

Student Sheet 4.1: Genetic Risk Score

Name: _____ Date: _____ Period: _____

This activity simulates a genetic predisposition for getting type 2 diabetes. The egg carton represents 12 genes that are known to contribute to type 2 diabetes. The beans represent alleles (variations) for that gene. For each gene, you will inherit two alleles—one from your mother, and one from your father. If you don't have beans, you can also use a coin. [Here is a form to help you tally, if needed.](#)

Directions if you are drawing beans:

1. Select two beans from the bag and place them in the first egg carton slot.
2. Continue drawing two beans until each egg carton slot has two beans, for a total of 24 beans.
3. Record your bean combinations on the egg carton below using a +1, 0 or -1 in each space.

Directions if you are flipping coins:

1. Flip a coin twice. Each flip represents a gene variant (allele).
2. Record the results of your coin combination by entering a +1, 0, or -1 in one of the egg carton spaces.
3. Continue flipping the coin twice until each space (1-12) has been recorded.



Two white beans (or tails) increase RISK **+ 1**



or



One of each is neutral

0



Two red beans (or heads)
are PROTECTIVE and decrease risk

- 1

1	2	3	4	5	6
7	8	9	10	11	12

4. Put the beans back into the bag and let your partner draw beans and record.



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A high number indicates an increased risk, a neutral number indicates no change, and a low or negative number indicates the possibility of a protective effect.

5. Tally your simulated genetic risk score and record it here: _____
6. What is the **probability** of drawing:
 - a) Two white beans?
 - b) Two red beans?
 - c) One of each color?
7. How might knowing your genetic risk score impact your behavior?
8. Does a person's environment change the genes for diabetes in the egg carton? Why or why not?