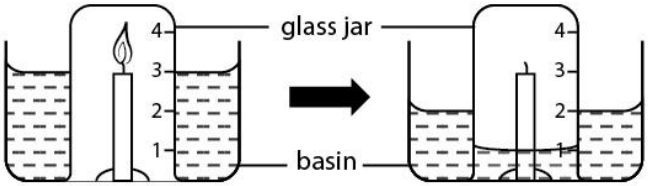
1. Henry conducted the experiment as shown below. After 5 minutes, the flame was extinguished and the water level rose up to the level as shown in the diagram.



Which of the following statements could be the objective(s) of the experiment?

1. To show that air is a mixture.
2. To show that air contains oxygen.
3. To show that burning requires oxygen.
4. To show that oxygen takes up space.

1. 1 only
2. 1,2 and 3 only
3. 2, 3 and 4 only
4. 1, 2, 3 and 4

2. Hydrogen peroxide (H_2O_2) is a toxic compound that is produced by plant and animal cells. These cells also produce the enzyme catalase, which converts H_2O_2 into water and oxygen gas, preventing the buildup of H_2O_2. A student designed an experiment to test the effect of an acidic pH on the rate of the reaction of H_2O_2 with catalase. The data below summarize the outcome of the experiment.

pH Level	**7 (neutral)**	**6**	**5**	**3**
Reaction Rate (mL of oxygen/minute)	1.5	1.3	1.0	0.55

Which conclusion is valid based upon the data collected by the student?

1. Catalase has the greatest activity at a pH of 7.
2. Catalase caused the greatest production of oxygen at a pH of 3.
3. Oxygen production will increase if more water is added to the reaction.
4. The change in pH prevents catalase from breaking down water.

3. For years, scientists believed that flight evolved when ancestral birds climbed trees and then glided back to the ground. Recent fossil evidence suggests that flight may have evolved from the ground up, as early birds used to jump off the ground as a way to avoid predators. These discoveries suggest that

1. ancestral birds always climbed trees
2. most birds avoid predators by jumping off the ground into the air
3. scientists use only fossil evidence to study flight
4. scientific understandings can change as new information becomes available

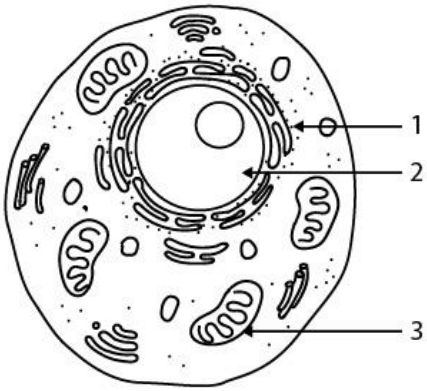
4. In a laboratory experiment, a small garden was set up in a sealed transparent plastic box that allowed the air to pass through. The components inside the box included a small plant, a small pond, some soil, and two insects. A group of Mathayom 1 students began observing the garden from day 1, and after one week, the experimental results were recorded as follows:

Day 0 : A small plant, black soil, 2 insects, and a small pond.
Day 7 : A plant has grown taller, new leaves have appeared, drops of water are visible on the walls of the plastic box, there are still 2 insects, the soil is black, and a small pond is still present.

Which living process does not explain the changes observed in the experimental results?

1. Growth
2. Reproduction
3. Photosynthesis
4. Respiration

5. The diagram shows the structure of an animal cell. Each labeled structure is involved in the synthesis of biological molecules.



Four students matched the numbers and functions of the structures that take parts in the synthesis of biological molecules together. Which student correctly identified them?

1. Boy A : Structure 1 produces protein. Structure 2 produces fat. Structure 3 produces DNA.
2. Girl B : Structure 1 produces fat. Structure 2 produces ATP. Structure 3 produces DNA.
3. Boy C : Structure 1 produces protein. Structure 2 produces DNA. Structure 3 produces ATP.
4. Girl D : Structure 1 produces fat. Structure 2 produces DNA. Structure 3 produces protein.

6. Four substances have the following electrical properties.

substance	property
W	does not conduct under any conditions
X	conducts only in aqueous solution
Y	conducts in both the molten and solid states
Z	conducts in both the molten and aqueous states

What are these four substances?

	W	X	Y	Z
1.	HCl	S	NaCl	Pb
2.	Pb	HCl	NaCl	S
3.	S	HCl	Pb	NaCl
4.	S	NaCl	HCl	Pb

7. The atoms of three elements in the Periodic Table have atomic numbers and mass numbers as follows:

Element	V	W	X
Atomic number	4	5	6
Mass number	9	11	12

Which of the following represents the number of neutrons in the nucleus of each of the elements?

	V	W	X
1.	4	5	6
2.	5	6	6
3.	8	10	12
4.	9	11	12

8. Some information about four solids M, N, O and P are given below.

Solid	% composition by mass	Solid conducts electricity	Strong heat in air
M	Constant	No	Decomposes
N	Varies	No	Burns
O	Varies	Yes	Melts
P	Constant	Yes	Oxidizes to one substance

Which of the following is **not** correct?

1. M is a compound.
2. N is a mixture.
3. O is a compound.
4. P is an element.

9. A scientist wanted to find out the purity of an unknown substance. What physical property/properties should he find out to determine whether the substance contains any impurities?

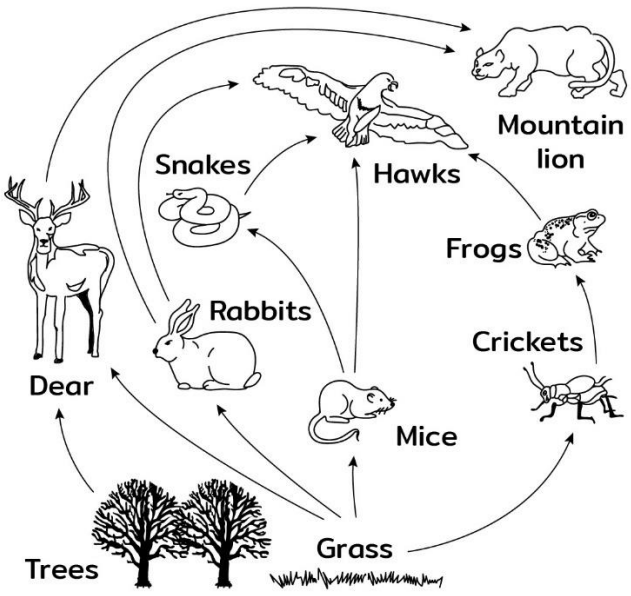
1. Density
2. Melting point
3. Magnetic properties
4. Electrical conductivities

1. 1 only
2. 1 and 2 only
3. 1,3 and 4 only
4. 1,2,3 and 4

10. Scientists who have examined the fossil record have noted that some species have changed very little over long periods of geologic time. The lack of change in such organisms is most likely because

1. there was a large amount of variation in their population, and the environment changed frequently
2. all members of their population were genetically identical, and they lived in a rapidly changing environment
3. the environment that they lived in remained the same, and they were well-adapted to it
4. they could move between different environments when food supplies became scarce

11. Which statement most accurately predicts the result of interfering with populations in the web?

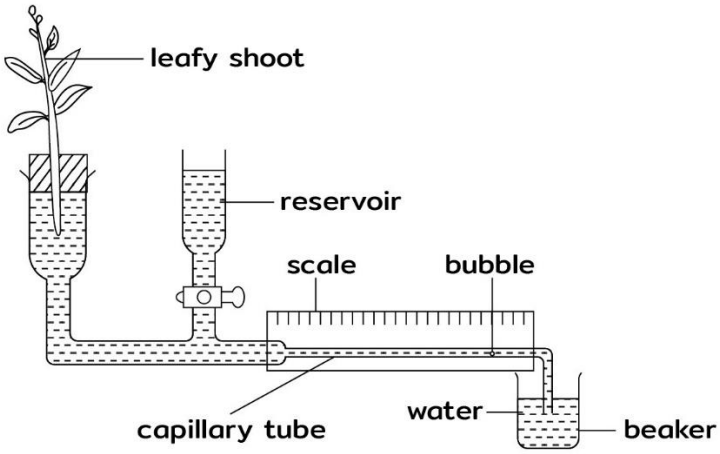


1. Removing the cricket population will have much effect on the balance of the food web.
2. Removing all the mountain lions from the food web will benefit the ecosystem.
3. Removing the cricket and rabbit populations would cause the number of trees to decrease.
4. Removing deer from the food web will affect the rabbit and grass populations.

12. In the 1660s, Jan van Helmont grew a small willow tree in a pot of soil. He added only water to the pot. At the end of five years, he found that the tree had gained 75 kilograms, but there was very little change in the mass of the soil. Van Helmont concluded that the plant gained weight directly from the water. We now know that this conclusion is only partially correct because, in addition to water, photosynthesis also requires

1. oxygen from the atmosphere
2. carbon dioxide from the atmosphere
3. proteins from animal prey
4. carbohydrates from the soil

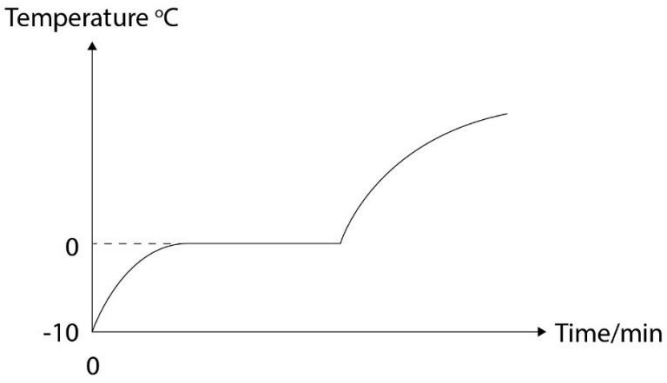
13. The diagram below shows an experimental set-up to investigate the rate of transpiration.



Under which of the following environmental conditions would the air bubbles in the capillary tube move at the fastest rate?

1. Cold, dry and windy
2. Cold, humid and windy
3. Warm, dry and windy
4. Warm, humid and without wind

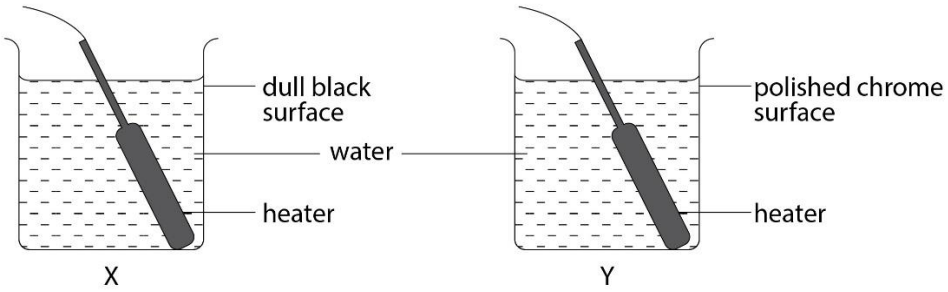
14. The graph below shows the temperature-time changes for ice, initially at -10 °C, being heated at a steady rate.



Which of the following can be deduced from the graph?

1. The ice is pure.
2. The system is well insulated.
3. The external atmospheric pressure is 750 mmHg.
4. The specific heat capacity of ice is greater than that of water.

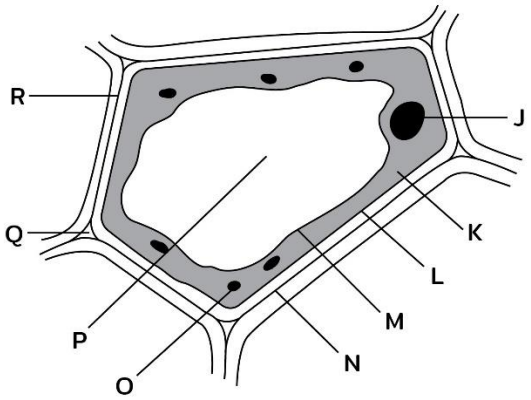
15. In the diagrams below, two copper cans X and Y with outer surface of different textures are filled with the same amount of water at room temperature and heated by heaters of the same power.



Which statement is correct?

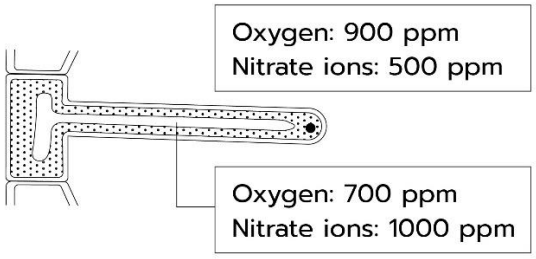
1. Water in X boils faster because dull black surface is a better insulator of heat.
2. Water in X boils faster because dull black surface is a good absorber of heat.
3. Water in Y boils faster because polished surface is a poor radiator of heat.
4. Water in both cans take the same length of time to boil because texture of the outer surface will not affect the rate of energy loss to the surroundings.

16. Which of the following describes parts **J, K, M** and **N**?



	J	K	M	N
1.	Contains hereditary materials	Made up of mainly sugar molecules	Most chemical reactions occur	Partially permeable
2.	Contains hereditary materials	Most chemical reactions occur	Partially permeable	Made up of mainly sugar molecules
3.	Contains hereditary materials	Most chemical reactions occur	Made up of mainly sugar molecules	Partially permeable
4.	Most chemical reactions occur	Contains hereditary materials	Partially permeable	Made up of mainly sugar molecules

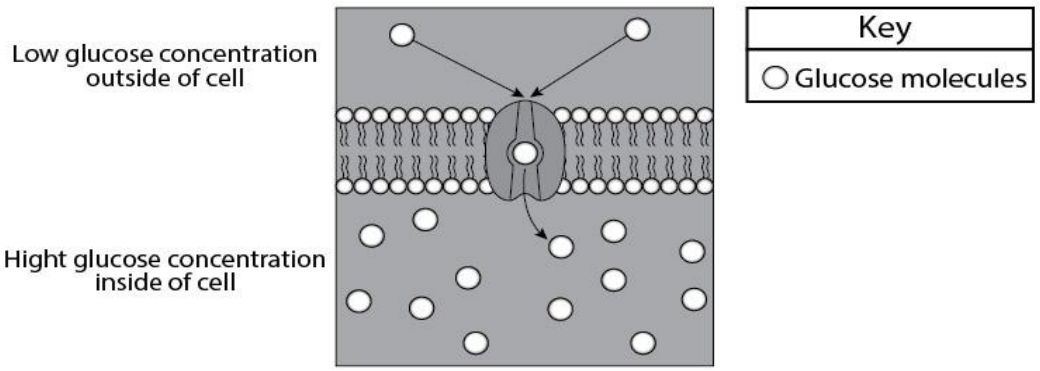
17. The diagram below shows the concentration (in parts per million) of various substances outside and inside a root hair cell.



What processes do these substances enter the cell?

	Oxygen	Nitrate ions
1.	Diffusion	Diffusion
2.	Osmosis	Diffusion
3.	Active transport	Active transport
4.	Diffusion	Active transport

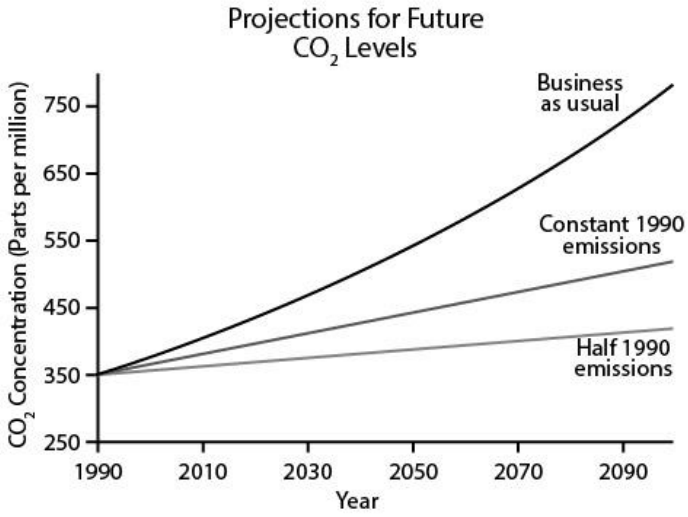
18. The diagram below illustrates the movement of glucose across a cell membrane.



Which two processes are most directly represented in this diagram?

1. ATP synthesis and the diffusion of water
2. molecule transport and energy use
3. homeostasis and ATP synthesis
4. homeostasis and the diffusion of water

19. The graph below shows three projections for future carbon dioxide (CO_2) levels.



— The “Business as usual” line shows CO_2 levels if emissions remain at current levels.

— The “Constant 1990 emissions” line shows CO_2 levels if emissions are cut to the same level that they were in 1990.

— The “Half 1990 emissions” line shows CO_2 levels if emissions are cut to half of the level that they were in 1990.

Which statement is supported by the graph?

1. Climate change will result in the melting of polar ice caps.
2. The increase in carbon dioxide levels will cause a decrease in global average temperature.
3. Human activities have no effect on atmospheric carbon dioxide levels.
4. Future generations can be affected by the choices of current generations.

20. To prepare for an experiment, ten different sources of food were sterilized and kept in a sterile container. Bacteria of the same species were placed on each of the ten different food sources and kept at 26°C for two days. During this time, bacteria grew in nine of the containers. Based on this observation, the scientist could conclude that

1. all ten food sources used in the experiment are capable of supporting this species of bacteria
2. the temperature varied greatly in nine of the containers during this experiment
3. only the container that failed to grow any bacteria was prepared correctly
4. this species of bacteria synthesizes enzymes needed to digest the food in nine of the ten containers

21. Some properties of four substances W,X,Y and Z are given in the table below.

Substance	Conducts electricity	Strong heating	Percentage composition by mass
W	Yes	Melts	Constant
X	No	Breaks down	Constant
Y	Yes	Melts	Varies
Z	Yes	Burns	Varies

Which of the following best represents substances W , X , Y and Z?

	W	X	Y	Z
1.	Element	Compound	Mixture	Mixture
2.	Mixture	Compound	Element	Mixture
3.	Compound	Element	Element	Mixture
4.	Mixture	Element	Compound	Compound

22. When a green substance X is heated, a gas Y is given off which turns limewater chalky. A black substance is left behind. Which of the following correctly tabulates X and Y?

	X	Y
1.	Element	Compound
2.	Compound	Mixture
3.	Compound	Compound
4.	Mixture	Element

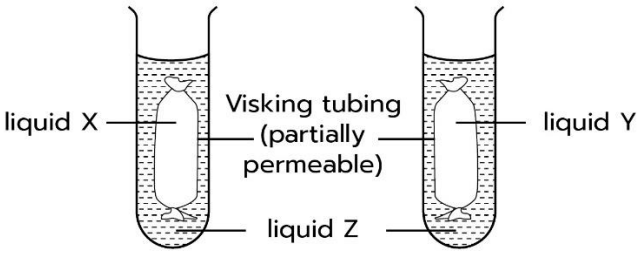
23. Male birds of two different species living on the same island have developed different mating behaviors, as shown in the table below.

Species	Mating Behavior of Male Birds
A	rapid chirps while spreading their tail feathers
B	movement in circles while spreading their tail feathers

Which statement is best supported by information in the table?

1. It is likely that male birds in species A will mate with female birds in species B.
2. It is likely that birds from species A will only mate with birds from species A.
3. Male birds from one species will change their mating behavior if the only female birds available are from the other species.
4. Mating behaviors are important only when these two species live together in the same area.

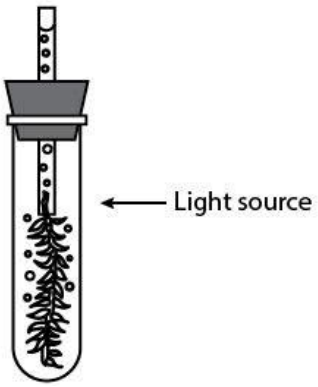
24. An experiment was set up as shown in the diagram below. After some time has elapsed, the visking tube containing liquid X collapsed while the tubing containing liquid Y was firm and hard.



Which of the following could be a correct description of the liquids at the start of the experiment?

	Liquid X	Liquid Z	Liquid Y
1.	Concentrated sucrose solution	Water	Dilute sucrose solution
2.	Dilute sucrose solution	Concentrated sucrose solution	Water
3.	Water	Concentrated sucrose solution	Dilute sucrose solution
4.	Water	Dilute sucrose solution	Concentrated sucrose solution

25. A student placed a test tube containing elodea (an aquatic plant) and pond water 10 cm from a light source. He observed that the plant gave off bubbles of a gas and counted how many bubbles were released in one minute. He moved the plant farther away from the light source to see if distance from the source made a difference. The data table below shows his results.



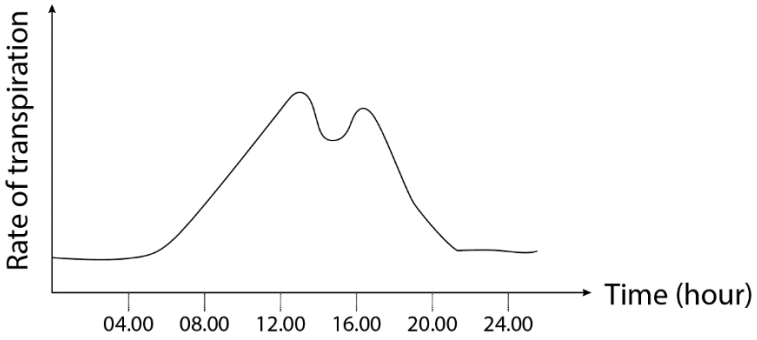
Gas Production

Distance from Light (cm)	Bubbles Produced per Minute
10	40
20	30
30	7
40	4

What gas was being produced and identify the process taking place in this experiment?

1. carbon dioxide as a product of the process of respiration
2. carbon dioxide as a product of the process of photosynthesis
3. oxygen as a product of the process of respiration
4. oxygen as a product of the process of photosynthesis

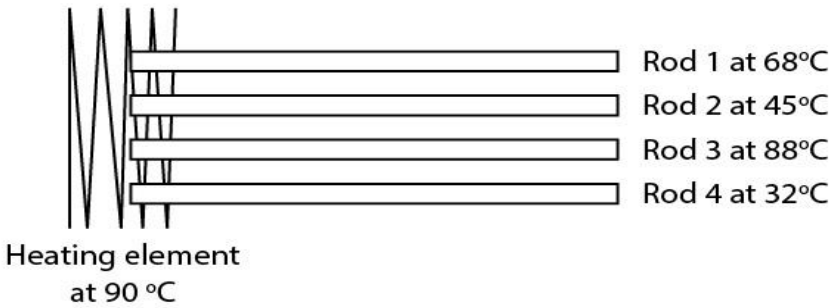
26. The graph below shows the changes in the transpiration rate of a plant during a dry, hot, sunny day.



Which of the following could be the reason for the sudden drop in the transpiration rate at 1400 hour?

1. The temperature rose.
2. The stomata closed.
3. The sky became cloudy temporarily.
4. There was more carbon dioxide in the air.

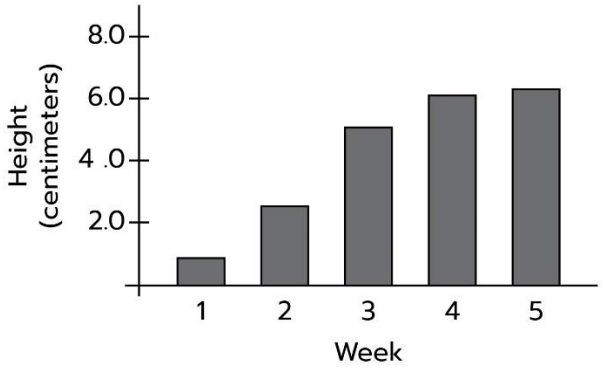
27. An experiment was conducted to compare the thermal conductivities of four rods wrapped with different materials. One end of each rod was attached to a heating element. After 10 minutes, the temperature at the other end of each rod was measured and recorded as shown in the diagram below.



Which material is best for making a winter jacket?

1. material 1
2. material 2
3. material 3
4. material 4

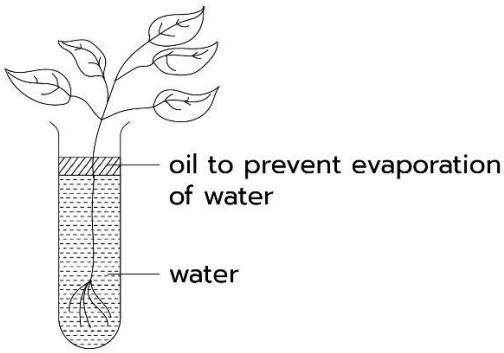
28. The bar graph below shows the height of a plant at the end of each week of a five-week growth period.



Which statement represents a valid conclusion based on the information in the graph?

1. The plant was given water during the first three weeks, only.
2. The plant will grow faster during the sixth week than it did during the fifth week.
3. The plant grew fastest during the first three weeks, and then it grew slower.
4. The plant grew slowest during the first three weeks, and then it grew faster.

29. Lilly conducted an experiment on the importance of stomata in transpiration. Five similar plants were placed in five test tubes respectively. The diagram below shows the set-up for each plant.



Some of the plants had their leaves coated with grease to reduce transpiration. Each plant was weighed in its test tube at the start of the experiment and again 2 days later. Her results are shown in the table below.

Plant	Mass (g)	
	At start of experiment	After 2 days
1	105	103
2	121	97
3	107	84
4	111	110
5	119	93

From the above results, which of the plants had their leaves coated with grease?

1. 1 and 2 only
2. 1 and 4 only
3. 2 and 5 only
4. 2, 3 and 5 only

30. A saltwater aquarium contained a variety of saltwater fish and plants. Members of a species of small fish from a freshwater stream were accidentally added to the saltwater tank. Within an hour, all of the fish that were added were dead, while the saltwater fish were still healthy. The freshwater fish most likely died because they

1. swelled up and died due to taking in too much water
2. became severely dehydrated due to the process of diffusion
3. had no freshwater organisms to eat in the saltwater tank, so they died of starvation
4. ate all of the plants in the tank, so there was no longer oxygen in the water

31. The diagrams below show tissue **K**, cell **L**, unit **M** and tissue **N** in a human body.


tissue K


cell L

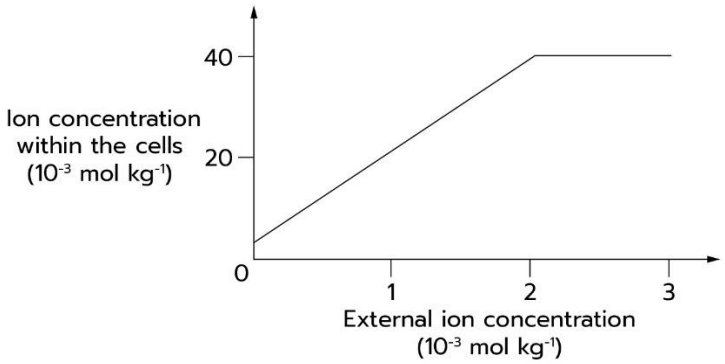

unit M


tissue N

Which systems are associated with tissue **K**, cell **L**, unit **M** and tissue **N**?

	Tissue K	Cell L	Unit M	Tissue N
1.	Blood circulatory system	Support system	Respiratory system	Excretory system
2.	Support system	Blood circulatory system	Excretory system	Respiratory system
3.	Support system	Excretory system	Respiratory system	Blood circulatory system
4.	Excretory system	Respiratory system	Blood circulatory system	Support system

32. The graph below shows the effect of the change in the external ion concentration on the ion concentration within some plant cells.



Which of the following conclusions can be drawn from the graph?

A. The cell membrane becomes impermeable to the ions when the external concentration reaches 2 units.

B. The ions are absorbed by the cells against a concentration gradient.

C. The uptake of ions occurs only in living cells.

1. A only
2. B only
3. A and B only
4. B and C only

33. A student completed a lab activity that demonstrated the connection between pulse rate, heart rate, and flow of blood during exercise. She left her class wondering if there is a connection between breathing rate and exercise. With the help of her track coach, she conducted an investigation to try and find an answer to her question.

In the investigation, the respiratory rates of thirty athletes were measured before any exercise. To measure their rates, they counted the number of times they took a breath in one minute. Then, they ran one lap around the track, and their respiratory rates were determined again. Finally, they ran two laps around the track and checked their respiratory rates one last time. All of their data were recorded, and the averages were calculated. The data table shows the information obtained in this investigation.

The Effect of Exercise on the Respiratory Rates of Thirty Athletes

Type of Activity	Average Respiratory Rates (breaths per minute)
At rest	13
After one lap	30
After two laps	38

During this activity, what was the purpose of finding the respiratory rates of the students at rest?

1. to determine if the students were healthy
2. to practice using the timer
3. to use as a comparison
4. to use as the variable

34. Nuclear radiation is harmful to living cells, particularly to fast-growing cells, such as cancer cells and blood cells. An external beam of the radiation emitted from a radioisotope can be directed on a small area of a person to destroy cancer cells within the body. Cobalt-60 is an artificially produced radioisotope that emits gamma rays and beta particles. One hospital keeps a 100.0-gram sample of cobalt-60 in an appropriate, secure storage container for future cancer treatment.

A. Nuclear radiation is harmful to all living cells. Radioisotopes can cause gene mutations .

B. Co-60 is used in the inspection of materials to reveal internal structure, the sterilization of food , is used to treat cancer and to sterilize medical equipment.

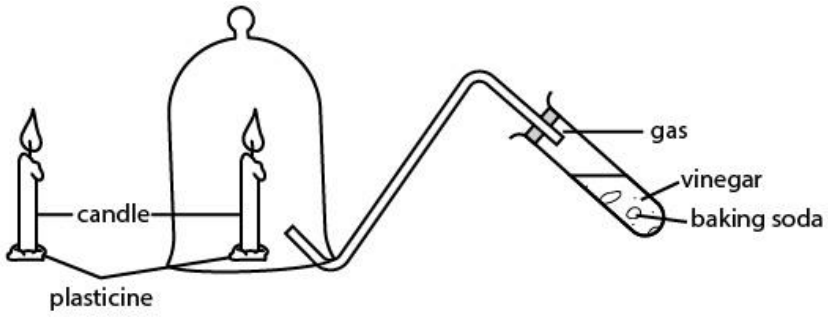
C. The penetrating power of the two emissions from the Co-60, Gamma radiation has weaker than beta particles.

D. The time of 10.54 years elapsed the Co-60 is 12.5 grams.

Which of the following are incorrect.

1. A and B
2. B and C
3. C and D
4. A and D

35. An experiment was set up as shown below.



The flame in the bell jar went out after some time. On the other hand, the other candle continued to burn. What is the aim of the experiment?

1. To show that a mixture is formed when two elements combine together.
2. To show that a compound is formed when two elements combine together.
3. To show that a compound is formed when two compounds combine together.
4. To show that a mixture is formed when two compounds combine together.

36. Some scientists are designing their first space rockets and have decided to gold-plate the heat reflecting shields, using electrolysis. Which electrodes and electrolyte would be used to gold-plate the heat shield?

	Cathode	Anode	Electrolyte
1.	Carbon	Heat shield	Gold nitrate
2.	Gold	Heat shield	Dilute sulfuric acid
3.	Heat shield	Carbon	Dilute sulfuric acid
4.	Heat shield	Gold	Gold nitrate

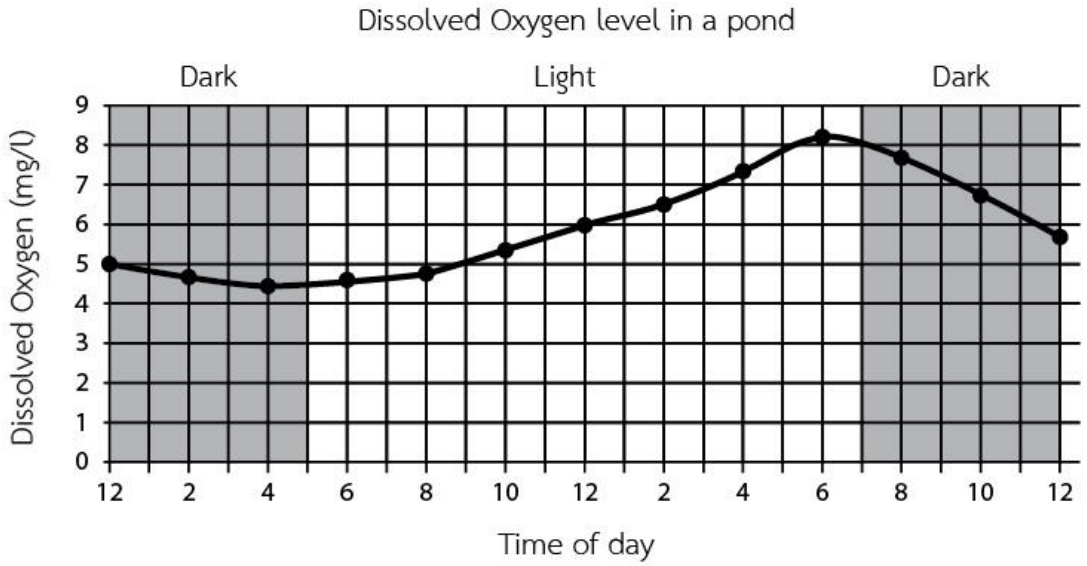
37. Over half the people on the planet eat rice as a staple food. Growing rice emits methane, a potent greenhouse gas—to the tune of 25 million to 100 million tons of methane every year, a notable contribution to human-caused greenhouse gas emissions...

...When rice paddies are flooded, methane-producing bacteria thrive on the carbohydrates secreted by rice roots in the oxygen-free soils. The rice plant itself acts as a conduit [pathway], transmitting methane from the soil into the atmosphere...

Scientists have incorporated a barley gene into a type of rice and produced rice plants that have much lower methane emissions. It is most likely that the scientists incorporated the barley gene into the rice, producing a new variety, using the process of .....

1. selective breeding
2. genetic engineering
3. meiosis, followed by recombination
4. sexual reproduction, followed by mitosis

38. The graph below shows changes in dissolved oxygen in a pond in the summertime over a 24-hour period.



What is the most likely reason for the variation in the dissolved oxygen levels in the pond over the 24-hour period?

1. The increased light during the day decreases the oxygen produced by photosynthesis.
2. More producers are active at night, so the dissolved oxygen increases.
3. Photosynthesis produces more oxygen during the day than is used by respiration.
4. Respiration is reduced at night, so the oxygen produced by photosynthesis increases.

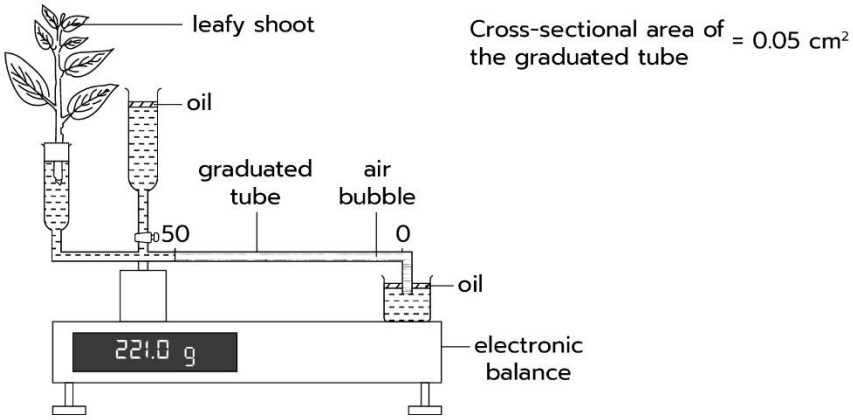
39. Corals come in about 1,500 known species—from soft swaying fans to stony varieties with hard skeletons that form reef bases. They are made up of polyps, tiny animals that live in colonies and feed at night on microscopic plants and creatures. The coral's surface is the living part, with color infused by single-celled algae called zooxanthellae that live in polyp tissue. The algae act like solar panels, passing energy to the coral as they photosynthesize while feeding on the coral's waste.

Extremely sensitive, corals survive in a narrow range of temperature, sunlight and salinity. An uncommonly severe El Niño in 1998 raised ocean temperatures and changed currents, causing bleaching that devastated reefs worldwide. Scientists say parts of the Indian Ocean lost up to 90 percent of corals. The bleaching struck reefs around the Persian Gulf, East Africa, Southeast Asia and the Caribbean. Some recovered. Many died. ...

The relationship between the polyps and the zooxanthellae can best be described as

1. negative for both
2. neutral for both
3. positive for both
4. negative for one and positive for the other

40. The diagram shows an experimental set-up to measure the rate of water absorption and transpiration of a leafy shoot.



Which of the following conditions would result in the greatest distance moved by the bubble in 30 minutes?

1. No wind, cold and bright condition
2. No wind, hot and dark condition
3. Windy, cold and bright condition
4. Windy, warm and dark condition

คำตอบวิชาวิทยาศาสตร์ ชั้นมัธยมศึกษาปีที่ 1

ข้อ	คำตอบ	ข้อ	คำตอบ
1	4	21	1
2	1	22	3
3	4	23	2
4	2	24	4
5	3	25	4
6	3	26	3
7	2	27	4
8	3	28	3
9	2	29	2
10	3	30	2
11	4	31	2
12	2	32	2
13	3	33	3
14	1	34	2
15	2	35	3
16	2	36	4
17	4	37	2
18	2	38	3
19	4	39	3
20	4	40	3