

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 statement is an example of the interdependence of organisms?

- (1) Owls hunt at night.
- (2) Ants get food from insects and protect insects from predators.
- (3) Ticks feed on the blood of animals and the ticks grow larger.
- (4) Crows feed on dead mice.

1 _____

2. Residents of a town are concerned that a recently built factory could pose health risks. Scientists were asked to investigate the effects of the factory on the health of local residents. The most relevant information they reported was that

- (1) in a survey, residents felt that the air in town looks dirtier now
- (2) there have been reports that other types of factories have been linked with health issues
- (3) residents have occasionally seen smoke coming from the factory
- (4) local medical facilities have recently reported a 15% increase in the number of patients treated for asthma

2 _____

3. Farmers may someday clone their best milk-producing cow into a whole herd. What potential disadvantage might be important to consider in having such a large group of clones on one farm?

- (1) It may be difficult to tell the animals apart.
- (2) Lack of variation may limit survival in the herd.
- (3) The cows could be fertilized by only one type of bull.
- (4) The cows could be mated only with each other.

3 _____

4. DNA replication occurs in preparation for

- (1) mitosis, only
- (2) meiosis, only
- (3) both mitosis and meiosis
- (4) neither mitosis nor meiosis

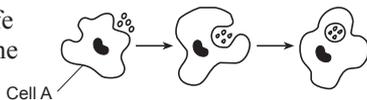
4 _____

5. An individual eats a hamburger. Which two systems must interact to transfer the nutrients in the hamburger to human muscle tissue?

- (1) respiratory and excretory
- (2) digestive and immune
- (3) digestive and circulatory
- (4) circulatory and respiratory

5 _____

6. The diagram shows cell *A* completing a life process. Cell *A* performs functions similar to the tissues and systems in complex, multicellular organisms. This process results in



- (1) increased genetic variation
- (2) the maintenance of homeostasis
- (3) a reduction in competition
- (4) increased autotrophic nutrition

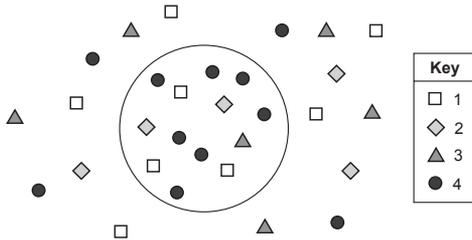
6 _____

7. The shape of a protein molecule directly determines its

- (1) movements through the cytoplasm
- (2) functions inside and outside of cells
- (3) roles in building water molecules
- (4) circulation throughout the body

7 _____

8. The diagram below represents a cell and some molecules in its environment.



Which molecule would require the use of energy in order to be brought into the cell?

- (1) 1
 - (2) 2
 - (3) 3
 - (4) 4
- 8 _____

9. Many domestic plants that are currently used for food by humans share a wild plant ancestor. The changes that have occurred in four common plants and the results are shown in the chart below.

Wild Plant Ancestor	Change That Occurred	Resulting Modern Plant
wild mustard	reduced flower development	broccoli
wild mustard	sterile flowers	cauliflower
wild mustard	enlargement of leaves	kale
wild mustard	shortened stem length	cabbage

What event most likely produced the changes that occurred in the wild plant ancestor?

- (1) Mutations in wild mustard sex cells were passed on to offspring.
 - (2) Humans did not like to eat wild mustard.
 - (3) Competition for survival occurred in all ecosystems of the world.
 - (4) Ancient herbivores overgrazed wild mustard.
- 9 _____

10. A strand of DNA in a skin cell contains the bases:

A-T-G-C-C-A-T-C-G-G-T-A

After the cell is exposed to ultraviolet light, the strand contains the bases:

A-T-G-G-C-C-A-T-C-G-G-T-A

Which statement describes the result of this exposure?

- (1) A new base has been inserted.
 - (2) A base has been deleted.
 - (3) One base has been substituted for another.
 - (4) There have been no changes in the bases.
- 10 _____

Part B–2

Answer all questions in this part. [12]

Directions (44–55): For those questions that are multiple choice, record in 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.

Base your answers to questions 44 through 47 on the information and data table below and on your knowledge of biology.

For most animals, the sex of the offspring is determined by sex chromosomes. In some species of reptiles, such as the painted turtle, there are no sex chromosomes. It has been discovered that the sex of the offspring is determined by the temperature of the nest in which the egg develops.

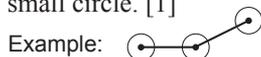
Directions (44–46): Using the information in the data table, construct a line graph on the grid below, following the directions below.

**Sex of Painted Turtle Offspring
at Various Nest Temperatures**

Temperature (°C)	Sex of Offspring	
	Males (%)	Females (%)
19	0	100
20	5	95
21	20	80
22	25	75
23	0	100
24	0	100
25	0	100

44. Mark an appropriate scale, without any breaks in the data, on each axis. [1]

45. Plot the data for percent males on the grid. Connect the points and surround each point with a small circle. [1]

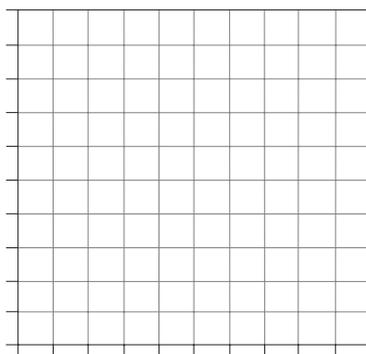


46. Plot the data for percent females on the grid. Connect the points and surround each point with a small triangle. [1]



**Sex of Painted Turtles at Various
Nest Temperatures**

Offspring (%)



Temperature (°C)

47. The fact that the sex of the painted turtle offspring is controlled by the temperature of the nest is an example of

Key	
⊙	Males
△	Females

- (1) natural selection causing a new species to form
- (2) a predator-prey interaction
- (3) habitat destruction decreasing biodiversity
- (4) environment modifying gene expression

47 _____

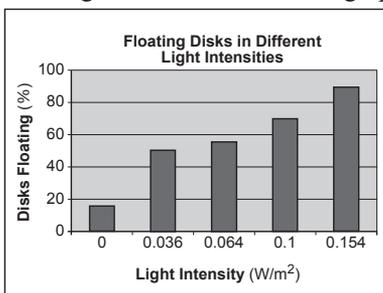
Base your answers to questions 48 through 50 on the information and graphs below and on your knowledge of biology. The graphs represent the results of two investigations using leaf disks from spinach plants.

Small disks were cut from spinach leaves that had been treated to remove any air from inside the leaf. The disks were placed in a solution that allowed them to carry out photosynthesis. At first, all the disks sank to the bottom of the container. These disks were then used for two different investigations.

Investigation 1

The disks were divided into five groups. Each group was exposed to light of a different intensity, measured in watts per meter squared (W/m^2). Some of the disks began to float. The results of the first investigation are shown in the graph below.

48. State the relationship between increasing light intensity and the percentage of disks floating at the conclusion of Investigation 1. [1]



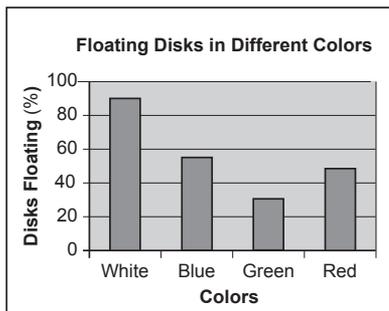
49. The substance produced inside the leaf disks that caused them to float to the surface of the solution is

- (1) ozone (2) oxygen (3) water (4) nitrogen 49 _____

Investigation 2

A number of freshly prepared disks were placed in five containers. These containers were then each exposed to light of a different color. The results of the second investigation are shown in the graph below.

50. Which color of light appears to be *least* effective for photosynthesis in spinach leaves?



- (1) white (2) blue (3) green (4) red 50 _____

Base your answer to question 51 on the information and photograph below and on your knowledge of biology. The photograph shows an oriental hornet.

Oriental hornets are unique insects. A yellow pigment in the body of the insect converts solar energy to electrical energy. Plants also convert energy from the Sun.



Yellow pigment

51. Identify the organelle present in plants where this conversion takes place. [1]

Base your answer to question 52 on the information below and on your knowledge of biology.

The SUNY Solar Car Model Racing Team’s Sunhawk: Car of the Future?

The Sunhawk, a car built by students at SUNY New Paltz, prompted Forbes Magazine to ask “Is The \$250,000 Sunhawk the Solar Car of the Future?” These cars show the most advanced solar technology and vehicle construction.

52. There are trade-offs involved in the use of solar-powered cars. Provide *one* advantage and *one* disadvantage of owning a solar car. [1]

Advantage: _____

Disadvantage: _____

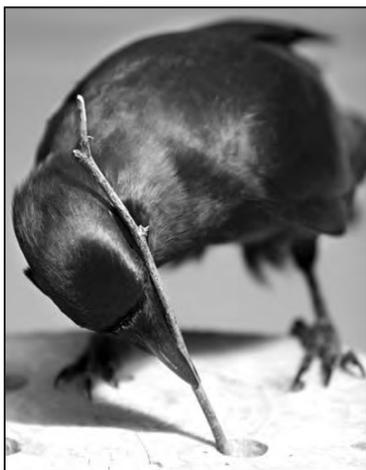
Base your answer to question 53 on the information below and on your knowledge of biology.

Ten years ago, scientists discovered a well-preserved set of dinosaur remains in China. This dinosaur, which walked on Earth about 125 million years ago, had feathers and was about the same size as a turkey — but don’t be fooled. This dino’s bite was a lot worse than a turkey’s gobble. After a close (and careful!) examination of the dino’s teeth, scientists recently concluded that this dinosaur was probably poisonous. The study was led by David Burnham, who works and teaches at the University of Kansas in Lawrence.

Source: www.sciencenewsforkids.org

53. State *one* inference that could be made based on the fact that this dinosaur had feathers. [1]

Base your answers to questions 54 and 55 on the photograph and information below and on your knowledge of biology.



A captive New Caledonian crow forages for food using a stick tool. (Credit: Dr. Simon Walker)

A Great Larvae Meal

New Caledonian crows consume a wide range of foods. These crows require tools to extract the larvae of wood boring beetles from their burrows. A bird pokes a larva with a stick until the larva is disturbed enough to bite the stick and hang on to it. The bird is then able to pull the larva out of its burrow. These larvae, with their unusual diet, have a distinct chemical that can be found in the feathers and blood of crows—allowing scientists to determine the percentage of the crows' diet that is made up of beetle larvae. Scientists found that the beetle larvae are so energy-rich that just a few could satisfy the daily energy requirement for a crow. The crows with the greatest skill in using a twig as a tool benefit most in terms of nutrition.

54. State *one* reason why the offspring of crows skilled at using twigs as tools would have the greatest chance of survival. [1]

55. State *one* reason why some members of a population of crows equally skilled in the use of twigs have different rates of survival. [1]

Part C

Answer all questions in this part. [17]

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

Base your answer to question 56–57 on the information below and on your knowledge of biology.

African violet plants are grown for their delicate, colorful flowers and furry, soft leaves. People often want to touch the leaves and brush the hairy leaves with their fingers. Growers and plant owners were concerned that this could negatively affect the plant. Of particular concern was the presence of body lotion or other skin products on the hands of persons touching the leaves.

A student thought this might be the basis of a science project. He selected two African violet plants. Ten leaves on each of the two plants were brushed with a gloved hand for 30 seconds, once a day, for a period of five days. The difference was that leaves of the second plant were brushed with a gloved hand that had hand lotion applied to the glove.

56–57. As part of the peer review process, evaluate the student’s experiment. As part of your evaluation, be sure to:

- state *one* possible hypothesis for the experiment proposed by the student [1]
- describe the type of data that should be collected to determine if the brushing with lotion was having a *negative* effect on the African violet plant [1]

Base your answers to questions 58 and 59 on the information and chart below and on your knowledge of biology.

Scientists studied the distribution of a species of pocket mouse that lived in the sandy desert regions of the southwestern United States. They are eaten by a variety of predators. Pocket mice are active at night, and feed on seeds and grasses. A single female mouse can reproduce several times each year, producing a litter of 3 to 13 offspring each time. Each new litter is considered a generation.

A volcanic eruption that resulted in lava flows changed the color of the area that the mice inhabit from light brown to black. Data from the scientist’s research of the population are shown in the chart below.

Changes in Pocket Mouse Fur Color after a Volcanic Eruption

Number of Generations	Percentage of Pocket Mice with Light Brown Fur	Percentage of Pocket Mice with Black Fur
10	95%	5%
25	90%	10%
50	75%	25%
100	5%	95%

LIVING ENVIRONMENT

ANSWERS

AND

EXPLANATIONS

- 2 Interdependence occurs when organisms rely on each other for food, for protection, or for a habitat. The behavior of ants as consumers and as protectors is an example of ecological interdependence.
- 4 Relevant information on the effect of factories on health would include data from medical facilities concerning changes in the health of patients. The 15% increase in asthma would be very relevant to the investigation on the health of local residents.
- 2 Clones are genetically identical. This would limit variation within the herd of cows and could impact their survival. For example, if a particular disease was introduced and the clones were susceptible, then there would be no genetic variation to resist the disease.
- 3 The cellular processes of mitosis (cell division) and meiosis (gamete formation) both require DNA to replicate in order to produce resulting daughter cells.
- 3 The digestive system will break down hamburger into small, usable organic molecules or organic building blocks. The circulatory system will then transport those organic molecules to muscle cells.
- 2 The life process shown for Cell A involves obtaining nutrients. All living things need to carry out nutrition to provide the necessary materials for metabolism and cellular processes. Nutrition is one of the life processes that helps maintain homeostasis or internal balance within organisms.
- 2 The arrangement of amino acids within a protein and the folding of that protein give it a specific structure or shape. This structure will then determine the function that the protein will perform within an organism.
- 4 The use of energy is required when molecules move from a lower concentration to a higher concentration. In the diagram, there are four round molecules (#4 in the key) outside of the cell and seven round molecules inside the cell. To move these outside molecules into the cell from a low concentration (of four) to a high concentration (of seven) would require energy (ATP).
- 1 Changes or variation in the structure or function of an organism are usually the result of a mutation within the DNA of an organism. This mutation may have been passed by sex cells from one generation to the next.

10. 1 The original skin cell DNA strand has 12 bases, while the DNA strand that received the UV light has 13 bases. There is an insertion of one molecular base (G) after the first three bases in UV strand.
11. 2 Organelles are cell parts or structures that perform particular functions such as movement, ingestion, and transport. These organelles are the functional parts that maintain homeostasis within the cell.
12. 2 The placenta serves as an exchange site for nutrients (nutrition) and gases such as O₂ and CO₂ (respiration), and the removal of metabolic wastes (excretion).
13. 2 A virus or pathogen initiates an immune response in the student's body. The immune system detects a foreign antigen (protein) and fights against the virus through various defense mechanisms, like the formation of antibodies.
14. 1 Natural selection occurs when a particular trait or behavior is favorable and leads to the survival of that organism. Successful courtship leads to reproduction where the favorable behavioral gene is then passed on to offspring, promoting survival of that population.
15. 4 Differentiation is a process where cells become specialized to perform specific functions within that organism. Certain genes are activated within cells to promote that particular function.
16. 3 Variation is a result of sexual reproduction where genetic material is sorted and recombined into new genetic arrangements. This genetic variation may provide a resistance to a particular insecticide, allowing leaf eating insects to survive.
17. 4 Due to genetic variation, certain pathogens have acquired a gene that provides resistance to antibiotics. These bacteria survive and reproduce, passing the resistant gene on to offspring. Overtime the bacterial population becomes more and more resistant.
18. 4 Within an ecosystem, organisms are connected or linked based on the interactions in a food web. If one population is negatively affected, it can impact other populations within that ecosystem due to these interactions.
19. 3 Asexual reproduction results in the production of offspring that are genetically identical to the parent organism. All of the genetic material comes from one single organism.

20. 3 A vaccine contains weakened or dead pathogens such as viruses or bacteria. When introduced into an organism, the content of the vaccine initiates an immune response and ultimately, immunity to that particular pathogen.
21. 4 All the organisms represented in the diagram require energy to carry out life functions such as nutrition, transport, and excretion. Energy would be produced through the process of cellular respiration in the form of ATP.
22. 1 A decrease in biodiversity or loss of species richness may occur due to a natural disaster that destroys a habitat. With less species available as food sources, other species may be impacted, making that ecosystem not as balanced or less stable.
23. 1 Human's ability to regulate temperature by adapting to environmental changes is similar to the ability of plants to adjust to changes in water content of their habitat. Guard cells open and close stomata, regulating water loss from plants.
24. 4 Nonrenewable resources are finite resources that are not able to be replaced. As they are used, these resources become depleted or used up. Fossil fuels such as coal and oil are examples of nonrenewable resources.
25. 1 A parasite is an organism that lives off another organism, the host, using its nutrients to sustain itself. The dodder plant has no chlorophyll and cannot carry out autotrophic nutrition; therefore, it takes nutrients (parasite) from living plants (hosts) on which it lives.
26. 4 Estrogen and progesterone, which are produced by a female ovary, are responsible for regulating the uterus lining, essential for fetal development. Testosterone, produced within the male testes, is responsible for male sexual characteristics.
27. 2 A thinning ozone shield allows harmful ultraviolet radiation to enter the earth's atmosphere. This radiation is known to cause increased levels of cancer through mutations to skin cells.
28. 4 Abiotic factors are nonliving factors which play a role in sustaining living organisms within an ecosystem. The nonliving factors, including water, sunlight, minerals, and carbon dioxide, are all essential for plants to develop and grow.