Lesson 12 – Genetic traits

Overview

This lesson is about **data collection**. Data collection is the recording of information from observations or measurements in a systematic way. This practice is important because scientists use collected data to analyze results, draw conclusions, and identify trends across people and things.

UQUEST scientists will learn about data collection by collecting data about their observable genetic traits and that of other scientists and guides in the room. Scientists will then graph the frequency of various genetic traits on a bar graph. After completing the lesson, UQUEST scientists will understand what data collection is, how to organize data, and how collected data is analyzed and interpreted to better understand our world.

Science Objectives:

UQUEST scientists will:

- understand that data collection helps scientists understand the world around them.

Health Messages:

- Diversity is healthy. Our genetics create diversity in our world.

Reinforcement of previous messages:

- Observation (Lesson 1) - Observation is required to see genetic phenotypes
- Variability (Lesson 2) - There is variability in which genetic traits people have. Variability is the differences among objects (people, animals, plants, things) along a particular characteristic.
- Variables (Lesson 4) - Characteristics that differ across people or objects

Vocabulary

- **Data collection** - the process of observing, measuring, and writing down information about a variable.
- **Spreadsheet -** A record of observations that is organized into rows and columns.

Materials

- UQUEST Kit
- Mirrors: Handheld personal
- Genetic traits print out
- Scientist's genetics spreadsheet (one per group)
- Clipboards (one per scientist)
- Aggregation of scientist data (one per group)

Preparation

- At UM:
    - Print out all documents
- At OYC:
    - Put about 2 mirrors per table

Introductory Script (~3 mins):

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 (~2 mins)

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 belly breathing.

- Guide the UQUEST scientists, through some belly breathing for ~1 minute.

Instructions for UQUEST Guides

1. **Introduction (~5 minutes)**
    a. *Has anyone heard of genes? What is a gene?*
        i. *Genes, or DNA, are information inside the cells in your body that help make you who you are. Genetic traits are characteristics that can be observed in living organisms that are passed down from parent to child. Some genetic traits are common while others are not. And every person has a different overall combination of genetic traits that makes them unique.*
        ii. *This means that DNA and genetic traits are variables because they differ between people.*
            1. *If DNA was the same for everyone, it would be a constant.*

iii. *For example, being right or left-handed is a genetic trait. Raise your hand if you are left-handed, or you use your left hand to write, brush your teeth, or hold a spoon.*

2. **Activity *(~35 minutes)***
    a. *Today, we are going to **collect data** about the genetic traits of the scientists in this classroom. **Collecting data** means observing, measuring, and writing down information about a variable. The variables we are interested in today are genetic traits.*
    b. *Inventory of traits*
        i. *Using a mirror as necessary, together we will complete the checkbox inventory of genetic traits on page 12B of your lab notebook. Together, we will also make a group **spreadsheet**. A **spreadsheet** is a record of observations that is organized into rows and columns.* **Guide shows the scientists the spreadsheet.**
            1. *In our group spreadsheet, genetic traits are columns and the scientists' names are rows.*
            2. *First, we will write all the scientist's names on the spreadsheet.* **Write all names of scientists.**
            3. *Now, let's start with detached ear lobes. Does anyone know what it means to have detached ear lobes?* **Show image of detached ear lobes.**
            4. *Using your mirror, **observe** if you have detached ear lobes and then on page 12B, check yes or no for question #1: I have detached ear lobes.*
            5. *Now, we will complete our group spreadsheet together. Next to your name, we will record your data for each trait: whether you do or do not have that trait (i.e., whether scientist wrote yes or no).*
            6. *Repeat above steps with the remaining 5 traits.*
    c. *Blackout BINGO*
        i. *Now, we are going to play blackout BINGO! On page 12C of your lab notebook, complete each square with the name of a classmate that has the trait written in the square. The first person to complete all 12 squares on page 12C yells BINGO wins an extra prize today! You can only write a classmate, supervisor, or guides names up to TWO times!*
        ii. **Students are provided a clip board and asked to remove page 12C from their lab notebook. Scientists stand up and survey the other scientists in the class regarding their genetic traits.**
            1. *****Supervisors*** while students are collecting each other's data, collect the spreadsheets from all groups and aggregate the data onto a summary sheet, one per group. Provide one complete summary sheet form to every group.**
            2. **Scientists will use the summary data to create their bar graphs. If possible, gather data from both the orange and green group. Take picture of summary sheet for documentation purposes**

3. **Documentation (~10 minutes)**

a. *Now we are going to make a bar graph to document our data of the genetic traits of all the scientists. Please use the summary data provided by the UQUEST supervisors to make your bar graph. Please complete the bar graph on page 12E.*

4. **Discussion (~10 minutes)**

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 does it mean to collect data?***
   i. *Collecting data means observing, measuring, and writing down information about a variable.*

c. ***What data did we collect today?***
   i. Genetic traits of the scientists in the classroom

d. ***Are genetic traits variables or constants?***
   i. *Variables because they differ between people.*

e. ***What are the two types of data that we collected today?***
   i. We collected data about 1) our own genetic traits by answering yes or no, and 2) the genetic traits of other scientists by asking them questions.

f. ***What observations did we make today?***
   i. The physical traits of ourselves and others

g. ***What is a spreadsheet?***
   i. *A record of observations that is organized into rows and columns.*

h. ***What is a spreadsheet used for?***
   i. *To organize data! And to make it easy to visualize it in a graph later.*

i. ***Can someone remind me what variability means?***
   i. *Variability is the differences among objects (people, animals, plants, things) along a particular characteristic.*
   ii. ***Was there variability in today's data? How?***
      1. *Everyone has a different combination of genetic traits because everyone has different DNA.*

j. ***What was the most common genetic trait as seen in the bar graph?***

Wrap up

a. *What did you learn today? Write that down on the lines on page 12F.*
b. *How much did you like today's lesson on scale from strongly agree to strongly disagree.*
c. **Award prize at the end based on number of stickers.**

Resources:
https://learn-genetics.b-cdn.net/basics/activities/pdfs/InventoryOfTraits.pdf

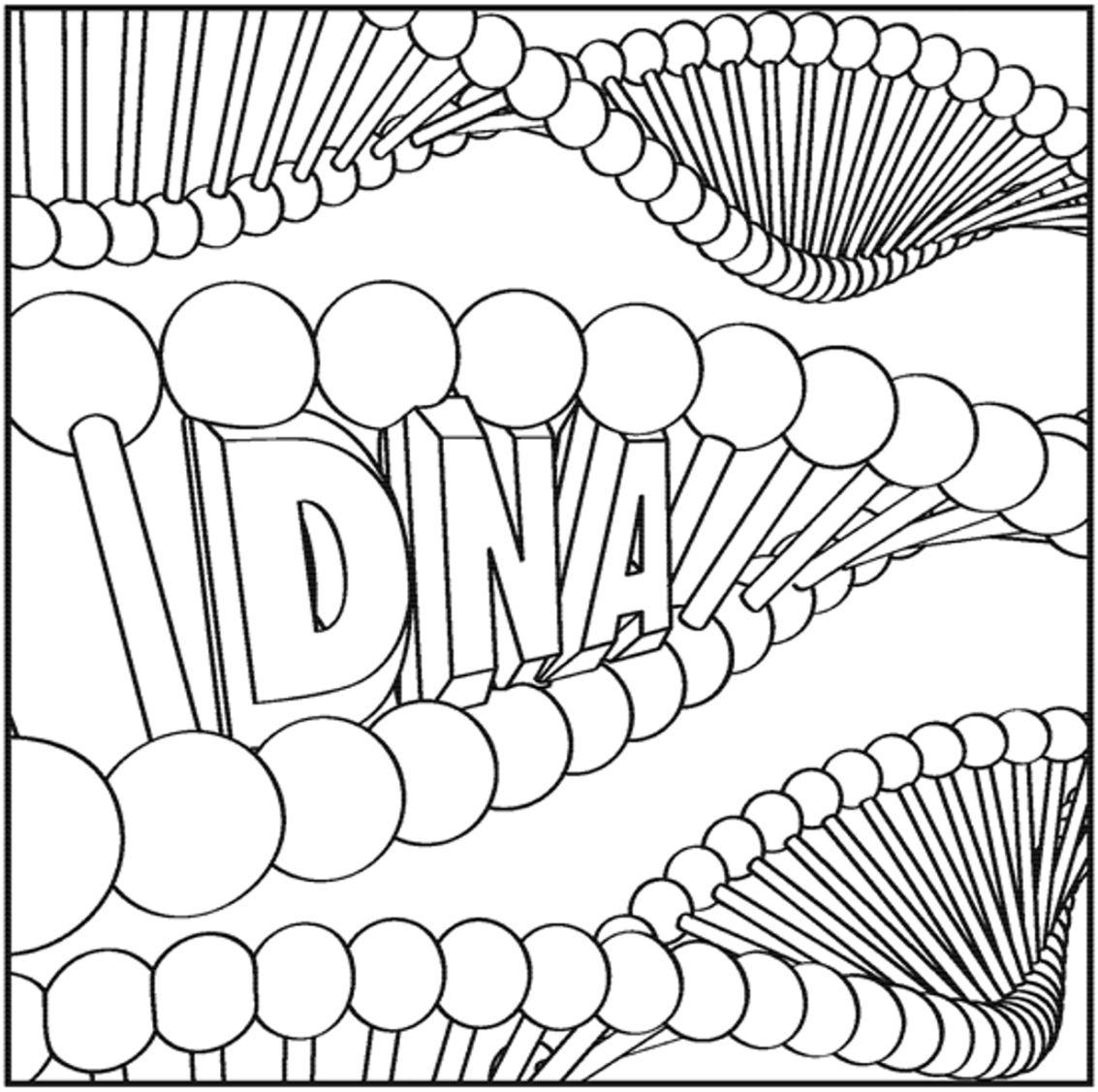
Scientist's genetics spreadsheet

Mark an X if the scientist has the given trait

Scientist name	Detached ear lobe	Tongue roller	Dimples	Right-handed	Allergies	Left thumb over right

Genetic traits: Operational definitions with pictures

Lesson 12
Our Genetic Traits



Date: _____

An Inventory of my Genetic Data

1. Do you have detached earlobes? ☐ Yes ☐ No
2. Can you roll your tongue? ☐ Yes ☐ No
3. Do you have dimples? ☐ Yes ☐ No
4. Are you right-handed? ☐ Yes ☐ No
5. Do you have allergies? ☐ Yes ☐ No
6. Do you cross your left thumb over your right when you clasp your hands together? ☐ Yes ☐ No

Date: _____

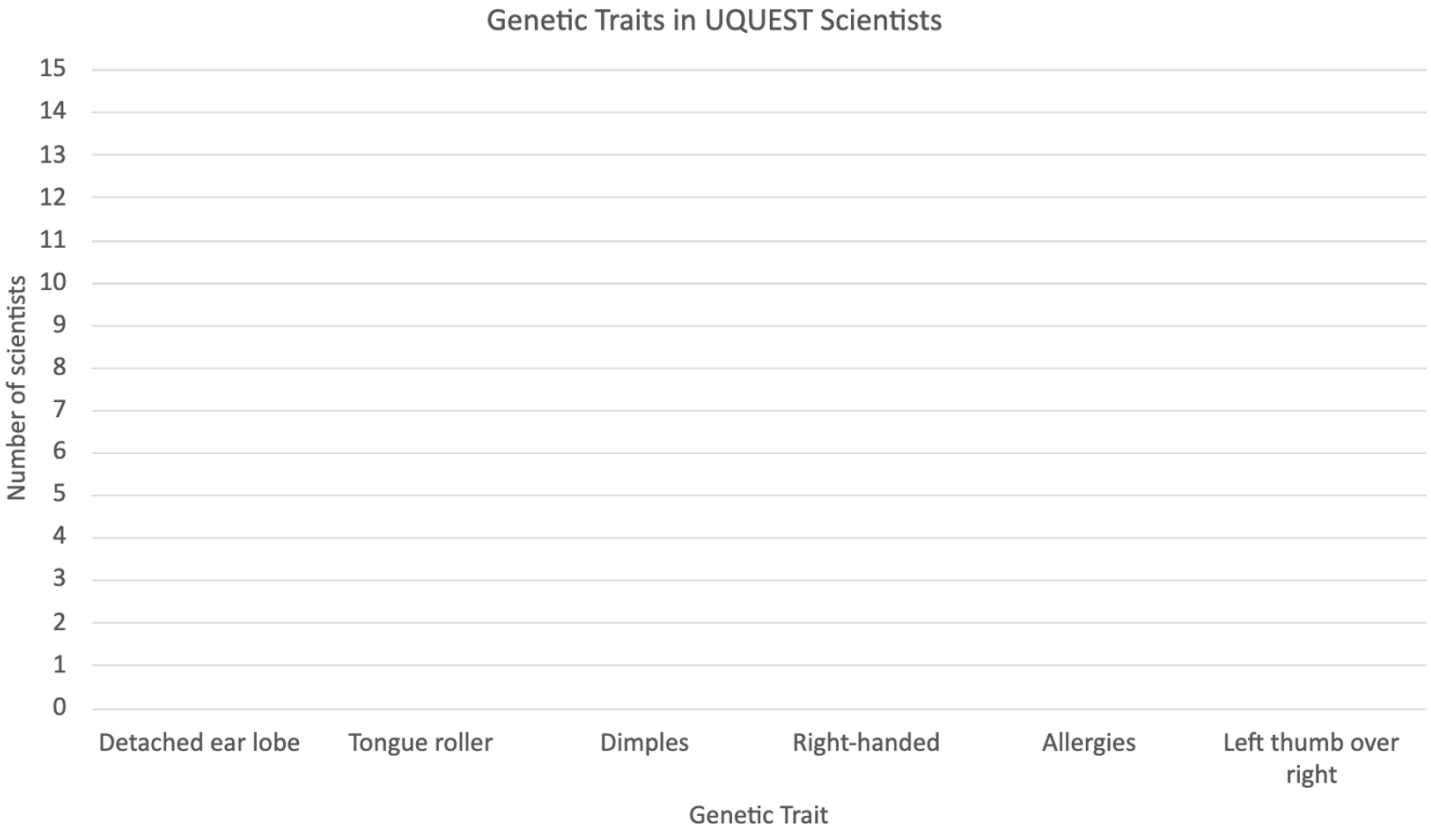
BINGO!

Has detached ear lobes	Has dimples	Is right-handed	Cannot roll their tongue
Does not have allergies	Crosses left thumb over right	Has allergies	Does not have dimples
Crosses right thumb over left	Is left-handed	Can roll their tongue	Has attached ear lobes

Page intentionally left blank

Date: _____

Graphing



Date: _____

Lesson 12

What did I learn today?

_____

_____

_____

I liked this lesson (circle one):

Strongly Agree	Agree	Disagree	Strongly Disagree