



The Case of the Missing Star Compass

Grade 4 math · Multiplication, Fractions of a number, Word problems, Bar models · Reading level grades 3-4

Detective: _____ **Date:** _____

The Golden Star Compass has vanished from the main observatory. This special map guide is the only way to navigate the dark asteroid belt. Chief Astronomer Orion needs the Galaxy Patrol to track down the thief before they escape 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 Rogue Ranger 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	SECONDARY TECH	DOMINANT HAND	VISOR COLOR	SENSOR GLITCH
Guy Bluford	asteroid mining	plasma blasting	right-handed	blue visor	solar wind
Yuri Gagarin	solar charging	nebula hiding	right-handed	blue visor	ice crystals
Buzz Aldrin	rocket boosting	comet chasing	left-handed	silver visor	ice crystals
Ellen Ochoa	rocket boosting	radar jamming	right-handed	silver visor	cosmic dust
Al Worden	laser steering	radar jamming	left-handed	gold visor	ice crystals
Scott Kelly	laser steering	nebula hiding	left-handed	silver visor	ice crystals
Harrison Schmitt	gravity warping	nebula hiding	left-handed	silver visor	cosmic dust
Chris Hadfield	solar charging	comet chasing	left-handed	silver visor	ice crystals
Alan Shepard	laser steering	comet chasing	left-handed	silver visor	ice crystals
Jim Lovell	asteroid mining	nebula hiding	right-handed	silver visor	cosmic dust
Neil Armstrong	gravity warping	radar jamming	right-handed	gold visor	cosmic dust
Kalpana Chawla	gravity warping	plasma blasting	left-handed	blue visor	ice crystals
Mark Kelly	laser steering	radar jamming	right-handed	silver visor	ice crystals
Katherine Johnson	asteroid mining	shield building	left-handed	silver visor	ice crystals
Valentina Tereshkova	gravity warping	shield building	left-handed	blue visor	cosmic dust
Pete Conrad	gravity warping	shield building	right-handed	gold visor	ice crystals
Ed White	asteroid mining	nebula hiding	left-handed	blue visor	ice crystals
Gene Cernan	rocket boosting	comet chasing	left-handed	silver visor	solar wind
Peggy Whitson	solar charging	shield building	right-handed	blue visor	cosmic dust
John Glenn	asteroid mining	radar jamming	left-handed	blue visor	solar wind
Michael Collins	laser steering	nebula hiding	right-handed	blue visor	cosmic dust

CLUE 1 Multiplication facts (1-12)

The space station hangar has neat rows of starships. We count the booster engines by multiplying the rows to find a hidden log.

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

4 81 30 63 121 77 77 3 121 66 99 55 30 144 66 55 4

9 144 30 66 30 28 9 77 3 81 121 99 121 66 44

$$4 \times 1 = \boxed{} \rightarrow \boxed{\text{T}}$$

$$11 \times 11 = \boxed{} \rightarrow \boxed{1}$$

$$7 \times 9 = \boxed{} \rightarrow \boxed{\mathbf{v}}$$

$$5 \times 11 = \boxed{} \rightarrow \boxed{0}$$

$9 \times 11 = \boxed{} \rightarrow \boxed{\text{D}}$

$11 \times 7 = \square \rightarrow \boxed{\text{L}}$

$4 \times 7 = \boxed{} \rightarrow \boxed{\mathbf{B}}$

$10 \times 3 = \boxed{} \rightarrow \boxed{\text{E}}$

$$3 \times 3 = \boxed{} \rightarrow \boxed{\mathbf{U}}$$

$3 \times 1 = \boxed{} \rightarrow \boxed{\mathbf{A}}$

$9 \times 9 = \square \rightarrow \boxed{\text{H}}$

$$6 \times 11 = \boxed{} \rightarrow \boxed{\text{N}}$$

$11 \times 4 = \boxed{} \rightarrow \boxed{\mathbf{G}}$

$12 \times 12 = \boxed{} \rightarrow \boxed{\mathbf{S}}$

Scratch space:

Fractions of a number

The crew divides a large box of space rations into equal fractional shares to see how much energy the intruder stole.

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

A 2x15 grid of boxes. The top row contains the following sequence: an orange box with 'T', three empty boxes, an orange box with 'T', three empty boxes, an orange box with 'T', three empty boxes, and three empty boxes. The bottom row contains: four empty boxes, an orange box with 'T', three empty boxes, an orange box with 'T', four empty boxes, and three empty boxes.

T															
23	32	20	6	18	6	11	20	14	23	7	4	3	23	20	23
14	3	21	20	7	36	23	32	40	20	12	23	32	35	2	21

$\frac{1}{3}$ of 69 = $\rightarrow$ **T**

8/10 of 40 = → **H**

$$4/8 \text{ of } 8 = \boxed{} \rightarrow \boxed{\text{R}}$$

$4/8$ of $70 = \square \rightarrow \mathbf{A}$

$$\frac{1}{2} \text{ of } 36 = \boxed{} \rightarrow \boxed{\text{U}}$$

$2/5$ of 30 = $\rightarrow$ **F**

$$2/5 \text{ of } 100 = \boxed{} \rightarrow \boxed{\text{L}}$$

$$2/3 \text{ of } 30 = \boxed{} \rightarrow \boxed{\text{E}}$$

$$\frac{1}{4} \text{ of } 44 = \boxed{} \rightarrow \boxed{\text{P}}$$

7/10 of 10 = $\rightarrow$ **W**

$1/10$ of 140 = $\rightarrow$ **C**

$$\frac{1}{2} \text{ of } 12 = \boxed{} \rightarrow \boxed{\text{S}}$$

$\frac{3}{5}$ of 35 = $\rightarrow$ **D**

$6/8$ of $4 = \boxed{} \rightarrow \boxed{0}$

$\frac{1}{5}$ of 10 = $\rightarrow$ **N**

$$2/6 \text{ of } 108 = \boxed{} \rightarrow \boxed{} \mid$$

Scratch space:

CLUE 4

Bar model word problems

We draw a bar model to compare the weight of moon rocks brought back by different team members to trace the thief.

Draw a bar model to solve each word problem, then write its letter in the boxes to fill in the missing word.

A strand of S hair turned up at the scene.

7 86 105 68 66 43 68 86 7 97 43

Commander Leo shares 77 star map equally among 11 teams. How many star map does each team get?

draw a bar model

Answer: → S

Commander Leo shares 194 space battery equally among 2 teams. How many space battery does each team get?

draw a bar model

Answer: → O

Commander Leo has 11 times as many space battery as a teammate. The teammate has 6 space battery. How many space battery does Commander Leo have?

draw a bar model

Answer: → E

Commander Leo has 215 space battery, packed 5 to a bag. How many bags can be filled?

draw a bar model

Answer: → R

Commander Leo used $\frac{1}{2}$ of the astro tool on the first day. The other 34 astro tool were used the next day. How many astro tool were there in all?

draw a bar model

Answer: → V

The red team has 141 astro tool and the blue team has 36 astro tool. How many more astro tool does the red team have?

draw a bar model

Answer: → L

Commander Leo has 172 astro tool, packed 2 to a bag. How many bags can be filled?

draw a bar model

Answer: → I

CLUE 5**Fractions of a number - the last clue**

The navigation computer needs us to calculate a fraction of the remaining solar energy cells to reveal the final escape path.

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:

$2/5 \text{ of } 30 = \boxed{}$

$2/8 \text{ of } 4 = \boxed{}$

$2/3 \text{ of } 9 = \boxed{}$

$1/5 \text{ of } 20 = \boxed{}$

$4/8 \text{ of } 6 = \boxed{}$

$1/4 \text{ of } 44 = \boxed{}$

$5/10 \text{ of } 20 = \boxed{}$

$2/3 \text{ of } 12 = \boxed{}$

$5/10 \text{ of } 10 = \boxed{}$

$3/6 \text{ of } 14 = \boxed{}$

$3/5 \text{ of } 15 = \boxed{}$

Step 2 - cross out the sentence with each answer:

1. The villain mined a rare space asteroid, then built a glowing force field.
2. The villain steered a heavy laser beam, then chased a wild green comet.
3. The villain warped local gravity fields, then jammed the space radar signals.
4. The villain boosted a massive rocket engine, then hid inside a dark nebula.
5. The villain warped local gravity fields, then built a glowing force field.
6. The villain boosted a massive rocket engine, then chased a wild green comet.
7. The villain charged solar power panels, then built a glowing force field.
8. The villain mined a rare space asteroid, then blasted hot plasma streams.
9. The villain charged solar power panels, then jammed the space radar signals.
10. The villain warped local gravity fields, then blasted hot plasma streams.
11. The villain warped local gravity fields, then hid inside a dark nebula.
12. The villain charged solar power panels, then chased a wild green comet.

Answer Key

The Case of the Missing Star Compass

Culprit: Alan Shepard

laser steering · comet chasing · left-handed · silver visor · ice crystals

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

Clue 1 (Multiplication facts (1-12)): "THE VILLAIN DOES NOT USE NEBULA HIDING"

$4 \times 1 = 4$ (T) · $11 \times 11 = 121$ (I) · $7 \times 9 = 63$ (V) · $5 \times 11 = 55$ (O) · $9 \times 11 = 99$ (D) · $11 \times 7 = 77$ (L) · $4 \times 7 = 28$ (B) · $10 \times 3 = 30$ (E) · $3 \times 3 = 9$ (U) · $3 \times 1 = 3$ (A) · $9 \times 9 = 81$ (H) · $6 \times 11 = 66$ (N) · $11 \times 4 = 44$ (G) · $12 \times 12 = 144$ (S)

Clue 2 (Fractions of a number): "THE SUSPECT WROTE THE CODE WITH LEFT HAND"

$1/3$ of 69 = 23 (T) · $8/10$ of 40 = 32 (H) · $4/8$ of 8 = 4 (R) · $4/8$ of 70 = 35 (A) · $1/2$ of 36 = 18 (U) · $2/5$ of 30 = 12 (F) · $2/5$ of 100 = 40 (L) · $2/3$ of 30 = 20 (E) · $1/4$ of 44 = 11 (P) · $7/10$ of 10 = 7 (W) · $1/10$ of 140 = 14 (C) · $1/2$ of 12 = 6 (S) · $3/5$ of 35 = 21 (D) · $6/8$ of 4 = 3 (O) · $1/5$ of 10 = 2 (N) · $2/6$ of 108 = 36 (I)

Clue 3 (Word problems): "ICE CRYSTALS"

Commander Leo found 26 oxygen tank yesterday and 6 more today. How many oxygen tank in all? = 32 (I) · Commander Leo found 9 space battery yesterday and 10 more today. How many space battery in all? = 19 (Y) · There were 48 star map. 17 were used up. How many star map are left? = 31 (C) · Commander Leo lined up 3 rows of 9 star map. How many star map in all? = 27 (T) · Commander Leo found 5 oxygen tank yesterday and 7 more today. How many oxygen tank in all? = 12 (S) · Commander Leo lined up 11 rows of 7 oxygen tank. How many oxygen tank in all? = 77 (R) · Commander Leo lined up 8 rows of 6 astro tool. How many astro tool in all? = 48 (E)

Clue 4 (Bar model word problems): "SILVER VISOR"

Commander Leo shares 77 star map equally among 11 teams. How many star map does each team get? = 7 (S) · Commander Leo shares 194 space battery equally among 2 teams. How many space battery does each team get? = 97 (O) · Commander Leo has 11 times as many space battery as a teammate. The teammate has 6 space battery. How many space battery does Commander Leo have? = 66 (E) · Commander Leo has 215 space battery, packed 5 to a bag. How many bags can be filled? = 43 (R) · Commander Leo used $1/2$ of the astro tool on the first day. The other 34 astro tool were used the next day. How many astro tool were there in all? = 68 (V) · The red team has 141 astro tool and the blue team has 36 astro tool. How many more astro tool does the red team have? = 105 (L) · Commander Leo has 172 astro tool, packed 2 to a bag. How many bags can be filled? = 86 (I)

Clue 5 (Fractions of a number): surviving statement is box 2 → Alan Shepard

$2/5$ of 30 = 12 · $2/8$ of 4 = 1 · $2/3$ of 9 = 6 · $1/5$ of 20 = 4 · $4/8$ of 6 = 3 · $1/4$ of 44 = 11 · $5/10$ of 20 = 10 · $2/3$ of 12 = 8 · $5/10$ of 10 = 5 · $3/6$ of 14 = 7 · $3/5$ of 15 = 9