

Biology

Elective and Research

Part of the 5-point exam

ביו לוג יא

נושאי בחירה ונושא מחקר

Instructions for examinees

- א. Duration of the exam: One and a half hours
- ב. Structure of questionnaire and point breakdown:
This questionnaire has two parts. The first part includes three topics and the second part includes four topics.

Part One

Topic	Page
I — Circulatory, Respiratory, Secretory, and Immune Systems	2
II — Plant Nutrition and Animal Nutrition	7
III — Heredity	11

Part Two

Topic	Page
IV — Reproduction	15
V — Microorganisms	17
VI — Evolution and Development	20
VII — Biotechnology	22

Answer questions for one topic from each part of the exam.

The topic you choose for Part One of the exam will be worth 60 points and the topic you choose for Part Two will be worth 40 points. Total: 100 points

ג. Material that may be used during the exam:

A Hebrew-foreign language/foreign language-Hebrew dictionary.

ד. Special instructions:

- (1) Answer questions only for topics that you studied.
- (2) Follow the instructions given for each topic.
- (3) **On the outer cover of your answer booklet, write the two topics for which you chose to answer questions.**
- (4) At the end of the exam period, give the answer booklet to the proctor.

Write all of your rough work (notes, calculations, etc.) on separate pages of the answer booklet only.

Write the word "טייטה" on the top of each of these pages.

If you write any sort of work outside the answer booklet, your exam may be disqualified!

Good Luck!

חלק מבחינת 5 יחידות לימוד

הוראות לנבחן

א. משך הבחינה: שעה וחצי.

ב. מבנה השאלון ומפתח ההערכה:

בשאלון זה שני פרקים,

בפרק הראשון שלושה נושאים

ובפרק השני ארבעה נושאים.

פרק ראשון

נושא	עמוד
I — מערכות הובלה, נשימה, הפרשה והגנה	2
II — הזנה בצמחים ובבעלי חיים	7
III — תורשה	11

פרק שני

נושא	עמוד
IV — רבייה	15
V — מיקרואורגניזמים	17
VI — אבולוציה וטיפוח	20
VII — ביוטכנולוגיה	22

עליך לענות על נושא אחד מכל פרק.

לנושא בפרק הראשון — 60 נקודות,

לנושא בפרק השני — 40 נקודות; סה"כ — 100 נקודות

ג. חומר עזר מותר בשימוש:

מילון עברי-לועזי / לועזי-עברי.

ד. הוראות מיוחדות:

(1) ענה על שאלות רק בנושאים שלמדת.

(2) ענה על פי ההנחיות המפורטות בראש כל נושא.

(3) **רשום על כריכת המחברת את שני הנושאים שענית עליהם.**

(4) בתום הבחינה מסור לבוחן את מחברת הבחינה.

כתוב במחברת הבחינה בלבד, בעמודים נפרדים, כל מה שברצונך לכתוב כטייטה (ראשי פרקים, חישובים וכדומה).

רשום "טייטה" בראש כל עמוד טייטה. רישום טייטות כלשהן

על דפים שמחוץ למחברת הבחינה עלול לגרום לפסילת הבחינה!

בהצלחה!

This questionnaire has two parts. Three topics are covered in Part One and four topics are covered in Part Two. For each part, choose one topic that you studied and answer the questions for that topic, according to the directions given for that topic. (You must answer a total of four questions for the topic that you choose for Part One, and a total of three questions for the topic you choose for Part Two.)

Note: You must answer questions from **both** Part One **and** Part Two of the exam, on one topic for each part. Write the two topics for which you chose to answer questions on the outside cover of the booklet.

Questions

Part One (60 points)

This part of the exam includes questions on three different topics:

The Circulatory, Respiratory, Secretory and Immune Systems; Plant Nutrition and Animal Nutrition; and Heredity.

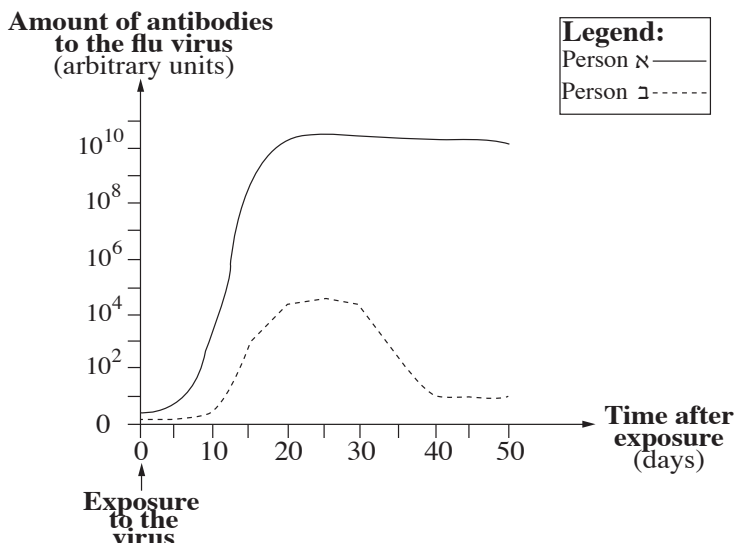
Choose one of these topics and answer **four** questions for that topic, following the directions given for that topic.

Topic I — The Circulatory, Respiratory, Secretory and Immune Systems

Answer four questions: Question 1 and Question 2 (both required), one of the questions 3-4 and one of the questions 5-6.

Answer both Question 1 and Question 2 (**required**).

- Two people, א and ב, were exposed to a flu virus. Researchers monitored the amount of antibodies to that virus in their blood starting from the moment they were exposed to the virus. The curves on the graph below describe the amount of antibodies to the flu virus found in the blood of the two people.



(Note: This question continues on the next page.)

/continued on page 3/

- א. After being exposed to the virus, one of the people became sick with the flu and the other did not.

Which curve describes the quantity of antibodies in the blood of the person who got the flu and which curve describes the quantity of antibodies in the blood of the person who did not get sick?

Explain your answer in light of the data presented in the graph.

(8 points)

- ב. Explain the reason for the difference between the quantity of flu antibodies in the blood of Person א and the quantity of flu antibodies in the blood of Person ב.

(7 points)

2. א. Blood flows through capillaries [נימים] more slowly than it flows through other blood vessels.

(1) What is one characteristic of capillaries that causes blood to flow through them slowly? Explain how this characteristic affects the rate of flow.

(2) How does the slow rate of flow through the capillaries contribute to the functioning of the capillaries?

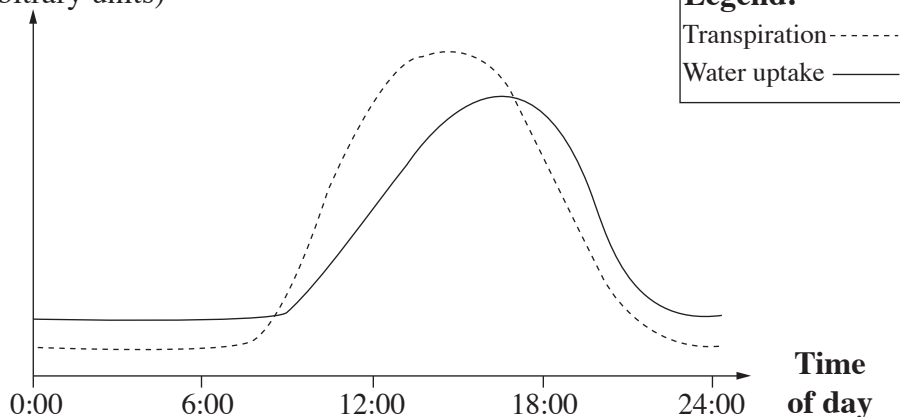
(9 points)

- ב. Name another characteristic of capillaries and explain how the principle that structure corresponds to function is expressed in the context of that characteristic. (6 points)

Answer one of the questions 3-4.

3. The curves of the graph below describe the quantities of water transferred through two processes in a certain plant: transpiration and the uptake of water. The amounts of water were measured over a 24-hour period in a plant that was grown in irrigated soil under optimal growing conditions.

**Amount of
water involved
in the process
(arbitrary units)**



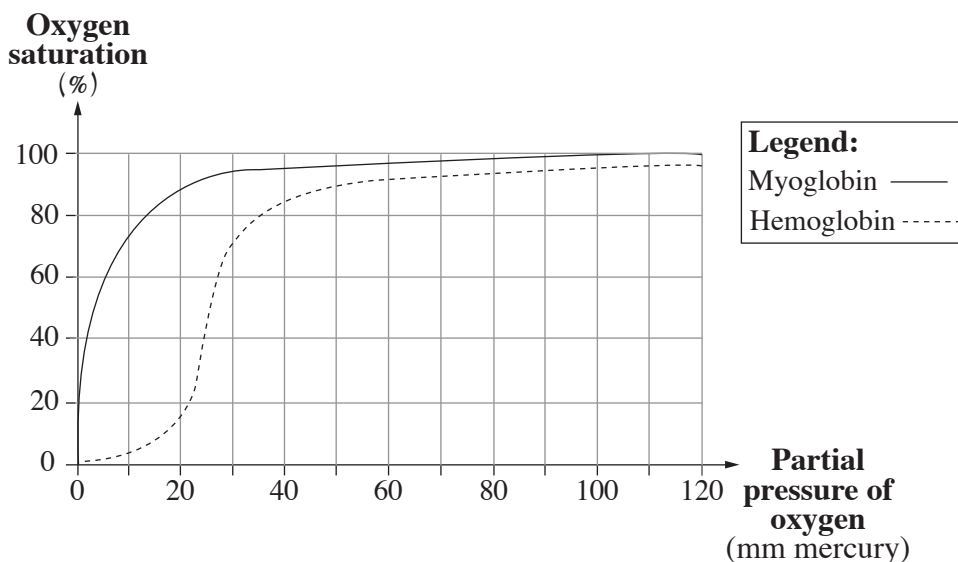
- א. Suggest an explanation for the changes in transpiration over the course of the 24-hour period. (8 points)
- ב. There is a relationship between transpiration and the uptake of water over the 24-hour period. Explain this relationship and note how it is expressed in the graph. (7 points)

4. The oxygen that is transported through blood is bound to hemoglobin.

Myoglobin is a protein found in muscles.

In muscles, oxygen is released from the hemoglobin of the blood and then binds to myoglobin.

The curves shown in the graph below describe the oxygen saturation of hemoglobin and myoglobin, as a function of the partial pressure of oxygen.



- א. In a muscle that is at work, the partial pressure of oxygen is 20 mm of mercury.

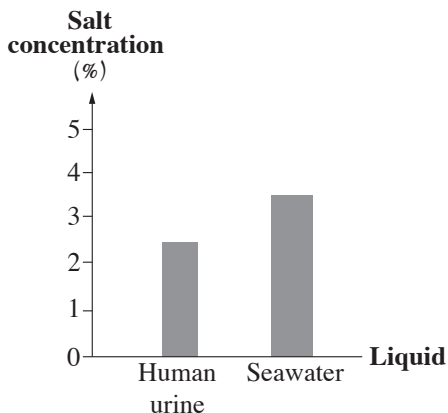
Explain how the difference that can be seen in the graph between the oxygen saturation of hemoglobin and that of myoglobin at a partial pressure of 20 mm of mercury allows the movement of oxygen from the blood to the working muscle. (8 points)

- ב. The amount of myoglobin in the muscle cells of marathon runners has been found to be higher than average.

Explain how the large amount of myoglobin in the muscle cells of marathon runners enhances their ability to run long-distance races. (7 points)

Answer one of the questions 5-6.

5. א. The graph below shows the concentration of salts in seawater and the maximum concentration of salts in the urine of a healthy human. Explain why a person forced to drink a large quantity of seawater would be in danger of dehydrating. (7 points)



- א. A large amount of alcohol in the blood will repress the secretion of the hormone ADH. How does drinking a large quantity of alcohol affect the volume of urine produced and how does it affect the concentration of the urine? Explain. (8 points)
6. An experiment examined the effect of water temperature on the oxygen consumption of goldfish.

The results are presented in the table below.

Oxygen consumption of a resting fish (mL/kg/hour)	Water temperature (°C)
8	5
50	15
140	25
225	35

- א. Explain the reason for the changes in the fish's oxygen consumption under the influence of the changes in the temperature of the environment. (8 points)
- א. The experiment also found that the faster the fish swam, the faster water flowed through its gills. Explain the advantage of this. (7 points)

/continued on page 7/

Topic II — Plant Nutrition and Animal Nutrition

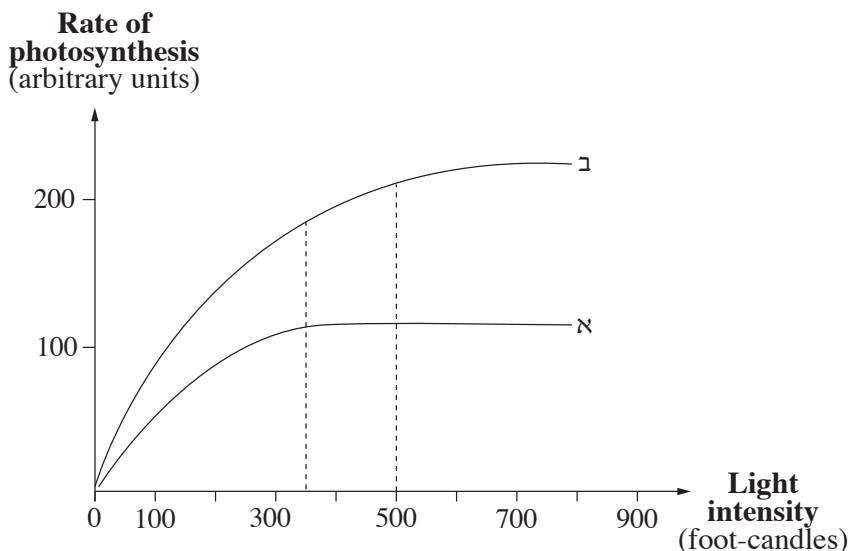
Answer four questions:

Question 7 and Question 8 (both required), one of the questions 9-10 and one of the questions 11-12.

Answer both Question 7 and Question 8 (**required**).

7. א. Students examined the effect of light intensity on the rate of photosynthesis in plants growing in water. They put the plants into two containers that contained water. Container א contained tap water and Container ב contained tap water that had been enriched with CO_2 . The results of the experiment are presented in the graph below.

Effect of Light Intensity on the Rate of Photosynthesis at Two Concentrations of CO_2



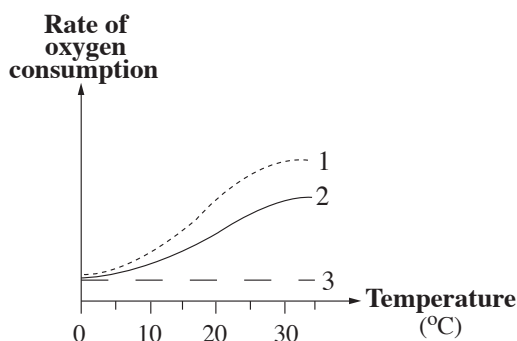
Based on the graph, note and explain two differences between the rate of photosynthesis of the plants in Container א and that of the plants in Container ב, at light intensities within the range of 350-500 foot-candles. (9 points)

- ב. Students raised two groups of the same species of green plant under identical, optimal conditions. They directed red light at one group and green light at the other group. Under which type of light was the rate of photosynthesis faster? Explain. (6 points)

/continued on page 8/

8. Researchers performed an experiment to examine the rate of oxygen consumption of yeast in three identical containers that each contained the same nutrient medium (water + glucose). Yeast that had been boiled was put into one container, whole (untreated) yeast was put into another container and crushed yeast whose mitochondria remained undamaged was put into the third container.

The graph below shows the rate of the yeast's oxygen consumption in each container, within the temperature range of 0°C–35°C.



- א. Curve 2 shows the rate of oxygen consumption of the whole yeast. Which of the two curves, 1 or 3, shows the rate of oxygen consumption of the crushed yeast and which shows the rate of oxygen consumption of the boiled yeast? Explain your answers. (8 points)
- ב. Compare the aerobic respiration of yeast with the fermentation process in yeast:
- What are the products of each of these processes?
 - Which of these two processes yields a greater energy profit?
- (7 points)

Answer one of the questions 9-10.

9. Researchers raised plants of the same species in two closed greenhouses.

The growing conditions in the two greenhouses were identical and optimal.

The same amount of CO_2 flowed into each greenhouse and the plants in the two greenhouses were irrigated with the same amount of water.

The difference between the treatments was as follows:

The oxygen in the CO_2 that flowed into Greenhouse 1 was radio-labeled (CO_2^*).

The oxygen in the **water** that flowed into Greenhouse 2 was radio-labeled (H_2O^*).

א. After 24 hours, the researchers compared the amount of radio-labeled glucose ($\text{C}_6\text{H}_{12}\text{O}_6^*$) produced by the plants in the two greenhouses. Much more radio-labeled glucose was found among the plants in Greenhouse 1, as compared to the plants in Greenhouse 2. Explain why. (8 points)

ב. In which of the two greenhouses, 1 or 2, was radio-labeled oxygen (O_2^*) emitted? Explain. (7 points)

10. א. Researchers examined the effect of a month of applications of nitrogen fertilizer on plant weight. They found that plants treated with the fertilizer weighed 25% more than plants that were not treated with the fertilizer. Explain this finding. (8 points)

ב. Nitrogen can be supplied to plants by applying manure or synthetic fertilizer to the soil. What are two differences between the use of manure and the use of synthetic fertilizer? (7 points)

Answer one of the questions 11-12.

11. א. Processes that require energy occur in the cell. Name two of these processes (which are different from one another). (8 points)

ב. In the human body, more than 40 kg of ATP are produced over a 24-hour period. However, at any given moment, the amount of ATP in the body is only 50 g.

Explain these data. In your explanation, refer to the function of ATP in the cell. (7 points)

12. א. Two characteristics of the cells of the wall of the small intestine are listed below.

- The membranes of these cells include many microvilli [סיסונים].
- These cells contain large numbers of mitochondria.

Explain how each of these two characteristics enhances absorption in the small intestine.

(9 points)

ב. Substances from the gall bladder [כיס המרה] and from the pancreas [התריסריון] are secreted into the duodenum [לבלב]. What is the difference between the activity of the substances secreted from the gall bladder and the activity of those secreted from the pancreas?

(6 points)

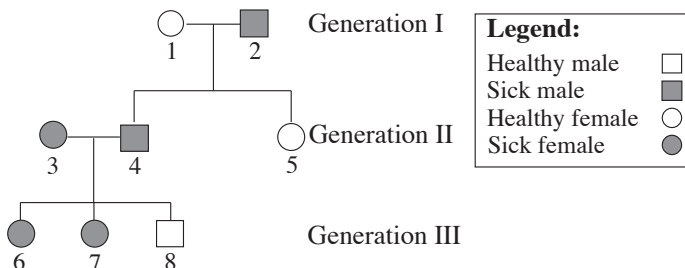
Topic III — Heredity

Answer four questions:

Question 13 and Question 14 (both required), one of the questions 15-16 and one of the questions 17-18.

Answer Question 13 and Question 14 (**required**).

13. The pedigree chart below includes individuals who suffer from a hereditary disease.



- א. (1) The allele that causes the disease is dominant. Explain this statement, based on the chart.
(2) Is the allele that causes the disease sex-linked? Explain your answer based on the chart.
(9 points)
- ב. List the numbers of two individuals in this family who are definitely heterozygous for the gene that causes the disease. Explain. (6 points)

14. E. coli bacteria can break down lactose. Researchers isolated three lines of E. coli – א, ב and ג – each of which possesses a different mutation in its lac operon [אפרון הלקטוז], as described in the table below.

Mutation	Line
No repressor is produced	א
A base is missing from the gene that codes for the enzyme that digests lactose	ב
Damage at the promoter site	ג

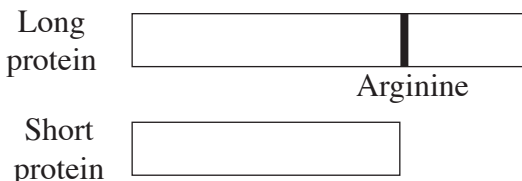
All of the bacteria were raised on a growth medium that included lactose and the researchers examined whether each line of bacteria was capable of digesting that lactose.

- א. Determine whether each of the lines, ג-א, can digest lactose.
(5 points)
- ב. Explain each of your answers. (10 points) /continued on page 12/

Answer one of the questions 15-16.

- 15.** One of the proteins that causes muscle cells to contract can appear in cells in two different forms: a long protein and a short protein.

The amino acid sequences of the two forms of this protein are identical up to a certain point. At that point, the sequence of the short protein ends and the sequence of the long protein contains the amino acid arginine (see figure).



The gene ACTN3 codes for the production of this protein. One of the alleles of this gene codes for the short protein and the other allele codes for the long protein.

The codons for arginine and the stop codons are shown below.

Codons	
CGU CGC CGA AGA AGG	Arginine
UGA UAA UAG	Stop codons

- א.** There are two possible DNA point mutations that can lead to the production of a stop codon instead of one that codes for arginine. Following such a mutation, the short protein will be produced instead of the long one.
- Based on the codons in the table, choose one of these two possibilities and indicate what change in the DNA causes the production of a stop codon instead of one that codes for arginine. (8 points)
- ב.** Researchers isolated the long protein from muscle cells and determined its amino acid sequence.
- The sequence of bases in the gene that codes for this protein cannot be determined from the protein's amino acid sequence.
- What are two reasons for this? (7 points)

16. Genes A and B, which are located on different chromosomes, code for the production of Enzymes 1 and 2, respectively.

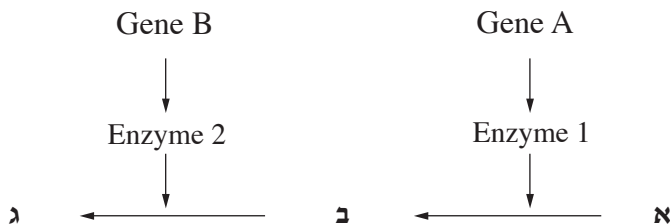
There are two alleles of Gene A: A and a. The recessive homozygote aa codes for a form of Enzyme 1 that is not active.

There are two alleles of Gene B: B and b. The recessive homozygote bb codes for a form of Enzyme 2 that is not active.

The figure below depicts some of the intermediate steps in the production of Substance λ in a cell. The production pathway for this substance includes two steps:

In the first step, the initial substance α is transformed into Substance β , with the help of Enzyme 1.

In the second step, Substance β is transformed into Substance λ , with the help of Enzyme 2.



An individual with the genotype AaBb was cross-bred with an individual with the genotype aabb.

- α.** List the genotypes of all of the possible offspring of this cross.
(6 points)
- β.** Determine which of the offspring that you listed for Item α do not produce Substance λ. Explain. (9 points)

Answer one of the questions 17-18.

- 17. א.** What are two things that can be discovered from a karyotype test of cells from a human fetus? (8 points)
- ב.** Normal results of a karyotype test do not guarantee that there is no genetic problem in the examined cells.
Explain why. (7 points)
- 18. א.** Color blindness is caused by a defect in a gene located on the X chromosome. A man who is color-blind and a woman who sees color normally had sons and daughters who all see color normally.
The couple has a grandson who is color-blind.
Explain the inheritance of the color-blindness from the grandparents' generation (P) to the grandson (F_2). To answer this question, you may draw a diagram. (8 points)
- ב.** A trait determined by a recessive allele of a gene located on the X chromosome is more common among males.
Explain why. (7 points)

Part Two (40 points)

Part Two includes questions on four different topics: Reproduction, Microorganisms, Evolution and Development, and Biotechnology.

Choose one of these topics and answer **three** questions for that topic, according to the directions given for that topic.

Topic IV — Reproduction

Answer three questions:

Question 19 (required), one of the questions 20-21, and one of the questions 22-23.

Answer Question 19 (**required**).

19. Over the monthly cycle, changes take place in a woman's body.

- א. What changes take place in the ovary [שחלה] and the uterus, in the different stages from the beginning of the cycle through the end of ovulation? (7 points)
- ב. Name three hormones that affect the changes you described for Item א. Describe the effect of each of these three hormones on these changes. (7 points)

Answer one of the questions 20-21.

- 20. א.** Describe two different mechanisms for preventing self-pollination in flowering plants. (6 points)
- ב.** A certain plant self-pollinates. Will its offspring be identical to one another? Provide two reasons for your answer. (7 points)
- 21. א.** Name one advantage and one disadvantage of seeds germinating far away from the mother plant. (7 points)
- ב.** Name two environmental factors that affect the germination process and explain the effect of each of those factors. (6 points)

Answer one of the questions 22-23.

- 22. א.** Name three substances that pass from the mother through the placenta to the fetus and two substances that pass from the fetus to the mother. (6 points)
- ב.** Explain how the structure of the placenta allows for the passage of substances between the mother and the fetus. (7 points)
- 23. א.** What are two possible effects of an inadequate amount of the hormone testosterone in the male body? (6 points)
- ב.** Explain how a high level of testosterone in the blood can harm a man's fertility. (7 points)

Topic V — Microorganisms

Answer three questions:

Question 24 (required), one of the questions 25-26, and one of the questions 27-28.

Answer Question 24 (**required**).

- 24. א.** The disease meningitis [דלקת קרום המוח] can be caused by a virus or bacteria. In order to determine whether a person suffering from this disease was infected by a virus or by bacteria, fluid containing the pathogen was extracted from his body. The fluid was transferred to two Petri dishes: one containing a nutrient-rich medium and the other containing cells taken from the membrane surrounding the brain. What results would indicate that the disease was caused by a virus? Explain. (7 points)
- ב.** There are two main strategies for dealing with contagious diseases caused by bacteria:
- immunization to prevent infection by the pathogen
 - treatment with antibiotic drugs after the disease has appeared.
- Are these two strategies also appropriate for dealing with a disease caused by a virus?
- Explain your answer for each strategy. (7 points)

Answer one of the questions 25-26.

- 25. א.** Name two changes that occur in the cell of a bacterium as it becomes a spore. (7 points)

Cracks sometimes appear in concrete walls. A recently developed method for repairing such cracks involves spores of aerobic bacteria. During construction, spores and a source of nutrition for the bacteria are mixed into the concrete. When a crack develops, water and air penetrate the crack and, under those conditions, the spores become active bacteria that secrete a material that contains calcium. This material seals the crack.

- ב.** Explain how the water and air enable the spores that were mixed into the concrete to become active bacteria. (6 points)
- 26.** Describe two natural processes, other than mutation, that cause changes in the genetic inheritance of bacteria. (13 points)

/continued on page 18/

Answer one of the questions 27-28.

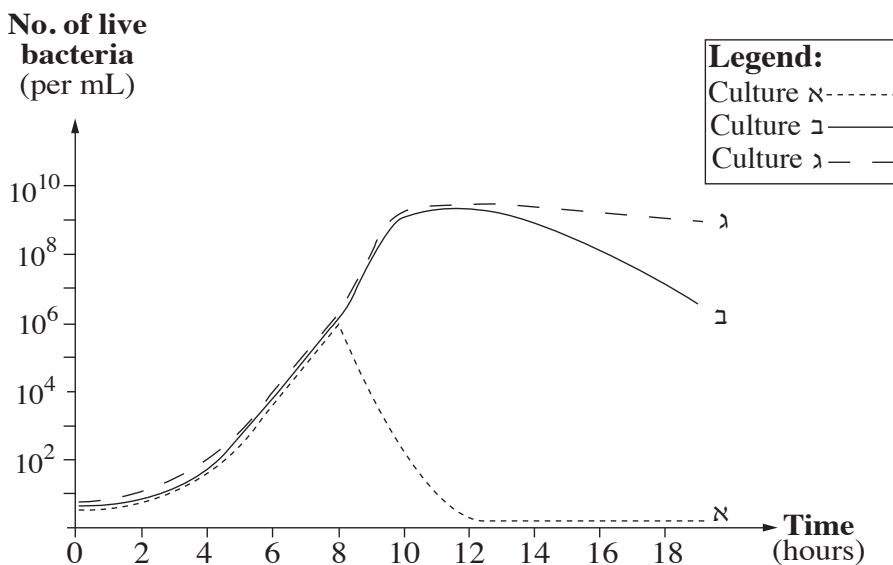
27. A bacterial culture was divided among three containers that each contained the same hypotonic solution. Each culture was raised under the same optimal conditions.

To Culture א, penicillin was added 8 hours after the culture began to grow.

To Culture ב, the same amount of penicillin was added 12 hours after the culture began to grow.

To Culture ג, no penicillin was added.

The growth curves of each of the cultures are shown in the graph below.

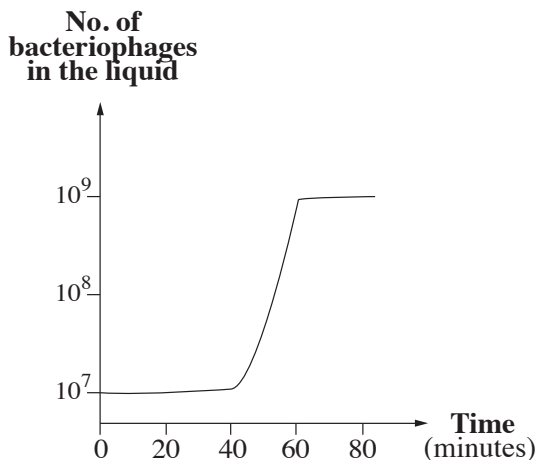


- א. Explain how the penicillin affected the bacteria that grew in Culture א. (6 points)
- ב. Explain why the results obtained for Culture ב are different from those obtained for Culture א. (7 points)

28. Researchers inoculated a culture of bacteria that were growing in a liquid nutrient medium with bacteriophages.

They examined the number of bacteriophages in the liquid over a period of 80 minutes, starting from the moment of inoculation.

The results of this experiment are presented in the graph below.



א. Explain the changes in the number of bacteriophages in the liquid over the entire course of the experiment. (7 points)

ב. The reproduction of a bacteriophage within a bacterium may proceed via one of two pathways: lytic or lysogenic.

Based on the data presented in the graph, by which pathway did the bacteriophages in this experiment reproduce? Explain.

(6 points)

Topic VI — Evolution and Development

Answer three questions:

Question 29 (required), one of the questions 30-31, and one of the questions 32-33.

Answer Question 29 (**required**).

29. א. A certain species of bacteria is not able to digest Substance X and use it as a source of nutrition. Occasionally, a mutation appears in certain individual bacteria that allows them to digest Substance X.

Is the likelihood of the appearance of this mutation in a population of bacteria grown in the presence of Substance X different from the likelihood of the mutation appearing in a population of bacteria grown without any Substance X? Explain. (7 points)

ב. In hospitals, bacteria that are resistant to different types of bacteria are common.

Describe the process that leads to the development of a population of antibiotic-resistant bacteria, specifically in hospitals. (7 points)

Answer one of the questions 30-31.

30. Three statements, (i)-(iii), are presented below. Determine whether each statement is true or false and explain your answers.

(i) Macroevolution is a result of many microevolutionary processes.

(ii) The frequency of the occurrence of useful mutations is higher than the frequency of the occurrence of harmful mutations.

(iii) The fitness of an individual depends on its genetic inheritance and the environmental conditions amongst which it lives.

(13 points)

31. As part of the work done to widen the highway between Tel Aviv and Jerusalem, a bridge was built above the highway as an ecological corridor. This bridge is meant to allow animals to cross from one side of the highway to the other.

א. Explain why, without such a corridor, two different species could develop on the two sides of the highway from an initial population of only one species. (8 points)

ב. How can we determine whether similar individuals from the two sides of the highway are members of the same species? (5 points)

Answer one of the questions 32-33.

32. Wheat and millet are two plants from the grain family. The millet plant is more tolerant of harsh environmental conditions and its seeds are less nutritious than those of wheat.

Transgenic millet plants are produced through genetic engineering: A gene from wheat that codes for the production of the protein glutenin is inserted into millet plants to yield millet plants whose seeds are very nutritious.

- א. What are the advantages of the transgenic plant, as compared to each of the two original plants? (4 points)
- ב. How might transgenic plants affect the course of evolution? Explain. (9 points)

33. Researchers monitored two populations of mice that were raised under the same conditions.

The two populations each contain black individuals and white individuals. The table below shows data regarding the number of individuals and the color distribution, at the start of the monitoring and one year later.

Population ב	Population א	
1000	4	Initial number of mice
500 white, 500 black	2 white, 2 black	Color distribution at the beginning of the monitoring
1200 white, 1300 black	10 white	Color distribution one year later

Which population experienced genetic erosion [סחיפה גנטית]: א or ב? Explain. (13 points)

Topic VII — Biotechnology

Answer three questions:

Question 34 (required), one of the questions 35-36, and one of the questions 37-38.

Answer Question 34 (**required**).

34. This question concerns two research studies:

- (1) "Genetically engineered bacteria produce biological fuel from plants"
- (2) "Treating the disease ADA-SCID by repairing genes of stem cells from bone marrow"

For each of the two studies, explain one advantage of the solution **proposed** in the article, as compared to the solution **available today**, and explain one limitation of the solution proposed in the article.

(14 points)

Answer one of the questions 35-36.

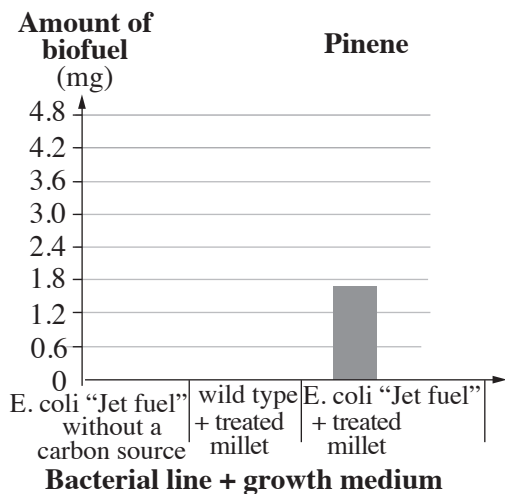
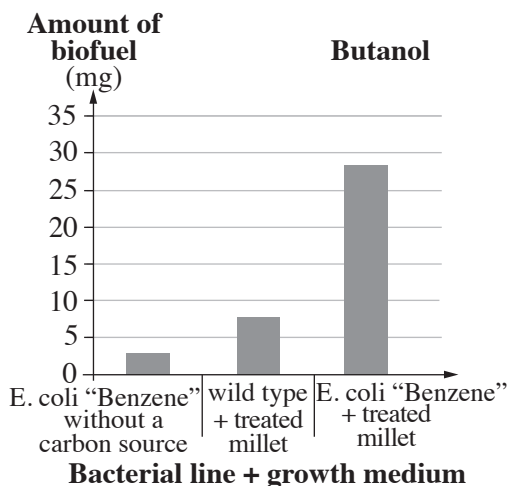
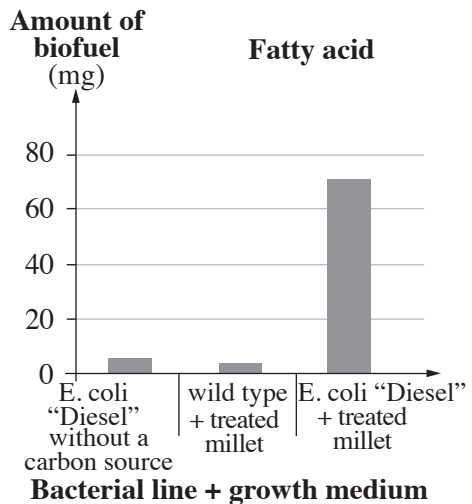
35. א. As part of a study concerning the production of biofuel using three different lines of genetically engineered E. coli, three plasmids were constructed: p-butanol, p-fatty acid and p-pinene.

Name three components found in each of these plasmids and briefly explain the function of each of those components. (5 points)

ב. The control region of the lac operon [אופרן לקטוז] that the researchers used is activated by the inducer IPTG, which is not broken down by the enzyme that digests lactose (β -galactosidase).

Explain why the researchers chose to use an inducer that is not broken down. (7 points)

36. The graphs below show the quantities of three types of biofuel produced in one liter of liquid medium by three different lines of genetically engineered *E. coli*.

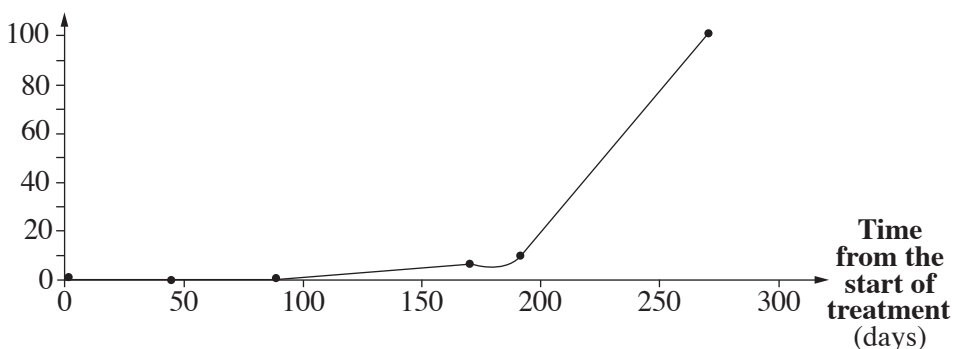


- א. Based on the data presented in the graphs, which of the three lines used the treated millet most efficiently? Explain your answer. (5 points)
- ב. Explain why the researchers also examined the amount of biofuel produced by the wild type. (7 points)

Answer one of the questions 37-38.

37. א. Researchers took white blood cells from the bodies of patients suffering from ADA-SCID disease and inserted a gene that codes for neomycin resistance into those cells. (Neomycin is an antibiotic.) Explain why they inserted the gene into the cells. (7 points)
- ב. The researchers injected the genetically engineered cells into the patients' bodies and, for the next several months, they monitored the percentage of neomycin-resistant T-cells among all of the T-cells in their bodies. The table below shows the results observed for one of the patients.

**Proportion
of T cells
that have
the
neomycin-
resistance
gene
(%)**



Based on the information in the graph, can we conclude that adenosine was broken down in the T-cells of this patient? Explain. (7 points)

38. After genetically engineered T-cells were injected into the blood of the ADA-SCID patients, blood samples were collected from those patients at different points in time (from the beginning of the treatment). The T-cells were separated out of each blood sample and their DNA was isolated and examined using quantitative PCR.
- א. What information did the researchers acquire from the quantitative PCR? (7 points)
- ב. Two primers from the neomycin (antibiotic)-resistance gene were put into the PCR machine. Why were these primers used, as opposed to primers of the ADA gene? (7 points)

Good Luck!

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בהצלחה!

זכות היוצרים שמורה למדינת ישראל
אין להעתיק או לפרסם אלא ברשות משרד החינוך