Lesson Plan: The Marvelous Motion and Machine Mission!

Materials Needed:

- Cardboard tubes (from paper towels or toilet paper)
- A sturdy, flat piece of cardboard (like a flap from a box) to act as a ramp
- A few books of different thicknesses
- Marbles or small toy cars
- A ruler (preferably a 12-inch wooden or plastic one)
- A pencil or a thick marker to use as a fulcrum
- String or yarn
- A small basket or plastic cup
- A doorknob, sturdy chair back, or hook to hang the pulley from
- Small toys or objects to put in the basket
- Popsicle sticks (about 7-8)
- Rubber bands
- A plastic spoon
- Mini marshmallows or cotton balls for launching
- Tape
- Paper and crayons or markers for drawing

Subject: Science (Introduction to Physics)

Grade Level: 1st - 2nd Grade (Age 7)

Time Allotment: 60 - 90 minutes (flexible)

1. Learning Objectives

By the end of this lesson, the student will be able to:

- Identify and demonstrate the function of three simple machines: the inclined plane, the lever, and the pulley.
- Explain in their own words how a simple machine helps make a task easier.
- Build a working model of a lever (catapult).
- Apply their knowledge by designing a creative invention that uses at least two simple machines.

2. Lesson Activities & Procedure

Part 1: The Hook - What is a Super Tool? (5-10 minutes)

1. **Engage:** Start with a question: "Have you ever tried to lift something really heavy? What if I told you there are secret 'super tools' that give you super strength? These tools are called **Simple Machines**, and they are all around us!"
2. **Introduce:** Explain that simple machines are tools with few or no moving parts that make work easier. Today, we are going on a mission to find and build three of them!

Part 2: Activity - The Ramp Race! (Inclined Plane) (15-20 minutes)

1. **Explain:** "Our first simple machine is the **inclined plane**. That's just a fancy name for a ramp! It helps us move things up and down without having to lift them straight up." Point to a wheelchair ramp or a slide as an example.
2. **Build:** Have the student create a low ramp by propping one end of the flat cardboard piece on a thin book.
3. **Experiment:**
    - Ask the student to roll a marble or toy car down the ramp. Discuss its speed.
    - Now, add another book to make the ramp steeper. Ask, "What do you predict will happen to the speed?"
    - Test the prediction! Roll the marble/car down the steeper ramp. It goes faster! Explain that the steeper the ramp, the faster gravity can pull the object down.
4. **Connect:** Discuss how ramps make it easier to push something up than to lift it straight into the air.

Part 3: Activity - The Marshmallow Launcher! (Lever) (20-25 minutes)

1. **Explain:** "Next up is the **lever**! A lever is a stiff bar that rests on a support, called a **fulcrum**, to help lift or move things. A see-saw at the playground is a perfect example of a lever!"
2. **Build a Simple Lever:**
    - Place the ruler on the pencil (the fulcrum).
    - Place a small, slightly heavy object (like a glue stick) on one end of the ruler.
    - Ask the student to push down on the other end of the ruler with one finger to lift the object. It should be easy! Explain that the lever made it easier to lift.
3. **Build a Catapult (a type of lever!):**
    - Stack about 5-6 popsicle sticks together and wrap a rubber band tightly around each end. This is your base.
    - Stack two popsicle sticks and wrap a rubber band around just one end.
    - Gently wedge the larger stack (the base) between the two popsicle sticks, as close to the rubber band as you can.
    - Tape a plastic spoon to the top popsicle stick. You've made a catapult!
4. **Experiment:** Place a mini marshmallow or cotton ball in the spoon, press down, and let it fly! Test how you can change the launch distance by moving the base (fulcrum) forward or backward.

Part 4: Activity - The Amazing Toy Lifter! (Pulley) (15-20 minutes)

1. **Explain:** "Our last machine is the **pulley**. A pulley is a wheel with a rope that helps you lift things up by pulling down. Think of a flagpole or window blinds."
2. **Build:**
    - Tie one end of the string to the handle of the small basket or cup.
    - Loop the string over a doorknob, a sturdy hook, or the back of a chair.
    - Put a few small toys in the basket.
3. **Experiment:** Have the student pull down on the free end of the string. The basket lifts up! Explain that it’s often easier to pull down than to pull up, and that's how a pulley helps us.

3. Assessment & Creative Application

My Marvelous Machine! (10-15 minutes)

1. **The Challenge:** "Your final mission is to become an inventor! On your paper, draw an amazing, wacky machine that does a simple job, like watering a plant or feeding a dog."

2. **The Rules:** The machine must use at least **two** of the simple machines we learned about today (inclined plane, lever, or pulley).
3. **Share and Explain:** Have the student present their drawing and explain how their marvelous machine works, pointing out where they used the simple machines. (For example: "The marble rolls down the ramp, hits a lever, which launches a dog treat into the bowl!")

4. Conclusion & Wrap-Up (5 minutes)

- **Review:** Quickly review the three machines. What does an inclined plane do? A lever? A pulley?
- **Real-World Hunt:** Challenge the student to be a "machine detective" for the rest of the day. Can they spot any simple machines around the house, in the yard, or at the park? (Examples: a door wedge, a light switch, a see-saw, a slide, a shovel).

5. Differentiation

- **For Extra Support:** Focus on just two machines. Guide the building process more directly. Provide a template for the final drawing with one machine already included, and have the student add the second.
- **For an Extra Challenge:** Introduce a fourth simple machine, the **wheel and axle**, using the toy car. Ask the student to measure and record how far their catapult launches the marshmallow and experiment with changing the fulcrum's position to see how it affects the distance. Encourage a more complex drawing with three or more machines interacting.