

## Quiz: Bioengineering

Read each question. Circle the letter of the correct answer.

1. Which of these technologies would most likely be developed with the help of a molecular engineer?
  - A. an artificial hip that is stronger and lighter
  - B. a method for transporting clean drinking water
  - C. a lens that can help to correct visual disorders
  - D. a new way to edit an organism's genetic material
2. A team of engineers is working on a solution to a problem involving prosthetic limbs. The engineers have already brainstormed several possible solutions. Which of these steps should they perform next?
  - A. Build and test a prototype of each possible solution.
  - B. Refine each of the solutions based on the results of testing.
  - C. Redefine the problem to clarify the most important criteria.
  - D. Evaluate the solutions in regard to the constraints and most important criteria.
3. An engineer is designing an implant to help people with spinal issues. The engineer is performing a cost-benefit analysis of his implant. Which of these would be a cost?
  - A. The implant is effective in treating a spinal issue.
  - B. The implant has a long lifespan in the human body.
  - C. The implant is made from a rare metal that is difficult to mine.
  - D. The implant is very small and can be implanted easily by a surgeon.
4. What is the first step that should be completed in the engineering design process?
  - A. Design a prototype.
  - B. Clearly define the problem.
  - C. Refine and optimize the solution.
  - D. Develop several possible solutions.
5. How would computer models help a scientist to expand biological research?
  - A. They help scientists design better experiments.
  - B. They allow the use of human experimental subjects.
  - C. They give scientists the ability to observe molecules directly.
  - D. They simulate complex biological systems that cannot be studied directly.
6. An engineer used a decision matrix to evaluate different designs. In the matrix, she weighted the design criteria from 0 to 6. What is the purpose of weighting the criteria of the designs?
  - A. to prioritize the most important criteria
  - B. to ensure that all criteria are treated equally
  - C. to help find new solutions to existing problems
  - D. to clearly define the problem the design must solve
7. Which of these would best help an engineer consider the environmental impact of the materials and wastes from producing a design?
  - A. decision matrix
  - B. life-cycle analysis
  - C. delimiting the problem
  - D. brainstorming solutions

8. Which term describes the use and application of living things and biological processes?
- A. epidemiology      C. human biology  
B. biotechnology      D. medical research
9. A group of scientists used bacteria as a model organism when studying technical applications of a biological process. Which of these most likely influenced the scientists to use bacteria as a model organism?
- A. Bacteria divide rapidly and so a single model can easily be made into many more.  
B. Bacteria cells live for a very long time, so a single model can be tested many times.  
C. Bacteria have large genomes with many genes, so the model can be used for many different applications.  
D. Bacteria cells share the same organelles as animal cells, so results that apply to the model will also apply to humans.

10. An engineer has developed a new hearing aid that restores hearing to the deaf. The hearing aid is quite small, but many users report that it leads to ear pain because it rubs the outside of the ear. Which tradeoff is most likely to outweigh all of the potential negatives associated with wearing this hearing aid?
- A. The hearing aid is small so the affected area is small.  
B. The hearing aid fits behind the ear so it is nearly invisible.  
C. The hearing aid lets people hear things they have never heard before.  
D. The hearing aid is on the outside of the ear, which hurts less than wearing something inside the ear.

**Read each statement. Write your answer on the lines.**

11. List two examples of technologies developed by bioengineering that will improve the lives of people with injuries.

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12. List two practical applications of biotechnology other than genetic engineering.

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Name: \_\_\_\_\_

Date: \_\_\_\_\_

**Unit 1 Lesson 4**

**Lesson Quiz**

- 13.** Describe a way that bioengineering may improve the treatment of people who have diabetes.

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- 14.** Explain why considering tradeoffs is an important part of the optimization process.

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- 15.** Explain how increased understanding of biology and science in general should enable humans to live longer and healthier lives.

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