

Science Enrichment
Grade 7 & 8

Junk Box Challenge

Stage 1-Desired Results	
<p>Goals</p> <ul style="list-style-type: none"> • Use science, mathematics, and technology concepts and principles by applying them to the engineering design process. • Gather data, collect and organize data, draw conclusions, and then apply understandings to new situations. • Recognize the need to design, test, redesign, and then implement solutions (engineering process). • Use initiative and self-motivation to set agendas, develop and gain self-confidence, and work within time specified time frames. • To apply rational and logical thought processes of science, mathematics, and engineering design to innovation and invention. 	
<p>Understandings</p> <ul style="list-style-type: none"> • Methods of investigation • Importance of the ability to work in teams to conduct investigations • Applied problem solving abilities to conduct investigations (engineering foundation of design) • Systematic process to evaluate design solutions 	<p>Essential Questions</p> <ul style="list-style-type: none"> • What are the steps involved in the engineering process? • How does the collaboration of scientists impact the final outcome of a solution? • Why is it important to take into account relevant scientific, mathematical and technological concepts to ensure a successful solution to a task? • What data and tests should be conducted and analyzed to identify the best design solution?
<p>Knowledge Students will know...</p> <ul style="list-style-type: none"> • The engineering foundation of design using science concepts to solve a task/problem • The methods of science investigation • Teamwork and cooperative learning strategies • Scientific techniques for analyzing data, testing, revision and redesign of projects based on measurable outcomes 	<p>Skills Students will be able to ...</p> <ul style="list-style-type: none"> • Design and redesign building plans • Conduct tests • Collect and analyze data • Make inferences • Work collaboratively • Evaluate solutions • Implement problem-solving strategies

NJCCCS:	
9.1 A	9.4.B(2)
9.1 B	9.4.O (1)
9.1 C	9.4.O (2)
9.4A(4)	
9.4.B(1)	

Stage 2-Assessment Evidence	
<p>Performance Tasks:</p> <ul style="list-style-type: none"> • Group activities • Science labs • Reading responses and discussions 	<p>Other Evidence:</p> <ul style="list-style-type: none"> • Student notebooks • Teacher observations • Student explanations
Stage 3- Learning Plan	
<p>Learning Activities</p> <ul style="list-style-type: none"> • Design challenge activities • STEM activities • Science Olympiad building events 	
<p>Resources:</p> <ul style="list-style-type: none"> • STEM kits • Science Olympiad manual • Discovery education • Teacher Geek web-site 	

8th Grade Science Quest Enrichment

“Junkbox Challenge”

Students will take part in creative, problem solving challenges that require them to apply the engineering process of investigating, proposing, creating, and evaluating solutions. They will critically think about science and scientific processes and concepts to create a variety of devices that perform different tasks. New competitions may begin at regular intervals, however, some activities may extend over the course of a month with a culminating activity.

Challenges are divided up into two main categories:

1. “Junk Box” Challenges:

These activities would be fairly short, two weeks or so. Students would be assigned a task and given a box of “junk”. Possible activities may include but not limited to:

Super Subs- Create a submarine that will sink and come to the surface in the shortest / longest amount of time

Ultimate Gumball Machine- Create a machine that will sort gumballs

Magnificent Marble Maze- Create a marble maze in which the marble must travel through a loop, spiral, hill and ramp in the longest amount of time

Super Structures- Build a structure that will hold the most pennies

Drop Zone- Create a parachute that will help an egg safely land on a target

Super Slinger- Create a device that will launch a Peep to earn points

Weakest Link- Build the longest chain that will hold the most weight

Whirling Wonders- Create a wheel powered by water that will pull the greatest amount of string

2. Design Challenges:

These challenges will take a longer time to complete and are composed of the Science Olympiad challenges and from STEM kits.

Wheeled Vehicle - Students will construct a vehicle powered only by a non-metallic elastic solid device. The participants must be able to adjust the vehicle to travel a specified distance as chosen by the event supervisor as fast, as straight, and as accurately as possible.

Balloon Launch Glider - Students will construct and fly a monoplane glider that will be launched from a balloon to achieve a maximum flight time.

Catch the Bug - Upon completion of the self-directed step-by-step Bug Build Guide and comprehensive Bug Electronics Lab, the Bug is ready to roam and explore by bumping into objects and finding new paths around the room. Learning and understanding basic concepts of electricity such as series and parallel circuits, voltage, current, resistance, switches and schematic diagrams has never been this much fun.

Electric/Solar Panel Car - Students will design, construct, and evolve a unique battery or solar-powered car. This activity demonstrates STEM Engineering as students use Science, Technology, Engineering, and Math processes to develop their design solutions. Upon completion of the car construction, students will compete in a teacher-generated competition.

Launcher - The Ping-Pong Ball Launcher combines the two favorites, building and making things fly. This activity comes with all the components to build an adjustable launcher base and a launcher mechanism. From there choose a design purpose. Do you want to hit a target at a given distance? Do you want to launch the ping pong ball the highest or farthest? Is consistency important? How do the constants or variables affect your results (angle of trajectory, gravity, stored energy, mass, range, environment, etc.)

Time-line:

Students would select one of the following time frame options:

Option One: 1 design challenge project and 1-2 junk box challenges

Design challenge projects will be long term and will run approximately 6 -7 weeks.

3 weeks to research and build / 2 weeks of testing and modifications /1 day to test

Junk box challenge projects will typically take one /two weeks per challenge and 1 day to test.

Option Two: 3-5 junk box challenges

Each junk box challenge typically will take one /two weeks and 1 day to test. This is dependent on the nature of the challenge