

HW# 11 Packet

Student's Name: _____

Due Date: _____

Scientific Method Experiment

Scientists genetically modified a variety of corn to protect it against pests like the corn borer. The corn borer is an insect caterpillar that feeds on the corn stalk, which weakens the stalk and makes it fall over. A new gene in the genetically modified corn causes the plant to produce a chemical that is toxic to the corn borer. Some people are concerned that the genetically modified corn could harm other insects such as the monarch butterfly caterpillar. The monarch caterpillar eats leaves of milkweed plants that might be coated with toxic corn pollen. However, not all researchers agree with the concerns regarding the monarch butterfly caterpillar. They state that it is unusual for large amounts of harmful corn pollen to be found on milkweed leaves. Also, only a small percentage of caterpillars feed on the milkweed plants near corn fields.

- 1.) Which was most likely introduced into corn that made it pest-resistant?
A.) gene B.) lipid C.) toxin D.) protein
- 2.) Define the independent variable. Name the independent variable.
- 3.) Define the dependent variable. Name the dependent variable.
- 4.) What concern did some of the researchers have with this investigation?
- 5.) Why are not all researchers concern with this investigation?

Punnett Square Practice

Student's Name: _____ Date: _____

1.) In garden peas, round seed coats (R) is dominant over wrinkled seed coats (r). What will the results be of a cross between a homozygous dominant male and a recessive female.

genotypes % genotype descriptions phenotypes

2.) In humans, straight toes (S) is dominant over curled toes (s). What would be the result of a cross between a recessive male and a heterozygous female?

genotypes % genotype descriptions phenotypes

3.) In iris, purple (p) is incompletely dominant over white (w). What would be the results of a cross if both parents were pale lavender (heterozygous-pw)?

genotypes % phenotypes

4.) In peas, yellow color (Y) is dominant to green (y). What will be the results of a cross-pollination of a heterozygous female and a heterozygous male?

genotypes % genotype descriptions phenotypes

5.) The ability to roll the tongue (R) is determined by a dominant gene while the recessive gene results in the inability to roll the tongue (r). A man and his wife can both roll their tongues and are surprised to find that their son cannot. Explain this by showing the genotypes of all three persons by using the Punnett square.

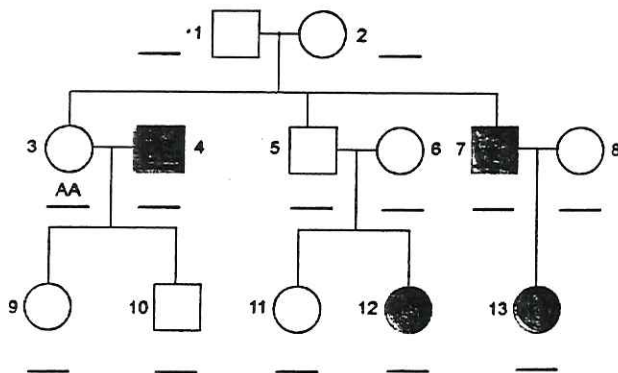
mom's genotype

dad's genotype

son's genotype

Pedigree Practice

Sickle-cell anemia is an autosomal recessive genetic disorder that causes red blood cells to change shape, which can cause the red blood cells to become stuck in blood vessels. Below is an autosomal pedigree tracing the passing of the sickle-cell anemia gene through these generations.



- 1.) How many generations exist in this pedigree? _____ Label them.
- 2.) Explain how you know when an individual is affected with sickle-cell anemia.
- 3.) Explain how you know when an individual is considered to be a carrier of Sickle-cell anemia.
- 4.) Write in the genotypes on the line next to or below each individual in the pedigree above.
- 5.) Write the phenotype description (normal, carrier, sickle-cell anemia) for the following individuals below.

Individual 12 _____	Individual 5 _____
Individual 3 _____	Individual 13 _____
Individual 2 _____	

- 6.) Explain why Individual 12 has the disorder of sickle-cell anemia, however, her parents DO NOT show the disorder's phenotype symptoms.

Discover Magazine—December 2012

BIG IDEA: Help Stressed Vets With SIM Coaches

by Adam Piore

GRANT WRITERS AND colleagues were dubious when Albert “Skip” Rizzo suggested modifying video games to help soldiers returning from Iraq and Afghanistan with post-traumatic stress disorder (PTSD). They called the idea “a harebrained treatment out of *Star Trek*,” recalls Rizzo, a professor of psychiatry at the University of Southern California and associate director of its Institute for Creative Technologies. But he was convinced that the computer simulations used to train soldiers for battle could also be harnessed to help them when they returned. By immersing the soldiers in realistic re-creations of combat experiences, he proposed, they could overcome one of PTSD’s most debilitating effects, a paralyzing compulsion to avoid anything that might remind them of the trauma. When Rizzo finally secured a grant in 2005, his ideas were quickly validated: Three months after completing 11 virtual reality sessions, 16 of 20 test patients no longer met the criteria for PTSD.

Now Rizzo is once again attempting to prove the skeptics wrong. This time he is using video game characters to overcome the reluctance of soldiers to seek mental treatment, even in desperate situations. Through the first half of 2012, at least 180 active-duty soldiers committed suicide, more than the number of U.S. troops who died in battle during the same period. According to many therapists, soldiers fear that an admission of depression or

trauma will make them look weak or endanger their careers. So Rizzo and his team have created “virtual mental-health guides”—highly realistic digital mentors that deliver psychological guidance anonymously over the Internet. The guides answer questions, let soldiers self-evaluate, and encourage them to get help. “The intention here is not to replace traditional therapists,” Rizzo says. “We’re trying to break down barriers. Hopefully, once soldiers feel comfortable asking questions, they’ll feel more comfortable accessing help.”

Rizzo’s characters sit across a virtual table. To begin, the words “How may I help you today?” appear in a chat box. The user may then write back, “I’m not sure if I have PTSD.” The program will then inquire about symptoms and suggest places that offer treatment. The responses are tailored to what the soldier says. If the program picks up depressive answers, it might write back, “It seems like you are feeling down today. Perhaps I can recommend a website.” If it senses that the symptoms are serious (for example, if someone types, “I think I’m going to end it all”) the guide can refer the user to an anonymous hotline.

The first generation of the program, called SimCoach, represents a significant leap over most artificial intelligence programs currently in use, Rizzo claims. He compares his virtual mentor to Alex, a chatbot available at the top of the United Airlines website. Like SimCoach, Alex provides answers based on conversational information the user types

in. But Alex cannot create answers specific to an individual. SimCoach keeps track of all the answers provided by a soldier and creates increasingly customized responses.

The SimCoach character’s responses also incorporate gestures and facial expressions to convey meaning. If the guide says, “Looks like you are having a hard time,” it will tilt its head to the side and perhaps hold its palms out in a welcoming gesture. “It’s the only game that tracks information and builds an evolving model,” Rizzo says. “The

answer you get 12 steps down the line may be completely different from what someone else gets.”

THE NEXT GENERATION

SimCoach is being tested by several research teams at four groups of Veterans Administration hospitals and military bases. Preliminary results are positive, Rizzo says, but SimCoach is only a first step in his project. A newer version of the technology, SimSensei, should be rolled out in clinics at military bases and VA hospitals over the next year.

SimSensei can track posture, hand gestures, and vocal patterns, using those inputs to guide the computer’s responses. To gain those capabilities, Rizzo added a webcam, a microphone, and Kinect, a commercial body-tracking camera used in Microsoft’s Xbox 360 game console. The resulting system can recognize smiles, frowns, and affect associated with anger or depression. Rizzo’s goal is



Science Journal Article Questions Discover Magazine—December 2012

BIG IDEA: Help Stressed Vets With SIM Coaches

by Adam Piore

1.) Define *PTSD*.

2.) What number of active-duty soldiers were reported to commit suicide during the first half of 2012?

3.) Define *Alex*.

4.) Describe in detail some features that SimCoach may offer active duty soldiers.

5.) What is the name given to the newer version of SimCoach?

6.) Describe in detail some of the advancements (improvements) made with this newer version of technology.