	High Pitch
Aquila Star	Gravity Glide	Solar Shield	Left Fin	Neon Cyan	Low Rumble
Coral Vance	Gravity Glide	Void Prism	Right Fin	Solar Gold	Low Rumble
Nixie Sterling	Plasma Tail	Solar Shield	Right Fin	Solar Gold	Low Rumble
Pearl Horizon	Hydro Jet	Stellar Beacon	Right Fin	Deep Violet	Low Rumble
Thalassa Moon	Gravity Glide	Comet Laser	Right Fin	Neon Cyan	Low Rumble
Triton Cole	Gravity Glide	Solar Shield	Left Fin	Solar Gold	Echo Pulse
Nereus Glen	Vortex Thruster	Solar Shield	Right Fin	Neon Cyan	Echo Pulse
Triton Sol	Plasma Tail	Nebula Net	Left Fin	Neon Cyan	High Pitch
Zephyr Currents	Quantum Fin	Solar Shield	Right Fin	Neon Cyan	Low Rumble
Hyperion Shell	Quantum Fin	Void Prism	Left Fin	Deep Violet	Low Rumble
Delphin Frost	Vortex Thruster	Void Prism	Left Fin	Deep Violet	High Pitch
Astra Kai	Vortex Thruster	Solar Shield	Right Fin	Neon Cyan	High Pitch
Calypso Ray	Hydro Jet	Void Prism	Left Fin	Solar Gold	Low Rumble
Marina Drake	Plasma Tail	Void Prism	Right Fin	Neon Cyan	Low Rumble
Cassiopeia Wave	Vortex Thruster	Void Prism	Right Fin	Neon Cyan	Low Rumble

CLUE 1

Pythagorean theorem

The navigation sensor calculates direct distance across the ocean trench coordinates.

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

T																T
123	26	20	65	75	51	51	34	75	58	85	52	20	25	58	52	123
111	25	20	34	82	52	68	20	123	51	34	25	20	100			

legs 27 and 120, hypotenuse = → **T**

legs 12 and 16, hypotenuse = → **E**

legs 36 and 105, hypotenuse = → **U**

legs 24 and 45, hypotenuse = → **L**

legs 40 and 75, hypotenuse = → **D**

legs 32 and 60, hypotenuse = → **M**

legs 16 and 30, hypotenuse = → **A**

legs 10 and 24, hypotenuse = → **H**

legs 18 and 80, hypotenuse = → **C**

legs 25 and 60, hypotenuse = → **V**

legs 28 and 96, hypotenuse = → **R**

legs 20 and 48, hypotenuse = → **O**

legs 15 and 20, hypotenuse = → **S**

legs 21 and 72, hypotenuse = → **I**

legs 40 and 42, hypotenuse = → **N**

Scratch space:

CLUE 2 Square roots

Analyzing the surface area of the bio energy shield reveals its base signal radius.

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

T									T						T				
10	5	8	7	23	7	19	8	15	10	23	7	8	7	10	5	8	9	11	

				T				T			T			
11	9	17	5	10	24	9	13	10	25	7	10	8	8	11

$$\sqrt{100} = \square \rightarrow \boxed{\text{T}}$$

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

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

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

$$\sqrt{529} = \square \rightarrow \boxed{\text{U}}$$

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

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

$$\sqrt{225} = \square \rightarrow \boxed{\text{C}}$$

$$\sqrt{625} = \square \rightarrow \boxed{\text{O}}$$

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

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

$$\sqrt{576} = \square \rightarrow \boxed{\text{F}}$$

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

Scratch space:

CLUE 3 Exponents

Measuring the exponential growth of stellar energy in the hydro core gives a clue.

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

T									T										
512	400	25	196	441	196	243	25	9	512	256	36	196	196	512	8	243	243	25	729
121	128	36	125	8	256	216	441	484	121	125	25								

$8^3 = \square \rightarrow$ T	$5^2 = \square \rightarrow$ E	$6^2 = \square \rightarrow$ A	$2^3 = \square \rightarrow$ O
$22^2 = \square \rightarrow$ M	$2^7 = \square \rightarrow$ Y	$11^2 = \square \rightarrow$ B	$5^3 = \square \rightarrow$ L
$2^8 = \square \rightarrow$ W	$3^5 = \square \rightarrow$ P	$3^2 = \square \rightarrow$ C	$21^2 = \square \rightarrow$ U
$14^2 = \square \rightarrow$ S	$9^3 = \square \rightarrow$ D	$20^2 = \square \rightarrow$ H	$6^3 = \square \rightarrow$ R

Scratch space:

CLUE 4

Order of operations

Decoding the sequence of operational commands from the submarine log pinpoints the next location.

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

T									T						
52	35	61	11	117	11	95	61	7	52	11	35	61	30	11	17
46	61	65	46	7	76	17	46	11	35	18	46	61			

$11 \times 5 - 3 = \square \rightarrow \boxed{\text{T}}$

$30 + 5 \times 7 = \square \rightarrow \boxed{\text{O}}$

$6 \times 2 - 5 = \square \rightarrow \boxed{\text{C}}$

$79 + 4 \times 4 = \square \rightarrow \boxed{\text{P}}$

$17 + 6 \times 3 = \square \rightarrow \boxed{\text{H}}$

$3 \times 7 - 4 = \square \rightarrow \boxed{\text{A}}$

$12 \times 11 - 15 = \square \rightarrow \boxed{\text{U}}$

$4 \times 7 - 10 = \square \rightarrow \boxed{\text{I}}$

$37 + 6 \times 4 = \square \rightarrow \boxed{\text{E}}$

$9 \times 11 - 23 = \square \rightarrow \boxed{\text{Y}}$

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

$22 + 3 \times 8 = \square \rightarrow \boxed{\text{N}}$

$3 \times 6 - 7 = \square \rightarrow \boxed{\text{S}}$

Scratch space:

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

Calculating the root frequency of the localized sonar wave isolates the rogue profile.

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:

$\sqrt{25} = \boxed{}$

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

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

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

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

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

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

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

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

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

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

Step 2 - cross out the sentence with each answer:

1. The villain blasted past the reef with hydro jets, then deflected laser fire behind a solar shield.
2. The villain drifted on currents via gravity glide, then cut through the hull with a comet laser.
3. The villain shot through tides with vortex thrusters, then lit up the trench using a stellar beacon.
4. The villain shot through tides with vortex thrusters, then cut through the hull with a comet laser.
5. The villain shot through tides with vortex thrusters, then trapped the patrol using a void prism.
6. The villain warped through water using a plasma tail, then trapped the patrol using a void prism.
7. The villain warped through water using a plasma tail, then snared the research pod in a nebula net.
8. The villain drifted on currents via gravity glide, then lit up the trench using a stellar beacon.
9. The villain warped through water using a plasma tail, then lit up the trench using a stellar beacon.
10. The villain surged through the deep with a quantum fin, then deflected laser fire behind a solar shield.
11. The villain drifted on currents via gravity glide, then snared the research pod in a nebula net.
12. The villain blasted past the reef with hydro jets, then trapped the patrol using a void prism.

Answer Key

The Cosmic Tide Caper

Culprit: Marina Drake

Plasma Tail · Void Prism · Right Fin · Neon Cyan · Low Rumble

Trail: Start 21 → Clue 1 19 → Clue 2 11 → Clue 3 8 → Clue 4 4 → Clue 5 1

Clue 1 (Pythagorean theorem): "THE VILLAIN DOES NOT USE A COMET LASER"

legs 27 and 120, hypotenuse = 123 (T) · legs 12 and 16, hypotenuse = 20 (E) · legs 36 and 105, hypotenuse = 111 (U) · legs 24 and 45, hypotenuse = 51 (L) · legs 40 and 75, hypotenuse = 85 (D) · legs 32 and 60, hypotenuse = 68 (M) · legs 16 and 30, hypotenuse = 34 (A) · legs 10 and 24, hypotenuse = 26 (H) · legs 18 and 80, hypotenuse = 82 (C) · legs 25 and 60, hypotenuse = 65 (V) · legs 28 and 96, hypotenuse = 100 (R) · legs 20 and 48, hypotenuse = 52 (O) · legs 15 and 20, hypotenuse = 25 (S) · legs 21 and 72, hypotenuse = 75 (I) · legs 40 and 42, hypotenuse = 58 (N)

Clue 2 (Square roots): "THE SUSPECT USES THEIR RIGHT FIN TO STEER"

$\sqrt{100} = 10$ (T) · $\sqrt{64} = 8$ (E) · $\sqrt{49} = 7$ (S) · $\sqrt{121} = 11$ (R) · $\sqrt{529} = 23$ (U) · $\sqrt{289} = 17$ (G) · $\sqrt{25} = 5$ (H) · $\sqrt{225} = 15$ (C) · $\sqrt{625} = 25$ (O) · $\sqrt{361} = 19$ (P) · $\sqrt{169} = 13$ (N) · $\sqrt{576} = 24$ (F) · $\sqrt{81} = 9$ (I)

Clue 3 (Exponents): "THE SUSPECT WAS STOPPED BY A LOW RUMBLE"

$8^3 = 512$ (T) · $5^2 = 25$ (E) · $6^2 = 36$ (A) · $2^3 = 8$ (O) · $22^2 = 484$ (M) · $2^7 = 128$ (Y) · $11^2 = 121$ (B) · $5^3 = 125$ (L) · $2^8 = 256$ (W) · $3^5 = 243$ (P) · $3^2 = 9$ (C) · $21^2 = 441$ (U) · $14^2 = 196$ (S) · $9^3 = 729$ (D) · $20^2 = 400$ (H) · $6^3 = 216$ (R)

Clue 4 (Order of operations): "THE SUSPECT SHEDS A NEON CYAN SHINE"

$11 \times 5 - 3 = 52$ (T) · $30 + 5 \times 7 = 65$ (O) · $6 \times 2 - 5 = 7$ (C) · $79 + 4 \times 4 = 95$ (P) · $17 + 6 \times 3 = 35$ (H) · $3 \times 7 - 4 = 17$ (A) · $12 \times 11 - 15 = 117$ (U) · $4 \times 7 - 10 = 18$ (I) · $37 + 6 \times 4 = 61$ (E) · $9 \times 11 - 23 = 76$ (Y) · $11 \times 3 - 3 = 30$ (D) · $22 + 3 \times 8 = 46$ (N) · $3 \times 6 - 7 = 11$ (S)

Clue 5 (Square roots): surviving statement is box 6 → Marina Drake

$\sqrt{25} = 5$ · $\sqrt{1} = 1$ · $\sqrt{100} = 10$ · $\sqrt{121} = 11$ · $\sqrt{9} = 3$ · $\sqrt{64} = 8$ · $\sqrt{4} = 2$ · $\sqrt{49} = 7$ · $\sqrt{81} = 9$ · $\sqrt{144} = 12$ · $\sqrt{16} = 4$