

# FOR TEACHERS ONLY

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

## LIVING ENVIRONMENT

Monday, January 22, 2018 — 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 ..... 2 .....	9 ..... 3 .....	17 ..... 3 .....	25 ..... 2 .....
2 ..... 1 .....	10 ..... 1 .....	18 ..... 2 .....	26 ..... 2 .....
3 ..... 3 .....	11 ..... 4 .....	19 ..... 4 .....	27 ..... 4 .....
4 ..... 2 .....	12 ..... 1 .....	20 ..... 1 .....	28 ..... 3 .....
5 ..... 4 .....	13 ..... 1 .....	21 ..... 1 .....	29 ..... 2 .....
6 ..... 2 .....	14 ..... 4 .....	22 ..... 4 .....	30 ..... 3 .....
7 ..... 4 .....	15 ..... 2 .....	23 ..... 3 .....	
8 ..... 2 .....	16 ..... 3 .....	24 ..... 4 .....	
Part B-1			
31 ..... 2 .....	35 ..... 1 .....	39 ..... 2 .....	43 ..... 3 .....
32 ..... 4 .....	36 ..... 1 .....	40 ..... 3 .....	
33 ..... 3 .....	37 ..... 4 .....	41 ..... 1 .....	
34 ..... 2 .....	38 ..... 3 .....	42 ..... 1 .....	
Part B-2			
47 ..... 3 .....	49 ..... 3 .....	50 ..... 1 .....	
Part D			
73 ..... 1 .....	75 ..... 3 .....	81 ..... 4 .....	
74 ..... 3 .....	76 ..... 2 .....	82 ..... 1 .....	

## 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 Monday, January 22, 2018. 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.

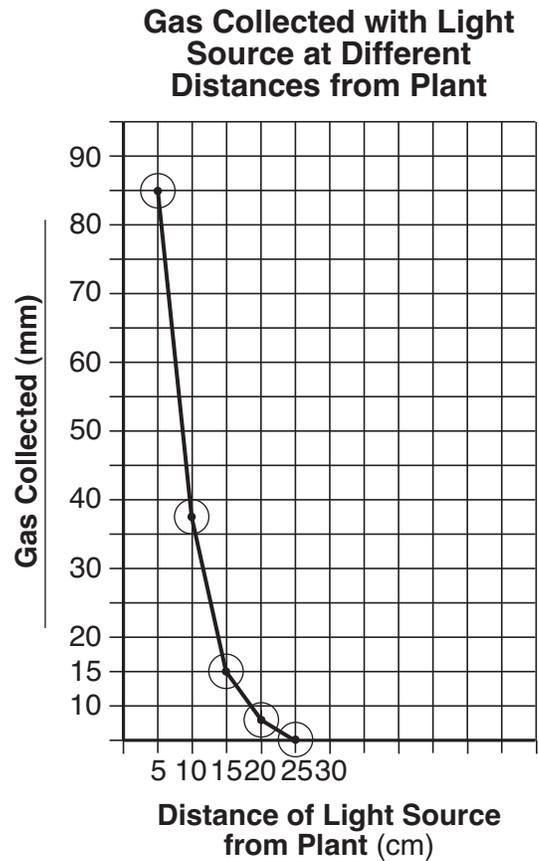
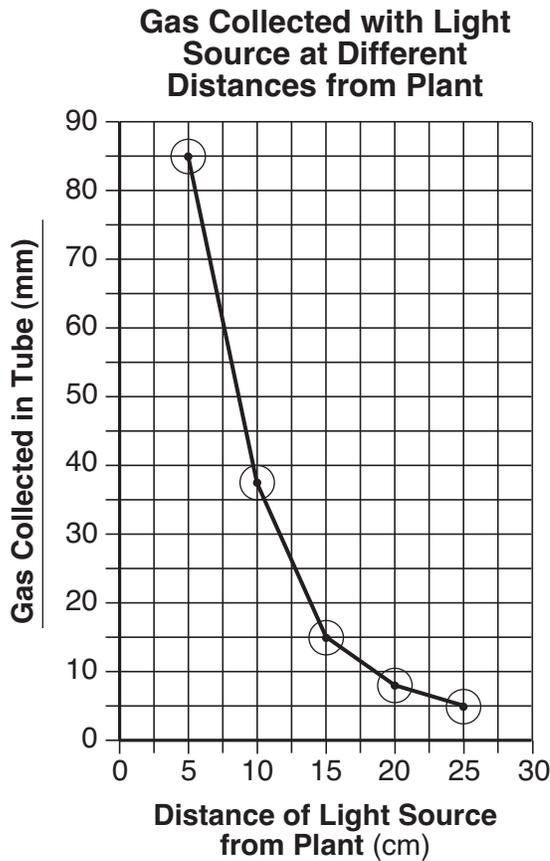
**Schools are not permitted to rescore any of the open-ended questions on this exam after each question has been rated once, regardless of the final exam score. Schools are required to ensure that the raw scores have been added correctly and that the resulting scale score has been determined accurately.**

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 providing an appropriate label on the  $y$ -axis and including the units.
- 45 [1] Allow 1 credit for marking an appropriate scale, without any breaks in the data, on each labeled axis.
- 46 [1] Allow 1 credit for correctly plotting the data and connecting the points.

**Two examples of a 3-credit response for questions 44-46:**



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.

**47 MC on scoring key**

- 48 [1] Allow 1 credit for oxygen/O<sub>2</sub>.

**49 MC on scoring key**

**50 MC on scoring key**

**51** [1] Allow 1 credit for insulin or glucagon.

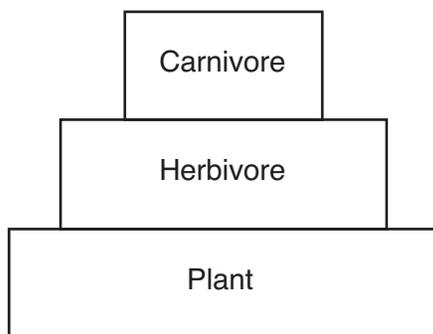
**52** [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- Each hormone has a different shape and attaches to a specific receptor.
- Hormones differ in their shapes. If this shape were changed, the molecule would not send the necessary message to the cell.
- Different sequences of amino acids make different hormones, giving them a unique shape.
- Cell receptors are specific for certain hormones.

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

- They would eat different foods.
- They eat at different times.
- One species might be active at night; one might be active during the day.
- There is plenty of food for both to survive.
- They occupy different niches.
- They may have a mutualistic/symbiotic relationship.

**54** [1] Allow 1 credit for:



Energy Pyramid

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

- As energy is transferred at each feeding level, some is lost as heat.
- Some of the energy is lost at each step of the energy pyramid.
- About 90% of the available energy is lost at each feeding level.
- Some energy is used for life functions.
- At each level, only about 10% is passed on to the next level.

### Part C

**Note:** The student's response to the bulleted items in question 56–58 need *not* appear in the following order.

- 56** [1] Allow 1 credit for explaining why red fescue plants with the fungus normally have an advantage over red fescue plants without the fungus. Acceptable responses include, but are not limited to:
- The plants with the fungus contain the toxin that usually keeps them from being eaten.
  - Plants with the fungus are poisonous to most animals that eat them. Plants without the fungus will be eaten readily by many herbivores with no negative effects.
  - The fungus produces a toxin that is harmful to some animals that eat the red fescue grass.
  - because it is toxic
  - It may not be eaten by reindeer or moose.
- 57** [1] Allow 1 credit for explaining how the moose and reindeer saliva protects them from the harmful effects of the fungus. Acceptable responses include, but are not limited to:
- The saliva slows down fungus growth.
  - The saliva helps detoxify the grass.
  - The saliva helps detoxify the fungus/poison.
- 58** [1] Allow 1 credit for explaining how the moose and reindeer could possess the same adaptation that protects them from the toxin produced by the fungus. Acceptable responses include, but are not limited to:
- The two species have a common ancestor that had the adaptation.
  - The same genetic mutation occurred independently in each species.
  - The ancestors of the two animals may have each had a different mutation that happened to protect them against the fungus toxin.
  - The two species are related.
  - It is the result of convergent evolution.
- 59** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- No eggs would be produced/sterility.
  - A female might not produce estrogen/progesterone.
  - An egg would not be released by the ovary.
  - A woman might have difficulty becoming pregnant.
  - Female characteristics would be influenced.
  - disrupts the female's menstrual cycle

- 60** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The bacteria in the student’s throat were resistant/immune to the antibiotic.
  - The bacteria had a mutation that made them resistant to the medication.
  - The student had a more severe infection, and it took longer for the antibiotic to work.
  - The student had a weaker immune system.

- 61** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- It increases genetic diversity/biodiversity.
  - It increases species variation.
  - makes the elephant population more diverse
  - Captive elephants produce lower-quality sperm.

- 62** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- habitat destruction/loss of food
  - lack of reproductive success
  - illness/disease
  - Breeding programs were not successful.
  - climate change
  - natural predators
  - lack of genetic diversity

**Note:** Do *not* allow credit for hunting or poaching.

- 63** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- They will recognize the CD19 protein/antigen on the B cells and destroy the B cells.
  - They can be used to destroy any cell with the CD19 protein on its surface.
  - They recognize the antigen on the surface of the B cells.
  - They can kill/destroy B cells.

- 64** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- B cells are killed by the new T cells, and B cells normally make antibodies.
  - The B cells that were destroyed by the treatment made antibodies, so antibodies should be given to the patient.
  - After the injections of T cells, the body won’t have enough antibodies to fight infection/disease.
  - because most of the B cells were destroyed

- 65** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The person's immune system will reject/attack cells from the donor.
  - The cells of different individuals have different proteins on their surfaces.
  - Each person's cells are different, and one person's immune system will fight cells from another person.
  - Each person's cells/proteins/genes are different.
- 66** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- absence of light
  - sulfur-bearing minerals/methane
  - high temperatures/heat
  - The pressure is very high at deep ocean depths.
- 67** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Crabs are predators.
  - Crabs are consumers of the other organisms.
  - The other organisms are the prey.
  - Crabs feed directly on animals in the vent community.
  - predator/prey relationship
- 68** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The bacteria can use sulfur-bearing minerals instead of light to produce organic materials.
  - They can produce organic matter without sunlight.
  - The bacteria produce food without photosynthesis.
- 69** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- With genetic modification, specific traits can be changed.
  - Direct gene modification can be quicker while selective breeding can take many generations.
  - It can take many generations to modify animals or plants with selective breeding.

- 70** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- It is more expensive to repeatedly inject them with the hormone.
  - They produce the hormone constantly due to the modified switch.
  - The offspring of the salmon will inherit the trait for rapid growth.

- 71** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- They could outcompete the wild salmon for resources.
  - They could negatively interact with native salmon.
  - They could disrupt the food web.
  - The new gene could get into the wild salmon and harm the wild salmon population.

- 72** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The transgenic Atlantic salmon grow faster.
  - Salmon farming could be more profitable.
  - Transgenic salmon can be brought to market sooner, so people would have more food.
  - Farming transgenic salmon could help conserve the wild salmon populations.

## 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. Acceptable responses include, but are not limited to:

- Molecule *A* is smaller than molecule *B*.
- Molecule *B* has an electrical charge.
- They could be different sizes.
- size of the molecule
- One is a sugar/monosaccharide and the other is a starch/polysaccharide.

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

- Compare the structure of the leaves/flowers/seeds of the plant to a hogweed plant.
- Examine the arrangement of the conducting tubes in the stems.
- Carefully take DNA samples from the plants and compare them using gel electrophoresis.
- The chromatography results of the plant pigments could be compared.
- Compare the leaf cells of the plants using a microscope.
- Classify using a dichotomous/taxonomic key.

79 [1] Allow 1 credit for recording in the table the mRNA codons coded for by the mutated DNA sequence as shown in the table below.

80 [1] Allow 1 credit for recording the amino acid sequence that is coded for by the mRNA codons as shown in the table below.

**Example of a 2-credit response for questions 79 and 80.**

Mutated Gene DNA Base Sequence	ACG	CGC	ACC	TTA
mRNA codons	<u>UGC</u>	<u>GCG</u>	<u>UGG</u>	<u>AAU</u>
Amino acid sequence	<u>CYS</u>	<u>ALA</u>	<u>TRP</u>	<u>ASN</u>

**Note:** Allow 1 credit for an answer that is consistent with the student's response to question 79.

81 MC on scoring key

82 MC on scoring key

83 [1] Allow 1 credit for *two* adaptations. Acceptable responses include, but are not limited to:

- better eyesight to locate food
- ability to produce more offspring
- ability to fly faster
- resistance to diseases in the area
- ability to tolerate hot/cold temperatures

84 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- Increase the sample size of both groups.
- Keep the exercise/time of exercise for each group the same.
- A control group that does not exercise should be included in the design of the investigation.
- Have equal numbers of males in both groups.
- Both groups should include equal numbers of males and females.
- Repeat the experiment.
- Take a resting pulse rate.

- 85** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The cells of the plant would lose water and shrink.
  - Water would leave the cells of the plant, and they would shrink.
  - The contents of the plant's cells would shrink.
  - The plant's cells would lose most of their water/become dehydrated.
  - plasmolysis

**The *Chart for Determining the Final Examination Score for the January 2018 Regents Examination in Living Environment* will be posted on the Department's web site at: <http://www.p12.nysed.gov/assessment/> on Monday, January 22, 2018. 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 2018 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		34		72
Key Idea 2		35, 36		
Key Idea 3		31, 37	44, 45, 46	
Appendix A (Laboratory Checklist)			47	
Standard 4				
Key Idea 1	1, 15, 16, 18, 20	32, 39, 40	49, 52, 53	
Key Idea 2	11, 22, 23, 25, 26, 29, 30			69, 70
Key Idea 3	6	33		56, 57, 58, 60, 61
Key Idea 4	3, 7, 8	42		59
Key Idea 5	12, 24, 27, 28		48, 50, 51	63, 64, 65, 68
Key Idea 6	13, 14, 17, 19, 21		54, 55	66, 67
Key Idea 7	2, 4, 5, 9, 10	38, 41, 43		62, 71

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