FREE STARTER

GRADES 4–6

Logic Mystery Club: Case Files

6 complete activities from Logic Mystery Club, each with a worked answer.

Clue 1	Clue 2	Clue 3
Not the tallest	Left of the blue	An odd number

HOW TO USE

1. Read the situation and the evidence first.
2. Show your thinking in the work boxes, not only an answer.
3. Explain how you know your answer makes sense.
4. Try the new problem at the bottom of the page.

6 activities • 3 answer pages • From the 16-activity collection

10 US Letter pages • Print at 100% / Actual Size

Original Bobotemp educational printable • Fictional names, places and prices

Name _____ Date _____

The Lunch Line Cookie Caper

LEVEL 1 ●○○

Read each clue. Cross out anyone the clue rules out. Write the clue number next to each cross-out.

One oatmeal cookie went missing from the lunch-line tray. Five friends were waiting in line. Spot 1 is the front of the line. “In front of” means a lower spot number. Use the three clues to find the one friend who took the cookie. Then check that your answer fits every clue.

CROSS-OUT GRID: MARK ✓ OR ✗

Spot and friend	Clue 1	Clue 2	Clue 3
1 Ava			
2 Ben			
3 Chen			
4 Dara			
5 Eli			

EVIDENCE TO USE

- Line: 1 Ava, 2 Ben, 3 Chen, 4 Dara, 5 Eli
- Clue 1: The cookie taker’s spot number is odd.
- Clue 2: Someone stood in front of the cookie taker.
- Clue 3: The cookie taker’s spot number times 2 is less than 10.

1. Draw a position strip with spots 1 to 5.

2. Cross out each friend who cannot be the taker, and write the clue that rules them out.

3. Write one sentence that tells why no other friend works.

TRY IT • Six students stand in spots 1 to 6. The taker’s spot is even. The taker’s spot times 3 is more than 10. Someone stands behind the taker (a higher spot number). Which spot is the taker in?

Name _____ Date _____

The Locker Combination

LEVEL 1 ●○○

Test every number on the sticky note against each clue. Cross out any number that breaks a clue.

Coach Rivera locked the jump ropes in the gym locker. Then she forgot the combination! Her sticky note lists eight numbers. The real combination is one of them. Use the three clues to find it. Only one number fits all three clues.

CROSS-OUT GRID: MARK ✓ OR ✗

Number	Clue 1	Clue 2	Clue 3
12			
15			
18			
20			
24			
27			
36			
45			

EVIDENCE TO USE

- Sticky note: 12, 15, 18, 20, 24, 27, 36, 45
- Clue 1: The number is even.
- Clue 2: The number is less than 30.
- Clue 3: The digits add up to 9.

1. Add the digits of each of the eight numbers, for example 1 + 2 = 3 for 12.

2. Next to each number, write which clue it breaks, if any.

3. Prove that each clue was needed by naming a number only that clue removes.

TRY IT • A lock is one of 18, 26, 35, 44, 53, 62. The digits add to 8. The number is even. The number is less than 40. What is the combination?

Name _____ Date _____

The Fossil and the Fibbers

LEVEL 2 ●●○

Make a case card for each student. On each card, pretend that student is the mover and test every statement.

The class trilobite fossil moved from its stand to a different shelf. Four students were near it. Each one made a statement. The rule: The student who moved the fossil fibs. Everyone else tells the truth. For each student, ask: "If this student is the mover, does every statement fit the rule?" Only one student passes the test.

CASE CARDS: MARK EACH STATEMENT T OR F

If the mover is	Kofi says	Lena says	Mateo says	Ruby says	Fits rule?
Kofi					
Lena					
Mateo					
Ruby					

EVIDENCE TO USE

- Kofi: "Lena or Mateo moved it."
- Lena: "Ruby did not move it."
- Mateo: "Kofi moved it."
- Ruby: "Kofi did not move it."
- Rule: Only the mover fibs.

1. Fill in a case card for each of the four students.

2. On each failed card, circle the statement that breaks the rule.

3. Write a Case Closed paragraph that cites each statement you used.

TRY IT • Only the culprit fibs. Ada: "Bo did it." Bo: "I did not do it." Cy: "Ada is telling the truth." Who did it?

Name _____ Date _____

The Three-Digit Locker Code

LEVEL 2 ●●○

Test all six codes against all four clues. Then prove that every clue was needed.

The Science Club locker uses a three-digit code. The club president wrote six possible codes and four clues. Hint: A number is a multiple of 4 when the number made by its last two digits is a multiple of 4. Find the one code that fits every clue. Then show that if you removed any one clue, more than one code would be left.

CROSS-OUT GRID: MARK ✓ OR ✗

Code	Clue 1	Clue 2	Clue 3	Clue 4
316				
456				
528				
735				
816				
972				

EVIDENCE TO USE

- Possible codes: 316, 456, 528, 735, 816, 972
- Clue 1: The code is a multiple of 4.
- Clue 2: The code is greater than 500.
- Clue 3: The hundreds digit is odd.
- Clue 4: The tens digit is less than the ones digit.

1. Make a case card for each code and mark which clues it passes.

2. Name the code that passes all four clues.

3. For each clue, name a code that only that clue rules out.

TRY IT • The codes are 236, 612, 614, 640, 724. The code is a multiple of 4, has an even hundreds digit, has a tens digit less than its ones digit, and is greater than 500. What is it?

Name _____ Date _____

The Fossil and the Exactly-One-True Fibbers

LEVEL 3 ●●●

For each suspect, assume they moved the fossil. Count how many statements would then be true.

The museum-club fossil was moved from its case before the open house. Four students are suspects. This time the rule is harder: exactly one of the four statements is true, and the other three are false. Anyone might be fibbing, even someone who is not the mover. Test each suspect with a case card. Then use the dust clue. Only one suspect fits both clues.

CASE CARDS: MARK EACH STATEMENT T OR F

If the mover is	Hana says	Diego says	Wren says	Tariq says	# true	Dust?
Hana						
Diego						
Wren						
Tariq						

EVIDENCE TO USE

- Hana: "Diego did it."
- Diego: "Tariq did it."
- Wren: "I did not do it."
- Tariq: "Hana did not do it."
- Clue A: Exactly one of the four statements is true.
- Clue B: The mover had fossil dust on their sleeves. Diego, Tariq, and Wren had dust. Hana had none.

1. Make a case card for each suspect and mark each statement T or F.

2. Name the suspects who pass Clue A, then apply Clue B.

3. Explain why Clue A alone is not enough.

TRY IT • Exactly one statement is true. Ada: "I did it." Bo: "Ada did not do it." Cy: "I did not do it." Who did it?

Name _____ Date _____

The Library Alibi Timeline

LEVEL 3 ●●●

Find each student's leaving time. Build a timeline, then apply each if-then rule carefully.

The new joke book vanished from the library return cart. The librarian saw it at 3:51, and it was gone at 3:53. The person who took it was in the library for that whole window. Use the sign-in log and the two rules. Be careful: an if-then rule only works in one direction.

LIBRARY SIGN-IN LOG

Student	In	Stayed	Out	Green pass	Lanyard
Aiden	3:15	20 min		no	yes
Bea	3:30	35 min		no	no
Carlos	3:45	25 min		yes	yes
Dev	3:50	15 min		no	yes
Elena	3:05	45 min		yes	yes

Time window

Seen at 3:51. Gone at 3:53. The taker was there the whole time.

Rule 1

If a student had a green pass, they did not go near the cart.

Rule 2

Everyone who used the cart wore a lanyard.

1. Draw a timeline from 3:00 to 4:15 showing each student's visit.

2. Apply the time window, Rule 1, and Rule 2, citing each one.

3. Explain why Elena's lanyard does not make her a suspect.

TRY IT • Rule: If a student was in the art room, they have paint on their hands. Rosa has paint on her hands. Must Rosa have been in the art room? Explain.

1. The Lunch Line Cookie Caper

LEVEL 1

Chen (spot 3) took the cookie. Story ending: He brought it to his little sister's class because she had forgotten her snack that day.

WORKED REASONING • Clue 1: The odd spots are 1, 3, and 5, so Ben (2) and Dara (4) are out. Clue 2: No one stands in front of spot 1, so Ava is out. Clue 3: Eli is in spot 5, and 5 × 2 = 10. Ten is not less than 10, so Eli is out. Only Chen is left. Check: 3 is odd, Ava and Ben stand in front of him, and 3 × 2 = 6, which is less than 10. Every clue fits, and every other friend breaks at least one clue.

WATCH FOR • Some students stop after Clue 1 and guess Ava because she is first. Others count 5 × 2 = 10 as "less than 10." Equal is not less than.

TRANSFER • Spot 4. The even spots are 2, 4, and 6. Times 3 more than 10 leaves 4 and 6. No one stands behind spot 6, so the answer is spot 4.

2. The Locker Combination

LEVEL 1

The combination is 18.

WORKED REASONING • Clue 1 (even) keeps 12, 18, 20, 24, 36. Clue 2 (less than 30) keeps 12, 15, 18, 20, 24, 27. Clue 3 (digits add to 9): 1+8=9, 2+7=9, 3+6=9, 4+5=9, so it keeps 18, 27, 36, 45. Only 18 is on all three lists. Check: 18 is even, 18 is less than 30, and 1 + 8 = 9. Each clue matters. Clue 1 alone removes 27, Clue 2 alone removes 36, and Clue 3 alone removes 12, 20, and 24.

WATCH FOR • Students may add the digits wrong, for example 3 + 6 = 8, and drop 36 for the wrong reason. Others pick 27 because it fits Clues 2 and 3 and forget to test Clue 1.

TRANSFER • 26. The digits of 18 add to 9, so it is out. The even numbers left are 26, 44, and 62. Only 26 is less than 40.

6. The Fossil and the Fibbers

LEVEL 2

Mateo moved the fossil. Story ending: He put it on the sunny shelf so the class could sketch it in better light.

WORKED REASONING • Test Kofi: then Ruby's "Kofi did not move it" is false, but Ruby must tell the truth. Fail. Test Lena: then Mateo's "Kofi moved it" is false, but Mateo must tell the truth. Fail. Test Ruby: then Kofi's "Lena or Mateo" is false, and so is Lena's statement. Fail. Test Mateo: Kofi's statement is true, Lena's is true, Ruby's is true, and only Mateo's "Kofi moved it" is false. Only the mover fibs, so Mateo works, and he is the only one who does.

WATCH FOR • Some students believe Mateo because he names a mover directly. A confident statement is not proof. You have to test every case against the rule.

TRANSFER • Bo. If Bo did it, Ada is truthful, Bo fibs, and Cy is truthful. If Ada did it, Cy's statement would be false. If Cy did it, Ada's statement would be false.

7. The Three-Digit Locker Code

LEVEL 2

The code is 528.

WORKED REASONING • Clue 1: 16, 56, 28, 16, and 72 are multiples of 4, but 35 is not, so 735 is out. Clue 2 removes 316 and 456. Clue 3: the hundreds digit of 816 is 8, which is even, so 816 is out. Clue 4: in 972, the 7 is not less than the 2, so 972 is out. Only 528 is left. Each clue is needed: 735 fails only Clue 1, 316 fails only Clue 2, 816 fails only Clue 3, and 972 fails only Clue 4.

WATCH FOR • Students may test the whole number for the multiple-of-4 rule and give up, or test only the last digit. An even last digit is not enough: 34 ends in 4, which is even, but 34 is not a multiple of 4. Use the number made by the last two digits.

TRANSFER • 612. 614 is not a multiple of 4, 724 has an odd hundreds digit, 640's tens digit is not less than its ones digit, and 236 is not greater than 500. Each clue removes one code, and only 612 passes all four.

11. The Fossil and the Exactly-One-True Fibbers

LEVEL 3

Wren moved the fossil. Story ending: She took it out to dust it for the open house.

WORKED REASONING • Clue A, test each suspect and mark all four statements. If Hana did it: Hana F, Diego F, Wren T, Tariq F. One true, so she passes. If Diego did it: Hana T, Diego F, Wren T, Tariq T. Three true, so he fails. If Tariq did it: Hana F, Diego T, Wren T, Tariq T. Three true, so he fails. If Wren did it: Hana F, Diego F, Wren F, Tariq T. One true, so she passes. Clue A leaves Hana and Wren, so Clue A alone is not enough. Clue B: Hana had no dust, so she is out. Wren is the only suspect who fits both clues.

WATCH FOR • Some students use the rule from the Level 2 (Detective) case The Fossil and the Fibbers, where only the culprit fibs. Here, innocent people can make false statements too. Count the true statements for each case instead.

TRANSFER • Cy. If Cy did it, only Bo's statement is true. If Ada did it, Ada and Cy would both be telling the truth. If Bo did it, Bo and Cy would both be telling the truth.

12. The Library Alibi Timeline

LEVEL 3

Dev took the book. Story ending: He carried it to the front desk to check it out.

WORKED REASONING • Leaving times: Aiden 3:35, Bea 4:05, Carlos 4:10, Dev 4:05, Elena 3:50. Time window: Only Bea, Carlos, and Dev were there from 3:51 to 3:53. Rule 1: Carlos had a green pass, so he did not go near the cart. Rule 2: The taker used the cart, so the taker wore a lanyard. Bea had no lanyard, so she is out. Dev is the only one left. Check: Dev was there 3:50 to 4:05, had no green pass, and wore a lanyard.

WATCH FOR • Rule 2 says cart users wore lanyards. It does not say every lanyard wearer used the cart. Thinking "Elena wore a lanyard, so she used the cart" reverses the rule. That is the converse, which does not follow. For Response 3, give credit for the converse explanation, and also for noting that Elena left at 3:50, before the window, and had a green pass.

TRANSFER • No. The rule only says art room visitors have paint. Rosa could have gotten paint somewhere else. Thinking she must have been in the art room reverses the rule.