

## **STUDENTS**

To be successful on the Living Environment Regents you must be able to apply the concepts you have learned over the year. The exams and answers presented here provide you with about 300 questions that will test your understanding and your ability to apply your knowledge of biology. It is not enough to just do the practice exams before the Regents, you must be committed to seriously reviewing each answer and explanation until you feel confident of the concept.

Planning for the Regents begins perhaps a month or two months before the exam date. You do not want to wait until the last minute and cram. You should work a set of questions daily (about 15 to 20), going over the answers and reviewing the concepts involved. Star the questions you do not feel totally confident in and go back to those for more review and make notes in your margins.

If you work hard and do the exams carefully, review the answers and revisit areas of concern in a timely fashion, you should have success on the Regents.

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# LIVING ENVIRONMENT REGENTS

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Answer all questions in this part. [30]

**Directions (1–30):** For *each* statement or question, write in the space provided the *number* of the word or expression that, of those given, best completes the statement or answers the question.

1. Which activity is an example of a decomposer recycling organic compounds back into the environment?

- (1) A tree synthesizes starch from simpler molecules.
- (2) A bacterial cell performs photosynthesis.
- (3) A bird digests proteins from its food.
- (4) A fungus breaks down the body of a dead animal.

1 \_\_\_\_\_

2. Itching and other skin problems are signs that a cat or dog may have fleas. Fleas are parasites known for their biting and blood-sucking abilities. When they bite, flea saliva enters the pet’s circulatory system, sometimes causing an allergic response commonly seen as a “hot spot” on the pet’s neck or the base of its tail.



Source: <https://www.planetnatural.com/pest-problem-solver/household-pests/flea-control/>

These observations are best explained by the fact that

- (1) flea saliva may stimulate an immune response in cats and dogs
- (2) fleas are microbes whose bites cause a decreased blood flow
- (3) flea saliva is a toxic substance that is released when fleas prey on cats and dogs
- (4) fleas are host organisms whose saliva digests cat and dog fur, leaving “hot spots”

2 \_\_\_\_\_

3. A German measles (rubella) epidemic during the years 1963 to 1965 resulted in approximately 30,000 babies being born with birth defects. The specific cause of these birth defects was most likely

- (1) the development of rubella virus infections in embryos
- (2) the failure of zygotes infected with rubella to develop
- (3) mutations in the nerve cells of pregnant females at the time of the rubella epidemic
- (4) an increase in the amount of time needed for healthy embryonic development

3 \_\_\_\_\_

## Part C

Answer all questions in this part. [17]

**Directions (56-72): Record your answers in the spaces provided.**

Base your answers to questions 56 and 57 on the information below and on your knowledge of biology.

### Turtle Cells and Human Skin

New research has demonstrated that turtles and humans may have had a common ancestor 310 million years ago. A recent study looked at the genes responsible for the skin layers of turtle shells compared to the genes for human skin. The findings of the study suggest that about 250 million years ago, when turtle evolution split from other reptiles, a mutation in a specific group of genes occurred. The basic organization of this group of genes is similar in turtles and humans, and they produce the important skin proteins that produce shells in turtles and protect against infection in the skin of humans.

56. Identify the molecule that contains the hereditary material and the organelle in which it is found in turtle cells. [1]

Molecule: \_\_\_\_\_ Organelle in turtle cells: \_\_\_\_\_

57. Describe how the mutation in the genes of a turtle ancestor turned out to be a beneficial evolutionary adaptation. [1]

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Base your answers to questions 58 through 60 on the accompanying illustration and information and on your knowledge of biology.

### The Little Brown Bat



Source: <http://knatolee.blogspot.com/2011/09/not-ducklings.html>

### The Little Brown Bat

The illustration is of a species commonly called the little brown bat. It has 38 teeth and usually lives near bodies of water. The animal is considered beneficial by many people because it eats mosquitoes and many types of garden pests. They feed at night, detecting their prey by echolocation—a form of sonar similar to what is used on ships. They can determine the location and size of their prey by listening to the return echo.

58. The little brown bat eats mainly mosquitoes and night-flying insects. State *one* way in which the animal is adapted to prey on these organisms. [1]

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68. State whether the pea seedling could have continued to grow and develop in the lung over a long period of time. Support your answer. [1]

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Base your answers to questions 69 and 70 on the accompanying picture, the information below and on your knowledge of biology.

### Scientists Reprogram Plants for Drought Tolerance



Source: Lancaster Farming 2/21/15/AAAS

*Arabidopsis* plants respond to drought conditions by producing a stress hormone called ABA. This hormone slows down plant growth and leads to a decrease in the plant's use of water.

ABA binds to specific receptors in the plant that cause the guard cells on the leaf surfaces to close the stomatal openings through which water vapor can normally pass. This reduces water loss during the drought conditions.

Although it has been suggested that spraying plants with ABA during a drought could be beneficial, it is not practical. The chemical is expensive to produce and quickly loses its ability to bind to cell receptors in the plant cells.

Recently, however, scientists have found a way to modify the ABA receptors in *Arabidopsis* plants so they can be activated by another chemical that is both stable and inexpensive.

69. Describe how the shape of molecules, such as the hormone ABA, is critical to their function in the *Arabidopsis* plant. [1]

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70. Explain how the response of the guard cells to a drought is part of a feedback mechanism. [1]

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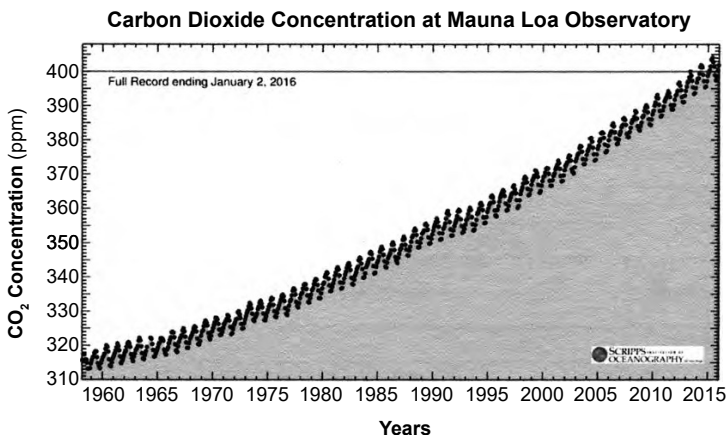


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Base your answers to questions 71 and 72 on the passage and graph below and on your knowledge of biology.

### Atmospheric Carbon Dioxide

Records from polar ice cores show that the natural range of atmospheric carbon dioxide (CO<sub>2</sub>) over the past 800,000 years was 170 to 300 parts per million (ppm) by volume. In the early 20th century, scientists began to suspect that CO<sub>2</sub> in the atmosphere might be increasing beyond this range due to human activities, but there were no clear measurements of this trend. In 1958, Charles David Keeling began measuring atmospheric CO<sub>2</sub> at the Mauna Loa observatory on the big island of Hawaii.



71. Record the approximate concentration of carbon dioxide at the start of the study and describe how it compares to the concentration in 2015. [1]

\_\_\_\_\_ ppm CO<sub>2</sub>

Description: \_\_\_\_\_  
\_\_\_\_\_

72. Identify *one* likely reason for the overall change in CO<sub>2</sub> concentration observed between 1958 and 2015. [1]

\_\_\_\_\_  
\_\_\_\_\_

### Part D

Answer all questions in this part. [13]

**Directions (73-85):** For those questions that are multiple choice, record on the space provided the *number* of the choice that, of those given, best completes each statement or answers each question. For all other questions in this part, follow the directions given and record your answers in the spaces provided.

Answer all questions in this part. [30]

**Directions (1–30):** For *each* statement or question, write in the space provided the *number* of the word or expression that, of those given, best completes the statement or answers the question.

1. Which two body systems provide humans with the raw materials necessary for their cells to release energy?  
(1) muscular and skeletal (3) digestive and respiratory  
(2) endocrine and nervous (4) reproductive and circulatory 1 \_\_\_\_\_

2. An example of an activity that best contributes to maintaining homeostasis in an organism is a  
(1) bear eating fish from a polluted stream  
(2) deer losing its fur at the start of winter  
(3) person not sweating on a 100°F day  
(4) response to a chickenpox vaccination 2 \_\_\_\_\_

3. Equine cloning can be used to produce performance horses. Although the horses are clones of each other, they may still exhibit slight differences in appearance.

Horse Clones



Source: <http://vetmed.tamu.edu/images/site/labs/eel/5-cloned-foals.jpg>

- The differences in the physical characteristics of the cloned horses are most likely the result of  
(1) environmental influences  
(2) natural selection  
(3) sexual reproduction  
(4) changes in gametes 3 \_\_\_\_\_

4. Which situation is an example of an organism responding to an abiotic factor?  
(1) Plants in a forest grow toward areas where there is more sunlight available.  
(2) Rabbits attract mates by performing a mating dance.  
(3) Woodpeckers peck holes in the trunks of trees to find insects for food.  
(4) Deer eat tree bark in winter when other food is scarce. 4 \_\_\_\_\_

5. CRISPR/Cas9 is a powerful system that bacteria use to cut and remove DNA from invading viruses. Using CRISPR/Cas9, researchers have successfully corrected a disease-causing mutation for muscular dystrophy in laboratory mice. Correcting the harmful mutation using CRISPR/Cas9 is an example of  
(1) biological evolution (3) genetic engineering  
(2) cloning techniques (4) selective breeding 5 \_\_\_\_\_

1. 4 Decomposers recycle organic compounds by breaking them down into basic building blocks that can be used by other organisms. A fungus acts as a decomposer by utilizing enzymes to break down a dead animal's body.
2. 1 Flea saliva, a foreign substance that enters a dog or cat's circulatory system through a bite, may initiate an immune response in that animal. Their immune system response may be an allergic reaction where irritations known as hot spots develop.
3. 1 Birth defects in newborn babies may have been the result of exposure and subsequent infection from the rubella virus to the embryo during development. Remember that embryonic development can be influenced by external factors such as viral attacks.
4. 3 The placenta is a reproductive structure that functions to exchange nutrients and wastes between the mother and baby. The placenta is attached to the uterine wall and allows for the exchange of materials through the mother's and embryo/fetus' blood vessels. A ruptured blood vessel would interrupt this exchange, as well as place the mother's life in danger
5. 1 An increase in tree mass is a result of the growth of plant tissues. These tissues are made of carbohydrate-based compounds. Plants use carbon dioxide to synthesize these carbohydrates through the process of photosynthesis. Carbon dioxide enter plants through tiny leaf openings known as stomata.
6. 1 Genetically modified organisms (GMOs) have DNA which has been altered by inserting a specific gene into its sequence. When the genetically modified fish reproduce, they pass the inserted growth hormone gene on to every cell in their offspring. Each fish cell is able to synthesize the new growth hormone from the modified gene.
7. 2 Much damaging ultraviolet radiation (UV) is blocked from reaching the Earth's surface by the atmospheric ozone layer or shield. Certain gases damage the ozone layer, allowing more UV to enter. By regulating the production of these gases and educating the public, the government can help to reduce occurrences of melanoma.
8. 4 In warmer, southern ecosystems, migratory birds feed on insects, maintaining those population levels. When migratory birds find a ready source of food in landfills in northern climates, fewer birds fly south during winter months. This human activity changes migratory behavior which in turn impacts the insect populations in southern ecosystems because there are fewer bird predators to keep insect populations in check.



72. Acceptable responses include, but are not limited to:  
Tuskless males would lose in mating battles and probably die.  
*or* Since they are males, they fight other males for mates and would be more likely to be seriously injured and die.  
*or* Females are not as likely to mate with tuskless males.  
*or* In males, tusklessness may be lethal.

Explanation: Being tuskless may be a disadvantage for male elephants as they are unable to defend themselves during mating season and may not be attractive as a mate to female elephants. There is some speculation that the tuskless gene may be lethal for males as well.

### Part D

73. 1 The heart rate is the dependent variable because it is the variable that changes as a result of the independent variable, different scary movie scenes, being manipulated.
74. 4 A hypothesis is a statement that attempts to explain an observable phenomenon. It provides the basis for scientific investigation. In this experiment, the effect of scary movie scenes on heart rates is being investigated.
75. 3 Solution *B* digested the cornstarch where it was swabbed. When exposed to starch indicating solution, the question mark was clear as there was no starch present unlike surrounding gel which turned blue. Solution *A* did not digest the starch and the swabbed question mark did not appear clear.
76. 2 Using the diagram, the warbler finch has a probing beak (white diagram section) and consumes insects (inner diagram section). The other finches in the chart are incorrectly matched with beaks and food.
77. Answer: Group *A*

*Supporting statement:*

- Distilled water moves into cells and makes them swell up or even burst.  
*or* Distilled water has a higher water concentration than the cytoplasm of red blood cells. Water will move into the cells and they will get larger.  
*or* These are the cells that got bigger/burst.  
*or* It is *A* because the cells in *B* shrank.

Explanation: Distilled water has 100% water concentration. When red blood cells, which have a lower water concentration, are placed into distilled water, water diffuses into the red blood cells. The red blood cells will swell and may even burst. Remember, that diffusion is the movement of molecules from a high concentration to lower concentration.

**LIVING ENVIRONMENT**

**CONCEPTS,**

**RELATIONSHIPS,**

**AND**

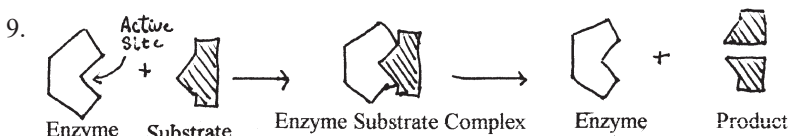
**QUESTIONS BY**

**TOPIC**

**REFERENCE**

- Cells are the basic unit of structure and can be different to perform many differentiated functions.
- Organisms are classified based upon structural and evolutionary relationships.
- All living organisms must carry out all life processes or functions in order to survive.
- Homeostasis is the maintenance of internal balance within an organism.
- Feedback mechanisms are a regulating action where levels of hormones, chemicals or physical features trigger a response or action that returns an organism back to normal conditions or homeostasis.
- Organic compounds are composed of building blocks which are essential for living organisms. They include:
  - Carbohydrates – composed of simple sugars
  - Proteins – composed of amino acids
  - Lipids – composed of fatty acids and glycerol

- Indicators identify substances by changing color when in that substance presence. Indicators can be used to identify organic compounds such as glucose or starch.
- Enzymes are organic catalysts that speed up a chemical reaction but are unchanged by that reaction.



- Rates of enzyme activity can be influenced by temperature, pH and the amounts of enzyme or substrate.
- Autotrophs produce organic molecules from inorganic materials, generally, through photosynthesis.
- Heterotrophs must obtain pre-made organic molecules for nutrition.
- Photosynthesis involves a process where light energy from the Sun is converted to chemical bond energy of organic compounds. Plants or autotrophs perform this process which is the base for the energy pyramid.
- The cell membrane (plasma membrane) regulates homeostasis within a cell by selectively allowing materials in or out.
- Active transport involves the use of energy to move materials from areas of low concentration to areas of higher concentration.

## REGENTS QUESTIONS BY TOPIC

### Scientific Methods and Laboratory Skills

June 2019 – 39, 44, 45, 46, 47, 49, 61, 62, 63, 64, 73, 77, 85

June 2021 – 31, 32, 33, 38, 39, 44, 45, 46, 47, 54, 75, 79, 80, 82, 84, 85

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