



Egg Lofting 103

Raw Eggs and Rockets: Something Chickens Never Thought of...

An Exploratory Curricula for Science.



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Introduction



When a teacher overhears a member of our educational staff using the words "rocket" and "egg" in the same sentence a deep silence usually accompanies the incredulous look we receive. These two words conjure up images and feeling that are - at best - diametrically opposite. Rockets are sleek and fast and personify the advance of human technological development. Eggs - while holding a place of importance in our literary and physical diet - are not built for speed and always seem to be just the perfect shape to unevenly roll off the counter and 'crack'.

Quest's Egg Lofting 103 Curricula is an excellent tool to introduce the exciting activity of "egg lofting" – or the liftoff, flight, and recovery of a raw egg carried onboard a model rocket. Egg lofting is a perfect example of "the sum being greater than the whole". Alone, an egg is an egg, and a rocket is a rocket. Paired together, they create an excellent tool to engage students in a discussion and examination of the issues surrounding human spaceflight and interplanetary travel.

Egg Lofting 103 consists of two units:

Unit 1 (Deep Space Egg) is a skills building exercise which introduces students to basic concepts in interplanetary travel. Students will be challenged to practice the evaluation, ranking, and technological system design skills that will be vital to a successful outcome in the following unit.

Unit 2 (The Vertical Egg Experimentation Project) is a hand-on exploratory unit that challenges students to experiment and discover the best material for cushioning a raw egg for flight onboard a model rocket.



Matrices



UNIT 1: DEEP SPACE EGG

Exploring modern challenges to interplanetary travel, students design a spacecraft for a mission to the “Mysterious Planet X”.

Essential Question:

What challenges do we face when attempting to explore other planets in our solar system and beyond?

Activity Challenge:

How can I design a spacecraft which will protect my Eggstronaut from the hazards of interplanetary travel?

Lesson at a Glance:

Human beings have touched the surface of only one planet in our solar system, yet eight others exist. In this lesson students will learn about the challenges of interplanetary space exploration. In small groups, students will discuss and rank certain challenges in order to create a “mission challenge worksheet”. Individually, students will create and illustrate a design for a spacecraft that would successfully carry an Eggstronaut from Earth to the Mysterious Planet X. This is a preliminary unit designed to build core skills relevant to the Egg Lofting 103 Experiment.

Lesson Duration:

- (1) 45 minute class period
- (1) 45 minute ‘take home’ assignment.

Teacher Preparation Time:

20 Minutes.

General Student Learning Objective(s):

Students will explore general themes in interplanetary space travel and planetary classification.

Specific Student Learning Objective(s):

In small groups, students will:

- ✓ Read and discuss the profile of Planet X.
- ✓ Discuss and rank some of the challenges of interplanetary exploration.

Individually, students will:

- ✓ Use the information learned in small group discussion to design and illustrate a spacecraft capable of carrying an ‘Eggstronaut’ from Earth to the Planet X.

Core Background Information:

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Space exploration is the physical exploration of [outer space](#), both by [human spaceflights](#) and by [robotic spacecraft](#). The development of large liquid-fueled [rocket engines](#) during the early 20th century allowed space exploration to become a practical possibility; it is distinct from the earth-based observation of outer space, known as [astronomy](#), which has occurred for millennia. Common rationales for the pursuit of space exploration include advancing scientific research, uniting different nations, and ensuring the future survival of humanity.



... Core Background Information (continued)

Space exploration has often been used as a proxy competition for geopolitical rivalries such as the [Cold War](#). The early era of space exploration was driven by a [space race](#) between the Soviet Union and the United States; the launch of the first man-made object to orbit the Earth, the USSR's [Sputnik 1](#) on October 4, 1957, and the first Moon landing by the American [Apollo-11](#) craft on July 20, 1969 are often taken as the boundaries for this initial period. The Soviet Union achieved many of the first milestones, including putting the first man in space, [Yuri Gagarin](#) aboard [Vostok 1](#) in 1961, and completing the first spacewalk (by [Aleksei Leonov](#) in 1965). In 1971, the Soviets launched the first space station, [Salyut 1](#).

After the first 20 years of exploration, focus shifted from one-off flights to renewable hardware, such as the [Space Shuttle program](#), and from competition to cooperation as with the [International Space Station](#). From the 1990's onward, private interests began promoting [space tourism](#). Larger government programs have advocated manned missions to the Moon and possibly Mars sometime after 2010.

Student Materials (per student):

- ✓ Four page student packet (stapled) containing:
 - Deep Space Egg: "Planet X Profile"
 - DSE: Mission Challenge Worksheet
 - DSE: Spacecraft Design Sheet
 - DSE: Spacecraft Design Info.
- ✓ Pencil
- ✓ Single piece of lined paper
- ✓ Markers and/or colored pencils

Teacher Preparation and Competency:

The purpose of this activity is to familiarize students with general themes relevant to interplanetary travel as well as to build evaluation, ranking, and system design skills. Familiarity – on the part of the educator - with general themes in space exploration, is more than sufficient for teacher competency. This unit will build core skills relevant to the Egg Lofting 103 Experiment.



Classroom Procedures:

(1) 45 min. classroom period broken into (4) sections:

Note: Students should be arranged into small groups.

1. General Discussion (10 minutes):
 - ✓ Discuss general themes in space travel and interplanetary exploration.
 - ✓ Ask students to relate to the class their favorite movie in which interplanetary exploration is a key theme.
 - ✓ Encourage and facilitate discussion on the difference between fictional depictions of interplanetary space travel and modern day capabilities.

2. Project Entry: (15 minutes):
 - ✓ Distribute four-page student packet.
 - ✓ Verbally provide students with an outline of the Deep Space Egg activity objectives.
 - ✓ Ask students to silently read the Planet X profile.
 - ✓ On a single piece of blank paper, have students individually list 4-6 challenges that are presented by the flight to – and landing on – Planet X.

3. Group discussion (15 minutes):
 - ✓ Ask students to discuss and compare their lists within their small groups.
 - ✓ Direct students to complete the Mission Challenge Worksheet while still in small groups.

4. Take Home Assignment Introduction (5 minutes):
 - ✓ Verbally lead students through the Spacecraft Design and Info Sheets. Instruct students that – when completed – these sheets should demonstrate thoughtful planning for the design of a spacecraft capable of delivering an Eggstronaut from Earth to Planet X.

Review and Assessment Criteria:

Student performance can be evaluated according to the following criteria:

- ✓ Mission Challenge Worksheet contains four individual listings that are ranked for importance.
- ✓ Mission Challenge Worksheet contains explanations to support ranking
- ✓ Spacecraft Design Sheet contains an illustration with sufficient detail to address the (4) features listed on the Spacecraft Design Info Sheet.
- ✓ Spacecraft Design Info Sheet lists (4) features unique to the student's spacecraft design with supporting explanations.

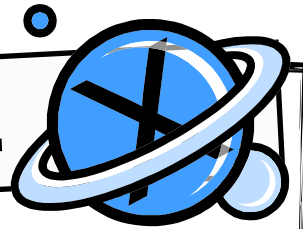


Additional Resources:

A fully detailed overview of Interplanetary Travel can be found online at www.Wikipedia.org.
The permalink to this subject matter is located at:
http://en.wikipedia.org/w/index.php?title=Interplanetary_travel&oldid=127124178

NASA has excellent resources available for teacher and students. The Mars Exploration Rover Mission page can be found at <http://marsrovers.nasa.gov/home/>





Deep Space Egg: "PLANET X" PROFILE



BACKGROUND:

On March 23rd, 2004, Sarah Bentz was in her backyard watching the moon with the new telescope. Just as she began to fall asleep she noticed a small object in her viewfinder. Writing down the object's coordinates, she decided to find more information when she visited the school library the next day. After looking for information (but finding nothing) she called her local observatory. They were amazed to hear of her discovery and soon the object she had observed was being called the "Mysterious Planet 'X'".

Now, nearly three years later, little have been discovered about Planet X. In order to learn more, scientists have decided to send an Eggstronaut to the planet's surface. But interplanetary space travel is even harder to do than it is to say! Many challenges will have to be overcome if your Eggstronaut is to land safely on the surface of this unknown planet.

PLANET 'X': Public Information:

Planet X is considered to be an outer planet. Outer planets are found outside the boundary between the asteroid belt between Mars and Jupiter. There are five outer planets: four of these are the "gas giants" (Jupiter, Saturn, Uranus and Neptune) and the last is the dwarf planet, Pluto. Planet X is also a superior planet. Superior planets are located farther from the Sun from Earth. Examples of superior planets are Mars, Jupiter, Saturn, Uranus, Neptune and the dwarf planet, Pluto. Lastly, Planet X is also a terrestrial planet. Terrestrial planets are composed of rock and metal ores, similar to our planet Earth.

CHALLENGES FOR DISCUSSION:

Unlike the movies, real interplanetary space travel takes years of research, planning and development before the first space vehicle is ever built! Understanding the challenges that your Eggstronaut vehicle will encounter in the trip to the planet surface is vital to the success of your mission. Using the information found on this sheet, discuss the importance of these challenges and then complete the Mission Challenge Worksheet.



PLANET 'X' PROFILE

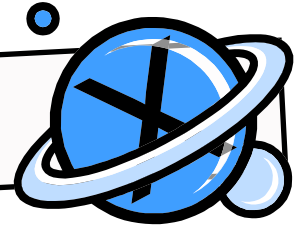
SIZE: 2.33 km
MASS: 132,122 (roughly 2x the mass of earth)
TYPE: Terrestrial
CLASS 1: This planet is considered Superior
CLASS 2: This planet is an Outer Planet
ATMOSPHERE: No oxygen is present.
GRAVITY: .25 (1/4th the gravity of earth)
MAX. DAY TEMP: 550 F
MAX. NIGHT TEMP: 80F
OTHER NOTES: The surface of this planet is very rugged with tall mountains and deep valleys. High winds and [unknown] storm systems with lightening are a regular occurrence during the day.



No Air? No Problem!
But 500 degrees during the day? That's going to give us some serious heartache...

OK. If we can deal with the temperature thing then we only have to work on avoiding those mountains...

TOP SECRET



DSE: Mission Challenge Worksheet

Mission Challenges:

Interplanetary space flight isn't easy! Here are some common challenges scientists must face:

Propulsion:

Space is big. Really big. Even if you want to travel from Earth to the next planet (Mars) it's a cool 100 Million miles! Because you can't bring along a gas can you'll need to think of creative ways of moving your vehicle through the blackness of space.

Power:

Forget about stopping at the local inter-planet convenience store for more batteries! Solar or nuclear are two current options....

Navigation and Communication:

Mechanical failures can dramatically alter the course of your vehicle. Having a method for your vehicle to communicate back to earth - and for you to communicate with it - are vital for a successful mission.

Thermal Protection

Our bodies have a circulatory system which helps to regulate heat. A spacecraft often can be baking hot on the side facing the sun and freezing cold on the other. How about entry in the atmosphere of Planet X? Don't forget those heat shields!

Impact Protection

Have you ever been hit with a baseball or tennis ball? There are more than 9000 pieces of space debris in orbit around our planet. These pieces can be as small as a tiny pebble, but they travel at enormous speed (22,000 miles per hour!). How about landing on the surface of Planet X? You'll need to think of a good method to protect your Eggstronaut from getting scrambled!



At 22,000 miles per hour (mph) a piece of space debris this size has the same kinetic energy as a bowling ball traveling at 60 mph... ouch!

Discuss the challenges your spacecraft might encounter in the mission to Planet X. Then fill in the blanks below from most to least important.

Challenge #1 _____

Explain why you think this is the most important mission challenge:

Challenge # 2 _____

Explain why you think this is the 2nd most important mission challenge:

Challenge # 3 _____

Explain why you think this is the 3rd most important mission challenge

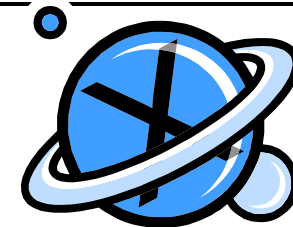
Challenge # 4 _____

Explain why you think this is the least most important mission challenge:



Now that you know WHAT the challenges are you need to design a system to overcome them!

NEXT!



DSE: Spacecraft Design INFO

Spacecraft Name: _____

FEATURE #1 _____

Explain why this feature is important to overcoming possible mission challenges

FEATURE #2 _____

Explain why this feature is important to overcoming possible mission challenges

FEATURE #3 _____

Explain why this feature is important to overcoming possible mission challenges

FEATURE #4 _____

Explain why this feature is important to overcoming possible mission challenges

UNIT2:

The Vertical Egg Experiment Project

Raw Eggs and Rockets... something chickens never thought of...students test and evaluate materials for suitability on Egg Lofting Flights.

Essential Question:

What properties make a material (or combination of materials) suitable to protect an egg carried onboard a model rocket during launch, flight, and recovery?

Activity Challenge:

What type of material design can I use to successfully protect my Eggstronaut during its launch, flight, and recovery onboard a model rocket?

Lesson at a Glance:

In the first stage of the experiment, students will propose the use of and experiment with different lightweight materials used to protect a raw egg encased within a model rocket payload capsule that is suspended from a parachute. After evaluating the success of their material design, students will create a final design use in protecting a raw egg (Eggstronaut) launched onboard a Quest V.E.E.P. model rocket.

Lesson Duration:

Please Note: This estimate is based on a projected classroom size of 24-30 students.

(3) 50 minute class periods:

1. Project introduction and experimentation.
2. Review and final material selection.
3. Launch and observation.

Optional (45) minute take-home assignment

Lesson Adaptations for gifted or older students:

(See explanatory note in Core Background Section)

Teacher Preparation Time:

- ✓ 20 Minutes for construction activities.
- ✓ 20 Minutes for first and second class periods.
- ✓ 1 hour for third class period.



- ✓ **General Student Learning Objective(s):**
- ✓ Students will experiment with various methods of protecting a raw egg during flight.

Specific Student Learning Objective(s):

- ✓ Students will experiment to determine a material design suitable to cushion an raw egg flown onboard a model rocket.
- ✓ Students will evaluate and modify this design in the first phase of experimentation.
- ✓ Students will test their final design in the launch, flight, and recovery of a raw egg.

Core Background Information:

Egg Lofting is the term used to describe the liftoff, flight, and recovery of a raw egg carried onboard a model rocket.

In the Vertical Egg Experiment, students will propose, evaluate and determine the best materials suitable for cushioning a small-medium raw egg within the nose cone section of a V.E.E.P. model rocket. Using the V.E.E.P. system, students will experiment with different material used with individual nose cone/parachute units. Once students believe they have determined a material design that is best suited for this purpose, these nose cone units are flown individually for testing on board a reusable, teacher-built booster rocket.

Lesson Adaptation:

The V.E.E.P. curricula can be adapted for use with gifted or older (grades 7-12) students by replacing the V.E.E.P. product with individual Quest Courier Model Rocket Kits. When using individual Quest Courier kits with this curriculum, the following lesson duration applies:

Lesson Duration using Quest Courier Model Rocket Kits

Please note: this estimate is based on a classroom size of 24-30 students.

(5) 50 minute class periods:

1. Phase 1 model rocket kit construction.
2. Phase 2 model rocket kit construction.
3. Introduction and material experimentation.
4. Review and final material selection.
5. Launch and observation.

Optional (45) minute take-home assignment

Project Materials:

Based on a class size of 30 students:

(5) Quest V.E.E.P. Egg Lofting Rocket and Capsule Sets (Item #5577).

Each V.E.E.P. set contains the materials needed for six students.

(5) B6-2/VEEP Bulk Model Rocket Engines (Item # 5990)

(1) Model Rocket Launch System (Item #7700 or #7700E) for each (12) students.

Please Note: These items can be obtained at Quest's eCommerce site located at www.questaerospace.com



Classroom Materials Needed:

- ✓ Various materials that could be used to cushion a raw egg within a capsule:
 - Paper (shredded)
 - Cotton
 - Fabric
 - Straws
 - Styrofoam
 - Pipe cleaners
 - Small pieces of felt
- ✓ Small folded-top sandwich bags for use as “flight suits”.
These will function to contain any raw eggs that may be broken during the experiment.
- ✓ Raw eggs sized small-to-medium or any small fresh hen’s egg weighing less than 32 grams in weight. This unit will require 1-3 eggs per student.
- ✓ Paper towels.
- ✓ Plastic-lined trash receptacle.

Teacher Preparation and Competency:

Educators undertaking this project will need to be able to:

- ✓ Assemble a simple model rocket(s) consisting of 5+ parts.
Average time to complete this construction is 20 mins. - no prior experience required.
- ✓ Guide students in the practical experimentation process.
- ✓ Guide students in an organized field activity.

Optional Teacher Preparation Resources:

Ground 2 Sky: An Educators Field Guide to Model Rocketry

This guide can be downloaded for free from:

<http://www.questaerospace.com/rcentral-edresources.asp>



V.E.E.P. DAY 1:

General Objective(s):

At the end of this session, students will:

- ✓ Have an understanding of the goals and purpose of the V.E.E.P. project.
- ✓ Have assembled and “dry tested” a V.E.E.P. nose cone and parachute system.

Teacher Preparation (30 minutes):

- ✓ Assemble the V.E.E.P. Booster Rocket(s).
- ✓ Prepare and organize required student materials.
- ✓ Select a clear location (classroom, indoors or outdoors) that can be used for testing. Because testing will be conducted by ‘hand tossing’ the assembled nose cone and parachute system in the air, adequate room is needed for students to maneuver.

Student Materials (per student):

- ✓ V.E.E.P. Nose cone capsule and parachute set.
- ✓ Five page student packet (stapled) containing:
 - Flight Events Diagram: Egg Lofting
 - V.E.E.P. Assembly Guide
 - V.E.E.P. Materials Assessment Sheet
 - V.E.E.P. Proposal Sheet
 - Model Rocket Safety Code
- ✓ Pencil
- ✓ 1” long piece of masking tape

Classroom Procedures:

One (50) min. period arranged into (4) sections:

Students should have desks clear of other materials. We recommend completing the construction of the V.E.E.P. booster rocket prior to the first session.

Project overview and introduction: (10 minutes):

- ✓ Ask students to compare and contrast descriptive words related to “eggs” and “rockets”.
- ✓ Provide an overview of objectives the Vertical Egg Experimentation Project.
- ✓ Allow students to examine the V.E.E.P. booster rocket with an assembled nose cone.
- ✓ Review the Flight Events Diagram for Egg Lofting.

Parachute Construction and attachment: (15) minutes:

- ✓ Guide students in the proper assembly of the parachute.
- ✓ Instruct students in the proper method of attaching the parachute to the nose cone.
- ✓ When students are finished, instruct them to write their name on the masking tape and attach this to a blank area of the nose cone.



Parachute Folding: (5) minutes:

- ✓ Guide students in the proper procedure for folding the parachute.
- ✓ Instruct the students to hold the parachute assembly and nose cone securely in hand.

Initial observation (“dry testing”): (20 minutes):

- ✓ Using a clear area in the classroom, gym or outdoors (low wind only), allow the students to “hand-toss” the nose cone and parachute assembly into the air.
- ✓ Instruct students to pay special attention the role of the parachute in slowing the rate of descent. Students should also take this time to ensure that the parachute shroud lines are securely fastened at all points – if not, direct students to securely re-attach these lines as necessary.



V.E.E.P. DAY 2:

General Objective(s):

- ✓ By the end of this session students will:
- ✓ Test and evaluate three materials for suitability as cushioning for their Eggstronaut.
- ✓ Record their observations on the V.E.E.P. Materials Assessment Sheet.
- ✓ Create a final material proposal using the V.E.E.P. Proposal Sheet.

Teacher Preparation (20 minutes):

- ✓ Prepare 3 eggs per student by placing individual eggs in plastic “fold top” sandwich bags (“flight suits”). Eggs should be returned to cartons until needed for field testing.
- ✓ Select an outdoor location that can be used for testing. Because testing will be conducted by “hand tossing” the fully loaded nose cone and parachute system into the air, a harder surface such as an asphalt parking lot or hard-packed earth (avoid concrete) will provide a more realistic representation of the forces encountered at impact during rocket splashdown.
- ✓ Arrange various materials used for cushioning in readily-accessible containers for transport to an outside location.
- ✓ Ensure that a plastic-lined trash receptacle is available for use at the outdoor location or provide.

Student Materials (per student):

- ✓ Assembled V.E.E.P. Nose cone and parachute set.
- ✓ 1-3 Raw Eggs sized small-to-medium encased in small folded-top sandwich bags (flight suits).
- ✓ Five page student packet (stapled).
- ✓ Pencil.

Classroom Procedures:

One (50) min. period arranged into (5) sections:

Students should have desks clear of other materials. We recommend completing the construction of the V.E.E.P. booster rocket prior to the first session.

Orientation and Movement to Outdoors Location: (5 minutes):

- ✓ Provide a verbal overview of the session objectives.
- ✓ Proceed to the outdoor location, ensuring that each student has their V.E.E.P. nose cone and parachute system, the student packet, and a pencil.

Material Selection and Experimentation (20):

- ✓ Arrange materials for cushioning and jacketed eggs at one end of the outdoor space.
- ✓ Direct students to select an egg and three types of cushioning material to experiment with.
- ✓ Ensure that students understand the purpose of the Eggstronaut’s “flight suit”.
- ✓ As students ‘hand toss’ and recover their nose cone and parachute systems, direct them to record their observations on the V.E.E.P. Materials Assessment Sheet.



Clean-up and Return to Classroom: (5) minutes:

- ✓ Ensure that any broken eggs are disposed of properly.
- ✓ Direct students who have had contact with raw egg material wash their hands thoroughly with soap before returning to class.

Discussion and Observation: (5) minutes:

- ✓ Encourage classroom discussion over material suitability.
- ✓ Explore potential challenges that may be encountered when nose cone and parachute systems are released from an altitude of 150 – 200 feet.

Final Material Choice: (15) minutes:

- ✓ Direct students to review the observations they recorded on the V.E.E.P. Materials Assessment Sheet.
- ✓ Using this information as a guide, students should outline their final proposal using the V.E.E.P. Proposal Worksheet.

Optional Work-at-Home Project:

- ✓ Students can elect to create and personalize their own Eggstronaut at home using standard craft materials. Please refer to the take-home guide entitled “V.E.E.P.: Creating your own Eggstronaut” found at the end of this curricula.



V.E.E.P. DAY 3:

General Objective(s):

- ✓ By the end of this session students will:
- ✓ Test and evaluate their final material selection for suitability by launching their Eggstronaut, nose cone, and parachute system onboard a V.E.E.P. model rocket to an altitude of 150 – 200 ft.
- ✓ Record their observations on the V.E.E.P. Proposal Sheet.

Important Staffing Note:

For launch day activities, we recommend a minimum adult-to-student ratio of 1:12. If possible, ask a parent volunteer to set up and maintain the launch field while classroom preparations are taking place.

Teacher Preparation (1 hour):

V.E.E.P. Booster Rocket and Launch Preparations:

- ✓ If not done so already, assemble the V.E.E.P. Booster Rocket(s). Please allow 24 hours for any glue to set.
- ✓ Select an appropriate location for the launch and recovery of the V.E.E.P. system.
- ✓ Given the low altitude of the V.E.E.P. flight and fast recovery of the nose cone and parachute system, the V.E.E.P. system can be flown within a clear area the size of a school baseball field or larger (min. 150 ft x 150 ft.).

Unsure of where to launch? Please refer to the V.E.E.P. Recommended Launch Range Diagram located in the appendix at the end of this curricula.

Is this your first time launching a model rocket? If so, we strongly recommend that you test fly the V.E.E.P. Booster rocket with a nose cone and parachute system prior to the classroom launch event. When test flying the V.E.E.P., be sure to use a nose cone and parachute system containing a raw egg contained in a “flight suit” and cushioned with small pieces of Styrofoam or other suitable material.

Motor Preparation:

- ✓ We recommend that you prepare your model rocket motors beforehand by inserting and securing the Q2 Igniters with masking tape. If you are unfamiliar with this step please refer to the publication entitled “Know your Igniter! Using the Q2!” located in the Additional Materials Section at the end of this publication.

Classroom and Field Activity Preparations:

- ✓ Arrange various materials used for cushioning in readily-accessible containers in the classroom.
- ✓ Create a “number box” containing small pieces of paper numbered 1-xxx (depending on your classroom size). Students will select from this box to determine launch order.
- ✓ Ensure that a plastic-lined trash receptacle is available for use at both the classroom and outdoor location.
- ✓ If students are bringing finished Eggstronauts from home, designate a specific staging area for placing these items during classroom hours.



Student Materials (per student):

- ✓ Assembled V.E.E.P. Nose cone and parachute set.
- ✓ Final material selected for cushioning.
- ✓ (2) Eggstronauts, each encased in a small folded-top sandwich bag (flight suit).
- ✓ V.E.E.P. Flight Report.
- ✓ Model Rocket Safety Code.
- ✓ Pencil.
- ✓ 1" long piece of masking tape.

Classroom Procedures:

One (50) min. period arranged into (5) sections:

Orientation: (5 minutes):

- ✓ Provide a verbal overview of the session objectives. Review the Model Rocket Safety Code.

Final Eggstronaut Assembly and Launch Selection: (10 minutes):

- ✓ Direct students to select their proposed material and ready their Eggstronaut for flight. To ensure the best possible outcome, each student should secure their nose cone capsule with a small piece of masking tape – this ensures that the capsule does not open during transport to the field.
- ✓ As students walk from the classroom, direct them to select a number from the prepared box – this number will determine their order in launch activities.
- ✓ Students should bring their finished capsule, V.E.E.P. Proposal Sheet and a pencil with them to the launch location.
- ✓

Field Activities: (30) minutes:

Arrival: After arriving at the launch location, direct students to a waiting and observation area (please see the V.E.E.P. Recommended Launch Range Diagram located in the appendix at the end of this curricula). For small groups totaling 12 students or less, a single launch station can be used. For larger groups totaling 13 students or more, we recommend the use of two launch stations.

Launch: Select students for launch based on their launch number. Encourage students who are waiting to participate in a short verbal countdown. Students should be allowed to depress the launch button on the model rocket controller.

Recovery: Students should be directed to recover their nose cone and parachute system only after these items have safely landed. Restrict students from attempting to 'catch' their nose cone and parachute systems or the Booster Rocket.

Recording Observations:

Instruct students to carefully open the nose cone capsule, observe and record the condition of their Eggstronauts.

Clean-up and Return to Classroom: (5) minutes:

- ✓ Ensure that any broken eggs are disposed of properly and that students who have had contact with raw egg material wash their hands thoroughly with soap before returning to class. Surviving Eggstronauts can be displayed in the classroom for the remainder of the day but should be disposed of by the teacher.



Review and Assessment Criteria:

Student performance can be evaluated according to the following criteria:

- ✓ Student demonstrated working knowledge of Flight Events related to Egg Lofting.
- ✓ Nose cone and parachute assembly were correctly constructed per the V.E.E.P. Assembly Guide.
- ✓ V.E.E.P. Proposal Worksheet reflects final material selection with supporting explanation clearly detailed.
- ✓ V.E.E.P. Flight Report reflects observation and recording of egg condition.





V.E.E.P Materials Assessment Worksheet
V.E.E.P. = Vertical Egg Experiment Project

Yeah, being an "Eggstronaut" is tough work... you just have to remember not to crack under the pressure...



Material Name:

#1

What are the characteristics of this material? How well did it work in protecting your Eggstronaut from impact?

Material Name:

#2

What are the characteristics of this material? How well did it work in protecting your Eggstronaut from impact?

Material Name:

#3

What are the characteristics of this material? How well did it work in protecting your Eggstronaut from impact?

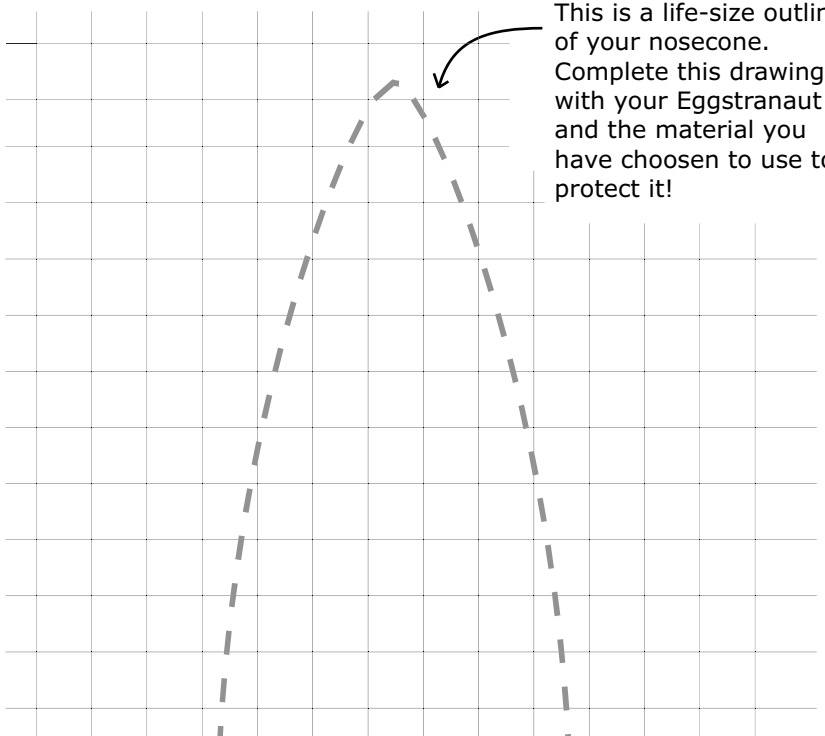


What do you think? Which material are you going to use for your Final Proposal?

YOUR NAME: _____

V.E.E.P. Proposal Worksheet

Now that you have tried different materials to protect your Eggstronaut, which material do you think will work the best? Write a proposal to show your choice!

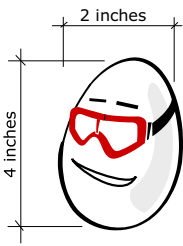


YOUR EGGSTRANAUT'S NAME:


I am planning to use the following material to protect my Eggstronaut during flight:

I think this is the best material because:
(Be sure to describe the properties of this material. Is this a natural or synthetic material? How will you use it to protect your Eggstronaut?)

Be sure to write correct dimensions to show the size of your Eggstronaut!



Birds Eye View!

In this space draw  what you think your Eggstronaut will see from 200 feet above the earth...

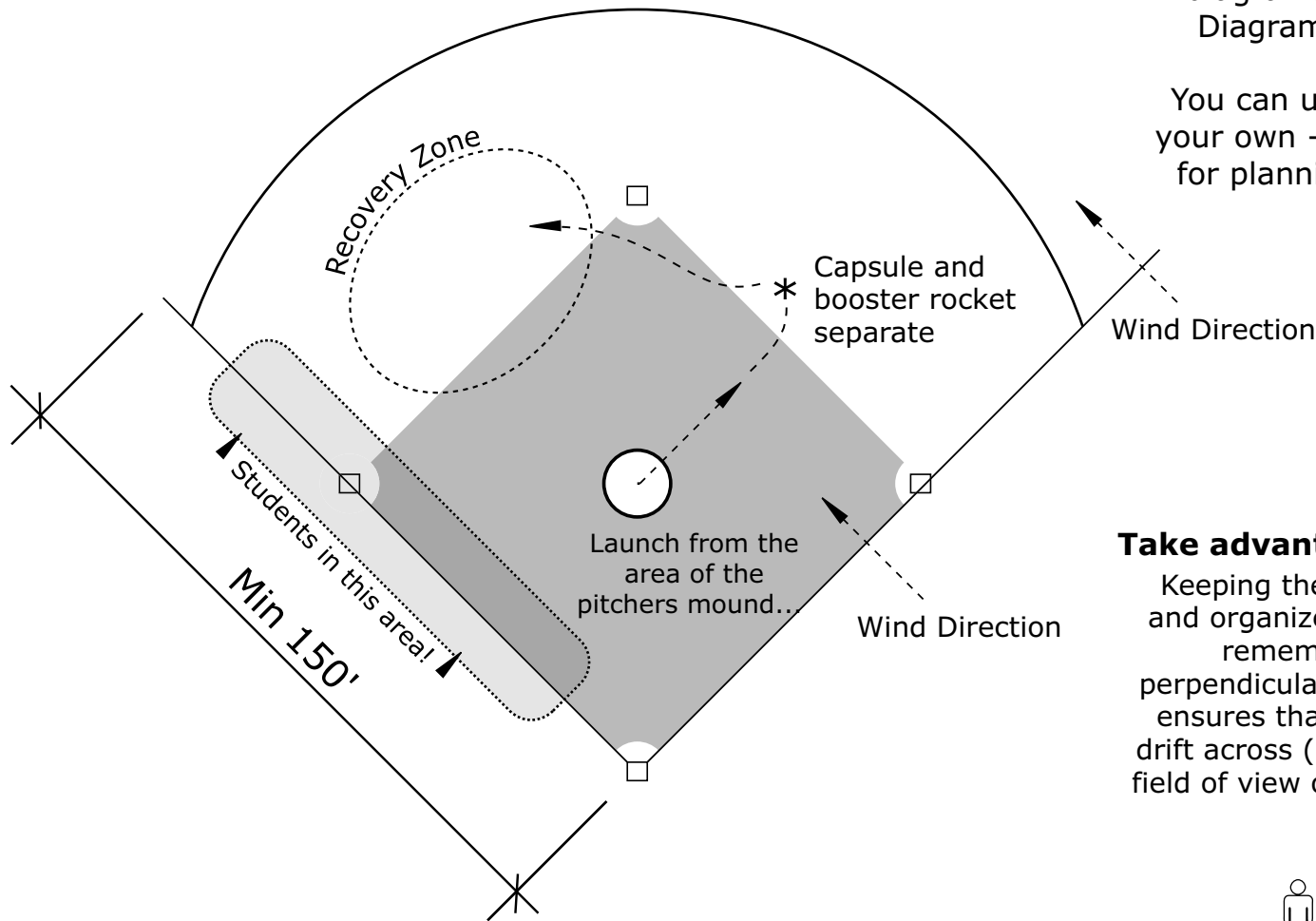
Be sure to include buildings, trees, cars, people and other objects!

Vertical Egg Experiment Project

TYPICAL CONFIGURATION FOR SCHOOL BASEBALL FIELD

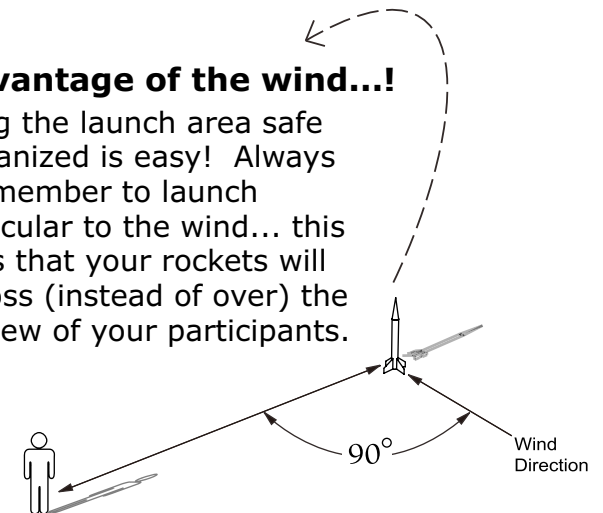
In the world of model rocketry, safety is the #1 priority. That's why we use launch site diagrams (often called "Range Safety Diagrams") map out the activities.

You can use this plan or you can create your own - either way, this is a great tool for planning a safe and exciting event!



Take advantage of the wind...!

Keeping the launch area safe and organized is easy! Always remember to launch perpendicular to the wind... this ensures that your rockets will drift across (instead of over) the field of view of your participants.



VEEP RECOMMENDED LAUNCH SITE DIAGRAM

I think I look
smashing, baby!
Yeah!



V.E.E.P. Eggstronaut Accessories

Use scissors to cut out these cool accessories - a "must have for your Eggstronaut's ride to the sky!"

