

FOR TEACHERS ONLY

The University of the State of New York

Le

REGENTS HIGH SCHOOL EXAMINATION

LIVING ENVIRONMENT

Wednesday, January 23, 2002 — 1:15 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) 3	(13) 2	(25) 4
(2) 4	(14) 2	(26) 4
(3) 3	(15) 1	(27) 3
(4) 3	(16) 3	(28) 1
(5) 3	(17) 3	(29) 2
(6) 2	(18) 1	(30) 3
(7) 1	(19) 2	(31) 1
(8) 4	(20) 1	(32) 1
(9) 2	(21) 4	(33) 3
(10) 2	(22) 3	(34) 1
(11) 1	(23) 4	(35) 4
(12) 4	(24) 2	

LIVING ENVIRONMENT – *continued*

Directions to the Teachers

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.

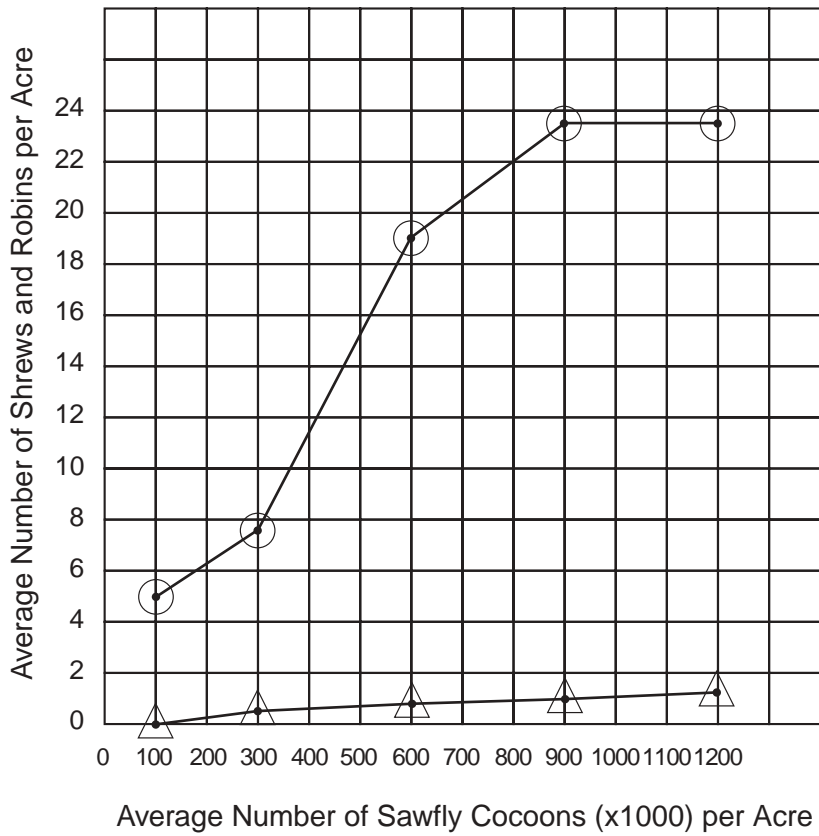
Raters should enter the scores earned for Part A, Part B, and Part C on the appropriate lines in the box printed on the answer sheet and should add these 3 scores and enter the total in the box labeled "Total Raw Score." Then the student's raw score should be converted to a scaled score by using the 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.

LIVING ENVIRONMENT – *continued*

Part B

- (36) Allow 1 credit for marking an appropriate scale on both axes.
- (37) Allow 1 credit for plotting the data for shrews correctly (based on the student's axes), surrounding each point with a small circle, and connecting the points.
- (38) Allow 1 credit for plotting the data for robins correctly (based on the student's axes), surrounding each point with a small triangle, and connecting the points.

Example of an appropriate graph:



LIVING ENVIRONMENT – *continued*

- (39) 15 ± 1
- (40) Allow 1 credit for indicating that the number of sawfly cocoons per acre would increase if the shrews and robins were removed from the area.
- (41) Allow a total of 2 credits, 1 credit for each of two variables other than the size of the lynx population that can affect the size of the hare population. Appropriate responses include, but are not limited to:
- food supply
 - humans
 - habitat
 - diseases
 - competition
 - environmental factors
 - carrying capacity
- (42) 2
- (43) Allow 1 credit for indicating that scientists would want to have a laboratory study on populations of different predators and their prey in order to eliminate unwanted variables or to generalize about the relationship between predators and prey.
- (44) Allow 1 credit for explaining the meaning of the word template as used here. Appropriate responses include, but are not limited to:
- The template serves as a pattern.
 - The sequence of bases in a DNA molecule serves as a pattern for the replication of that DNA molecule.
 - The molecule in box A (DNA) serves as a pattern for the production of other DNA molecules.
 - The template serves as a pattern for the eventual production of protein.
 - The template serves as a pattern for the formation of RNA.
- (45) 2
- (46) 4
- (47) 1
- (48) 3
- (49) Allow 1 credit for grass.
- (50) 4

LIVING ENVIRONMENT – *continued*

- (51) Allow a total of 2 credits, 1 credit for each of two negative effects the shopping mall would have on the Pine Barrens. Appropriate responses include, but are not limited to:
- Clearing the land for the mall would cause a decrease in the amount of plant life.
 - Destroying the plants would reduce the habitat available for some animals.
 - The mall will attract more automobile traffic to the area, increasing the amount of air pollution.
- (52) 3
- (53) Allow 1 credit for identifying the process as respiration *or* cell respiration *or* aerobic respiration *or* oxidation.
- (54) Allow 1 credit for ATP *or* adenosine triphosphate.
- (55) Allow 1 credit for indicating, either as a general statement or by citing numerical data from the table, that the oxygen-holding ability of freshwater is greater than the oxygen-holding ability of seawater in the temperature range shown. Appropriate responses include, but are not limited to:
- Freshwater can hold more oxygen than seawater.
 - Seawater cannot hold as much oxygen as freshwater.
- (56) Allow 1 credit for indicating, either as a general statement or by citing numerical data from the table, that the oxygen-holding ability of freshwater decreases as the temperature increases or increases as the temperature decreases. Appropriate responses include, but are not limited to:
- As temperature increases the oxygen carrying capacity of freshwater decreases.
 - As the temperature decreases the oxygen carrying capacity of freshwater increases.
 - Within the range shown, as the temperature increases freshwater can hold less oxygen.
 - At 10°C, freshwater can hold 11.29 ppm but at 15°C it can only hold 10.10 ppm.
- (57) 2
- (58) 3

LIVING ENVIRONMENT – *continued*

- (59) Allow 1 credit for stating one valid conclusion that can be drawn from the data. Valid conclusions may compare the resistance (tolerance) to insecticide of one species of mosquito to the other or the effectiveness of one insecticide to the other. Valid conclusions may also make generalizations about a decreased number of mosquitoes or an increasing resistance. Appropriate responses include, but are not limited to:
- *Anopheles culifacies* is more resistant to malathion and dieldrin than *Anopheles strephensi*.
 - *Anopheles strephensi* is more resistant to dieldrin than to malathion.
- (60) Allow 1 credit for stating one negative impact that the use of malathion and dieldrin might have on the environment. Appropriate responses include, but are not limited to:
- Malathion and dieldrin may kill beneficial insects.
 - The malathion and dieldrin may pollute water supplies.
 - Malathion and dieldrin adversely affect other organisms.
- (61) 1
- (62) 4
- (63) Allow 1 credit for stating one reason why the results of the experiment might be considered invalid. Appropriate responses include but are not limited to:
- The surface area of each leaf was not measured at the beginning of the investigation so they may not have been equal.
 - The pieces of each leaf may not have been the same thickness and so the masses of the pieces may have been unequal.
 - The sample size is too small.
 - The sample size of leaf specimens was not noted.

LIVING ENVIRONMENT – *continued*

Part C

- (64) Allow a total of 2 credits for stating the relationship between the presence of telomerase, telomere length, and the number of cell divisions. Appropriate responses include, but are not limited to:
- telomerase lengthens telomeres [1]
 - so that cells continue to divide [1]
- (65) Allow 1 credit for stating how the knowledge of telomerase may lead to an effective treatment for cancer. Appropriate responses include, but are not limited to:
- Introducing a substance that destroys or counteracts telomerase in cancer cells would result in cell division of the cancer cells stopping and the tumor no longer growing.
- (66) Allow 1 credit for stating how the knowledge of telomerase could be used to treat patients who have HIV. Appropriate responses include, but are not limited to:
- Blood-forming cells could be removed from HIV patients early in the disease, cultured with telomerase, and then returned to the bodies of the patients as their blood cell count falls.
 - The telomerase-treated blood cells of the HIV patient would be able to divide more often and form more blood cells than if they were not treated.
- (67) Allow a total of 3 credits for explaining the role of vaccines in the prevention of disease. The response must include:
- a description of the contents of a vaccine (e.g., weakened, altered, or dead microbes, or parts of weakened microbes) [1]
 - a description of how a vaccine protects the body from disease (e.g., by stimulating the immune system to react, by causing the immune system to produce antibodies, by having the body make antibodies) [1]
 - one specific reason certain vaccinations are required for students to attend public schools (e.g., to prevent the spread of disease, to keep schoolchildren protected from a disease, to prevent an epidemic in school, to protect children from diseases brought in by a classmate) [1]

Example of a 3-credit response:

A vaccine is a substance that contains dead or weakened bacteria that causes the body to make antibodies. These antibodies will then protect the body if it is exposed to these bacteria in the future. Schoolchildren need vaccinations so that they do not get sick from common illnesses and miss a lot of school.

LIVING ENVIRONMENT – *continued*

- (68) Allow a total of 4 credits for explaining how a certain species of bacteria has become resistant to an antibiotic. The explanation must include the following concepts:
- overproduction [1]
 - variation [1]
 - natural selection [1]
 - adaptation to the environment [1]

Example of a 4-credit response:

Due to their rapid rate of reproduction, more bacteria than can possibly survive (overproduction) were produced. Due to genetic differences (variation), some bacteria had genes making them resistant to the antibiotic and so were better adapted to an environment containing the antibiotic. They were the ones most likely to survive and produce the next generation (natural selection). Over several generations, a greater percentage of the population was resistant (adaptation to the environment).

- (69) Allow a total of 4 credits for summarizing the results of the experiment, for identifying another possible variable that could be investigated to improve the growth of lettuce, and for a recommendation of an extension of the investigation to make it more valid. The response *must* include:
- a recommendation for the best growth solution to use for hydroponic lettuce and support for this recommendation (e.g., the growth solution used for group 5 was best since in this solution, the plants grew to the greatest height *or* the growth solution that included $H_2O + N + P + Mg + K$ was best, since in this solution the average surface area of the leaves was the greatest) [2]
 - a variable (besides the growth solution) that might be investigated to improve growth of hydroponic lettuce (e.g., the light intensity *or* the number of hours of light received each day *or* the color of the light) Adding soil as a variable is *not* acceptable. [1]
 - a recommendation for an extension of this investigation to make it more valid (e.g., the validity of the investigation could be improved by repeating it or by using more than five plants in each group) Adding to or changing the growth solution is *not* acceptable. [1]
- (70) Allow 1 credit for stating whether the results of this investigation could be used to select the best growth solution for other species of plants. Appropriate responses include, but are not limited to:
- No. A growth solution that provides the necessary chemicals for one species of plant may not provide the necessary chemicals for other species.
 - No. The results of an investigation involving one species of plant would not necessarily apply to other species of plants.
 - Yes. The investigation could aid in the selection of a growth solution for other species of plants if these plants are closely related to the species used in the experiment.

LIVING ENVIRONMENT – *concluded*

- (71) Allow a total of 4 credits for describing two organelles. The response must include:
- the name of two organelles and the function of each (e.g., the cell membrane allows oxygen, carbon dioxide, and water to enter a cell *or* a chloroplast uses water and carbon dioxide to make glucose *or* mitochondria use food and oxygen to release energy) [2]
 - an explanation of how the two organelles work together (e.g., The cell membrane allows carbon dioxide to enter a plant cell to be used by chloroplasts.) [1]
 - the name of an organelle and a human body system that have similar functions (e.g., food vacuole and digestive system *or* cell membrane and respiratory system *or* nucleus and nervous system) [1]

Regents Examination in Living Environment

January 2002

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	74	27	53
84	99	55	73	26	52
83	97	54	73	25	50
82	96	53	72	24	49
81	95	52	72	23	48
80	93	51	71	22	46
79	92	50	71	21	45
78	91	49	70	20	44
77	90	48	69	19	42
76	89	47	69	18	40
75	88	46	68	17	39
74	87	45	68	16	37
73	86	44	67	15	35
72	85	43	66	14	33
71	84	42	66	13	32
70	83	41	65	12	30
69	82	40	64	11	28
68	82	39	64	10	25
67	81	38	63	9	23
66	80	37	62	8	21
65	80	36	61	7	19
64	79	35	60	6	16
63	78	34	60	5	14
62	78	33	59	4	11
61	77	32	58	3	9
60	76	31	57	2	6
59	76	30	56	1	3
58	75	29	55	0	0
57	74	28	54		

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

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