

FOR TEACHERS ONLY

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The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Thursday, August 16, 2001—12:30 to 3:30 p.m., only

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

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

Part A (35 credits)

Allow a total of 35 credits for Part A, one credit for each correct answer.

(1) 3	(13) 1	(25) 1
(2) 3	(14) 2	(26) 1
(3) 1	(15) 4	(27) 3
(4) 2	(16) 1	(28) 2
(5) 4	(17) 3	(29) 3
(6) 2	(18) 1	(30) 4
(7) 3	(19) 4	(31) 2
(8) 3	(20) 2	(32) 4
(9) 1	(21) 4	(33) 1
(10) 4	(22) 3	(34) 2
(11) 2	(23) 2	(35) 1
(12) 2	(24) 4	

LIVING ENVIRONMENT—*continued*

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 Administering and Scoring Regents Examinations in Living Environment and Physical Setting/Earth Science*.

Use only *red* ink or *red* pencil in rating Regents papers. Do not attempt to *correct* the student's work by making insertions or changes of any kind.

Allow 1 credit for each correct response for multiple-choice questions in Part A and Part B.

On the detachable answer sheet for Part A, indicate by means of a checkmark each incorrect or omitted answer to multiple-choice questions. In the box provided in the upper right corner of the answer sheet, record the number of questions the student answered correctly for that part.

At least two science teachers must participate in the scoring of the Part B and Part C 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 all the open-ended questions on a student's answer paper.

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. In the student's examination booklet, record the number of credits earned for each answer in the box printed to the right of the answer lines or spaces for that question.

Fractional credit is *not* allowed. Only whole-number credit may be given to 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.

Raters should enter the scores earned for Part A, Part B, and Part C on the appropriate lines in the box printed on the answer sheet and should add these three scores and enter the total in the box labeled "Total Raw Score." Then the student's raw score should be converted to a scaled score by using the conversion chart printed at the end of this Scoring Key and Rating Guide. The student's scaled score should be entered in the labeled box on the student's answer booklet. The scaled score is the student's final examination score.

LIVING ENVIRONMENT—*continued*

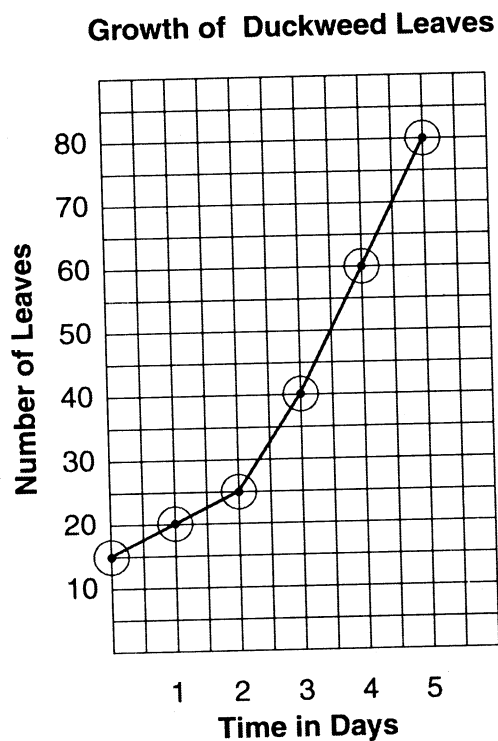
Part B

- (36) Allow 1 credit for identifying, by name, an organelle shown in the diagram. Appropriate responses include, but are not limited to:
- A* = vacuole (or food vacuole)
 - B* = vacuole (or contractile vacuole)
 - C* = nucleus
 - D* = cell membrane
- (37) Allow 1 credit for explaining how the organelle selected in question 36 assists in the maintenance of homeostasis. [Note: students may receive credit for the correct function of the organelle chosen, even if the name of the organelle was incorrect in question 36.] Appropriate responses include, but are not limited to:
- A* = Food is digested (or stored) in the vacuole.
 - B* = Liquid wastes are stored in the vacuole.
 - C* = The nucleus controls the activities of the cell.
 - D* = The cell membrane controls the movement of molecules into and out of the cell.
- (38) Allow 1 credit for identifying a system in the human body (not an organ) that performs a function similar to that of the organelle selected in question 36. Appropriate responses include, but are not limited to:
- A* = digestive system
 - B* = excretory system
 - C* = nervous system
 - D* = excretory system, lining of digestive system (or respiratory system)
- (39) Allow 1 credit for marking appropriate scales on the two axes. (Both scales must be correct for full credit.)

LIVING ENVIRONMENT—continued

- (40) Allow 1 credit for plotting the data accurately (according to its dependent/independent variables) and connecting the points.

Example of an appropriate graph:



- (41) 2

- (42) Allow 1 credit for stating *one* effect of increasing the intensity and duration of exposure to light on the production of oxygen by duckweed plants. Appropriate responses include, but are not limited to:

—The production of oxygen would increase

- (43) 3

- (44) 1

- (45) Allow 1 credit for stating an ecological drawback to the use of the “dig and dump” method. Appropriate responses include, but are not limited to:

—The dig and dump method adds wastes to landfills that are overloaded.

—It’s messy.

—It only moves the contaminated soil from one place to another.

LIVING ENVIRONMENT—*continued*

- (46) Allow 1 credit for a correct explanation of why the cleanup took only three months. Appropriate responses include, but are not limited to:
- The air, water, and fertilizer were piped into the biocell and speeded up the natural process.
 - An increase in the number of bacteria decreased the time necessary for the breakdown of the contaminants.
 - The bacteria were stimulated to reproduce more rapidly.
- (47) 4
- (48) Allow a total of 2 credits, 1 credit for each of *two* different errors in the investigation. Appropriate responses include, but are not limited to:
- Each species of fish should be treated with the same concentrations of adrenaline solution.
 - There should be a control for each treatment.
 - The same number of fish should be used for each treatment.
- (49) Allow a total of 2 credits, 1 credit for each of *two* differences between mitosis and meiosis, other than the fact that meiosis occurs in the development of sex cells and mitosis occurs in most other cells. Appropriate responses include, but are not limited to:
- Cells resulting from mitosis have the same number of chromosomes as the parent cell, and those resulting from meiosis have one half of the number of chromosomes of the parent cell.
 - Cells resulting from mitosis have both chromosomes of each pair characteristic of the species, and those resulting from meiosis have only one chromosome of each pair characteristic of the species.
 - The process of mitosis involves one nuclear division, and the process of meiosis involves two nuclear divisions.
- (50) Allow 1 credit for a correct conclusion that can be drawn from the chart concerning the relationship between the age of the mother and the chance of having a child with Down syndrome. Appropriate responses include, but are not limited to:
- The older the mother, the greater the chance of her having a child with Down syndrome.
- (51) Allow 1 credit for identifying *one* action taken by a mother that could have a negative effect on the embryonic development of her baby. Appropriate responses include, but are not limited to:
- failing to maintain proper nutrition
 - using alcohol/drugs
 - exposing her body to extremes in temperature due to overuse of sauna, hot tub

LIVING ENVIRONMENT—*continued*

- (52) Allow 1 credit for a correct explanation of how staying out of the sun helps organisms such as snakes and lizards maintain homeostasis. Appropriate responses include, but are not limited to:

- This behavior helps maintain a relatively cooler body temperature.
- Staying in the shade keeps the body temperature low enough so that dehydration will not occur, or so that enzyme action (body chemistry) is not affected.

- (53) Allow 1 credit for stating *one* negative effect the holes in the ozone shield could have on humans. Appropriate responses include, but are not limited to:

- more UV rays reach the Earth
- increased incidence of sunburn
- increased incidence of skin cancers and/or cataracts

Note: Reference to global warming or greenhouse effect is *not* acceptable.

- (54) 1

- (55) Allow 1 credit for a correct explanation of why species *B* and *C* are more closely related than species *A* and *C* are. Appropriate responses include, but are not limited to:

- Species *B* and *C* have a common ancestor (*F*) that is more recent than the common ancestor (*H*) of species *A* and *C*.

- (56) 4

- (57) 3

- (58) Allow 1 credit for a correct explanation of how the change in amino acid sequence could result in poor oxygen distribution in the body. Appropriate responses include, but are not limited to:

- The change in amino acid sequence would reduce the ability of the hemoglobin molecule to combine with oxygen.
- The change in amino acid sequence would change the shape of the hemoglobin molecule, reducing its ability to carry oxygen.

- (59) Allow 1 credit for stating *one* reason the corporations are interested in obtaining the samples. Appropriate responses include, but are not limited to:

- Pharmaceutical corporations want to obtain these samples to see if any of them could be the source of an antibiotic.
- Agricultural corporations want to obtain samples to see if they could be used to develop crop plants with desirable features such as disease resistance, higher yield, etc.

LIVING ENVIRONMENT—*continued*

- (60) Allow 1 credit for stating a reason for the decline in the size of the population of one species after one week. Appropriate responses include, but are not limited to:
- Metabolic wastes were more toxic to one species than to the other.
 - The oxygen level (or other limiting factor) was changed.
 - One species was better adapted to survive in the conditions of the culture.
 - competition
 - predation
- (61) Allow 1 credit for stating what could happen to a species in a changing environment if the members of that species did not express any genetic variations. Appropriate responses include, but are not limited to:
- The species could become extinct.
 - The species does not evolve.
 - The species remains the same.
- (62) Allow 1 credit for describing a way in which an increase in the deer population could be harmful to humans. Appropriate responses include, but are not limited to:
- An increase in the deer population could result in an increase in the number of ticks and/or cases of Lyme disease.
 - An increase in deer population could result in more deer feeding on plants of value to humans.
 - increase in auto-deer accidents
 - increase in number of deer predators
- (63) Allow 1 credit for stating and explaining *one* environmental impact of reduced funding for public transportation on future generations. Appropriate responses include, but are not limited to:
- Reducing funds for public transportation would result in more air pollution since more cars would be used for commuting.

LIVING ENVIRONMENT—*continued*

Part C

- (64) Allow 1 credit for stating a valid conclusion about the activity of enzyme *X*. Appropriate responses include, but are not limited to:
- Enzyme *X* breaks down sugar *C* to monosaccharides.
 - Enzyme *X* does not break down sugar *A*. (or *B*)
- (65) Allow a total of 3 credits. Allow 2 credits for a detailed procedure of an investigation that would show how a change in pH would affect the activity of enzyme *X*. Appropriate responses include, but are not limited to:
1. Place 5 milliliters of sugar *C* solution into each of three test tubes labeled *A*, *B*, and *C*.
 2. Add 1 milliliter of enzyme *X* to each tube.
 3. Add 1 milliliter of vinegar to test tube *A*; add 1 milliliter of water to test tube *B*; add 1 milliliter of baking soda to test tube *C*.
 4. Using an appropriate indicator, determine the pH of each tube and record the results in the data table.
 5. Place each tube in an incubator at 37°C for 24 hours.
 6. After 24 hours, test each tube for the presence of monosaccharides with an appropriate indicator. Record results in the data table.

Allow 1 credit for an appropriate data table to record the experimental results.

Example of an appropriate data table:

Data Table

Test Tube	pH	Presence of Monosaccharides
<i>A</i>		
<i>B</i>		
<i>C</i>		

- (66) Allow 1 credit for stating *one* safety precaution that should be used during the investigation. Appropriate responses include, but are not limited to:
- Safety goggles should be worn during the investigation.

LIVING ENVIRONMENT—*continued*

- (67) Allow a total of 4 credits for identifying a technique presently being used to alter the genetic make up of an organism and explaining how humans have benefited from this change.

The response *must* include:

- The name of the technique used to alter the genetic makeup (e.g., genetic engineering, genetic manipulation, selective breeding, gene therapy) [Note: Cloning is not acceptable because it represents duplication rather than alteration.] [1 credit]
- a brief description of what is involved in this technique (e.g., a segment of DNA is moved from one organism to another organism) [1 credit]
- one specific example of how this technique has been used (e.g., the gene for insulin production has been inserted into certain bacteria) [1 credit]
- a statement of how humans have benefited from the production of this new variety of organism (e.g., more insulin is readily available from these bacteria than from extractions from pancreases of animals) [1 credit]

- (68) *a* Allow a total of 3 credits for describing how humans have made the environment less stable.

The description *must* include information concerning:

- changing the chemical composition of air, soil, and water (e.g., releasing more waste products of combustion to pollute the atmosphere) [1 credit]
- reducing the biodiversity of an area (e.g., large areas of the rain forest in Brazil have been cut down) [1 credit]
- one way in which introducing technologies has made the environment less stable (e.g., returning cooling water from nuclear power plants to bodies of water has raised the temperature of the bodies of water, making them less fit for certain species) [1 credit]

- b* Allow a total of 2 credits, 1 credit for each of two ways humans have reduced the amount of chemicals being added to the environment. Appropriate responses include, but are not limited to:

- Pollution controls on cars have reduced the amount of pollutants in the air.
- The use of biological controls has reduced the amount of pesticides being put in the environment.
- Methods of organic farming have reduced the amount of fertilizer and thus reduced chemicals added to the environment.

LIVING ENVIRONMENT—concluded

- (69) Allow a total of 4 credits for explaining what happened to the species of rabbits as a result of the use of the *Myxoma sp.* virus.

The explanation *must* include each of the following terms in the paragraph:

- gene [1 credit]
- adaptive value *or* adaptation *or* adapted [1 credit]
- variation [1 credit]
- survival of the fittest [1 credit]

Example of a 4-credit response:

Some rabbits had genes that resulted in the production of a variation that made them resistant to the virus. These rabbits were better adapted to survive in the presence of the virus. These rabbits are better fit to survive and will pass on the favorable variation so each succeeding generation will contain more resistant members.

[Note: Do *not* deduct credit if the student does not circle the terms.]

- (70) Allow 1 credit for an explanation of why experimental drugs must be tested on human volunteers as well as on test animals. Appropriate responses include, but are not limited to:

- Animal testing alone does not insure that there would be no risk to humans.
- The effects of drugs on humans may be different from their effects on other animals.

- (71) Allow 1 credit for stating *one* reason scientists often use mice for testing experimental drugs that may be used by humans. Appropriate responses include, but are not limited to:

- Drugs are first tested on animals to determine if there is a possible benefit to using the drugs on humans.
- Drugs are first tested on animals to help determine if there are dangers to using the drugs on humans.
- Mice are mammals and have body systems and functions similar to those of humans.

Regents Examination in Living Environment

August 2001

**Chart for Converting Total Test Raw Scores to
Final Examination Scores (Scaled Scores)**

Raw Score	Scaled Score	Raw Score	Scaled Score	Raw Score	Scaled Score
85	100	56	75	27	49
84	99	55	74	26	48
83	98	54	73	25	47
82	96	53	72	24	46
81	95	52	72	23	44
80	94	51	71	22	43
79	93	50	70	21	41
78	92	49	70	20	40
77	91	48	69	19	38
76	90	47	68	18	37
75	89	46	67	17	35
74	88	45	67	16	34
73	88	44	66	15	32
72	87	43	65	14	30
71	86	42	64	13	28
70	85	41	63	12	27
69	84	40	63	11	25
68	83	39	62	10	23
67	83	38	61	9	21
66	82	37	60	8	19
65	81	36	59	7	17
64	80	35	58	6	14
63	80	34	57	5	12
62	79	33	56	4	10
61	78	32	55	3	7
60	77	31	54	2	5
59	77	30	53	1	3
58	76	29	52	0	0
57	75	28	51		

To determine the student's final examination score, find the student's total test raw score in the column labeled "Raw Score" and then locate the scaled score that corresponds to that raw score. The scaled score is the student's final examination score. Enter this score in the space labeled "Final Score" on the student's answer sheet.

All student answer papers that receive a scaled score of 60 through 64 **must** be scored a second time. For the second scoring, a different committee of teachers may score the student's paper or the original committee may score the paper, except that no teacher may score the same open-ended questions that he/she scored in the first rating of the paper. The school principal is responsible for assuring that the student's final examination score is based on fair, accurate, and reliable scoring of the student's answer paper.

Because scaled scores corresponding to raw scores in the conversion chart may change from one examination to another, it is crucial that for each administration, the conversion chart provided in the scoring key for that administration be used to determine the student's final score. The chart is usable only for this administration of the living environment examination.

Map to Core Curriculum

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