

Lesson 2 – “Grapeful” for Science

Overview

This lesson is about **variability**. Variability refers to the individual differences among objects (i.e., people, animals, plants, things) along a particular characteristic. Variability is important to scientists because it motivates them to ask questions about why things may be different. Variability makes the world interesting. If everyone were the same in every way, life would be pretty dull. This lesson gives the UQUEST scientists the opportunity to observe variability even in grapes. The UQUEST scientists will collect data through observations, measurements, and descriptions of various types of grapes. They will explore similarities and differences across various characteristics: size, color, texture, taste, and “squish-ability”.

After completing the lesson, UQUEST scientists will compile their observations to plot their responses about a characteristic of the grapes. Then they will describe the variability across grapes. UQUEST scientists will also learn that grapes are high in potassium that protects the heart and helps muscles and bones. Grapes also have vitamin C, which can help boost the immune system.

Science Objectives:

UQUEST scientists will:

- apply their observational skills to identify variability among grape varieties.

Health Messages:

- Grapes are a common fruit and a nutritious snack.
- Grapes are high in potassium, which protects our heart and helps our muscles and bones.
- Grapes have vitamin C, which can help boost our immune system.

Reinforcement of previous objectives:

- Observation (Lesson 1) - Observation is important for science and can involve some or all the senses.
- Graphs (Lesson 1) - Scientists use graphs to organize, communicate, and describe information about the observations they collect.

Vocabulary

- **Data** - A collection of facts, such as information, numbers, words, etc.
- **Variability** - The differences among objects (people, animals, plants, things) along a particular characteristic.
- **Y axis**: The line on a graph that goes up and down.
- **X axis**: The line on a graph that goes side to side.

Materials

- 4-6 bunches of grapes (green, red, purple, and cotton candy grapes)
- 4-6 packs of raisins
- Toothpicks
- Reusable plastic knives; one per scientist
- Paper plates and napkins
- Black sharpie to label plates
- Camera
- Pack of hand wipes; one per team
- Magnetic dry-erase easel with dry erase markers and magnets
- Crayons
- UQUEST kit

Preparation

At UM:

- Label each Ziploc bag with the 4 grape types

At OYC

- **Ensure that no UQUEST scientist has a grape allergy.**
- At each team's table, place paper plates, reusable knives, hand wipes, and pencils
- Each UQUEST scientist will be given grapes: 3 green, 3 red, and 3 purple, 3 cotton candy.
- Bags should be organized as follows:
 - 2 Ziploc bags per scientist
 - 1 bag with purple and cotton candy grapes (labeled)
 - 1 bag with red and green grapes (labeled)
- Each bag of grapes should be placed on one plate for each UQUEST scientist.
 - Grapes should only be distributed when ready to start activity to avoid distractions.
 - Separate bunches of grapes will be used for building activity.
- Graph - On magnetic dry-erase boards, use dry erase marker to make the following graph (also on page 2C of lab notebook)
 - Title: Which grape was the most squish-able?"
 - X Axis: Grape Type (green, red, purple, raisin)
 - Y axis: Number of UQUEST Scientists and be scaled to include the total number of students in the classroom (I.e., 0 – 20) in intervals of one (0, 1, 2)

Introductory Script:

Welcome UQUEST scientists.

*ALLERGIES GRAPES

Remember the lab notebook is an important tool that scientists use to record their observations and the results of their experiments.

Let's open up your lab notebooks to the second page. Like all scientists, UQUEST scientists pay attention to the world around them. They create an environment that helps them to learn about the world. They listen to each other. They communicate with each other. And they treat each other with respect.

Let's review the values of a UQUEST scientist. Each UQUEST scientist reads OUT LOUD one value.

- 1. Pay attention** when others are talking.
- 2. Speak in a low voice.** Do not scream.
- 3. Respect each other.** Do not push or shove each other.

****Be sure to praise the students when they do well and tell them why.****

Relaxation

Before we begin the lesson, we'd like to start off by doing a relaxation activity. When scientists are relaxed, they do better science.

For today's relaxation activity we will do belly breathing.

- Guide the UQUEST scientists, through a deep breathing exercise for ~1 minute.

Instructions for Lesson 2

1. Introduction

- a. *Today, our quest is to learn about variability. Has anyone heard the word variability before?*
- b. **Ask scientists to close eyes and imagine this scene:** (for example)
 - i. *You are walking down a street. You are in a town called Novare where everything looks exactly the same. Everybody has the same face and body. Everyone is dressed the same, all the cars look the same, all houses and trees are identical....*
- c. *Okay open your eyes. Would you want to live in the town of Novare?*
 - i. *Probably not, right?! In Novare, there is no variability!*
- d. **Variability** means that there are differences among similar objects in a group on a particular characteristic.
 - i. **Give example of objects that have variability**
 - a. *Example: There are differences in the colors, shapes, and speed of cars, even though they are all cars.*
- e. **Introduce quest with variability among grapes**
 - i. *For example, there is variability (differences) in color of these grapes: green, red, and purple.*

***ALLERGIES GRAPES**

- f. Ask scientists what they know about grapes.**
 - i. *Grapes are a healthy snack that we can eat at any time of the day. Grapes contain a lot of nutrients, like vitamins, that our bodies need to work properly. Grapes also have a lot of potassium, which can help lower your blood pressure and lower your chances of heart disease.*
- g. Present box of raisins. Discuss what raisins are (dried grapes) Who has eaten raisins before? Do you know what raisins are?**
 - i. *Raisins are dried grapes! They may look different, but raisins are also a type of grape.*



2. Activity

- a. Review 5 senses and how we, as scientists, use them to collect data.**
 - i. *The information we collect about our grapes is called **data**. As scientists, you will write down your data in your lab notebooks so that there is a record of your observations*
- b. Direct scientists to page 2B in lab notebook.**
 - i. *First, we will examine the color, size, texture, and taste of each type of grape.*
- c. Pass out grapes to each UQUEST scientist.**
 - i. **Ensure scientists do NOT eat grapes at this moment**
- d. Let's observe the grapes. You each have four different types of grapes.**
- e. UQUEST scientists will observe the following for each grape:**
 - i. Color**
 - a. **Have scientists compare and discuss the colors of the grapes (green, red, and purple).**
 - ii. Size**
 - a. **Have scientists compare and discuss the size of the grapes (Which grape is the biggest? Which is the smallest?).**
 - iii. Texture**
 - a. **Have scientists compare and discuss the texture of the grapes (smooth, soft, crinkly, bumpy, wrinkly, hard)**
 - iv. Taste**
 - a. **Have scientists compare and discuss the taste of the grapes (sweet/sour)**
 - b. First, let's try the green grape. What does it taste like? Describe it.**
 - c. Second, let's try the purple grape. What does it taste like? Describe it.**

- d. *Third, let's try the red grape. What does it taste like? Describe it.*
- e. *Finally, let's try the cotton candy grape. What does it taste like? Describe it.*
- f. *Think carefully about the sweetness of the grapes.*
- g. *On page 2B, mark your response next to the question, "Which grape was the sweetest?"*
 - 1. *If you think two grapes are both the same sweetness, try and pick just one.*

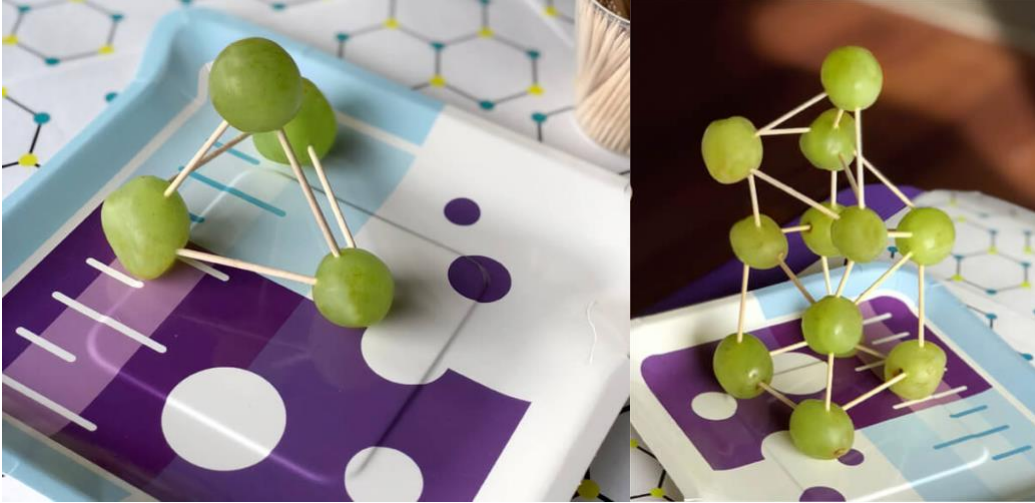
v. Squish-ability

- a. **Have students place one of each grape type in the Ziploc bag**
- b. **Have scientists compare and discuss the squishiness of the grapes that are in the Ziploc bag (easy/hard, soft/hard)**
- c. **Have scientists squish 2 grapes at a time with two fingers to better tell difference in variability**
- d. *You will put a grape between your fingers (while it is still in the bag) and squish it like this (demonstrate)*
 - a. *Does it squish easily?*
 - b. *Does it feel soft or hard when you press it with your fingers?*
- e. *On page 2B, mark your response next to the question, "Which grape was the easiest to squish?"*
- f. **Offer wipes to clean hands.**
- g. *Congratulations, everyone! You have just collected your own data about grapes*
 - i. **[Clean the grapes and wipe your team station]**

3. Documentation

- a. **Explain that we will use the data about taste that we just collected to make a bar graph on which grape was the sweetest**
 - i. **Ask scientists to recall last week when we made a bar graph about guesses in the mystery bag**
 - ii. *Turn to the graph from lesson 1 on page 1C in your lab notebook and observe the graph.*
- b. **Direct scientists to page 2C in lab notebook and ask if they recall parts of the graph.**
- c. *First, we have the title (point to title), which shows the data we are trying to present. We want the title to represent what we are trying to communicate with our data.*
 - i. *Take a crayon and circle the title of the graph.*
 - ii. *For this graph we want to see which grape you rated as sweetest, so we titled the graph "Which grape was the sweetest?"*
- d. *Next, we have this line called the x-axis that goes from side to side (slide finger along the x-axis), which will show the four different types of grapes we rated.*

- i. *Take a different color crayon and trace the line of the x-axis. You can see the label says grape type, and then you can also see our four types of grapes: green, red, and purple grapes and a raisin.*
 - e. *Last, we have this line, called the y-axis, which goes up and down (point to y-axis).*
 - i. *Take a different color crayon and trace the line of the y-axis. This will represent the number of votes from UQUEST scientists about which grape was the sweetest.*
 - f. *Which grape did you rate as the sweetest? (Have students refer to page 2B)*
 - g. *Just like last week we want each of you to come up to the board, one team at a time, take a magnet and STACK it above the grape type that you think is the sweetest. I am going to give you your magnets.*
 - i. **UQUEST leaders will call teams up to the board one at a time and each student will place their magnet.**
 - ii. **Once all teams place magnets, UQUEST leaders will outline the magnet columns with a dry erase marker and write the total number of magnets on top of each bar.**
 - h. *Scientists use graphs to communicate their data to others. Let's take a look at the data on the class bar graph.*
 - i. *What do you observe?*
 - ii. *Which type of grape did most UQUEST scientists rate as most sweet?*
 - iii. *What on the graph shows you that ____ was sweetest?*
 - i. *Turn to page 2C and copy the graph into your notebook.*
 - i. *Be sure to draw the bars just like they are on the board. Use a different color crayon for each bar.*
 - j. *Why do we use bar graphs?*
 - i. *We are using this bar graph to communicate your data to see which grape was the sweetest.*
- 4. **Activity 2**
 - a. **Note: If you are short on time, this activity can be skipped and you can go straight to the discussion.**
 - b. **Distribute toothpicks and grapes**
 - c. **Instruct scientists to connect grapes using toothpicks. They can be creative in creating any structure they would like (examples below)**
 - i. **Demonstrate to scientists how to connect grapes.**
 - d. *Try using different types of grapes to create your structures. Do you notice any differences in the grapes when building?*
 - i. **For example: more firm grapes may be more useful to build with**
 - e. **Point out the variability in the structures the scientists are making**
 - i. **No two structures are the same. This may be due to the differences in shape, type of grapes used, number of grapes used, or number of toothpicks used.**



5. Discussion

- a. *Now let's discuss what we did today. I will ask some questions, and if you answer, you get a sticker. At the end, the stickers can be traded in for a special prize. Let's GO!*
 - i. **Award sticker for every question answered.**
- b. **Review lesson: observations from grapes (size, color, taste, texture, squish-ability) and senses used**
- c. *Was there variability across the grapes?*
 - i. *Grapes were not all the same in terms of color, size, taste, texture, or squish-ability = VARIABILITY.*
- d. *What is variability?*
 - i. *Differences within a group of objects. Today, we observed the color of the grapes, the size of the grapes, the sweetness of the grapes, the texture of the grapes, and how easy or hard the grapes were to squish.*
- e. *What does our graph show us?*
 - i. *Our graph shows us that the grapes had variability in a characteristic we all measured... sweetness.*
- f. *What are some similarities in the grapes?*
 - i. *Green, red, and purple grapes are all types of grapes! They are all fruits. They also all have a fleshy layer inside. Grapes are healthy snacks.*
- g. *What makes grapes a healthy snack?*
 - i. *They are fruits that contain lots of nutrients, like vitamins and potassium that our bodies need. Fruits can be eaten as a snack any time of the day.*
- h. *Why is variability important?*
 - i. **Example:** *it keeps things interesting in our world. It makes our world very different than the boring town Novare we mentioned at the beginning of today's quest. It helps us understand how objects in a group are similar and different.*

- ii. *Variability is important to scientists because it motivates them to ask questions about why things may be different.*
- iii. *Can anyone think of some plants, animals, or objects that have variability?*
 - a. *Just by going outside, you can see there are different kinds of flowers, birds, and even people. All these things have variability.*

i. Wrap-up

- i. *What did you learn today? Write that down on the lines on page 2D.*
- ii. *How much did you like today's lesson on scale from strongly agree to strongly disagree.*
- iii. **Award prize at the end based on number of stickers.**

End of Lesson

Sing UQUEST chant and color, if time permits.

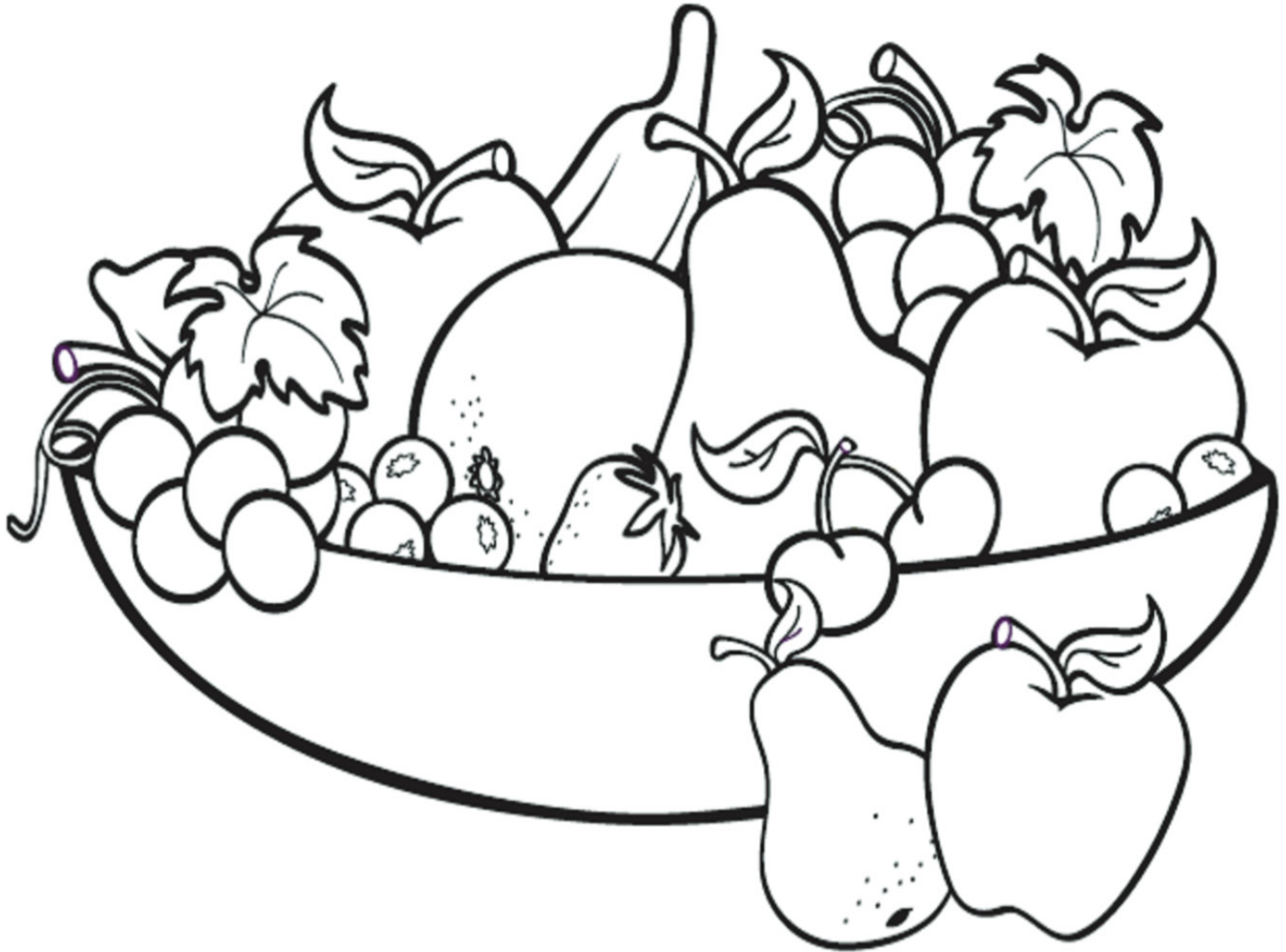
*I observe and experiment to figure it out.
That's what UQUEST is all about!*

*My thoughts and questions?
I write them down.
That's what UQUEST is all about!*

*U-Q-U! E-S-T!
UQUEST is the place for me!*

Lesson 2

"Grapeful" for Science

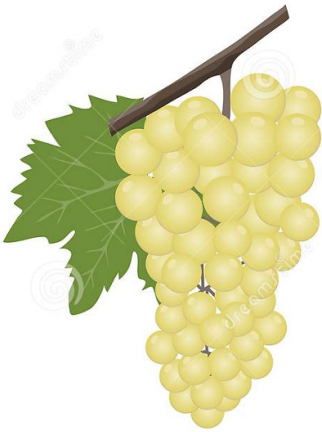


Date: _____

Variability

I liked this lesson (circle one): : Circle the grape that best answers the question.

Which grape was the sweetest?



Green



Purple



Red



Cotton candy

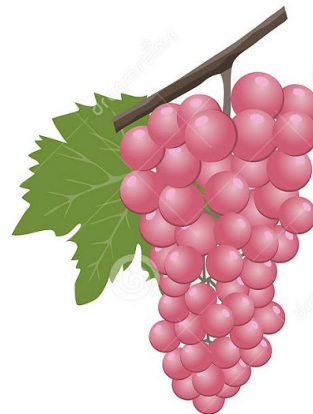
Which grape was the easiest to squish?



Green



Purple



Red

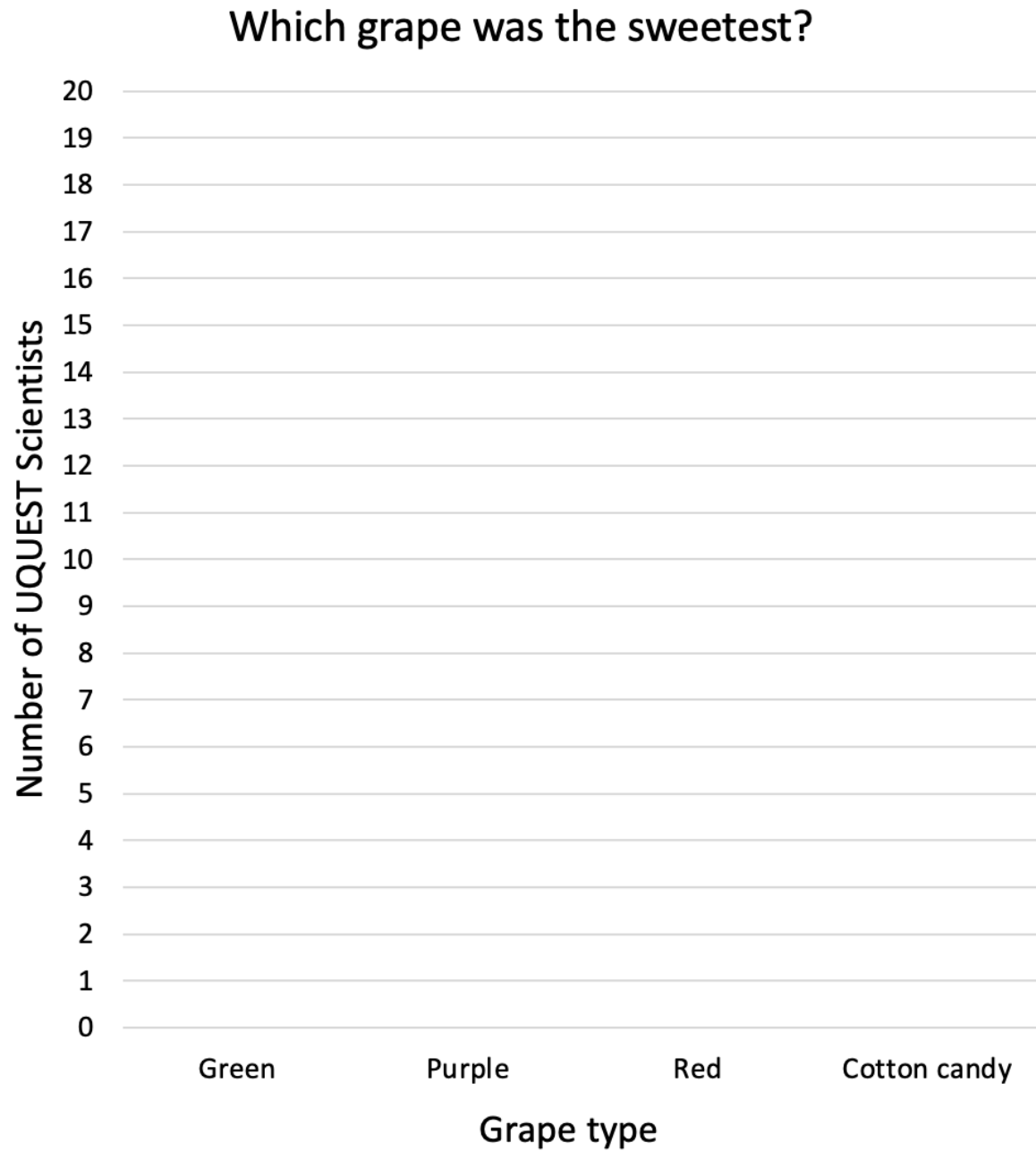


Cotton candy

Date: _____



Graphing



Date: _____



Lesson 2

What did I learn today?

I liked this lesson (circle one):

**Strongly
Agree**



Agree



Disagree



**Strongly
Disagree**

