FOR TEACHERS ONLY

The University of the State of New York
REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Tuesday, January 22, 2019 — 1:15 to 4:15 p.m., only

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

Refer to the directions on page 2 before rating student papers.

Updated information regarding the rating of this examination may be posted on the New York State Education Department's web site during the rating period. Check this web site at: http://www.p12.nysed.gov/assessment/ and select the link "Scoring Information" for any recently posted information regarding this examination. This site should be checked before the rating process for this examination begins and several times throughout the Regents Examination period.

Multiple Choice for Parts A, B–1, B–2, and D
Allow 1 credit for each correct response.

Part A

1 ..... **4**	9 ..... **2**	17 ..... **2**	25 ..... **1** .....
2 ..... **4**	10 ..... **2**	18 ..... **4**	26 ..... **3** .....
3 ..... **3**	11 ..... **1**	19 ..... **3**	27 ..... **2** .....
4 ..... **2**	12 ..... **1**	20 ..... **1**	28 ..... **4** .....
5 ..... **3**	13 ..... **1**	21 ..... **1**	29 ..... **4** .....
6 ..... **2**	14 ..... **4**	22 ..... **4**	30 ..... **3** .....
7 ..... **3**	15 ..... **4**	23 ..... **2**	
8 ..... **2**	16 ..... **4**	24 ..... **3**	

Part B–1

31 ..... **1**	35 ..... **3**	39 ..... **2**	43 ..... **3** .....
32 ..... **2**	36 ..... **3**	40 ..... **3**	
33 ..... **4**	37 ..... **4**	41 ..... **1**	
34 ..... **1**	38 ..... **3**	42 ..... **4**	

Part B–2

47 ..... **2**	49 ..... **3**	50 ..... **2** .....

Part D

73 ..... **1**	75 ..... **1**	81 ..... **2** .....
74 ..... **4**	76 ..... **2**	82 ..... **3** .....

Directions to the Teacher

Follow the procedures below for scoring student answer papers for the Regents Examination in Living Environment. Additional information about scoring is provided in the publication *Information Booklet for Scoring Regents Examinations in the Sciences.*

Do not attempt to correct the student's work by making insertions or changes of any kind. If the student's responses for the multiple-choice questions are being hand scored prior to being scanned, the scorer must be careful not to make any marks on the answer sheet except to record the scores in the designated score boxes. Marks elsewhere on the answer sheet will interfere with the accuracy of the scanning.

Allow 1 credit for each correct response.

At least two science teachers must participate in the scoring of the Part B–2, Part C, and Part D open-ended questions on a student's paper. Each of these teachers should be responsible for scoring a selected number of the open-ended questions on each answer paper. No one teacher is to score more than approximately one-half of the open-ended questions on a student's answer paper. Teachers may not score their own students' answer papers.

Students' responses must be scored strictly according to the Scoring Key and Rating Guide. For open-ended questions, credit may be allowed for responses other than those given in the rating guide if the response is a scientifically accurate answer to the question and demonstrates adequate knowledge as indicated by the examples in the rating guide. On the student's separate answer sheet, for each question, record the number of credits earned and the teacher's assigned rater/scorer letter.

Fractional credit is *not* allowed. Only whole-number credit may be given for a response. If the student gives more than one answer to a question, only the first answer should be rated. Units need not be given when the wording of the questions allows such omissions.

For hand scoring, raters should enter the scores earned in the appropriate boxes printed on the separate answer sheet. Next, the rater should add these scores and enter the total in the box labeled "Total Raw Score." Then the student's raw score should be converted to a scale score by using the conversion chart that will be posted on the Department's web site at: http://www.p12.nysed.gov/assessment/ on Tuesday, January 22, 2019. The student's scale score should be entered in the box labeled "Scale Score" on the student's answer sheet. The scale score is the student's final examination score.

Schools are not permitted to rescore any of the open-ended questions on this exam after each question has been rated once, regardless of the final exam score. Schools are required to ensure that the raw scores have been added correctly and that the resulting scale score has been determined accurately.

Because scale scores corresponding to raw scores in the conversion chart may change from one administration to another, it is crucial that, for each administration, the conversion chart provided for that administration be used to determine the student's final score.

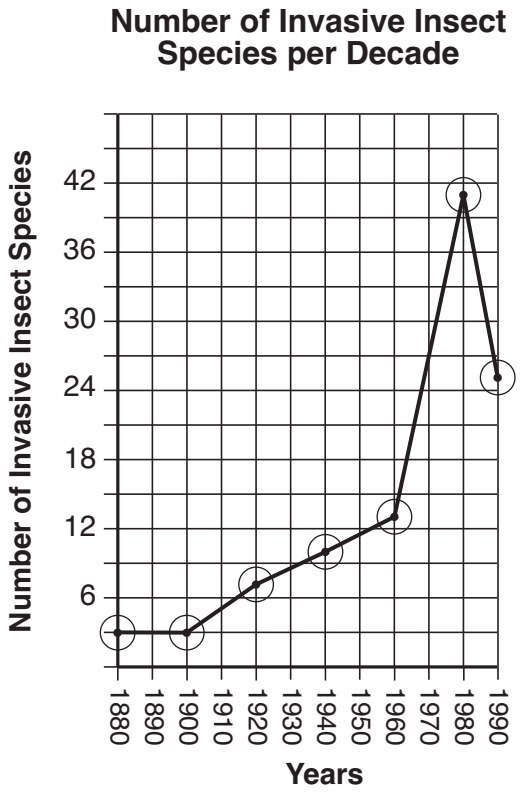
Part B–2

44 [1] Allow 1 credit for marking an appropriate scale on the grid provided, without any breaks in the data, on each labeled axis.

Note: Do *not* allow credit if the grid is altered to accommodate the scale.

45 [1] Allow 1 credit for correctly plotting the data and connecting the points and surrounding each point with a small circle.

Example of a 2-credit graph for questions 44-45:



Note: Allow credit if the points are plotted correctly, but not circled.

Do *not* assume that the intersection of the x-and y-axes is the origin (0,0) unless it is labeled. An appropriate scale only needs to include the data range in the data table.

Do *not* allow credit if points are plotted that are not in the data table, e.g., (0,0), or for extending lines beyond the data points.

46 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— They have damaged crops all over the world.

— They reduce the amount of food produced.

— They might bring a new plant disease to an area.

— There are no predators present to control the invasive population.

— They ruin crops; they make them unattractive and not able to sell.

47 MC on scoring key

48 [1] Allow 1 credit for correctly filling in the missing results.

Base	Percent Found (%)
A (Adenine)	20
T (Thymine)	**20**
G (Guanine)	**30**
C (Cytosine)	**30**

49 MC on scoring key

50 MC on scoring key

51 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— genetic engineering

— gene splicing

— genetic manipulation

Note: Do *not* accept biotechnology; it is a field of science, *not* a technique.

52 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— It reduces the need for the chemical control of insects.

— The farmer would not need to use pesticides.

— The farmer would save money.

— Insects that don't eat tomatoes won't be killed.

— It would prevent insects from destroying the plants.

53 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— an enzyme

— a restriction enzyme

— a biological catalyst

54 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— mitotic cell division/mitosis

— asexual reproduction

— cloning

55 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— This will prevent the egg from reaching the uterus.

— The egg will not be fertilized since sperm will be blocked.

— This will prevent sperm from reaching the egg.

— The other oviduct is not blocked, so fertilization could still occur.

— The blockage will reduce the chance of a pregnancy.

Part C

56 [1] Allow 1 credit for identifying which group of organisms in this food web would contain the greatest amount of stored energy and supporting the answer. Acceptable responses include, but are not limited to:

— The greatest amount of stored energy in this food web would be in the plants because they obtain energy directly from the Sun.

— Plants would, since they are the producers/autotrophs.

— Plants, seeds, needles, and leaf litter would have the most energy because they are at the base of the energy pyramid/beginning of food chains.

57 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Both the plants and animals would be negatively affected, since the rate of photosynthesis would slow down with less light from the Sun available, and less food would be available for animals to eat.

— The plant and animal populations would both decrease with less energy available for them because of less light for the plants.

— These organisms would have less food because of less photosynthesis occurring, so there would be fewer of them.

— It would affect both plants and animals negatively, because the plants would receive less light to make food.

58 [1] Allow 1 credit for describing how the niche of the mouse population differs from the niche of the shrew population in this ecosystem and supporting the answer with information from the food web. Acceptable responses include, but are not limited to:

— Shrews are predators of spiders, while mice eat plants.

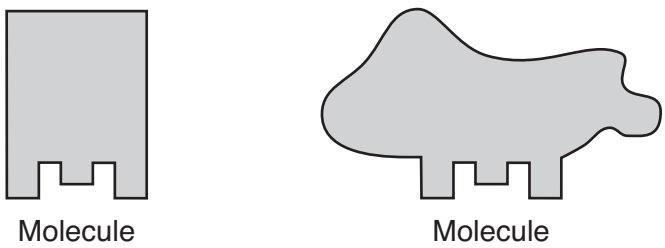
— Mice are herbivores/primary consumers and shrews are carnivores/tertiary consumers.

— Mice are food for both weasels and foxes, while shrews are only eaten by weasels.

— Mice compete with spruce grouses for food, while shrews compete with weasels for spiders.

59 [1] Allow 1 credit for drawing a diagram that fits the enzyme.

Examples of 1-credit responses:



60 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Enzymes catalyze chemical reactions.

— Enzymes affect the rate of chemical reactions.

— They help synthesize proteins.

— Enzymes speed up digestion.

61 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The activity of enzymes will slow down/stop.

— Enzymes will not catalyze reactions as quickly.

— The rate would decrease.

— The enzyme will not function.

— The enzyme will change shape/denature, and stop activity.

62 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— A longer study provides more data that will result in the findings being more reliable/accurate.

— It is more likely that other scientists repeating her work will obtain similar results.

— There would be more data.

63 [1] Allow 1 credit for describing the trend in the amphibian populations from over the course of the study and supporting the answer with information from the graph. Acceptable responses include, but are not limited to:

— The population size of three of the four species decreased.

— Only the western toad population has remained the same. The populations of frogs and salamanders have decreased.

— Generally, the numbers of populations decreased from 1992-1993 to 2006-2008.

64 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Global warming has likely caused eight of the original 46 ponds to dry up. This has reduced the size of the habitat available for frogs and salamanders.

— Global warming has resulted in less rain and snow in Yellowstone. This has resulted in the loss of many ponds once inhabited by frogs and amphibians. With a decrease in habitat, there has been a decrease in population size.

— It could have warmed some of the ponds so much that the amphibians there died/did not reproduce.

— Global warming has decreased the food available for the amphibians.

Note: Do *not* accept "that the frogs and salamanders were not adapted" without an explanation.

Note: The student's response to the bulleted items in question 65–67 need *not* appear in the following order.

65 [1] Allow 1 credit for stating *one* example of a genetic variation that is important for the survival of *one* specific cat species. Acceptable responses include, but are not limited to:

— Siberian tigers have genes that increase their ability to smell prey.

— Snow leopards have mutations related to the use of oxygen at high altitudes.

— A lion that is more muscular has a better chance of catching prey.

66 [1] Allow 1 credit for identifying a specific technique that can be used to analyze the genomes of organisms and for explaining how this technique is used. Acceptable responses include, but are not limited to:

— Electrophoresis can be used to study the DNA patterns of organisms. The resulting bands can be used to compare the genetic makeup of the organisms.

— Genes can be cut from the DNA of organisms using special enzymes and can then be analyzed/compared with each other.

— Bioinformatics can be used to compare a data set with a reference genome.

Note: Do *not* allow credit for biotechnology. It is a field of science, *not* a technique.

67 [1] Allow 1 credit for explaining how genes for a trait, such as a specific fur color, can increase in a population. Acceptable responses include, but are not limited to:

— Certain traits help the big cats survive in the environment; as a result, they are able to reproduce and pass on the genes for the trait to their offspring.

— When more cats with a certain fur color trait survive and reproduce, the number of big cats with genes for the trait increases.

— The cats with a specific fur color gene are more successful at catching prey than those without it. They then pass this on to their offspring.

— The fur color makes them more successful in mate selection. They reproduce and pass on the fur color.

— Natural selection can lead to beneficial traits increasing in frequency.

68 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The immune system may produce antibodies to fight the tetanus bacteria.

— The immune system may produce more white blood cells to fight the tetanus bacteria.

69 [1] Allow 1 credit for indicating whether or not individuals who have taken the vaccine would be protected against future tetanus infections. Acceptable responses include, but are not limited to:

— Yes, the immune system may produce specialized white blood cells that remain in the body to fight off future infections.

— Yes, the immune system may make memory cells that can later fight the infection.

— No, the antibodies may not stay in the body long enough.

70 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— eliminates the need for needles

— eliminates the need for sterilizing equipment

— They remain viable for many years.

— The modified spores cost less.

— more available for poor countries

— The spores don't need refrigeration.

71 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Mammary glands provide nourishment/antibodies for the offspring.

— They allow the female to easily feed her young.

— Mammary glands provide milk, which helps the offspring survive.

72 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— A placenta allows for the exchange of nutrients/wastes/oxygen between the mother and developing embryo.

— Food/oxygen move from the mother to the fetus.

— It supports internal development of the embryo.

Part D

73 MC on scoring key

74 MC on scoring key

75 MC on scoring key

76 MC on scoring key

77 [1] Allow 1 credit for predicting how the average beak thickness would be expected to change and supporting the answer with information from the graph. Acceptable responses include, but are not limited to:

— The average thickness of the beaks would be around or greater than 9.8 mm, as it was in the two dry years shown in the graph.

— The average thickness would increase since the beaks were thicker in the dry years shown in the graph.

— During dry years (1980 and 1982), the beaks were thicker. After a series of dry years, beaks would be thicker.

78 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— The bird species would be able to obtain more food.

— The variations would help the species survive certain environmental changes.

— Since the rainfall varies from year to year, the bird population would die out if all the birds ended up with either thin or thick beaks; they might not be able to eat the available seeds.

— The range allows the bird species to eat seeds of different sizes.

79 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— food availability

— predators

— competition with other individuals

— availability of mates

— pathogens/diseases

80 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Wastes built up in muscles/muscle cells.

— Not enough oxygen was available to muscle cells.

— Anaerobic respiration occurred.

81 MC on scoring key

82 MC on scoring key

83 [1] Allow 1 credit for *C* and explaining why the diagram indicates a close relationship. Acceptable responses include, but are not limited to:

— Diagram *C* shows species *X* and *Y* on the same branch.

— Species *X* and *Y* have a more recent ancestor.

84 [1] Allow 1 credit for whether the crown-giant and trunk-ground anoles would compete for resources if they lived on the same tree and supporting the answer with an explanation. Acceptable responses include, but are not limited to:

— No. The two species occupy different niches/have different diets.

— No. The two species prefer different habitats.

— No. They live in different parts of the tree.

— Yes. They could compete when resources are scarce.

— Yes. They would compete because they eat the same food/use the same tree for shelter.

85 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

— Since muscle cell activity is reduced, oxygen demand decreases.

— The cells are producing less carbon dioxide/waste products during rest periods.

— Homeostasis is being restored.

— The body is returning to normal after the activity stops.

The *Chart for Determining the Final Examination Score for the January 2019 Regents Examination in Living Environment* will be posted on the Department's web site at: http://www.p12.nysed.gov/assessment/ on Tuesday, January 22, 2019. Conversion charts provided for previous administrations of the Regents Examination in Living Environment must NOT be used to determine students' final scores for this administration.

Online Submission of Teacher Evaluations of the Test to the Department

Suggestions and feedback from teachers provide an important contribution to the test development process. The Department provides an online evaluation form for State assessments. It contains spaces for teachers to respond to several specific questions and to make suggestions. Instructions for completing the evaluation form are as follows:

1. Go to http://www.forms2.nysed.gov/emsc/osa/exameval/reexameval.cfm.
2. Select the test title.
3. Complete the required demographic fields.
4. Complete each evaluation question and provide comments in the space provided.
5. Click the SUBMIT button at the bottom of the page to submit the completed form.

Map to Core Curriculum

January 2019 Living Environment

Standards	Question Numbers			
	Part A 1–30	Part B–1 31–43	Part B–2 44–55	Part C 56–72
Standard 1 — Analysis, Inquiry and Design				
Key Idea 1			46	
Key Idea 2				
Key Idea 3		34, 35	44, 45	62, 63
Appendix A (Laboratory Checklist)			50	66
Standard 4				
Key Idea 1	1, 6, 7, 8, 15, 22, 26, 28, 30	32		57
Key Idea 2	3	39, 42, 43	48, 51, 52, 53, 54	
Key Idea 3	11, 13, 14, 17, 24			65, 67
Key Idea 4	2, 18	36	55	71, 72
Key Idea 5	20, 21	38, 41	49	59, 60, 61, 68, 69, 70
Key Idea 6	5, 9, 10, 12, 16, 27	37		56, 58
Key Idea 7	4, 19, 23, 25, 29	31, 33, 40	47	64

Part D 73–85	
Lab 1	73, 81, 82, 83
Lab 2	80, 85
Lab 3	77, 78, 79, 84
Lab 5	74, 75, 76