Egg drop challenge worksheet pdf

Our annual egg reduction project is one of the most eagerly awaited STEM and science activities of the year in schools. Check out this year's egg drop design created by fourth graders to get inspiration for your own egg drop ideas and be sure to print free printed planning and record sheets. Don't forget to check out all the designs from previous years: This post contains affiliate links. What is the Egg Drop Project? Not sure what popular STEM and STEAM activity is? In egg droplet projects, children are challenged to make contraption tools using a variety of materials (usually recyclable) to protect raw eggs from falling high. This physics activity is very common in college and high school classes, but we have adapted it for elementary and even preschool age! How We Laid Out the Challenge of Egg Decline This Year 1. Students are first given a description of the challenge - to protect raw eggs from falling high, and it's their job to design some sort of container or contraption tool to protect that egg using materials brought from the house. There are many variations to the egg drop challenge. This year we decided not to allow cardboard boxes as they always seem to be the material that comes in. We want to see what other ideas they can come up with instead. 2. They then form a group of 2-3 students (and are also given the option to work independently if they wish). 3. In groups, students exchange thoughts for contraption of their egg drops and record their final designs on printable planning sheets. 4. They decide as a group who will bring which material and write it down as a reminder when they get home. (We also provide additional supplies in the class to complement their materials such as strings, tapes, scissors, various recycling etc.) 5. The next day, the children use their materials to build their contraption together. We have a cat-themed contraption made of plastic parachute bags, straws, sticky tape, paper cups, paper plates and ropes... ... and others are made of bubble wrap and parachute garbage bags, birthday cake themed designs using lots of cotton balls, and even eggplant! 6. Each child is then given a printable prediction sheet. When each group presented their design to the class, another group recorded each contraption on the chart and predicted whether it would protect the egg or not. After all the groups presented their egg drop contraptions to the class, each group was then given raw eggs to put into their designs. (Many students like to decorate their eggs with Sharpies before placing them in their designs.) 8. go outside with contraption, eggs, and their record sheets on the clipboard. 9. This year my husband climbed onto the roof of the school to drop every contraption. Each contraption tool is dropped one by one and then the egg is examined to see if it survived the fall. (Eggplant and cotton cotton balls work!) The children then record whether each contraption tool works onto their worksheet or not. This STEM project is truly an absolute hit with kids! We often have other classes that come out to watch because of the excitement. You can even do this project on a smaller scale with preschool or kindergarten students. No child is too young to design and create! See More Science Activities! Be sure to check out our STEAM Kids books and ebooks for more creative STEM and STEAM ideas! 90 Minutes | The 3rd – 12th Grades The Egg Drop project is a highly versatile activity that can be used to introduce students to the dynamics of physics, material science, and fluids. For elementary and junior high school classes, students have a variety of materials to 'buy' with the allocated budget. For high school classes, the budget and number of materials available are reduced, making challenges more difficult and emphasizing the engineering design process. Additional components for the activity include falling times to calculate average speed, measuring device deformation after decline, and data analysis to compare which materials work best overall. The egg droplet device simulates parachutes and other similar features seen in nature, such as helicopter seeds being dropped from some trees. The process of slowing down to withstand gravitational forces has been used in a number of instances in history, and continues to be an important science - especially today around emergency relief and transport of goods to inaccessible areas. Lesson Plan: Lesson Plan - Egg Drop Handout: Egg Handout Drop Upside Down Egg Drop Egg Handout List Presentation: Egg Drop + Brain Injury Egg Drop Prezi Reverse Egg Drop Prezi Standard: 4-PS3-3. Ask questions and predict results about energy changes that occur when objects collide. 6.MS-ETS2-2 (MA). Given the design task, select the appropriate material based on the specific properties required in the construction of the Activity solution In this challenge, your child's job is to create a contraption tool that will protect the egg when dropped from a height of about 10 feet. Since this command is open, your child can get creative by the way they make their egg drop device. This activity doesn't require a specific set of materials, so feel free to give your child any arts and crafts materials you have around the house and allow them to decide how to use them. After completing this activity, students should be able to: Explain that engineers design and build devices to help people. Explain why supplies may need to be dropped from planes rather than shipped by car or truck. Identify materials that impact the pillow. Explain between kinetic and potential energy. NGSS MS-ETS1-1 Performance Expectations. Define the criteria and limitations of design issues by to ensure a successful solution, taking into account relevant scientific principles and potential impacts on humans and the natural environment that could limit possible solutions. (Grades 6 - 8) Do you agree with this alignment? Thank you for your feedback! Click to see other curriculums aligned with this Performance Expectation This activity focuses on the following aspects of NGSS Three Dimensional Learning: Science Practice & Crosscutting Concept Techniques Core Ideas Discipline Define design problems that can be solved through the development of objects, tools, processes or systems and include several criteria and limitations, including scientific knowledge that can limit possible solutions. Sync agreement: Thank you for your feedback! The more precisely the criteria and limitations of design tasks can be defined, the more likely it is that the designed solution will succeed. Specification constraints include consideration of scientific principles and other relevant knowledge that tend to limit possible solutions. Sync agreement: Thank you for your feedback! All human activities attract natural resources and have short and long-term consequences, positive and negative, for human health and the natural environment. Sync agreement: Thank you for your feedback! The use of technology and any restrictions on its use are driven by individual or social needs, desires, and values; with scientific research findings; and by differences in factors such as climate, natural resources, and economic conditions. Sync agreement: Thank you for your feedback! NGSS MS-ETS1-2 Performance Expectations. Evaluation of competing design solutions uses systematic processes to determine how well they meet the criteria and limitations of the problem. (Grades 6 - 8) Do you agree with this alignment? Thank you for your feedback! Click to see other curriculums aligned with this Performance Expectation This activity focuses on the following aspects of NGSS Three Dimensional Learning: Science & Crosscutting Concept Engineering Practice Discipline Core Ideas Evaluate competing design solutions based on co-developed and agreed design criteria. Sync agreement: Thank you for your feedback! There is a systematic process for evaluating solutions with respect to how well they meet the criteria and constraints of the problem. Sync agreement: Thank you for your feedback! Represents real world and math problems with graph points in the first quadrant of the coordinate field, and interprets the coordinate value of the points in the context of the situation. (Class 5) More Details See a harmonious curriculum Do you agree with this alignment? Thank you for your feedback! Represents and interprets data. (Class 5) More Details See curriculum do you agree with this alignment? Thank you for your feedback! Display numeric data in a plot on a number including point plots, histograms, and box plots. (Grade 6) More Details See a harmonious curriculum Do you agree with this alignment? Thank you for your feedback! Design is a creative planning process that leads to useful products and systems. (Grades 6 - 8) More Details See a harmonious curriculum Do you agree with this alignment? Thank you for your feedback! No design is perfect. (Grades 6 - 8) More Details See a harmonious curriculum Do you agree with this alignment? Thank you for your feedback! Requirements for design consist of criteria and limitations. (Grades 6 - 8) More Details See a harmonious curriculum Do you agree with this alignment? Thank you for your feedback! Brainstorming is a group problem-solving design process where everyone in the group presents their ideas in an open forum. (Grades 6 - 8) More Details See a harmonious curriculum Do you agree with this alignment? Thank you for your feedback! Modeling, testing, evaluation, and modification are used to turn ideas into practical solutions. (Grades 6 - 8) More Details See a harmonious curriculum Do you agree with this alignment? Thank you for your feedback! Define criteria and limitations for the design. (Grades 6 - 8) More Details See a harmonious curriculum Do you agree with this alignment? Thank you for your feedback! Create a two-dimensional and three-dimensional representation of the designed solution. (Grades 6 - 8) More Details See a harmonious curriculum Do you agree with this alignment? Thank you for your feedback! Test and evaluate designs with respect to established requirements, such as criteria and limitations, and improve as needed. (Grades 6 - 8) More Details See a harmonious curriculum Do you agree with this alignment? Thank you for your feedback! Energy is the capacity to do the job. (Grades 6 - 8) More Details See a harmonious curriculum Do you agree with this alignment? Thank you for your feedback! Energy can be used to do the job, using many processes. (Grades 6 - 8) More Details See a harmonious curriculum Do you agree with this alignment? Thank you for your feedback! Represents and interprets data. (Class 5) More Details See a harmonious curriculum Do you agree with this alignment? Thank you for your feedback! Represents real world and math problems with graph points in the first quadrant of the coordinate field, and interprets the coordinate value of the points in the context of the situation. (Class 5) More Details See a harmonious curriculum Do you agree with this alignment? Thank you for your feedback! Show data in plots on number lines, including point plots, histograms, and box plots. (Grade 6) More Details See a harmonious curriculum Do you agree with this alignment? Thank you for your feedback! Understand the characteristics of energy transfer and the interaction of matter and energy. (Grade 6) More Details See a harmonious curriculum Do you agree with this alignment? Thank you for your feedback! Understanding the form of energy, energy energy and transformation and conservation in mechanical systems. (Class 7) More Details See a harmonious curriculum Do you agree with this alignment? Thank you for your feedback! Explain how kinetic and potential energy contribute to the mechanical energy of an object. (Class 7) More Details See a harmonious curriculum Do you agree with this alignment? Thank you for your feedback! Explain how energy can be changed from one shape to another (specifically potential energy and kinetic energy) using a model or diagram of a moving object (roller coaster, pendulum, or car on a ramp for example). (Class 7) More Details See a harmonious curriculum Do you agree with this alignment? Thank you for your feedback! Suggest alignments that aren't listed above Give each student team the same amount of material to build their device. Suggested supplies are listed below, but feel free to be creative in what materials you provide. Scissors are the only tool they need. 1 raw egg (buy extra as surely some broken before testing) tape, 2 feet; more ribbons make the activity easier and fewer ribbons make it more difficult so scale like you like white glue, such as Elmer glue target drop, such as points painted in grassy fields, chalk on sidewalks, etc.; it is important to be able to measure the distance from the target to the actual impact point of 1 gauge, such as a ruler, yard stick or measuring tape of 10 sheets of paper, such as 8.5 x 11 paper copies, but any kind will do 1 large black plastic garbage bag 10 pipecleaners 15 cotton 3 wide rubber 10 popsicle rods, 6 feet Feel free to be creative and include additional supplies or remove supplies from the list above. Alternative or additional supply ideas: foil, grocery bags, plastic straws, toothpicks or shaving creams. Consider including small rocks that can give weight to keep your device parts in place. When choosing materials, keep in mind that some materials, such as cardboard and foam boards, make this task too easy, especially for older students. On the other hand, additional materials provide opportunities for student creativity. An understanding of the concepts of energy transfer, energy conservation, potential energy and kinetic energy, as presented in the related lessons move it! (In addition to the information below, the related lesson, Move It!, provides an introduction to this activity. The motivation of the activity is also discussed in the Assessment and Counseling section of the Lesson.) Have you heard of the decline in disaster relief supply packages? (Listen to students' responses.) Disaster relief groups and the armed forces must provide a supportive supply of food and equipment and sometimes smooth to people in very hard-to-reach areas, often where no roads, trains, or nearby airports are located. These supplies must reach the designated landing area accurately and intact. When things don't go as planned, planned, food can explode from the impact, and sometimes supplies completely miss the target landing area. (Read aloud to students a 1994 news article about emergency food airdrops that landed from a target in Zaire.) Your engineering challenge today is to apply what you know about energy (potential, kinetic, energy conservation) to try to solve this real-life problem by testing techniques to drop valuable supplies (holding eggs), such as those represented by fragile raw eggs, accurately and safely from a specified height. Let's get started! A number of disaster relief packages are ready to descend from low altitudes. Before activities Find a good place to make test airdrops. Ideally, drop the device from three or four different heights such as 3, 6 (if the teacher holds it above his head), 15 feet (the second story window) and higher, if possible. Mark the target directly below the drop point (such as the second story window). If the landing area is soft, place a piece of plywood or concrete beam under the target to make the drop surface more difficult. For safety and uniformity reasons, have the teacher make (or at least closely monitor) all airdrops. Collect materials and prepare the same supplies for each group. See the Activity Scaling section for ideas about limiting inventory and creating more restrictions that mimic real-world conditions. Set a time limit for students to design and create their projects, based on your class time limit. It also mimics real-world conditions and usually helps students focus on working quickly. Leave for at least 25-30 minutes. Generally, the more time provided, the better the project. With Students Divide the class into groups of two each. Randomly divided groups better mimic how engineering problems require teamwork among people who may not know each other well or get along. On the other hand, randomly divided groups may be more disruptive. After presenting the Introduction/Motivation content, let students know that engineers solve problems by first identifying design requirements and constraints. For this design challenge, the requirements and constraints are: Design something that will protect your eggs, which represents a fragile relief supply, thus surviving the air droplets. Not only should the dropped egg remain intact, but it should land close to the target area. Your building supplies are limited to what you are given by the teacher. Your egg protection system will be tested from a height of more than one. (Tell students the altitude.) You should leave some way for the teacher to check after each drop of the test to determine whole eggs or have cracked. One simple method is to leave an opening or some access where the teacher can poke the egg with a finger. Feeling something wet or a flexing shell indicates that the egg has broken. You have __ minutes. Direct students to in their team and then design their device by creating an image along with a short paragraph describing what they want to do and why. This is what engineers do. Doing this also encourages students to communicate their ideas to others, which is important when they work in groups, and helps them analyze their ideas for achievement. Share supplies, including eggs. Warn students to be careful with fragile cargo. Tell them that if they accidentally break an egg, they face penalties (such as losing a few minutes of work time or losing material, in addition to cleaning up the mess). When the time runs out, ask the team to bring their design to the drop location. Do egg droplets from a height of 3 feet. Make sure the entire apparatus is above the required height. Test the broken egg and ask students to measure and record the distance from the target. The package of eggs that survive at the first height moves to the second height. If the teacher drops the egg, be sure to have the student show you the desired way to drop it, as it may require a certain orientation to be most effective. Drop eggs and test damaged shellfish. Ask students to help measure and record the distance from the specified target. Repeat until all the eggs are broken or you run out of height or spin. Whether each group discusses what they are doing and how their design is intended to protect eggs and ensure they land close to the target. Make sure they describe what they do and don't work on their design, as well as what they might do to make it better. Ask them to link their explanations to kinetic and potential energy and discuss how their design eliminates energy without breaking eggs. The most successful group is the group that lasts the most and has the least total distance from the target. acceleration: The rate of change in speed with respect to time. A measure of how fast the speed of an object increases or decreases. energy: Capacity to do the work. Some types of dfferent energy include: mechanical, heat, electrical, magnetic, chemical, nuclear, sound or luminous. For the purposes of this activity and related lessons, we mainly focus on mechanical energy because it is motion energy. style: Anything that tends to change the state of the break or movement of the object. The style is represented by two quantities; and its direction in space. The amount of strength is represented by amounts such as pounds, tons or Newtons. The direction in space refers literally to the direction the force is applied. This means that the style is vector and requires two passages of information to Fully. When a certain amount of force acts simultaneously on an object, the object moves as if it were acting with one force with a large and direction which is the amount of force applied. impact: The striking of one object against the Collision. Kinetic energy: The energy an object possesses because of its movement. Mass: A measure of how many problems an object contains, or the total number of particles in an object. Mass is not heavy. Weight is a force caused on mass by gravity. Thus, a person's mass will not change on a different planet, but his weight will. For example, you will weigh about 1/6 of your body weight now if you are in months. Potential energy: Particle energy or particle system generated from position, or condition. The potential energy of gravity is based on how high from the ground the object is while other potential forms of energy include springs, batteries or fuel. vector: Quantity that has magnitude and direction. Examples of the number of vectors include speed, weight, and style. Alternatively, speed and mass are

NOT the number of vectors and can be represented by their magnitude. speed: The large quantity of vectors is the speed of the object and its direction towards the object's movement. The speed differs from the speed because the speed describes the direction as well. As a class, the plot is remotely from the target to which each egg lands, with altitude on the x-axis and a distance from the target on the y-axis. Use different colors to plot different groups, and discuss reasons why some designs may be more accurate than others. How does accuracy change as altitude increases? Design Description: Review the team design to make sure students understand the concept of mechanical energy. One method for measuring understanding is to have students draw their designs and write short paragraphs explaining in their own words why they think their design ensures safe and accurate drops. Design Evaluation: Listen to students' descriptions of the device and its results. How well do students design their devices for different drops? Do they understand what works and what doesn't? Perhaps most importantly, do they understand why certain designs don't work? Energy Question: Ask students to explain how energy is transferred when eggs are released until it impacts the soil. The importance of this question is to connect material from this engineering design activity to related lessons about this type of mechanical energy. Cover the material in the lesson either before or after the activity. What idea works best to protect eggs? Why do you think they made it? (Ask students to think about energy transfer. For example, the parachute limits acceleration by causing some energy to disappear because the air is frictionless with the parachute. This friction causes upward force that limits acceleration.) Which idea works best to improve the accuracy of the device in landing close to the target? Why Work? Which idea looks promising in the design phase, but doesn't work well? What's What Wrong? (Maybe the parachute was caught under the package, etc.) How do you improve your design to better protect eggs? How do you improve your design for a more accurate landing? Scissors and supplies are the main source of danger. Make sure students use the right prudence. If descending from a height is like a second story window, be sure to keep proper student supervision near the window. For the greatest safety on higher drops, only the teacher drops the eggs. Make sure the drop location remains clear for a considerable distance, especially on a windy day. Falling eggs can harm a person, and raw eggs are messy and unhealthy. Students may accidentally break their eggs while building their devices. Apply a small penalty for the first violation, possibly losing time or material, as well as the task of cleaning up the mess. Beware that the broken eggs left outside the refrigerated environment smell very bad when damaged. If this seems too much to achieve in one day, divide the activity into three parts: design, creation, and testing. For more advanced students, reduce the amount of inventory. Make the challenge more difficult by providing plenty of inventory, but limiting the total package weight to no more than the weight of the egg. This requires accurate scale, but additional limitations more accurately represent real-world problems. Because the aircraft has a limited cargo weight capacity, the dropped package usually has the maximum allowed weight. This may require some testing on the teacher's part to determine what the maximum weight is allowed. Make the challenge more demanding by adding an economic aspect to the activity. Set a price for inventory and give each group a limited budget to buy inventory. This takes more time, but improves the overall understanding of real-world engineering problems by adding financial constraints. One method of doing this in a similar activity is described in egg landing activities. For more advanced students, limit the types of materials that make a good parachute (no plastic or large sheets of paper, challenge students to design creative ways to make parachutes) or eliminate parachutes completely. Integrated Regional Information Network. United Nations. Olojede, Dele. Posted July 25, 1994. U.S. Food Decline Misses Mark for Rwandan Refugees: Pallets Land Off Target, Spill, While Sanitation Crisis Awaits. News day. Perusahaan Seattle Times. Retrieved 17 June 2014. Randall Evans, Programs; Dan Choi, MUSIC Program Engineering Program K-PhD, Pratt School of Engineering, Duke University This content was developed by MUSIC (Math Understanding through Integrated with Curriculum) Program at Pratt School of Engineering at Duke University under national science foundation grant GK-12 no. DGE 0338262. However, these content does not necessarily represent NSF policy, and you should not consider support by the federal government. Last modified: 7 October 2020 2020