EXPLORATION

A. Students will conduct a **toxicity labs** (Record your lab in your science notebook or on the handout from your teacher:

- **Modified Lab: Salt toxicity in seed germination:**
- **Bioassay Test for Toxicity | Bioassay Experiment and Science Project (homesciencetools.com)**

B. Students choose two science articles to analyze about toxicity in the real world. Some articles are given by the teacher but students may choose their own articles as well.

- Possible articles:
  - Drying Great Salt Lake Could Expose Millions to Toxic Arsenic-Laced Dust
  - U.K. Killer Whale Contained Staggering Levels of Toxic Chemical
  - How does reducing air pollution help birds?
  - Our water was poison.
  - A resource for more articles: Breakthrough Information on Public Health - Research | Environmental Working Group (ewg.org)
- Use the skill: How to analyze a scientific article by Richard Paul and Linda Elder?
- Alternative guiding questions for students as they analyze two articles:
  - Analyzing two articles

C. Students will participate in the **"Introduction To Toxicology" Webquest (Record the questions and answers in your science notebook):**

Step 1: Visit the following website: http://bit.ly/2FGRD74

1. What is toxicology?
2. How does the field of toxicology use the "power of science"?
3. When during a person's life are the most susceptible to chemicals?
4. Give an example of something that is non-toxic becoming life threatening to a person.
5. What is the role of a toxicologist?

Step 2: Visit the following website: http://bit.ly/2F4WL3D

1. What is the average salary of a forensic toxicologist?
2. What is the role of a forensic toxicologist?
3. Describe the working conditions of a forensic toxicologist.
4. Why would you need to enjoy learning to be a forensic toxicologist?

Step 3: Visit the following website: http://bit.ly/2F6z6QA

1. Who usually collects the first specimens that are then sent to a toxicologist?
2. List 7 specimens that may be collected and sent to a toxicologist to obtain information about a possible drug related death.
3. What are some problems that are related to the collection of blood specimens?

4. What is vitreous humor?
5. Give 3 examples of a poison related death?

D. Students will explore **"What is Toxicology?"**

Visit the websites listed below and watch the simulations. As each simulation plays, answer the following questions for each area of the lab that is displayed. You may need to pause the video or rewind to get the answers. Record the questions and answers in your science notebook.

Forensic Biology: https://www.youtube.com/watch?v=jHkrS4aFaWc

1. What are the four steps in DNA processing?
2. Why is a buccal swab used to collect a DNA sample?
3. Which DNA profile was a match?

Forensic Toxicology: https://www.youtube.com/watch?v=U2ta63MPlCk

1. What are the three fluids collected from the body?
2. What is a "maggot milkshake?"
3. Why do toxicologists analyze so many different body fluids?
4. When was forensic toxicology invented?
5. Describe how alcohol is screened.
6. What does an ELISA test screen for?
7. What is the confirmatory test used in forensic toxicology?
8. How does the GC work?
9. What drug(s) was the individual on while driving?

Firearms & Toolmarks: https://www.youtube.com/watch?v=fRFA64bWfQQ

1. List the parts of the gun.
2. List and describe the parts of a cartridge.
3. Name and describe the two types of bullet impressions.
4. What are striations?

Medical Examiner: https://www.youtube.com/watch?v=0bvKDbdnFGo

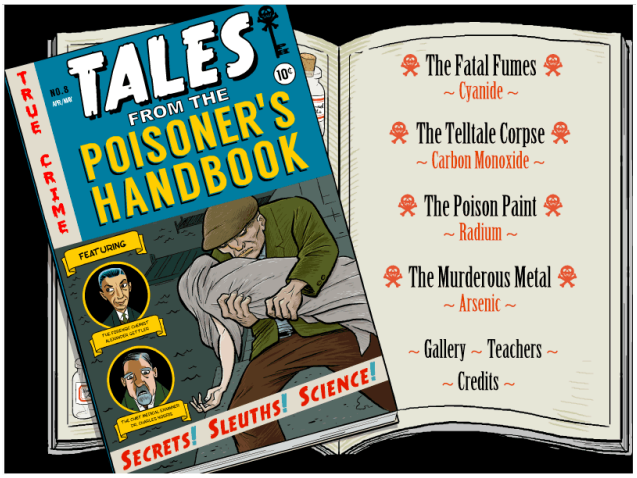
1. What is the first thing a medical examiner does?
2. Perform the autopsy. What articles of clothing are used to protect the medical examiner?
3. What type of incision is made first?
4. What is the Rokitansky technique?
5. Name the three types of mortis.

Code of Ethics: https://www.youtube.com/watch?v=tG5S-aMLug

1. Describe the four items in the Forensic Code of Ethics.

E. Students will participate in the **PBS Tales From The Poisoner's Handbook Interactive Experience.**

https://demo.wgbhdigital.org/poisonershandbook/home.html



1. Click "The Poison Paint: Radium".
2. When and where was the story?
3. Fill in the blank: The U.S. _____ Corporation.
4. What were the female workers hired to do?
5. Yuck. Describe this "simple" job for the corporation.
6. How many dials did one worker paint a day?
7. How many ladies sued the Radium Corporation?
8. What are they exhaling?
9. Who discovered radium and what year?
10. What happens to the bones of people exposed to radium for extended periods of time?
11. Draw slide 10 to show the chipping away of the skeleton due to radium exposure.
12. Who died when she was only 25 because she was a dial painter exposed to radium?
13. Slide 12: How many workers died?
14. Perform the "lab" activity after slide 12 and describe what you have to do to detect radium. This should be a small paragraph.
15. Slide 13 fill in the blank: All those years of _____ would proved to be _____ to so many of these _____, including 5 plaintiffs.
16. Slide 14: describe the health issues of each woman who had worked for the corporation.

17. For how much money did the corporation settle?
18. Do YOU think this amount of money was fair??
19. Hit the home button in the top left.

20. Click on “The Murderous Metal: Arsenic”
21. Where and what year was the story?
22. Who was the “killer” and what poison did she use?
23. Slide 3: For how many years was arsenic been used as a poison?
24. Why was it used as poison?
25. Victims of arsenic poisoning often appeared to have died how?
26. Slide 4: Where was arsenic available?!?!?!
27. Do the lab activity after slide 4 and write a paragraph describing what you had to do to detect arsenic (MAKE SURE you list the names of the pieces of lab equipment!).
28. Was Mary found guilty or not guilty?
29. Slide 9: What is the year and where?
30. Hmmm…Mary again! Who is she suspected to kill this time?
31. What organ was sent to the lab from her brother-in-law’s death?
32. After slide 13 do the lab all over again, but don’t describe it (because you already did earlier….just do the lab and read the things that are happening).
33. Slide 14: Was Mary convicted this time?
34. Why did she do it???
35. What food did she mix the poison into?
36. Did Mary commit the murders alone?
37. What 2 men solved the case against Mary?
38. Complete this graphic outline: Poisoner's Handbook-A

F. Article: How Wood Alcohol Poisonings Advanced Toxicology

G. Use Claims-Evidence-Reasoning and Metacognition to analyze an article about, “ organ on a chip technology.” Also complete the transfer journal about this article.

Read this article (https://docs.google.com/document/d/1H8AIpl5xVoAmaMRa3GavVSzXYDwkjDDBiEnOpvMpCtU/edit?usp=sharing)

and complete claims evidence and reasoning work and the transfer journal that follows:

Record these questions and answers in your science journal.

Claims, Evidence and Reasoning = Quality Scientific Explanations

What is the Big idea or question?

_____

_____

What is the claim (answer to the big idea or question)?

_____

_____

Identify 3 pieces of evidence that support the claim.

_____

_____

_____

Science background - **Describe the key science ideas you learned (or knew). You will need this information to answer the reasoning.**

_____
_____
_____
_____
_____
_____

Reasoning: The author claims_____.
I found (describe the evidence that supports the claim)

_____
_____
_____
and this supports the science concept that states

_____

TRANSFER JOURNAL

PURPOSE:

Students fill out the chart for basic concepts learned in class to apply/transfer those concepts to new ideas or areas.

DIRECTIONS:

Have students fill out the following chart for a concept or multiple concepts.

IDEA	INTERPRETATION	CONNECTION	TRANSFER	INSIGHTS/ REFLECTION
What is the big idea? (copy phrases/ sentences exactly from text)	What does it mean? (write in own words)	How can you connect the idea to another subject?	How can you transfer or apply the idea to your life?	What insight or reflection do you have from the idea?

1.

Source: Microsoft Word - METACOGactivitiesFOLDER.docx (gmercyu.edu)

I: Real world research investigation of toxins in soap, shampoo and conditioners:

J. Digital Escape Challenge