

KIPP/2025/_____

Review of Traits and Reproduction

Directions: Answer the questions below to refresh yourself on key concepts from our second unit.

Chapter 1

1. What two things does the function of a protein molecule depend on?
● _____
● _____
2. What do differences in the structure of protein molecules affect? This can also result in different traits.
● _____
3. Do all of the proteins in an organism's cell have to be the same? Explain.
● _____

****Chapter 1 Helpful Hint:** The structure of molecules determines how they function at a molecular scale, which determines the properties of the object that they make up.

Chapter 2

4. What condition prevents a person from forming scabs?
● _____
5. What are genes?
● _____
6. True or False: Each gene provides a unique instruction to make a specific protein molecule in an organism's cell.
● _____
7. How many copies of a gene does an organism have for each feature?
● _____
8. What is the term for two gene copies that are the same version and provide instructions for only one type of protein?
● _____
9. What is the term for the two gene copies that are different versions and provide instructions for two types of protein?
● _____

Chapter 3

10. What process do organisms inherit their genes through?
● _____
11. How many genes does each parent randomly pass on to its offspring?
● _____
12. How many copies of a gene does an offspring receive in total from its parents?
● _____
13. True or False: Through sexual reproduction each offspring can inherit a different combination of gene versions. Therefore siblings can have different traits from each other and even their parents.
● _____
14. What is an alternative to sexual reproduction that skips all of the steps and only requires chromosomes from one parent? This process is controversial because it would all scientists to make an exact copy of organisms that are already alive and possibly bring back organisms that are extinct.
● _____
15. Can genes affect physical attributes like running ability? Explain. (Hint: think about ACTN3)
● _____

Chapter 4

16. What is ACTN3?
● _____
17. Are mutations predictable or random? Do mutations always cause a change in genes?
● _____

Practice Problems

1. Three tigers have different parents. They all have the same proteins for stripe pattern in their cells. What can you say about the tigers' stripe patterns?
- (a) They will have the same stripe patterns since all tigers have the same stripe patterns.
 - (b) They will have the same stripe patterns since their proteins for stripe pattern are the same so the proteins will connect in the same way.
 - (c) They will have different stripe patterns because even with the same proteins for stripe pattern, the proteins can connect in different ways.
 - (d) They will have different stripe patterns since only offspring from the same parents have the same stripe patterns.

2. Two goldfish have different parents. One fish has a split tail and the other does not. Why do the goldfish have tails with different shapes?

- (a) Each goldfish has a different tail shape because offspring from different parents will have different tail shapes.
- (b) Each goldfish has a different tail shape because they have different versions of the gene for tail shape that connect together to make different tail shapes.
- (c) The goldfish have different versions of the gene for tail shape. The genes are split inside one goldfish's tail but not inside the other's.
- (d) The goldfish have different versions of the gene for tail shape, which instruct for different proteins that connect in different ways to make different tail shapes.

3. A young goat has downward-curved horns. Its father has upward-curved horns while its mother has downward-curved horns. Which of these statements explains why the young goat has downward-curved horns?

- (a) The young goat inherited one copy of the gene for horn shape from its mother and one copy from its father. That gene combination instructs for proteins that connect in ways that make downward-curved horns.
- (b) The young goat inherited one copy of the gene for horn shape from its mother and one copy from its father. Those genes connect together to make its downward-curved horns.
- (c) The young goat inherited its copies of the gene for horn shape from its mother and not from its father. Just like its mother's genes, those genes instruct for proteins that connect in ways that make its downward-curved horns.
- (d) The young goat inherited its copies of the gene for horn shape from its mother and not from its father. Those genes connect together to make its downward-curved horns.

4. Sh'qira reads an article about a family of wildcats. One of them had a mutation for tooth sharpness. Which of these statements about the wildcat with the mutation is true?

- (a) There must have been a change in the wildcat's genes.
- (b) The wildcat must have sharper teeth.
- (c) There will be no change to the wildcat's teeth.
- (d) The wildcat must have less sharp teeth.

8. The body cells of scorpions have proteins that connect together. In one scorpion, the structure of the proteins in the body cells changed, but the amount of that type of protein in the cell stayed the same. What happened to the function of that type of protein?

- (a) The changed protein connects differently, but its function doesn't change.
- (b) The changed protein connects differently, so its function changes.
- (c) The changed protein connects in the same way, but its function changes.
- (d) The amount of that type of protein stayed the same, so its function doesn't change.

9. Hannah is trying to figure out how tooth size is determined in two different wolves. In wolf 1, the copies of the gene are different from each other. In wolf 2, the copies of the gene are the same as each other. How does this affect how many types of proteins there are in each tooth cell?

- (a) Wolf 1 has one type of protein for the tooth size feature. Wolf 2 has one type of protein for the tooth size feature.
- (b) Wolf 1 has two types of protein for the tooth size feature. Wolf 2 has one type of protein for the tooth size feature.
- (c) Wolf 1 has two types of protein for the tooth size feature. Wolf 2 has two types of protein for the tooth size feature.
- (d) It is impossible to say anything about proteins from the given information.