FOR TEACHERS ONLY

The University of the State of New York

REGENTS HIGH SCHOOL EXAMINATION

Le

LIVING ENVIRONMENT

Wednesday, August 13, 2003 — 12:30 p.m. to 3:30 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)	**1**	**(13)**	**3**	**(25)**	**4**
(2)	**1**	**(14)**	**3**	**(26)**	**2**
(3)	**2**	**(15)**	**4**	**(27)**	**3**
(4)	**4**	**(16)**	**1**	**(28)**	**3**
(5)	**2**	**(17)**	**4**	**(29)**	**2**
(6)	**1**	**(18)**	**3**	**(30)**	**4**
(7)	**2**	**(19)**	**2**	**(31)**	**1**
(8)	**4**	**(20)**	**4**	**(32)**	**3**
(9)	**2**	**(21)**	**3**	**(33)**	**1**
(10)	**4**	**(22)**	**3**	**(34)**	**3**
(11)	**2**	**(23)**	**3**	**(35)**	**1**
(12)	**4**	**(24)**	**1**		

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 1

37 4

38 3

39 4

40 4

41 2

42 2

43 Allow 1 credit for **graduated cylinder** or another acceptable response.

44 Allow 1 credit for identifying the correct cellular process.

Set *A*: protein synthesis
Set *B*: respiration

45 Allow 1 credit for explaining how the two organelles in the set selected interact to carry out the cellular process identified. Acceptable responses include, but are not limited to:

Set *A*: The nucleus contains DNA that provides the code to make proteins at the ribosome.

Set *B*: The cell membrane allows substances (such as O_2 and sugars) needed by mitochondria for cellular respiration to enter the cell.

46 Allow 1 credit for explaining how the structures labeled *X* function to maintain homeostasis in a plant. Acceptable responses include, but are not limited to:

— regulate the movement of gases into and out of the leaf
— control the size of the leaf openings
— regulate water loss

47 Allow 1 credit for stating that nitrate pollution increased.

48 Allow 1 credit for explaining how deforestation contributed to this change. Acceptable responses include, but are not limited to:

— Trees absorb nitrates and when trees are removed, fewer nitrates are absorbed.
— Nitrates from top soil are washed into the brook.
— Nitrogen cycles are disrupted in deforested areas.
— Debris from deforestation entered the brook and decomposed.
— Deforestation increases nitrate runoff into the brook.

49 Allow 1 credit for explaining the value duckweed has for the heterotrophic organisms in a pond. Acceptable responses include, but are not limited to:

— Heterotrophic organisms can use duckweed as a food source.
— Duckweed produces O_2 for heterotrophs.
— Duckweed removes hazardous materials from water.

50 Allow 1 credit for explaining the statement, "The level of iron-containing compounds is often a limiting factor." Acceptable responses include, but are not limited to:

— The iron in the pond/lake can influence the size of the duckweed population.
— Too much iron may reduce the size of the duckweed population.
— Too little iron may reduce the size of the duckweed population.

51 Allow 1 credit for stating one way in which shading the water below the duckweed affects the growth of algae. Acceptable responses include, but are not limited to:

— The shading reduces the growth of algae.
— Shading reduces the rate of photosynthesis in algae, making less food available for growth.
— Shading reduces the oxygen available for algae.

52 Allow 1 credit for explaining why *Spirodela* would most likely absorb more hazardous substances from water than other species of duckweed. Acceptable responses include, but are not limited to:

— Plants have 2 or more large-sized roots.
— larger surface area in roots
— larger roots

Note: Do *not* allow credit for merely stating that the plant has roots.

53 Allow 1 credit for using words or chemical symbols to summarize the reaction involved in the process. Acceptable responses include, but are not limited to:

Photosynthesis:
— carbon dioxide + water → glucose + oxygen
— $CO_2 + H_2O +$ sunlight $\rightarrow C_6H_{12}O_6 + O_2$
— $CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2$
— $CO_2 + H_2O \rightarrow C_6H_{12}O_6 + O_2 + H_2O$
— Radiant energy is converted into chemical bond energy.

Cellular respiration:
— glucose + oxygen → carbon dioxide + water + ATP
— $C_6H_{12}O_6 + O_2 \rightarrow CO_2 + H_2O +$ energy
— $C_6H_{12}O_6 + O_2 \rightarrow CO_2 + H_2O$
— Energy is released from food.

54 Allow 1 credit for stating one reason this process is essential for the survival of the *Euglena*. Acceptable responses include, but are not limited to:

— Photosynthesis produces food (or oxygen).
— Respiration provides energy.

55 Allow 1 credit for describing one condition that might cause the gypsy moth population to increase rapidly. Acceptable responses include, but are not limited to:

— Trees do not produce phenol.
— increase in number of eggs produced
— abundance of food
— removal of limiting factors
— larger females
— phenol resistant moths

56 Allow 1 credit for stating one reason that a rapid increase in a gypsy moth population may cause some species of herbivores to vanish or be reduced in number. Acceptable responses include, but are not limited to:

— Gypsy moths outcompete other herbivores that feed on trees.
— Other herbivores are denied food, so their populations decline.
— Bare trees can't protect herbivores that hide in trees from carnivores.

57 Allow 1 credit for stating that plants produce phenol chemicals.

58 Allow 1 credit for writing the sequence of amino acids.

methionine – cysteine – valine – cysteine – proline

59 Allow 1 credit for indicating how the sequence of amino acids would change. Acceptable responses include, but are not limited to:

— methionine – tryptophan – valine – cysteine – proline
— The first cysteine would be replaced by tryptophan.

60 Allow 1 credit for stating one reason this mutation will not cause a change in the action of the final molecule. Acceptable responses include, but are not limited to:

— GGG and GGT both code for proline.
— The same molecule will be produced.
— The last three bases still code for proline.
— The same amino acid sequence is produced.

61 Allow 1 credit for appropriately labeling the second column of the data table and indicating units (e.g. Disk Rising Time (seconds)) and recording that label on the *y*-axis of the graph with appropriate units.

62 Allow 1 credit for completing the data table so that the percent enzyme increases from the top to the bottom of the table.

61–62

Example of a 2-Credit Data Table

Enzyme Concentration (percent)	**Disk Rising Time** (seconds)
20	15.8
40	12.1
60	9.9
80	5.8
100	4.1

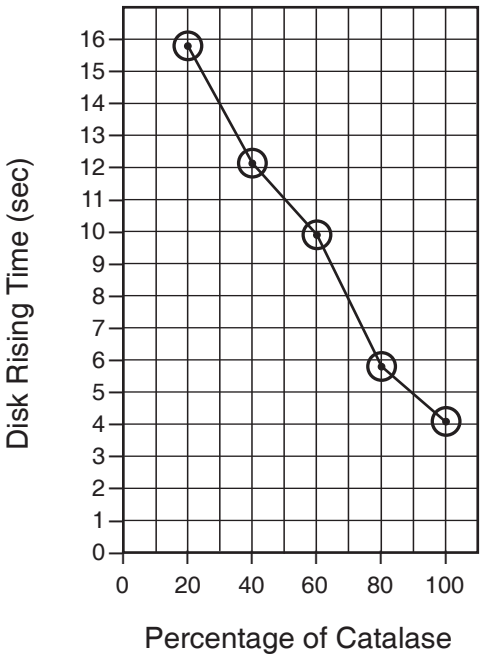
63 Allow 1 credit for marking an appropriate scale on both the *x*- and *y*-axes.

Note: Allow credit for an answer that is consistent with the student's responses to questions 61 and 62.

64 Allow 1 credit for plotting the data correctly and connecting the points.

Note: Credit may be allowed if the points are plotted correctly, but not circled.

Example of a 2-Credit Graph



65 Allow 1 credit for stating one valid conclusion relating enzyme concentration to reaction rate. Acceptable responses include but are not limited to:

— As the concentration of the catalase enzyme increases, the rate of the reaction increases.
— More enzyme causes a faster reaction.
— As the enzyme concentration decreases, the reaction rate decreases.

Part C

66 Allow a maximum of 5 credits, 1 credit each for a description of:

- the treatment to be given to the experimental group (e.g., a certain brand of cough drop)
- the treatment to be given to the control group (e.g., hard candy without cough drop's active ingredients *or* no cough medicine at all)
- the data to be collected (e.g., number of coughs *or* depth of coughing *or* length of time between coughs)
- when the data should be collected (e.g., every minute, hour *or* under various conditions such as sleep, rest, or activity)
- one observation that would lead to the conclusion that the claim is valid (e.g., the experimental group had fewer coughs per time unit than the control group)

67 Allow a maximum of 3 credits, 1 credit each for any vertebrate body system, other than the skeletal system, with a description of how that system contributed to maintaining homeostasis. Acceptable responses include, but are not limited to:

— excretory system: removed wastes from the body
— digestive system: changed parts of food to molecules that diffused across membranes to cells
— respiratory system: exchanged gases
— circulatory system: carried food and/or oxygen to the cells

68 Allow a maximum of 4 credits for discussing the effects of global warming on the environment, allocated as follows:

- Allow 1 credit for an explanation of what is meant by the term *global warming* (e.g., global warming is an increase in average temperature of the atmosphere)

- Allow 1 credit for stating one human activity that is thought to be a major contributor to global warming and allow 1 credit for an explanation of how this activity may contribute to the problem. Acceptable responses include, but are not limited to:

Human Activity	Explanation
burning fossil fuels	adds CO_2 to atmosphere
factories / cars	adds CO_2 to atmosphere
deforestation	reduces photosynthesis reduces CO_2 removal from the atmosphere

- Allow 1 credit for one negative effect of global warming if it continues for many years. Acceptable responses include, but are not limited to:

  — melting of polar icecaps / major flooding
  — too hot for people to live
  — increase in disease

  Note: Do *not* give credit for indicating that Earth will get hotter unless accompanied by further information that illustrates a negative effect.

69 Allow 1 credit for stating one reason that individuals of some species must lay hundreds of eggs in order for the species to survive. Acceptable responses include, but are not limited to:

— Many eggs do not get fertilized.
— Many eggs are eaten by predators.
— The death rate for the developing young is very high.
— The eggs are exposed to hazards of the environment.

70 Allow 1 credit for explaining why fertilization in reptiles and birds must be internal. Acceptable responses include, but are not limited to:

— The egg is surrounded by a shell that the sperm could not penetrate outside the body of the female.
— The sperm must fertilize the egg before the shell is formed.

71 Allow a maximum of 2 credits, 1 for each of 2 reasons that the human species has been able to survive even though usually only one offspring is born at a time. Acceptable responses include, but are not limited to:

— The human fetus is well protected.
— The human baby is protected after birth.
— The developing human fetus is nourished internally.
— The developing human fetus is not exposed to the external environment.

72 Allow a maximum of 4 credits for discussing the use of antibiotics and vaccines in the treatment and prevention of bacterial diseases. The response must include:

- what is in a vaccine (e.g., dead or weakened bacteria) [1]
- how a vaccine promotes immunity (e.g., stimulates antibody production) [1]
- one advantage of the use of vaccinations to fight bacterial diseases (e.g., usually, you will not get the disease or vaccinations provide immunity that lasts a long time) [1]
- one disadvantage of the use of antibiotics to fight bacterial diseases (e.g., do not provide protection against future attacks; bacteria may become resistant; allergies to antibiotics; target beneficial bacteria) [1]

Regents Examination in Living Environment

August 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	77	27	51
84	99	55	76	26	50
83	98	54	75	25	49
82	97	53	75	24	48
81	96	52	74	23	46
80	95	51	73	22	45
79	94	50	73	21	43
78	93	49	72	20	42
77	92	48	71	19	40
76	91	47	71	18	39
75	90	46	70	17	37
74	90	45	69	16	35
73	89	44	68	15	33
72	88	43	67	14	32
71	87	42	67	13	30
70	86	41	66	12	28
69	86	40	65	11	26
68	85	39	64	10	24
67	84	38	63	9	22
66	84	37	62	8	20
65	83	36	61	7	17
64	82	35	60	6	15
63	81	34	59	5	13
62	81	33	58	4	10
61	80	32	57	3	8
60	79	31	56	2	5
59	79	30	55	1	3
58	78	29	54	0	0
57	77	28	53		

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

August 2003 Living Environment

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