



The Mystery of Black Sand Cove

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

Detective: _____ Date: _____

Someone plundered the harbor master's vault and swiped the legendary Golden Astrolabe! Clues were left all across the deck. Solve the math ciphers to unmask the pirate thief!

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 pirate captain 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	PIRATE GEAR	DOMINANT HAND	HEADWEAR STYLE	PEST CONTROL
Woodes Rogers	Brass Spyglass	Pocket Compass	Left Handed	Braided Dreadlocks	Bright Sun Glare
Francois l Olonnais	Brass Spyglass	Trained Parrot	Left Handed	Braided Dreadlocks	Splash of Sea Water
Gentleman Jib	Iron Hook	Pocket Compass	Left Handed	Striped Bandana	Splash of Sea Water
Samuel Bellamy	Brass Spyglass	Signal Flare	Left Handed	Braided Dreadlocks	Scurvy Lemon Juice
Calico Jack	Flintlock Pistol	Boarding Grapple	Left Handed	Striped Bandana	Scurvy Lemon Juice
Scurvy Pete	Curved Cutlass	Trained Parrot	Left Handed	Striped Bandana	Splash of Sea Water
Ching Shih	Curved Cutlass	Signal Flare	Right Handed	Trikorn Hat	Splash of Sea Water
John Rackham	Flintlock Pistol	Boarding Grapple	Right Handed	Trikorn Hat	Scurvy Lemon Juice
Stede Bonnet	Curved Cutlass	Boarding Grapple	Left Handed	Striped Bandana	Splash of Sea Water
Thomas Tew	Curved Cutlass	Trained Parrot	Right Handed	Trikorn Hat	Bright Sun Glare
Sadie the Goat	Brass Spyglass	Trained Parrot	Left Handed	Braided Dreadlocks	Scurvy Lemon Juice
Mary Read	Curved Cutlass	Smoke Bomb	Right Handed	Braided Dreadlocks	Scurvy Lemon Juice
Howell Davis	Wooden Pegleg	Boarding Grapple	Right Handed	Braided Dreadlocks	Bright Sun Glare
Edward England	Wooden Pegleg	Smoke Bomb	Right Handed	Striped Bandana	Splash of Sea Water
Blackbeard	Wooden Pegleg	Signal Flare	Right Handed	Braided Dreadlocks	Splash of Sea Water
Jean Lafitte	Curved Cutlass	Signal Flare	Left Handed	Striped Bandana	Splash of Sea Water
Charles Vane	Curved Cutlass	Trained Parrot	Right Handed	Braided Dreadlocks	Bright Sun Glare
Anne Bonny	Curved Cutlass	Trained Parrot	Left Handed	Braided Dreadlocks	Scurvy Lemon Juice
Grace O Malley	Iron Hook	Smoke Bomb	Left Handed	Striped Bandana	Splash of Sea Water
Cheung Po Tsai	Brass Spyglass	Signal Flare	Right Handed	Trikorn Hat	Bright Sun Glare
Barnaby Finch	Flintlock Pistol	Smoke Bomb	Right Handed	Braided Dreadlocks	Bright Sun Glare

CLUE 1 Exponents

A mysterious scroll uses powers of two to encode the secret coordinates of the pirate hideout.

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

T																T
64	121	225	324	27	361	361	400	27	729	4	25	225	196	729	25	64
128	196	225	400	169	25	100	343	225	64	100	25	512	169	400	196	196

$4^3 = \square \rightarrow$ T	$2^2 = \square \rightarrow$ D	$10^2 = \square \rightarrow$ C	$11^2 = \square \rightarrow$ H
$5^2 = \square \rightarrow$ O	$15^2 = \square \rightarrow$ E	$19^2 = \square \rightarrow$ L	$2^7 = \square \rightarrow$ U
$3^6 = \square \rightarrow$ N	$3^3 = \square \rightarrow$ I	$13^2 = \square \rightarrow$ P	$14^2 = \square \rightarrow$ S
$20^2 = \square \rightarrow$ A	$2^9 = \square \rightarrow$ M	$7^3 = \square \rightarrow$ K	$18^2 = \square \rightarrow$ V

Scratch space:

CLUE 2 Square roots

The quartermaster measures the area of a square treasure chest to figure out the length of its side.

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

A number line from 0 to 100 with boxes for numbers. The boxes are arranged in two rows. The first row contains boxes for 25, 17, 7, 14, 7, 18, 25, 17, 15, 23, 2, 7, 2, 24, 4, 6, 15, 25, and 7. The second row contains boxes for 10, 6, 15, 19, 19, 7, 2, 25, 17, 7, 13, 17, 7, 7, and 14. The boxes for 25, 17, 7, 25, 25, and 25 are highlighted in orange and contain the letter 'T'.

sqrt(625) = → **T**

sqrt(576) = → **P**

sqrt(324) = → **F**

sqrt(225) = → **A**

sqrt(361) = → **B**

sqrt(529) = → **N**

sqrt(16) = →

sqrt(36) = → **R**

sqrt(100) = → **G**

sqrt(4) = → **D**

$$\text{sqrt}(169) = \boxed{} \rightarrow \boxed{\mathbf{W}}$$

sqrt(196) = → **L**

sqrt(289) = → **H**

sqrt(49) = → **E**

Scratch space:

CLUE 3

Pythagorean theorem

To cross the stormy reef safely, the navigator calculates the straight diagonal distance between two points.

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

S				S				S							
10	5	74	50	10	26	82	29	10	15	50	87	50	75	15	51
S				S											
10	75	82	5	10	75	26	15	20	39	82	74	68			

legs 6 and 8, hypotenuse = → **S**

legs 3 and 4, hypotenuse = → **P**

legs 12 and 16, hypotenuse = → **M**

legs 32 and 60, hypotenuse = → **D**

legs 9 and 12, hypotenuse = → **E**

legs 10 and 24, hypotenuse = → **H**

legs 60 and 63, hypotenuse = → **W**

legs 15 and 36, hypotenuse = → **C**

legs 20 and 21, hypotenuse = → **F**

legs 14 and 48, hypotenuse = → **A**

legs 18 and 80, hypotenuse = → **O**

legs 21 and 72, hypotenuse = → **T**

legs 24 and 70, hypotenuse = → **L**

legs 24 and 45, hypotenuse = → **R**

Scratch space:

CLUE 4

A locked cipher box requires solving math operations in the correct order to release the latch.

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

67 119 110 15 114 70 47 73 56 53 47 56 53 56 20 56 67

119 10 110 53 10 53 56 53 56 15 80

$$11 + 8 \times 7 = \boxed{} \rightarrow \boxed{\text{S}}$$

$$12 \times 4 - 28 = \boxed{} \rightarrow \boxed{\text{W}}$$

$7 + 2 \times 4 = \boxed{} \rightarrow \boxed{1}$

$$10 \times 6 - 4 = \boxed{} \rightarrow \boxed{\text{A}}$$

$$2 + 2 \times 4 = \boxed{} \rightarrow \boxed{0}$$

$$55 + 2 \times 9 = \boxed{} \rightarrow \boxed{\mathbf{B}}$$

$$38 + 4 \times 8 = \boxed{} \rightarrow \boxed{\text{E}}$$

$$95 + 4 \times 6 = \boxed{} \rightarrow \boxed{\text{T}}$$

$$6 \times 10 - 7 = \boxed{} \rightarrow \boxed{\text{N}}$$

$12 \times 10 - 6 = \boxed{} \rightarrow \boxed{\text{P}}$

$$6 \times 9 - 7 = \boxed{} \rightarrow \boxed{\text{D}}$$

$$12 \times 10 - 10 = \boxed{} \rightarrow \boxed{\mathbf{R}}$$

$$8 \times 12 - 16 = \boxed{} \rightarrow \boxed{\text{L}}$$

Scratch space:

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

Balancing the gold doubloons on the deck scale requires solving for the missing iron weight.

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:

$3x + 12 = 18, x = \boxed{}$

$6x + 9 = 75, x = \boxed{}$

$3x + 4 = 19, x = \boxed{}$

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

$6x + 5 = 11, x = \boxed{}$

$2x + 3 = 17, x = \boxed{}$

$4x + 10 = 42, x = \boxed{}$

$5x + 4 = 24, x = \boxed{}$

$5x + 9 = 39, x = \boxed{}$

$4x + 2 = 38, x = \boxed{}$

$4x + 8 = 20, x = \boxed{}$

Step 2 - cross out the sentence with each answer:

1. The villain stumps along on a wooden pegleg, then consults a pocket compass.
2. The villain swings a curved cutlass, then launches a boarding grapple.
3. The villain scratches with an iron hook, then launches a boarding grapple.
4. The villain swings a curved cutlass, then consults a pocket compass.
5. The villain scratches with an iron hook, then drops a heavy smoke bomb.
6. The villain scratches with an iron hook, then signals a trained parrot.
7. The villain brandishes a flintlock pistol, then consults a pocket compass.
8. The villain brandishes a flintlock pistol, then launches a boarding grapple.
9. The villain peers through a brass spyglass, then drops a heavy smoke bomb.
10. The villain brandishes a flintlock pistol, then drops a heavy smoke bomb.
11. The villain swings a curved cutlass, then ignites a bright signal flare.
12. The villain swings a curved cutlass, then signals a trained parrot.

Answer Key

The Mystery of Black Sand Cove

Culprit: Scurvy Pete

Curved Cutlass · Trained Parrot · Left Handed · Striped Bandana · Splash of Sea Water

Trail: Start 21 → Clue 1 19 → Clue 2 9 → Clue 3 5 → Clue 4 4 → Clue 5 1

Clue 1 (Exponents): "THE VILLAIN DOES NOT USE A POCKET COMPASS"

$4^3 = 64$ (T) · $2^2 = 4$ (D) · $10^2 = 100$ (C) · $11^2 = 121$ (H) · $5^2 = 25$ (O) · $15^2 = 225$ (E) · $19^2 = 361$ (L) · $2^7 = 128$ (U) · $3^6 = 729$ (N) · $3^3 = 27$ (I) · $13^2 = 169$ (P) · $14^2 = 196$ (S) · $20^2 = 400$ (A) · $2^9 = 512$ (M) · $7^3 = 343$ (K) · $18^2 = 324$ (V)

Clue 2 (Square roots): "THE LEFT HANDED PIRATE GRABBED THE WHEEL"

$\sqrt{625} = 25$ (T) · $\sqrt{576} = 24$ (P) · $\sqrt{324} = 18$ (F) · $\sqrt{225} = 15$ (A) · $\sqrt{361} = 19$ (B) · $\sqrt{529} = 23$ (N) · $\sqrt{16} = 4$ (I) · $\sqrt{36} = 6$ (R) · $\sqrt{100} = 10$ (G) · $\sqrt{4} = 2$ (D) · $\sqrt{169} = 13$ (W) · $\sqrt{196} = 14$ (L) · $\sqrt{289} = 17$ (H) · $\sqrt{49} = 7$ (E)

Clue 3 (Pythagorean theorem): "SPLASH OF SEA WATER STOPS THEM COLD"

legs 6 and 8, hypotenuse = 10 (S) · legs 3 and 4, hypotenuse = 5 (P) · legs 12 and 16, hypotenuse = 20 (M) · legs 32 and 60, hypotenuse = 68 (D) · legs 9 and 12, hypotenuse = 15 (E) · legs 10 and 24, hypotenuse = 26 (H) · legs 60 and 63, hypotenuse = 87 (W) · legs 15 and 36, hypotenuse = 39 (C) · legs 20 and 21, hypotenuse = 29 (F) · legs 14 and 48, hypotenuse = 50 (A) · legs 18 and 80, hypotenuse = 82 (O) · legs 21 and 72, hypotenuse = 75 (T) · legs 24 and 70, hypotenuse = 74 (L) · legs 24 and 45, hypotenuse = 51 (R)

Clue 4 (Order of operations): "STRIPED BANDANA WAS TORN ON A NAIL"

$11 + 8 \times 7 = 67$ (S) · $12 \times 4 - 28 = 20$ (W) · $7 + 2 \times 4 = 15$ (I) · $10 \times 6 - 4 = 56$ (A) · $2 + 2 \times 4 = 10$ (O) · $55 + 2 \times 9 = 73$ (B) · $38 + 4 \times 8 = 70$ (E) · $95 + 4 \times 6 = 119$ (T) · $6 \times 10 - 7 = 53$ (N) · $12 \times 10 - 6 = 114$ (P) · $6 \times 9 - 7 = 47$ (D) · $12 \times 10 - 10 = 110$ (R) · $8 \times 12 - 16 = 80$ (L)

Clue 5 (Two-step equations): surviving statement is box 12 → Scurvy Pete

$3x + 12 = 18, x = 2$ · $6x + 9 = 75, x = 11$ · $3x + 4 = 19, x = 5$ · $2x + 11 = 31, x = 10$ · $6x + 5 = 11, x = 1$ · $2x + 3 = 17, x = 7$ · $4x + 10 = 42, x = 8$ · $5x + 4 = 24, x = 4$ · $5x + 9 = 39, x = 6$ · $4x + 2 = 38, x = 9$ · $4x + 8 = 20, x = 3$