

## **Invention and the Creative Process Resource Package**

### **STEM Activity Ideas and Lesson Plans**

#### **Area 1: Activity Ideas**

This is a sampling of ideas; additional activity ideas are available with the teacher tools included with individual videos in this resource package.

- ❖ Design and build a tall structure using popsicle sticks then do same with a house of cards, and a tower of cups. Discuss and redesign using what has been learned. Now design the tallest free-standing structure using only pipe cleaners. What are the challenges with the pipe cleaners that were not there with the other items? How did the type of material used to build the structure necessitate changes in how the structure was built and what the structure looked like? What does this experience tell you about architects and engineers and how their job might change depending on the materials used? Present your conclusions in a written report or an oral presentation.
- ❖ Design a town for a population of 10,000 people. Research the ideal amount of space per person and other elements needed for a town. Use graph paper to draw to scale a diagram of your town. Write a report explaining the justification for the choices of what is in your town.
- ❖ Test the adhesive properties of Post-it notes or tape. Choose a surface to remove the Post-its or tape from. Discuss variables. Plan a way to test the adhesion and complete the experiment 3 times. Keep data in a table and interpret the data and report.
- ❖ Study what variables cause a ball to travel the farthest. Test playground balls, baseballs, and golf balls. Make a table with the weight, diameter, circumference, material, and surface differences (like dimples) of each. Select a flat surface location to bounce each ball and measure the height of each ball's bounce. Bounce each ball the same amount of times (minimum of three) and determine the average bounce height for each. Which ball bounced the highest? Why do you think it did? How do you think the results would change if you threw each ball rather than bounced it? How do you think the results would change if you hit each ball off a tee or similar surface? Extend your learning by researching what designers have done to make each ball travel as far as possible for its particular purpose.
- ❖ Research the patent process and write a step-by-step plan from idea stages to patent for a future invention of your choice.

- ❖ Build a balloon-powered car using popsicle sticks, balloon, straw, cardboard, skewers or chopsticks, bottle tops, hammer, nail, tape and scissors.
- ❖ Assign students to groups and have them brainstorm invention ideas. Have them pick one and either build or write a plan to build the invention chosen.

## **Area 2: Lesson Plans**

This is a sampling of lesson plans. Additional activity lesson plans are available with the teacher tools included with individual videos in this resource package.

### **Sample Lesson 1: Building a Balloon-Powered Car**

**Type of Teacher Tool:** Whole Class

**Targeted Grade Level(s):** 9-12

**Targeted Curriculum Areas:** STEM, Science

#### **Learning Objectives:**

The learner will:

1. make use of their ingenuity and design skills.
2. increase their understanding of the mechanics and troubles encountered with invention.
3. demonstrate ability to apply measurement skills.

#### **Featured National Standards**

1. [CCSS.ELA-LITERACY.RST.9-10.5](#)  
Analyze the structure of the relationships among concepts in a text, including relationships
2. [CCSS.MATH.PRACTICE.MP2](#) Reason abstractly and quantitatively
3. [CCSS.MATH.PRACTICE.MP5](#) Use appropriate tools strategically.

#### **Resources/Materials Needed:**

1. Invention 12: Explore Invention! How do you create an invention? What is the process like?
2. Invention 3: How long did it take to invent the cancer goggles? Dr. Samuel Achilefu answers the question..
3. Invention 16: Invented by Accident: Learn of some famous inventions that happened by accident.
4. Invention 8: Do you have any advice for student inventors? Dr. Samuel Achilefu answers the question
5. Materials: popsicle sticks, balloon, straw, cardboard, skewers or chopsticks, bottle tops, hammer, nail, ruler, tape, scissors, glue and string

**Teacher Instructions:**

1. Have students view any of the videos listed above to help put them in the frame of mind of an inventor.
2. Tell students that they will be building a balloon car in class, but do not tell them the materials they will be able to use.
3. Divide the class into groups of 3. Give each group the materials listed above.
4. Do not give any instructions for the balloon car (although there are many designs you can find online)
5. The students should now design and build the car. They do not have to use all of the materials, but you want the car to travel at least a couple of feet. The car that goes the furthest wins!

**Assessment/Evaluation Option:**

1. Grade the car by rating the it on ingenuity, design, and distance the car goes.