

# STEM Week Planning Guide

## Plastic Waste



This strategic planning document serves as a guide as you prepare to embark on the exciting and engaging STEM Week Challenge with your students. The goal of this resource is to spur your thinking as you determine the best plan for implementation. Used in combination with the Teacher Guide, the lists below identify logistical topics of consideration and items to organize and source before you start the STEM Week Challenge.

### Logistics and Additional Personnel

- Organize and store all materials needed for the challenge.
- Print all materials and handouts required.
- Invite your building administrator(s) to visit your classroom during the challenge.
- Identify additional staff you would need to be involved and contact them with how they can help with the challenge.
- Identify industry/community/family potential partners in the STEM challenge and contact them with details on how they can support your implementation and enhance the student experience.

### Materials and Equipment

Preview the lists of materials below. The first list provides an overview of the items provided to you in the STEM Week kit. The second list is the items you will have to source or prepare to implement the challenge. Make sure to plan and inventory all these items before beginning implementation in your classroom.

## STEM Week Kit

APB	Item
Activity 2	Plastic pellets
Project	4 Polyester Swatches, cut into 2” by 2”
	6 Dissecting needles
	6 Coffee filters
	Classroom set—steel wool
	6 Magnifying glasses (10x)
Problem	Electric kit <ul style="list-style-type: none"> <li>• 6 DC motors</li> <li>• 6 mounting brackets</li> <li>• 6 propellers</li> <li>• 6 battery holders</li> <li>• 6 switches</li> <li>• 12 electronic wires</li> <li>• 86 gears</li> <li>• 1 heat shrink tube</li> </ul>

## Teacher Supplied and/or Prepared

APB	Item
Activity 1, Activity 2, Project, Problem	Teacher computer with projector
	Student computers with access to the Internet (recommended)
	Plastic Waste Student Packet (1 per student)
Activity 1	Items for materials comparison station (see the Preparation section of Activity 1 on page 12 of your Teacher Guide for a chart of suggested items)
Activity 2	YES, NO, USED TO signs
	Phytoplankton strips (50 strips per group, found in the Appendix on page 58 of the Teacher Guide)
	Plastic pollution card (1 per group, found in the Appendix on page 59 of the Teacher Guide)
Project	Water (approximately 250 mL)
	Blender
	Scissors
	6 rubber Bands
	6 forceps

APB	Item
Project cont.	Lighter
	6 rulers
	Dissection or compound microscope (recommended, but optional)
	6 glass jars or beakers
	Liquid laundry detergent (optional)
Problem	Plastic waste (collected by students in Activity 1)
	Scale (bathroom scale will be best for larger amounts of plastic)
	Electrical tape
	Lighter (if you use heat shrink wrap)
	Duct tape
	Scissors
	Simulated body of water (container or tub filled 2/3 with water - 18”L x 15”W x 11”H works well for one group to test at a time)
	Rubber bands (various sizes)
	Options for scooping/filtering microplastics/microfibers (such as coffee filters, cheese cloth, fabric, window screening, etc.)

## Tips and Tricks

### General

- Review all materials on the Experience PLTW website relevant to your grade band.
- Read the Teacher Guide in its entirety.
- Begin planning for implementation of the curriculum (10 hours) based on your schedule with students
- If you intend to participate in the STEM Week Challenge Showcase event, you’ll need to work backward to ensure students have time to prepare for their presentations at the in-person showcase
- Read through the Plastic Waste Student Packet and decide how you will distribute this to your students in your classroom (printout, electronically, etc.).
- Practice any experiments and hands-on portions that you feel may be challenging. This will allow you to provide additional facilitation instructions to your students.

### Activity 1

- Collect comparison items for stations in advance. See suggestions in the Preparation section of Activity 1.

## Activity 2

- If you don't have the space to move around the classroom for Part 1: Activator, consider giving students their own sets of signs and having them complete this from their desks.

## Project

- Have students complete the observations and first drawing before you blend their fabric. You may need to provide guidance on how to create a scaled drawing.
- When “washing” fabric squares, do not combine more than 3-4 groups of fabric squares at a time in the blender. Total blending time is not critical; usually, 2 minutes is enough.
- Consider the benefits and drawbacks of using soap when “washing” clothes in the blender. Using soap more closely simulates washing, but the soap suds make the filtration process take longer.

## Problem

- [Watch this demonstration](#) for visual reference on wire stripping, proper wiring, and the use of shrink wrap.
- Consider stripping 1/2 inch of insulation off each wire in preparation for student use.
- Avoid short circuiting the motors by reviewing the proper wiring diagram located on page 66 of the Teacher Guide.
- Motors will run fully submerged under water, but do not allow the battery pack or switch to get wet.
- Cut up some of the plastic waste collected by students in Activity 1 to create “microplastics.” Make sure to cut the plastic into pieces smaller than 5 mm. Examples of plastics to use include a milk jug, yogurt container, or green plastic soda bottle. You can also use the rings and caps from the milk jugs and other containers, but may need to cut the caps with strong scissors or garden pruning shears. Some types of plastic float, while others sink. To obtain a variety of sinking and floating plastics in your “body of water”, explore different plastic types.
- For proper use of the magnifying glass, hold it one inch from your eye, keep both eyes open, bring the fabric or fibers close to focus.



- Find a tub or container you can fill with water to simulate a body of water out of which students can filter microplastics.