

## Objective

By the end of this lesson, Emily will understand the principles of magnetism and how they can be applied to create a floating maglev train model. She will learn about the science behind magnetic levitation and gain hands-on experience in building a simple model that demonstrates this technology.

## Materials and Prep

- Paper or cardboard (for the train body and track)
- Magnets (preferably neodymium magnets for stronger effects)
- Small plastic or wooden blocks (to serve as train wheels)
- Ruler (for measuring)
- Glue or tape (for assembling the model)
- Markers or paint (for decorating the train)

Before the lesson, ensure you have a safe space to work with magnets and that Emily understands basic safety precautions when handling them. It's also helpful to have a flat surface to build the model on.

## Activities

### • Activity 1: Introduction to Magnetism

Start with a brief discussion about magnets. What are they? How do they work? Emily can explore how magnets attract and repel each other by experimenting with two magnets and observing their behavior when brought close together.

### • Activity 2: Building the Maglev Train Model

Using the materials, Emily will design and build her own floating maglev train. She will create a track and attach magnets to both the train and the track in a way that allows the train to levitate. This hands-on activity will reinforce her understanding of magnetic forces.

### • Activity 3: Test and Modify

After building the model, Emily will test her maglev train to see how well it floats and moves along the track. If it doesn't work as expected, she can modify her design and try again, encouraging problem-solving and critical thinking skills.

### • Activity 4: Decorate Your Train

Once the model is functioning, Emily can use markers or paint to decorate her maglev train. This activity allows for creativity and personal expression while reinforcing the engineering process.

## Talking Points

- "Did you know that maglev trains can travel really fast because they don't touch the tracks? That's because of magnetic levitation!"
- "Magnetic forces can either pull things together or push them apart. Can you feel that when you bring two magnets close to each other?"
- "When we place magnets in the right way, we can make things float! Let's see how we can do that with our train."

- "If your train isn't floating perfectly, what do you think we can change? It's all about experimenting!"
- "Engineering is like solving puzzles. Every time we build something, we learn what works and what doesn't."
- "Decorating your train is a fun way to express yourself! What colors or designs do you think would make your train stand out?"
- "Maglev technology is used in real trains around the world. Can you think of places where this technology might be useful?"
- "The faster a train goes, the less friction it has. How do you think this affects its speed?"
- "Remember, every great inventor faced challenges. What challenges did you face while building your train?"
- "How do you think magnetism could change transportation in the future?"
- "What was your favorite part of building your maglev train? Why?"
- "Can you think of other ways we could use magnets in our daily lives?"