

2027-04-13 · 80 minutes

Wk13 Exit ticket: Heavy-metal exposure debate

Your goal: Debate the ethics of testing heavy-metal toxicity and who bears responsibility for environmental exposure.

One product: Written position on heavy-metal exposure responsibility, citing one factual reason and naming one genuine tradeoff in regulation.

Question: Who should lead protection and cleanup planning in fictional Cedar Court, and what testing would add useful evidence?

Start the work

1. Read E1, E2 and S1. Write the exposure route and a bounded explanation of the possible effect.
2. Read R1 and prepare two role arguments for industry, regulators or residents. If working alone, record the supplied perspectives for all three roles.
3. Compare the three roles and identify a tradeoff. Use T1 to record a benefit, concern and condition.
4. Exchange one rebuttal, or label a rehearsal using a supplied opposing claim.
5. Write your individual position with factual support, a tradeoff and uncertainty. Revise one overclaim and check Schoology after uploading.

If access is unavailable, save a dated copy and tell the teacher. Use the supplied practice for the argument; include only peer exchanges that actually occur and follow the assigned official task separately.

Words you will use

lead

A naturally occurring metal that can harm health.

heavy metal

An informal grouping used here for metals such as lead with toxicity concerns.

contamination

The presence of an unwanted substance in a place or material.

exposure

Contact with a substance through a route such as breathing or swallowing.

absorption

Movement of a substance into the body's internal circulation.

dose

The amount of a substance received.

duration

How long an exposure or event lasts.

route

The path by which exposure occurs.

tissue

A group of cells working together.

organ system

Organs that work together on major body functions.

enzyme

A molecule, usually a protein, that helps a chemical reaction occur.

inhibition

A reduction in an activity or process.

heme

An iron-containing part of hemoglobin.

hemoglobin

The oxygen-carrying protein in red blood cells.

nervous system

The brain, spinal cord and nerves that receive and send signals.

kidneys

Organs that filter blood and help regulate water and dissolved substances.

toxic substance

A substance capable of causing harmful effects under exposure conditions.

toxin

In the strict biological sense, a poisonous substance produced by a living organism.

toxicology

The study of harmful effects of substances.

stakeholder

A person or group affected by a decision or able to influence it.

regulator

A public authority that oversees rules within its assigned role.

regulation

A public rule governing an activity; today you discuss a fictional proposed rule.

ethical responsibility

A reasoned judgment about what someone ought to do.

legal liability

Responsibility established under applicable law and facts.

fairness

Reasoned treatment of benefits, burdens and people's ability to act.

tradeoff

A choice that gains a benefit while accepting a cost or competing concern.

rebuttal

A reasoned response to an opposing argument.

claim

A statement or position offered for support.

evidence

Information that supports or challenges a claim.

uncertainty

Something relevant that the evidence does not establish.

replacement

Using a suitable alternative to animal use for a research question.

reduction

Using fewer animals while still meeting the study purpose.

refinement

Changing methods or care to reduce animal distress.

model

A simplified system used to investigate a question.

limitation

A boundary on what evidence or a method can establish.

hypothesis

A testable prediction about a relationship.

variable

A feature that may differ or be measured.

control

A comparison condition used to help interpret a treatment.

protocol

A specified plan for carrying out a study.

conclusion

A statement about what evidence supports.

E1: lead exposure and health

Lead is a metal found in Earth's crust. Older paint, contaminated dust and some water pipes can be sources of exposure. A source is not proof of a person's exposure.

MedlinePlus explains that swallowing contaminated food or water and breathing lead-containing air can expose people. Lead can affect several body systems; children are especially vulnerable to developmental harm.

CDC identifies hand-to-mouth contact with lead dust as one childhood exposure route. No safe blood lead level in children has been identified.

These facts support prevention. They do not identify who contaminated a particular place, diagnose anyone, or tell us that every exposed person has the same injury.

E2: how effects can reach beyond the entry point

After lead enters the body and is absorbed, blood can carry it to tissues beyond the entry point. Its effects are not limited to the mouth or stomach.

ATSDR describes lead interfering with enzymes involved in making heme. Heme is part of hemoglobin, the protein that carries oxygen in red blood cells.

This disruption can reduce hemoglobin production. Lead can also affect the nervous system and kidneys through other cellular processes. One mechanism does not explain every possible effect.

An enzyme helps a chemical reaction occur. Inhibiting an enzyme means reducing its activity; it does not mean that every cell immediately stops working.

ATSDR explains that effects depend on amount, duration, route of contact and individual differences. Thus, a possible effect is not a guaranteed outcome from one exposure.

For this lesson, heavy metal is an informal label for metals such as lead that raise toxicity concerns. It does not mean all metals have identical biological effects.

Use toxic substance for lead. In a stricter biological sense, a toxin is a poison made by a living organism. The classroom debate concerns a chemical contaminant.

S1: fictional Cedar Court case

All details in this case are invented for discussion. Cedar Court is an old apartment block beside a former battery workshop. It represents no actual school, family or neighborhood.

In this fictional case, an inspection identifies lead-containing paint and lead in courtyard dust. The original source of the dust remains unresolved. No medical results are supplied.

The current property company receives rent and controls building repairs. It did not operate the former workshop. Residents cannot authorize major repairs to the building.

The fictional city can coordinate inspection and temporary access changes. Its repair fund is limited. A complete repair estimate, funding plan and source investigation are not yet available.

Residents want protection and clear updates. Some need access to the courtyard entrance. Closing it for work could disrupt access; delaying action could leave a possible exposure route open.

Proposed fictional regulation: require the company to give residents a written repair-status update and temporary access plan before closing the courtyard entrance. This is not an existing law.

Identify what the proposed rule could improve and what burden or delay it could create. Compare that benefit with that burden.

Choose who should lead prevention and cleanup planning now, and how costs might be shared later. Propose protection while preserving the uncertainty about source and legal fault.

This is an ethical recommendation, not a finding of legal liability. No law, court ruling, required payment share or authorized cleanup method is supplied.

R1: three stakeholder role cards

Industry role: you represent the current property company. Point 1: control of repairs and rental benefit support contributing to protection now, even while the dust source is investigated.

Industry point 2: assigning every cost before source evidence could be unfair to a current owner. Ask for a transparent cost-sharing review without using uncertainty to ignore the hazard.

Regulator role: you represent the fictional city. Point 1: coordination can protect residents who lack repair authority and can make information available to all affected people.

Regulator point 2: a limited public fund requires priorities. Spending everything here may delay other repairs; define a fair priority rule and seek contributions from parties with resources.

Resident role: you represent people living at Cedar Court. Point 1: residents face the possible exposure but do not control major repairs, so household resources should not determine basic protection.

Resident point 2: residents can report concerns and help shape access plans. Those actions matter, but they do not give residents the tools or money to remove building hazards.

For the absence task, map industry to the company, government to the city, and individuals to residents. Record two points for each side, then choose a lead responsibility.

Each role must acknowledge a burden: company costs, competing public needs, or disrupted resident access. Roles supply perspectives, not facts about actual people or a required personal opinion.

T1: opposing claims and toxicity-testing ethics

Opposing claim A: Wait for final source proof before any protective planning; otherwise the current company is blamed unfairly. Reply by separating protection now from a later liability decision.

Opposing claim B: Make residents pay because they use the building. Reply using their limited repair authority, while recognizing that residents can still report problems and shape the plan.

Opposing claim C: Pay every cost from the city fund immediately. Reply by naming the competing repair needs and explaining a priority or shared-funding rule.

In groups, exchange and record an actual opposing claim before replying. Alone, choose a supplied claim that challenges your position and label your reply as an original solo rehearsal.

The city also asks whether a new animal toxicity test would add useful knowledge. No study, organism, dose, protocol or approval is provided. Today you evaluate the question on paper.

NIEHS describes animal-testing concerns about welfare, time, resources and uncertain relevance to human health. Computer, cell-based and other methods can help answer some questions.

The 3 Rs guide this discussion: replace animal use when a suitable alternative answers the question; reduce numbers while meeting the study's purpose; refine methods to reduce distress.

A reason to seek more evidence is to answer a clearly stated unknown. A concern is imposing harm or delay for a test that repeats what is already known.

Before endorsing any study, name its missing question and ask whether existing evidence or a suitable alternative answers it. No new animal test is needed to establish that lead can be harmful.

Model findings do not automatically predict a human outcome. State one potential benefit, one ethical concern and one condition for evaluating the proposed testing. No bench work is authorized.

C1: start, repair and check your reasoning

Warmup 1: use E1 to trace one route from old paint to a child's possible exposure. Warmup 2: explain why a substance absorbed into blood could affect more than the entry organ.

Prerequisite: define heavy metal using E2 and name one old-building source. On-grade response: connect a biological fact with a fairness fact about who benefits, faces risk or controls repairs.

For a smaller starting task, use only the fictional resident role. Identify who can order repairs and who can fund them. Then add the two other roles before completing the absence record.

Self-check: why can lead affect several systems, and why does that not mean inevitable organ failure? Use absorption, transport, a cellular example and an exposure limit from E2.

Check your answer: trace lead from entry to blood to one E2 cellular process, then name what E2 says influences whether effects occur.

Extension: suppose the former workshop owner no longer exists. Propose a fair cost-sharing rule, explain who bears its burden, and name information still needed to apply it.

Lost your place? Return to R1, write two responsibility arguments, choose one opposing claim in T1, and write a reasoned response. Ask the teacher how to join any required discussion; do not invent another person's contribution.

P1: Work and submission checks

Your original task is the written position, with one factual reason and one genuine regulation tradeoff. Keep role notes, rebuttal and testing-ethics reasoning with that exit ticket.

Actual group exchange and pair-share require real classmates. The solo route supports the same reasoning; it does not claim that a peer replied or agreed.

Today's class schedule lists nothing new in myPLTW and says to write this exit ticket. Your teacher may also assign a Problem 2.3.1 ethics prompt; ask which one applies.

There may be no standalone official heavy-metal ethics screen. If the teacher assigns one, follow its prompt and retain a note or screenshot from that task for the tracker.

Do not mark official work complete merely because this original practice is finished. Ask for missing access or assigned prompts; use only evidence from work you actually do.

Problem 2.3.1 Toxic Relationships includes actual research, a hypothesis, variables, controls, teacher-directed culture work, data, graphs and a report. The supplied Module II guide and safety directions are needed.

Your real April 9 plan and April 12 literature revision remain actual inputs when available. This packet does not establish team adoption, completed preparation or an experiment in progress.

This week, April 12-16, names the research design phase and model-organism plan. Ask your teacher whether investigation, data and a report with limitations are also due.

Ask for any missing teacher-posted data/model packet, tracker or weekly-evidence directions. The April 13 schedule lists tracker and evidence in Class Records.

No homework is due before this class. April 14 is catch-up. April 15 separately lists 25 minutes of Hypothesis and protocol preparation in Class Records before the investigation.

Submit Wk13 Exit ticket: Heavy-metal exposure debate through your enrolled section. Section 1292: <https://app.schoolology.com/assignment/8544588073> . Section 6792: <https://app.schoolology.com/assignment/8544588096> .

Confirm the live assignment before submitting. If access is unavailable, save the dated response and tell the teacher. Check Schoology after uploading. Do not substitute a guessed route.

M1: a different fictional responsibility decision

A fictional library has a loose entrance step. The building owner controls repairs; the library manages access; visitors need a usable entrance. No injury is reported.

My position: the owner should arrange repair, while the library plans an accessible temporary entrance with visitors. Control of repairs is the stated fact supporting this division.

The fairness reason is that visitors should not bear a repair task they cannot authorize. The tradeoff is temporary disruption versus leaving the damaged entrance in use.

An opposing claim says to close the whole library until repairs finish. I accept the safety concern, but ask whether an inspected alternative entrance can preserve access.

No evidence here establishes that alternative explanation. I cannot claim that it is safe or that law requires this payment plan. This model separates a protective proposal from a legal conclusion.

Apply the same reasoning structure to S1. Lead requires its own biological evidence; the library example supplies neither exposure data nor a cleanup procedure.

Try the decision

Which statement respects the supplied evidence while preparing the responsibility debate?

- Plan protection while investigating the source, and distinguish an ethical cost-sharing proposal from a legal finding.
- Declare that all residents have organ failure because lead is present in courtyard dust.
- Assign the current company legal liability for all costs because it receives rent.

Explain your choice using the reading. Discuss it or say it to yourself. This practice does not add another submission.

Your 80-minute flow

0–8 minutes	Read E1, E2 and S1; write the route and bounded effect explanation.
8–22 minutes	Read R1 and prepare two role arguments; solo students record all six points.
22–40 minutes	Compare three roles, identify a tradeoff, and use T1 for benefit, concern and condition.
40–55 minutes	Exchange one rebuttal or label a supplied-claim solo rehearsal.
55–70 minutes	Write the individual position with factual support, tradeoff and uncertainty.
70–80 minutes	Revise one overclaim, pair-share when available and check Schoology after uploading.

Your response record

Use these labels on paper or in your document. The space below also works when this page is printed.

Trace exposure and read the case

Complete both C1 warmups and the prerequisite definition. Read S1 and mark known case facts and unknowns.

Use E1 and E2. A lead source does not establish a person's dose or illness.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.

Prepare responsibility arguments

Use R1 to prepare two arguments for the assigned role. For the absence route, record two points for each of industry, government and individuals.

All three role inputs are supplied. Include a fairness fact and a biological fact; label fictional case facts separately from public source facts.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.

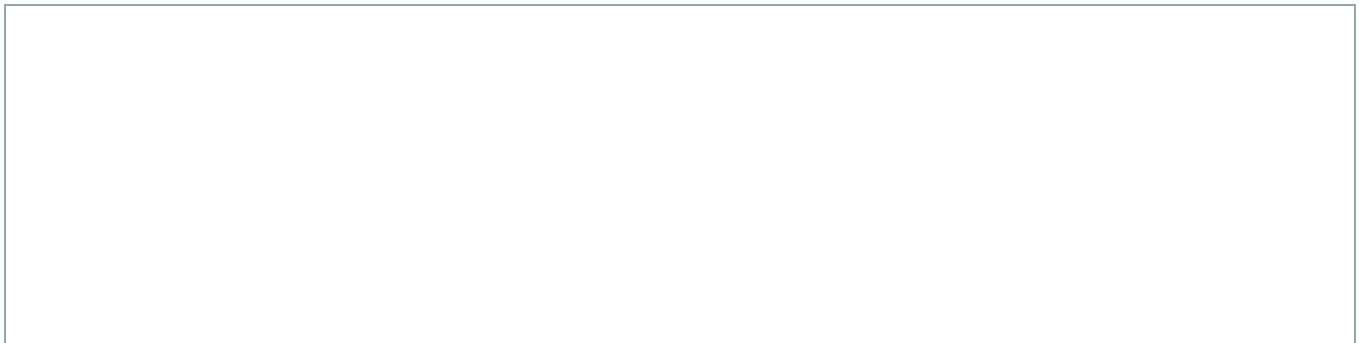


Compare all three perspectives

State the strongest argument from each role, then name one genuine regulation tradeoff. Discuss the testing question in T1 with a benefit, concern and condition.

Solo work can compare the supplied roles. A test must answer a useful unknown; do not propose a dose or conduct animal work.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.



Answer a serious opposing claim

Record one actual opposing claim and your rebuttal. If working alone, choose T1's strongest challenge to your position and label the reply a solo rehearsal.

Recognize the concern before explaining your response. If no classmate is available, ask the teacher how to join the required group exchange.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.

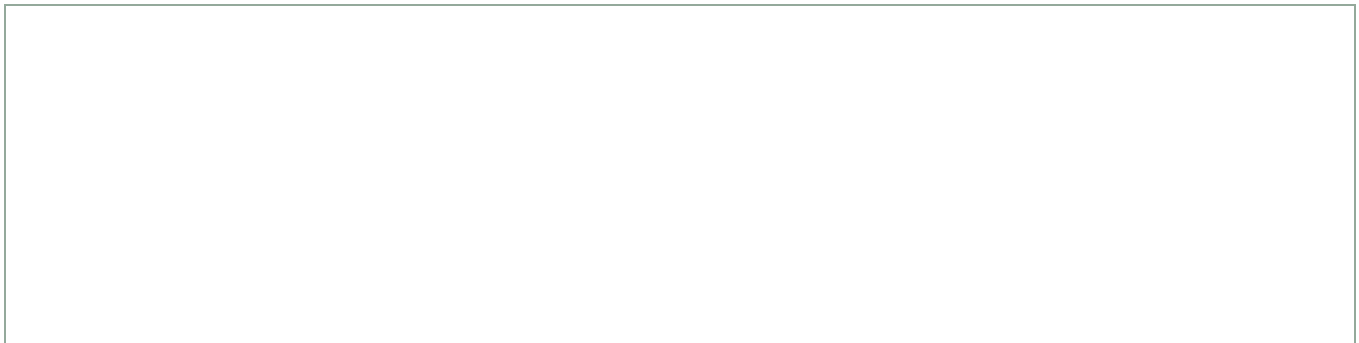


Write the exit ticket

State your position on responsibility with one factual reason and one genuine regulation tradeoff. Connect the fact to your fairness rule and name an unresolved question.

Use E1 or E2 and S1. Different lead roles or shared responsibility are acceptable when supported; no ethical preference is graded as the only answer.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.



Review, share and check your next step

Complete C1's self-check and extension when ready. Pair-share when possible. Submit the exit ticket with notes. Use P1 to identify what you need from the teacher.

The absence task still needs two points per side. A solo record does not satisfy actual peer exchange, teacher-assigned official work or live submission.

Use this space or the same labeled section in your existing document. Add paper when your table, graph or drawing needs more room.

Check your product

- Each student takes a reasoned position on responsibility.
- Groups name one genuine tradeoff in regulation.
- The record distinguishes biological evidence, fictional case facts and ethical judgments.
- The testing discussion states a possible benefit, concern and condition without authorizing a study.
- The response avoids diagnosis, unsupported blame and inevitable organ-failure claims.

Keep the limit: Original fictional discussion supports a bounded ethical recommendation. It cannot establish personal exposure, diagnosis, legal liability, a safe cleanup method, validated testing or official completion.

Turn in your work

Submit the exit ticket and supporting notes to your enrolled section: 1292

<https://app.schoology.com/assignment/8544588073> or 6792

<https://app.schoology.com/assignment/8544588096> . Confirm the live assignment. Keep the teacher-assigned note or screenshot from the official task for the tracker.

If access is unavailable, save a dated copy and tell the teacher. Use the supplied practice for the argument; include only peer exchanges that actually occur and follow the assigned official task separately.

[Section 1292: Wk13 Exit ticket: Heavy-metal exposure debate](#)

[Section 6792: Wk13 Exit ticket: Heavy-metal exposure debate](#)

Carry forward

Use evidence about possible harm to plan protection, then state the fairness rule and uncertainty behind your responsibility claim.

A later investigation needs an approved question, protocol and record plan. Today's debate does not establish that any organisms have been exposed. What must the approved record plan capture before an investigation begins?

Sources and resources

[Open today's page](#)

MP-LEAD · Lead Poisoning

MedlinePlus, National Library of Medicine; summary credited to ATSDR

<https://medlineplus.gov/leadpoisoning.html>

CDC-LEAD · About Childhood Lead Poisoning Prevention

CDC, August 21, 2025

<https://www.cdc.gov/lead-prevention/about/index.html>

ATSDR-EFFECTS · Lead Toxicity: What Are Possible Health Effects from Lead Exposure?

ATSDR Environmental Medicine, archived educational resource

https://archive.cdc.gov/www_atsdr_cdc_gov/csem/leadtoxicity/physiological_effects.html

ATSDR-DOSE · Public Health Statement: Lead

ATSDR, August 2007; used only for exposure principles

<https://www.atsdr.cdc.gov/toxprofiles/tp13-c1-b.pdf>

NIEHS-TEST · Alternatives to Animal Testing

National Institute of Environmental Health Sciences

<https://www.niehs.nih.gov/health/topics/science/sya-iccvam>

NCI-TOXIN · Toxin

National Cancer Institute dictionary

<https://www.cancer.gov/publications/dictionaries/cancer-terms/def/toxin>

IUPAC-METAL · Heavy metal

IUPAC Gold Book

<https://goldbook.iupac.org/terms/view/14739>