Prep Lesson 1
What is Technology?

Guiding Question:
What are technologies and why do we use them?

Learning Objective:
Students will be able to

- ☑ identify that technologies are things that people use to solve problems.

Lesson Overview:
In the **Introduction,** students will

- activate prior knowledge of technology.

In the **Activity,** students will

- identify a problem.
- identify technologies that can solve the problem.

In the **Reflection,** students will

- consider that many things we use every day are technologies.

Preparation
10 Minutes

Introduction
5 Minutes

Activity
15 Minutes

Reflection
5 Minutes

Total Lesson Time:
25 Minutes

Vocabulary:
- **Problem**
- **Technology**

About This Lesson
This lesson introduces students to the designed world by focusing on everyday technologies and the problems they solve.

Children often think that technology is something electronic or mechanical. They may be surprised to learn that objects like crayons, pencils, and carrying cases are also considered technologies because they were all designed by humans to solve a problem.

By expanding children's definitions of technology to include a wide variety of objects that they use every day, you help them build an early understanding of the designed world.

Looking Ahead
This lesson prepares students for engaging in any EiE for Kindergarten unit by introducing the idea that they use technologies every day to help them solve problems. In the next prep lesson, students will learn that engineers are people who figure out how to make technologies.

Materials:

For the class

- ☐ (optional) *Evidence of Student Progress* checklist, p. 11
- ☐ 1 sheet of blank paper
- ☐ a variety of drawing tools, like pencils, crayons, markers, etc.
- ☐ a variety of containers and bags, like bins, boxes, backpacks, trays, etc.

Preparation:

If you prepared materials in advance, start at step 3.

Prepare the materials

1. ☑ Optional: Make copies of the *Evidence of Student Progress* checklist, p. 11, to use throughout the lesson to note student progress toward the lesson objective.

Set up for the lesson

2. Make sure that there are enough pencils, crayons, markers, and other drawing tools located throughout the classroom so that each student can find one during the Activity.

3. Make sure that there are enough bags, bins, boxes, and other containers located throughout the classroom so that each student can find one during the Activity.

4. ⏰ Consider leading Prep Lesson 2 directly after finishing this lesson.

Activate prior knowledge of technology.

1. Gather students in the meeting area. Ask:
   - **Have you heard the word "technology" before?**
   - **What do you think of when you hear the word "technology"?** *Responses will vary but may include statements related to electronics and words related to problem solving. They may also include gestures like: pretending to type on a computer, pretending to be a robot, etc.*

2. Let students know that technologies are things that people figure out how to make to solve problems.

Consider using the "technology" and "problem" Vocabulary Cards to review key terms.

Have students identify a problem.

1. Let students know that you are going to play a game. Explain the game:
   - **In this game, I will act out a problem that you need to solve.**
   - **You will find a technology in the classroom that I could use to solve my problem.**

2. Act out the problem: trying to draw a picture on a piece of paper without a drawing implement.

3. Ask:
   - **What is my problem?** *You want to draw but you don't have anything to draw with.*

Have students identify technologies that can solve the problem.

4. Invite students to get up and find a technology that they think could help solve your problem.

5. Have students sit in a circle and place their technology in the middle so everyone can see.

6. ☑ Help students build an understanding of technology by asking:
   - **What do you notice about the technologies you found?**
   - **How can these technologies help me solve my problem?**
   - **Are there any other technologies that could help me solve my problem?**

7. Reinforce the idea that all of the writing implements they found and discussed are technologies, because they are all things that someone figured out how to make to solve the problem.

8. To reinforce the understanding that we use technologies to solve problems, repeat steps #2–7 with a new problem: you need to pick up and carry the writing implements that students brought to the meeting area, but you keep dropping them.

Consider that many things we use every day are technologies.

1. Remind students that a technology is anything a person figures out how to make to solve a problem.

2. Have students work with a partner to find another technology in the classroom and, if possible, bring it back to the middle of the meeting area.

3. ☑ Select one or two technologies to discuss as a group. Ask:
   - **What do we use this technology for?**
   - **What problems would we have if we didn't have this technology in the classroom?**

4. Reinforce the idea that we use technologies every day.

5. Let students know that next time, they will learn more about the people who figure out how to make technologies.

If you have time, consider leading Prep Lesson 2 directly after finishing this lesson.

Prep Lesson 1:
Evidence of Student Progress

Date:

Students will be able to
identify that technologies are things that people use to solve problems.

Developing: The student is not able to identify technologies that solve a particular problem.
When asked to find a technology to draw with, the student brings a coat.

Meets: The student is able to appropriately identify a technology that solves a particular problem.
When asked to find a technology to draw with, the student brings a pencil or crayon and can explain or demonstrate how it solves the problem.

Exceeds: The student is able to compare, make connections, and generalize about technology.
When discussing technologies used for writing, the student compares markers, crayons, and pencils and discusses when it is best to use each.

Student	D	M	E	Student	D	M	E	Student	D	M	E

Notes:

Prep Lesson 2
The Engineering Design Process

Guiding Question:
Who are engineers and what do they do?

Learning Objective:
Students will be able to

- ☑ make personal connections with the steps of the Engineering Design Process.

Lesson Overview:
In the **Introduction,** students will
- review that technology is anything a person figures out how to make to solve a problem.
- connect what they know about technology with what engineers do.

In the **Activity,** students will
- engage with the Engineering Design Process.

In the **Reflection,** students will
- make personal connections with the Engineering Design Process.

Preparation
5 Minutes

Introduction
5 Minutes

Activity
10 Minutes

Reflection
5 Minutes

Total Lesson Time:
20 Minutes

Vocabulary:
- **Engineer**

Looking Back
In Prep Lesson 1, students were introduced to the term “technology.” They identified technologies in the classroom that they use every day to solve problems.

About This Lesson
In this lesson, students build on their understanding of technology by thinking about who figures out how to make technologies and how. Students are introduced to the term “engineer” and learn that engineers are people who figure out how to make technologies by using an engineering design process.

Young children often think that engineers are people who drive trains. Limited understandings of what engineers do persist even as children expand upon this definition in later years. Many children think that engineers build buildings, bridges, and roads; work with machines and tools; or build and fix computers. Engineers may do these things as part of their job, but these things do not define engineering. Engineers are people who use their creativity and understanding of materials, tools, mathematics, and science to design technologies that solve problems.

In this lesson, students make personal connections with the Engineering Design Process by looking at the iconography associated with each step, singing a song to familiarize themselves with the language, and thinking about which steps they have done or will enjoy. By helping students make these connections, you are helping students see themselves as engineers before stereotypes about who can engineer take hold.

Looking Ahead
This lesson prepares students for engaging in any EiE for Kindergarten unit by giving them the understanding that engineers are people who design technologies to solve problems. Students will use the Engineering Design Process introduced in this lesson as they engineer throughout the unit.

Supporting Engineering Habits of Mind

Engineers use a problem-solving process.

- Engineers use a design process to solve problems. There is no one set process that all engineers use, but every engineering design process includes the same basic phases.
- In this lesson, students are introduced to the five-step Engineering Design Process used in EiE for Kindergarten. As students use the steps of the Engineering Design Process, they will develop their executive functioning skills, capacity as problem solvers, and confidence when facing challenges.
- Throughout the unit, take every opportunity to help students make connections between their actions and the steps of the Engineering Design Process.

Materials:

For the class

- ☐ *Engineering Design Process* poster
- ☐ (optional) *Evidence of Student Progress* checklist, p. 19
- ☐ 1 dull or unsharpened pencil
- ☐ (optional) 1 marker
- ☐ (optional) 1 sheet of chart paper

Preparation:

If you prepared materials in advance, start at step 3.

Prepare the materials

1. Optional: Write the lyrics to “The Engineering Song” on the chart paper for students to follow along.

2. ☑ Optional: Make copies of the *Evidence of Student Progress* checklist, p. 19, to use throughout the lesson to note student progress towards the lesson objective.

Set up for the lesson

3. Post the *Engineering Design Process* poster in the meeting area. Consider reviewing “The Engineering Design Process” section of this guide (p. ix).

Review that technology is anything a person figures out how to make to solve a problem.

1. Have students think back to the previous engineering lesson, in which you acted out a problem and they identified a technology that could solve it.

2. Act out a new problem: you are trying to draw with a dull or unsharpened pencil.

3. Have students turn and talk with a partner. Ask:
   - **What problem do I have?** *The pencil is not sharp.*
   - **What technology could I use to solve this problem?** *The pencil sharpener; a new pencil.*

4. Remind students that technologies, like pencil sharpeners, are things people figure out how to make to help us solve problems.

If you are teaching this lesson directly after teaching Prep Lesson 1, start at step #5.

Consider using the "technology" and "problem" Vocabulary Cards to review key terms.

Help students connect what they know about technology with what engineers do.

5. Define "engineer" for students: an engineer is a person who figures out how to make technologies.

Consider using the "engineer" Vocabulary Card to review this key term.

Engage with the Engineering Design Process.

1. Explain that engineers follow steps that help them figure out how to make technologies.

2. Display the *Engineering Design Process* poster and read the steps aloud.

3. Model thinking aloud to answer the following question as you refer to the words and icons on the *Engineering Design Process* poster.
   - **Have I ever used any of these steps to make something? What did I do?** *One time, I made a bed for my doll because she was uncomfortable. I asked about what materials would be comfortable and imagined what the bed might look like. Then I drew a picture to plan my doll bed. I created the bed with a shoebox and felt, and I improved the bed by adding more felt to make it even softer.*

4. Have students turn and talk with a partner, using the same prompt.

5. ☑ Circulate and listen as students share. Select a few students to share their thoughts with the class.

6. Tell students that there is a song to help them become familiar with the steps of the Engineering Design Process called "The Engineering Song."

7. Have students sing through the verses of the song a few times to help them learn it.

"The Engineering Song"	Suggested full body movements
(To the tune of "The Farmer in the Dell")	
We are engineers.	(one thumb to chest)
We are engineers!	(second thumb to chest)
We can solve problems.	(march in place)
We are engineers!	(both thumbs to chest)
Ask, Imagine, Plan,	(march in a circle)
Then we Create.	(both hands in fists, on top of each other)
Improve to make it better.	(march in place and wiggle fingers over head)
Engineers are great!	(march in place then jump)

Have students make personal connections with the Engineering Design Process.

1. Remind students that engineers use the steps of the Engineering Design Process as they figure out how to make technologies that solve problems.

2. Tell students that by following the steps of the Engineering Design Process, they can be engineers and figure out how to make technologies, too.

3. To help students see themselves as engineers, have students turn and talk:
   - **Which steps of the Engineering Design Process do you think you will like doing? Why?**

4. ☑ Circulate and listen as students share. Select a few students to share their thoughts with the class.

Prep Lesson 2:
Evidence of Student Progress

Date:

Students will be able to
make personal connections with the steps of the Engineering Design Process.

Developing: The student does not make connections to the Engineering Design Process.
"I like the stars!" "I see scissors."

Meets: The student makes personal connections with a step of the Engineering Design Process.
"I planned my birthday party." "I can create a car from a box." "I will like imagining because I imagine lots of stories!"

Exceeds: The student makes personal connections with multiple steps of the Engineering Design Process.
"I couldn't reach the sink, so first I imagined ways to solve the problem and then I used a box to create a stool."

Student	D	M	E	Student	D	M	E	Student	D	M	E

Notes: