Objective: Students will be able to:

- Explain what a machine is and how it makes work easier.
- Identify the six different simple machines, and be able to explain how they make work easier.
- Conceptualize an invention that would improve the performance of a particular position player on a baseball team, or an invention that would make the job of a stadium worker easier.

Time Required: One class period

Materials Needed:
- Models or drawings of simple machines
- Paper
- Pencils
- 1 copy of each “Client Profile” (included)
- 4 copies of the “Design Worksheet” - 1 for each team (included)

Vocabulary:
Inclined Plane - A flat surface that is higher on one end than the other.
Lever - A lever is a board or bar that rests on a turning point (a fulcrum). Downward motion at one end results in upward motion at the other end.
Pulley - A freely turning wheel and a rope. The wheel is fixed to a support and the rope runs over the wheel.
Screw - A central core with a thread or groove wrapped around it. While turning, a screw converts rotary motion into forward or backward motion.
Simple Machine - A device used for changing the amount or direction of a force.
Wedge - A wedge is made up of two inclined planes. The planes meet to form a sharp edge. The edge is used to push or split things apart.
Wheel and Axle - A wheel or spoke is locked to a central axle so that when one is turned the other must turn.
Applicable Common Core State Standards:

**CCSS.ELA-Literacy.SL.3.1, SL.4.1, SL.5.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade-appropriate topics and texts, building on others’ ideas and expressing their own clearly.

**CCSS.ELA-Literacy.RF.3.4, RF.4.4, RF.5.4** Read with sufficient accuracy and fluency to support comprehension.

**CCSS.ELA-Literacy.L.3.1, L.4.1, L.5.1** Demonstrate command of the conventions of standard English grammar and usage when writing or speaking.

**CCSS.ELA-Literacy.L.3.2, L.4.2, L.5.2** Demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing.

Additional Relevant National Learning Standards:
(Based on Mid-continent Research for Education and Learning)

**Technology. Standard 3. Level II [Grade 3-5]**. Understands the relationships among science, technology, society, and the individual

**Technology. Standard 4. Level II [Grade 3-5]**. Understands the nature of technological design

**Technology. Standard 6. Level II [Grade 3-5]**. Understands the nature and uses of different forms of technology
1. Start this lesson with a brief review of the six simple machines.

2. Provide a picture for each simple machine in order for the students to have a visual understanding of what each simple machine looks like.
   - Inclined plane
   - Lever
   - Pulley
   - Screw
   - Wedge
   - Wheel and axle

3. Review that simple machines make work easier. Discuss simple machines in everyday life and have students identify simple machines in the classroom, school building, or at home.

4. Ask students to list people that are involved in a baseball game. What are their roles and functions? Encourage students to think of people both on and off the field. Some examples include:
   - Baseball Players
   - Fans
   - Mascots
   - Vendors
   - Ticket Takers/Ushers
   - Umpires
   - Groundskeepers
   - Announcers
   - Scorekeepers

5. Explain that students will be working together in teams to design machines that will improve the baseball experience for some of the people they listed.
6. Divide students into 4 groups. Assign each group to one of the following "clients":
   - Groundskeeper
   - Umpire
   - Vendor
   - Mascot

7. Explain that each team must improve or simplify one element of their client's baseball experience. Improvements might consist of a more efficient way of moving, an improvement on a tool, a new tool to use, an adjustment made to the working environment or something the client might wear.

8. Explain that any improvements must meet the following criteria:
   - Make use of at least one simple machine
   - Make the client’s job easier or safer in some way

9. Give each team the appropriate background article for their client (included). Then give teams a few minutes to discuss the ways that they could make their client’s job easier or safer.

10. Hand out pencils, paper, and design worksheets and allow students to begin the design process.

11. Once all groups have finished, have each group present the drawing and description of their invention.

**Conclusion:**

To conclude this lesson and check for understanding, give students the following homework assignment: "At home, identify the different types of simple machines at work. Try to find at least one example of each simple machine per room. Write down the examples and share them with the class."
Client Profile #1: Billy the Baseball

As a baseball mascot it is my job to entertain fans at ballparks around the country. During each and every game I can be found running, jumping, dancing and moving on the field and in the stands. Just getting into my costume can be a challenge since it weighs so much. I have to have two people help me get dressed for each game! It would be nice to be able to get into my costume without any help.

Client Profile #2: Vinnie the Vendor

For the past fifteen years I have been selling ice cream to hungry ballpark patrons. On a hot day I am more popular than the baseball players! Each game I climb up and down the stairs in the bleachers to make sure that everyone gets their fill of their favorite sweet summer treat. With each passing year I seem to be slowing down. I can’t get around like I used to and my back aches from the weight of the ice cream tray that I carry around my neck. I would like to be able to serve my customers without all of the pain in my back.
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Client Profile #3: Stump the Ump

At a baseball game my word is final. Although I am the shortest umpire in all of baseball everyone respects my decisions on balls, strikes, fair and foul balls. In recent years it seems that my job has been getting harder since players keep getting bigger and bigger. Sometimes I can’t see the pitches as they cross home plate because I can’t see over the catcher. I wish there was a way for me to have a more clear view of home plate.

Client Profile #4: Glenda the Groundskeeper

My job begins long before the players arrive at the ballpark and continues long after they leave. It is my responsibility to ensure that the ball field looks perfect. This includes making sure that all of the lines on the field are straight and that each blade of grass is cut to the same length. Taking care of the field requires a lot of tools. Before and after each game I have to carry all of my tools on and off the field. My job would be a lot easier if I had a more efficient way of transporting my tools around the ballpark.
1. Who is your client? ______________________________________________________

2. What is this person’s main job at a baseball game?
   ______________________________________________________________________
   ______________________________________________________________________

3. What is difficult about your client’s job?
   ______________________________________________________________________
   ______________________________________________________________________

4. What simple machine(s) could your client use to make their job easier?
   ______________________________________________________________________
   ______________________________________________________________________

5. Draw a picture of your invention: