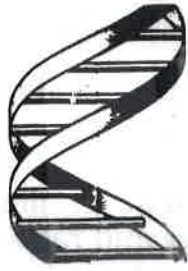


Name _____

Period _____
Due date _____



HEREDITY & ENVIRONMENT



Do you act the way you do because your personality was determined by your genes? Or is it more a product of how you were raised and the people around you? Scientists argue over whether your genes (heredity) determine your characteristics and interests, or whether your environment plays a stronger role.

Your DNA is a code for the production of proteins, which, in turn, determine your traits. Some research has shown that it is these chemicals that can predetermine what you will look like, how you will behave, and what your abilities will be. Your environment includes the family you are raised in, your friends, the values that are taught to you, and the geographic location in which you grow up. Other research has shown that these environmental factors determine what you will be like. There has been much research done on identical twins (people with identical genes) to answer this age-old question of heredity vs. environment.

Do you think your traits and characteristics are determined by your genetics, your up-bringing, or a combination of both? You will watch a short video on this topic then participate in a simulation of the effects of environmental choices on physical traits.

PART 1: VIDEO

www.pbs.org

Click on "Video" then search for "Epigenetics"

Scroll down and click on "NOVA SCIENCENOW" (13:25). Watch the video to the 10:20 mark and answer the following questions.

_____ 1. Differences between identical twins are more pronounced:

A. In the womb

B. During childhood

C. When they get older

2. TRUE or FALSE: Identical twins have the same genes _____

3. TRUE or FALSE: If your identical twin gets a disease, you will too _____

_____ 4. What caused obesity in the “fat” mice?

- A. The Agouti Gene was always switched on
- B. The Agouti Gene was always switched off
- C. The mice were not allowed to exercise

_____ 5. What does the “Epigenome” do?

- A. Turns genes on and off
- B. Mutates genes into new genes
- C. Causes DNA to replicate

6. Who has more identical gene expression? (circle one) 6 year old twins 66 year old twins

PART 2: SIMULATION OF HERDITY AND ENVIRONMENT

SCENARIO: You and your partner are identical twins (you have exactly the same DNA and genes). However, you tend to make different life choices. To simulate this, each of you will roll 2 dice at the same time - the high roller will circle the life event in the first column & the low roller will circle the life event in the second column. (If it's a tie, re-roll.) At the end, you will conclude how your environmental choices impacted your genetics.



Simulation begins on next page



HEREDITY AND ENVIRONMENT

LIFE EVENT

HIGH ROLLER

LOW ROLLER

OVERALL
DIET

Eat lots of fruits & vegetables
and other nutritious foods

A fan of deep-fried foods from
the local pizza shop and other
junk foods

EXERCISE

Play sports regularly and enjoy
hiking and riding your bike

Basically a couch potato

WEALTH

Plenty of money so you have a
house full of books, games, and
other things to do

Household is poor so there
is little to do at home of any
interest

FAMILY

Loving, involved parents. You
play games and go places together
as a family

Your parents are rarely home
and even when they are they
don't believe in "family time"

LEISURE
TIME

Very active. Go to parks, events,
museums, and camping

Spend most of your time
in front of the TV

SCHOOL
LIFE

You like school so you are
involved in activities and
are committed to academics

You don't like school so you
frequently skip. No after-
school activities or clubs

FRIENDS

Several close friends that care
about you and share your
interests

Pretty much a "loner" - You
don't let anyone get to know
you or care about you

SUBSTANCES

Choose not to do drugs or
drink alcohol

Drugs and alcohol are a
regular part of your life

MEDICAL

Have gone for regular check-ups
since you were a baby. You
follow your doctor's advice

Haven't seen a doctor since
the day you were born and
don't believe in them

(1) Predict what kind of person you would be like after many years of these life choices:
(Your physical traits and perhaps your emotional state)

(2) Compare yourself with your twin. Are you still "identical?" _____

THE GENETICS OF OBESITY

The question of genes vs environment has been highly debated in recent years and encompasses a wide variety of both physical and psychological characteristics. These characteristics include intelligence, athletic ability, heart disease and schizophrenia. Such traits are often examined within families for their genetic or environmental influences. For example, do you prefer certain foods because everyone in your family ate them as you were growing up (environment), or are the shared taste preferences in your family a result of heredity (genes).

(1) Put an "X" on the continuum below where you think the most influence over traits are:

HEREDITY <-----> ENVIRONMENT

As you might suspect, body weight is one trait that has attracted a considerable amount of attention. It is well known that obesity runs in families. For example, children with two obese parents have an 80% chance of being overweight, compared to 40% for children with one obese parent and 20% when neither parent is obese. One scientist even went to the extreme of documenting that obese pets are almost twice as prevalent in obese households as non obese households. These findings have been used to argue that environment is the key.

(2) What is the probability that a child who lives with 2 obese parents will be obese? _____

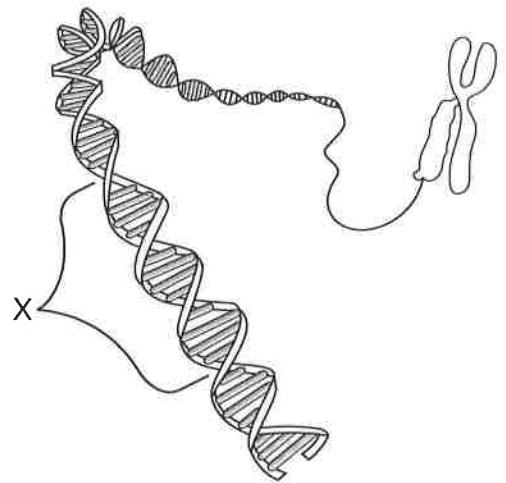
___3. Brothers and sisters often have similar facial characteristics, such as nose shape or eye color, because they

- (1) are raised in similar environments
- (2) eat similar types of foods
- (3) have similar types of proteins
- (4) use similar types of facial care products

___4. Corn seeds with identical genetic information were planted on two adjacent farms. The corn plants on one farm were well fertilized and grew large, while the plants on the other farm were not given fertilizer and did not grow as large. The best explanation for these observations is that

- (1) crops grow differently in different climates
- (2) the corn plants all contained mutated genes that made them grow
- (3) environmental conditions affect gene expression
- (4) the plants on one farm had different genes from the plants on the other farm

The diagram below represents genetic material.



___5. The expression of the section labeled X may be modified by

- (1) temperature, only
- (2) asexual reproduction
- (3) the environment
- (4) pH, only