Name: Per:

Inductive vs. Deductive Reasoning

***Inductive Reasoning*** *is the process of using PAST EXPERIENCE (like patterns, history, or what has happened before) to make conclusions about the present and the future.*

*For example: John Doe has a history of violence. His wife was murdered. Therefore, John Doe*

*killed her.*

***Deductive reasoning*** *is the process of using FACTS, TRUTH, & KNOWLEDGE (like definitions, theorems, or accepted truths) to make conclusions about the present and the future.*

*For example: The killer’s blood, found on the murder weapon, is AB negative. John Doe is O positive.*

*Therefore, John Doe did not kill her.*

*If you were falsely accused of a crime, which detective would you want on your case—the Inductive Detective, or the Deductive Detective? Why?*

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**Case 1:**

A serious math crime has been committed. On September 30th, Suspect X broke into a bakery, killed the baker and stole all of the πs. When the two detectives found the baker, his hand was reaching toward an equation written in spilled flour:

(5x – 8) = ½(6x + 8).

Listed below are the clues that the Inductive Detective and the Deductive detective used to solve the crime. First, label the clues as belonging either to the Inductive (I) or the Deductive (D) detective. Then, use your case log to organize the steps into a logical case for each detective. Then decide what number is responsible for the death of the π baker.

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| **I or D?** | **Clues and Conclusions** | **Explanation of Discovery** |
|  | In June, the number 3 was arrested for π theft. | A search for like crimes revealed 3’s case |
|  | 5x – 8 = 3x + 4 | Distribution of ½ |
|  | In August, the number 7 was arrested for destruction of private π. | A search for like crimes revealed 7’s case |
|  | In July, the number 5 was arrested for vandalism with π filling. | A search for like crimes revealed 5’s case |
|  | 5x – 8 = ½ (6x + 8) | Given—written by the baker |
|  | 5x – 12 = 3x | Subtraction Property of Equality *(if you subtract a number from one side of the equation, then you subtract it from both sides)* |
|  | Suspect X is not an even number | All recent π crimes were committed by odd numbers |
|  | 6 = x | Division Property of Equality *(if you divide a number from one side of the equation, then you divide it from both sides)* |
|  | –12 = –2x | Subtraction Property of Equality *(if you subtract a number from one side of the equation, then you subtract it from both sides)* |
|  | Suspect X is the number 9. | All recent π crimes have been committed in a pattern: June=3, July=5, August=7. Therefore, September=9. |
|  | Suspect X is the number 6. | Symmetric Property of Equality *(If 6 = x, then x = 6)* |

**Case 2:**

On Halloween, a trick-or-treater reported the theft of his M + Ms. The victim reported seeing the following equation on the back of the thief’s costume: 11y + 9 = 13y – 2. Who is Suspect Y?

Inductive Detective had an open case file the day he left for vacation. So, Deductive Detective took over. Seeing how little had been done, Deductive Detective decided to go back to the beginning and to search for clues his way. The following are his Clues & Conclusions from his notebook. **Put the Clues & Conclusions in order, and enter them into your Case Log under Case 2**. Since his notes do not provide his Explanations of Discovery, you must **use the Reason Bank at the bottom of this page to fill the Explanations into your Case Log**. Each explanation may be used as often as necessary, or not at all.

11/2 = y

9 = 2y – 2

11y + 9 = 13y – 2

11 = 2y

y = 11/2

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**Case 3:**

Last night, the number line was vandalized with a familiar tag: 18g + 1 = 12g – 5. We know that Suspect g is the vandal, but no detective has been able to solve the case and determine his identity. Can you solve this case and bring Suspect G to justice? Use your Case Log to record your **Clues & Conclusions** and your **Explanations of Discovery**.

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**REASON BANK**

Use these reasons to fill in the **Explanation of Discovery** column. You may use the reasons below as many times as necessary to prove your case.

|  |  |
| --- | --- |
| **Given** | The evidence was found at the scene or provided by a witness. |
| **Addition Property of Equality** | If I add a number to one side of the equation, then I must add it to the other.  Ex: If a = b, then a + 1 = b + 1. |
| **Subtraction Property of Equality** | If I subtract a number from one side of the equation, then I must subtract it from the other.  Ex: If a = b, then a – 1 = b – 1. |
| **Multiplication Property of Equality** | If I multiply a number to one side of the equation, then I must multiply it to the other.  Ex: If a = b, then 2a = 2b. |
| **Division Property of Equality** | If I divide a number from one side of the equation, then I must divide it from the other.  Ex: If a = b, then 2a = 2b. |
| **Symmetric Property of Equality** | In any equation the left and right side of the equal sign can be switched.  Ex: If 4 = s, then s = 4 |
| **Reflexive Property of Equality** | A number, variable or expression equals itself.  Ex: 3w + 7 = 3w + 7 |
| **Transitive Property of Equality** | Any 2 numbers, variables or expressions that are equal to the same number, variable or expression can be set equal to each other.  Ex: If y = 3 and 3 = z, then y = z. |
| **Substitution Property of Equality** | Any number, variable or expression can be replaced with an equal number, variable or expression.  Ex: If x = 4, then 2x + 7 = 2(4) + 7 |

Name: Per:

Case Log

**Case 1:** Suspect X

Inductive Detective

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| **Clues and Conclusions** | **Explanation of Discovery** |
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According to the Inductive Detective, who killed the baker?

Deductive Detective

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| **Clues and Conclusions** | **Explanation of Discovery** |
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According to the Deductive Detective, who killed the baker?

**I trust the work of the Detective. Suspect X is .**



**Case 2:** Suspect Y

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| **Clues and Conclusions** | **Explanation of Discovery** |
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I used reasoning to conclude that the crime was committed by .

**Case 3:** Suspect G

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| **Clues and Conclusions** | **Explanation of Discovery** |
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I used reasoning to conclude that the crime was committed by .