**Designing Parachutes Lesson Plan**

**Standards addressed**: 4.1.2.2.2 (Generate ideas and possible constraints for solving a problem through the engineering process).

4.1.2.2.3 (Test and evaluate situations, considering advantages and disadvantages of the engineering solution, and communicate the results effectively).

**Essential Question:** How does the use of the engineering process, hands on learning, and collaboration lead to student engagement and understanding?

•For students: How can we design a parachute to help The Hen, Jack, and the Giant land safety on the ground?

How can you slow down The Hen’s, Jack’s, or The Giant’s speed to land safely?

**Accommodations:** Students will work in pairs, get support from the teacher, and work as a class; will be given prompts and options like speaking, drawing or writing; and use hands on activities, to differentiate various learning styles.

**Pre-Assessment:**

Talk as a class discussing prior knowledge about parachutes on Day 1 or the start of Day 2: make a list on board.

**Formative Assessments**

Daily Science Packets (observations, designing, reflections).

**Summative Assessment:**

Class discussion/trivia about key ideas like the design process, engineering, parachutes, etc.

**Materials**

**•**Stopwatches

•Tissue Paper

•Napkins

•Construction Paper

•Coffee Filters

•Paper Clips

•Scissors and Hole Punchers

•Pipe Cleaners

•Heavy Duty Trash Bags

•Weights: Washers (3 different weight sizes)

•Pencils

•Jack and the Beanstalk story

•Masking Tape

•Folders + Packets

**Day 1**

**Content Objective:** Students will learn about making observations, compare drop times of objects, and be introduced to the idea of parachutes.

**Language Objective:** Students will effectively communicate with and listen to others. Students will also use reading and writing skills to make observations, and gain knowledge.

**Academic Language:** boundaries, stopwatch, observations, time, compare, engineer, parachute, drop, height.

**Introduction**

**○ Get to know you activity:** In a circle, pass around beach ball with different questions on it.

○ **Safety** (first aid/if injuries happen, what to do in case of severe weather, etc.).

○ **Bathrooms:** go withbuddies and/or whole group breaks.

**○ Set expectations/Classroom rules** (do this together).

**Activity**

**○** Take students outside:set boundaries of where students can go while outside (where teachers can see).

○ Split students up into pairs/small groupsand give a stopwatch to each group (quickly model how to use stopwatch).

**○** As the teacher drops a golf ball, and a ping pong ball (one at a time), students will use the stop watch to time the object falling and will write down the times and observations in their packets. Have a conversation comparing findings of golf ball vs. ping pong ball.

○Then students will collect 2 objects outside (pine cone, stick, leaf, rock). Students will drop the objects one at a time, time them, and independently write down the times and observations in packet. Groups will compare the objects and discuss.

**Read Jack and the Beanstalk (If time allows, otherwise first thing on Day 2)**

**○** Pass out story to the students (could use strategies like popcorn reading, splitting the class into groups and reading, choral reading, or teacher reads – students follow along).

**○** After reading the story,discuss any thoughts or wonderings students have.

○ Express how our goal as engineers is to create a parachute that will help The Hen, Jack, and The Giant land safety on the ground from the top of the beanstalk. Have a discussion about what prior knowledge students have regarding parachutes: write ideas on the board.

○ Video teaching about parachutes.

\* Collect packets (in folders)

**Day 2**

**Content Objective:** Students will design, test, and evaluate a parachute to ultimately get “The Hen” safely off the beanstalk.

**Language Objective:** Students will effectively communicate with and listen to others. Students will also use reading and writing skills to make observations, construct a design, and gain knowledge.

**Academic Language:** stopwatch, design, weights/washers, reflect, observations, time, compare, engineer, parachute, materials, height, drop, sketch.

**Briefly Introduce Engineer Design Process**

**○ State the goal:** Students will be making a parachute (holding the washer) that should stay in the air longer than the washer alone. Consider how to make Jack stay in the air longer?

○Teacher will drop the washer (lightest weight), as the teacher or a volunteer student times for the class on a stopwatch – write time on the board.

○ Constraints: Express how the drop height will be the same as the height the washer was dropped, and that the washer (The Hen) needs to be attached to the parachute.

○ Give a reminder on important things to remember in order for partnerships to be successful.

○ Review available materials.

○ Pair students up, and have students discuss and sketch in their packet their parachute design.

○ Students will test their parachutes and will independently reflect in their packets on what went well, and what improvements could be made. Discuss findings as a class.

\* Collect packets (in folders)

**Day 3**

**Content Objective:** Students will design, test, and evaluate a parachute to get “Jack” safely off the beanstalk, with a higher weight than the previous day.

**Language Objective:** Students will effectively communicate with and listen to others. Students will also use reading and writing skills to make observations, construct a design, and gain knowledge.

**Academic Language:** stopwatch, design, weights/washers, reflect, observations, time, compare, engineer, parachute, materials, height, drop, sketch.

**Refer back to Engineer Design Process**

**○ State the goal:** Students will be making a parachute (holding the washer) that should stay in the air longer than the washer alone. Consider how to make Jack stay in the air longer?

○Teacher will drop the washer (medium weight), as the teacher or a volunteer student times for the class on a stopwatch – write time on the board.

○ Constraints: Express how the drop height will be the same as the height the washer was dropped, and that the washer (Jack), which is a higher weight now, needs to be attached to the parachute.

○ Give a reminder on important things to remember in order for partnerships to be successful.

○ Review available materials.

○ Same pairs as the previous day will discuss and sketch in their packet their parachute design.

○ Students will test their parachutes and will independently reflect in their packets on what went well, and what improvements could be made. Discuss as a class while students are reflecting – what did you notice happened when Jack’s weight increased?

\* Collect packets (in folders)

**Day 4**

**Content Objective:** Students will design, test, and evaluate a parachute to ultimately get “The Giant” safely off the beanstalk, with the heaviest weight so far.

**Language Objective:** Students will effectively communicate with and listen to others. Students will also use reading and writing skills to make observations, construct a design, and gain knowledge.

**Academic Language:** stopwatch, design, weights/washers, reflect, observations, time, compare, engineer, parachute, materials, height, drop.

**Refer back to Engineer Design Process**

**○ State the goal:** Students will be making a parachute (holding the washer) that should stay in the air longer than the washer alone. Consider how to make The Giant stay in the air longer?

○Teacher will drop the washer (heaviest weight), as the teacher or a volunteer student times for the class on a stopwatch – write time on the board.

○ Constraints: Express how the drop height will be the same as the height the washer was dropped, and that the washer (The Giant), which is an even higher weight now, needs to be attached to the parachute.

○ Give a reminder on important things to remember in order for partnerships to be successful.

○ Review available materials.

○ Same pairs as the previous day will discuss and sketch in their packet their parachute design.

○ Students will test their parachutes and will independently reflect in their packets on what went well, and what improvements could be made.

○ As a class we will play a trivia game/have a class discussion regarding concepts learned over the last 4 days (engineering design process, parachutes, etc.).

\* Collect packets (in folders)

**I grant permission for the use of my lesson at STEM Camp.**