4.5 "Genetic Technologies" **name _____**

- **How do humans use artificial selection to produce organisms with desired traits?**
- **How do scientists engineer a new gene?**
- **How can genetic information be used?**

1. _____ _____, also known as selective breeding, occurs when _____ breed only those organisms with desired _____ to produce the next _____. These _____ do not necessarily benefit the organism's chances for _____.

2. What are two examples of animals that humans selectively breed in order to produce an organism with a specific, desired trait? _____ and _____.

3. What is the practice described in question # 2 called? _____

4. True or False – Artificial selection occurs only with human intervention.

5. Genetic engineering is (circle all that apply)
a. an ancient method of producing desired traits in offspring.
b. a way of transferring one gene from one organism into another organism.
c. used to give organisms genes they cannot get through breeding.
d. a method of artificial selection.

6. One example of genetic engineering given in the text involves inserting a fluorescence gene from a _____ into fertilized _____ to produce a _____ that _____ under a _____.

7. What do geneticists hope to accomplish with the engineering described in question # 6? _____
_____

8. What is genetic engineering also used for? _____

9. To help diabetics, what did scientists genetically engineer?_____
What did this produce? _____

Use Figure 3 Bacteria Make Human Insulin on page 219 to answer questions 10-12.

10. What is a plasmid?
_____

11. In step 3, how is the bacterial plasmid changed?
_____

12. Why are the bacteria in step 5 able to produce insulin?

_____

13. Genetic disease are caused by _____, or changes in the DNA code. Some are passed on by parents and some occur _____.

14. What is gene therapy?

_____

15. Sickle Cell Disease affects _____, a protein in red blood cells that carries oxygen. It is a painful _____ disorder that is caused by a single mutation.

16. What gene-editing tool can help people with sickle cell disease? _____

17. For the sickle cell gene-editing tool to work, it uses a _____ and an enzyme to cut out the DNA sequesnce with the mutation. The "guide RNA" takes the enzyme to the _____ sequence with the sickle cell mutation and the _____ then removes that sequence. Then another tool pastes a copy of the _____ sequence into the DNA.

18. What is a clone?

_____

_____

19. List the steps to creating a clone:

1. _____
2. _____
3. _____
4. _____

20. What is cloning used to develop that is very beneficial for us?

_____

21. What is DNA sequencing?

_____

_____

22. The complete set of genetic information that an organism carries in its DNA is called a _____.

23. How many letters make up the Human Genome Project? _____

24. What was the main goal of the Human Genome Project?

_____

25. What did all life on Earth evolve from?

_____

26. What evidence suggests all organisms evolved from a common ancestor?

_____

27. Since the Human Genome Project has been completed, what 2 things has greatly increased?

1. _____
2. _____

28. What are 2 uses for DNA technologies?

1. _____
2. _____

29. What are 2 examples of problems that exist because of genetic research advances?

1. _____
2. _____

30. Your genetic information is a big part of your _____.

31. What is the Genetic Information Nondiscrimination Act (GINA)?

_____

_____

_____

32. What is 1 pro about GMO foods?

_____

_____

33. What is 1 con about GMO foods?

_____

_____