Lesson 4 – Variables and Constants

Overview

This lesson will introduce the UQUEST scientists to the concept of **variables.** Variables are characteristics of objects that differ among a group of similar objects. For example, in a class of students with different color shirts, shirt color is a variable. By contrast, **constants** are characteristics that are the same among a group of objects. If all the students in the class are in second grade, then grade level is a constant in that class. In science, it is important to identify variables and look for patterns to understand why objects vary. Noticing variables motivates scientists to ask questions about them.

In this lesson, UQUEST scientists will identify variables and constants among apples, dairy and grain playing cards, and pictures of UQUEST guides. UQUEST scientists will practice identifying variables and constants by examining characteristics that may differ or be constant among them.

The UQUEST scientists should end the lesson knowing the differences between a variable and a constant and understanding how both concepts can apply to almost any group of objects, including people.

Science Objectives:

UQUEST scientists will:

- understand the differences between variables and constants.
- understand that bar graphs can be used to visually represent variables.

Health Messages:

- Variability among people strengthens the community in a lot of different ways such as inclusivity and diversity.

Reinforcement of previous messages:

- Observation (Lesson 1) - we observe variables
- Variability (Lesson 2) - Variability is the concept that describes differences among objects (e.g., people, animals, plants, things) along a particular characteristic
- Classification (Lesson 3) - Classification is when we observe similarities and differences, and then put things or people in categories based on certain characteristics or variables

Vocabulary

- **Variable** - a characteristic that is different across people or objects
- **Constant** - a characteristic that is the same across people or objects

Materials

- UQUEST kit

- 8 whole red apples, 8 whole yellow apples, and 8 whole green apples
- A gallon Ziploc bag with slices red apples
- A gallon Ziploc bag with slices yellow apples
- A gallon Ziploc bag with slices green apples
- Guess Who Games 1 game per group ~8 groups
- Guide photos (all laminated) - please calculate how many we need of these

Preparation

- At UM:
    - Print, cut, laminate the guide photos
- At OYC:
    - Set up tables

Introductory Script:

Welcome UQUEST scientists.

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. E*ach 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 practice playing Scientist says

In Scientist says, one of you will be the scientist and tell the group what relaxation exercises to do. For example, stretch your arms, close your eyes, or take 10 deep breaths.

- Guide the UQUEST scientists through relaxation for ~1 minute.

Instructions for UQUEST Guides

1. **Introduction**
    a. **Every scientist has a red, green, and yellow apple slice. Ask scientist to describe the apple using their 5 senses and write down observations on the appropriate column on page 4B.**

b. **Engage in discussion about what is different and similar between the three types of apples. What do they all have in common? What do they all have different?**

c. Something that is different between the apples is the color. A <u>variable</u> is a characteristic that is different across people or objects. Among the apples, color is a <u>variable</u>.

d. Something that is the same between the apples is the shape and texture. A <u>constant</u> is a characteristic that is the same across people or objects. Among the apples, shape and texture are <u>constants</u>.

2. Variables and constants worksheet

a. Scientists turn to page 4C and identify the variables and the constants in the 5 examples.

b. After all variables and constants have been identified:

i. *Remember in the last lesson when we classified health items? Can someone remind me what we did?*

ii. *Yes – we classified items that were similar together. For example, in one category, there may have been tennis balls and basketballs. What is the constant?*

1. *They are all balls*

iii. *In another category, there was cheese, milk, yogurt, and ice cream. What is the constant?*

1. *They are all dairy items.*

iv. *Finally, in another category, there were sunglasses, sunscreen, and hats. What is the constant?*

1. *They are all for protecting from the sun.*

3. Guess the Guide game

a. Now we will play a game. The game involves looking at pictures of all the UQUEST guides and playing Guess Who.

b. Guess the Guide Rules:

i. *Before we start this game, we want to remember our UQUEST Values.* **(Refer to laminated values)**.

ii. *As UQUEST Scientist we are to be respectful of our fellow colleagues and guides when playing the game.*

1. Pay attention when others are talking.

2. Speak in a low voice. Do not scream.

3. Respect each other. Do not touch, push or shove each other.

c. Before you begin playing, look at all the pictures of the guides.

d. Please write on page 4D of your lab notebook at least 2 variables and 2 constants about the UQUEST guides.

i. *What is different between all the guides?*

ii. *What is the same between all the guides?*

e. Start activity.

f. *I will secretly select one guide from this pile.*
g. *Your job will be to guess which guide I have selected.*
h. *You will ask me yes/no questions about characteristics of my chosen guide.*
i. *For example, you can ask me questions that can be answered with a "yes" or "no"*
    i. *For example: "Does your guide have long hair?"*
    ii. *If the answer is "yes", then you put down all the guides without long hair.*
    iii. *If the answer is "no", then all of the guides with long hair can be eliminated.*
j. *The scientist that guesses the guide first wins!*
k. Scientists take turns asking questions to the guide until they have one person remaining on the board and can guess who is on the guide's Mystery Card.
    i. Scientists will have 2 guess who boards so that they are more easily be able to see everyone on the board (without having many scientists hovering over just one board).
l. Begin playing.
m. *The game we just played showed us the variability among the guides! Just like us guides, there is also variability among you scientists! Can anyone tell me why variability is important?*
    i. *Variability means there are variables, and these variables are the differences between people.*
    ii. *Differences among people is healthy for our world; variability between us strengthens our communities in a lot of different ways. By recognizing and accepting all our differences, we are practicing inclusivity and diversity, which allows for all of us to come up with cool and unique ideas!*
    iii. *If we were all the same with no variability, what would life be like?*

4. 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.
    ii. Note: below are example questions. You can ask additional questions not listed.

b. What did we do today?
    i. We practiced identifying variables and constants with the apples, in the memory matching shape game, in the guess the guide game, and in the worksheet on page 4D.
c. What is a variable?
    i. A characteristic that is different between items
    ii. **What is an example of a variable?**
d. What is a constant?
    i. A characteristic that is the same between items
    ii. What is an example of a constant?
e. What other variables or constants do you see inside of this room?

   i. **Example:** *if all the chairs are the same, then the type of chairs is a constant.*
   ii. *If all the kids are different, that is a variable.*

f. What surprised you today?

g. Why is variability healthy for our community and our society?

   i. *Because different people have many different ideas that can help to make the world a better place.*

Wrap-up

   i. *What did you learn today? Write that down on the lines on page 4E.*
   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.**

References

N/A

Lesson 4
Variables and Constants

Date: _____

Recording Observations

Instructions: Circle the apple that you have in front of you. In the box, record your observations for the apple that you have.

-

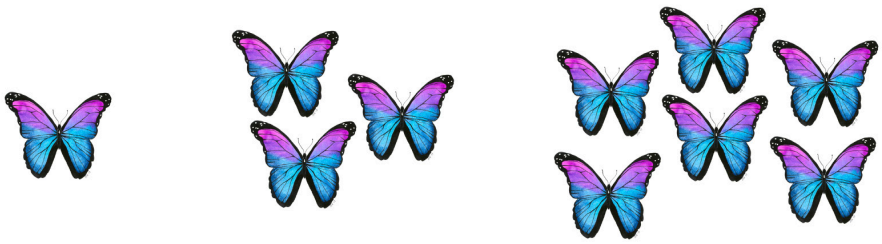
Date: _____

Variables and Constants: Objects

Instructions: Identify and write down the variable and the constant in each set of items.

Variable _____

Constant _____

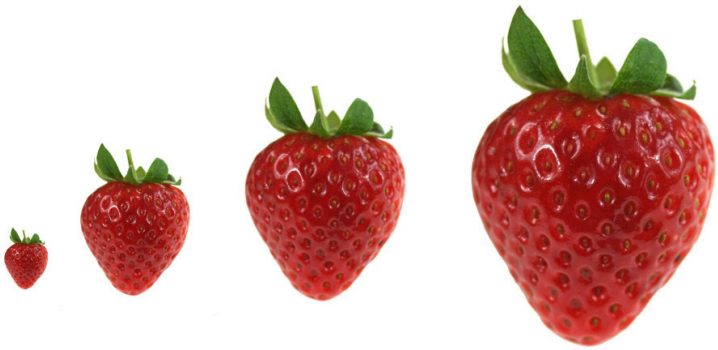


Variable _____

Constant _____

Variable _____

Constant _____



Variable _____

Constant _____

Variable _____

Constant _____

Date: _____

Variables and Constants: UQUEST guides

Instructions: In the space below, write down ***constants*** between the guides that you can think of.

They all go to UM

Instructions: In the space below, write down ***variables*** between the guides that you can think of.

They are wearing different clothes

Date: _____

Lesson 4

What did I learn today?

_____

_____

_____

I liked this lesson (circle one):

Strongly Agree	Agree	Disagree	Strongly Disagree