

FOR TEACHERS ONLY

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

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LIVING ENVIRONMENT

Thursday, June 19, 2003 — 1:15 p.m. to 4:15 p.m., only

SCORING KEY AND RATING GUIDE

Directions to the Teacher:

Refer to the directions on page 3 before rating student papers.

Part A (35 credits)

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

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

LIVING ENVIRONMENT – *continued*

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 the Sciences*.

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 3 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.

Part B

- (36) 2
- (37) 3
- (38) 2
- (39) 4
- (40) 3
- (41) 1
- (42) 3
- (43) 4
- (44) 2
- (45) 3
- (46) Allow 1 credit for explaining how the two cells can function differently in the same organism, even though they both contain the same genetic instructions. Acceptable responses include, but are not limited to:
- Different types of cells express different genes.
 - They contain different proteins.
- (47) 1
- (48) 1
- (49) 4
- (50) 1
- (51) Allow a maximum of 2 credits, 1 for each of two ways that the decline in amphibian populations could disrupt the stability of the ecosystems they inhabit. Appropriate responses include, but are not limited to:
- Prey populations increase.
 - It reduces the biodiversity in these areas.
 - Food chains are disrupted.
 - Predators are denied food.
- (52) Allow 1 credit for indicating that the chromosome number in offspring 1 and 2 is **8**.
- (53) Allow 1 credit for indicating that the cell labeled X is a white blood cell.

- (54) Allow 1 credit for stating one way a cell such as cell *X* helps to maintain homeostasis. Acceptable responses include, but are not limited to:

- destroys foreign antigens
- produces antibodies
- engulfs bacteria

Note: Allow credit for an answer that is consistent with the student's answer to question 53.

- (55) Allow a maximum of 2 credits, 1 for each of two ways that active transport is different from diffusion. Acceptable responses include, but are not limited to:

- Active transport requires the use of energy by the organism.

or

Diffusion does not require the use of energy by the organism.

- In active transport, molecules move from a region of lower concentration to a region of higher concentration of those molecules.

or

In diffusion, molecules move from a region of higher concentration to a region of lower concentration of those molecules.

- (56) Allow 1 credit for **receptor molecules, receptor proteins, cell receptors, or receptors.**

- (57) Allow a maximum of 2 credits, 1 credit for correctly identifying the structure labeled *X* in the diagram chosen and 1 credit for stating a problem for the organism that would result from a malfunction of the structure identified in part *b*. Appropriate responses include, but are not limited to:

Diagram *A*: Structure *X* is a guard cell. If the guard cells do not function properly, the plant can lose too much water *or* gas exchange could be affected.

Diagram *B*: Structure *X* represents the pancreas. If the pancreas does not produce enough insulin, a person will develop diabetes.

Note: Do *not* allow credit for indicating the diagram chosen.

Allow credit for an answer to part *c* that is consistent with the student's answer to part *b*.

- (58) Allow 1 credit for completing both columns of the data table correctly.

Example of an Appropriate Data Table

Data Table

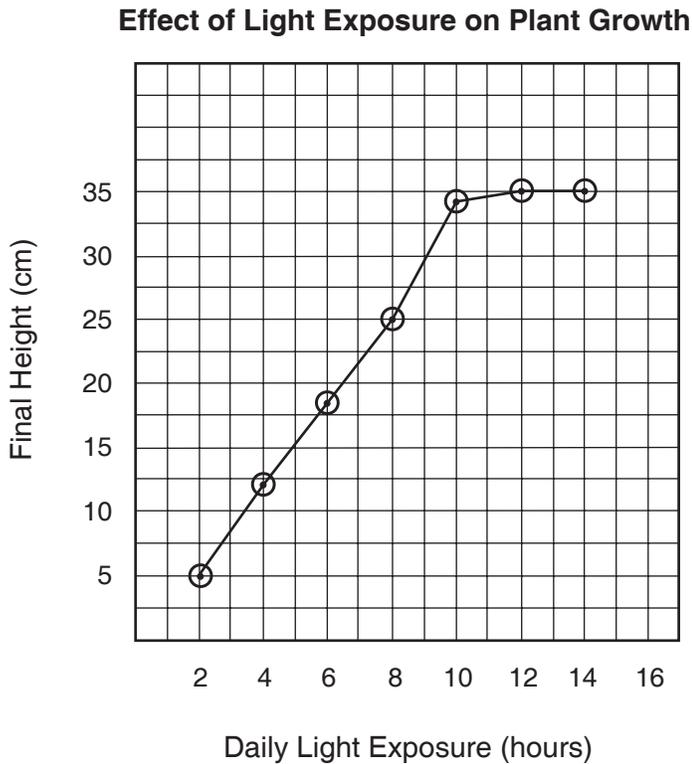
Daily Light Exposure (hours)	Final Height (cm)
2	5
4	12
6	18
8	25
10	34
12	35
14	35

- (59) Allow 1 credit for stating one possible reason that the plant exposed to 2 hours of light per day was the shortest. Acceptable responses include, but are not limited to:
- The plant exposed to 2 hours of light per day produced the smallest amount of food.
 - Plants require 12–14 hours of light per day to reach optimum growth.
 - The plant exposed to 2 hours of light per day carried on photosynthesis for the shortest time.

- (60) Allow 1 credit for marking an appropriate scale on each axis.
- (61) Allow 1 credit for plotting the data correctly and connecting the points.

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

Example of a 2-Credit Graph

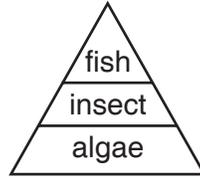


- (62) Allow 1 credit for indicating what the final height of a plant of the same species exposed to 16 hours of light per day would probably be (either as an exact height, or taller, shorter, or the same) and supporting the prediction. Acceptable responses include, but are not limited to:

- 35 centimeters, because the plant reached optimal growth
- shorter, because of dehydration, stress on the plant
- taller, because more light, more growth

Part C

- (63) Allow 1 credit for drawing an energy pyramid that illustrates the information underlined in the second paragraph. Appropriate responses include, but are not limited to:



Note: Do *not* allow credit for stating only producer, consumer, etc.

- (64) Allow a maximum of 3 credits for explaining the phrase “only certain organisms can change solar energy into chemical energy,” allocated as follows:
- Allow 1 credit for indicating that autotrophic nutrition is carried out by these organisms.
 - Allow 1 credit for indicating that photosynthesis is the process being carried out.
 - Allow 1 credit for identifying chloroplasts as the organelles that are directly involved in changing solar energy into chemical energy.
- (65) Allow 1 credit for explaining why an ecosystem with a variety of predator species might be more stable over a long period of time than an ecosystem with only one predator species. Appropriate responses include, but are not limited to:
- Different populations of prey in an ecosystem are controlled by different kinds of predators.
 - More biodiversity in an ecosystem provides more stability.
- (66) Allow a maximum of 2 credits, allocated as follows:
- Allow 1 credit for stating one effect of temperature change on the oxygen content of fresh water. Appropriate responses include, but are not limited to:
 - As the temperature increases, the oxygen content decreases.
 - As the temperature decreases, the oxygen content increases.
 - Allow 1 credit for correctly supporting the answer using specific information from the data table. Appropriate responses include, but are not limited to:
 - As the temperature increases from 15°C to 20°C the oxygen decreases by 0.99 ppm.
 - At 10°C fresh water holds 11.29 ppm and at 15°C only 10.10 ppm.

- (67) Allow a maximum of 3 credits for explaining how a new power plant built on the banks of the Rocky River could have an environmental impact on the Rocky River ecosystem downstream from the plant, allocated as follows:
- Allow 1 credit for stating that the power plant will increase the temperature of the river water.
 - Allow 1 credit for stating that the dissolved oxygen content of the river water will decrease.
 - Allow 1 credit for stating the effect on fish species. Appropriate responses include, but are not limited to:
 - The population of trout (and/or bass) may decrease.
 - The carp population may increase.
 - If the oxygen level decreases below 2 ppm, no fish survive.
 - Some species may increase in number while others may decrease.
- (68) Allow a maximum of 3 credits for explaining how a prolonged, excessively high body temperature during an illness could be fatal to humans, allocated as follows:
- Allow 1 credit for stating the role of enzymes in a human. Appropriate responses include, but are not limited to:
 - Enzymes catalyze chemical reactions.
 - affect the rate of reaction
 - help synthesize proteins
 - speed up digestion
 - Allow 1 credit for stating the effect of this high body temperature on enzyme activity. Appropriate responses include, but are not limited to:
 - the activity of enzymes will slow down
 - enzymes will not catalyze reactions as quickly
 - Allow 1 credit for stating the reason that this high body temperature can result in death. Appropriate responses include, but are not limited to:
 - Enzymes don't work.
 - Chemical reactions necessary for life don't take place fast enough to maintain life.
 - The distorted shape of the enzyme no longer matches the substrate.
- (69) Allow a maximum of 2 credits, 1 for each of *two* reasons that a gardener might choose to grow this new variety of plant. Appropriate responses include, but are not limited to:
- New Leaf Superior produces its own insecticide.
 - This variety of plant is not eaten by some insects.
 - Other insecticides may cause environmental harm.
 - This variety requires less work to grow.

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- (70) Allow 1 credit for stating one possible disadvantage of the synthesis of an insecticide by potatoes. Appropriate responses include, but are not limited to:
- The insecticide in the potato may be harmful to humans.
 - Insecticides sprayed on can be washed off; those produced in cells cannot.
 - Insects may develop a resistance to the insecticide produced by potatoes.
- (71) Allow 1 credit for explaining why every cell in the New Leaf Superior potato plant is able to produce its own insecticide. Appropriate responses include, but are not limited to:
- All cells have the same genetic information.
 - All cells have common DNA.
 - Genetic information in one cell is passed to other cells through cell division.
- (72) Allow a maximum of 3 credits. For the *one* ecological problem selected, allow 1 credit for stating how humans have caused the problem, 1 credit for describing one specific effect the problem will have on the ecosystem, *and* 1 credit for stating one specific action humans could take to reduce the problem. Appropriate responses include, but are not limited to:
- Acid rain
 - Cause — industry producing air pollution (sulfides, nitrates, etc.)
 - cars/burning fossil fuels

Note: Do *not* allow credit for pollution or air pollution unless the source is identified.

 - Effect — lowers pH of certain lakes which kills some fish
 - Action — remove the chemicals from the exhaust before it leaves the factory
 - Increased amounts of nitrogen and phosphorous in a lake
 - Cause — fertilizer runoff
 - Effect — rapid aging of lakes
 - Action — use less fertilizer
 - Loss of biodiversity
 - Cause — overhunting
 - habitat destruction
 - Effect — unstable ecosystem
 - loss of sources for new medicines
 - Action — enforce game laws
 - habitat rehabilitation

Regents Examination in Living Environment

June 2003

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

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 a 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 the administration be used to determine the student's final score. The chart above is usable only for this administration of the living environment examination.

Map to Core Curriculum

June 2003 Living Environment

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