



# The Kepler Prime Sabotage

Grade 8 math · Exponents, Square roots, Pythagorean theorem, Order of operations, Two-step equations · Reading level grades 7-9

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

A rogue pilot has disabled the primary shield generator at Kepler Prime! With an asteroid shower closing in, we must analyze local telemetry and identify the saboteur before our life support systems fail.

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 stellar saboteur is** \_\_\_\_\_

## Possible suspects

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

| NAME                 | PRIMARY THRUSTER     | AUXILIARY GEAR        | FLIGHT DECK HABIT          | VISOR TINT            | SENSOR VULNERABILITY      |
|----------------------|----------------------|-----------------------|----------------------------|-----------------------|---------------------------|
| Mae Jemison          | fusion impulse drive | gravity anchor beam   | left handed joystick grip  | deep cobalt sheen     | magnetic pulse disruption |
| Scott Kelly          | antimatter plasma    | gravity anchor beam   | right handed joystick grip | deep cobalt sheen     | subzero thermal shock     |
| Buzz Aldrin          | fusion impulse drive | cloaking light bender | left handed joystick grip  | emerald green glare   | subzero thermal shock     |
| Kalpana Chawla       | solar sail rig       | gravity anchor beam   | left handed joystick grip  | deep cobalt sheen     | magnetic pulse disruption |
| Valentina Tereshkova | antimatter plasma    | nanotech repair swarm | left handed joystick grip  | emerald green glare   | magnetic pulse disruption |
| Sally Ride           | fusion impulse drive | gravity anchor beam   | right handed joystick grip | amber gold reflection | magnetic pulse disruption |
| Sunita Williams      | dark energy booster  | plasma cutter torch   | left handed joystick grip  | emerald green glare   | magnetic pulse disruption |
| Katherine Johnson    | dark energy booster  | stasis field emitter  | left handed joystick grip  | amber gold reflection | magnetic pulse disruption |
| Ellen Ochoa          | dark energy booster  | nanotech repair swarm | right handed joystick grip | emerald green glare   | subzero thermal shock     |
| Franklin Chang Diaz  | fusion impulse drive | stasis field emitter  | left handed joystick grip  | emerald green glare   | subzero thermal shock     |
| Michael Collins      | dark energy booster  | nanotech repair swarm | left handed joystick grip  | deep cobalt sheen     | subzero thermal shock     |
| Margaret Hamilton    | fusion impulse drive | stasis field emitter  | left handed joystick grip  | emerald green glare   | magnetic pulse disruption |
| Roberta Bondar       | solar sail rig       | nanotech repair swarm | left handed joystick grip  | emerald green glare   | magnetic pulse disruption |
| Guion Bluford        | solar sail rig       | gravity anchor beam   | left handed joystick grip  | amber gold reflection | subzero thermal shock     |
| Charles Bolden       | fusion impulse drive | stasis field emitter  | left handed joystick grip  | deep cobalt sheen     | cosmic microwave static   |
| Bernard Harris       | fusion impulse drive | stasis field emitter  | right handed joystick grip | deep cobalt sheen     | magnetic pulse disruption |
| John Glenn           | fusion impulse drive | cloaking light bender | left handed joystick grip  | emerald green glare   | magnetic pulse disruption |
| Neil Armstrong       | dark energy booster  | gravity anchor beam   | right handed joystick grip | amber gold reflection | magnetic pulse disruption |
| Alan Shepard         | antimatter plasma    | gravity anchor beam   | right handed joystick grip | emerald green glare   | cosmic microwave static   |
| Joan Higginbotham    | solar sail rig       | stasis field emitter  | right handed joystick grip | emerald green glare   | magnetic pulse disruption |
| Peggy Whitson        | dark energy booster  | gravity anchor beam   | left handed joystick grip  | emerald green glare   | subzero thermal shock     |

## CLUE 1 Exponents

Our subspace sensors logged an energy reading that grows exponentially. Calculate the base power value to unlock the first terminal log.

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

|     |     |    |     |     |     |     |     |     |     |     |     |    |     |     |     |     |  |   |
|-----|-----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|-----|-----|-----|-----|--|---|
| T   |     |    |     |     |     |     |     | T   |     |     |     |    |     |     |     |     |  | T |
| 361 | 324 | 25 | 243 | 144 | 125 | 144 | 361 | 256 | 27  | 121 | 256 | 25 | 125 | 625 | 256 | 361 |  |   |
|     |     |    |     |     |     |     |     |     |     |     |     |    |     |     |     |     |  |   |
|     |     |    |     |     |     |     |     |     |     |     |     |    |     |     |     |     |  |   |
| 9   | 125 | 25 | 289 | 216 | 256 | 400 | 729 | 144 | 625 | 36  | 361 | 25 | 289 | 324 |     |     |  |   |

|                                       |                                       |                                       |                                       |
|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| $19^2 = \square \rightarrow \text{T}$ | $3^5 = \square \rightarrow \text{V}$  | $3^3 = \square \rightarrow \text{R}$  | $4^4 = \square \rightarrow \text{O}$  |
| $6^3 = \square \rightarrow \text{L}$  | $9^3 = \square \rightarrow \text{K}$  | $5^3 = \square \rightarrow \text{S}$  | $5^4 = \square \rightarrow \text{N}$  |
| $5^2 = \square \rightarrow \text{E}$  | $11^2 = \square \rightarrow \text{D}$ | $3^2 = \square \rightarrow \text{U}$  | $6^2 = \square \rightarrow \text{G}$  |
| $18^2 = \square \rightarrow \text{H}$ | $17^2 = \square \rightarrow \text{C}$ | $20^2 = \square \rightarrow \text{A}$ | $12^2 = \square \rightarrow \text{I}$ |

Scratch space:

## CLUE 2 Square roots

The runaway vessel carved a square-shaped ion path through our grid. Find the square root of the total area to determine their flight speed.

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

|    |    |    |    |    |    |    |    |    |    |    |   |    |    |    |    |   |   |  |
|----|----|----|----|----|----|----|----|----|----|----|---|----|----|----|----|---|---|--|
| T  |    |    |    |    |    |    |    |    |    | T  |   |    |    | T  |    |   |   |  |
| 11 | 3  | 15 | 25 | 2  | 25 | 24 | 23 | 20 | 11 | 25 | 2 | 21 | 11 | 13 | 2  | 8 | 5 |  |
|    |    |    |    |    |    |    |    |    |    |    |   |    | T  |    |    |   |   |  |
| 18 | 15 | 13 | 15 | 10 | 13 | 20 | 23 | 23 | 15 | 12 | 9 | 4  | 11 | 3  | 15 |   |   |  |
|    |    |    | T  |    |    |    |    |    |    |    |   |    |    |    |    |   |   |  |
| 8  | 15 | 6  | 11 |    |    |    |    |    |    |    |   |    |    |    |    |   |   |  |

|                                             |                                             |                                             |
|---------------------------------------------|---------------------------------------------|---------------------------------------------|
| $\sqrt{121} = \square \rightarrow$ <b>T</b> | $\sqrt{529} = \square \rightarrow$ <b>P</b> | $\sqrt{16} = \square \rightarrow$ <b>Y</b>  |
| $\sqrt{441} = \square \rightarrow$ <b>N</b> | $\sqrt{169} = \square \rightarrow$ <b>R</b> | $\sqrt{81} = \square \rightarrow$ <b>B</b>  |
| $\sqrt{4} = \square \rightarrow$ <b>O</b>   | $\sqrt{144} = \square \rightarrow$ <b>D</b> | $\sqrt{225} = \square \rightarrow$ <b>E</b> |
| $\sqrt{625} = \square \rightarrow$ <b>C</b> | $\sqrt{100} = \square \rightarrow$ <b>G</b> | $\sqrt{400} = \square \rightarrow$ <b>I</b> |
| $\sqrt{64} = \square \rightarrow$ <b>L</b>  | $\sqrt{324} = \square \rightarrow$ <b>W</b> | $\sqrt{576} = \square \rightarrow$ <b>K</b> |
| $\sqrt{25} = \square \rightarrow$ <b>S</b>  | $\sqrt{9} = \square \rightarrow$ <b>H</b>   | $\sqrt{36} = \square \rightarrow$ <b>F</b>  |

Scratch space:

### CLUE 3 Pythagorean theorem

We need to plot an intercept vector. Calculate the diagonal path of their escape using the Pythagorean theorem with our station coordinates.

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

39 87 75 51 5 52 40 13 37 50 82 10 5 10 25 50 39 37 5 68

52 41 5 37 40 15 87 52 5 10 10 41 40 5 82 68

legs 15 and 36, hypotenuse =  → **M**

legs 5 and 12, hypotenuse =   $\rightarrow$  **C**

legs 3 and 4, hypotenuse =  → **E**

legs 12 and 35, hypotenuse =  → **P**

legs 18 and 80, hypotenuse =  → **L**

legs 30 and 40, hypotenuse =   $\rightarrow$  **U**

legs 15 and 20, hypotenuse =  → **J**

legs 9 and 12, hypotenuse =  → **R**

legs 9 and 40, hypotenuse =  → **H**

legs 6 and 8, hypotenuse =  → **S**

legs 60 and 63, hypotenuse =  → **A**

legs 21 and 72, hypotenuse =  → **G**

legs 20 and 48, hypotenuse =   $\rightarrow$  **T**

legs 24 and 32, hypotenuse =   $\rightarrow$

legs 24 and 45, hypotenuse =  → **N**

legs 32 and 60, hypotenuse =  → **D**

Scratch space:

## CLUE 4 Order of operations

The saboteur left a scrambled override code. Solve this arithmetic sequence using the proper order of operations to reveal their ship's registry.

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

|    |    |    |    |     |    |    |    |    |    |    |    |    |     |    |    |    |    |    |
|----|----|----|----|-----|----|----|----|----|----|----|----|----|-----|----|----|----|----|----|
| T  |    |    |    |     |    |    |    |    |    |    |    |    |     |    |    |    |    |    |
| 92 | 25 | 85 | 85 | 12  | 72 | 79 | 81 | 85 | 79 | 64 | 28 | 73 | 36  | 72 | 53 | 25 | 79 | 49 |
|    |    |    |    |     |    |    |    |    |    | T  |    |    |     |    |    |    |    |    |
| 44 | 28 | 85 | 85 | 116 | 25 | 85 | 73 | 34 | 85 | 92 | 12 | 72 | 119 | 63 | 63 | 12 |    |    |

$$47 + 9 \times 5 = \boxed{\phantom{00}} \rightarrow \boxed{\text{T}}$$

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

$$63 + 2 \times 5 = \boxed{\phantom{00}} \rightarrow \boxed{\text{L}}$$

$$22 + 3 \times 9 = \boxed{\phantom{00}} \rightarrow \boxed{\text{D}}$$

$$11 \times 6 - 2 = \boxed{\phantom{00}} \rightarrow \boxed{\text{I}}$$

$$1 + 5 \times 7 = \boxed{\phantom{00}} \rightarrow \boxed{\text{O}}$$

$$11 \times 8 - 9 = \boxed{\phantom{00}} \rightarrow \boxed{\text{A}}$$

$$26 + 9 \times 2 = \boxed{\phantom{00}} \rightarrow \boxed{\text{G}}$$

$$11 + 2 \times 7 = \boxed{\phantom{00}} \rightarrow \boxed{\text{H}}$$

$$58 + 9 \times 3 = \boxed{\phantom{00}} \rightarrow \boxed{\text{E}}$$

$$11 \times 8 - 7 = \boxed{\phantom{00}} \rightarrow \boxed{\text{P}}$$

$$13 + 5 \times 8 = \boxed{\phantom{00}} \rightarrow \boxed{\text{K}}$$

$$71 + 8 \times 6 = \boxed{\phantom{00}} \rightarrow \boxed{\text{U}}$$

$$55 + 2 \times 4 = \boxed{\phantom{00}} \rightarrow \boxed{\text{F}}$$

$$2 + 5 \times 2 = \boxed{\phantom{00}} \rightarrow \boxed{\text{S}}$$

$$12 \times 11 - 16 = \boxed{\phantom{00}} \rightarrow \boxed{\text{N}}$$

$$4 \times 10 - 6 = \boxed{\phantom{00}} \rightarrow \boxed{\text{M}}$$

$$7 \times 6 - 14 = \boxed{\phantom{00}} \rightarrow \boxed{\text{R}}$$

Scratch space:

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

A damaged fuel capsule is losing pressure at a constant rate. Solve this two-step equation to find the exact minute the saboteur launched.

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:**

$3x + 9 = 30, x = \boxed{\phantom{00}}$

$2x + 11 = 31, x = \boxed{\phantom{00}}$

$6x + 2 = 68, x = \boxed{\phantom{00}}$

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

$2x + 9 = 33, x = \boxed{\phantom{00}}$

$2x + 3 = 11, x = \boxed{\phantom{00}}$

$3x + 4 = 28, x = \boxed{\phantom{00}}$

$3x + 9 = 27, x = \boxed{\phantom{00}}$

$2x + 9 = 27, x = \boxed{\phantom{00}}$

$5x + 4 = 9, x = \boxed{\phantom{00}}$

$2x + 4 = 10, x = \boxed{\phantom{00}}$

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

1. The villain scrambled the lunar mapping beacon, then slipped into the dark nebula.
2. The villain overloaded the station hyperdrive, then escaped through the asteroid field.
3. The villain hacked the orbital defense grid, then hid behind the Martian moons.
4. The villain drained the solar power array, then fled toward the Jupiter outpost.
5. The villain overloaded the station hyperdrive, then hid behind the Martian moons.
6. The villain overloaded the station hyperdrive, then warped into the outer system.
7. The villain drained the solar power array, then slipped into the dark nebula.
8. The villain drained the solar power array, then hid behind the Martian moons.
9. The villain scrambled the lunar mapping beacon, then escaped through the asteroid field.
10. The villain scrambled the lunar mapping beacon, then warped into the outer system.
11. The villain vented the oxygen reserve tanks, then warped into the outer system.
12. The villain hacked the orbital defense grid, then escaped through the asteroid field.

# Answer Key

## The Kepler Prime Sabotage

### Culprit: Margaret Hamilton

fusion impulse drive · stasis field emitter · left handed joystick grip · emerald green glare · magnetic pulse disruption

Trail: Start 21 → Clue 1 19 → Clue 2 12 → Clue 3 7 → Clue 4 4 → Clue 5 1

### Clue 1 (Exponents): "THE VISITOR DOES NOT USE CLOAKING TECH"

$19^2 = 361$  (T) ·  $3^5 = 243$  (V) ·  $3^3 = 27$  (R) ·  $4^4 = 256$  (O) ·  $6^3 = 216$  (L) ·  $9^3 = 729$  (K) ·  $5^3 = 125$  (S) ·  $5^4 = 625$  (N) ·  $5^2 = 25$  (E) ·  $11^2 = 121$  (D) ·  $3^2 = 9$  (U) ·  $6^2 = 36$  (G) ·  $18^2 = 324$  (H) ·  $17^2 = 289$  (C) ·  $20^2 = 400$  (A) ·  $12^2 = 144$  (I)

### Clue 2 (Square roots): "THE COCKPIT CONTROLS WERE GRIPPED BY THE LEFT"

$\sqrt{121} = 11$  (T) ·  $\sqrt{529} = 23$  (P) ·  $\sqrt{16} = 4$  (Y) ·  $\sqrt{441} = 21$  (N) ·  $\sqrt{169} = 13$  (R) ·  $\sqrt{81} = 9$  (B) ·  $\sqrt{4} = 2$  (O) ·  $\sqrt{144} = 12$  (D) ·  $\sqrt{225} = 15$  (E) ·  $\sqrt{625} = 25$  (C) ·  $\sqrt{100} = 10$  (G) ·  $\sqrt{400} = 20$  (I) ·  $\sqrt{64} = 8$  (L) ·  $\sqrt{324} = 18$  (W) ·  $\sqrt{576} = 24$  (K) ·  $\sqrt{25} = 5$  (S) ·  $\sqrt{9} = 3$  (H) ·  $\sqrt{36} = 6$  (F)

### Clue 3 (Pythagorean theorem): "MAGNETIC PULSES JUMPED THE PIRATES SHIELD"

legs 15 and 36, hypotenuse = 39 (M) · legs 5 and 12, hypotenuse = 13 (C) · legs 3 and 4, hypotenuse = 5 (E) · legs 12 and 35, hypotenuse = 37 (P) · legs 18 and 80, hypotenuse = 82 (L) · legs 30 and 40, hypotenuse = 50 (U) · legs 15 and 20, hypotenuse = 25 (J) · legs 9 and 12, hypotenuse = 15 (R) · legs 9 and 40, hypotenuse = 41 (H) · legs 6 and 8, hypotenuse = 10 (S) · legs 60 and 63, hypotenuse = 87 (A) · legs 21 and 72, hypotenuse = 75 (G) · legs 20 and 48, hypotenuse = 52 (T) · legs 24 and 32, hypotenuse = 40 (I) · legs 24 and 45, hypotenuse = 51 (N) · legs 32 and 60, hypotenuse = 68 (D)

### Clue 4 (Order of operations): "THE ESCAPE AIRLOCK HAD GREEN HELMET SCUFFS"

$47 + 9 \times 5 = 92$  (T) ·  $12 \times 7 - 12 = 72$  (C) ·  $63 + 2 \times 5 = 73$  (L) ·  $22 + 3 \times 9 = 49$  (D) ·  $11 \times 6 - 2 = 64$  (I) ·  $1 + 5 \times 7 = 36$  (O) ·  $11 \times 8 - 9 = 79$  (A) ·  $26 + 9 \times 2 = 44$  (G) ·  $11 + 2 \times 7 = 25$  (H) ·  $58 + 9 \times 3 = 85$  (E) ·  $11 \times 8 - 7 = 81$  (P) ·  $13 + 5 \times 8 = 53$  (K) ·  $71 + 8 \times 6 = 119$  (U) ·  $55 + 2 \times 4 = 63$  (F) ·  $2 + 5 \times 2 = 12$  (S) ·  $12 \times 11 - 16 = 116$  (N) ·  $4 \times 10 - 6 = 34$  (M) ·  $7 \times 6 - 14 = 28$  (R)

### Clue 5 (Two-step equations): surviving statement is box 2 → Margaret Hamilton

$3x + 9 = 30, x = 7$  ·  $2x + 11 = 31, x = 10$  ·  $6x + 2 = 68, x = 11$  ·  $6x + 9 = 39, x = 5$  ·  $2x + 9 = 33, x = 12$  ·  $2x + 3 = 11, x = 4$  ·  $3x + 4 = 28, x = 8$  ·  $3x + 9 = 27, x = 6$  ·  $2x + 9 = 27, x = 9$  ·  $5x + 4 = 9, x = 1$  ·  $2x + 4 = 10, x = 3$