

Study Guide — BI Problem 7: Forensic Autopsy (Mid-Unit Test)

Biomedical Innovations · Problem 7 — Forensic Autopsy · Modeled on the PLTW Guided Review format

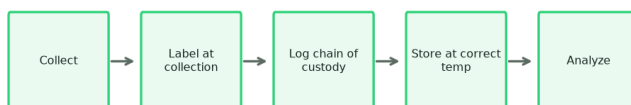
Vocabulary to know cold

Term	Definition
Chain of custody	Signed, unbroken record of every handoff of a specimen; keeps evidence admissible.
Pre-analytical error	A handling, labeling, transport, or storage mistake that happens before analysis.
Sample integrity	A specimen remaining unchanged and uncontaminated from collection to analysis.
Contamination	Introduction of an outside substance (e.g., stomach contents into blood) that distorts a result.
Sharps container	Rigid, puncture-resistant container for needles, blades, and broken glass.
Biohazard bag	Labeled red bag for soft infectious waste like gauze and gloves.
Hazardous chemical waste	Regulated chemicals (e.g., formalin) collected per SDS, never poured down a drain.
Control sample	A known-value sample run with unknowns to confirm the method/instrument is valid.
Vitreous potassium	Potassium in eye fluid that rises predictably after death, used to estimate time of death.
Controlled variable	A factor held constant so the tested variable's effect can be isolated.
Dependent variable	The measured outcome that responds to the manipulated (independent) variable.
Storage temperature	The cold conditions (refrigerated/frozen) used to slow degradation of analytes.

Worked examples (follow the reasoning)

Example 1. Using the workflow, place these steps in the correct order and explain why each protects the evidence: analyze, store at correct temp, collect, label at collection, log chain of custody.

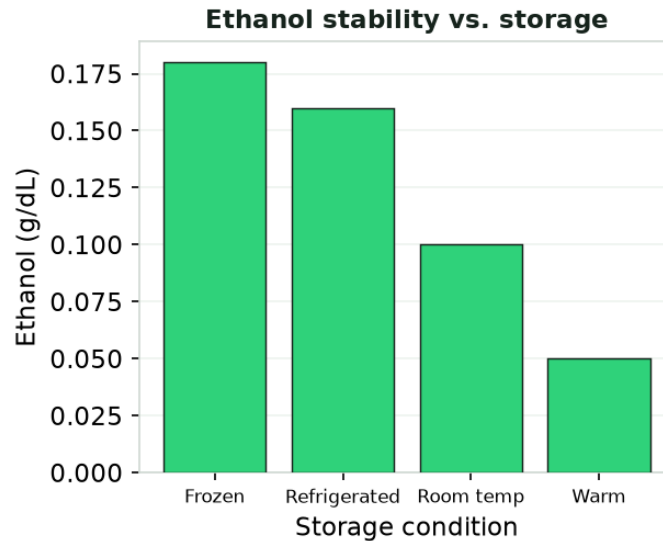
Specimen-handling workflow



- Collect: obtain the specimen using clean technique and PPE.
- Label at collection: write case ID, type, date/time, initials so identity is fixed immediately.
- Log chain of custody: record the handoff with signatures to keep it admissible.
- Store at correct temp: cold storage preserves the analyte before testing.
- Analyze: only now is the sample valid and traceable.

Answer: Collect -> Label -> Chain of custody -> Store -> Analyze; each upstream step protects identity and integrity.

Example 2. A lab stores split ethanol samples at four temperatures for 7 days. The frozen tube reads 0.18, refrigerated 0.16, room temp 0.10, warm 0.05 g/dL (initial 0.18). Which condition should the SOP require and why?



- Compare each value to the initial 0.18 g/dL.
- Frozen retained the value; warm lost the most to microbial/chemical breakdown.
- Lower readings at warmer temps would falsely underestimate intoxication.
- Therefore the SOP should require frozen (or at least refrigerated) storage.

Answer: Frozen storage; it best preserves the true ethanol concentration and prevents a falsely low result.

Practice questions (with reasoning)

1. A blood tube is collected but never labeled. The most direct consequence is:

- A. The control fails
- B. Loss of traceability / broken chain of custody
- C. Too much fixative
- D. Better accuracy

Answer: B. An unlabeled tube cannot be tied to the case, breaking the chain of custody.

2. Which belongs in the sharps container?

- A. Blood-soaked gauze
- B. A broken glass pipette
- C. Used gloves
- D. A paper requisition form

Answer: B. Broken glass can puncture and must go in the rigid sharps container.

3. In a storage-temperature experiment, what makes the test fair?

- A. Using different tubes for each temperature
- B. Holding everything constant except temperature
- C. Skipping the control
- D. Changing two variables at once

Answer: B. Controlling all other variables isolates the effect of temperature.

4. A control reads far outside its known value. The correct action is to:
- A. Report the unknowns anyway
 - B. Repeat the run before trusting any results
 - C. Delete the control
 - D. Lower the storage temperature

Answer: B. A failed control invalidates the run, so it must be repeated.