

Genetic Variation: Environment plus Genetics

NOTE: Inform me if you will be using this activity ahead of time so I may send you the necessary materials and supplies. If you want to print off the worksheets and make copies yourselves, you may, but you can also request that I print off and make copies for you. Thanks! - Alex

- Have the students divide into pairs (if odd number, have 3 in a group). Each student should get a copy of the “Inventory” worksheet. Each pair should get a paper tape measure.
- Show the instructions for the activity using the PowerPoint presentation slide. Give the students a few minutes to complete their worksheets. While they are working, move to the slide showing examples of some of the traits.
 - In the case of dimples, the yes is for 2 dimples, one on each side. 1 dimple counts as a “no.”
 - In the case of middigital hair, even one hair on one finger means a person has this trait, so have the students look carefully.
- Either while they are working or ahead of time, draw the four histogram charts on the board as seen (in materials provided to you ahead of time).
- Once the students have finished the worksheet, ask them about the traits of their partner. Have the students raise their hands to answer you.
 - Sex: how many students are male? how many are female?
 - Number of noses? how many have 0? 1? 2? 3?
 - Hair: how many have black hair? dark brown? light brown? blond? red? other?
 - Height: how many are 150? 155? 160 cm? 165? 170? 175? 180? 185? 190?
- Record how many students responded to each trait on the histograms.
- Ask the students to answer the questions on the “Comparing four traits” slide
- Ask the students to answer the question at the end of the “Distribution of traits” slide
- Move on to the “How different are we?” slide. Ask the students how many traits it would take to distinguish a person as unique, then write down their answer(s).
- Ask for a volunteer. Bring the volunteer to the front of the room with their own trait worksheet (the one their partner filled out about them). Have the rest of the students stand up. Have the volunteer read his or her phenotype for each of the traits, beginning with the first one and continuing sequentially. Direct the students who share the volunteer’s phenotype for each trait to remain standing. All others sit down. Once a student has sat down, he or she will remain sitting. Count how many traits the volunteer gets through before he or she is the only one standing. Compare that to the students’ answer at the beginning.
- Repeat this process with as many volunteers as you wish.
- Go through the questions on the slide show.

This activity can be modified for a large audience. Instead of having a partner fill out the worksheet, just have the students fill it out about themselves. Also, remove the item about

wrist circumference, as you will not have enough tape measures for everyone. And leave yourself plenty of time to construct the histograms.

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Preparation: Cut the genetic risk factors into strips – have enough for every participant at your presentation. These will need to be placed in a hat or a bucket or some kind of container for the students to draw from.

- Divide the students into groups of five or six people per group. Each student should get a copy of the “Rolling the Dice” packet. Each group should get 1 die.
- Show the instructions for the first part of the activity using the PowerPoint presentation slide. The students should pass the die among the members of their group so everyone can roll their own numbers. Give the students about 10-20 minutes to complete their worksheets.
- Once everyone is finished, have all the students stand up. Have all the students who “died” at the end of Life Stage 1 go to one part of the classroom, all those who “died” at the end of Life Stage 2 go to another part, at the end of Life Stage 3 to another part, and all survivors to another part. Count how many are in each of those 4 groups and make a note of it. Then have the students return to their seats.
- Move on to the second slide of instructions. Put all of the strips of genetic risk factors into a container. Walk around the classroom, make sure every student draws out a strip. Have them recalculate their “risk” using the worksheet on the last page.
- Then have all the students stand up. Have all the students who “died” at the end of Life Stage 1 go to one part of the classroom, all those who “died” at the end of Life Stage 2 go to another part, at the end of Life Stage 3 to another part, and all survivors to another part. Count how many are in each of those 4 groups and make a note of it. Compare those numbers to the count at the end of the behavioral factor only phase.
- Write the numbers you recorded from having the students stand up and move around on the board or somewhere where the students can see it, into a chart that will look something like this:

Life Stages	Behavioral Factors Only	Behavioral and Genetic Factors Combined
Fatal heart attack by end of teen years (life stage 1)		
Fatal heart attack by end of adult years (life stage 2)		
Fatal heart attack by end of senior citizen years (life stage 3)		
Did not have fatal heart attack		

- Go through the questions on the slide show.

You can modify this activity for a large audience by asking for 15-20 volunteers (maybe one person from each row?) to come up “on stage.” Then, while the volunteers roll the

dice, discuss how genetic + environment plays a role in familial breast cancer (e.g. BRCA mutations) with the rest of the audience.