

## Super Sleuths

1. **DESCRIPTION:** Given a mystery scenario, evidence, and a list of possible suspects, teams will be expected to perform a series of tests to draw specific conclusions about the scenario and suspects. The test results along with other evidence will be used to solve the mystery of the scenario.
2. **ESSENTIAL STANDARDS ALIGNMENT:** 3.P.2, 4.P.2, Science as Inquiry
3. **TEAM OF UP TO:** 2
4. **MAXIMUM TIME:** 60 min.
5. **TEAMS:** Teams may bring only specified items and goggles. No other items are allowed. The event supervisors will check the kits, and confiscate non-allowed items. **Students not bringing these items will be at a disadvantage. (In-person tournaments only)**
  - a. Spot plates, cups, or any containers in which teams can perform the tests
  - b. Droppers, popsicle sticks, spatulas, plastic spoons, tongs, and/or forceps for handling materials
  - c. pH test strips or pH paper
  - d. A ruler
  - e. A wash bottle or dropper bottle of distilled water (don't use tap water for this)
  - f. Hand lens (aka magnifying glass)
  - g. Paper towels
  - h. A disposable cup for solid waste
  - i. Writing instruments
  - j. Safety gear – see rule #7.
  - k. Teams may bring one 8.5" x 11" two-sided page of notes containing information in any form from any source.
6. **EVENT LEADERS (in-person tournaments only):** Event leaders will provide evidence at a central location or pre-organized bags or packets of evidence for each team along with the following:
  - a. Iodine reagent (KI solution) Note: ***Be sure to check with parents about Iodine allergies before assigning students to this event.***
  - b. Vinegar
  - c. Isopropyl (rubbing) alcohol
  - d. A waste container

The event leader may provide additional equipment such as microscopes or special demos as the test calls for; instructions on additional equipment will be given if deemed necessary. Flame tests are not permitted.

*Virtual tournaments will be provided with the results of chemical tests, but no tests may be performed at home during a tournament.*

### 7. **SAFETY REQUIREMENTS:**

Students must wear the following or they cannot participate:

- a. Closed-toed shoes
- b. Safety goggles (indirect vent goggles)
- c. Long hair must be tied back
- d. Optional: aprons, gloves, and lab coats

Students who unsafely remove their safety goggles or are observed handling any of the material or equipment in a hazardous/unsafe manner (e.g., tasting or touching chemicals or flushing solids down a drain) will be disqualified from the event.

### 8. **IMPOUND:** No

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9. **THE COMPETITION:** Teams will be given a scenario that introduces a crime, suspects, and sources of evidence. Teams will perform tests on the evidence to identify the perpetrator of the crime and write up their analysis of the crime.

a. **Crime Scene Chemical Evidence:**

- i. Powders: Teams will be asked to identify up to 5 of the following powders. There will be no mixtures of powders.

baking powder	crystal sugar	sodium acetate
baking soda	flour	sodium carbonate
borax	non-iodized table salt	vitamin C (ascorbic acid)
citric acid	powdered milk	yeast
cornstarch	powdered sugar	

- ii. General Knowledge: Teams will be expected to answer questions about the tests they perform, chemical and physical properties of the powders, and proper lab procedure. Example questions:
1. If the pH of a substance is 3.5, is it acidic or basic?
  2. What does it mean if a powder turns black in the presence of iodine?
  3. What is the chemical name and chemical formula of table salt?
  4. What is the proper method to smell a chemical?

b. **Crime Scene Physical Evidence:**

- i. Soil: Participants may be given the composition of soil found at the scene or on the suspects and asked to determine if this implicates any of the suspects.
- ii. Footprints, Shoeprints and Tire treads: Participants may be asked to compare prints and make conclusions such as direction and relative speed of travel. No calculations are expected to be performed.

c. **Analysis of the Crime:**

Students will answer questions about which pieces of evidence implicate which suspect and why the suspect was chosen as the culprit, and also why the other suspects were not chosen. They will also answer any other crime scene analysis questions posed by the event supervisor.

10. **SCORING:** The team with the highest score wins. Time will not be used for scoring. The score will be composed of the following elements (percentages given are approximate):

- a. Analysis of chemical evidence 50%, analysis of physical evidence 30%, and analysis of the crime 20%.
- b. Tiebreaker: The highest score on the chemical evidence analysis will break ties.
- c. A 10% penalty may be given if the area is not cleaned up as designated.

11. **EVENT RESOURCES:**

See the Event Resources tab on our website at for instructions, videos and more.