Student Name _____

9TH Grade Scientific Processes OGT Assessment

Directions: For multiple-choice questions, choose the correct answer and then mark the corresponding circle in the Answer Document. If you change an answer, be sure to erase the first mark completely.

Short-answer questions are worth two points. Extended-response questions are worth four points. Point values are printed near each question in your Test Booklet. The amount of gridded space provided for your answer is the same for all two- and four-point questions. Using the gridded space may or may not be necessary to answer the question; however, your response should be written in the gridded space.

Make sure the number of the question in this Test Booklet corresponds to the number on the Answer Document. Be sure to answer the question completely and show all your work in the Answer Document.

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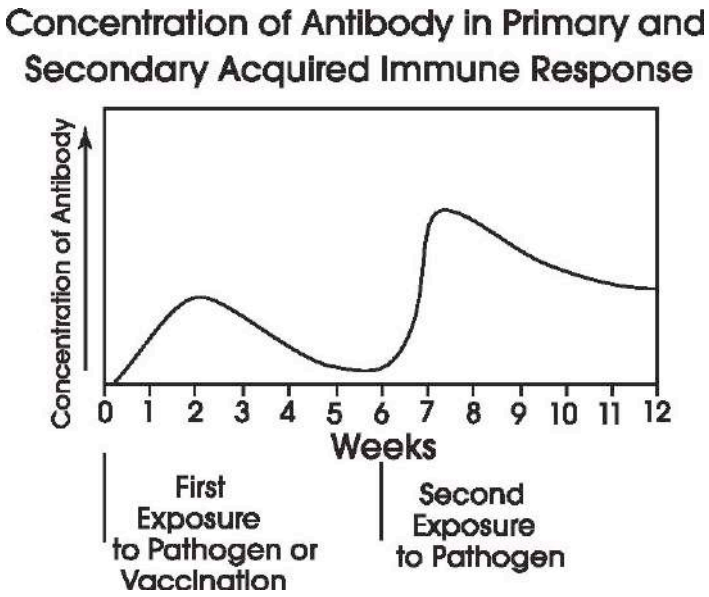
1. When a medical technician analyzes human body fluids such as blood, which safety precaution would not be necessary? OGT2005-Q.10

A. protective gloves
B. safety goggles/face shield
C. closed-toed shoes
D. lead-lined apron table

Use the following information and graph to answer question 2.

A medical researcher is investigating immune response in patients exposed to a specific pathogen. The graph below shows the concentration of a particular antibody in the bloodstream produced during the process of acquired immunity. One curve shows the primary immune response (after the first exposure to the pathogen), and the other curve shows the secondary immune response (after the second exposure to the pathogen).

A vaccination serves as the first exposure to a pathogen and triggers the body's primary immune response. Some vaccines contain weakened or inactive pathogens. Other vaccines contain highly similar but nonpathogenic forms.



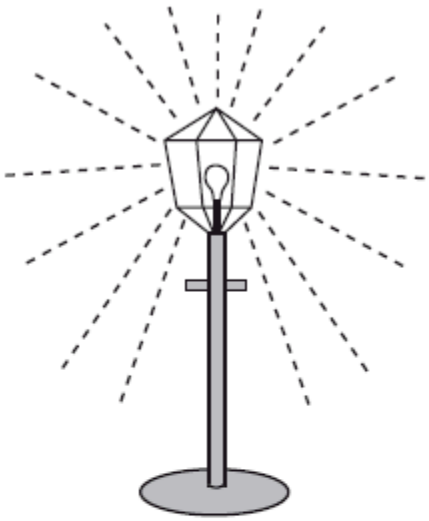
2. Describe two benefits of receiving a vaccine, such as the polio vaccine, in protecting the body against disease, and include data from the graph to support each benefit. Respond in the space provided in your **Answer Document**. (4 points) OGT2005-Q.36

3. Hydroelectric power is considered a "clean" energy source because it OGT2005-Q.40

A. is available in most areas.
B. increases the amount of power available.
C. does not produce the pollutants that burning fossil fuels do.
D. requires minimal investment in equipment.

4. Artificial light at night can negatively impact wildlife. Which outdoor light design minimizes the effect of the light on wildlife? OGT2005-Q.41

A.



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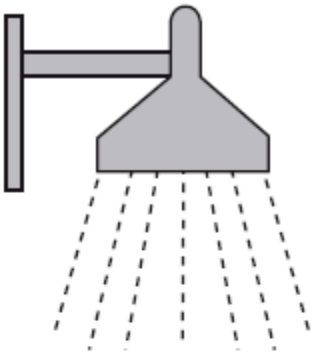

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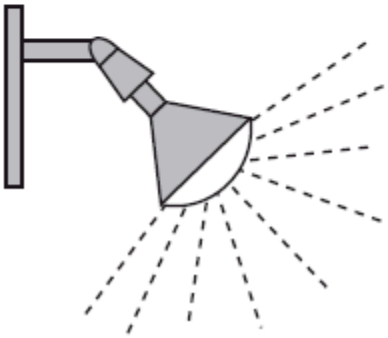
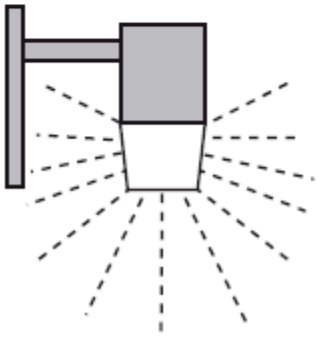


D.



5. An agricultural scientist wants to determine the effect of fertilizers on corn plant growth. She selects a fertilizer to treat a soil plot where corn seeds have just sprouted. Describe an appropriate control she could use to determine whether the fertilizer affects growth of the corn plants. Explain why it is important to include this control. Respond in the space provided in your **Answer Document**. (2 points) OGT2005-Q.42

6. The water level in a graduated cylinder rises from 10 cm to 35 cm when a solid lead ball is added. What is the approximate volume of the lead ball? OGT2005-Q.44

A. 3.5 cm^3
B. 25 cm^3
C. 35 cm^3
D. 45 cm

Use the following information to answer question 7 and 8.

Cataracts

In 2004, wildlife rescuers found a great horned owl nearly dead from starvation. The owl's eyes had formed cataracts, which cloud the natural lens and inhibit the eye's ability to focus and form clear images. Cataracts can be inherited or acquired as a result of aging, disease and/or use of certain medications. Without clear vision, the owl, named Minerva, had been unable to hunt.

Minerva was taken to the Veterinary School at the University of Wisconsin, Madison, after a local veterinarian confirmed the presence of cataracts. A pair of lenses specifically made for owls was implanted in Minerva's eyes. After the surgery and a recovery period, Minerva was moved to a large, enclosed area where small rodents were released and her ability to hunt was to be evaluated. Scientists confirmed that, if she showed a clear ability to hunt, she would be released back into her natural habitat.

7. Provide two reasons why the researchers' actions in rescuing and operating on Minerva either were or were not ethical. Respond in the space provided in your **Answer Document**. (2 points) OGT2006-Q.7

8. All cataracts were originally thought to be acquired; however, recent research indicates that some cataracts are genetic in nature.

What type of study would be most likely to lend support to the claim that cataracts can be inherited? OGT2006-Q.10

A. analysis of cataract thickness in several species

B. studying age-related onset of cataracts within a species

C. linkage studies on DNA from families with a history of cataracts

D. comparing characteristics of cataracts caused by specific diseases

9. Engineers are designing an auditorium that will be used for performances by orchestras.

What must they do to maximize the loudness of the sound heard by the audience?

OGT2006-Q.40

A. hang curtains behind the orchestra

B. put carpet all around the walls of the auditorium

C. hang reflecting panels from the ceiling behind the orchestra

D. install narrow glass windows and skylights around the top of the walls

10. A medical research group placed the following advertisement in a newspaper:

Seeking Volunteers for
Medical Research Study

Volunteers are needed to participate in a 12-week research study to test a new drug for type 2 diabetes. Participants must be between the ages of 18 and 80 and must not be taking more than one oral medication for diabetes. The following will be provided to participants at no cost:

- Medical evaluations (physical exam)
- Diagnostic testing (blood & urine tests)
- Experimental study medication
- Compensation for time and travel expenses

If you are interested in participating, please contact Rudy at 1-808-555-5000.

In order for potential participants to make a medically sound decision, what is the research group's ethical obligation?

OGT2007-Q.17

A. Pay all participants' health insurance costs during the entire course of the study.

B. Inform participants of the exact amount of compensation they will be receiving.

C. Provide participants with a list of additional studies that may be relevant to their condition.

D. Disclose all medical procedures and provide information on risks and potential side effects.

11. Scientists have written computer programs to model populations of organisms within ecosystems. By changing initial numbers of individuals and survival rates, these programs can simulate what will happen to members of the ecosystem over time.

Explain how computer modeling could be valuable to an ecologist studying a forest ecosystem. Speculate on why this type of data can only be gained by using a computer program. Respond in the space provided in your **Answer Document**. (2 points)

OGT2007-Q.28

12. A university student wants to perform an experiment using mice as test subjects. The procedure would require the mice to be injected with a specific bacterial infection and then treated with an antibiotic. Their response to the treatment would be observed and recorded. Provide two questions that an ethics review board would raise regarding the proposed work. For each question, explain why it is important that the question be answered prior to granting permission for the experiment. Respond in the space provided in your **Answer Document**. (4 points)

OGT2007-Q.33

13. *Bacillus thuringiensis* (Bt) is a bacterium that contains a gene that results in the production of a natural pesticide that kills insects. Genetic engineers have successfully inserted this Bt gene into the DNA of some corn varieties, allowing the corn to produce its own pesticide.

What negative consequence could result from this technology?

OGT2007-Q.34

A. Only corn that is resistant to the Bt gene will survive.

B. Individual insects that eat the genetically modified corn will develop resistance to Bt.

C. The genetically modified crops will insert this Bt gene into the DNA of humans that eat the corn.

D. Only Bt resistant insects will survive to reproduce, eventually producing a population of entirely resistant individuals.

14. Some strains of laboratory mice have been inbred for many generations, resulting in large numbers of mice with nearly identical genetic makeup. Explain an advantage of using these mice in designing an experiment to test the effects of a new drug. Compare this to a test using mice with varied genetic makeup. Respond in the space provided in your **Answer Document**. (2 points)

OGT2007-Q.37

. **Use the information to answer question 15.**

Himalayan Rabbits

Himalayan rabbits are native to the Himalayan Mountains, where a great deal of snow falls annually. These rabbits have white fur over most of their bodies, with black fur on the ears, noses, feet and tails. This color pattern results from temperature differences in different parts of the rabbits' bodies. Areas where the body temperature is below 33°C the fur grows in black.

To demonstrate this color change, a scientist shaved a small area of fur on the backs of adult Himalayan rabbits. Ice packs were kept on the shaved areas long enough for the rabbits' fur to begin growing back. When the ice packs were removed, the fur growing beneath them was black.

15. Suppose the same scientist wanted a Himalayan rabbit with white feet. Which procedure would most likely generate these results?

OGT2007-Q.39

A. place ice packs on the rabbit's feet

B. place the rabbit outside on a sunny day

C. place the rabbit outside when it is snowing

D. place the rabbit in a cage with a heated floor