INQUIRY: **NAME:**

2015-2016 Regents Questions, Std. 1 Students will use mathematical analysis, scientific inquiry, and engineering design, as appropriate, to pose questions, seek answers, and develop solutions.

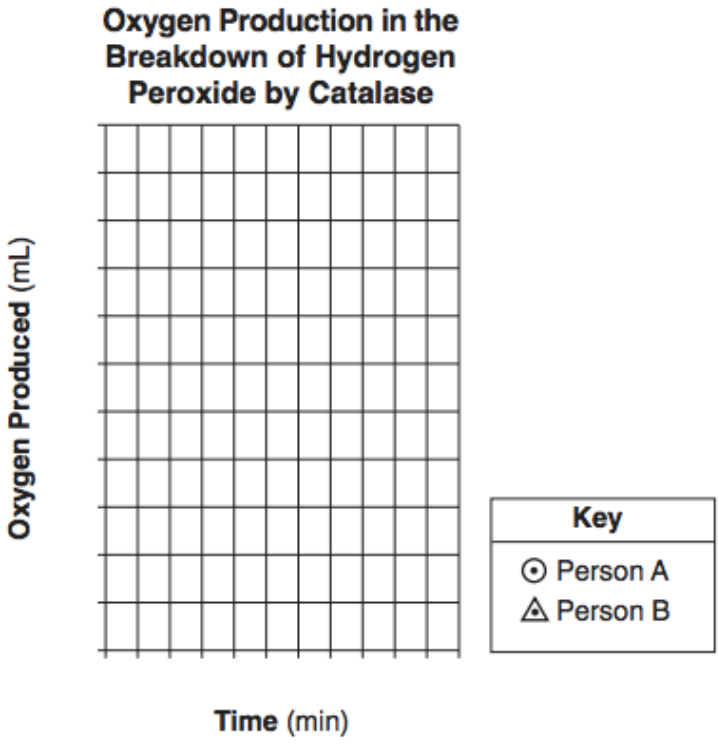
The Enzyme Catalase Catalase is an enzyme found in nearly all living organisms that breathe or are exposed to oxygen. According to recent scientific studies, low levels of catalase may play a role in the graying process of human hair. The body naturally produces hydrogen peroxide, and catalase breaks it down into water and oxygen. If there is a dip in catalase levels, hydrogen peroxide cannot be broken down. This causes hydrogen peroxide to bleach hair from the inside out. Scientists believe this finding may someday be used in anti-graying treatments for hair. A pharmaceutical company, investigating ways to prevent hair from turning gray, took tissue samples from two different individuals. Both individuals were the same age. Each of the samples was placed in a solution of hydrogen peroxide. The volume of oxygen gas produced was measured every 5 minutes for 25 minutes. The data the company collected are shown below.

Using the information in the data table, construct a line graph on the grid on the next page, following the directions below.

Oxygen Production in the Breakdown of Hydrogen Peroxide by Catalase

Time (min)	Sample from Person A (mL oxygen)	Sample from Person B (mL oxygen)
5	2.0	4.5
10	3.5	8.5
15	5.0	12.0
20	7.5	15.5
25	9.5	20.0

- Mark an appropriate scale, without any breaks in the data, on each labeled axis. [1]
- Plot the data from the data table for the sample from person A on the grid. Connect the points and surround each point with a small circle. [1]
- Plot the data from the data table for the sample from person B on the grid. Connect the points and surround each point with a small triangle. [1]



1. If the temperature of the tissue samples used in the experiment had been raised from 37°C (body temperature) to 50°C, the results would have been different because

(1) more enzymes are produced at higher temperatures, increasing the amount of hydrogen peroxide
(2) more hydrogen peroxide is released at higher temperatures, increasing the activity of catalase
(3) increasing temperatures altered the structure of catalase, decreasing oxygen production
(4) increasing temperatures decreased the synthesis of amino acids, increasing levels of hydrogen peroxide

2. According to the data provided, which person, A or B, is more likely to be the first to have gray hair? Support your answer. [1] Person: _____

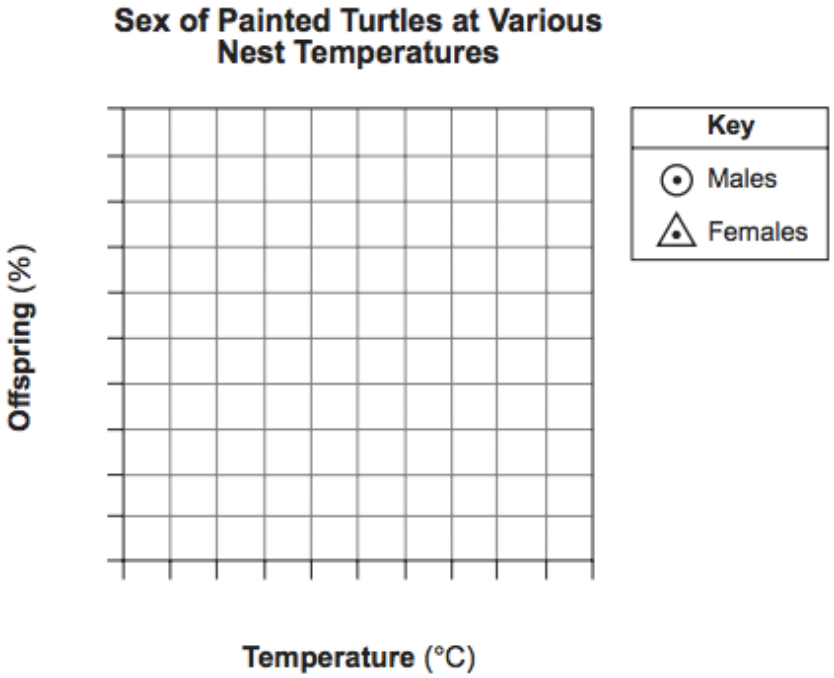
For most animals, the sex of the offspring is determined by sex chromosomes. In some species of reptiles, such as the painted turtle, there are no sex chromosomes. It has been discovered that the sex of the offspring is determined by the temperature of the nest in which the egg develops.

Sex of Painted Turtle Offspring at Various Nest Temperatures

Temperature (°C)	Sex of Offspring	
	Males (%)	Females (%)
19	0	100
20	5	95
21	20	80
22	25	75
23	0	100
24	0	100
25	0	100

Using the information in the data table, construct a line graph on the grid below, following the directions below.

- Mark an appropriate scale, without any breaks in the data, on each axis. [1]
- Plot the data for percent males on the grid. Connect the points and surround each point with a small circle. [1]
- Plot the data for percent females on the grid. Connect the points and surround each point with a small triangle. [1]



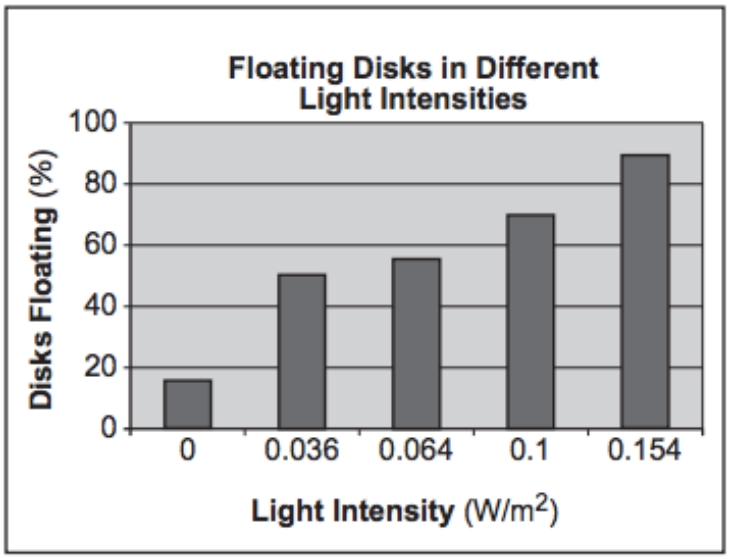
3. The fact that the sex of the painted turtle offspring is controlled by the temperature of the nest is an example of
(1) natural selection causing a new species to form
(2) a predator-prey interaction
(3) habitat destruction decreasing biodiversity
(4) environment modifying gene expression

4. During an investigation, a student measures out 15 grams of salt. Then, he measures 15 milliliters of water and adds the salt to it. Next, he measures a 1 centimeter wide by 4 centimeters long section of plant leaf. Which list of tools is arranged in the order that the student used them?
(1) graduated cylinder, ruler, balance
(2) balance, ruler, graduated cylinder
(3) graduated cylinder, balance, ruler
(4) balance, graduated cylinder, ruler

The graphs represent the results of two investigations using leaf disks from spinach plants. Small disks were cut from spinach leaves that had been treated to remove any air from inside the leaf. The disks were placed in a solution that allowed them to carry out photosynthesis. At first, all the disks sank to the bottom of the container. These disks were then used for two different investigations.

Investigation 1

The disks were divided into five groups. Each group was exposed to light of a different intensity, measured in watts per meter squared (W/m2). Some of the disks began to float. The results of the first investigation are shown in the graph below.



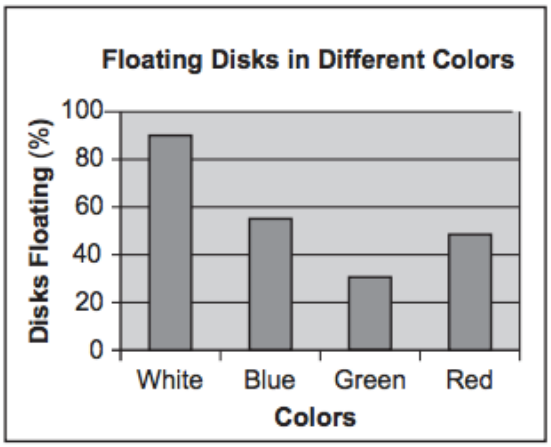
5. State the relationship between increasing light intensity and the percentage of disks floating at the conclusion of Investigation 1. [1]

6. The substance produced inside the leaf disks that caused them to float to the surface of the solution is
(1) ozone
(2) oxygen
(3) water
(4) nitrogen

A number of freshly prepared disks were placed in five containers. These containers were then each exposed to light of a different color. The results of the second investigation are shown in the graph below.

7. Which color of light appears to be least effective for photosynthesis in spinach leaves?

(1) white
(2) blue
(3) green
(4) red



Ten years ago, scientists discovered a well-preserved set of dinosaur remains in China. This dinosaur, which walked on Earth about 125 million years ago, had feathers and was about the same size as a turkey — but don't be fooled. This dino's bite was a lot worse than a turkey's gobble. After a close (and careful!) examination of the dino's teeth, scientists recently concluded that this dinosaur was probably poisonous. The study was led by David Burnham, who works and teaches at the University of Kansas in Lawrence.

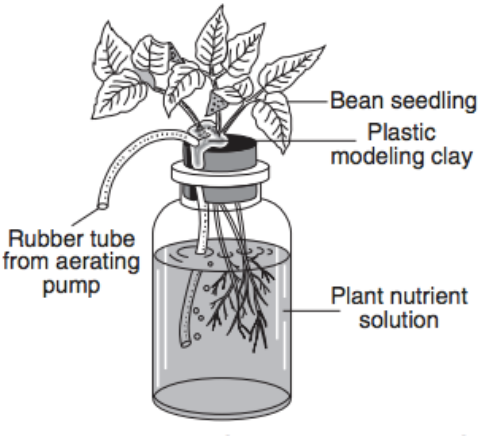
8. State one inference that could be made based on the fact that this dinosaur had feathers. [1]

9-10. African violet plants are grown for their delicate, colorful flowers and furry, soft leaves. People often want to touch the leaves and brush the hairy leaves with their fingers. Growers and plant owners were concerned that this could negatively affect the plant. Of particular concern was the presence of body lotion or other skin products on the hands of persons touching the leaves. A student thought this might be the basis of a science project. He selected two African violet plants. Ten leaves on each of the two plants were brushed with a gloved hand for 30 seconds, once a day, for a period of five days. The difference was that leaves of the second plant were brushed with a gloved hand that had hand lotion applied to the glove

As part of the peer review process, evaluate the student's experiment. As part of your evaluation, be sure to:

- state one possible hypothesis for the experiment proposed by the student [1]
- describe the type of data that should be collected to determine if the brushing with lotion was having a negative effect on the African violet plant [1]

11-15. The presence of air is believed to be important for root growth in bean plants. The apparatus available to conduct an investigation is shown below. There are enough bottles and other materials to have multiple setups. Air (for aeration) can be bubbled into the bottle through the rubber tube.



Design an experiment to test the effect of aeration on the growth of roots of bean seedlings. In your answer, be sure to:

- state one hypothesis the experiment would test [1]
- describe how the control group will be treated differently from the experimental group [1]
- identify the dependent variable in the experiment [1]
- state one reason why many setups should be used in both the experimental and control groups [1]
- state one reason why several different kinds of seedlings were not tested in this experiment [1]

LIVING THINGS/CELLS: **NAME:**

2015-2016 Regents Questions, Key Idea 1 Living things are both similar to and different from each other and from nonliving things.

1. Which statement is an example of the interdependence of organisms?
(1) Owls hunt at night.
(2) Ants get food from insects and protect insects from predators.
(3) Ticks feed on the blood of animals and the ticks grow larger.
(4) Crows feed on dead mice.

2. Farmers may someday clone their best milkproducing cow into a whole herd. What potential disadvantage might be important to consider in having such a large group of clones on one farm?
(1) It may be difficult to tell the animals apart.
(2) Lack of variation may limit survival in the herd.
(3) The cows could be fertilized by only one type of bull.
(4) The cows could be mated only with each other.

3. An individual eats a hamburger. Which two systems must interact to transfer the nutrients in the hamburger to human muscle tissue? (1) respiratory and excretory
(2) digestive and immune
(3) digestive and circulatory
(4) circulatory and respiratory

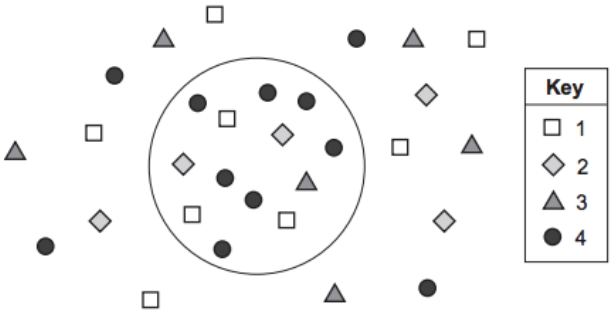
The diagram below shows cell

4. A completing a life process. Cell A performs functions similar to the tissues and systems in complex, multicellular organisms. This process results in
(1) increased genetic variation
(2) the maintenance of homeostasis
(3) a reduction in competition
(4) increased autotrophic nutrition'

5. An ameba, a one-celled organism, can move, ingest, and transport materials within the cell, because it has
(1) organs
(2) organelles
(3) tissues
(4) systems

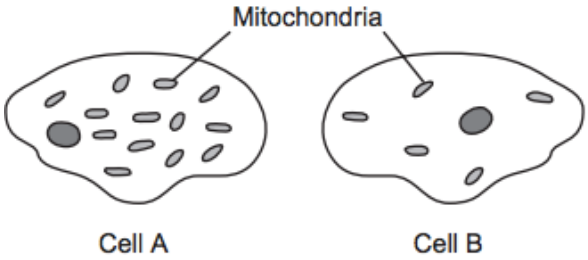
6. Materials are transported within a single-celled organism by the
(1) nucleus
(2) cytoplasm
(3) mitochondrion
(4) ribosome

The diagram below represents a cell and some molecules in its environment.



7. Which molecule would require the use of energy in order to be brought into the cell?
(1) 1
(2) 2
(3) 3
(4) 4

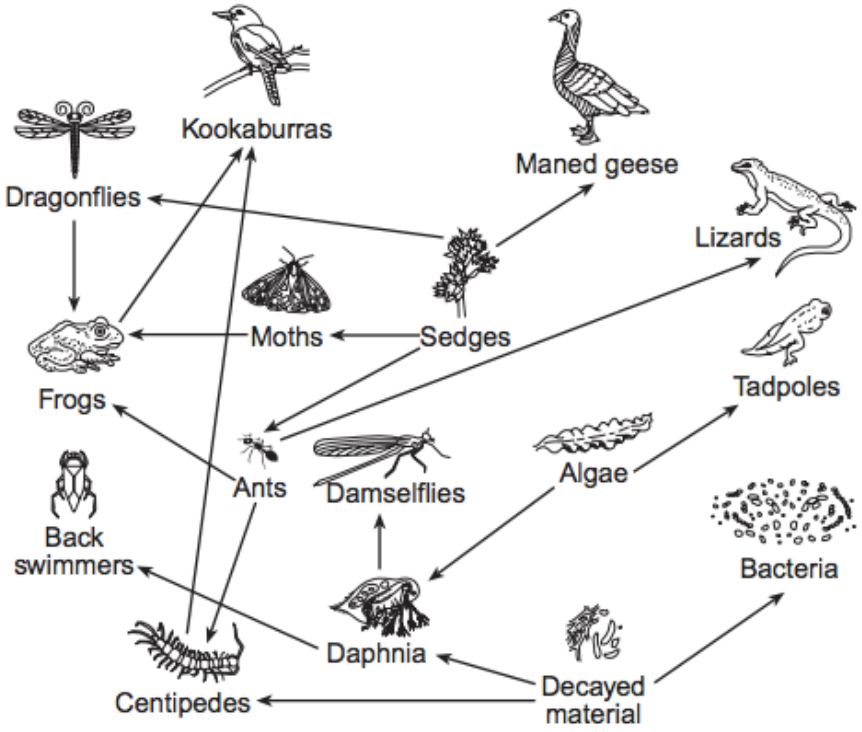
The diagram below represents two cells viewed using the same magnification with the same microscope.



8. One possible conclusion that can be drawn about the activity of these two cells is that
(1) more active transport occurs in cell B than in cell A
(2) more active transport occurs in cell A than in cell B
(3) cell B uses some of the extra mitochondria to make food
(4) cell A is a plant cell since it has a cell wall

9. The flow of energy in an ecosystem is best described as energy moving in
(1) one direction from the Sun to the producers and then to the consumers
(2) one direction from a consumer to a producer and then to the Sun as heat and light
(3) two directions between the producers that are present
(4) two directions, back and forth, between the producers and the consumers

The diagram represents part of a food web.



10. Which sequence of organisms represents a food chain within this food web?
(1) tadpoles → algae → daphnia → back swimmers
(2) sedges → ants → frogs → kookaburras
(3) algae → daphnia → decayed material → bacteria
(4) dragonflies → sedges → ants →centipedes

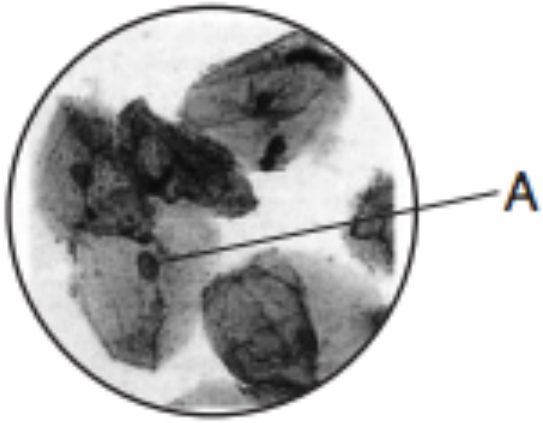
11. Which population would be most immediately affected by the removal of the lizard population?
(1) sedges
(2) algae
(3) ants
(4) centipedes

---

12. Which row in the chart below correctly pairs a food molecule with its building block?

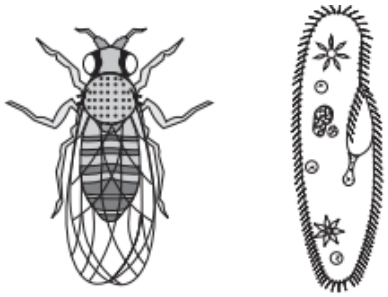
Row	Food Molecule	Building Block
(1)	starch	amino acid
(2)	sugar	starch
(3)	protein	amino acid
(4)	amino acid	sugar

13. A photograph of human cells as seen with a compound light microscope is shown below. A cell structure is labeled A. Structure A is most likely a



(1) mitochondrion that synthesizes food for the cell
(2) nucleus that is the site of food storage
(3) mitochondrion that absorbs energy from the Sun
(4) nucleus that is responsible for the storage of information

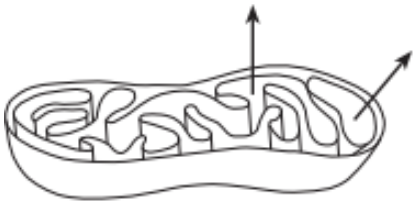
14. A land-dwelling organism, A, and an aquatic single-celled organism, B, are represented below. Which statement best explains how A and B are able to survive in their environments?



A B

(1) The organelles in B perform similar functions to the organ systems in A.
(2) The transport system in B is more complex than the transport system in A.
(3) Both A and B take in oxygen from the water.
(4) Only A can pass on traits to offspring

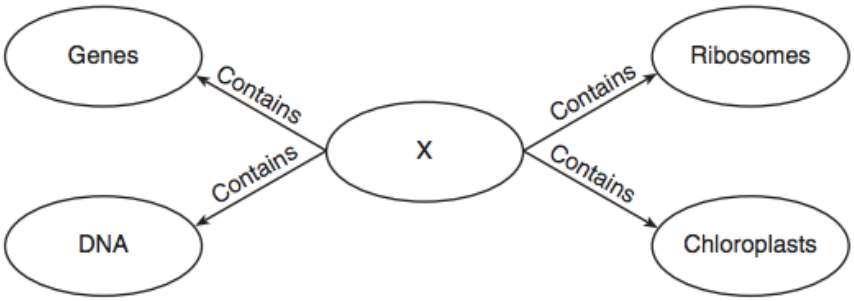
15. The diagram below represents a cell structure involved in converting energy stored in organic molecules into a form used by animal cells.



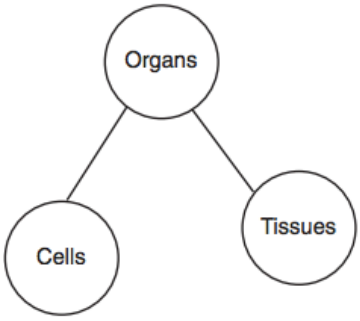
16. The arrows represent the movement of which substances?
(1) carbon dioxide and sugar
(2) oxygen and ATP
(3) ATP and carbon dioxide
(4) oxygen and sugar

17. The diagram below shows a concept map. Which label correctly identifies what X represents in the concept map?

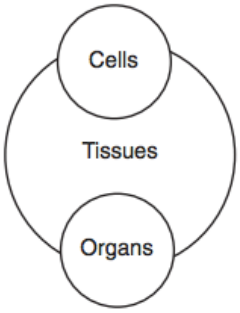
(1) nucleus
(2) chromosome
(3) autotrophic cell
(4) heterotrophic cell



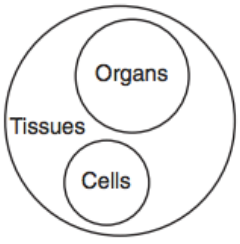
18. Which diagram best illustrates the relationship between the number of cells, tissues, and organs in a complex multicellular organism?



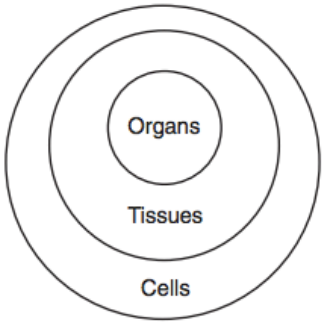
(1)



(3)

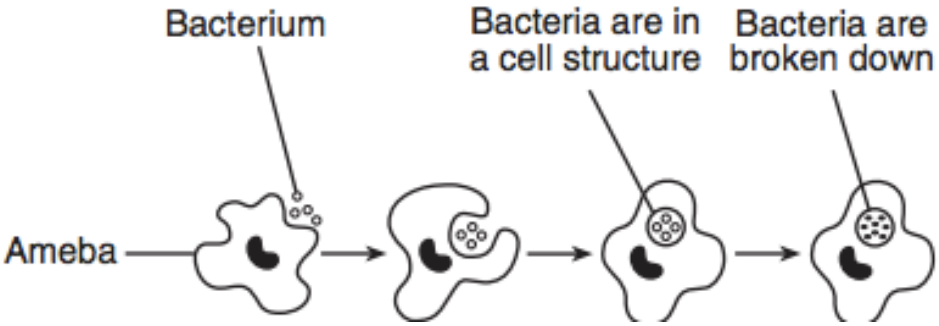


(2)



(4)

Base your answers to questions ___ and ___ on the diagram below, which represents an ameba engulfing bacteria, and on your knowledge of biology.



19. This ameba would most likely be classified as a
(1) decomposer
(2) producer
(3) consumer
(4) pathogen

20. The activity taking place is
(1) photosynthesis
(2) differentiation
(3) autotrophic nutrition
(4) heterotrophic nutrition

21. If the temperature of a test tube of enzymes used in the experiment had been raised from 37°C (body temperature) to 50°C, the results would have been different because
(1) more enzymes are produced at higher temperatures
(2) the activity of the enzymes would increase
(3) increasing temperatures altered the structure of enzymes
(4) increasing temperatures decreased the synthesis of amino acids

Structures in an animal cell are represented in the diagram below.

22. Which row in the chart correctly identifies the functions of structures A, B, and C?

Row	Structure A	Structure B	Structure C
(1)	waste removal	extract energy from nutrients	protein synthesis
(2)	information storage	transport of materials	storage of liquids
(3)	protein synthesis	storage of wastes	reproduction
(4)	cell communication	transport of materials	waste removal

GENETICS: **NAME:**

2015-2016 Regents Questions, Key Idea 2: Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring.

1. The shape of a protein molecule directly determines its
(1) movements through the cytoplasm
(2) functions inside and outside of cells
(3) roles in building water molecules
(4) circulation throughout the body

2. A strand of DNA in a skin cell contains the bases:

A-T-G-C-C-A-T-C-G-G-T-A

After the cell is exposed to ultraviolet light, the strand contains the bases:

A-T-G-G-C-C-A-T-C-G-G-T-A

Which statement describes the result of this exposure?
(1) A new base has been inserted.
(2) A base has been deleted.
(3) One base has been substituted for another.
(4) There have been no changes in the bases.

3. The paramecium is a single-celled organism that reproduces asexually. The offspring of a paramecium usually contain
(1) only half of the genes of the parent cells
(2) more DNA than the parent cell
(3) genetic material identical to that of the parent cell
(4) fewer mutations than the parent cell

4. Which phrase best describes a gene?
(1) a segment of a DNA molecule found only in the body cells of an organism
(2) a segment of a DNA molecule found only in the gametes of an organism
(3) a segment of a DNA molecule that contains the instructions for producing a trait in an organism
(4) a segment of a DNA molecule that contains the instructions for producing all the characteristics of an organism

5. The molecule DNA contains the four bases listed below.
A – adenine
C – cytosine
G – guanine
T – thymine
Which base pairings normally occur during DNA replication?
(1) Guanine pairs with cytosine. Thymine pairs with thymine.
(2) Adenine pairs with thymine. Cytosine pairs with guanine.
(3) Thymine pairs with guanine. Cytosine pairs with adenine.
(4) Cytosine pairs with cytosine. Thymine pairs with thymine.

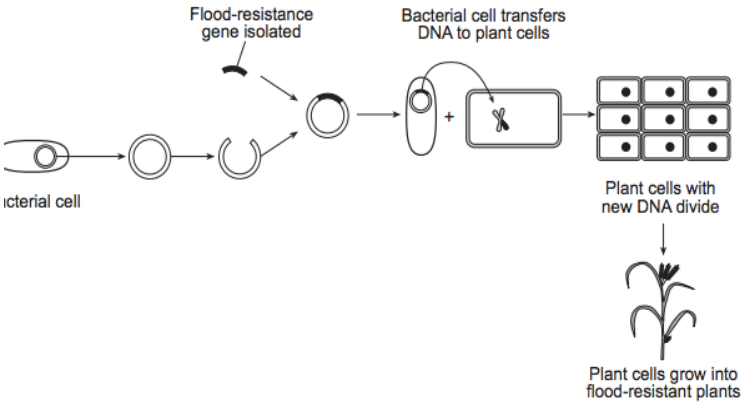
6. Genetic engineering has the potential to correct human genetic disorders. In gene therapy, a defective gene is replaced by using a virus to insert a normal gene into the cells of an individual. This treatment will be most successful if the virus is inserted into cells that
(1) lack a nucleus
(2) are recycled after death, rather than removed from the body
(3) carry out one specific function, rather than multiple functions
(4) continue to divide during the life of the patient

GENETICS: **NAME:**

2015-2016 Regents Questions, Key Idea 2: Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring.

7. In the early 1900s, experiments were conducted on two caterpillar species. The members of the two species were each divided into two groups. One group of each species was placed under red light, while the other group of each species was kept in the dark. When the caterpillars developed into butterflies, their wings showed extreme color differences. Exposure to red light resulted in intensely colored wings, while those kept in the dark had paler wing colors. The color differences were most likely due to
(1) mutations in the color-producing genes
(2) the caterpillars in the red light producing more DNA
(3) gene expression being affected by the environment
(4) the caterpillars in the dark evolving less than those in the light

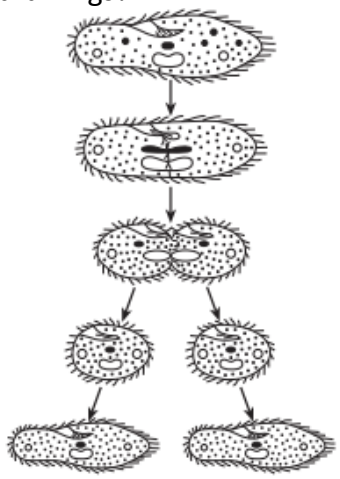
Researchers have produced rice plants that can withstand being completely submerged for up to two weeks. This is good news for farmers in the flood regions of Southeast Asia. The farmers in this region rely heavily on this crop. The diagram below illustrates the process used to genetically modify plants, such as rice.



8. The molecules used to cut, copy, and connect the DNA segments used in this process are
(1) sugars
(2) enzymes
(3) indicators
(4) antigens

9. The best explanation for these modified rice plants being flood resistant is that
(1) the gene for flood resistance was inserted into plant cells, which grew into plants whose cells are expressing this gene
(2) they were produced by fertilization, using gametes from two flood-resistant bacterial cells
(3) there was a mutation in the bacterial DNA after it was inserted into the plant that caused it to be flood resistant
(4) the researchers used selective breeding for the flood-resistance trait

10. A student used a microscope to observe a single-celled organism. As he watched, it looked as if the organism split into two cells. He made drawings, shown below, of the organism over a short period of time.
Which process did the student record in his drawings?

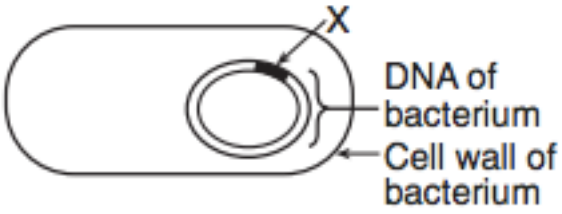


(1) genetic engineering
(2) asexual reproduction
(3) selective breeding
(4) gamete formation

GENETICS: **NAME:**

2015-2016 Regents Questions, Key Idea 2: Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring.

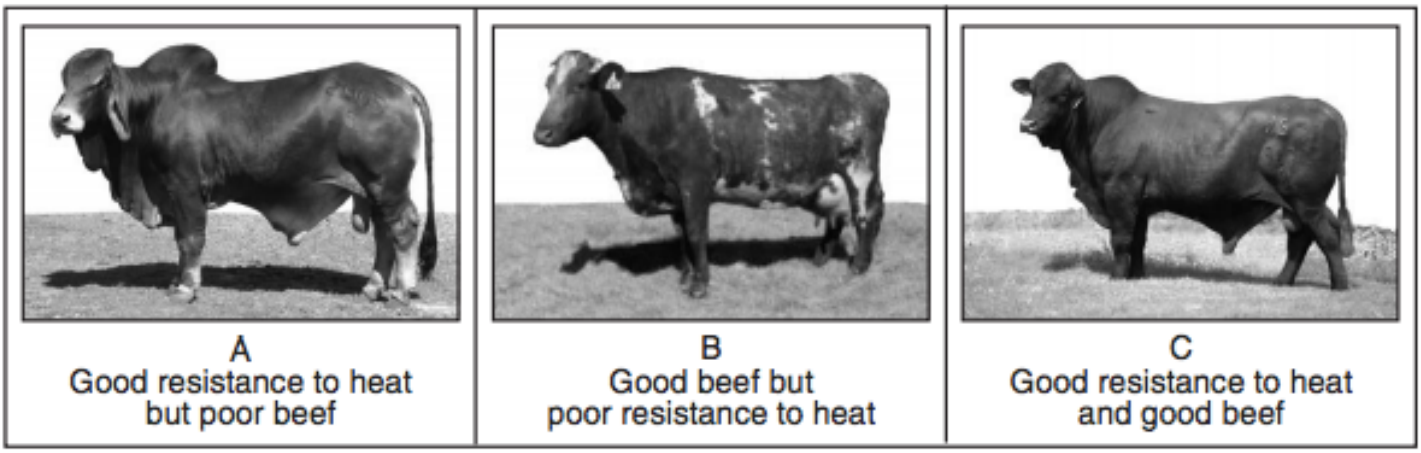
11. The diagram below shows some of the DNA in a bacterium into which a human gene, X, has been successfully inserted. The bacteria that result from reproduction of this cell will most likely have the ability to



(1) replicate all of the genetic instructions found in humans
(2) produce vaccines to be used to immunize humans
(3) produce a human blood cell according to instructions in gene X
(4) produce the human protein coded for by gene X

12, For most animals, the sex of the offspring is determined by sex chromosomes. In some species of reptiles, such as the painted turtle, there are no sex chromosomes. It has been discovered that the sex of the offspring is determined by the temperature of the nest in which the egg develops. The fact that the sex of the painted turtle offspring is controlled by the temperature of the nest is an example of
(1) natural selection causing a new species to form
(2) a predator-prey interaction
(3) habitat destruction decreasing biodiversity
(4) environment modifying gene expression

13. The photographs below show different varieties of cattle and characteristics of each variety. Which statement best explains the development of variety C?

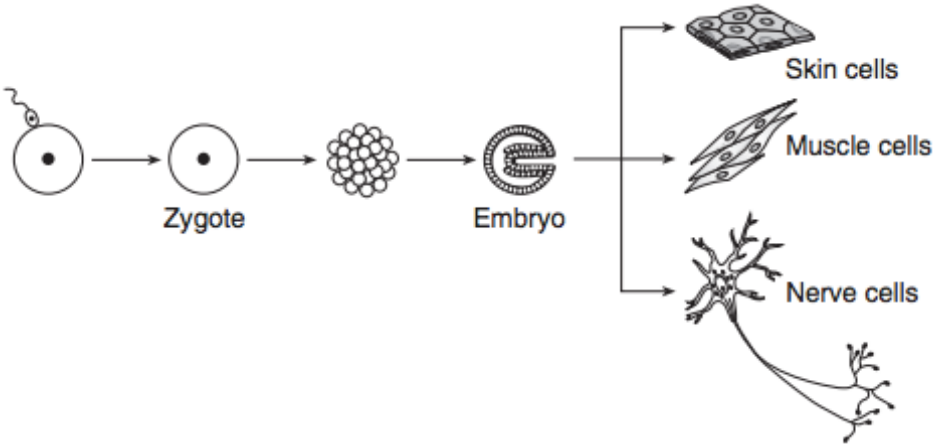


(1) Nuclei from body cells taken from variety A were inserted into egg cells lacking nuclei taken from variety B.
(2) Selective breeding was used to combine desirable traits from both varieties A and B.
(3) The need to adapt to changes in the environment led to the selection of advantageous characteristics in the offspring of variety B.
(4) Mutations that occurred in the body cells of variety A were passed on to the offspring generation after generation.

GENETICS: **NAME:**

2015-2016 Regents Questions, Key Idea 2: Organisms inherit genetic information in a variety of ways that result in continuity of structure and function between parents and offspring.

14. The development of nerve, muscle, and skin cells is represented in the diagram below. Which statement best explains how each of the different cell types can develop from the same embryo?



(1) The cells have identical genetic instructions, but different parts of these instructions are being expressed in each cell.
(2) The cells have identical genetic instructions, and all parts of these instructions are being expressed in each cell.
(3) The cells are produced by asexual reproduction and contain identical genetic instructions.
(4) The cells contain genetic instructions from two different parents and will express the instructions from one parent, only.

In 2003, as a result of the Human Genome Project, the complete sequence of all the bases in human DNA was released to the public. Although knowing the entire sequence of bases has proven valuable, scientists are currently working to map genes. Mapping genes involves determining the exact location of each gene. Since much of human DNA does not code for a protein, it is challenging to figure out which segments are actual genes. Often, scientists look at the percent composition of bases in a segment of DNA. If the segment of DNA has a large percentage of C and G bases (together over 50%), it is likely that it is a gene and codes for a protein.

15. A scientist analyzes the bases in a segment of DNA from a human skin cell to determine if it codes for a protein.
The base A is 12% of the bases in this segment of DNA. Calculate the percentage of bases that would be C. [1]
_____%

16. Is it likely this segment of DNA codes for a protein? Circle yes or no and support your answer. [1] Circle one: Yes or No

EVOLUTION: **NAME:**

2015-2016 Regents Questions, Key Idea 3 Individual organisms and species change over time.

1. Many domestic plants that are currently used for food by humans share a wild plant ancestor. The changes that have occurred in four common plants and the results are shown in the chart below

Wild Plant Ancestor	Change That Occurred	Resulting Modern Plant
wild mustard	reduced flower development	broccoli
wild mustard	sterile flowers	cauliflower
wild mustard	enlargement of leaves	kale
wild mustard	shortened stem length	cabbage

What event most likely produced the changes that occurred in the wild plant ancestor?
(1) Mutations in wild mustard sex cells were passed on to offspring.
(2) Humans did not like to eat wild mustard.
(3) Competition for survival occurred in all ecosystems of the world.
(4) Ancient herbivores overgrazed wild mustard.

---

2. Many animals have developed courtship behaviors. Males will often dance, swim, or sing in a particular way to attract a female. Males who are more successful at the courtship behavior will have a greater chance of having more offspring. This behavior is a result of
(1) natural selection
(2) genetic engineering
(3) asexual reproduction
(4) gene manipulation

3. A farmer wanted to rid his apple trees of a particular leaf-eating insect. He sprayed his trees with an insecticide that killed 98% of the insects. The survival of 2% of this population of insects is most likely due to
(1) genes obtained from another species
(2) certain chemicals that stimulated overproduction
(3) variations that resulted from sexual reproduction
(4) their ability to produce food from the pesticide

4. Which occurrence represents an example of evolution?
(1) Exposure to radiation reduces the rate of mutation in leaf cells.
(2) A mutation in a liver cell causes a person to produce an enzyme that is less efficient.
(3) Cells in a zygote eventually change into bone cells or skin cells.
(4) Some antibiotics are almost useless, because pathogens have developed a resistance to these antibiotics.

5. A man is exposed to large amounts of ultraviolet radiation while sunbathing at the beach. This exposure causes a genetic change in the DNA of a skin cell. In the future, this change can be passed on to
(1) his male and female children
(2) his male children, only
(3) all cells in his body
(4) his skin cells, only

6. Evolution of a species could occur as a result of changes in the
(1) DNA in muscle cells
(2) base sequences in liver cells
(3) genes in an egg cell
(4) number of chromosomes in a fetal bone cell

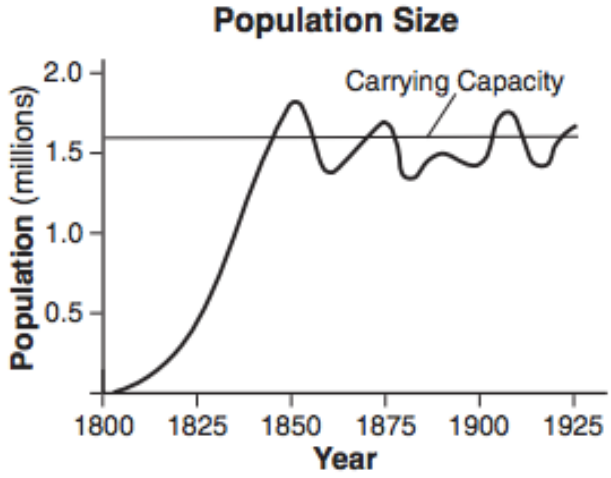
EVOLUTION: **NAME:**

2015-2016 Regents Questions, Key Idea 3 Individual organisms and species change over time.

7. When receiving x rays, individuals wear a lead shield over major organs in order to limit the body's exposure to radiation. One reason for this procedure is to
(1) protect the patient against broken bones
(2) prevent mutations in gametes
(3) improve circulation in the patient
(4) increase the chance of a change in DNA

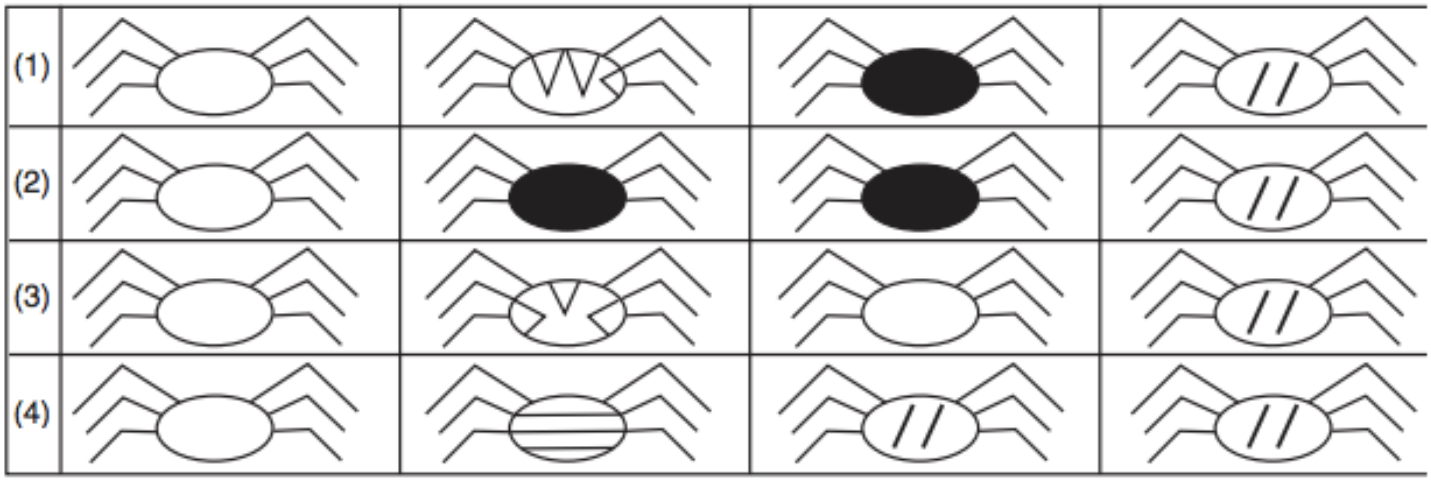
8. Medical professionals are concerned with the increase in the number of bacterial species that are resistant to antibiotics. Once resistance appears in a bacterial population, it spreads rapidly. This is most likely because
(1) populations of resistant bacteria are small
(2) exposure to antibiotics increases the rate of reproduction in bacteria
(3) resistant bacteria are small when compared to non-resistant bacteria.
(4) resistant bacteria survive in greater numbers and pass the trait to their offspring

The graph below shows the size of a population of foxes over a period of years.



9. If the line did not stay around the carrying capacity, but continued to rise, which concept would this graph best illustrate?
(1) environmental stability
(2) genetic variety
(3) behavioral change
(4) overproduction

10. Each row in the chart below represents a different population of the same species of insect. Which row shows the population with the greatest chance of survival in a changing environment?



EVOLUTION: **NAME:**

2015-2016 Regents Questions, Key Idea 3 Individual organisms and species change over time.

A Great Larvae Meal

New Caledonian crows consume a wide range of foods. These crows require tools to extract the larvae of wood boring beetles from their burrows. A bird pokes a larva with a stick until the larva is disturbed enough to bite the stick and hang on to it. The bird is then able to pull the larva out of its burrow. These larvae, with their unusual diet, have a distinct chemical that can be found in the feathers and blood of crows—allowing scientists to determine the percentage of the crows' diet that is made up of beetle larvae. Scientists found that the beetle larvae are so energy-rich that just a few could satisfy the daily energy requirement for a crow. The crows with the greatest skill in using a twig as a tool benefit most in terms of nutrition.

A captive New Caledonian crow forages for food using a stick tool. (Credit: Dr. Simon Walker)

11. State one reason why the offspring of crows skilled at using twigs as tools would have the greatest chance of survival. [1]

12. State one reason why some members of a population of crows equally skilled in the use of twigs have different rates of survival. [1]

Ocean-dwelling (marine) iguanas and land iguanas inhabit the Galapagos Islands. Some scientists believe that both types of iguanas diverged from a common ancestor. Marine iguanas eat algae. Land iguanas feed on cacti. Algae are more abundant in the ocean than cacti are on the islands. Both species lay their eggs in the sand. Rats, cats, and goats have been introduced to the islands by humans. Rats feed on iguana eggs, cats eat baby iguanas, and goats eat cacti.

13. Identify the process by which ancestral iguanas developed into the present-day marine iguanas and land iguanas of the Galapagos Islands. [1]
Process: _____

14. Identify one technique that can be used to support the conclusion that these two species of iguana developed from a common ancestor. [1]
Technique:

EVOLUTION: **NAME:**

2015-2016 Regents Questions, Key Idea 3 Individual organisms and species change over time.

Scientists studied the distribution of a species of pocket mouse that lived in the sandy desert regions of the southwestern United States. They are eaten by a variety of predators. Pocket mice are active at night, and feed on seeds and grasses. A single female mouse can reproduce several times each year, producing a litter of 3 to 13 offspring each time. Each new litter is considered a generation. A volcanic eruption that resulted in lava flows changed the color of the area that the mice inhabit from light brown to black. Data from the scientist's research of the population are shown in the chart below.

Changes in Pocket Mouse Fur Color after a Volcanic Eruption

Number of Generations	Percentage of Pocket Mice with Light Brown Fur	Percentage of Pocket Mice with Black Fur
10	95%	5%
25	90%	10%
50	75%	25%
100	5%	95%

15. State the role of mutation or recombination in the appearance of the trait for black fur color in the pocket mouse population. [1]

16. Explain why the percentage of black pocket mice changed so much after the volcanic eruption. [1]

Female mosquitoes need a meal of blood from a person or other animal in order to produce eggs. It has been discovered that mosquitoes have cells on their antennae that can detect the insect repellent known as DEET. The repellent is not harmful to mosquitoes, but when mosquitoes detect DEET, they will not land on the surface where the DEET has been applied. This protects people from being bitten by mosquitoes. Recently, scientists found some mosquitoes that are resistant to DEET because they do not detect its presence. They bred these mosquitoes and eventually produced a population consisting of about 50% DEET-resistant insects.

17. Identify the process most likely responsible for a mosquito initially becoming resistant to DEET. [1]

18. Mosquitoes with DEET resistance have been found in natural environments. Explain how the continued use of this repellent may cause the percentage of these resistant mosquitoes to increase in the future. [1]

Reproduction: **NAME:**

2015-2016 Regents Questions, Key Idea 4. The continuity of life is sustained through reproduction and development.

1. DNA replication occurs in preparation for
(1) mitosis, only
(2) meiosis, only
(3) both mitosis and meiosis
(4) neither mitosis nor meiosis

2. In humans, the placenta is essential to the embryo for
(1) nutrition, excretion, and reproduction
(2) respiration, nutrition, and excretion
(3) movement, reproduction, and nutrition
(4) coordination, movement, and growth

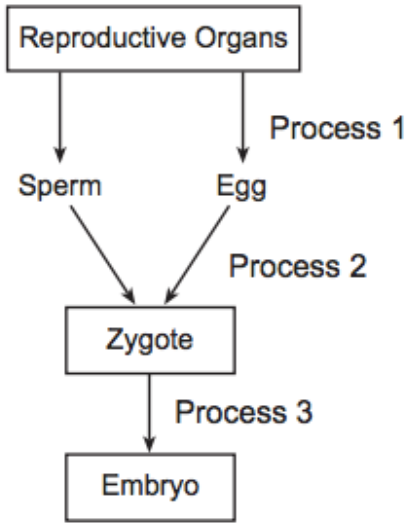
3. After a zygote is formed, specialization of cells occurs. Through which process do the cells of a zygote become specialized?
(1) sexual reproduction
(2) meiosis
(3) fertilization
(4) differentiation

4. Three human hormones most directly involved in sexual reproduction are
(1) estrogen, insulin, and progesterone
(2) testosterone, estrogen, and insulin
(3) progesterone, ATP, and testosterone
(4) estrogen, progesterone, and testosterone

5. Which process produces only identical offspring?
(1) meiotic cell division
(2) selective breeding
(3) cloning
(4) fertilization

6. Rabbits produce large numbers of offspring during each reproductive season, yet the number of rabbits within a given population changes very little from year to year. The stability of the population size is most likely the result of
(1) the development of mutations in young rabbits
(2) environmental factors that keep the population in check
(3) rabbits continuing to reproduce when the population is large
(4) the survival of more female rabbits than male rabbits

The diagram below represents the processes leading to the formation of a human embryo.



7. The correct sequence for processes 1, 2, and 3 represented in the diagram is

Row	Process 1	Process 2	Process 3
(1)	gamete formation	cell division	fertilization
(2)	cell division	gamete formation	fertilization
(3)	gamete formation	fertilization	cell division
(4)	fertilization	gamete formation	cell division

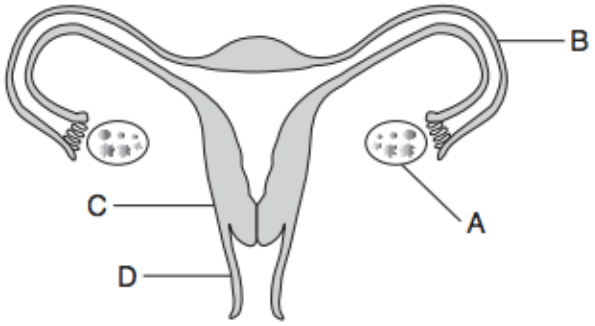
8. Occasionally, during pregnancy, the placenta can separate from the uterus. This causes a disruption in development and sometimes death of the fetus. Harm to the developing fetus might occur because the placenta
(1) transfers oxygen and nutrients to the fetal blood
(2) sends maternal blood into the fetus
(3) supplies milk for the fetus
(4) breaks down wastes of the fetus

Reproduction: **NAME:**

2015-2016 Regents Questions, Key Idea 4. The continuity of life is sustained through reproduction and development.

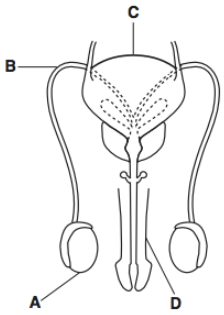
9. Rabbits produce large numbers of offspring during each reproductive season, yet the number of rabbits within a given population changes very little from year to year. The stability of the population size is most likely the result of
(1) the development of mutations in young rabbits
(2) environmental factors that keep the population in check
(3) rabbits continuing to reproduce when the population is large
(4) the survival of more female rabbits than male rabbits

10. The human female reproductive system is represented below.



Which structure produces chemicals that regulate the reproductive cycle?
(1) A
(2) B
(3) C
(4) D

11. The human male reproductive system is represented below.



Which structure produces cells that have the potential to become gametes?
(1) A
(2) B
(3) C
(4) D

HOMEOSTASIS: **NAME:**

2015-2016 Regents Questions, Key Idea 5 Organisms maintain a dynamic equilibrium that sustains life

1. A student infected by a common cold virus ran a low-grade fever. After a few days, the student's temperature returned to normal and the student was free of cold symptoms. The fever served as
(1) an antigen in the circulatory system
(2) an immune response to a pathogen
(3) a biological catalyst
(4) a weakened pathogen

2. A dead or weakened pathogen used to establish immunity would most likely be found in
(1) a pesticide
(2) an antibiotic
(3) a vaccine
(4) a toxin

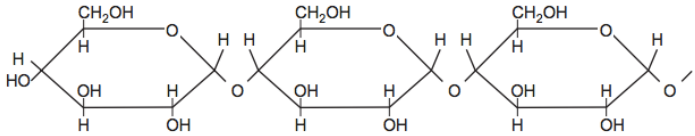
3. Which statement is true for all of the organisms in the ecosystem represented in the diagram below?

(1) They use energy to combine the inorganic molecules carbon dioxide and water into energy-rich organic compounds.
(2) Stored energy cannot be used by these organisms as a source of energy for life processes.
(3) Energy stored in inorganic molecules is released during cellular respiration in these organisms.
(4) Energy is used by the organisms to obtain and transport materials, and to eliminate wastes.

4. An individual walks out of his air-conditioned (75°F) home into the hot outside environment (85°F). His ability to adjust to this changing environment involves a mechanism similar to
(1) the regulation of water loss by guard cells in plant leaves
(2) the digestion of carbohydrates by enzymes
(3) using ATP for the diffusion of water
(4) glucose production in the pancreas

5. As it grows from a seed to a mature plant, a plant will grow taller and thicker. Which are abiotic factors most responsible for the increase in the mass of the plant?
(1) water, minerals, bacteria
(2) sunlight, oxygen, plant receptors
(3) minerals, water, plant enzymes
(4) water, sunlight, carbon dioxide

questions 6 and 7 are based on the diagram below.
The diagram represents a portion of a starch molecule.



6. The building blocks for this molecule are
(1) amino acids
(2) simple sugars
(3) fats
(4) molecular bases

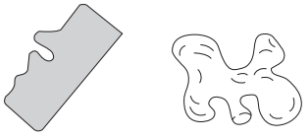
7 The energy in this molecule is stored
(1) in the bonds between atoms
(2) in the oxygen found in the molecule
(3) when the carbon atoms break off
(4) when water breaks this molecule apart

8. When an ant in a colony dies, the live ants will throw the dead ant out of the anthill. If a live ant from the colony, ant X, is sprayed with a chemical characteristic of dead ants, the live ants will repeatedly throw this ant out of the anthill until they can no longer detect the chemical on ant X. What is the best explanation for this behavior?
(1) The ants are responding to a chromosomal mutation in ant X.
(2) The chemical is exhibiting a feedback mechanism.
(3) The live ants must continue this behavior until they have eliminated ant X.
(4) The chemical acts as a stimulus for a particular behavior.

HOMEOSTASIS: **NAME:**

2015-2016 Regents Questions, Key Idea 5 Organisms maintain a dynamic equilibrium that sustains life

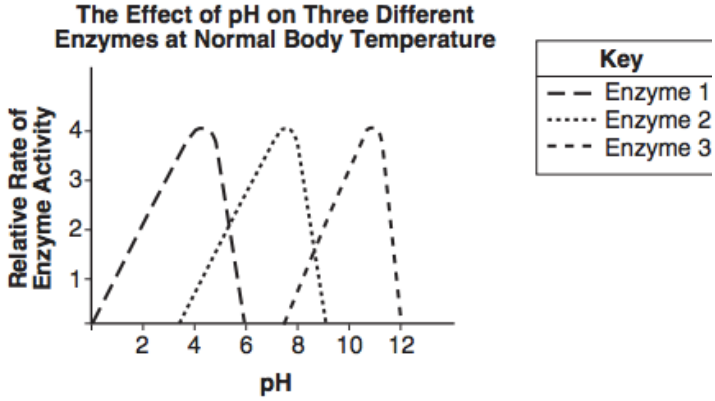
9. The diagrams below represent two molecules that are involved in metabolic activities in some living cells. The shape of each of the molecules is important because



(1) molecules having different shapes are always found in different organisms
(2) the shape of a molecule determines how it functions in chemical reactions
(3) the shape of a molecule determines the age of an organism
(4) if the shape of any molecule in an organism changes, the DNA in that organism will also change

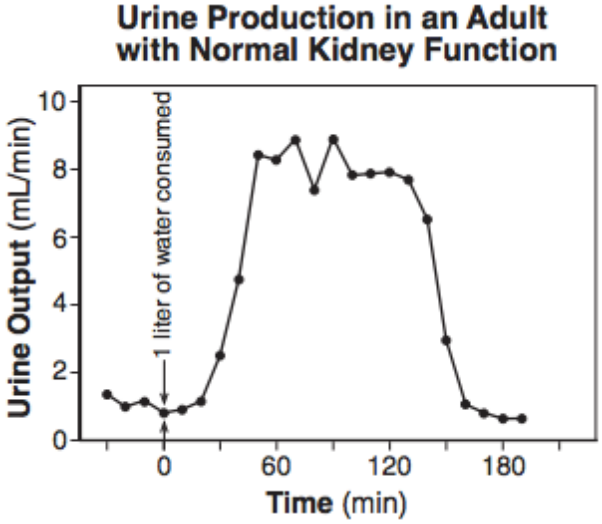
10. When getting a vaccination, which substance is injected into the body?
(1) bacteria to combat a pathogen
(2) white blood cells to engulf a pathogen
(3) a weakened form of a virus
(4) antibiotics to kill a virus

11. The graph below represents the effect of pH on three different enzymes at normal body temperature.



The graph illustrates that enzymes 1, 2, and 3
(1) are not affected by pH
(2) work best at different pH levels
(3) work best in an acidic environment
(4) work best in a basic environment

(12-14 are based on this text and the image to the right)
An investigation was carried out to determine the effect of drinking an excessive amount of water on urine flow. A subject drank 1 liter of water in 5 minutes, and then urine output was measured. The graph shows how the human adult kidneys responded to regulate water balance in the body. Urine output was measured every 10 minutes for a little over 3 hours. Normal output for an average adult is approximately 0.5–1 mL/min.



12.One half-hour after the liter of water was consumed, the urine produced by the kidneys was
(1) between 2 and 3 mL/min
(2) between 4 and 5 mL/min
(3) eight times greater than normal
(4) below the normal range

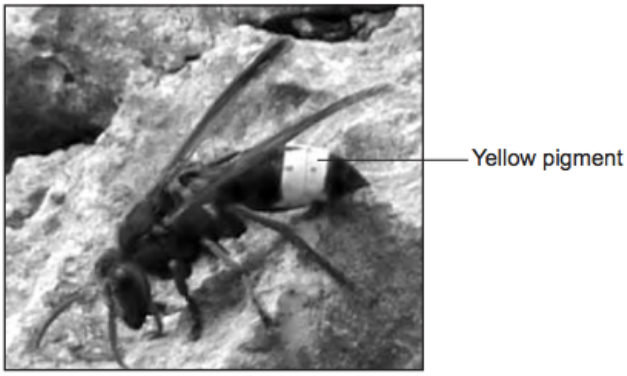
13. The change in urine production during this 3-hour period was most likely the result of
(1) antibody production
(2) homeostatic feedback
(3) enzymatic breakdown of the water consumed
(4) nerve cell malfunctions of the kidneys

14. Identify a structure, in organisms that do not have kidneys, that is adapted to regulate water balance. [1]

HOMEOSTASIS: **NAME:**

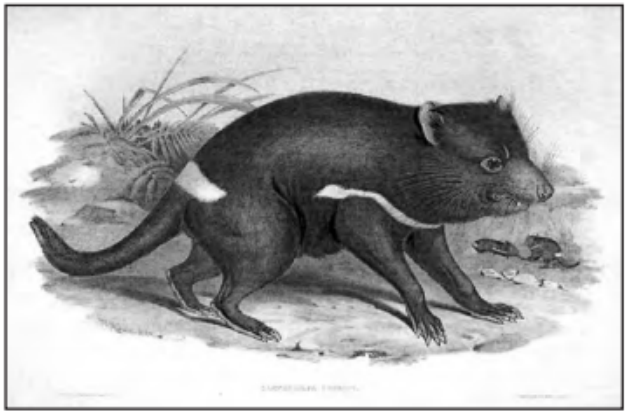
2015-2016 Regents Questions, Key Idea 5 Organisms maintain a dynamic equilibrium that sustains life

Oriental hornets are unique insects. A yellow pigment in the body of the insect converts solar energy to electrical energy. Plants also convert energy from the Sun.



15. Identify the organelle present in plants where this conversion takes place. [1] _____

The illustration is of a Tasmanian devil. The Tasmanian devil is the largest surviving carnivorous marsupial in Australia. It is in danger of extinction due to an unusual type of cancer called Devil Facial Tumor Disease (DFTD). It can be passed from one individual to another through wounds that occur when they fight over food. Tumor cells in the mouth of an infected animal break off and enter the wound on an uninfected animal. The tumor cells multiply in the body of the newly infected devil, forming new tumors that eventually kill the animal. Recent research has shown that the immune system of a Tasmanian devil accepts tumor cells from another devil as if they were cells from its own body. The tumor cells are ignored by the immune system. No immune response develops against them, and the cancerous cells multiply. Scientists predict that DFTD could wipe out all the remaining Tasmanian devils in 25 years, unless a treatment is developed.



16. Using the terms antigens and antibodies, explain why the tumor cells are ignored by the immune system in Tasmanian devils. [1]

17. Explain how cancer cells differ from normal cells. [1]

18. Describe one possible way to maintain a population of healthy, uninfected Tasmanian devils until a treatment or cure can be found. [1]

HOMEOSTASIS: **NAME:**

2015-2016 Regents Questions, Key Idea 5 Organisms maintain a dynamic equilibrium that sustains life

Fungi are interesting organisms that interact with humans in many ways. Yeasts are fungi used in the food industry to produce products such as bread and certain beverages. Some fungi are valuable in medicine. For example, the drug cyclosporine, which is capable of suppressing the response of the immune system to foreign antigens, and the antibiotic penicillin are both products from fungi. Other fungi are less welcomed by humans. The irritation of athlete's foot is caused by a fungus, and a number of allergies are caused by reproductive spores released by fungi.

19. Describe the role of a drug like cyclosporine when transplanting organs from one person to another person. [1]

20. Explain the difference between an infection caused by a fungus and an allergy caused by a fungus.

A company selling solar panels claims that their panels, like plants, provide clean, renewable energy. They also claim that using solar panels will have a positive effect on the biosphere by reducing global warming.

21State how the energy-capturing process used by plants worldwide can help to reduce global warming [1]

ECOLOGY: **NAME:**

2015-2016 Regents Questions, Key Idea 6 Plants and animals depend on each other and their physical environment

1. When a natural disaster destroys a stable ecosystem, the area is temporarily less stable than before. This is most likely due to
(1) a decrease in biodiversity
(2) an increase in the number of food chains
(3) an increase in the number of species
(4) a decrease in the rate of mutation

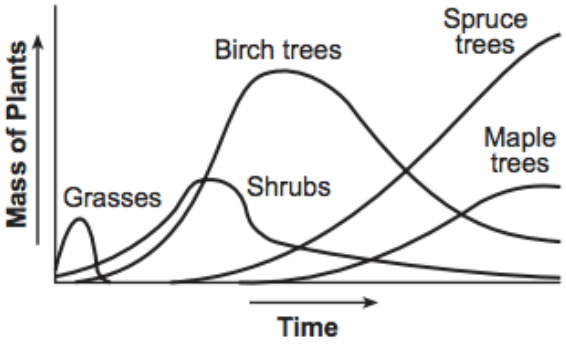
2. Dodder, a plant with no chlorophyll, grows on a living plant of a different species from which it obtains nutrients. Which pair of terms describes this relationship?
(1) parasite and host
(2) predator and prey
(3) producer and decomposer
(4) consumer and scavenger

3. Populations of aspen trees in the western United States are being destroyed by an unexplained illness. The altered landscape is affecting the animals that live there. Populations of deer mice are increasing greatly in these areas. Unfortunately, these mice often carry a virus that is deadly to humans. This scenario best illustrates that
(1) a change in the environment always results in disease
(2) humans are the cause of the breakdown of this ecosystem
(3) the stability of this ecosystem is limited by the amount of water available
(4) every population in an ecosystem is linked with other populations

4. The Eurasian water milfoil is a nonnative species, which was once commonly sold as an aquarium plant, and is now found growing in many lakes in New York State. It has few natural enemies, and grows rapidly, crowding out many native species. This plant ruins fishing areas and interferes with boating and other water sports. This is an example of

(1) human consumption of finite resources
(2) an unintended consequence of adding an organism to an ecosystem
(3) an abiotic factor having a negative effect on an ecosystem
(4) the introduction of a species that has increased the long-term biodiversity of an ecosystem

Base your answers to questions 5 through 7 on the graph below and on your knowledge of biology. The graph shows the masses of different types of plants found in an area of the Adirondack Mountains after a forest fire occurred.



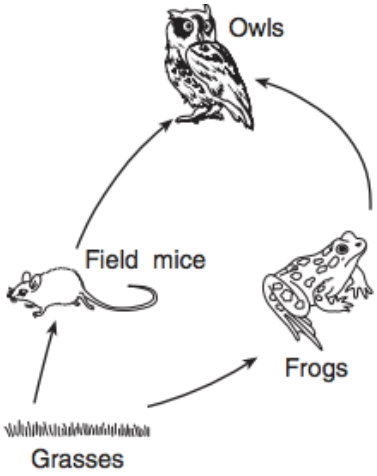
5. Based on the information provided in the graph, the process that is occurring is
(1) ecological succession
(2) biological evolution
(3) selective breeding
(4) genetic engineering

6. The time shown in the graph is most likely measured in
(1) days
(2) weeks
(3) months
(4) years

7. The mass of plants shown in the graph refers to the mass of a number of
(1) populations
(2) decomposers
(3) ecosystems
(4) communities

8. A food web is represented on the right. Which organism would receive the least amount of transferred solar energy?

(1) grasses
(2) owls
(3) frogs
(4) field mice

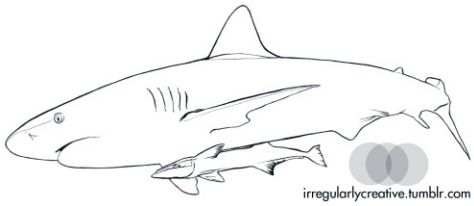


ECOLOGY: **NAME:**

2015-2016 Regents Questions, Key Idea 6 Plants and animals depend on each other and their physical environment

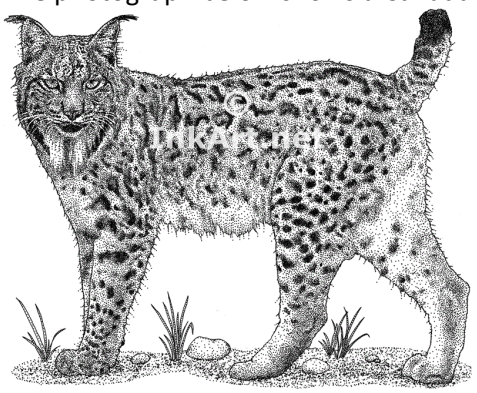
9. Birch bolete is a fungus that normally grows on the roots of birch trees in New York State. During the life of the fungus and the birch, each organism receives nutrients from the various biochemical processes of the other. According to this information, it can be inferred that these two species
(1) are both predators
(2) require the same amount of sunlight
(3) require a similar soil pH
(4) recycle the remains of dead organisms

10. The diagram below represents a remora fish attached to a shark.



A remora fish has an adhesive disk or sucker on its head, which it uses to attach itself to larger fishes, such as sharks. This attachment causes the shark no harm. The remora fish eat scraps of food that the sharks drop as they feed. This is an example of
(1) an adaptation to a specialized niche
(2) an adaptation of a successful parasite
(3) competition between two fish species for food
(4) competition for abiotic resources

The photograph below shows a Canada lynx, a mammal native to North America.



Lynx are found in areas where there is deep, soft snow cover during the winter months. The body design of the Canada lynx helps keep the animal on top of the soft snow. Several unique characteristics, such as the design of its feet and its weight, enable the cat to successfully chase and catch snowshoe hares, its primary source of food. Snowshoe hares are also able to remain on top of the snow. Increased winter recreation has created packed snow trails in lynx habitat. This allows coyotes and cougars to compete with lynx.

11. Explain why coyotes were not in competition with the lynx prior to the presence of packed snow trails. [1]

12. Describe the niche that the lynx, coyote, and cougar are competing to fill. [1]

13. Explain how the carrying capacity affects the number of predators in an area. [1]

ECOLOGY: **NAME:**

2015-2016 Regents Questions, Key Idea 6 Plants and animals depend on each other and their physical environment

Cowherds Discovering Ticks Are for the Birds South African cowherds [cowboys] are discovering that when it comes to debugging their cattle, nature knows best. Generations of cattle owners who dipped their livestock in pesticides ended up killing not only the ticks that feast on them, but also the red-billed oxpeckers [birds] that eat the ticks. Now environmentalists want to cut out the pesticides, hand the job back to the birds and in the process save them from extinction.… The bird is famous for its bright red bill, yellow ringed eyes and voracious appetite for ticks. An oxpecker can eat 13,000 of them [ticks] in a day, and meals are everywhere— on antelope, horses, cattle, buffalo, rhino, lion, elephant and leopard. The ticks carry a host of illnesses, including red-water disease, a common killer of cattle, but [ticks] are harmless to oxpeckers.… Source: Eric Naki, Associated Press writer

14. State one way that the use of pesticides to kill ticks could lead to the decline of the oxpecker population. [1]

15. State one ecological advantage of using oxpeckers to solve the problem with these ticks. [1]

The data table summarizes the changes that occurred to farmland in the years immediately following its abandonment. The land is located in a very stable ecosystem. It was abandoned after years of overuse and weathering, which resulted in the depletion of soil nutrients

Years Since Abandoned	Grasses and Weeds	Shrubs	Pine Forest	Hardwood Forest
1	X			
18	X	X	X	
30			X	
70			X	X
100				X
118 (present)				X

16. Which type of vegetation appears to have the lowest soil nutrient requirements? Support your answer with information from the data table. [1]

Lowest soil nutrient requirement vegetation: _____

17. Assuming the ecosystem remains undisturbed, which type of vegetation would you expect to be most common in this area 200 years after it was first abandoned? Support your answer. [1]

Most common vegetation: _____

18. Describe how the types of vegetation present on this farmland would change if a fire burned down all the trees 120 years after the land was abandoned. [1]

ECOLOGY: **NAME:**

2015-2016 Regents Questions, Key Idea 6 Plants and animals depend on each other and their physical environment

Ocean-dwelling (marine) iguanas and land iguanas inhabit the Galapagos Islands. Some scientists believe that both types of iguanas diverged from a common ancestor. Marine iguanas eat algae. Land iguanas feed on cacti. Algae are more abundant in the ocean than cacti are on the islands. Both species lay their eggs in the sand. Rats, cats, and goats have been introduced to the islands by humans. Rats feed on iguana eggs, cats eat baby iguanas, and goats eat cacti.

19. Identify the process by which ancestral iguanas developed into the present-day marine iguanas and land iguanas of the Galapagos Islands. [1] Process: _____

20. Identify one organism in the Galapagos Islands that directly limits the population of both the marine iguanas and land iguanas. [1] Organism: _____

21. Which population of iguanas, marine or land, would you expect to be larger? Support your answer. [1] Population of iguana: _____

22. Would the introduction of goats have a greater effect on the population of the marine iguanas or the land iguanas? Support your answer. [1] Population of iguana: _____

23. Identify one technique that can be used to support the conclusion that these two species of iguana developed from a common ancestor. [1] Technique: _____

HUMAN IMPACT: **NAME:**

2015-2016 Regents Questions Key Idea 7:Human decisions and activities have had a profound impact on the physical and living environment.

1. Residents of a town are concerned that a recently built factory could pose health risks. Scientists were asked to investigate the effects of the factory on the health of local residents. The most relevant information they reported was that

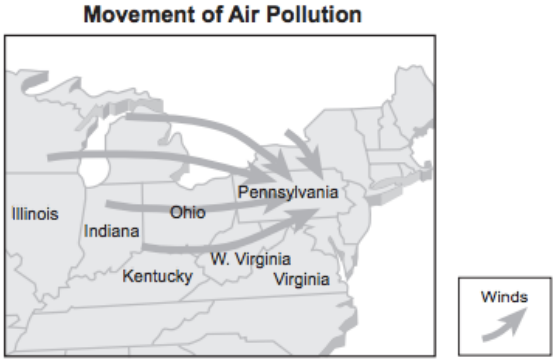
(1) in a survey, residents felt that the air in town looks dirtier now
(2) there have been reports that other types of factories have been linked with health issues
(3) residents have occasionally seen smoke coming from the factory
(4) local medical facilities have recently reported a 15% increase in the number of patients treated for asthma

2. Populations of aspen trees in the western United States are being destroyed by an unexplained illness. The altered landscape is affecting the animals that live there. Populations of deer mice are increasing greatly in these areas. Unfortunately, these mice often carry a virus that is deadly to humans. This scenario best illustrates that
(1) a change in the environment always results in disease
(2) humans are the cause of the breakdown of this ecosystem
(3) the stability of this ecosystem is limited by the amount of water available
(4) every population in an ecosystem is linked with other populations

3. Nonrenewable resources are
(1) not finite and are not depleted over time
(2) not finite and are depleted over time
(3) finite and are not depleted over time
(4) finite and are depleted over time

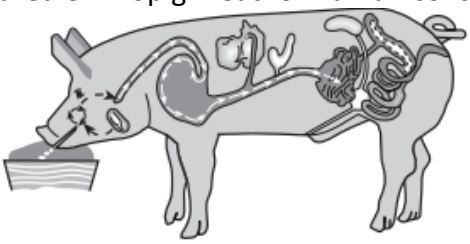
4. At one point, scientists observed that the ozone shield was getting thinner. They warned that the loss of the effectiveness of this shield may lead to an increase in
(1) allergies to ozone
(2) mutations that lead to cancer
(3) viral diseases, such as AIDS
(4) ice formation at the poles

5. The diagram below represents how air pollution may move across the eastern United States



In order to reduce the amount of air pollution in Pennsylvania, which change is necessary?
(1) Laws must be passed to protect endangered species.
(2) The use of natural resources must be increased.
(3) More coal-burning power plants must be built.
(4) The cooperation between the different states must be improved.

A genetically modified pig, nicknamed the "enviropig," has the ability to produce a bacterial enzyme in its saliva that helps reduce the amount of phosphorus in its wastes. Phosphorus pollution is a serious environmental concern. Enviropigs are expensive, but the cost is balanced against the benefit to the environment. There is also a concern that the US Department of Agriculture still has not cleared enviropig meat for human consumption.



6. Government agencies and citizens should propose the use of enviropig in the future only after
(1) developing ways to remove the bacterial enzyme
(2) assessing risks, costs, and benefits
(3) people have eaten lots of enviropig meat and determined the effects
(4) a different, cheaper pig can be produced regardless of the output of phosphorus

HUMAN IMPACT: **NAME:**

2015-2016 Regents Questions Key Idea 7:Human decisions and activities have had a profound impact on the physical and living environment.

7. Palm oil, produced from palm trees, is not only a biofuel, but is also used in food additives, cosmetics, and lubricants. Palm tree plantations are now cultivated in areas that were formerly natural forests. One ecological concern raised by this expansion is that
(1) the natural forest ecosystem may harm the palm trees
(2) the use of the land for agriculture will increase the biodiversity of the area
(3) humans are changing the basic processes of the palm trees
(4) planting large expanses of one crop reduces the biodiversity of the area

8. Fishermen have harvested certain fish to the point where the population of that fish is decreasing. This level of direct harvesting could cause
(1) ecosystems to be improved for future generations
(2) ecosystems to be severely damaged
(3) the restoration of environmental stability
(4) all other fish species to increase in number

9. One positive impact that industrialization has had is that
(1) industrialization produces waste gases that pollute the air
(2) fossil fuels used by industries help reduce finite resources
(3) industrialization has been a source of many jobs for people
(4) new technologies have increased acid rain

10. In one town, some people support a proposal to build a shopping mall on a large, undeveloped lot, because it would increase business and create new jobs. As a trade-off, the shopping mall would cause a decrease in the
(1) amount of air pollution
(2) volume of garbage and litter
(3) amount of wastewater entering the local sewage system
(4) variety of wildlife populations in the area

11. Medical professionals are concerned with the increase in the number of bacterial species that are resistant to antibiotics. Once resistance appears in a bacterial population, it spreads rapidly. This is most likely because
(1) populations of resistant bacteria are small
(2) exposure to antibiotics increases the rate of reproduction in bacteria
(3) resistant bacteria are small when compared to non-resistant bacteria.
(4) resistant bacteria survive in greater numbers and pass the trait to their offspring

12. Many beverage companies are required to recycle bottles and cans because this activity directly reduces
(1) air pollution and destruction of the ozone shield
(2) overpopulation and soil erosion
(3) solid waste and depletion of resources
(4) thermal pollution and extinction of wildlife

13. The Eurasian water milfoil is a nonnative species, which was once commonly sold as an aquarium plant, and is now found growing in many lakes in New York State. It has few natural enemies, and grows rapidly, crowding out many native species. This plant ruins fishing areas and interferes with boating and other water sports. This is an example of
(1) human consumption of finite resources
(2) an unintended consequence of adding an organism to an ecosystem
(3) an abiotic factor having a negative effect on an ecosystem
(4) the introduction of a species that has increased the long-term biodiversity of an ecosystem

HUMAN IMPACT: **NAME:**

2015-2016 Regents Questions Key Idea 7:Human decisions and activities have had a profound impact on the physical and living environment.

14. The SUNY Solar Car Model Racing Team's Sunhawk: Car of the Future?
The Sunhawk, a car built by students at SUNY New Paltz, prompted Forbes Magazine to ask "Is The $250,000 Sunhawk the Solar Car of the Future?" These cars show the most advanced solar technology and vehicle construction.

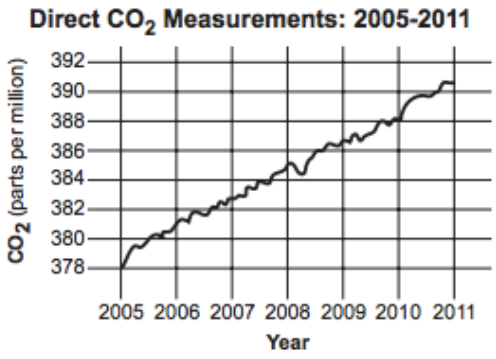
There are trade-offs involved in the use of solar-powered cars. Provide one advantage and one disadvantage of owning a solar car. [1]

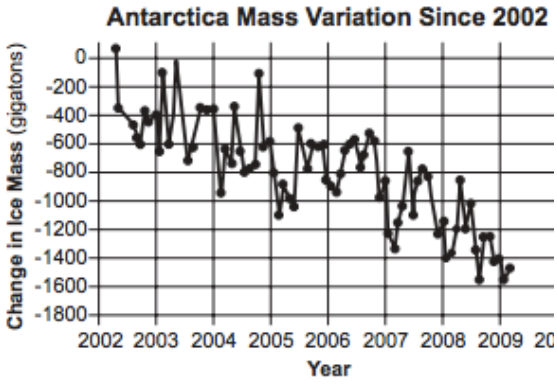
Advantage:

Disadvantage:

Over the past few decades, researchers have observed declining numbers in two species of penguins native to the West Antarctic peninsula. New evidence is pointing to a decline in their food supply as the primary cause for the recent drops in their numbers. These penguins feed on krill, small animals that grow and develop under ice masses. The graphs below show data related to two factors: atmospheric carbon dioxide (CO2) levels and Antarctic ice mass. The diagram of a generalized Antarctic food web illustrates the role of the penguins.

15. State one possible relationship between CO2 levels and the change in Antarctic ice mass. [1]

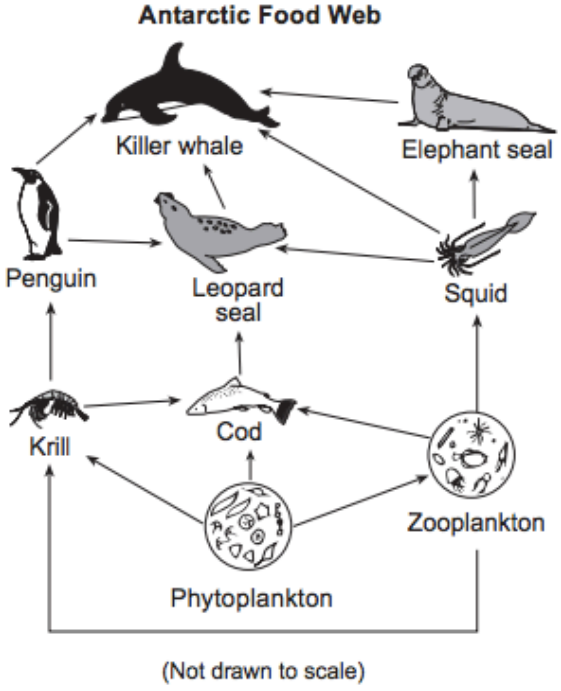




Source: http://www.nasa.g

16. Explain why the change in ice mass is resulting in a decline in the penguin populations. [1]

17. State one specific way in which humans might have caused the changes in atmospheric CO2 levels [1]



HUMAN IMPACT: **NAME:**

2015-2016 Regents Questions Key Idea 7:Human decisions and activities have had a profound impact on the physical and living environment.

The photograph below is part of an advertisement used by a company selling solar panels. The company claims that their panels, like plants, provide clean, renewable energy. They also claim that using solar panels will have a positive effect on the biosphere by reducing global warming. 56–58 Explain why these claims are valid. In your answer, be sure to:

18. explain why both plants and solar panels provide renewable energy, rather than nonrenewable energy [1]
19. state how the widespread use of solar panels to generate electricity can help to reduce global warming [1]
20. state how the energy-capturing process used by plants worldwide can help to reduce global warming [1]

Female mosquitoes need a meal of blood from a person or other animal in order to produce eggs. It has been discovered that mosquitoes have cells on their antennae that can detect the insect repellent known as DEET. The repellent is not harmful to mosquitoes, but when mosquitoes detect DEET, they will not land on the surface where the DEET has been applied. This protects people from being bitten by mosquitoes. Recently, scientists found some mosquitoes that are resistant to DEET because they do not detect its presence. They bred these mosquitoes and eventually produced a population consisting of about 50% DEET-resistant insects.

21. Identify the process most likely responsible for a mosquito initially becoming resistant to DEET. [1]

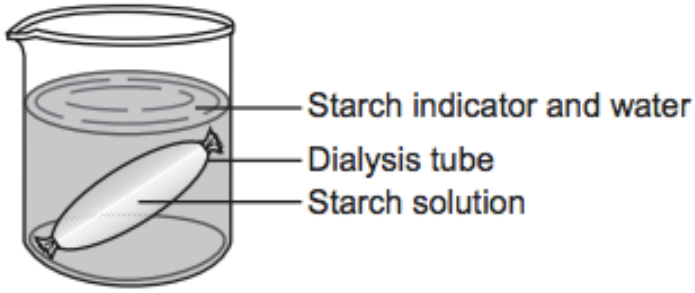
22. Mosquitoes with DEET resistance have been found in natural environments. Explain how the continued use of this repellent may cause the percentage of these resistant mosquitoes to increase in the future. [1]

LAB: **NAME:**

2015-2016 Regents Questions, Living Environment Laboratory Checklist

DIFFUSION THROUGH A MEMBRANE:

Base your answers to questions 73 through 75 on the diagram below and on your knowledge of biology. The diagram represents an experimental setup.

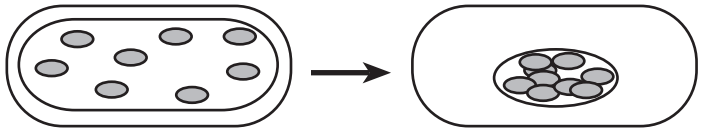


1.Which statement best describes what would most likely be observed after 20 minutes?
The contents of the dialysis tube would turn blue-black.
The liquid in the beaker would turn blue-black.
The dialysis tube would burst.
There would be no change visible.

2. Which term correctly identifies the process by which molecules move through the dialysis tube membrane?
paper chromatography
active transport
diffusion
digestion

3. A student filled a dialysis tube with 97% water solution and sealed the ends. The tube and its contents had a mass of 55 grams. The student placed the tube in a solution, and the mass of the tube and its contents increased to 60 grams. Into which solution was the dialysis tube placed?
0% water
95% water
97% water
99% water

The diagram below represents a green plant cell viewed with the high power of a compound light microscope before and after a particular substance was added

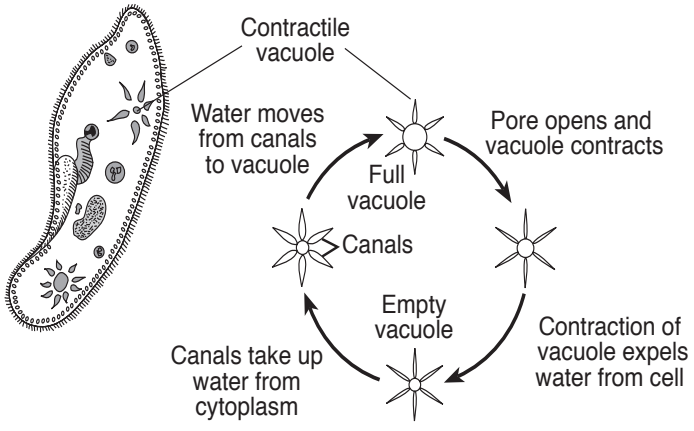


4. Identify a substance that could have been added to the slide to bring about the change shown. [1]

5. State *one* reason why a molecule may *not* be able to pass into or out of a cell. [1]

Question 6 and 7 are based on the following:

Using a microscope and a wet-mount slide, a student observed a pond water sample containing paramecia, which are single-celled freshwater organisms. He noticed that there was a structure within each living paramecium that contracted regularly—about four times each minute. He researched the organism in his science textbook and found that the structure was a contractile vacuole and its function was to remove excess water from the paramecium. In the diagram below, a paramecium is represented as seen through a microscope. The function of the contractile vacuole is described. He decided to determine if the concentration of salt in the environment of the paramecium would affect the rate at which the contractile vacuole would contract.



6. The process used to remove excess water from the paramecium by the contractile vacuole is
(1) synthesis
(2) digestion
(3) active transport
(4) passive transport

LAB: **NAME:**

2015-2016 Regents Questions, Living Environment Laboratory Checklist

(Based on image and experiment on previous page)

7. The student predicted that the contractile vacuole would contract fewer times in one minute in a solution that had a higher concentration of salt than that found in typical pond water. This prediction is most likely

1) correct, because a high concentration of salt in the environment will force water into the cell, causing the contractile vacuole to pump
2) incorrect, because salt would be entering the cell, and the contractile vacuole would have to pump it out
3) incorrect, because the concentration of salt in the environment should not affect a cell
4) correct, because water would be moving out of the cell into the salt solution

8. A student observing onion cells using a microscope was having difficulty seeing any detail in the cells. State *one* action the student could take to improve the detail. [1]

RELATIONSHIPS AND BIODIVERSITY

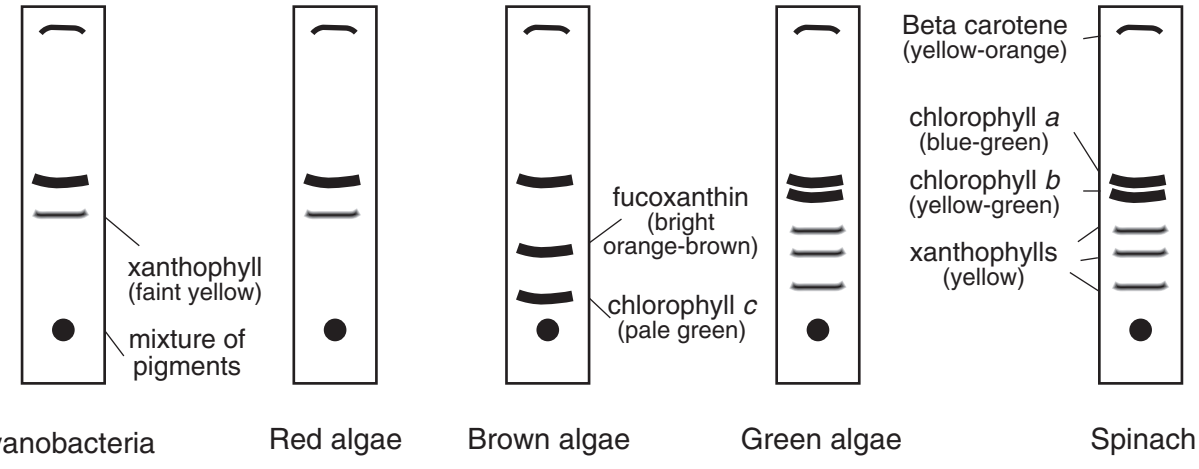
Species A: CAC GTG GAC AGA GGA CAC CTC

Species B: CAT GTG GAC AGA GGA CAC CTC

Species C: CAC GTA GAC TGA GGA CTT CTC

9. Using the DNA base sequences above, identify which *two* species are more closely related. Support your answer. [1]
Species: _____ and _____

The diagram represents the results of paper chromatography performed on extracts from five organisms.



10. Identify *one* pigment molecule common to all five organisms. [1]

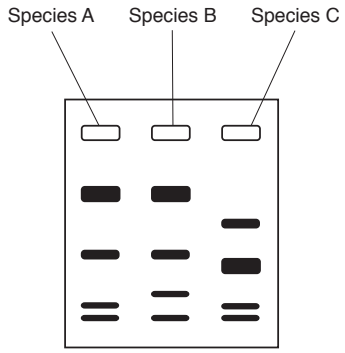
11. Which two organisms are most closely related?

1) cyanobacteria and green algae
2) red algae and spinach
3) brown algae and red algae
4) red algae and cyanobacteria

LAB: **NAME:**

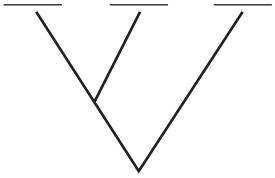
2015-2016 Regents Questions, Living Environment Laboratory Checklist

Scientists attempted to determine the evolutionary relationships between three different finch species, A, B, and C. In order to do this, they examined the physical characteristics and DNA of these species. DNA was extracted from all three species and analyzed using gel electrophoresis. The results are shown in the diagram.

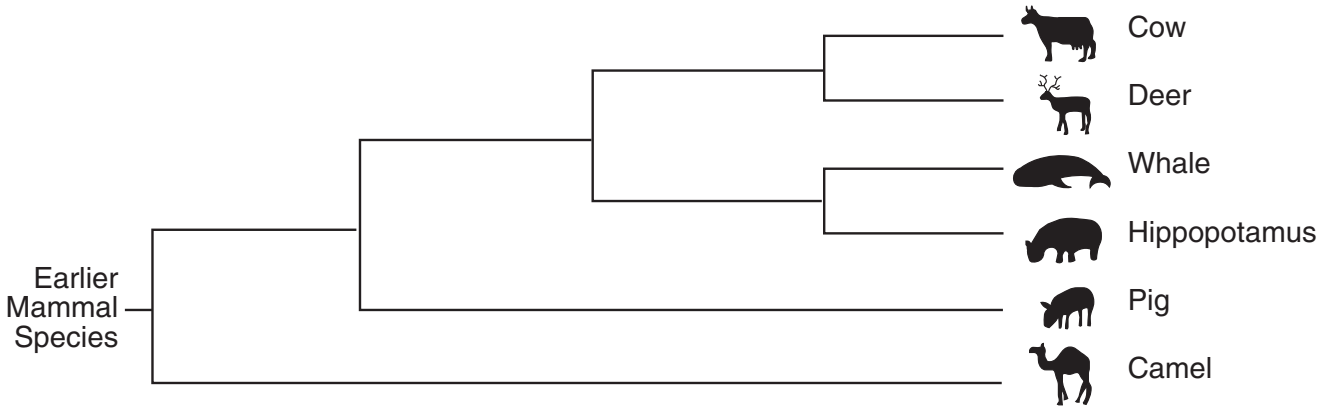


12. Which statement best describes the method used above to determine the evolutionary relationships between three species of finches?
(1) Examine the structure of the beaks and compare them.
(2) Observe behavioral and physical characteristics of all the finches and group them by similarities.
(3) Obtain molecular evidence from all three species and identify similarities.
(4) Compare common ancestors of all three of the species to see if they are the same.

13.Based on the data they collected using gel electrophoresis, label the branching tree diagram below. Write the letters A, B, and C, to represent the possible evolutionary relationships between species A, B, and C. [1]



The diagram below shows the evolutionary relationships among several types of mammals.



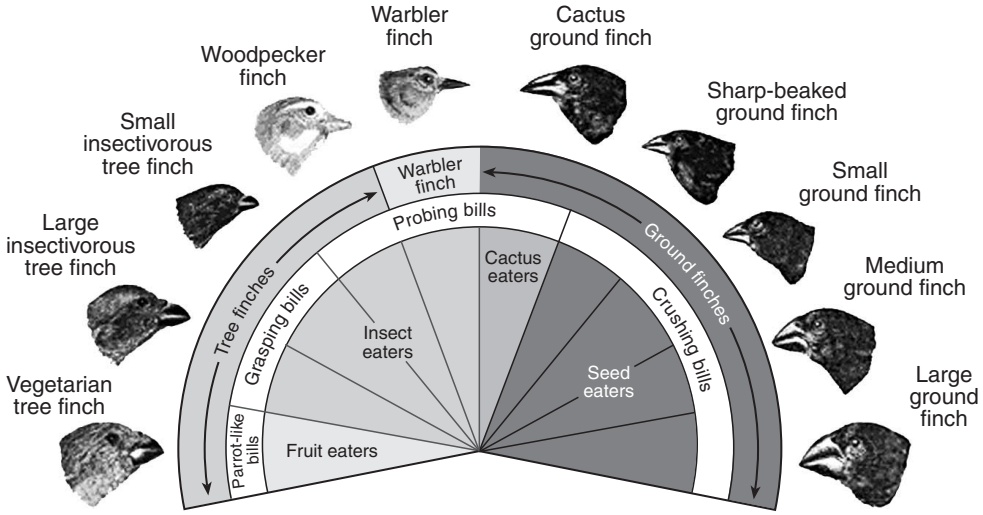
14. Which mammal would be most closely related to a hippopotamus?
(1) deer
(2) whale
(3) pig
(4) cow

LAB: **NAME:**

2015-2016 Regents Questions, Living Environment Laboratory Checklist

BEAKS OF FINCHES

The diagram shows variations in the beaks of finches in the Galapagos Islands.

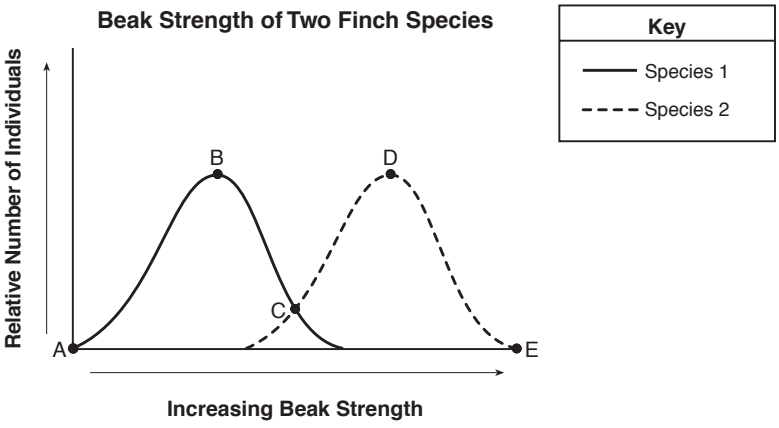


15. In this diagram, the variety of beak sizes and shapes are adaptations directly related to successful
(1) feeding
(2) camouflage
(3) defense
(4) singing

16. State *one* reason why the large ground finch and the woodpecker finch can live successfully on the same island. [1]

17. Identify *one* finch in the diagram that is *least* likely to compete with any of the other finches. Support your answer. [1]

Two species of finches found on a particular Galapagos island eat the seeds of a certain variety of plant. The relative strength of their beaks is shown in the graph below.



18. One of the finch species has a slightly smaller, weaker beak. Is this species 1 or species 2? Support your answer with information from the graph. [1]

19. Select the point on the graph where beak strength of the two bird species is equal. Support your answer. [1]

20. If the environment on the island changed and the seeds of more of the plants became harder to crack open, describe what the graph might look like after many years have passed. [1]

LAB: **NAME:**

2015-2016 Regents Questions, Living Environment Laboratory Checklist

MAKING CONNECTIONS

Five individuals had their pulses taken in beats per minute (bpm) before and after exercise. The data are shown in the chart below.

Pulse Rates

Individual	**Pulse before Exercise** (bpm)	**Pulse after Exercise** (bpm)
A	68	100
B	70	120
C	54	130
D	64	122
E	75	115

21. State *one* reason why an individual's pulse rate increased during exercise. [1]

22. Calculate the average pulse rate *before* exercise for this group, to the *nearest tenth*. [1] _____ **bpm**

23. State why the individuals in this group have different pulse rates before exercise. [1]

The buildup of waste products in muscle cells that are active might cause

(1) digestion

(2) cellular respiration

(3) increased fatigue

(4)decreased heart rate

A group of students obtained the following data while trying to determine the effect of exercise on pulse rate.

Effect of Exercise on Pulse Rate

Student	**Resting Pulse Rate** (beats per minute)	**Pulse Rate After Exercising** (beats per minute)
A	66	92
B	82	107
C	65	97
D	74	124
E	79	118
F	68	98
G	89	122

24. Which statement is an example of an observation the students could have made?

(1) Pulse rates in beats per minute decrease for all people after exercise.

(2) Student *A* most likely exercises regularly.

(3) The pulse rate of student *C* was dangerously low.

(4) The pulse rate of student *F* increased by 30 beats per minute.

25. Which two body systems were most actively involved in this experiment?

1) respiratory and immune
2) digestive and endocrine
3) respiratory and circulatory
4) immune and circulatory