



The Sonata Sabotage

Grade 9 math · Two-step equations, Exponents, Square roots, Integers · Reading level grades 7-9

Detective: _____ Date: _____

The prestigious Steinway Tuning Key has vanished hours before the final round of the International Chopin Competition. Without it, the grand piano will fall out of tune, ruining the performance of a lifetime. The culprit has left behind a trail of coded musical scores.

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 virtuoso is _____

Possible suspects

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

NAME	SIGNATURE PIECE	PERFORMANCE FLAIR	PAGE TURNING STYLE	PERFORMANCE HAIRSTYLE	PERFORMANCE DISTRACTION
Yuja	Rachmaninoff Prelude	Double Octaves	Left Hand Page Turn	Beethoven Shag	Coughing Audience
Arthur	Chopin Nocturne	Heavy Pedaling	Right Hand Page Turn	Beethoven Shag	Coughing Audience
Robert	Bach Prelude	Heavy Pedaling	Left Hand Page Turn	Sleek Chignon	Squeaky Bench
Anton	Liszt Etude	Double Octaves	Right Hand Page Turn	Sleek Chignon	Sticky Keys
Igor	Rachmaninoff Prelude	Heavy Pedaling	Right Hand Page Turn	Sleek Chignon	Sticky Keys
Johann	Beethoven Sonata	Double Octaves	Left Hand Page Turn	Sleek Chignon	Sticky Keys
Felix	Beethoven Sonata	Heavy Pedaling	Left Hand Page Turn	Beethoven Shag	Coughing Audience
Erik	Chopin Nocturne	Cross Hand Play	Left Hand Page Turn	Beethoven Shag	Squeaky Bench
Wolfgang	Beethoven Sonata	Blindfolded Jumps	Right Hand Page Turn	Sleek Chignon	Coughing Audience
Franz	Rachmaninoff Prelude	Rapid Arpeggios	Right Hand Page Turn	Beethoven Shag	Coughing Audience
Mitsuko	Beethoven Sonata	Heavy Pedaling	Right Hand Page Turn	Sleek Chignon	Coughing Audience
Claude	Beethoven Sonata	Double Octaves	Right Hand Page Turn	Sleek Chignon	Coughing Audience
Lang	Bach Prelude	Blindfolded Jumps	Right Hand Page Turn	Beethoven Shag	Coughing Audience
Maurice	Rachmaninoff Prelude	Cross Hand Play	Right Hand Page Turn	Sleek Chignon	Coughing Audience
Frederic	Beethoven Sonata	Heavy Pedaling	Left Hand Page Turn	Classical Part	Sticky Keys
Martha	Bach Prelude	Rapid Arpeggios	Right Hand Page Turn	Beethoven Shag	Sticky Keys
Ludwig	Rachmaninoff Prelude	Rapid Arpeggios	Right Hand Page Turn	Beethoven Shag	Sticky Keys
Clara	Rachmaninoff Prelude	Blindfolded Jumps	Left Hand Page Turn	Beethoven Shag	Squeaky Bench
Sergei	Liszt Etude	Blindfolded Jumps	Right Hand Page Turn	Beethoven Shag	Squeaky Bench
Hector	Liszt Etude	Rapid Arpeggios	Right Hand Page Turn	Beethoven Shag	Coughing Audience
Pyotr	Beethoven Sonata	Heavy Pedaling	Right Hand Page Turn	Beethoven Shag	Coughing Audience

CLUE 1 Two-step equations

To unlock the backstage double-doors, you must solve for the unknown variables on the twin-dial combination lock.

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

A 2x10 grid of boxes. The top row contains the following values from left to right: 'T' (orange), 5, 14, 11, 10, 17, 7, 7, 8, 17, 16, 22, 6, 11, 20, 16, 6, 'T' (orange), 5. The bottom row contains the following values from left to right: 9, 20, 11, 3, 7, 17, 16, 22, 18, 6, 7, 22, 11, 22, 2, 9, 4, 19, 20.

$$6x + 9 = 39, x = \boxed{} \rightarrow \boxed{\text{T}}$$

$$9x + 6 = 33, x = \boxed{} \rightarrow \mathbf{B}$$

$$5x + 12 = 42, x = \boxed{} \rightarrow \boxed{0}$$

$$6x + 7 = 73, x = \boxed{} \rightarrow \boxed{\text{E}}$$

$$4x + 10 = 38, x = \boxed{} \rightarrow \boxed{\text{L}}$$

$$9x + 7 = 97, x = \boxed{} \rightarrow \mathbf{v}$$

$$3x + 1 = 61, x = \boxed{} \rightarrow \boxed{\text{S}}$$

$$4x + 9 = 73, x = \boxed{} \rightarrow \mathbf{N}$$

$8x + 2 = 18, x = \boxed{} \rightarrow \boxed{\mathbf{J}}$

$$9x + 4 = 175, x = \boxed{} \rightarrow \boxed{\text{P}}$$

$$9x + 11 = 137, x = \boxed{} \rightarrow \boxed{\text{H}}$$

$$6x + 6 = 108, x = \boxed{} \rightarrow \boxed{1}$$

$$8x + 6 = 150, x = \boxed{} \rightarrow \boxed{\text{F}}$$

$$4x + 12 = 28, x = \boxed{} \rightarrow \boxed{\text{M}}$$

$$7x + 10 = 66, x = \boxed{} \rightarrow \boxed{\mathbf{A}}$$

$$4x + 3 = 39, x = \boxed{} \rightarrow \boxed{\text{U}}$$

$$3x + 5 = 71, x = \boxed{} \rightarrow \mathbf{D}$$

Scratch space:

CLUE 2 Exponents

The soundboard decibel readings multiply exponentially with each octave. Calculate the power of the amplifier to find the clue.

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

T										T	T						
324	216	625	361	400	361	64	625	169	324	324	400	441	8	625	32		
							T		T							T	
64	225	256	625	361	512	49	324	216	324	216	625	441	49	256	216	324	
216	225	8	32														

$18^2 = \square \rightarrow \text{T}$	$20^2 = \square \rightarrow \text{U}$	$2^5 = \square \rightarrow \text{D}$	$5^4 = \square \rightarrow \text{E}$
$7^2 = \square \rightarrow \text{I}$	$2^3 = \square \rightarrow \text{N}$	$13^2 = \square \rightarrow \text{C}$	$19^2 = \square \rightarrow \text{S}$
$15^2 = \square \rightarrow \text{A}$	$8^2 = \square \rightarrow \text{P}$	$21^2 = \square \rightarrow \text{R}$	$6^3 = \square \rightarrow \text{H}$
$8^3 = \square \rightarrow \text{W}$	$16^2 = \square \rightarrow \text{G}$		

Scratch space:

CLUE 3 Square roots

The grand piano string lengths are calculated using a square root function. Find the base length to uncover the hidden note.

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

A									A							
16	14	6	19	25	20	3	11	25	16	19	15	3	7	11	14	7

23	3	21	21	12	19	3	11	10	20	7	14	6	11	14	7	12	10

$\text{sqrt}(256) = \div \rightarrow \boxed{\text{A}}$	$\text{sqrt}(100) = \div \rightarrow \boxed{\text{T}}$	$\text{sqrt}(9) = \div \rightarrow \boxed{\text{I}}$
$\text{sqrt}(121) = \div \rightarrow \boxed{\text{N}}$	$\text{sqrt}(144) = \div \rightarrow \boxed{\text{R}}$	$\text{sqrt}(529) = \div \rightarrow \boxed{\text{W}}$
$\text{sqrt}(196) = \div \rightarrow \boxed{\text{C}}$	$\text{sqrt}(225) = \div \rightarrow \boxed{\text{D}}$	$\text{sqrt}(49) = \div \rightarrow \boxed{\text{E}}$
$\text{sqrt}(625) = \div \rightarrow \boxed{\text{G}}$	$\text{sqrt}(400) = \div \rightarrow \boxed{\text{H}}$	$\text{sqrt}(441) = \div \rightarrow \boxed{\text{L}}$
$\text{sqrt}(361) = \div \rightarrow \boxed{\text{U}}$	$\text{sqrt}(36) = \div \rightarrow \boxed{\text{O}}$	

Scratch space:

CLUE 4 Integers

The pitch pipe can tune notes both above and below absolute pitch. Balance the positive and negative frequencies to hear the clue.

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

T													
38	26	14	25	27	8	10	27	33	26	27	10	27	

			T										
13	14	14	38	26	22	25	14	8	30	26	27	16	

$34 - (-4) = \boxed{} \rightarrow \boxed{\text{T}}$

$12 - (-2) = \boxed{} \rightarrow \boxed{\text{E}}$

$12 - (-13) = \boxed{} \rightarrow \boxed{\text{V}}$

$22 - (-4) = \boxed{} \rightarrow \boxed{\text{H}}$

$5 - (-5) = \boxed{} \rightarrow \boxed{\text{D}}$

$(-7) + 20 = \boxed{} \rightarrow \boxed{\text{B}}$

$(-14) + 30 = \boxed{} \rightarrow \boxed{\text{G}}$

$(-9) + 36 = \boxed{} \rightarrow \boxed{\text{A}}$

$23 - (-7) = \boxed{} \rightarrow \boxed{\text{S}}$

$13 - (-9) = \boxed{} \rightarrow \boxed{\text{O}}$

$(-9) + 17 = \boxed{} \rightarrow \boxed{\text{N}}$

$(-15) + 48 = \boxed{} \rightarrow \boxed{\text{L}}$

Scratch space:

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

The stage lighting rig requires a two-step equation to balance the wattage of the spotlights against the main house lights.

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:

$3x + 5 = 35, x = \boxed{}$

$5x + 8 = 23, x = \boxed{}$

$5x + 3 = 28, x = \boxed{}$

$9x + 3 = 12, x = \boxed{}$

$5x + 1 = 46, x = \boxed{}$

$9x + 10 = 118, x = \boxed{}$

$2x + 1 = 13, x = \boxed{}$

$8x + 12 = 68, x = \boxed{}$

$6x + 4 = 28, x = \boxed{}$

$5x + 6 = 16, x = \boxed{}$

$3x + 3 = 36, x = \boxed{}$

Step 2 - cross out the sentence with each answer:

1. The villain plays a Chopin Nocturne at high speed, then leaps blindly with blindfolded jumps.
2. The villain blasts a Bach Prelude on the grand piano, then drowns the room out with heavy pedaling.
3. The villain blares a Rachmaninoff Prelude, then sweeps into rapid arpeggios.
4. The villain blasts a Bach Prelude on the grand piano, then executes a flurry of double octaves.
5. The villain plays a Chopin Nocturne at high speed, then drowns the room out with heavy pedaling.
6. The villain blasts a Bach Prelude on the grand piano, then sweeps into rapid arpeggios.
7. The villain plays a Chopin Nocturne at high speed, then executes a flurry of double octaves.
8. The villain performs a Beethoven Sonata with passion, then drowns the room out with heavy pedaling.
9. The villain blares a Rachmaninoff Prelude, then crosses their hands in a cross-hand play.
10. The villain tears through a Liszt Etude, then sweeps into rapid arpeggios.
11. The villain plays a Chopin Nocturne at high speed, then sweeps into rapid arpeggios.
12. The villain performs a Beethoven Sonata with passion, then leaps blindly with blindfolded jumps.

Answer Key

The Sonata Sabotage

Culprit: Pyotr

Beethoven Sonata · Heavy Pedaling · Right Hand Page Turn · Beethoven Shag · Coughing Audience

Trail: Start 21 → Clue 1 17 → Clue 2 11 → Clue 3 7 → Clue 4 4 → Clue 5 1

Clue 1 (Two-step equations): "THE VILLAIN DOES NOT USE BLINDFOLDED JUMPS"

$6x + 9 = 39, x = 5$ (T) · $9x + 6 = 33, x = 3$ (B) · $5x + 12 = 42, x = 6$ (O) · $6x + 7 = 73, x = 11$ (E) · $4x + 10 = 38, x = 7$ (L) · $9x + 7 = 97, x = 10$ (V) · $3x + 1 = 61, x = 20$ (S) · $4x + 9 = 73, x = 16$ (N) · $8x + 2 = 18, x = 2$ (J) · $9x + 4 = 175, x = 19$ (P) · $9x + 11 = 137, x = 14$ (H) · $6x + 6 = 108, x = 17$ (I) · $8x + 6 = 150, x = 18$ (F) · $4x + 12 = 28, x = 4$ (M) · $7x + 10 = 66, x = 8$ (A) · $4x + 3 = 39, x = 9$ (U) · $3x + 5 = 71, x = 22$ (D)

Clue 2 (Exponents): "THE SUSPECT TURNED PAGES WITH THE RIGHT HAND"

$18^2 = 324$ (T) · $20^2 = 400$ (U) · $2^5 = 32$ (D) · $5^4 = 625$ (E) · $7^2 = 49$ (I) · $2^3 = 8$ (N) · $13^2 = 169$ (C) · $19^2 = 361$ (S) · $15^2 = 225$ (A) · $8^2 = 64$ (P) · $21^2 = 441$ (R) · $6^3 = 216$ (H) · $8^3 = 512$ (W) · $16^2 = 256$ (G)

Clue 3 (Square roots): "A COUGHING AUDIENCE WILL RUIN THE CONCERT"

$\sqrt{256} = 16$ (A) · $\sqrt{100} = 10$ (T) · $\sqrt{9} = 3$ (I) · $\sqrt{121} = 11$ (N) · $\sqrt{144} = 12$ (R) · $\sqrt{529} = 23$ (W) · $\sqrt{196} = 14$ (C) · $\sqrt{225} = 15$ (D) · $\sqrt{49} = 7$ (E) · $\sqrt{625} = 25$ (G) · $\sqrt{400} = 20$ (H) · $\sqrt{441} = 21$ (L) · $\sqrt{361} = 19$ (U) · $\sqrt{36} = 6$ (O)

Clue 4 (Integers): "THE VANDAL HAD A BEETHOVEN SHAG"

$34 - (-4) = 38$ (T) · $12 - (-2) = 14$ (E) · $12 - (-13) = 25$ (V) · $22 - (-4) = 26$ (H) · $5 - (-5) = 10$ (D) · $(-7) + 20 = 13$ (B) · $(-14) + 30 = 16$ (G) · $(-9) + 36 = 27$ (A) · $23 - (-7) = 30$ (S) · $13 - (-9) = 22$ (O) · $(-9) + 17 = 8$ (N) · $(-15) + 48 = 33$ (L)

Clue 5 (Two-step equations): surviving statement is box 8 → Pyotr

$3x + 5 = 35, x = 10$ · $5x + 8 = 23, x = 3$ · $5x + 3 = 28, x = 5$ · $9x + 3 = 12, x = 1$ · $5x + 1 = 46, x = 9$ · $9x + 10 = 118, x = 12$ · $2x + 1 = 13, x = 6$ · $8x + 12 = 68, x = 7$ · $6x + 4 = 28, x = 4$ · $5x + 6 = 16, x = 2$ · $3x + 3 = 36, x = 11$