Lesson 1 – Pre-Visit
Simple Machines at the Ballgame

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: 1-2 class periods

Materials Needed:
- Models or drawings of simple machines
- Your preferred means of screening a movie
- A DVD player or cable access
- Paper
- Pencils
- 8 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 a rotary motion into a forward or backward motion.
Simple Machines - A simple 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.6.1, SL.7.1, SL.8.1** Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others’ ideas and expressing their own clearly.

**CCSS.ELA-Literacy.SL.6.2, SL.7.2, SL.8.2** Interpret information presented in diverse media and formats (e.g., visually, quantitatively, orally) and explain how it contributes to a topic, text, or issue under study.

**CCSS.ELA-Literacy.SL.6.4, SL.7.4, SL.8.4** Present claims and findings, sequencing ideas logically and using pertinent descriptions, facts, and details to accentuate main ideas or themes; use appropriate eye contact, adequate volume, and clear pronunciation.

**CCSS.ELA-Literacy.RST.6-8.3** Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

**CCSS.ELA-Literacy.WHST.6-8.2** Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

**CCSS.ELA-Literacy.WHST.6-8.4** Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.

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

**Technology. Standard 3. Level III [Grade 6-8].** Understands the relationships among science, technology, society, and the individual

**Technology. Standard 4. Level III [Grade 6-8].** Understands the nature of technological design

**Thinking and Reasoning. Standard 2. Level III [Grade 6-8].** Understands and applies basic principles of logic and reasoning

**Thinking and Reasoning. Standard 5. Level III [Grade 6-8].** Applies basic troubleshooting and problem-solving techniques
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 \((work = force \times distance)\) easier by decreasing the effort needed to lift a resisting load.

4. Discuss simple machines in everyday life and have students identify simple machines in the classroom or school building.

5. Ask students to list people that they might observe at a baseball game. What are their roles and functions?

6. 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.

7. Divide students into 8 small groups. Assign each group to one of the following "clients":
   - Batter
   - Catcher
   - Fan
   - Fielder
   - Food vendor
   - Pitcher
   - Ticket taker
   - Usher
8. 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.

9. Explain that any improvements must meet the following criteria:
   - Make use of at least one simple machine
   - Be able to be completed in at least three steps
   - Be easily built using common materials

10. Watch a few innings of a baseball game, either recorded or live.
    OR
    Watch a well-known baseball movie, such as The Sandlot or The Natural.

11. As students watch, each team should make careful observations of their client, their movements, and the tools they use. They should also make note of inventions already in place: change dispensers for the vendors, the weight rings on the batter's bats for warm-up, rosin for the pitcher, binoculars, a big scoreboard for the fans, etc.

12. After viewing, give teams a few minutes to discuss the observations they made.

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

14. Once each group has settled on an invention, they should write out step-by-step instructions on how to build the invention they designed. Groups will also sketch out designs and compile lists of materials needed.

15. Each group must also explain how their invention improves or simplifies their client's baseball experience.

16. Once all groups have finished, have each group present the diagram and description of their inventions.

**Conclusion:**

To conclude this lesson and check for understanding, have students spend about ten minutes writing a response to the following prompt: In what ways has the development of machinery improved or hurt the experience of a baseball game? Have machines such as hot dog warmers, pitching machines and electronic scoreboards changed the game for better or worse? Invite students to share their responses with the class.
Design Worksheet - Page 1

Names: ___________________   Date: ________________

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________________________________________________________________________

________________________________________________________________________

1. Who is your client? _____________________________________________________

2. What is his or her main job at a baseball game?
________________________________________________________________________
________________________________________________________________________

3. Draw a picture of your invention below:
1. What is the name of your invention?
_______________________________________

2. Write a description of your invention here:
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________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

3. What materials are needed to build your invention? List them here:
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4. List the step-by-step instruction needed to build your invention.
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5. How does your invention improve or simplify your client’s baseball experience?
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