

FOR TEACHERS ONLY

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

LIVING ENVIRONMENT

Wednesday, June 15, 2022 — 1:15 to 4:15 p.m., only

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.nysed.gov/state-assessment/high-school-regents-examinations> 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.

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*.

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 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. Do not attempt to correct the student’s work by making insertions or changes of any kind. 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.nysed.gov/state-assessment/high-school-regents-examinations> on Wednesday, June 15, 2022. 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

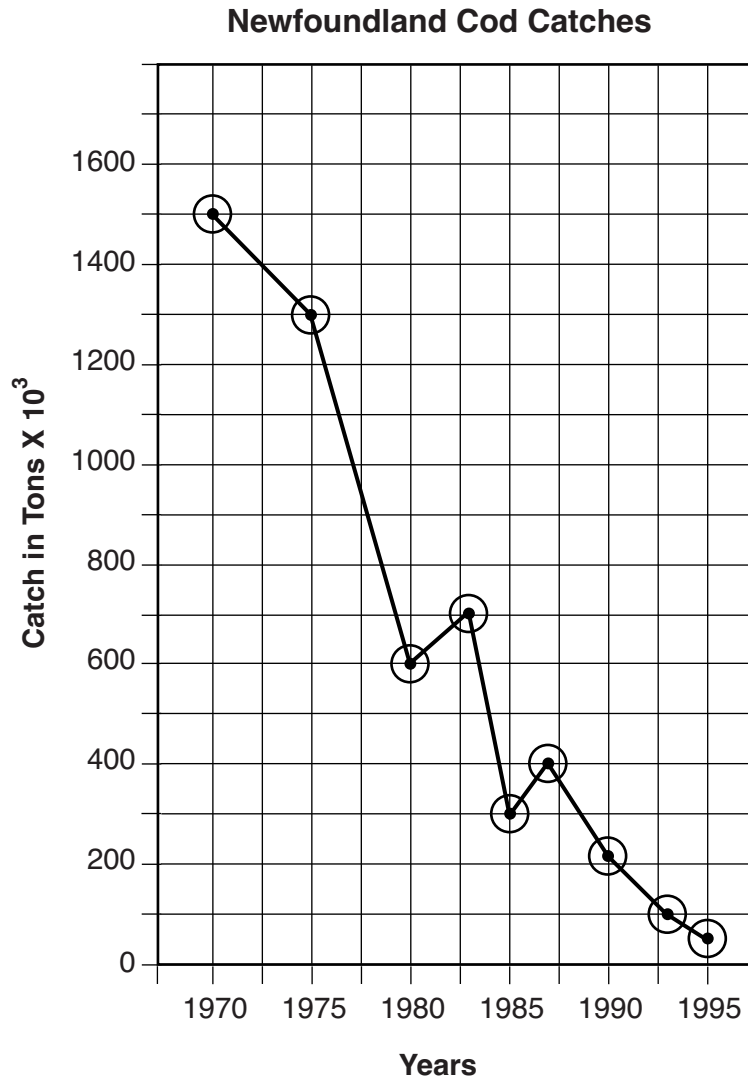
- 44 [1] Allow 1 credit for brown eyes/eye color and supporting the answer. Acceptable responses include, but are not limited to:
- Eye color is a trait that is inherited from parents. A scar, birth date, and decision to be a vegetarian are not inherited.
 - Brown eye color can be passed on to offspring. An individual does not pass eating preferences, a scar, or birth date on to offspring.
 - Eye color is determined by the genes, which can be passed on to offspring.
 - Brown eyes is a genetic trait, while all the others are personal choices/environmentally caused.

- 45 [1] Allow 1 credit for marking an appropriate scale, without any breaks in the data, on each labeled axis.

Note: Do *not* allow credit if the grid is altered to accommodate the scale.

46 [1] Allow 1 credit for correctly plotting the data, connecting the points, and surrounding each point with a small circle.

Example of a 2-credit graph for questions 45-46:



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. Acceptable responses include, but are not limited to:

- Maintaining fish populations in the oceans will help to maintain biodiversity/stability in the ocean ecosystems.
- The organisms the fish feed on will not overpopulate and destroy the ecosystems.
- Food chains will not be disrupted.
- There will be more food for predators.
- Other species may be saved from extinction.

49 MC on scoring key

50 MC on scoring key

51 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- The fossil organism located in the deepest rock layers would most likely be the oldest. Those in layers less deep would be younger.
- If DNA for each of the species is available, scientists could determine which were the most closely related and which seemed to be less similar.
- They could use radioactive/relative/carbon dating to determine the actual age of the fossil.
- Determine the age and arrange them in order.
- comparing the bone structures in the fossils

52 [1] Allow 1 credit for algae.

53 [1] Allow 1 credit for stating what would most likely happen to the bass population if a pesticide that was used in this ecosystem killed the entire pickerel population and supporting the answer. Acceptable responses include, but are not limited to:

- The bass population would increase because the pickerel would not be feeding on it.
- The bass population would increase because there is no predator. Eventually the bass population could start to decrease due to lack of food.
- The bass population might decrease because some may be killed by the pesticide.

- 54** [1] Allow 1 credit for identifying the role of bacteria and stating the importance of this role. Acceptable responses include, but are not limited to:
- They break down dead organic matter, returning nutrients to the environment.
 - Decomposers recycle materials in the environment, returning nutrients for the producers to use.
 - Decomposers recycle nutrients.
 - They break down organic matter, removing dead organisms.

- 55** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- There was a decrease in dead organisms.
 - There was less food available.
 - a disease in the bacteria population
 - change in season/temperature/pH/abiotic factors
 - The crayfish population grew as they fed on dead organisms, leaving less food for the bacteria.

Part C

- 56 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The ozone shield protects living things from radiation.
 - UV radiation can increase the risk of skin cancer.
 - Destruction of the ozone shield can allow more UV radiation to reach the Earth.
- 57 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The Montreal Protocol has been effective because the size of the ozone hole has been decreasing since 2000.
 - The Montreal Protocol has not been effective because the ozone hole was still 19.6 million km² in 2017.
 - It was not effective, since the size of the hole increased for several years after it was passed.
 - It was effective, since the size of the hole eventually started to decrease.
- 58 [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- There could be an economic cost to banning ozone-destroying chemicals that may impact the economy of some countries.
 - Although they destroy the ozone layer, the chemicals may have important uses, and alternatives would have to be developed before banning them.
 - Limiting the production of certain chemicals may cause economic hardships for some countries.
 - Alternative chemicals could be more expensive.
- 59 [1] Allow 1 credit for explaining how the results of the experiment support Dr. Steffan's hypothesis and supporting the answer with information from the reading. Acceptable responses include, but are not limited to:
- The control group averaged 43 survivors, while the group exposed to fungicide residues averaged only 12 survivors.
 - He hypothesized that if the fungi associated with the pollen suffer, then the bumblebee larvae will also suffer, and they did. The colonies exposed to fungicides produced fewer individuals.
 - Fewer larvae that fed on pollen without the fungus survived.
 - There were about three times more individuals in the colonies that were not exposed to the fungicide.

Note: Do *not* accept Dr. Steffan's hypothesis was correct without supportive information.

- 60** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The bees/larvae would not be feeding on pollen at that time.
 - The pollen the larvae were fed during flowering would still have the beneficial fungus.
 - If there are no flowers, there will be no pollen.
- 61** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- There would be less variation present in a smaller population in a smaller area.
 - The plants in the smaller area are less diverse and may be affected more easily by temperature changes.
 - Changes in the climate could result in large changes in the types of plant species present in a smaller area. This could result in less pollen being available for the bee species.
 - The bee species may be able to survive within a narrow temperature range. Climate change could result in the temperature becoming too warm for the bees to survive.
 - The growing season for the plants the bees feed on may be shorter, so they do not produce enough pollen for the bees to survive.
 - In a smaller area there are fewer bees present, and their diversity may not be enough to be able to adapt to changes that occur.
 - In small populations, there is less variation/biodiversity.
- 62** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Without bumblebees, many food crops will not be pollinated and the amount of food available for humans and wildlife will decrease.
 - If bee populations are lost, biodiversity will decrease and the stability of the ecosystem will decrease.
 - They pollinate many flowering plants/food crops.
 - They produce honey.
- 63** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Their triple-helix model was valuable because it led to further investigation.
 - It led to discussion and testing by other scientists, which eventually resulted in Watson and Crick revising their model to one that was supported by the data.
 - Their model was questioned by others and led to the currently accepted model.
 - They correctly identified the nitrogen bases.
 - Some parts of the model were correct.

- 64** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Heart muscle cells require more energy than skin cells.
 - Skin cells are not as active as muscle cells.
 - The heart muscle cells use more energy/ATP.
- 65** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Every food web requires organisms that are able to transform solar energy and store it in glucose that can be consumed by other organisms to use for energy.
 - Other species in the food web are unable to carry on photosynthesis and must rely on species like phytoplankton to trap solar energy in food molecules.
 - because phytoplankton are producers
- 66** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Chief was selected to breed because he had valuable genetic traits.
 - Chief was mated with many cows to produce offspring who would be good milk cows.
 - Chief was mated with these cows because he possessed many favorable traits.
 - Chief's sperm contained genes for many traits that would increase the value of his offspring.
- 67** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Chief's offspring are great milk producers. However, a lethal mutation present in Chief's genetic code resulted in the spontaneous death of many fetal calves.
 - Due to the presence of a lethal mutation that came from Chief, he cost the dairy industry \$420 million. However, because of the great milk-producing genes his offspring inherited, his daughters made the dairy industry \$30 billion.
 - His offspring produce a lot of milk, but many fetal calves spontaneously died.
 - His daughters produced a lot of milk, but there was less diversity in the offspring.
- 68** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The lethal gene could be replaced with a healthy one.
 - Genes that increase the risk of death could be detected and removed.
 - The lethal gene could be repaired.
 - Remove the deadly mutation.
 - Fix the fatal gene.

- 69** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- The baby elephant may have had a mutation that kept it from growing tusks.
 - Both parents had a recessive gene for no tusks.
 - Gene recombination/meiosis may have produced an embryo with no genes for growing tusks.
- 70** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Many elephants died from poaching during the war. Almost all of them had tusks. This means most of the surviving elephants had no tusks, so they made up a larger part of the surviving population.
 - Most of the elephants with tusks were killed, so most of the survivors did not have tusks.
 - Elephants with tusks were killed by poachers.
 - Most of the survivors did not have tusks, so they were of no value to poachers.
- 71** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Many of their mothers had no tusks, so they inherited that trait.
 - Most of the surviving females had no tusks, so their offspring were more likely to inherit the trait from them.
 - Tuskless females made up more than 50% of the population after the war.
- 72** [1] Allow 1 credit. Acceptable responses include, but are not limited to:
- Tuskless males would lose in mating battles and probably die.
 - Since they are males, they fight other males for mates and would be more likely to be seriously injured and die.
 - Females are not as likely to mate with tuskless males.
 - In males, tusklessness may be lethal.

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 for group *A* and supporting the answer. Acceptable responses include, but are not limited to:

- Distilled water moves into cells and makes them swell up or even burst.
- Distilled water has a higher water concentration than the cytoplasm of red blood cells. Water will move into the cells and they will get larger.
- These are the cells that got bigger/burst.
- It is *A* because the cells in *B* shrank.

78 [1] Allow 1 credit for predicting that the cell in the beaker with 25% sugar solution would not have the greatest increase in mass and supporting the answer. Acceptable responses include, but are not limited to:

- No, the prediction is not correct because the sugar concentrations are equal so no net change in mass would occur.
- Since the concentrations are equal, there will be no change in the mass of the cell.
- Since the cell and solution are equal concentrations, they are balanced.
- No, because the beaker with 0% solution would have the greatest change.

79 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- carbon dioxide
- lactic acid
- heat
- water/H₂O

80 [1] Allow 1 credit for stating the unknown individual is *D* and supporting that answer. Acceptable responses include, but are not limited to:

- The bars from the DNA of individual *D* all match those of the unknown individual.

81 MC on scoring key

82 MC on scoring key

83 [1] Allow 1 credit for no, and supporting the answer. Acceptable responses include, but are not limited to:

- No, this mutation would not cause any change because they both code for the same amino acid, threonine.
- This mutation would still result in threonine being put in the amino acid sequence.

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

- Evidence: Many similar proteins
Organisms that produce many of the same proteins are more closely related than organisms that produce a high number of different proteins.
- Evidence: Similar DNA sequence
The closer the DNA sequence of two species is, the closer they are related.
The use of DNA sequencing showed that the flamingo was more related to group B, so it was moved to that group.
- Evidence: Production of similar enzymes
Organisms that produce many similar enzymes are most likely closely related.

85 [1] Allow 1 credit. Acceptable responses include, but are not limited to:

- Bird species: Crows and Pigeons
These two species have similar beaks.
- Bird species: Penguins and Grebes
Both of these bird species live in water and have similar beak structures.
- Bird species: Finches and Pigeons
They have small pointed beaks.
- Bird species: Egrets and Flamingos
They both have long beaks and may eat the same kind of food.

The *Chart for Determining the Final Examination Score for the June 2022 Regents Examination in Living Environment* will be posted on the Department's web site at: <http://www.nysed.gov/state-assessment/high-school-regents-examinations> on Wednesday, June 15, 2022. 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.nysed.gov/state-assessment/teacher-feedback-state-assessments>.
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

June 2022 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			47	60
Key Idea 2				59
Key Idea 3		35, 37		57, 63, 72
Appendix A (Laboratory Checklist)		34	45,46	
Standard 4				
Key Idea 1	10, 11, 16, 23, 27	38, 39	52, 53, 55	64
Key Idea 2	3, 4, 12	40	44	66, 67, 68
Key Idea 3	21	41, 42	50, 51	69, 70, 71
Key Idea 4	6, 7, 26	31, 32		
Key Idea 5	2, 8, 9, 13, 14, 15, 17, 20	33, 36, 43		
Key Idea 6	1, 5, 18, 19, 22, 29		54	62, 65
Key Idea 7	24, 25, 28, 30		48, 49	56, 58, 61

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