

## Chapter 13 Review questions

Which of the following is not a goal of biotechnology?

- a. Generating economic benefits
- b. Efficiently producing biologically important molecules
- c. Improving agriculturally important food plants
- d. More effectively treating disease
- e. Creating humans with higher intelligence levels

Manipulating the molecular basis of inheritance by recombinant DNA technology is called:

- a. Mendelian genetics
- b. Biotechnology
- c. DNA fingerprinting
- d. Restriction fragment length polymorphism (RFLP)
- e. The polymerase chain reaction (PCR)

Biotechnology cannot be used to:

- a. Produce large quantities of particular human proteins
- b. Produce effective and safe vaccines
- c. Identify human fetuses with particular genetic diseases
- d. Alter food plants to increase yield
- e. Alter the intelligence levels of newborn infants

Small accessory chromosomes found in bacteria and useful as vectors in recombinant DNA procedures are called:

- a. Plasmids
- b. Palindromes
- c. Centrioles
- d. Bacteriophage
- e. Viruses

Which of the following results from inserting foreign DNA into an organism to produce a new gene combination?

- a. Recombinant DNA
- b. Regulatory genes
- c. Mutations
- d. Translation
- e. Gene cloning

DNA recombination involves:

- a. Changing the nucleotide components of DNA in a cell
- b. Mutation
- c. Selecting valuable DNA combinations
- d. Changing the nucleotide components of DNA in a cell and selecting valuable DNA combinations
- e. Adding protein that alters gene replication

A cell or organism that contains foreign DNA inserted into its own genetic material is termed

- a. transgenic.
- b. polygenic.
- c. engineered.
- d. foreign.
- e. xenophobic.

Goals of genetic engineering include all of the following EXCEPT

- a. to learn more about genetic inheritance.
- b. to learn more about genetic diseases.
- c. to learn more about bacterial inheritance.
- d. to provide economic and social benefits.
- e. all of the above are goals of genetic engineering.

Naturally occurring methods of recombining DNA within a species include:

- a. Mitosis
- b. Crossing over during meiosis I only
- c. Sexual reproduction only
- d. In-vitro fertilization
- e. Crossing over and sexual reproduction

Plasmids are:

- a. Non-circular DNA segments in bacteria
- b. Small self-replicating DNA molecules in bacteria
- c. Made of RNA
- d. Found only in single copies within bacteria
- e. Necessary in order for bacteria to reproduce

DNA recombination does not occur between different species in nature by:

- a. Bacterial transformation
- b. Bacteria acquiring plasmids
- c. Viruses transferring DNA between host organisms
- d. Sexual reproduction in animals
- e. None of the above is a correct choice

Recombinant DNA technology:

- a. Will never be of economic importance
- b. Only concerns changing genes in large animals
- c. Is concerned with randomly creating new genes from nucleotides
- d. Is dangerous and will lead to monstrosities
- e. Involves combining existing genes from different organisms in new ways

Which of these is not a natural method of DNA recombination?

- a. Sexual reproduction
- b. Genetic transformation in bacteria
- c. Viral infection
- d. Gene amplification in bacteria
- e. All the above are correct choices

Which of the following statements is false regarding natural recombinant DNA and human-directed laboratory DNA recombination?

- a. Laboratory studies involve exchanges of DNA between organisms, including between species, while natural DNA recombination never involves exchanges between different species.
- b. Natural DNA recombination are relatively random and undirected.
- c. In lab studies, specific pieces of DNA are moved between deliberately chosen organisms to achieve a specific goal.
- d. The usefulness of natural DNA recombination is determined by natural selection.
- e. Human interests determine the usefulness of lab DNA recombinations.

DNA from different bacteria may be combined using all of the following EXCEPT

- a. transformation.
- b. plasmids.
- c. viruses.
- d. crossing over.
- e. all of the above

In biotechnology research, DNA fragments created by restriction enzyme action are separated from one another by:

- a. Crossing over
- b. Gel electrophoresis
- c. Centrifugation
- d. Filtering
- e. The polymerase chain reaction

The enzymes used to cut genes in recombinant DNA research are called:

- a. DNA polymerases
- b. RNA polymerases
- c. Spliceosomes
- d. Replicases
- e. Restriction enzymes

In recombinant DNA technology, plasmids:

- a. Are used to insert foreign DNA into bacteria
- b. Show restriction enzymes where to cut bacterial DNA
- c. Are necessary for cellular respiration in bacteria
- d. Are where protein synthesis occurs in bacteria
- e. Are found in the blood of bacteria

Which pair of enzymes is necessary to make recombinant DNA?

- a. DNA polymerase and ligase
- b. Ligase and restriction enzyme
- c. Restriction enzyme and DNA polymerase
- d. DNA polymerase and RNA polymerase
- e. Those that cause dehydration synthesis and hydrolysis

DNA recombinations controlled by scientists in the laboratory:

- a. Are random and undirected
- b. Involve specific pieces of DNA moved between deliberately chosen organisms
- c. Use natural selection to determine their usefulness
- d. Are of little practical use to humans
- e. Usually cause harmful mutations

In recombinant DNA technology, bacteria containing recombinant plasmids are usually identified by:

- a. Microscopic examination of the cells
- b. Exposing the bacteria to an antibiotic that kills all cells not carrying a recombinant plasmid
- c. Analyzing the DNA from each bacterial cell with restriction enzymes
- d. Using antibiotics that only adhere to bacteria containing recombinant plasmids
- e. Both choices b and d are correct

In order to join a fragment of human DNA to bacterial or yeast DNA, both the human DNA and the bacterial (or yeast) DNA must be first treated with the same

- a. DNA ligase.
- b. DNA polymerase.
- c. restriction enzyme.
- d. DNA gyrase.
- e. None of the above.

Choosing from the list below, which is a reasonable sequence of steps for cloning a piece of foreign DNA into a plasmid vector?

1. Transform competent cells
2. Select for the lack of antibiotic resistance gene #1 function
3. Select for the plasmid antibiotic resistance gene #2 function
4. Digest vector and foreign DNA with *EcoRI*, which inactivates antibiotic resistance gene #1
5. Ligate the digested DNA together

- a. 4, 5, 1, 3, 2
- b. 4, 5, 1, 2, 3
- c. 1, 3, 4, 2, 5
- d. 3, 2, 1, 4, 5
- e. None of the above

Restriction enzymes are useful in recombinant DNA studies because they:

- a. Cut DNA at specific locations
- b. Join the cut ends of small DNA molecules
- c. Can reproduce in bacteria
- d. Give plasmids antibiotic properties
- e. Can separate pieces of DNA and RNA from each other

Restriction enzymes:

- a. Randomly sever DNA into small pieces
- b. Defend bacteria against viral infections
- c. Normally cut bacterial DNA as well as viral DNA
- d. Will only cut DNA containing methyl groups
- e. Will only work on viruses that attack bacteria

A readily accessible, easily duplicated assemblage of all the DNA of a particular organism is:

- a. Found in a chromosome
- b. Called a "gene pool"
- c. Possible only using bacterial DNA
- d. Called a "polymerase chain reaction" assemblage
- e. Called a "DNA library"

The polymerase chain reaction (PCR) is useful in:

- a. Analyzing a person's fingerprints
- b. Cutting DNA into many small pieces
- c. Allowing restriction enzymes to cut DNA at palindromes
- d. Creating recombinant plasmids
- e. Making many copies of a small amount of DNA

Suppose ENZ-1 and ENZ-2 are two different restriction enzymes. If various pieces of DNA are cut with either of these enzymes, which of the following cut DNAs would join together most easily to form recombinant molecules?

- Human DNA cut with ENZ-1 and gorilla DNA cut with ENZ-2
- Human DNA cut with ENZ-1 and human DNA cut with ENZ-2
- Human DNA cut with ENZ-2 and bacterial DNA cut with ENZ-2
- Bacterial DNA cut with ENZ-1 and gorilla DNA cut with ENZ-2
- All of the above choices

Restriction fragment length polymorphism (RFLP) techniques are useful in:

- Isolating a gene whose location and function are already known
- Prenatal diagnosis of certain genetic defects if the nucleotide sequence of the gene is known
- "DNA fingerprinting" in forensic medicine
- Providing DNA for PCR analysis
- Both choices b and c are correct

Differences in RFLP banding patterns indicate that

- the two different DNAs being tested possess different base pairs.
- mRNA is not transcribed.
- the genes map to different chromosomes.
- a and c.
- None of the above.

DNA migrates in an electric field because

- it is positively charged.
- it is negatively charged.
- organisms only have a few chromosomes.
- different chromosomes carry different charges.
- none of the above.

Which of the following has not yet been done by using the technique of inserting human genes into bacteria?

- Making growth hormone to help children grow normally
- Making insulin to treat diabetics
- Making blood clotting enzymes to treat hemophiliacs
- Making cancer cell-killing hormones to treat those with malignancies
- Making clot-dissolving enzymes to treat those with heart attacks

The polymerase chain reaction (PCR) allows scientists to do all of the following except:

- Make millions of copies of a particular gene
- Make gene copies quite rapidly
- Make gene copies quite cheaply
- Use a very small amount of DNA as starting material
- Sequence the bases within a gene as it is being copied

Which of the following is not a use of PCR at the present time?

- Accurate prenatal diagnosis of certain genetic diseases
- A sensitive assay for AIDS
- To study DNA taken from the remains of people who died long ago
- In forensic medicine to amplify small DNA samples left behind by criminals
- To develop new antibiotics to fight resistant bacteria

Controversy has arisen about using genetically engineered bovine growth hormone to increase milk yield in cattle. This points out that:

- a. Recombinant DNA technology is inherently a bad idea and should be abandoned
- b. Humans are not wise enough to use this technique properly
- c. Society should let scientists decide the proper uses of recombinant DNA technology
- d. Society as a whole should decide the proper uses of recombinant DNA technology
- e. Citizens should not be allowed to decide such issues since they tend to make decisions based on emotion

Which of the following is not a goal of biotechnology?

- a. To understand more about the process of inheritance and gene expression
- b. To provide better understanding and treatment of various human diseases
- c. To generate improved agricultural plants and domestic animals
- d. To prevent the inheritance of human genes judged to be undesirable
- e. All the above choices are valid goals of biotechnology