

Should the Festival Switch to Corn Cups? A Claim-Evidence-Reasoning Case

Learning target: I can use qualitative evidence about where a synthetic material comes from, what it does at the end of its life and where a town's waste actually goes to argue whether switching materials would help, and I can spot a claim that the evidence does not support.

Claim, evidence, reasoning

About 45 min

Individual

MS-PS1-3 · assesses

MS-ETS1-2 · practice

writing

data analysis

reading

Name _____

Date _____

Period _____

Directions

Read the scenario, the audit data, the reference table, the town facts and the vendor's flyer. Answer the warm-up questions first; they will organize your evidence. Then write your Claim, Evidence and Reasoning. Your claim can be yes, no, or yes-with-conditions, but it must follow from the evidence, and your reasoning must explain why 'biodegradable' depends on where the cups actually go. Give both materials a fair hearing: each has a real benefit and a real cost.

You will need: This worksheet, Pencil, Scrap paper for the three arrows, Calculator (optional)

The scenario

Every July the town of Cedar Hollow holds a three-day music festival on the fairgrounds. Last year the food booths handed out about 12,000 drinks in clear PET plastic cups. A town council member has proposed a rule for this year: all booths must switch to PLA cups made from corn, because 'they are biodegradable and PET is not.' A cup supplier has sent the council a flyer. Before the vote, the council asked the high school science club to review the evidence and write a recommendation. The club collected the audit from last year's cleanup crew and looked up what the two materials actually do.

Where last year's 12,000 PET cups ended up (teaching dataset)

Simulated teaching dataset: the numbers are invented to be realistic, not measured.

Where the cups were found	Number of cups	What happened to them next
Recycling bins	4100	Sent to the county sorting plant; about 1 in 5 rejected for food contamination
Trash bins	7300	Sent to the county landfill, 20 km away
On the ground or in the creek	600	Picked up by volunteers and sent to the landfill

Simulated cleanup audit. The crew counted cups in each kind of bin and on the ground at the end of each night.

What the two cup materials actually do (reference facts)

	PET cup	PLA cup
Natural resource it comes from	petroleum (nonrenewable; drilling and refining can pollute)	corn starch (renewable crop; growing it uses farmland, water and fertilizer)
How it is made	petroleum-derived molecules are reacted and joined into long PET chains	glucose from corn starch is fermented to lactic acid, which is joined into long PLA chains
In an industrial composter (about 58 °C, moist, aerated)	does not break down	breaks down over weeks to months; the common standard is 90 percent within 180 days
In a landfill, a backyard pile, a creek or on the ground	lasts for decades or longer	lasts for years; no useful breakdown
In the recycling stream	recyclable where accepted; sorted and melted into new products	not recyclable with PET; looks like PET, and even a small amount can spoil a melted batch of PET

Cedar Hollow facts (from the town public works office; teaching scenario) — 1. All festival trash goes to the county landfill. 2. The county recycling plant accepts PET cups but rejects any load found to contain PLA. 3. The nearest industrial composting facility is 140 km away. A hauler quoted \$900 to collect festival food waste and cups in separate bins and deliver them there, and the booths would need a volunteer at every bin to keep PET and trash out. 4. Cost per cup: PET 4 cents, PLA 6 cents. 5. The fairgrounds has no dishwashing facility.

The supplier's flyer (fictional advertisement, printed exactly as received) — GreenLeaf cups are made from corn, so they are 100 percent natural. Toss one anywhere and it vanishes in 45 days. Zero impact on the planet. Switch today and never think about plastic waste again.

Warm-up: organize the evidence

1. From the audit, calculate the percent of cups that reached the recycling bins and the percent that went to the landfill (trash bins plus ground). Show your work.

2. Suppose this year's cups are PLA and people throw them away exactly as they did last year. Using the reference table and the town facts, describe what happens to a PLA cup that lands in (a) a recycling bin, (b) a trash bin, and (c) the creek.

3. The flyer makes four claims. Pick the two you think are least supported and, for each, write the evidence from this sheet that contradicts it. Then name one claim in the flyer that is at least partly true.

Your recommendation

CLAIM

Claim: Should the festival switch from PET cups to PLA cups this year? Answer yes, no, or yes only if a specific condition is met, in one clear sentence.

EVIDENCE

Evidence: Give at least four specific pieces of evidence from the audit, the reference table and the town facts, with numbers where they exist (for example, how many cups went where, what PLA does in a landfill, what happens to PLA in the recycling stream, what composting access would cost). Include at least one fact that favors PLA and one that favors PET.

REASONING

Reasoning: Explain how your evidence leads to your claim. Your reasoning must explain why 'biodegradable' depends on the conditions a material ends up in, and must weigh PLA's benefit (a renewable source) against its costs in this particular town. If you chose 'yes with a condition,' explain why that condition changes the outcome.

4. The council member's argument was 'PLA is biodegradable and PET is not.' Rewrite that sentence so that it is accurate for Cedar Hollow. Then name one change the town could make that would most change your claim, and explain why.

Follow the cup

Before writing, draw three arrows on scrap paper, one for each place a cup can land (recycling bin, trash bin, ground). At the end of each arrow write where that cup goes in Cedar Hollow and what the reference table says PET and PLA do there. The arrow that catches the most cups (use the audit numbers) is the one your reasoning should spend the most words on. Sentence frame for the claim: 'The festival should _____ because, in Cedar Hollow, most cups end up _____, where PLA _____.'

A third option

The council also received a proposal for a deposit system: festival-goers pay \$2 for a sturdy reusable polypropylene cup, refill it all weekend and get the \$2 back when they return it, after which the cups are washed in town and stored for next year. Using W5's break-even idea (a reusable plastic cup takes roughly 30 times the energy of a single-use cup to make), write a second CER on whether this option beats both PET and PLA for Cedar Hollow. Name the two pieces of evidence you would need that this sheet does not give you, such as the return rate and the number of years the cups would last.