
READING & WRITING ASSIGNMENTS

Hidden Costs of Computing

One theme - four different reading options.

In this packet (suggested pairings):

- **AP Computer Science Principles**
You Bought It. Can You Fix It? (Right to Repair)
- **AP Computer Science A**
The Footprint of a Prompt (AI Data Centers)
- **Cybersecurity**
The Data That Wouldn't Die (E-Waste & Data Remanence)
- **Independent Study**
The Hands Behind the Battery (Cobalt)

Each assignment shares the same spine: a specific story, the broader concept, at least four of your own sources, tiered questions, and a prepared for/against debate.

You Bought It. Can You Fix It?

The Right to Repair

The Story That Started This

I'm really into coffee. Back when I was student teaching, I worked as a barista at a shop in Austin to help pay the bills, and I saved up for a nice variable-temperature kettle. It was great... right up until it broke. Frustrated, I went hunting online for a schematic, a repair guide, anything that might help me fix it myself. I came up empty: the manufacturer simply doesn't publish that information. So my expensive kettle has been sitting in the back of a cabinet ever since, waiting for me to find some more time to fix it - five years and counting.

Now picture a farmer whose tractor breaks down in the middle of harvest. He can see the problem. He has the tools. But the tractor is a **John Deere**, and its software won't let the repair "count" until an authorized Deere technician plugs in a laptop and approves it - which can mean days of waiting and a big bill while the crop rots. Farmers got so fed up that some started flashing their tractors with bootleg Ukrainian firmware just to fix their own machines.

That fight finally cracked open. In 2026, Deere paid **\$99 million** to settle a class action, and the FTC secured a settlement forcing Deere to give owners and independent shops the same diagnostic and repair tools its dealers get. And it's not just tractors: as of 2026, right-to-repair laws are in effect in states including California, New York, Minnesota, Colorado, Oregon, and Washington, forcing electronics makers to sell parts, tools, and manuals to ordinary people. Even Apple - which fought repair for years - now runs a self-service repair program. The thing you "own" is finally starting to be yours to fix.

The Bigger Idea

Here's a hidden cost of modern computing you rarely see on the price tag: when you buy a device, you often don't fully control it. Manufacturers use software locks, "parts pairing" (where a new screen or battery won't work unless the company's system blesses it), and withheld manuals to funnel all repairs through themselves. That makes fixes slower and pricier, pushes people to just buy new, and quietly turns ownership into something more like a long-term rental (see: streaming platforms).

The "right to repair" movement argues a simple thing: if you own it, you should be able to fix it - or pay whoever you want to fix it. That collides with how a lot of the tech economy is built, where the sale is just the start of a long relationship designed to keep you paying the maker.

Why This Is Tricky

Manufacturers make legitimate arguments: locked-down repair can protect safety, security, and quality, and independent fixes can go wrong. Repair rules can also expose intellectual property. But the costs of *not* having repair rights are just as real - higher prices for consumers, more e-waste for the world, and less actual ownership. And you may have a slightly different stance depending on the product, time, or place. Where do you stand in this debate?

Step 1 - Read

The first two cover the 2026 breakthroughs and the movement; the third is a law firm's more industry-aware read of the same landscape.

- **The breakthrough (FTC)** - the FTC and states secure a right-to-repair settlement with Deere.
<https://www.ftc.gov/news-events/news/press-releases/2026/07/ftc-states-secure-settlement-deere-company-advancing-farmers-right-repair>
- **The movement (CNBC)** - a populist wave rising to end the “captive” repair economy.
<https://www.cnn.com/2026/04/25/right-to-repair-consumer-prices-affordability-economy-elections.html>
- **The industry read (Arnold & Porter)** - Deere's \$99M settlement and the right-to-repair landscape.
<https://www.arnoldporter.com/en/perspectives/blogs/consumer-products-and-retail-navigator/2026/04/john-deeres-99-million-settlement-and-the-right-to-repair-landscape>

Step 2 - Research on Your Own

Find **at least four more** reputable sources you dig up yourself - your own state's repair law, a company's official position, iFixit, or reporting on “parts pairing.” Random social-media posts don't count. You'll cite these in your paper and lean on them in the debate.

Step 3 - Written Response

Turn in a typed paper. Answer in complete sentences. Point values are shown; total is **25 points**.

Comprehension

1. What is the “right to repair,” and what specific tactics do manufacturers use to limit repair? (2 pts)
2. What changed for John Deere owners in 2026? (2 pts)

Analysis

1. Who benefits from repair restrictions, and who bears the cost? Name at least two groups on each side and explain each. (3 pts)
2. Explain how software locks and “parts pairing” turn something you bought into something you don't fully control - and connect that to price and e-waste. (3 pts)
3. Manufacturers cite safety, security, and quality to justify repair restrictions. Are those reasons enough? Take a position and support it with evidence. (5 pts)

Position

Take a clear position on the resolution below and argue it - this is the required part.

1. Where do you stand on the resolution? Argue your side using evidence from at least two of the sources you found, then fairly state the single strongest argument against your view and respond

to it.

(10 pts)

(OPTIONAL) Prepare Both Sides

Your teacher may ask you to be ready to argue *either* side. If so, also prepare a short case for each:

1. The strongest case **FOR** the resolution, backed by evidence you found yourself.
2. The strongest case **AGAINST** the resolution, backed by evidence you found yourself.

Step 4 - (OPTIONAL) Class Debate

Resolved: *“Consumers should have a legal right to repair the devices they own.”*

If your teacher runs the debate, you’ll defend a position on this resolution, and you may be **assigned a side at random** - which is why the optional prep above asks you to be ready for both. You won’t have your paper or notes with you, so know your evidence well enough to argue from memory.

Two rules make the debate work:

1. **Evidence only.** Every claim points to a specific source for evidence, not a feeling.
2. **Steelman first.** Before you rebut the other side, restate their strongest argument fairly enough that they’d nod along. Then tell your tale.

One More Thing

There is an overall trend away from “owning” things towards “renting” things. Consider movies and TV shows, once owned and now “rented” via streaming platforms (e.g. Amazon Prime, Netflix). Or think of video game makers moving away from physical cartridges towards downloading games. Or Apple, which just released an option to lease (read: rent) a phone/laptop. Every piece of hardware and software you’ll ever own comes with hidden rules about what you’re allowed to do with your own property. This is a chance to notice those rules - and to decide what you think “owning” something should actually mean.

The Footprint of a Prompt

AI, Data Centers, and the Cost of “the Cloud”

The Story That Started This

When ChatGPT first came out, it felt like everyone and their parents became an overnight expert. Suddenly there were takes on everything: how to optimize your prompts (the instructions you feed the AI), whether it would help or hinder jobs (where you stood usually depended on who signed your paycheck), and its broader benefits and harms to the world. This assignment focuses in on the environmental cost of AI.

You type a question into an AI chatbot, it thinks for a moment... and then answers with more detail and patience than your best friend. It feels like magic - weightless, free, conjured out of thin air. Well, it isn't. Somewhere, in a warehouse the size of several football fields, thousands of processors just fired up to answer you and millions of others, drawing electricity off the grid and drinking water to keep from overheating.

One estimate puts a single 100-word response from a state-of-the-art AI model at around **half a liter of water** and **0.14 kWh of electricity** - enough to run several LED bulbs for an hour, for one reply. Multiply by the roughly **2.5 billion prompts a day** that a popular chatbot might handle, and you're looking at the water and power use of a small city, just for that one product. Zoom all the way out and global data centers used about **448 terawatt-hours** of electricity in 2025, on track to more than double by 2030. “The cloud” turns out to be very much on the ground.

The Bigger Idea

Here's the hidden cost most people never connect to computing: every **abstraction** you rely on is running on physical hardware that consumes real resources. “The cloud” is just a marketing word for someone else's data center - a building full of servers that need constant electricity and constant cooling, often with water. AI made this dramatically worse, because training and running large models is enormously compute-hungry (aka takes a lot of computing power).

There's a detail here that should interest you as a programmer: most of AI's energy is spent not on *training* the model once, but on **inference** - answering the billions of everyday requests after it's deployed. Estimates put inference at 80-90% of a deployed model's energy use. That means efficiency in the code and processes that serves those requests isn't just an academic nicety about Big-O. At this scale, a more efficient algorithm is measured in power plants and reservoirs.

Why This Is Tricky

AI isn't just cat pictures and chatbots - it's helping design drugs, model climate, and detect disease, and those uses may save resources elsewhere. So "AI is bad for the planet" is too simple of an argument. The honest question is about *tradeoffs*: which uses are worth the footprint, who pays the environmental bill (often communities near data centers, in higher electric bills and stressed water supplies along with negative health outcomes), and whether the benefits are shared as widely as the costs.

Step 1 - Read

The first two lay out the energy, water, and land costs; the third looks at who pays locally through bills and water.

- **The footprint (United Nations University)** - the environmental cost of AI's energy, carbon, water, and land use.
<https://unu.edu/inweh/news/environmental-cost-of-AIs-Energy-use-carbon-water-and-land-footprints>
- **The scale (PBS NewsHour)** - energy, water, and pollution of AI and data centers rival whole countries.
<https://www.pbs.org/newshour/science/energy-water-use-and-pollution-of-ai-and-data-centers-rival-most-countries>
- **The local bill (Consumer Reports)** - AI data centers' impact on electric bills, water, and more.
<https://www.consumerreports.org/data-centers/ai-data-centers-impact-on-electric-bills-water-and-more-a1040338678/>

Step 2 - Research on Your Own

Find **at least four more** reputable sources you dig up yourself - a study on AI energy or water use, reporting on a specific data center's local impact, or industry efforts to run on clean power. Random social-media posts don't count. You'll cite these in your paper and lean on them in the debate.

Step 3 - Written Response

Turn in a typed paper. Answer in complete sentences. Point values are shown; total is **25 points**.

Comprehension

1. Where does the electricity and water actually go when you send an AI prompt? (2 pts)
2. What is the difference between *training* and *inference*, and which one uses most of a deployed model's energy? (2 pts)

Analysis

1. Who benefits from large-scale AI, and who bears its environmental costs? Name at least two groups on each side and explain each. (3 pts)
2. At data-center scale, doing something more efficiently is measured in real electricity and water - not just in speed. Explain why that is, and where in an AI system (training or inference) that efficiency matters most. (3 pts)
3. Estimate the footprint of your own AI use for a week (prompts $\times$ per-prompt cost), state your assumptions, and reflect on what the number does or doesn't tell you. Compare this footprint with not using AI. (5 pts)

Position

Take a clear position on the resolution below and argue it - this is the required part.

1. Where do you stand on the resolution? Argue your side using evidence from at least two of the sources you found, then fairly state the single strongest argument against your view and respond to it. (10 pts)

(OPTIONAL) Prepare Both Sides

Your teacher may ask you to be ready to argue *either* side. If so, also prepare a short case for each:

1. The strongest case **FOR** the resolution, backed by evidence you found yourself.
2. The strongest case **AGAINST** the resolution, backed by evidence you found yourself.

Step 4 - (OPTIONAL) Class Debate

Resolved: *“The environmental cost of today’s AI outweighs its benefits.”*

If your teacher runs the debate, you’ll defend a position on this resolution, and you may be **assigned a side at random** - which is why the optional prep above asks you to be ready for both. You won’t have your paper or notes with you, so know your evidence well enough to argue from memory.

Two rules make the debate work:

- 1. Evidence only.** Every claim points to a specific source for evidence, not a feeling.
- 2. Steelman first.** Before you rebut the other side, restate their strongest argument fairly enough that they’d nod along. Then tell your tale.

One More Thing

The whole point of “the cloud” is that you’re not supposed to think about the machine - you can handwave it away and make it someone else’s problem to deal with. This assignment asks you to think about it anyway - because the code you write, the tools you use, and the decisions you take have an actual physical footprint. Noticing it is the first step to shrinking it.

The Data That Wouldn't Die

E-Waste and Data Remanence

The Story That Started This

It's the summer of 2026. I've still got a drawer of old cell phones from my college days - each one quietly holding years of my texts, photos, and logins. Around the same time, I went looking to buy a few hard drives to build a home NAS (network-attached storage), only to find that new drives are absurdly expensive right now. So, like a lot of people, I started eyeing pre-owned, "recertified" drives instead. Which got me wondering: when a used drive shows up at your door, what's still on it?

An IT consultant in Oklahoma bought some used hard drives off an online auction site. When he powered them up, they weren't blank. They were full of the private financial records of **Morgan Stanley** customers - and he emailed the bank to tell them so.

Here's how that happened. Morgan Stanley had retired thousands of old servers and hired a moving company - with no data-destruction experience - to clear them out. The movers didn't wipe the drives; they just **resold about 4,900 devices**. The hardware even had encryption software built in, but nobody had ever actually switched it on. Personal data on roughly **15 million customers** went out the door on these auctioned drives, most of which were never recovered. In 2022 the SEC fined Morgan Stanley **\$35 million**. The breach didn't come from a hacker breaking in. It came from a company throwing something away.

The Bigger Idea

We usually picture the "hidden cost" of e-waste as an environmental one - toxic mountains of discarded electronics. There's a second hidden cost that's pure cybersecurity: **data remanence**, the stubborn fact that data survives on a device long after you think it's gone. Dragging a file to the trash, or even a quick "delete," usually just removes the *pointer* to the data while the bits sit there, fully recoverable with free tools. The data outlives the device's life with you.

This turns every discarded phone, laptop, hard drive, and even office copier into a potential breach. Researchers who buy secondhand devices in bulk routinely recover Social Security numbers, medical records, photos, and corporate secrets. Properly destroying data means actively overwriting it, encrypting it, or physically shredding the drive - a step that's easy to skip because the risk is invisible. Nothing looks wrong - the laptop is just has been "disposed" of as required.

Why This Is Tricky

Doing it right has friction. Wiping and shredding cost time and money; recycling and reselling old gear is good for the environment and the budget, but every resold device is a remanence risk. And who *owns* that risk when you hand a device to a recycler, a school, or a buyer - you, or them? Morgan Stanley outsourced disposal and still got fined. That tension between convenience, sustainability, and security is the whole debate.

Step 1 - Read

The first two cover the Morgan Stanley case and the fine; the third looks at the data-center disposal angle, useful for understanding scale.

- **The breach (CBS News)** - Morgan Stanley fined \$35 million for failing to protect customer data.
<https://www.cbsnews.com/news/morgan-stanley-35-million-sec-fine/>
- **The details (Banking Dive)** - fined by the SEC over improper data disposal and an online auction.
<https://www.bankingdive.com/news/morgan-stanley-fine-35m-sec-customer-data-disposal-online-auction/632244/>
- **The pattern (Data Center Dynamics)** - Morgan Stanley fined again over a data-center decommissioning failure.
<https://www.datacenterdynamics.com/en/news/morgan-stanley-fined-another-35-million-over-data-center-decommissioning-snafu/>

Step 2 - Research on Your Own

Find **at least four more** reputable sources you dig up yourself - a study that recovered data from secondhand devices, a guide to secure data destruction (look up “NIST 800-88”), or reporting on e-waste and data. Random social-media posts don’t count. You’ll cite these in your paper and lean on them in the debate.

Step 3 - Written Response

Turn in a typed paper. Answer in complete sentences. Point values are shown; total is **25 points**.

Comprehension

1. What is data remanence, and why doesn’t “delete” actually get rid of your data? (2 pts)
2. What went wrong in the Morgan Stanley case, and why is it interesting that no one “hacked” anything? (2 pts)

Analysis

1. Who is put at risk by careless device disposal, and who saves resources (time, money) by cutting corners? Name at least two groups on each side. (3 pts)
2. Explain the technical difference between *deleting* a file, *overwriting* it, and *physically destroying* a drive - and why only some of these defeat data remanence. (3 pts)
3. Recycling old electronics is good for the planet but risky for data. How should someone weigh sustainability against security when getting rid of a device? Argue your view with evidence. (5 pts)

Position

Take a clear position on the resolution below and argue it - this is the required part.

1. Where do you stand on the resolution? Argue your side using evidence from at least two of the sources you found, then fairly state the single strongest argument against your view and respond to it. (10 pts)

(OPTIONAL) Prepare Both Sides

Your teacher may ask you to be ready to argue *either* side. If so, also prepare a short case for each:

1. The strongest case **FOR** the resolution, backed by evidence you found yourself.
2. The strongest case **AGAINST** the resolution, backed by evidence you found yourself.

Step 4 - (OPTIONAL) Class Debate

Resolved: *"You, not the recycler or manufacturer, are responsible for wiping a device before you get rid of it."*

If your teacher runs the debate, you'll defend a position on this resolution, and you may be **assigned a side at random** - which is why the optional prep above asks you to be ready for both. You won't have your paper or notes with you, so know your evidence well enough to argue from memory.

Two rules make the debate work:

1. **Evidence only.** Every claim points to a specific source for evidence, not a feeling.
2. **Steelman first.** Before you rebut the other side, restate their strongest argument fairly enough that they'd nod along. Then tell your tale.

One More Thing

You will get rid of many devices over your lifetime. Every one of them is a little time capsule of your data unless you deliberately destroy it. While the environmental cost of e-waste is real, so is the one nobody sees, sitting on a small drive in someone else's hands.

The Hands Behind the Battery

Cobalt, Labor, and the Supply Chain You Can't See

The Story That Started This

The device in your pocket runs on a lithium-ion battery, and that battery needs **cobalt**. Over half of the world's cobalt comes from the Democratic Republic of the Congo. And a meaningful share of it is dug by hand, in unregulated "artisanal" mines, sometimes by **children as young as seven**, crawling through narrow tunnels with no safety gear for as little as **\$2 a day**. Amnesty International traced this cobalt from those mines up through the supply chain and into the batteries of some of the most valuable companies on Earth.

In 2019, human-rights lawyers sued Apple, Google, Microsoft, Dell, and Tesla on behalf of Congolese families whose children were killed or maimed mining cobalt. In 2024, a U.S. appeals court **dismissed** the case, ruling that buying cobalt through a global supply chain doesn't legally count as "participating" in the forced labor that produced it. The harm was documented. The chain was traced. And the law still couldn't quite reach across the distance between a mine in the Congo and a phone in your hand.

The Bigger Idea

Every computing device carries a hidden cost that never appears on the documentation or spec sheet: the human and environmental toll of pulling its raw materials out of the ground. We talk about phones in terms of cameras and chips, but they begin as cobalt, lithium, tin, and rare earths - mined, and often in places with weak protections and enormous demand pressure. The magic of a sleek finished product is that it hides everything upstream of it.

This is a case study in **moral distance**. A long, complex supply chain diffuses responsibility until no single link feels accountable: the miner is desperate, the supplier is opaque, the manufacturer says it can't verify every gram, and you at the end just wanted a phone. The 2024 court ruling essentially made that diffusion official. And it isn't only a tech problem. The same question drives people to give up meat, or to pay extra for "fair-trade" coffee or chocolate: how much of the harm hidden behind a product belongs to the person who buys it? So the hard question isn't just legal, it's ethical: when harm is real but responsibility is spread across thousands of hands, does anyone owe anything - and do you?

Why This Is Tricky

Artisanal mining is a livelihood for hundreds of thousands of people; a clumsy boycott could put families out of work rather than protect them. Companies do attempt to run auditing and "responsible sourcing" programs, though critics call them weak. And cobalt powers the electric-vehicle batteries meant to fight climate change. Doing right by the people at the bottom of the supply chain is harder than it looks.

Step 1 - Read

The first is Amnesty's original investigation; the second reports the lawsuit; the third is the advocates' case file, which lays out the legal argument.

- **The investigation (Amnesty International)** - child labour behind smartphone and electric-car batteries.
<https://www.amnesty.org/en/latest/news/2016/01/child-labour-behind-smart-phone-and-electric-car-batteries/>
- **The lawsuit (CBS News)** - Apple, Google, Microsoft, Tesla, and Dell sued over cobalt mining in Congo.
<https://www.cbsnews.com/news/apple-google-microsoft-tesla-dell-sued-over-cobalt-mining-children-in-congo-for-batteries-2019-12-17/>
- **The legal case (International Rights Advocates)** - the cobalt case file, Doe v. Apple et al.
<https://www.internationalrightsadvocates.org/cases/cobalt>

Step 2 - Research on Your Own

Find **at least four more** reputable sources you dig up yourself - reporting on cobalt or lithium mining, a company's "responsible sourcing" policy, or scholarship on supply-chain ethics. Random social-media posts don't count. You'll cite these in your paper and lean on them in the debate.

Step 3 - Written Response

Turn in a typed paper. Answer in complete sentences. Point values are shown; total is **25 points**.

Comprehension

1. Why is cobalt in your devices, and what conditions did Amnesty document in parts of the DRC supply chain? (1 pts)
2. What did the 2019 lawsuit allege, and how did the court rule in 2024? (1 pts)

Analysis

1. Who benefits from cheap cobalt, and who bears the cost? Name at least two groups on each side and explain each. (2 pts)
2. Explain the idea of "moral distance" in a supply chain - how a long chain can leave real harm with no one clearly responsible. (3 pts)
3. Some people change what they eat because of how animals or workers in the food supply chain are treated. Is buying a phone built on cobalt any different? Explain what's the same and what's not. (3 pts)
4. The court said buying cobalt isn't legally "participating" in forced labor. Is that morally satisfying? Argue whether buyers bear responsibility for harm far up their supply chain, with evidence. (5 pts)

Position

Take a clear position on the resolution below and argue it - this is the required part.

1. Where do you stand on the resolution? Argue your side using evidence from at least two of the sources you found, then fairly state the single strongest argument against your view and respond to it. (10 pts)

(OPTIONAL) Prepare Both Sides

Your teacher may ask you to be ready to argue *either* side. If so, also prepare a short case for each:

1. The strongest case **FOR** the resolution, backed by evidence you found yourself.
2. The strongest case **AGAINST** the resolution, backed by evidence you found yourself.

Step 4 - (OPTIONAL) Class Debate

Resolved: *“Consumers share moral responsibility for the labor conditions behind the devices they buy.”*

If your teacher runs the debate, you'll defend a position on this resolution, and you may be **assigned a side at random** - which is why the optional prep above asks you to be ready for both. You won't have your paper or notes with you, so know your evidence well enough to argue from memory.

Two rules make the debate work:

1. **Evidence only.** Every claim points to a specific source for evidence, not a feeling.
2. **Steelman first.** Before you rebut the other side, restate their strongest argument fairly enough that they'd nod along. Then tell your tale.

One More Thing

Every electronic device you will ever own starts the same way: with resources mined from the ground, often by someone far younger and poorer than you. You are statistically never going to meet that person. The question is whether that distance - the fact that you can't see them - actually changes what you owe them, if anything at all. Sit with it.