



# The Cosmic Corsair Caper

Grade 8 math · Exponents, Square roots, Pythagorean theorem, Order of operations, Two-step equations · Reading level grades 5-6

Detective: \_\_\_\_\_ Date: \_\_\_\_\_

A rogue Space Pirate has plundered the ancient Star Charts from the safe of the Chief Astro-Navigator! We must track down the thief before they jump their starship to hyperspace.

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 Space Pirate is** \_\_\_\_\_

## Possible suspects

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

| NAME              | PRIMARY WEAPON   | SPACE GEAR          | LASER SIGHT         | SPACE HELMET  | SYSTEM VULNERABILITY |
|-------------------|------------------|---------------------|---------------------|---------------|----------------------|
| Quasar Morgan     | proton hook      | cybernetic eyepatch | left eye targeting  | bubble helmet | magnetic pulses      |
| Aero Avery        | plasma blaster   | magnetic boots      | right eye targeting | visor dome    | magnetic pulses      |
| Nova Blackbeard   | gravity cannon   | magnetic boots      | right eye targeting | bubble helmet | sound waves          |
| Echo Elly         | proton hook      | cybernetic eyepatch | right eye targeting | visor dome    | ice blasts           |
| Pulsar Pete       | plasma blaster   | stealth cloak       | right eye targeting | skull plate   | magnetic pulses      |
| Tracker Thomas    | starlight rapier | jetpack boots       | left eye targeting  | visor dome    | magnetic pulses      |
| Astro Anne        | plasma blaster   | stealth cloak       | left eye targeting  | skull plate   | magnetic pulses      |
| Laser Lafitte     | gravity cannon   | cybernetic eyepatch | right eye targeting | bubble helmet | magnetic pulses      |
| Orbit One-Eye     | starlight rapier | cybernetic eyepatch | right eye targeting | skull plate   | ice blasts           |
| Gamma Gray        | laser saber      | jetpack boots       | right eye targeting | visor dome    | magnetic pulses      |
| Vortex Velvet     | proton hook      | cybernetic eyepatch | right eye targeting | bubble helmet | magnetic pulses      |
| Stella Bonny      | starlight rapier | jetpack boots       | right eye targeting | bubble helmet | sound waves          |
| Comet Calico Jack | plasma blaster   | jetpack boots       | left eye targeting  | skull plate   | sound waves          |
| Starboard Sue     | gravity cannon   | cybernetic eyepatch | right eye targeting | visor dome    | magnetic pulses      |
| Solar Silver      | proton hook      | shield belt         | right eye targeting | bubble helmet | sound waves          |
| Cyborg Kidd       | gravity cannon   | stealth cloak       | right eye targeting | visor dome    | magnetic pulses      |
| Vector Vane       | laser saber      | cybernetic eyepatch | left eye targeting  | skull plate   | magnetic pulses      |
| Cosmic Hook       | laser saber      | magnetic boots      | right eye targeting | visor dome    | magnetic pulses      |
| Nebula Ned        | laser saber      | shield belt         | right eye targeting | bubble helmet | magnetic pulses      |
| Baron Baffin      | gravity cannon   | jetpack boots       | left eye targeting  | bubble helmet | ice blasts           |
| Pegleg Pluto      | starlight rapier | stealth cloak       | left eye targeting  | visor dome    | sound waves          |

## CLUE 1 Exponents

We scanned the cargo bay computer. The security lock code grew exponentially with every failed attempt, but we found a file showing the suspect's gear.

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

|     |   |     |     |     |     |     |    |     |     |     |     |     |     |     |     |     |     |   |
|-----|---|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|
| T   |   |     | T   |     |     |     |    |     |     |     |     |     |     | T   |     |     |     |   |
| 100 | 9 | 216 | 100 | 9   | 25  | 216 | 32 | 64  | 484 | 216 | 8   | 225 | 484 | 100 | 400 | 216 | 121 | 4 |
|     |   | T   |     |     |     | T   |    |     |     |     |     |     |     |     |     |     |     |   |
| 121 | 8 | 100 | 216 | 121 | 243 | 100 | 9  | 144 | 243 | 484 | 121 | 81  |     |     |     |     |     |   |

|                                |                                |                                |                                |
|--------------------------------|--------------------------------|--------------------------------|--------------------------------|
| $10^2 = \square \rightarrow$ T | $3^2 = \square \rightarrow$ H  | $3^5 = \square \rightarrow$ L  | $2^6 = \square \rightarrow$ D  |
| $20^2 = \square \rightarrow$ W | $22^2 = \square \rightarrow$ O | $2^5 = \square \rightarrow$ F  | $3^4 = \square \rightarrow$ K  |
| $15^2 = \square \rightarrow$ N | $2^3 = \square \rightarrow$ S  | $12^2 = \square \rightarrow$ C | $11^2 = \square \rightarrow$ A |
| $5^2 = \square \rightarrow$ I  | $2^2 = \square \rightarrow$ R  | $6^3 = \square \rightarrow$ E  |                                |

Scratch space:

## CLUE 2 Square roots

We mapped out the square-shaped escape hatch. By finding the exact root of its area, we opened the hatch and found a clue about the suspect's helmet.

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

|    |   |    |   |    |    |   |    |    |    |    |    |    |   |    |   |    |   |    |    |
|----|---|----|---|----|----|---|----|----|----|----|----|----|---|----|---|----|---|----|----|
| T  |   |    |   |    |    |   |    | T  |    |    |    |    |   |    |   |    |   |    |    |
| 24 | 2 | 7  | 8 | 4  | 17 | 2 | 24 | 7  | 12 | 7  | 24 | 11 | 8 | 17 | 7 | 24 | 4 | 23 | 17 |
|    |   | T  |   |    |    |   |    |    |    |    |    | T  |   |    |   |    |   |    |    |
| 8  | 7 | 24 | 4 | 16 | 22 | 7 | 14 | 11 | 3  | 11 | 16 | 24 | 4 | 25 | 7 |    |   |    |    |

|                                                   |                                                   |                                                   |
|---------------------------------------------------|---------------------------------------------------|---------------------------------------------------|
| $\text{sqrt}(576) = \square \rightarrow \text{T}$ | $\text{sqrt}(16) = \square \rightarrow \text{I}$  | $\text{sqrt}(9) = \square \rightarrow \text{S}$   |
| $\text{sqrt}(625) = \square \rightarrow \text{V}$ | $\text{sqrt}(289) = \square \rightarrow \text{G}$ | $\text{sqrt}(196) = \square \rightarrow \text{W}$ |
| $\text{sqrt}(529) = \square \rightarrow \text{N}$ | $\text{sqrt}(144) = \square \rightarrow \text{Y}$ | $\text{sqrt}(49) = \square \rightarrow \text{E}$  |
| $\text{sqrt}(256) = \square \rightarrow \text{C}$ | $\text{sqrt}(121) = \square \rightarrow \text{A}$ | $\text{sqrt}(64) = \square \rightarrow \text{R}$  |
| $\text{sqrt}(4) = \square \rightarrow \text{H}$   | $\text{sqrt}(484) = \square \rightarrow \text{L}$ |                                                   |

Scratch space:

**CLUE 3**

# Pythagorean theorem

The pirate fled diagonally across the triangular hangar bay. We used the hangar's wall lengths to calculate the exact flight path and find their weakness.

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

|          |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
|----------|----|----|----|----|----|----|----|----|----|----|----|----|----|--|
| <b>M</b> |    |    |    |    |    |    |    |    |    |    |    |    |    |  |
| 68       | 65 | 75 | 82 | 41 | 51 | 17 | 13 | 10 | 74 | 29 | 58 | 41 | 58 |  |

  

|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |       |
|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|-------|
|    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |       |
| 51 | 39 | 17 | 10 | 10 | 41 | 26 | 51 | 87 | 41 | 58 | 74 | 58 | 10 | 41 | 13 | 51 | 74 10 |

legs 32 and 60, hypotenuse =  → **M**

legs 18 and 80, hypotenuse =  → **N**

legs 8 and 15, hypotenuse =  → **I**

legs 5 and 12, hypotenuse =  → **C**

legs 25 and 60, hypotenuse =  → **A**

legs 24 and 70, hypotenuse =  → **U**

legs 9 and 40, hypotenuse =  → **E**

legs 15 and 36, hypotenuse =  → **R**

legs 24 and 45, hypotenuse =  → **T**

legs 60 and 63, hypotenuse =  → **H**

legs 10 and 24, hypotenuse =  → **D**

legs 40 and 42, hypotenuse =  → **S**

legs 6 and 8, hypotenuse =  → **P**

legs 21 and 72, hypotenuse =  → **G**

legs 20 and 21, hypotenuse =  → **L**

Scratch space:

**CLUE 4**
**Order of operations**

To decode the security footage, we had to solve the control panel equations in the strict pirate order of operations. This revealed which eye they target with.

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

|          |     |    |     |     |    |    |          |    |    |    |    |     |    |    |    |  |          |
|----------|-----|----|-----|-----|----|----|----------|----|----|----|----|-----|----|----|----|--|----------|
| <b>A</b> |     |    |     |     |    |    | <b>A</b> |    |    |    |    |     |    |    |    |  | <b>A</b> |
| 33       | 101 | 9  | 117 | 105 | 35 | 11 | 33       | 45 | 45 | 51 | 51 | 105 | 56 | 30 | 30 |  | 33       |
|          |     |    |     |     |    |    |          |    |    |    |    |     |    |    |    |  |          |
| 98       | 117 | 45 | 56  | 28  | 81 | 56 | 22       | 51 |    |    |    |     |    |    |    |  |          |

$21 + 6 \times 2 = \boxed{\phantom{00}} \rightarrow \boxed{\text{A}}$

$22 + 2 \times 3 = \boxed{\phantom{00}} \rightarrow \boxed{\text{R}}$

$12 \times 9 - 10 = \boxed{\phantom{00}} \rightarrow \boxed{\text{V}}$

$1 + 7 \times 3 = \boxed{\phantom{00}} \rightarrow \boxed{\text{M}}$

$5 \times 10 - 15 = \boxed{\phantom{00}} \rightarrow \boxed{\text{T}}$

$37 + 2 \times 4 = \boxed{\phantom{00}} \rightarrow \boxed{\text{S}}$

$89 + 4 \times 4 = \boxed{\phantom{00}} \rightarrow \boxed{\text{N}}$

$8 \times 2 - 7 = \boxed{\phantom{00}} \rightarrow \boxed{\text{L}}$

$5 \times 11 - 4 = \boxed{\phantom{00}} \rightarrow \boxed{\text{E}}$

$81 + 4 \times 9 = \boxed{\phantom{00}} \rightarrow \boxed{\text{I}}$

$2 \times 8 - 5 = \boxed{\phantom{00}} \rightarrow \boxed{\text{W}}$

$16 + 7 \times 2 = \boxed{\phantom{00}} \rightarrow \boxed{\text{F}}$

$6 \times 11 - 10 = \boxed{\phantom{00}} \rightarrow \boxed{\text{O}}$

$12 \times 9 - 7 = \boxed{\phantom{00}} \rightarrow \boxed{\text{G}}$

$8 \times 12 - 15 = \boxed{\phantom{00}} \rightarrow \boxed{\text{D}}$

Scratch space:

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

We weighed the leftover plunder boxes. Solving for the unknown variable of the missing treasure revealed the culprit's final details.

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:**

$6x + 12 = 72, x = \boxed{\phantom{00}}$

$6x + 11 = 23, x = \boxed{\phantom{00}}$

$4x + 3 = 7, x = \boxed{\phantom{00}}$

$5x + 9 = 64, x = \boxed{\phantom{00}}$

$3x + 11 = 23, x = \boxed{\phantom{00}}$

$6x + 8 = 62, x = \boxed{\phantom{00}}$

$2x + 7 = 19, x = \boxed{\phantom{00}}$

$6x + 9 = 39, x = \boxed{\phantom{00}}$

$2x + 4 = 20, x = \boxed{\phantom{00}}$

$6x + 6 = 48, x = \boxed{\phantom{00}}$

$4x + 3 = 51, x = \boxed{\phantom{00}}$

**Step 2 - cross out the sentence with each answer:**

1. The villain hacks the gravity control, then leaves behind a space patch.
2. The villain swings from a solar sail, then leaves behind a space patch.
3. The villain swipes the star map, then zaps the power grid.
4. The villain swings from a solar sail, then scrambles the security drones.
5. The villain swipes the star map, then scrambles the security drones.
6. The villain overrides the bridge console, then zaps the power grid.
7. The villain hacks the gravity control, then escapes in a rocket pod.
8. The villain overrides the bridge console, then scrambles the security drones.
9. The villain swipes the star map, then disables the ship radar.
10. The villain swings from a solar sail, then escapes in a rocket pod.
11. The villain swipes the star map, then leaves behind a space patch.
12. The villain blasts through the airlock, then disables the ship radar.

# Answer Key

## The Cosmic Corsair Caper

### Culprit: Starboard Sue

gravity cannon · cybernetic eyepatch · right eye targeting · visor dome · magnetic pulses

Trail: Start 21 → Clue 1 17 → Clue 2 12 → Clue 3 7 → Clue 4 4 → Clue 5 1

#### Clue 1 (Exponents): "THE THIEF DOES NOT WEAR A STEALTH CLOAK"

$10^2 = 100$  (T) ·  $3^2 = 9$  (H) ·  $3^5 = 243$  (L) ·  $2^6 = 64$  (D) ·  $20^2 = 400$  (W) ·  $22^2 = 484$  (O) ·  $2^5 = 32$  (F) ·  $3^4 = 81$  (K) ·  $15^2 = 225$  (N) ·  $2^3 = 8$  (S) ·  $12^2 = 144$  (C) ·  $11^2 = 121$  (A) ·  $5^2 = 25$  (I) ·  $2^2 = 4$  (R) ·  $6^3 = 216$  (E)

#### Clue 2 (Square roots): "THE RIGHT EYE TARGETING RETICLE WAS ACTIVE"

$\sqrt{576} = 24$  (T) ·  $\sqrt{16} = 4$  (I) ·  $\sqrt{9} = 3$  (S) ·  $\sqrt{625} = 25$  (V) ·  $\sqrt{289} = 17$  (G) ·  $\sqrt{196} = 14$  (W) ·  $\sqrt{529} = 23$  (N) ·  $\sqrt{144} = 12$  (Y) ·  $\sqrt{49} = 7$  (E) ·  $\sqrt{256} = 16$  (C) ·  $\sqrt{121} = 11$  (A) ·  $\sqrt{64} = 8$  (R) ·  $\sqrt{4} = 2$  (H) ·  $\sqrt{484} = 22$  (L)

#### Clue 3 (Pythagorean theorem): "MAGNETIC PULSES TRIPPED THE SUSPECT UP"

legs 32 and 60, hypotenuse = 68 (M) · legs 18 and 80, hypotenuse = 82 (N) · legs 8 and 15, hypotenuse = 17 (I) · legs 5 and 12, hypotenuse = 13 (C) · legs 25 and 60, hypotenuse = 65 (A) · legs 24 and 70, hypotenuse = 74 (U) · legs 9 and 40, hypotenuse = 41 (E) · legs 15 and 36, hypotenuse = 39 (R) · legs 24 and 45, hypotenuse = 51 (T) · legs 60 and 63, hypotenuse = 87 (H) · legs 10 and 24, hypotenuse = 26 (D) · legs 40 and 42, hypotenuse = 58 (S) · legs 6 and 8, hypotenuse = 10 (P) · legs 21 and 72, hypotenuse = 75 (G) · legs 20 and 21, hypotenuse = 29 (L)

#### Clue 4 (Order of operations): "A GLINT WAS SEEN OFF A VISOR DOME"

$21 + 6 \times 2 = 33$  (A) ·  $22 + 2 \times 3 = 28$  (R) ·  $12 \times 9 - 10 = 98$  (V) ·  $1 + 7 \times 3 = 22$  (M) ·  $5 \times 10 - 15 = 35$  (T) ·  $37 + 2 \times 4 = 45$  (S) ·  $89 + 4 \times 4 = 105$  (N) ·  $8 \times 2 - 7 = 9$  (L) ·  $5 \times 11 - 4 = 51$  (E) ·  $81 + 4 \times 9 = 117$  (I) ·  $2 \times 8 - 5 = 11$  (W) ·  $16 + 7 \times 2 = 30$  (F) ·  $6 \times 11 - 10 = 56$  (O) ·  $12 \times 9 - 7 = 101$  (G) ·  $8 \times 12 - 15 = 81$  (D)

#### Clue 5 (Two-step equations): surviving statement is box 3 → Starboard Sue

$6x + 12 = 72, x = 10$  ·  $6x + 11 = 23, x = 2$  ·  $4x + 3 = 7, x = 1$  ·  $5x + 9 = 64, x = 11$  ·  $3x + 11 = 23, x = 4$  ·  $6x + 8 = 62, x = 9$  ·  $2x + 7 = 19, x = 6$  ·  $6x + 9 = 39, x = 5$  ·  $2x + 4 = 20, x = 8$  ·  $6x + 6 = 48, x = 7$  ·  $4x + 3 = 51, x = 12$