



The Kepler Outpost Heist

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

Detective: _____ Date: _____

A rogue traveler has breached the secure vault at Kepler Outpost and stolen the experimental star charts! As the lead forensic officer, you must analyze the high-tech gear, trace physical evidence, and use mathematical coordinates to identify the culprit before their escape shuttle launches into deep space.

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 cosmic bandit is _____

Possible suspects

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

NAME	PRIMARY GEAR	INFILTRATION TOOL	PHYSICAL TELL	HELMET HAIR CLUE	SYSTEM VULNERABILITY
Fred Haise	magnetic gloves	hacking pad	right-handed grip	neon blue dye	copper wiring
Valentina Tereshkova	jetpack thruster	oxygen siphon	right-handed grip	silver strands	copper wiring
Al Worden	gravity boots	stealth cloak	left-handed grip	silver strands	cold vacuum
Jack Swigert	gravity boots	oxygen siphon	right-handed grip	jet black locks	copper wiring
Buzz Aldrin	laser visor	EMP grenade	right-handed grip	jet black locks	cold vacuum
Chris Hadfield	plasma cutter	EMP grenade	left-handed grip	silver strands	cold vacuum
Arthur Clarke	laser visor	oxygen siphon	left-handed grip	jet black locks	cold vacuum
Sally Ride	magnetic gloves	oxygen siphon	left-handed grip	silver strands	cold vacuum
Edwin Hubble	gravity boots	EMP grenade	left-handed grip	silver strands	cold vacuum
Neil Armstrong	jetpack thruster	oxygen siphon	left-handed grip	silver strands	cold vacuum
Carl Sagan	magnetic gloves	oxygen siphon	right-handed grip	jet black locks	cold vacuum
Vera Rubin	magnetic gloves	EMP grenade	left-handed grip	jet black locks	cold vacuum
Michael Collins	laser visor	stealth cloak	left-handed grip	neon blue dye	copper wiring
Henrietta Leavitt	magnetic gloves	signal jammer	left-handed grip	silver strands	copper wiring
Stephen Hawking	plasma cutter	stealth cloak	right-handed grip	silver strands	cold vacuum
Isaac Asimov	jetpack thruster	hacking pad	right-handed grip	silver strands	copper wiring
John Glenn	laser visor	signal jammer	left-handed grip	jet black locks	copper wiring
Mae Jemison	laser visor	stealth cloak	right-handed grip	silver strands	copper wiring
Alan Shepard	plasma cutter	EMP grenade	right-handed grip	silver strands	cold vacuum
Tycho Brahe	gravity boots	signal jammer	left-handed grip	silver strands	solar flares
Peggy Whitson	jetpack thruster	EMP grenade	left-handed grip	silver strands	cold vacuum

CLUE 1

To trace the cosmic bandit's escape vector, you must calculate the diagonal distance between the hangar bay and the solar array. Solve this right-triangle problem to unlock the first secure database file.

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

15 26 85 65 10 29 123 87 15 123 30 85 74 29 30 15 25 74 85

10 29 30 5 82 41 85 29 74 87 17 26 30 29

legs 9 and 12, hypotenuse = $\rightarrow$ **T**

legs 7 and 24, hypotenuse = → **U**

legs 18 and 80, hypotenuse = $\rightarrow$ **Y**

legs 18 and 24, hypotenuse = →

legs 9 and 40, hypotenuse = → **G**

legs 6 and 8, hypotenuse = → **A**

legs 40 and 75, hypotenuse = → **E**

legs 8 and 15, hypotenuse = → **P**

legs 3 and 4, hypotenuse = → **X**

legs 25 and 60, hypotenuse = → **B**

legs 20 and 21, hypotenuse = → **N**

legs 60 and 63, hypotenuse = $\rightarrow$

legs 27 and 120, hypotenuse = $\rightarrow$ **D**

legs 24 and 70, hypotenuse = → **S**

legs 10 and 24, hypotenuse = $\rightarrow$ **H**

Scratch space:

CLUE 2 Square roots

The communications array needs its frequency square-rooted to bypass the bandit's jammer. Crack this root to isolate the signal and find the next clue.

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

L																
5	7	18	9	21	24	3	22	7	22	19	4	25	3	9	14	3
9	21	7	16	14	3	9	4	14	L							

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

$$\sqrt{484} = \square \rightarrow \boxed{\text{D}}$$

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

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

$$\sqrt{441} = \square \rightarrow \boxed{\text{H}}$$

$$\sqrt{16} = \square \rightarrow \boxed{\text{R}}$$

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

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

$$\sqrt{196} = \square \rightarrow \boxed{\text{O}}$$

$$\sqrt{9} = \square \rightarrow \boxed{\text{N}}$$

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

$$\sqrt{324} = \square \rightarrow \boxed{\text{F}}$$

$$\sqrt{256} = \square \rightarrow \boxed{\text{C}}$$

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

Scratch space:

CLUE 3 Exponents

The backup reactor's energy levels are multiplying exponentially. Find the base value of this power surge to safely download the security footage.

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

F													
484	36	243	243	100	121	343	128	729	216	400	4	4	196

324	216	196	441	243	343	25	49	125	36	4	25	49	243

$22^2 = \square \rightarrow \mathbf{F}$	$20^2 = \square \rightarrow \mathbf{C}$	$11^2 = \square \rightarrow \mathbf{I}$	$7^3 = \square \rightarrow \mathbf{N}$
$3^5 = \square \rightarrow \mathbf{E}$	$6^2 = \square \rightarrow \mathbf{R}$	$21^2 = \square \rightarrow \mathbf{P}$	$5^3 = \square \rightarrow \mathbf{H}$
$5^2 = \square \rightarrow \mathbf{S}$	$6^3 = \square \rightarrow \mathbf{A}$	$7^2 = \square \rightarrow \mathbf{T}$	$14^2 = \square \rightarrow \mathbf{M}$
$2^2 = \square \rightarrow \mathbf{U}$	$18^2 = \square \rightarrow \mathbf{D}$	$10^2 = \square \rightarrow \mathbf{Z}$	$9^3 = \square \rightarrow \mathbf{V}$
$2^7 = \square \rightarrow \mathbf{G}$			

Scratch space:

CLUE 4
Order of operations

The auxiliary computer is locked behind a strict math sequence. Solve this multi-step equation using the proper order of operations to boot up the system.

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

S										S					
77	95	45	54	104	35	47	115	95	35	77	33	35	115	103	118
38	115	51	58	47	33	95	103	33	47	104	45	53	38	41	

$8 \times 12 - 19 = \square \rightarrow \text{S}$

$19 + 7 \times 2 = \square \rightarrow \text{T}$

$11 \times 10 - 7 = \square \rightarrow \text{N}$

$11 \times 12 - 17 = \square \rightarrow \text{A}$

$29 + 2 \times 8 = \square \rightarrow \text{L}$

$5 \times 12 - 22 = \square \rightarrow \text{C}$

$12 \times 4 - 1 = \square \rightarrow \text{H}$

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

$5 + 4 \times 9 = \square \rightarrow \text{K}$

$12 \times 6 - 19 = \square \rightarrow \text{O}$

$59 + 4 \times 9 = \square \rightarrow \text{I}$

$33 + 7 \times 3 = \square \rightarrow \text{V}$

$19 + 4 \times 8 = \square \rightarrow \text{U}$

$22 + 9 \times 4 = \square \rightarrow \text{G}$

$11 \times 11 - 17 = \square \rightarrow \text{E}$

$10 \times 5 - 15 = \square \rightarrow \text{R}$

Scratch space:

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

The gravity grid has a safety lock determined by the square root of the hangar's area. Calculate this value to open the hangar doors and corner the suspect.

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:

$\text{sqrt}(16) = \boxed{}$

$\text{sqrt}(25) = \boxed{}$

$\text{sqrt}(36) = \boxed{}$

$\text{sqrt}(81) = \boxed{}$

$\text{sqrt}(100) = \boxed{}$

$\text{sqrt}(9) = \boxed{}$

$\text{sqrt}(49) = \boxed{}$

$\text{sqrt}(121) = \boxed{}$

$\text{sqrt}(144) = \boxed{}$

$\text{sqrt}(64) = \boxed{}$

$\text{sqrt}(1) = \boxed{}$

Step 2 - cross out the sentence with each answer:

1. The villain charges the laser visor, then siphons off reserve air using the oxygen siphon.
2. The villain overrides the gravity boots, then disables the main grid using the EMP grenade.
3. The villain engages the magnetic gloves, then siphons off reserve air using the oxygen siphon.
4. The villain overrides the gravity boots, then vanishes into the vents using the stealth cloak.
5. The villain activates the jetpack thruster, then disables the main grid using the EMP grenade.
6. The villain ignites the plasma cutter, then disables the main grid using the EMP grenade.
7. The villain engages the magnetic gloves, then cuts off communications using the signal jammer.
8. The villain activates the jetpack thruster, then decodes the vault using the hacking pad.
9. The villain engages the magnetic gloves, then decodes the vault using the hacking pad.
10. The villain overrides the gravity boots, then cuts off communications using the signal jammer.
11. The villain ignites the plasma cutter, then vanishes into the vents using the stealth cloak.
12. The villain ignites the plasma cutter, then decodes the vault using the hacking pad.

Answer Key

The Kepler Outpost Heist

Culprit: Edwin Hubble

gravity boots · EMP grenade · left-handed grip · silver strands · cold vacuum

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

Clue 1 (Pythagorean theorem): "THE BANDIT DOES NOT USE AN OXYGEN SIPHON"

legs 9 and 12, hypotenuse = 15 (T) · legs 7 and 24, hypotenuse = 25 (U) · legs 18 and 80, hypotenuse = 82 (Y) · legs 18 and 24, hypotenuse = 30 (O) · legs 9 and 40, hypotenuse = 41 (G) · legs 6 and 8, hypotenuse = 10 (A) · legs 40 and 75, hypotenuse = 85 (E) · legs 8 and 15, hypotenuse = 17 (P) · legs 3 and 4, hypotenuse = 5 (X) · legs 25 and 60, hypotenuse = 65 (B) · legs 20 and 21, hypotenuse = 29 (N) · legs 60 and 63, hypotenuse = 87 (I) · legs 27 and 120, hypotenuse = 123 (D) · legs 24 and 70, hypotenuse = 74 (S) · legs 10 and 24, hypotenuse = 26 (H)

Clue 2 (Square roots): "LEFT HANDED PRINT ON THE CONTROLS"

$\sqrt{25} = 5$ (L) · $\sqrt{484} = 22$ (D) · $\sqrt{625} = 25$ (I) · $\sqrt{576} = 24$ (A) · $\sqrt{441} = 21$ (H) · $\sqrt{16} = 4$ (R) · $\sqrt{81} = 9$ (T) · $\sqrt{49} = 7$ (E) · $\sqrt{196} = 14$ (O) · $\sqrt{9} = 3$ (N) · $\sqrt{100} = 10$ (S) · $\sqrt{324} = 18$ (F) · $\sqrt{256} = 16$ (C) · $\sqrt{361} = 19$ (P)

Clue 3 (Exponents): "FREEZING VACUUM DAMPENS THRUSTERS"

$22^2 = 484$ (F) · $20^2 = 400$ (C) · $11^2 = 121$ (I) · $7^3 = 343$ (N) · $3^5 = 243$ (E) · $6^2 = 36$ (R) · $21^2 = 441$ (P) · $5^3 = 125$ (H) · $5^2 = 25$ (S) · $6^3 = 216$ (A) · $7^2 = 49$ (T) · $14^2 = 196$ (M) · $2^2 = 4$ (U) · $18^2 = 324$ (D) · $10^2 = 100$ (Z) · $9^3 = 729$ (V) · $2^7 = 128$ (G)

Clue 4 (Order of operations): "SILVER HAIR STRAND CAUGHT IN THE LOCK"

$8 \times 12 - 19 = 77$ (S) · $19 + 7 \times 2 = 33$ (T) · $11 \times 10 - 7 = 103$ (N) · $11 \times 12 - 17 = 115$ (A) · $29 + 2 \times 8 = 45$ (L) · $5 \times 12 - 22 = 38$ (C) · $12 \times 4 - 1 = 47$ (H) · $11 \times 11 - 3 = 118$ (D) · $5 + 4 \times 9 = 41$ (K) · $12 \times 6 - 19 = 53$ (O) · $59 + 4 \times 9 = 95$ (I) · $33 + 7 \times 3 = 54$ (V) · $19 + 4 \times 8 = 51$ (U) · $22 + 9 \times 4 = 58$ (G) · $11 \times 11 - 17 = 104$ (E) · $10 \times 5 - 15 = 35$ (R)

Clue 5 (Square roots): surviving statement is box 2 → Edwin Hubble

$\sqrt{16} = 4$ · $\sqrt{25} = 5$ · $\sqrt{36} = 6$ · $\sqrt{81} = 9$ · $\sqrt{100} = 10$ · $\sqrt{9} = 3$ · $\sqrt{49} = 7$ · $\sqrt{121} = 11$ · $\sqrt{144} = 12$ · $\sqrt{64} = 8$ · $\sqrt{1} = 1$