6-8 Sustainable Engineering Design Challenge — Weekly Student Pack

NAME	DATE	CLASS / PERIOD
_____	_____	_____

What you'll learn this week

A five-session engineering design challenge where students target one real waste stream in their classroom, school or cafeteria, then prototype and iterate twice. Uses the NGSS engineering design loop with explicit Define-Develop-Optimize phases. Ends with a Friday design review using a real industry critique format.

My goals for the week

- [ ] Session 1: I can define a measurable design problem from observed waste, with clear constraints and one success criterion.
- [ ] Session 2: I can brainstorm 8+ solutions and choose one using a 2-axis decision matrix (impact × feasibility).
- [ ] Session 3: I can prototype version 1 with materials at hand and identify the failure points before testing.
- [ ] Session 4: I can test v1, gather one kind of quantitative + one kind of qualitative data, and make ONE substantive change.
- [ ] Session 5: I can present v2 in a structured design review and incorporate one piece of critique.

Session 1

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TODAY'S GOAL

I can define a measurable design problem from observed waste, with clear constraints and one success criterion.

WORDS I NEED TO KNOW

Today's plan

1. Warm-up: "In the next 10 minutes, walk this hallway and the cafeteria entry. Count one wasteful thing."
2. Lesson: MS-ETS1-1 problem-statement frame: For [user], [the current state] is [bad outcome] because [cause]. Success…
3. Practice together: Triads draft using the frame for the waste stream they observed.
4. Practice on my own: Each team finalizes their statement with at least one number in the success criterion.
5. Exit ticket: Gallery walk; teams add one critique sticky to one other team.

MY PRACTICE — SHOW YOUR WORK

EXIT TICKET — before you leave today

Prompt: Gallery walk; teams add one critique sticky to one other team.

Session 2

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TODAY'S GOAL

I can brainstorm 8+ solutions and choose one using a 2-axis decision matrix (impact × feasibility).

WORDS I NEED TO KNOW

Today's plan

1. Warm-up: "Bad ideas first." 90-second team brainstorm of 5 deliberately bad solutions. Loosens up.
2. Lesson: Walk decision-matrix logic: high impact × high feasibility wins. Show how to honestly score feasibility…
3. Practice together: Teams generate 8+ solutions, score on the matrix, defend their pick to a sister team.
4. Practice on my own: Each team writes a one-paragraph chosen-solution rationale.
5. Exit ticket: Whip-around: one solution that almost won and why it didn't.

MY PRACTICE — SHOW YOUR WORK

EXIT TICKET — before you leave today

Prompt: Whip-around: one solution that almost won and why it didn't.

Session 3

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TODAY'S GOAL

I can prototype version 1 with materials at hand and identify the failure points before testing.

WORDS I NEED TO KNOW

Today's plan

1. Warm-up: "Version 1 is supposed to fail. That's data."
2. Lesson: Show two prototypes — one over-built (precious), one minimum-viable. The MVP teaches faster.
3. Practice together: Teams sketch first, then build. Walk room — push 'what's the smallest thing you can build today that proves…
4. Practice on my own: Build v1.
5. Exit ticket: Each team predicts: 'Our v1 will probably fail at ___.'

MY PRACTICE — SHOW YOUR WORK

EXIT TICKET — before you leave today

Prompt: Each team predicts: 'Our v1 will probably fail at ___.'

Session 4

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TODAY'S GOAL

I can test v1, gather one kind of quantitative + one kind of qualitative data, and make ONE substantive change.

WORDS I NEED TO KNOW

Today's plan

1. Warm-up: "You get one change. Choose it from data, not from feelings."
2. Lesson: Quant data = a number that changed. Qual data = what users said. Walk through how to weigh them.
3. Practice together: Teams test v1 in context; collect both kinds of data.
4. Practice on my own: Make the one change!' v2.
5. Exit ticket: Each team logs the change + why.

MY PRACTICE — SHOW YOUR WORK

EXIT TICKET — before you leave today

Prompt: Each team logs the change + why.

Session 5

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TODAY'S GOAL

I can present v2 in a structured design review and incorporate one piece of critique.

WORDS I NEED TO KNOW

Today's plan

1. Warm-up: Show how an industry design review runs: 5 min pitch, 5 min critique, no defensiveness.
2. Lesson: Set ground rules: presenters listen and write critique down silently; respond after the timer.
3. Practice together: Two reviews per round; rotate.
4. Practice on my own: Each team picks ONE piece of critique to act on next week and writes it down.
5. Exit ticket: Public commitment: one critique, one action, one date.

MY PRACTICE — SHOW YOUR WORK

EXIT TICKET — before you leave today

Prompt: Public commitment: one critique, one action, one date.

My Week — Reflection

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How did it go?

One thing I'm proud I learned this week:

One thing that was tricky for me:

A question I still have:

How I'd rate my effort this week (1–5) and why: