

CUT! How Does CRISPR Work

Name: _____

Date: _____

Student quiz — *Answer key*

Directions: Indicate the correct answer(s) for each question below.

1. What is the natural role of the CRISPR-Cas9 system?
 - a. It is a defense system in bacteria against competing bacteria.
 - b. It is a defense system in human cells against viruses.
 - c. It is a defense system in bacteria against viruses.
 - d. It is a defense system in human cells against bacteria.

2. Match each of the following CRISPR components to its function. (*Write in the correct letter*)
 - a. Single-guide RNA
 - b. Cas9
 - c. PAM sequence
 - d. Target DNA
 - e. DNA repair template

- ___**d**___ Part of the double-stranded DNA that includes the target sequence that will be edited.
- ___**a**___ A specific nucleotide sequence that guides the Cas9 nuclease to the matching sequence in the target DNA.
- ___**e**___ A DNA sequence that is inserted into the cut target DNA to replace or correct a certain DNA sequence.
- ___**c**___ A short nucleotide sequence that signals the single-guide RNA where to bind on the target DNA.
- ___**b**___ A nuclease protein that induces a double-strand break of the DNA at the target site.

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3. Is this statement true or false? "CRISPR-Cas9 can induce a double-strand break anywhere in the genome that has a nearby PAM sequence."

- a. True
- b. False

4. What can happen during repair of the CRISPR-Cas9-induced double-strand break at the target site? (*Select all that apply*)

- a. Additional nucleotides can be added at the target site, which results in an insertion mutation.
- b. The double-strand break is only repaired in one DNA strand, not the other.
- c. Nucleotides can be removed at the target site, which results in a deletion mutation.
- d. A specific nucleotide sequence or an entire new gene can be introduced into the target DNA if a DNA repair template is present.

5. Which of the following are possible applications of the CRISPR technology?

- a. Fixing a mutation in a gene in order to cure a disease.
- b. Introducing a mutation to inactivate a gene.
- c. Introducing a new gene into an organism's genome.
- d. A and B only
- e. A, B, and C