



The Greenwich Star Heist

Grade 5 math · Multiplication, Bar models, Fractions of a number, Order of operations, Division · Reading level grades 5-6

Detective: _____ **Date:** _____

The great golden astrolabe has vanished from the Royal Observatory. The suspect left behind muddy footprints, star charts, and a trail of astronomical clues. We must track them down before they sell our kingdom's prized navigation secrets.

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 Celestial Thief is _____

Possible suspects

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

NAME	NAVIGATION TOOL	ASTRONOMY GEAR	OBSERVING EYE	CAP COLOR	HISTORICAL DISTRACTION
Ptolemy	cross staff	pocket telescope	right eye	blue felt	ancient coins
Banneker	sun compass	planisphere	right eye	blue felt	fossil shells
Copernicus	brass compass	pocket telescope	right eye	blue felt	ancient coins
Herschel	marine chronometer	pocket telescope	right eye	blue felt	ancient coins
Zheng He	sextant	armillary sphere	right eye	red velvet	ancient coins
Drake	marine chronometer	pocket telescope	right eye	brown leather	fossil shells
Ibn Battuta	sun compass	pocket telescope	right eye	red velvet	ancient coins
Eratosthenes	brass compass	armillary sphere	right eye	red velvet	fossil shells
Magellan	sun compass	planisphere	right eye	blue felt	ancient coins
Marco Polo	sun compass	pocket telescope	left eye	brown leather	ancient coins
Kepler	brass compass	pocket telescope	right eye	brown leather	ancient coins
Cassini	cross staff	pocket telescope	left eye	blue felt	ancient coins
Cabot	sextant	armillary sphere	left eye	blue felt	old maps
Mitchell	marine chronometer	armillary sphere	right eye	blue felt	ancient coins
Balboa	marine chronometer	armillary sphere	right eye	red velvet	fossil shells
Halley	sextant	planisphere	left eye	brown leather	ancient coins
Cartier	sun compass	armillary sphere	left eye	blue felt	ancient coins
Cook	sun compass	pocket telescope	left eye	red velvet	old maps
Hudson	cross staff	armillary sphere	left eye	brown leather	fossil shells
Mercator	sextant	lunar dial	left eye	brown leather	old maps
Strabo	sun compass	star globe	left eye	blue felt	fossil shells

CLUE 1
Multiplication facts (1-12)

Our young scouts found rows of astronomical desks in the observatory. Each row holds a set number of star maps. We can multiply the rows to find the total map count and unlock the first secret.

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

T			T											T			
40	54	45	40	54	50	45	132	12	5	45	80	55	5	40	22	80	45

T																	
40	54	45	100	1	33	50	30	30	100	1	7	80	16	54	45	1	45

$8 \times 5 = \square \rightarrow \boxed{\text{T}}$

$5 \times 9 = \square \rightarrow \boxed{\text{E}}$

$2 \times 11 = \square \rightarrow \boxed{\text{U}}$

$9 \times 6 = \square \rightarrow \boxed{\text{H}}$

$1 \times 1 = \square \rightarrow \boxed{\text{R}}$

$12 \times 11 = \square \rightarrow \boxed{\text{F}}$

$10 \times 10 = \square \rightarrow \boxed{\text{A}}$

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

$10 \times 5 = \square \rightarrow \boxed{\text{I}}$

$2 \times 6 = \square \rightarrow \boxed{\text{D}}$

$2 \times 8 = \square \rightarrow \boxed{\text{P}}$

$1 \times 5 = \square \rightarrow \boxed{\text{O}}$

$10 \times 8 = \square \rightarrow \boxed{\text{S}}$

$5 \times 11 = \square \rightarrow \boxed{\text{N}}$

$10 \times 3 = \square \rightarrow \boxed{\text{L}}$

$7 \times 1 = \square \rightarrow \boxed{\text{Y}}$

Scratch space:

CLUE 2

Bar model word problems

The suspect left behind two parallel travel logs. By comparing the bar models of their journey lengths, we can see exactly how many leagues farther one explorer traveled than the other.

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

A witness saw the villain was

R							
---	--	--	--	--	--	--	--

 .

85 59 89 40 111 138 62 138

One group collected 83 astrolabe and another group collected 2 astrolabe. How many astrolabe in all?

draw a bar model

Answer:

--

 →

R

Navigator shares 222 star chart equally among 2 teams. How many star chart does each team get?

draw a bar model

Answer:

--

 →

T

Navigator has 10 times as many compass as a teammate. The teammate has 4 compass. How many compass does navigator have?

draw a bar model

Answer:

--

 →

H

Navigator has 124 sextant, packed 2 to a bag. How many bags can be filled?

draw a bar model

Answer:

--

 →

Y

The red team has 177 star chart and the blue team has 39 star chart. How many more star chart does the red team have?

draw a bar model

Answer:

--

 →

E

The red team has 104 sextant and the blue team has 15 sextant. How many more sextant does the red team have?

draw a bar model

Answer:

--

 →

G

The red team has 65 star chart and the blue team has 6 star chart. How many more star chart does the red team have?

draw a bar model

Answer:

--

 →

I

CLUE 3

Fractions of a number

Only a specific fraction of the stars on the ceiling dial are active constellation markers. Let's find that fraction of the total stars to locate the hidden wall compartment.

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

T						T							T				T			
2	3	30	39	17	2	5	37	37	30	20	2	5	17	2	30	16	26			

						T					
16	12	32	34	30	12	2	32	5	34	12	17

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

$$2/10 \text{ of } 160 = \boxed{} \rightarrow \boxed{\text{C}}$$

$$3/5 \text{ of } 50 = \boxed{} \rightarrow \boxed{\text{E}}$$

$$5/10 \text{ of } 52 = \boxed{} \rightarrow \boxed{\text{L}}$$

$$4/5 \text{ of } 20 = \boxed{} \rightarrow \boxed{\text{A}}$$

$$6/10 \text{ of } 5 = \boxed{} \rightarrow \boxed{\text{H}}$$

$$2/6 \text{ of } 51 = \boxed{} \rightarrow \boxed{\text{S}}$$

$$1/4 \text{ of } 48 = \boxed{} \rightarrow \boxed{\text{N}}$$

$$3/6 \text{ of } 74 = \boxed{} \rightarrow \boxed{\text{P}}$$

$$5/8 \text{ of } 32 = \boxed{} \rightarrow \boxed{\text{D}}$$

$$2/10 \text{ of } 170 = \boxed{} \rightarrow \boxed{\text{I}}$$

$$3/8 \text{ of } 104 = \boxed{} \rightarrow \boxed{\text{Y}}$$

$$1/4 \text{ of } 20 = \boxed{} \rightarrow \boxed{\text{O}}$$

Scratch space:

CLUE 4
Order of operations

To open the heavy brass vault, we must enter the combination using the strict rules of PEMDAS. Solving the equations in the correct order reveals the lock code.

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

A													A			A		
19	18	49	26	42	7	42	49	77	77	8	71	42	19	29	11	19	67	
7	24	26	12	29	24	12	77	8	42	77	42	49	42	67	63	24	31	42

$13 + 2 \times 3 = \square \rightarrow \text{A}$

$3 \times 11 - 15 = \square \rightarrow \text{B}$

$8 \times 9 - 23 = \square \rightarrow \text{L}$

$2 + 5 \times 2 = \square \rightarrow \text{N}$

$43 + 4 \times 5 = \square \rightarrow \text{C}$

$24 + 2 \times 9 = \square \rightarrow \text{E}$

$14 + 3 \times 4 = \square \rightarrow \text{U}$

$11 \times 9 - 28 = \square \rightarrow \text{R}$

$2 + 3 \times 2 = \square \rightarrow \text{H}$

$5 \times 6 - 1 = \square \rightarrow \text{D}$

$1 + 3 \times 2 = \square \rightarrow \text{F}$

$12 \times 3 - 5 = \square \rightarrow \text{P}$

$11 \times 9 - 22 = \square \rightarrow \text{T}$

$9 \times 10 - 23 = \square \rightarrow \text{S}$

$3 \times 9 - 16 = \square \rightarrow \text{W}$

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

Scratch space:

CLUE 5**Division facts (1-12) - the last clue**

The night guards are sharing a box of rations equally before their next shift. Dividing the crackers evenly helps us calculate the time of the thief's escape.

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:

$30 \div 6 = \boxed{}$

$144 \div 12 = \boxed{}$

$10 \div 5 = \boxed{}$

$20 \div 2 = \boxed{}$

$36 \div 6 = \boxed{}$

$27 \div 9 = \boxed{}$

$24 \div 3 = \boxed{}$

$77 \div 11 = \boxed{}$

$77 \div 7 = \boxed{}$

$36 \div 4 = \boxed{}$

$20 \div 5 = \boxed{}$

Step 2 - cross out the sentence with each answer:

1. The villain calculated the local meridian, then grabbed the planisphere from the table.
2. The villain recorded the evening constellations, then tucked the pocket telescope into a coat.
3. The villain plotted a new shipping route, then stole the armillary sphere.
4. The villain measured the angle of the North Star, then slipped away with the star globe.
5. The villain tracked the path of Venus, then tucked the pocket telescope into a coat.
6. The villain calculated the local meridian, then hid the lunar dial under some parchment.
7. The villain plotted a new shipping route, then hid the lunar dial under some parchment.
8. The villain tracked the path of Venus, then grabbed the planisphere from the table.
9. The villain tracked the path of Venus, then stole the armillary sphere.
10. The villain recorded the evening constellations, then hid the lunar dial under some parchment.
11. The villain tracked the path of Venus, then hid the lunar dial under some parchment.
12. The villain plotted a new shipping route, then tucked the pocket telescope into a coat.

Answer Key

The Greenwich Star Heist

Culprit: Magellan

sun compass · planisphere · right eye · blue felt · ancient coins

Trail: Start 21 → Clue 1 14 → Clue 2 8 → Clue 3 6 → Clue 4 4 → Clue 5 1

Clue 1 (Multiplication facts (1-12)): "THE THIEF DOES NOT USE THE ARMILLARY SPHERE"

$8 \times 5 = 40$ (T) · $5 \times 9 = 45$ (E) · $2 \times 11 = 22$ (U) · $9 \times 6 = 54$ (H) · $1 \times 1 = 1$ (R) · $12 \times 11 = 132$ (F) · $10 \times 10 = 100$ (A) · $11 \times 3 = 33$ (M) · $10 \times 5 = 50$ (I) · $2 \times 6 = 12$ (D) · $2 \times 8 = 16$ (P) · $1 \times 5 = 5$ (O) · $10 \times 8 = 80$ (S) · $5 \times 11 = 55$ (N) · $10 \times 3 = 30$ (L) · $7 \times 1 = 7$ (Y)

Clue 2 (Bar model word problems): "RIGHT EYE"

One group collected 83 astrolabe and another group collected 2 astrolabe. How many astrolabe in all? = 85 (R) · Navigator shares 222 star chart equally among 2 teams. How many star chart does each team get? = 111 (T) · Navigator has 10 times as many compass as a teammate. The teammate has 4 compass. How many compass does navigator have? = 40 (H) · Navigator has 124 sextant, packed 2 to a bag. How many bags can be filled? = 62 (Y) · The red team has 177 star chart and the blue team has 39 star chart. How many more star chart does the red team have? = 138 (E) · The red team has 104 sextant and the blue team has 15 sextant. How many more sextant does the red team have? = 89 (G) · The red team has 65 star chart and the blue team has 6 star chart. How many more star chart does the red team have? = 59 (I)

Clue 3 (Fractions of a number): "THEY STOPPED TO STEAL ANCIENT COINS"

$2/5$ of 5 = 2 (T) · $2/10$ of 160 = 32 (C) · $3/5$ of 50 = 30 (E) · $5/10$ of 52 = 26 (L) · $4/5$ of 20 = 16 (A) · $6/10$ of 5 = 3 (H) · $2/6$ of 51 = 17 (S) · $1/4$ of 48 = 12 (N) · $3/6$ of 74 = 37 (P) · $5/8$ of 32 = 20 (D) · $2/10$ of 170 = 34 (I) · $3/8$ of 104 = 39 (Y) · $1/4$ of 20 = 5 (O)

Clue 4 (Order of operations): "A BLUE FELT THREAD WAS FOUND ON THE TELESCOPE"

$13 + 2 \times 3 = 19$ (A) · $3 \times 11 - 15 = 18$ (B) · $8 \times 9 - 23 = 49$ (L) · $2 + 5 \times 2 = 12$ (N) · $43 + 4 \times 5 = 63$ (C) · $24 + 2 \times 9 = 42$ (E) · $14 + 3 \times 4 = 26$ (U) · $11 \times 9 - 28 = 71$ (R) · $2 + 3 \times 2 = 8$ (H) · $5 \times 6 - 1 = 29$ (D) · $1 + 3 \times 2 = 7$ (F) · $12 \times 3 - 5 = 31$ (P) · $11 \times 9 - 22 = 77$ (T) · $9 \times 10 - 23 = 67$ (S) · $3 \times 9 - 16 = 11$ (W) · $3 + 3 \times 7 = 24$ (O)

Clue 5 (Division facts (1-12)): surviving statement is box 1 → Magellan

$30 \div 6 = 5$ · $144 \div 12 = 12$ · $10 \div 5 = 2$ · $20 \div 2 = 10$ · $36 \div 6 = 6$ · $27 \div 9 = 3$ · $24 \div 3 = 8$ · $77 \div 11 = 7$ · $77 \div 7 = 11$ · $36 \div 4 = 9$ · $20 \div 5 = 4$