

## Flight of the Fruit: A unit that focuses on weight, gravity, and imagination.

Rev. for Teacher's Use in Elementary Classroom

Name of Lesson	Flight of the Fruit
Time to complete	Six lessons (45 – 60 minutes each day)
Author of lesson	Ashley Whitehead
Sources used to compose lesson:	<ul style="list-style-type: none"> <li>• What are systems? <a href="http://www.lindaboothsweeney.net/publications">http://www.lindaboothsweeney.net/publications</a></li> <li>• Teach Engineering <a href="https://www.teachengineering.org/activities/view/design_a_parachute">https://www.teachengineering.org/activities/view/design_a_parachute</a></li> <li>• Parachute Games: <a href="http://www.high5teambuilding.com/files/3150455/uploaded/parachute.pdf">http://www.high5teambuilding.com/files/3150455/uploaded/parachute.pdf</a></li> <li>• Folktale <a href="http://u.cs.biu.ac.il/~schiff/Once/rst12.html">http://u.cs.biu.ac.il/~schiff/Once/rst12.html</a></li> <li>• Parachute Background Information: <a href="https://www.rafmuseum.org.uk/documents-london-downloads-and-worksheets-parachutes-ks2-teachers-resou...">https://www.rafmuseum.org.uk/documents-london-downloads-and-worksheets-parachutes-ks2-teachers-resou...</a></li> </ul>
Summary of Skills & knowledge students must learn	<ul style="list-style-type: none"> <li>• What is gravity?</li> <li>• What are the units of measure?</li> <li>• What is impact?</li> <li>• Students will learn how to measure length and weight.</li> <li>• Students will experience the actual size of things through estimation and measurement.</li> <li>• Techniques for designing and creating a functioning parachute.</li> <li>• How air resistance plays a role in flying.</li> </ul>

<p><b>Florida Standards K -2</b></p>	<p><b>LAFS.1.SL.2.5</b> Add drawings or other visual displays to descriptions when appropriate to clarify ideas, thoughts, and feelings.</p> <p><b>LAFS.1.W.2.5</b> With guidance and support from adults, focus on a topic, respond to questions and suggestions from peers, and add details to strengthen writing as needed.</p> <p><b>LAFS.2.W.3.8</b> Recall information from experiences or gather information from provided sources to answer a question.</p> <p><b>LAFS.K12.W.4.10</b> Write routinely over extended time frames (time for research, reflection, and revision) and shorter time frames (a single sitting or a day or two) for a range of tasks, purposes, and audiences.</p> <p><b>MAFS.1.MD.3.4</b> Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.</p> <p><b>MAFS.K.MD.1.1</b> Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.</p> <p><b>SC.1.P.12.1</b> Demonstrate and describe the various ways that objects can move, such as in a straight line, zigzag, back-and-forth, round-and-round, fast, and slow.</p> <p><b>SC.2.N.1.1</b> Raise questions about the natural world, investigate them in teams through free exploration and systematic observations, and generate appropriate explanations based on those explorations.</p> <p><b>SC.2.N.1.2</b> Compare the observations made by different groups using the same tools.</p> <p><b>SC.K.P.12.1</b> Investigate that things move in different ways, such as fast, slow, etc.</p> <p><b>SC.K.E.5.1</b> Explore the Law of Gravity by investigating how objects are pulled toward the ground unless something holds them up.</p> <p><b>SC.2.N.1.6</b> Explain how scientists alone or in groups are always investigating new ways to solve problems.</p>
<p><b>NGSS</b></p>	<p><b>K-2-ETS1-1:</b> Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool</p> <p><b>K-2-ETS1-2:</b> Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem</p>

Relevant STEM practices

Practice	Description / Connection to Lesson	Language you will use to help students see the connection to STEM practitioners
Design	Students will work in teams to design a functioning parachute.	“Engineers design and redesign the shape and materials used to get better results.”
Create/Improve	Students will create a parachute for a chosen piece of fruit. They will test their parachute in class and will make improvements as needed.	“Engineers thoroughly test the materials and designs of parachutes to make sure they are strong enough to withstand the air resistance needed to slow skydivers to safe landing speeds.”
Explore	Students will work in teams to discover the weight of fruit in a variety of measurement, such as grams, ounces, and pounds. They will explore how to use a scale.	Engineers explore ways to problem solve and create new inventions.
Record	Students will record the weight of fruit in notebook. Students will draw designs and record the rate of falling fruit in science notebook.	Engineers record data in their notebooks so that they can remember important details about their observations.
Imagine	Students will transform their fruit into a character that needs a parachute for a made up reason.	Engineers use their imagination to create possible solutions and idea.

**STEM Discovery Center Tools**

Science – fruit, parachute, notebooks

Technology – Pocket lab, video camera

Engineering – materials to make parachutes, art materials

Mathematics - rulers, scale, manipulatives

**DAY 1:**

**Materials** – Folktale: Pumpkin vines and Walnut trees, science notebook, items/photographs that can be glued to create a picture, photographs of fruit trees/bushes

**Engage:** Introduce the context in which this lesson is situated in the unit. *How will you invite students into the lesson, access prior knowledge, get them excited?*

Goal	What you will say / do	Expected student responses / actions
<p>To explore that everything in nature has a right size and the effects if that size was to change.</p> <p>To understand what scale is. Scale is referring to an object’s actual size.</p> <p>Systems Thinking – Rightness of Size</p>	<p>Provide students the opportunity to question why things in nature act the way they are.</p> <ol style="list-style-type: none"> <li>1. How do we know if the size of something is serving its purpose?</li> <li>2. When is bigger/smaller better?</li> <li>3. What did Hojda learn about the size of the walnut?</li> </ol>	<p>Students will create a scene that includes pictures that are out of scale. For example, a giant shoe next to a tiny tree.</p> <p>Students will be able to answer questions stating their opinion and reason.</p>

**Detailed Procedure:**

1. If possible, take students outside to an area with trees. Have a small discussion outside about why they think some fruit grows on trees and some grow on vines or bushes.
2. Tell students the folktale from Turkey. You can simply read it aloud but it would be more meaningful to tell story using eye contact, pictures, and hand motions.

Ask the following questions: How do we know if the size of something is serving its purpose?

When is bigger/smaller better?

What did Hojda learn about the size of the walnut?

3. Explain what scale means as it relates to this story. Have students create a silly picture that consists of pictures that are not in scale. Provide students with drawing materials, magazine clippings, and/or other 3D items.
4. Afterwards, have an Art Walk to admire all the silly pictures. In science notebook, students can write/draw the reason things are a certain size.

**Explore:** Give students an opportunity to practice the skills, or engage in meaningful work with the knowledge they need to learn. *How will you organize student activities and thinking as they explore the S/K in this lesson?*

Goal	What you will say / do	Expected student responses / actions
<p>Students will learn how to use a scale to measure weight in grams, ounces, and pounds.</p> <p>Students will understand gravity and the rate of gravity.</p> <p>Students will measure depth of impact</p>	<p>Which unit of measurement is the smallest/largest</p> <p>Why are the numbers different?</p> <p>Engineers measure things a variety of units too.</p> <p>Can you think of something else that uses a scale?</p> <p>How could we change how fast the fruit falls? Why do things fall to the ground?</p>	<p>Students will discuss reasons for choosing a certain fruit.</p> <p>Students will discover that heavier things make a deeper impact but things fall at a same rate no matter its weight.</p>

**Day 2: Materials** – fruit, science notebook, scale, worksheet (grams, ounces, pounds chart), Small index cards,

**Advanced Preparation:** Before Day 2 lesson, set up pool with flour near an elevated height, rulers, Purchase fruit.

**Day 2: Detailed Procedure –**

1. Explain that yesterday you learned what ‘scale’ was. Explain that today you are going to learn a different meaning of scale. Show students scale and ask class what they think its purpose is. Show class how to use it by demonstrating using the stacking weights. Have volunteers help too.
2. Show students variety of fruit and explain that they are going to work in teams to choose a fruit to study. Allow for teams to discuss which piece of fruit to choose. Assist students as needed. Once teams have chosen fruit have students draw the scale, purpose, and fruit they have chosen. While students are recording in their notebooks, call each team up and allow them to use the scale to weigh their fruit. They will document the weight of the fruit in their notebook too.  
*Ask why the numbers are different? Which unit of measurement is the smallest/largest? What are other things that use that measurement?*
3. Tell class they are about to be a part of a very exciting investigation. Explain that they are going to get to go outside and drop their fruit from a tall structure. For example, the top of a slide. Review the story from yesterday about what would happen if pumpkins fell from trees? What will happen to the ground? Explain that this is called ‘impact.’ Have one student drop fruit from top of slide, 1-2 teammates use digital timer to record how much time it takes for the fruit to hit the ground, and 1-2 teammates will record the depth of the impact after it falls using ruler. On an index card label the teams name and fruit and place over crater. If using pocket lab tape pocket lab to fruit using masking tape and look at data as it falls.
4. Once all teams have gone, compare the time it took for the fruit to fall. Ask did heavier things fall faster? Why not?
5. What made the biggest impact and why? How could we change how fast the fruit falls? Why do things fall to the ground?
6. Tell class they were such good thinkers today! Explain that they understand what gravity is and learned a lot.

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**Explain:** Guide students in formulation their own explanations to make sense of the S/K in the lesson *How will you help*

Goal	What you will say / do	Expected student responses / actions
<p>Students will use their senses to observe how a parachute works.</p> <p>Students will transform their chosen piece of fruit into a character. They will create a character trait graphic organizer.</p> <p>Students will develop a short story that explains a made-up reason for why their fruit needs a parachute.</p>	<p>During read aloud, point out important parts of the parachute and how that helps skydiver.</p> <p>Practice teambuilding activities by participating in parachute games. Ask, how working in a team helps problem solve?</p> <p>Assist students with writing process. Model how to use graphic organizer.</p>	<p>Students will use their background knowledge about parachutes as well record any new facts they learned.</p> <p>Students will make the connection that working together in a team can be fun and helpful when attempting to solve a problem.</p> <p>Students will use their creativity and background knowledge to create a character and reason for why their fruit would need a parachute.</p>

language

**Day 3: Detailed Materials** – Book: How Parachutes Work, Wonder Parachute, Science Notebook, post-it notes,

**Day 3: Detailed Procedure** –

1. Have students sit in teams and provide each team with a small stack of Post-its. Taking turns, each student will write one thing they know about parachutes. This can be a drawing of one, a purpose, description, etc. Have students stick notes to board or chart paper and state what similarities you know among the notes.
2. Take students outside with parachute and choose one of the parachute games that can be found at <http://www.high5teambuilding.com/files/3150455/uploaded/parachute.pdf>. Have students explain why it is important to work in a team.
3. Take class back in side and read the book, *How Do Parachutes Work?* Think aloud any key parts you know, especially those that relate to the function and design of the parachute and how engineers contributed to that.
4. After reading, ask students if they have anything else they would like to add to the list of information about parachutes. If so provide more post-it notes for them to write or if it is an inexperienced writer you can write it for the student.
5. In science notebooks, students will draw a detailed picture of parachute and its parts. Explain that this will help them with tomorrows lesson.

**Day 4: Detailed Materials** – Fruit, Paper/Graphic Organizer to create fruit character, googly eyes, permanent markers/paint, glue, yarn, other objects that could potentially used as facial features.

**Day 4: Detailed Procedure** –

1. Review data from falling fruit investigation. Tell students they are going to create a make believe story about their fruit. Tell students they each will choose a piece of fruit and will add a face to it. Tell them they will transform their fruit into a character in a story. In their story their fruit character will need to have a name, character traits, and come up with a reason why their character needs a parachute. You may model how to write thoughts onto graphic organizer. Allow students time to discuss their ideas with one another.
2. Students choose their fruit and began to transform it into a character. Students complete graphic organizer.
3. As students finish, they may draw design for parachute.

*\*\* You may wish to spray the fruit with adhesive glue or hairspray to prevent it from breaking down.*

**Elaborate:** Emphasize the connection of what is contained in this lesson and how it will be used in the classroom and/or lab setting. *How will you connect this experience with other ideas or real world applications?*

Goal	What you will say / do	Expected student responses / actions
<p>Students will design and build parachute for fruit.</p> <p>They will use their notebook to record their design, attempts, fails, and changes made to parachute.</p>	<p>Remember that your parachute will need to be improved and they only way to do that is to try your parachute and think about what went wrong and how to fix it? Use a growth mindset not a fixed one.</p> <p>Look back through your notes and think about the design of your parachute.</p>	<p>Students will not have functioning parachutes at first. They will continue to make improvements on the design and will record data in science notebook.</p>

- **Day 5: Detailed Materials** – Fruit Characters, materials for parachutes such as tissue paper, napkins, construction paper, tape, newspaper, paper towels, plastic bags, string, glue

**Day 5: Detailed Procedure**

1. Students will weigh fruit and record weight in notebook. They will construct their parachute and test it in the classroom. Each time they test it, they will write any changes that are made in notebook. Allow for students to help one another.
2. Students will weigh fruit and record weight in notebook. They will construct their parachute and test it in the classroom. Each time they test it, they will write any changes that are made in notebook. Allow for students to help one another.
3. Show students a diagram of a standard parachute with its three main components; **canopy, strings (suspension line) and load**. Build and demonstrate how to construct a basic parachute with an emphasis on taping the strings to the four corners.
- 4.

**Evaluate:** *How will you assess the extent to which learning goals are met, during / by the end of the lesson? (Remember to include some sort of review of the lesson/ revisit the response to “Essential Question” before you get to the evaluation.)*

Goal	What you will say / do	Expected student responses / actions
<p>Launch day! Students will present their fruit stories and parachute design.</p> <p>Students will drop fruit from high surface once more and record data.</p>	<p><b>Ask:</b> Did the parachute work? Did it lessen the impact of the fall? How do you know? What would you do differently?</p> <p>Document presentations using camera.</p>	<p>Students will compare data from the two days to determine if their parachute worked or not.</p> <p>Students will be evaluated using a rubric. on design and function of Their story will also be assessed based on creativity, reasoning, and organization.</p> <p>Communicate their design process and results.</p>

- **Day 6: Detailed Materials** – Fruit Characters with parachutes, Pocket lab or kiddie pool with flour, science notebook, timers, video camera, rubric for evaluation.

**Day 6: Detailed Procedure**

1. Launch day! Explain to students they are ready to test their parachutes. Take class outside and repeat the investigation from day two. Before students launch, have them present the name of their fruit, reason for needing a parachute, and explain design of parachute. Be sure to videotape this and the fruit falling. If the parachute does not work praise students for the process and ask them why it didn't work.
5. Have students compare their data from day 2 to this investigation. Did the parachute work? Did it lessen the impact of the fall? How do you know? What would you do differently?

**Extension Activities:**

Take photographs of fruit characters and parachutes and make a class book.  
Have students create an Adobe presentation that includes their video, story, and results from parachute.

# PUMPKIN TREES AND WALNUT VINES

OH, HOW hot my poor head is!" Nasred-Din Hodja sat alone under a walnut tree. He fanned himself with a pumpkin leaf that he had picked from the vine sprawling at his feet.

"I wonder if I dare take off this hot turban." The Hodja looked to the right, to the left, behind him, before him. "There's not a soul in sight. And for once, I can take off my turban without anyone laughing at my baldness!"

He unwound his turban and wiped his dripping hot head with it. He threw the turban down on the ground beside him, and he sighed contentedly as the breeze from the pumpkin-leaf fan blew on his smooth glistening head.

"There, I feel like myself," said the Hodja, comfortable and contented again.

"That was a good day's work I did in the vineyard today. I have earned a good supper. Fatima said she was going to cook goat's-milk soup for supper. I'll just rest here a minute to cool off, then go home to a good big bowl to fill me up.

With the sense of well-being, the Hodja always felt the urge to talk to someone - to tell of his exploits or to give advice. But he had already made sure that not a soul was in sight. He could hear the tinkle of sheep bells and the reedy whine of a shepherd's flute on the distant hillside, but not a person could he see.

The pumpkin-leaf fan waved more slowly, as Nasr-ed-Din Hodja sat erect. The fan dropped to the ground. The Hodja was wide awake again. He had discovered something that really should be changed.

"You silly old tree!" Nasr-ed-Din Hodja shook an accusing finger at the walnut tree that was shielding him. "Is that the best you can do? And that? And that?" The Hodja pointed scornfully at the walnuts growing on the tree.

"Look at the size of you!" The Hodja shook his fist at the tree. He was working

up a pleasant excitement. "You rise up so proud and high, but what do you have to brag about - just some little walnuts no bigger than my two thumbs. Take a lesson from your neighbor, the pumpkin vine. It lies along the ground, feeling so humble and unimportant but see what good reason it has to brag." The Hodja pointed at the huge golden pumpkins, snuggled among the dark green leaves of the pumpkin vine.

The more he thought about it, the more disgusted the Hodja became with a scheme of things which made little walnuts grow on a noble tree and huge pumpkins grow on a groveling vine.

"Now, if I had been planning it," cried the Hodja to his audience of walnuts and pumpkins, "it would have been very different! The big important

trouble to the spineless pumpkin vine. The vine might even hold up its head a little, if it had something the right size growing on it."

Unnoticed by him, a gentle breeze had sprung up and was swaying the branches above his bald bare head.

"Yes, yes," he went on, "if I had been planning the trees and the vines, you -" The Hodja never finished his sentence. There was a little snap on the branch above his head. There was a little crackle as something rushed through the leaves. There was a resounding smack as something hit the Hodja's bald bare head.

For a minute the Hodja swayed. He saw little bright lights where none had been before. With his left hand he picked up a walnut, small, to be sure, but hard, oh, very hard. With his right hand he rubbed his poor head where a lump the size of a walnut was quickly rising.

The Hodja bowed apologetically toward the sacred city of Mecca in the east.

"Oh, Allah!" It was a meek and humble Hodja who spoke. "Forgive me for saying you were wrong to have pumpkins grow on vines and walnuts grow on trees. You were wiser than I. Suppose it had been a pumpkin that fell from that tree onto my poor head!"

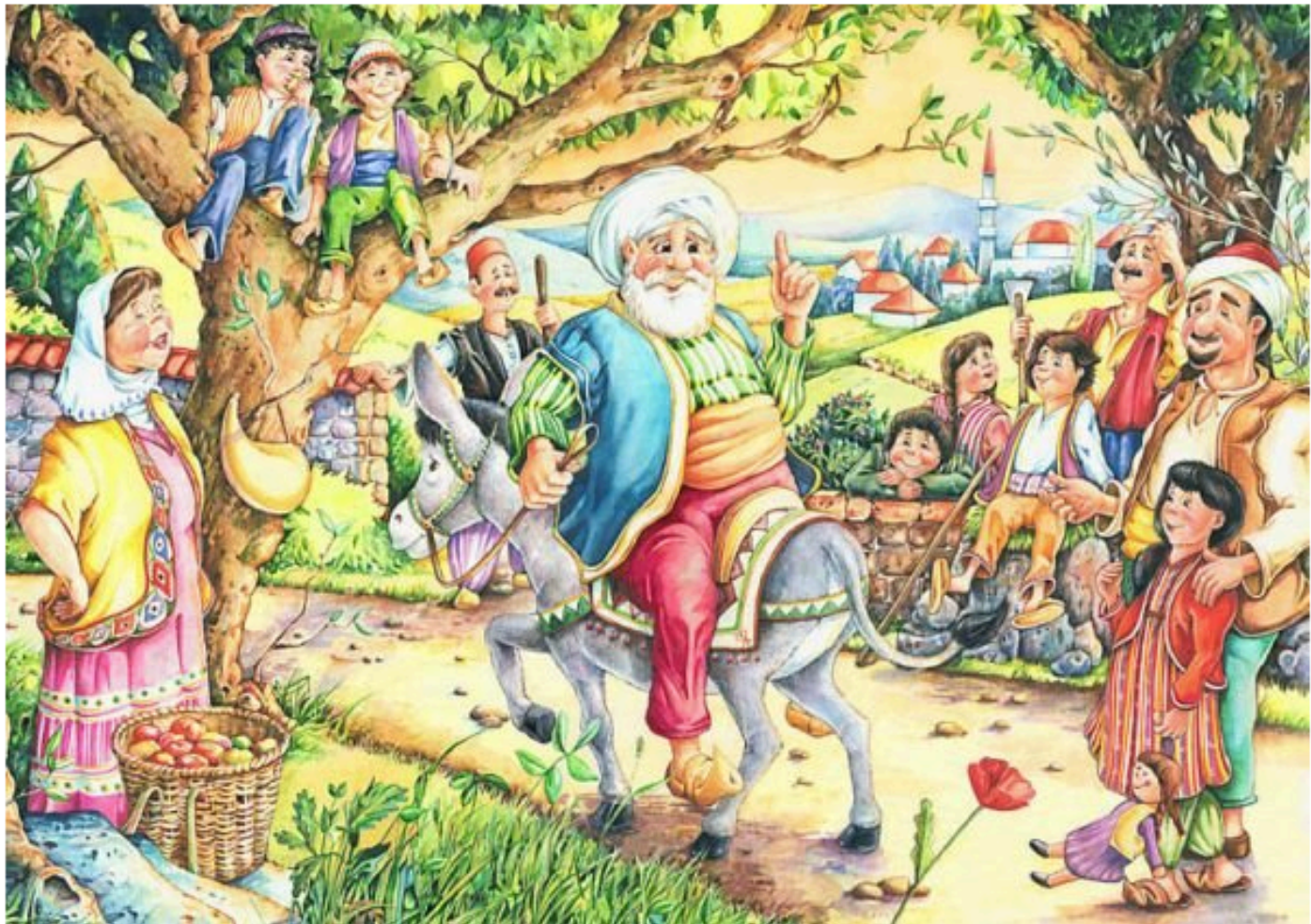
Rubbing his bruised and aching head, the Hodja sat under the walnut tree. He was thinking how beautiful the golden pumpkins looked on their graceful twining vine. They were so close to the good brown earth that they could not possibly fall anywhere. Allah was wise.



Picture cards for story:







Fruit Trees:









Need to make:  
SCALE Worksheet:  
Grams, Ounces, Pounds  
FRUIT GRAPHIC ORGANIZER/CHARACTER TRAIT  
GRAVITY INVESTIGATION GRAPHIC ORGANIZER