

Name _____

Vocabulary Review

Use the terms in the box to complete the sentences.

- Any device that people use to meet their needs and solve practical problems is ______.
- Using science and math for everyday purposes such as designing structures, machines, and systems is ______.
- 3. The standards for measuring how well a design does its job

are _____.

- The process of applying the engineering design process to living things is ______.
- The working model on which tests are performed is a(n) ______.

6. Artificial legs are an example of ______.

Science Concepts

Fill in the letter of the choice that best answers the question.

- 7. Computer models, along with mathematical data, can help to provide which information to bioengineers?
 - (A) which prosthesis is more appealing
 - (B) which prosthesis would be less necessary
 - C what kinds of changes need to be made to a prosthetic device
 - (D) what kinds of adjustments need to be made to the marketing plan.

8. This foot x-ray is an example of which kind of science or engineering?



bioengineering biotechnology criteria engineering prototype technology

- Suppose you are a bioengineer who is designing a prosthetic shoulder joint. You are building a prototype. Which is an important design criterion for a shoulder joint that you should include?
 - (A) It should be realistic in color and appearance.
 - (B) It should be capable of full movement within a shoulder socket.
 - C It should keep the person for whom it is designed from injuring himself or herself again.
 - (D) It should be stronger than a typical shoulder joint and support more weight.
- 10. A sports designer wants to produce a profitable product that will benefit the wearer. The data below show the result of a survey about students' favorite sport activities.

| Sports Participation in High School | |
|-------------------------------------|------------------------|
| Sport | Percentage of students |
| basketball | 80 |
| bicycling | 60 |
| soccer | 50 |
| swimming | 30 |

Which can you infer would be the **most** needed product among the students surveyed?

- (F) a helmet to protect from accidental head injuries
- (G) high-impact, ankle-supporting shoes
- (H) water-repelling racing swim trunks
- () shorts with padded backs

- 11. You and your design team have designed a new waterproof wristwatch made of a soft, flexible, clothlike material. Which of the following prototypes could be tested to predict how well the watch would work in real life?
 - (A) a graphic drawing of the watch
 - (B) a computer model of the watch that actually moves
 - (C) a wearable model of the watch made of plastic or cloth
 - a wearable version of the watch made of the new material
- 12. A company has developed a new skateboard that can more easily roll over gravel or grass. Some users of these new boards are wearing paths through the local park. What aspect of technology does this situation represent?
 - (F) benefits and risks
 - (G) design and redesign
 - (H) computer models and prototypes
 - () brainstorming and communication

Benchmark Review (continued)

Name_

- 13. Bioengineers designed a prosthetic hand that is capable of grasping small objects between the thumb and index finger. The thumb was not one of the prosthetic hand's original design criteria. Which process was most responsible for including this feature in the final design?
 - (A) troubleshooting after manufacture
 - B safety concerns among doctors
 - C brainstorming sessions within the design team
 - (D) prototype testing and redesigning
- 14. You are determining the criteria you will use to decide how well your prototype racecar works. Which units would you use to determine the distance your car traveled?
 - (F) grams
- (H) meters
- (G) degrees
- () liters

15. Engineers are investigating several materials that they think might be suitable for use in an artificial knee joint. They need to select a strong material that has a density (mass ÷ volume) in the range of 2.3–2.6.



What can the engineers conclude using the data from the graph?

- (A) All of the samples meet the density criteria that the engineers identified.
- (B) Sample 3 has the least volume and should not be considered for the knee.
- © Sample 2 has the greatest mass per volume and is the densest material.
- (D) All samples are outside the acceptable range and show a mass of 5–6.
- 16. An engineering team is developing a device that will help individual farm families clean drinking water. The device must be inexpensive enough that families can afford to buy one. At what stage in the engineering process should the team take into account the need for the device to be affordable?
 - (F) before they build a prototype
 - (G) after the device is on the market
 - (H) before they identify the problem
 - (I) after the testing has been completed