

THE UNIVERSITY OF THE STATE OF NEW YORK

GRADE 8

INTERMEDIATE-LEVEL SCIENCE TEST

WRITTEN TEST

June 5, 2023

Student Name _____

School Name _____

The possession or use of any communications device is strictly prohibited when taking this examination. If you have or use any communications device, no matter how briefly, your examination will be invalidated and no score will be calculated for you.

Print your name and the name of your school on the lines above.

The questions on this test measure your knowledge and understanding of science. The test has two parts. Both parts are contained in this test booklet.

Part I consists of 45 multiple-choice questions. Record your answers to these questions on the separate answer sheet. Use only a No. 2 pencil on your answer sheet.

Part II consists of 40 open-ended questions. Write your answers to these questions in the spaces provided in this test booklet.

You may use a calculator to answer the questions on the test if needed.

You will have two hours to answer the questions on this test.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

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THE UNIVERSITY OF THE STATE OF NEW YORK
THE STATE EDUCATION DEPARTMENT
ALBANY, NEW YORK 12234

Part I

DIRECTIONS

There are 45 questions on Part I of the test. Each question is followed by three or four choices, lettered A through D. Read each question carefully. Decide which choice is the best answer. On the separate answer sheet, mark your answer in the row of circles for each question by filling in the circle that has the same letter as the answer you have chosen.

Read the sample question below.

Sample Question

Earth gets most of its light from

- A the stars
- B the Sun
- C the Moon
- D other planets

The correct answer is **the Sun**, which is choice **B**. On your answer sheet, look at the box showing the row of answer circles for the sample question. Since choice **B** is the correct answer for the sample question, the circle with the letter **B** has been filled in.

Answer all of the questions in Part I in the same way. Mark only one answer for each question. If you want to change an answer, be sure to erase your first mark completely. Then mark the answer you want.

You will not need scrap paper. You may use the pages of this test booklet to work out your answers to the questions.

You may use a calculator if needed.

When you are told to start working, turn the page and begin with question 1. Work carefully and answer all of the questions in Part I.

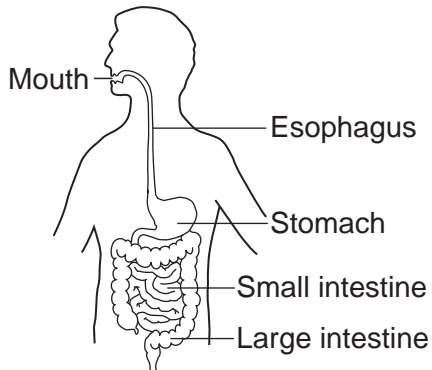
When you have finished Part I, go right on to Part II. Answer all of the questions in Part II.

Part I

- 1 The cells of all living things
 - A contain chlorophyll
 - B release energy from nutrients
 - C have reproductive tissues
 - D produce their own food

- 2 A major function of the nervous system is to
 - A control and coordinate responses of the body
 - B remove undigested wastes from the body
 - C eliminate carbon dioxide from the body
 - D move nutrients throughout the body

- 3 The diagram below represents parts of a human organ system.



- Which pair correctly matches this human organ system with its function?
- A respiratory system: transport nutrients to cells
 - B respiratory system: mechanical and chemical breakdown of food
 - C digestive system: transport nutrients to cells
 - D digestive system: mechanical and chemical breakdown of food
-
- 4 What happens if a species' traits do *not* allow for survival of that species in a changing environment?

A evolution	C natural selection
B extinction	D selective breeding

- 5 Most of the oxygen in Earth's atmosphere is the result of
 - A respiration
 - B photosynthesis
 - C burning of fossil fuels
 - D eruption of volcanoes

- 6 The pointed beak that a woodpecker uses to remove insects from a tree trunk is an example of
 - A an organ system
 - B an environmental stimulus
 - C a biological adaptation
 - D a feedback system

- 7 The diagram below represents the results of a cross between a pure dominant tall corn plant (TT) and a pure recessive short corn plant (tt).

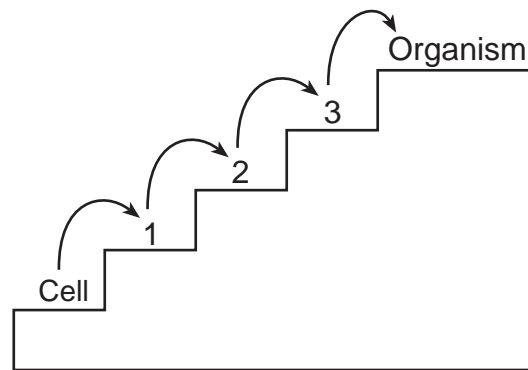
	T	T
t	Tt	Tt
t	Tt	Tt

Key
T = tall (dominant)
t = short (recessive)

- Which result should be expected if 100 offspring are produced?
- | | |
|------------------------|-------------|
| A 75 tall and 25 short | C 100 short |
| B 50 tall and 50 short | D 100 tall |
-
- 8 What percentage of an offspring's genetic material is contributed by one parent in sexual reproduction?

A 25%	C 75%
B 50%	D 100%

9 The numbers 1, 2, and 3 in the diagram below represent the different levels of organization in a multicellular organism.



Which chart correctly identifies the levels of organization of 1, 2, and 3?

Number	Level of Organization
1	tissue
2	organ
3	organ system

A

Number	Level of Organization
1	organ
2	tissue
3	organ system

C

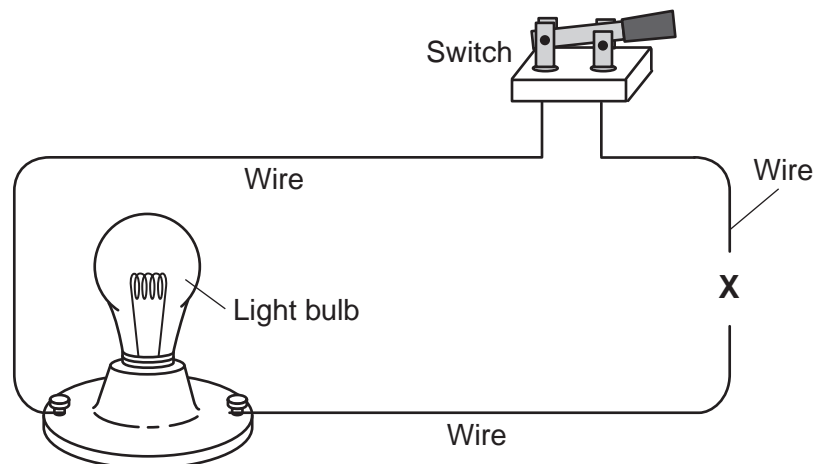
Number	Level of Organization
1	organ system
2	organ
3	tissue

B

Number	Level of Organization
1	tissue
2	organ system
3	organ

D

10 The diagram below represents an incomplete electric circuit, since the wires are not connected at X.

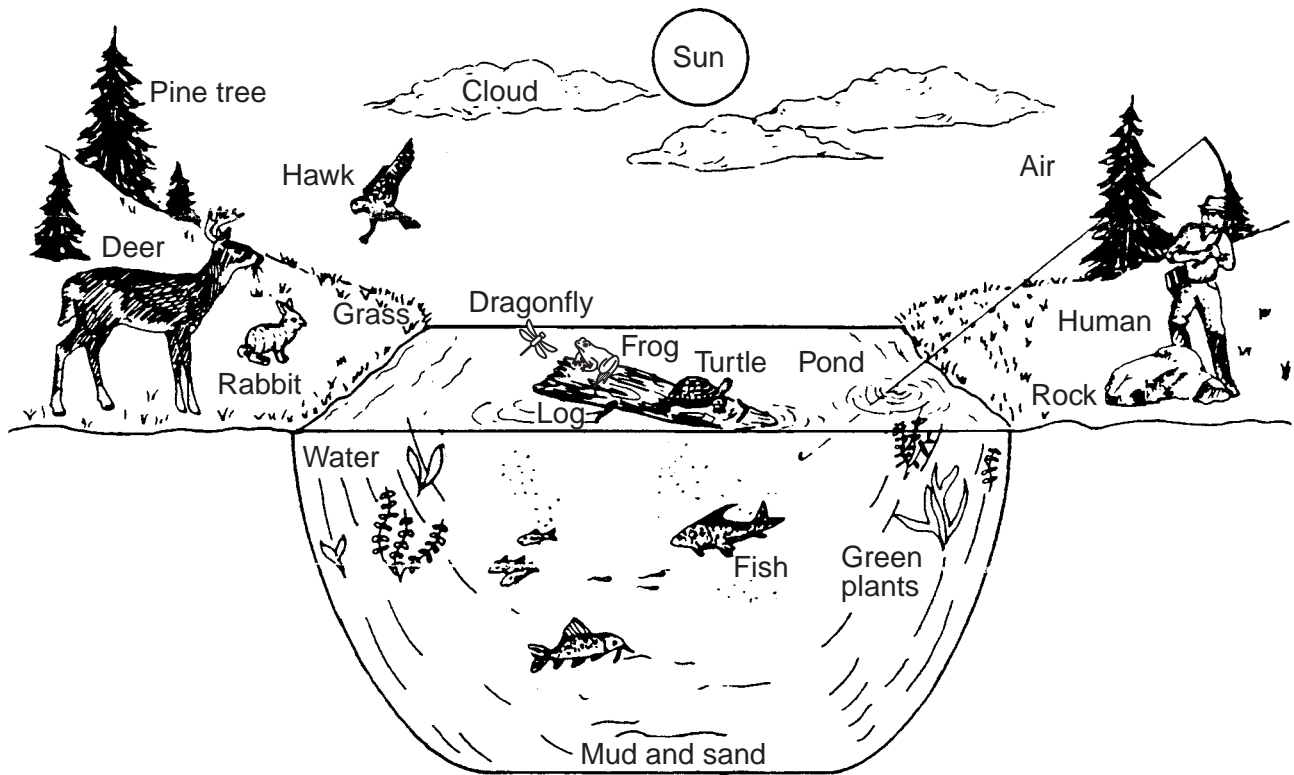


Which object should be placed at X to complete the circuit?

- A magnet
- B battery

- C iron nail
- D second lightbulb

11 The diagram below represents a pond area in New York State.

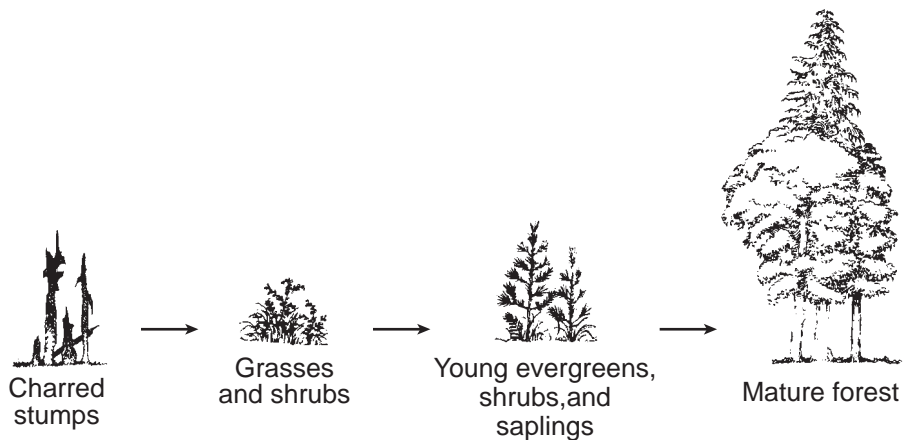


(Not drawn to scale)

Which list identifies three populations in the diagram?

- A grass, cloud, hawk
- B air, frog, water
- C hawk, human, pine tree
- D green plants, rock, fish

12 The diagram below represents a natural process that occurs over a long period of time.

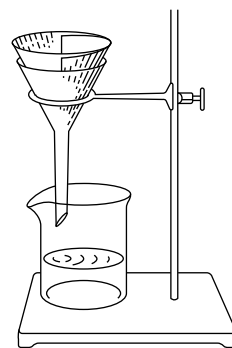


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The process is best identified as

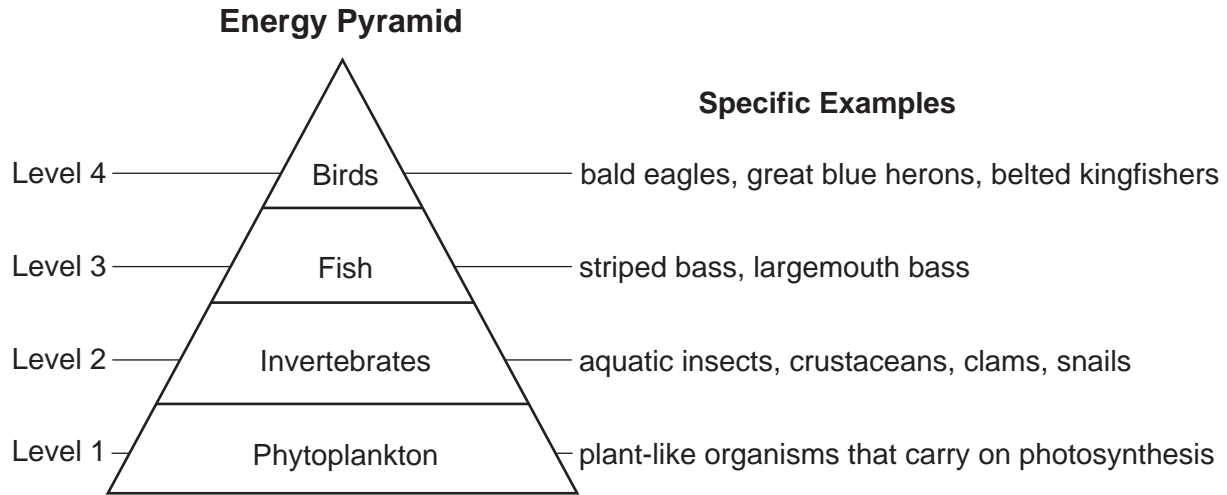
- A selective breeding
- B genetic engineering
- C ecological succession
- D metamorphosis

- 13 The excretory system is responsible for the removal of dissolved wastes and
- A light energy C sound energy
B heat energy D nuclear energy
- 14 A single unit of hereditary information is called
- A a gene C a cell
B an atom D a chromosome
- 15 Cancer within an organism's body is a result of
- A dynamic equilibrium
B increasing essential microorganisms
C natural selection
D abnormal cell division
- 16 Which statement best explains why stars look like points of light when observed from Earth?
- A Stars are much smaller in size compared to Earth.
B Stars have less gravitational attraction than Earth.
C Earth is older than the stars.
D Earth is a great distance away from the stars.
- 17 Which action should be taken when a tornado warning has been issued?
- A leave the building
B find shelter under a tree
C go down into a basement
D go to the store to buy supplies
- 18 Moon phases are caused by the
- A revolution of the Moon around Earth
B revolution of Earth around the Moon
C daily rotation of Earth on its axis
D daily rotation of the Moon on its axis
- 19 For an observer in New York State, the Sun appears to move across the sky in a general path from
- A west to east C north to south
B east to west D south to north
- 20 During which process in the water cycle is moisture lost from land surfaces?
- A precipitation C evaporation
B condensation D runoff
- 21 The characteristic weather that prevails from season to season in a region is defined as
- A a front C the climate
B an air mass D an air pressure system
- 22 What type of air mass is most likely to form over an ocean near the Equator?
- A warm and humid C cold and humid
B warm and dry D cold and dry
- 23 Which two properties would be best used for the identification of an unknown compound?
- A conductivity and size
B length and height
C solubility and density
D mass and temperature
- 24 Which process involves putting objects into different groups based on common properties?
- A sequencing C inferring
B measuring D classifying
- 25 The diagram below represents equipment used to separate solids from a liquid.



- What is the name of this separation process?
- A dissolving C melting
B conducting D filtering

Base your answers to questions 26 and 27 on the diagram below and on your knowledge of science. The diagram represents an energy pyramid.



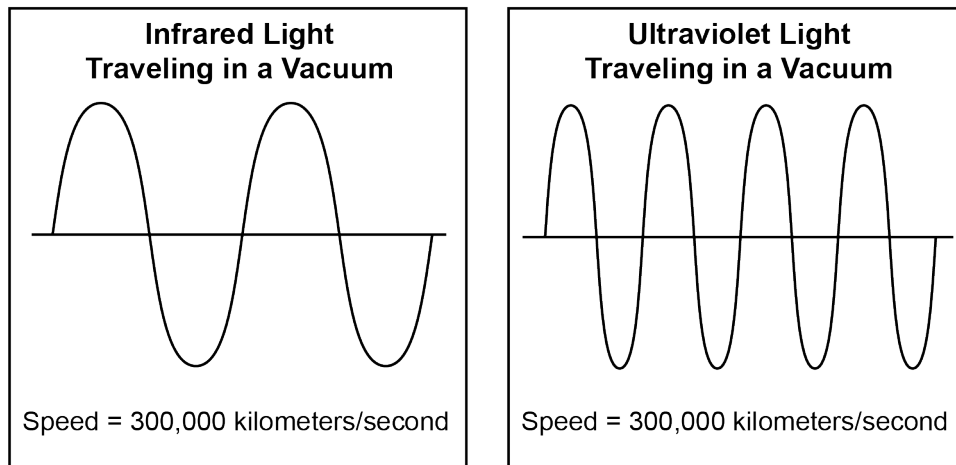
26 Which organisms are classified as producers?

- A phytoplankton
- B invertebrates
- C fish
- D birds

27 What is the original source of energy for this energy pyramid?

- A food
- B sunlight
- C oxygen
- D phytoplankton

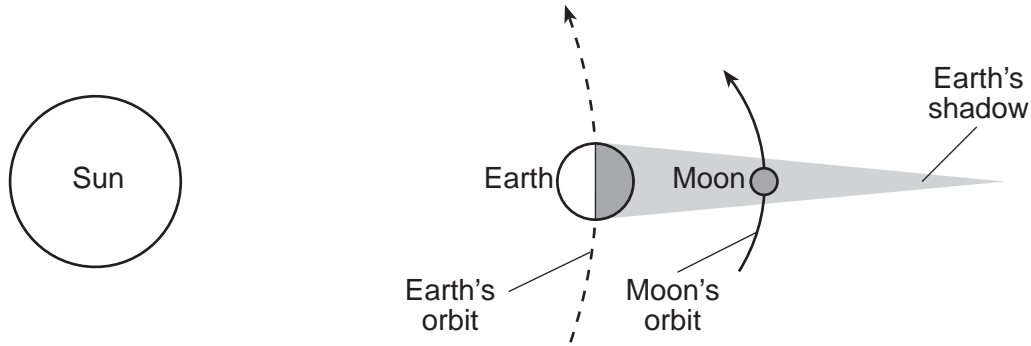
28 The diagram below represents two forms of electromagnetic energy traveling in a vacuum.



What difference is shown between infrared light and ultraviolet light?

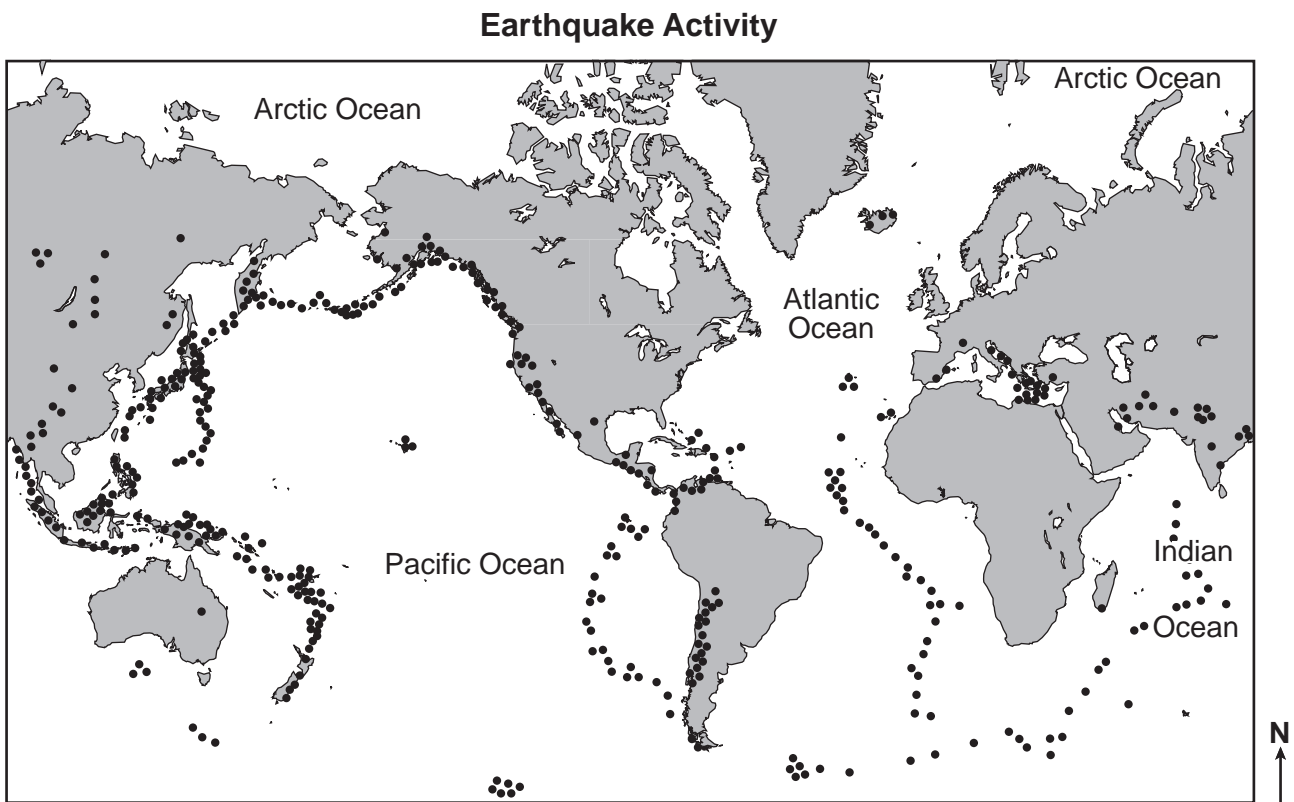
- A the speeds at which they travel
- B the material through which they are traveling
- C their wave heights
- D their wavelengths

- 29 The diagram below represents a natural event involving Earth's shadow that occurs in our solar system. Which natural event is shown in the diagram?



(Not drawn to scale)

- A a meteor shower
B high and low ocean tides
C an eclipse
D comets orbiting the Sun
- 30 The map below shows a portion of Earth. The dots on the map represent areas of earthquake activity.



In general, if Earth's most active volcanic areas were indicated on the same map, where would these volcanic areas be located?

- A at the North and South Poles
B mainly in the centers of the continents
C evenly distributed over Earth's surface
D in the same areas as active earthquakes

Base your answers to questions 31 and 32 on the portion of the Periodic Table of the Elements below and on your knowledge of science.

Portion of the Periodic Table of the Elements

KEY

28	— approximate atomic mass
Si	— symbol
Silicon	— name
14	— atomic number

		Groups					
		13	14	15	16	17	18
		11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
		27 Al Aluminum 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35 Cl Chlorine 17	40 Ar Argon 18
11	12	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
64 Cu Copper 29	65 Zn Zinc 30	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54

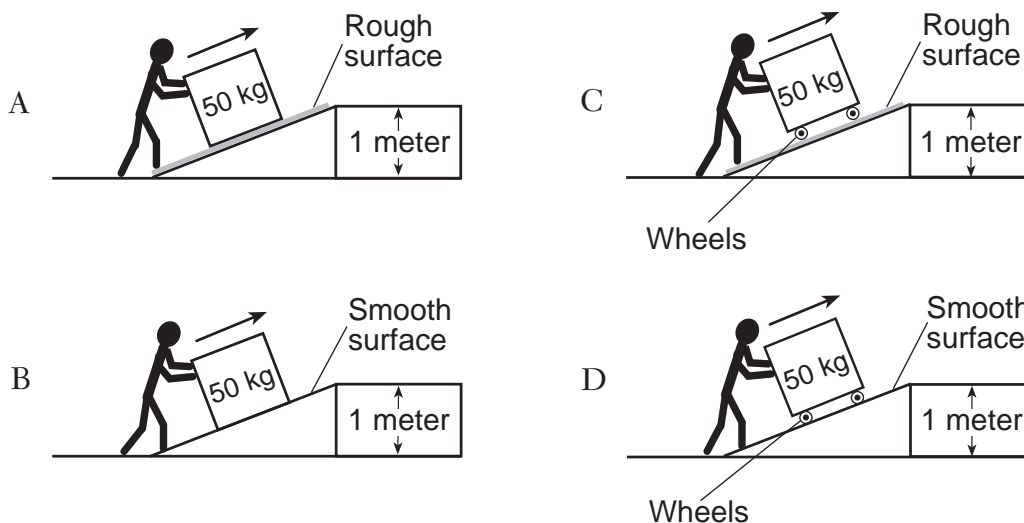
31 Which list of element symbols represents a metal, a nonmetal, and a noble gas?

- A Ga, Sn, Ge
 B Ga, S, Br
 C Zn, Sn, Ar
 D Zn, O, Ne

32 Which element has an atomic number of 31?

- A copper
 B gallium
 C xenon
 D phosphorus

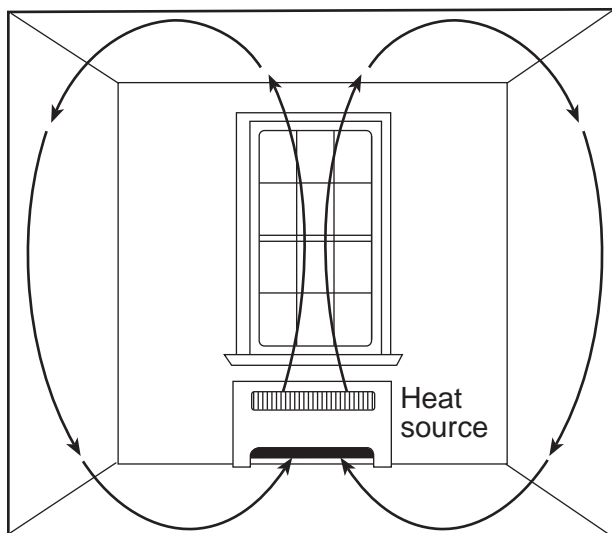
33 In which diagram would the force required to move the object up the ramp be the greatest?



34 Which energy transformation occurs when classroom lights are switched on?

- A Electrical energy is transformed into light energy.
- B Light energy is transformed into electrical energy.
- C Heat energy is transformed into sound energy.
- D Sound energy is transformed into heat energy.

35 The arrows in the diagram below represent a heat transfer process in a closed room.



The arrows in the diagram represent the process of

- A evaporation
- B conduction
- C convection
- D condensation

36 Which phases (states) of matter have a definite volume?

- A solids and liquids, only
- B solids and gases, only
- C liquids and gases, only
- D solids, liquids, and gases

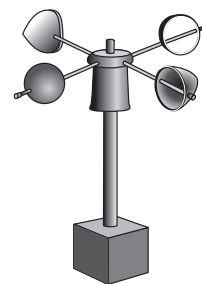
37 A student placed a drop of iodine (a reddish-brown dye) on a piece of white potato. The student noticed that the potato turned black where the drop of iodine landed. What the student noticed is an example of

- A a prediction
- B a hypothesis
- C an observation
- D an inference

38 A student noticed that there were fewer fish in the stream behind the school this year than last year. Which method would best determine if poor water quality caused this decrease in the fish population?

- A Distribute an opinion survey about the stream to all students in the school.
- B Observe the fish in the classroom aquarium and the fish in the stream for ten weeks.
- C Produce a video encouraging students to help conserve the fish population in the stream.
- D Collect and test the stream water and compare the results to last year's data.

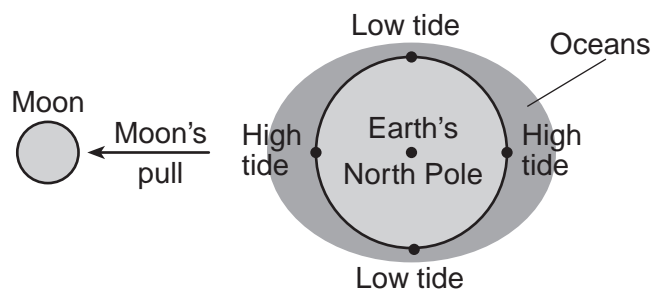
39 The diagram below represents a weather instrument.



This instrument is used to measure

- A wind direction
- B wind speed
- C relative humidity
- D barometric pressure

40 The diagram below represents high and low ocean tides on Earth that are caused by the gravitational attraction of the Moon on Earth's oceans.



(Not drawn to scale)

Due to Earth's rotation, the approximate amount of time between two consecutive high tides is

- A 6 hours
- B 12 hours
- C 24 hours
- D 48 hours

- 41 The data table below shows some atmospheric data at different heights above Earth's surface for Paducah, Kentucky on June 2, 1990.

Data Table

Height Above Earth's Surface (m)	Air Pressure (mb)	Air Temperature (°C)
3145	700	10.5
4408	600	0.9
5852	500	-7.6
7550	400	-19.5
9615	300	-36.2
12,309	200	-57.6

The general relationship represented by the data is that as height above Earth's surface increases

- A both air pressure and air temperature decrease
 - B both air pressure and air temperature increase
 - C air pressure decreases, and air temperature increases
 - D air pressure increases, and air temperature decreases
- 42 The data table below shows the wind chill temperature (how cold the air feels) at different wind speeds and air temperatures. Wind speed is shown in miles per hour (mph). Air temperature and wind chill temperature are shown in degrees Fahrenheit (°F).

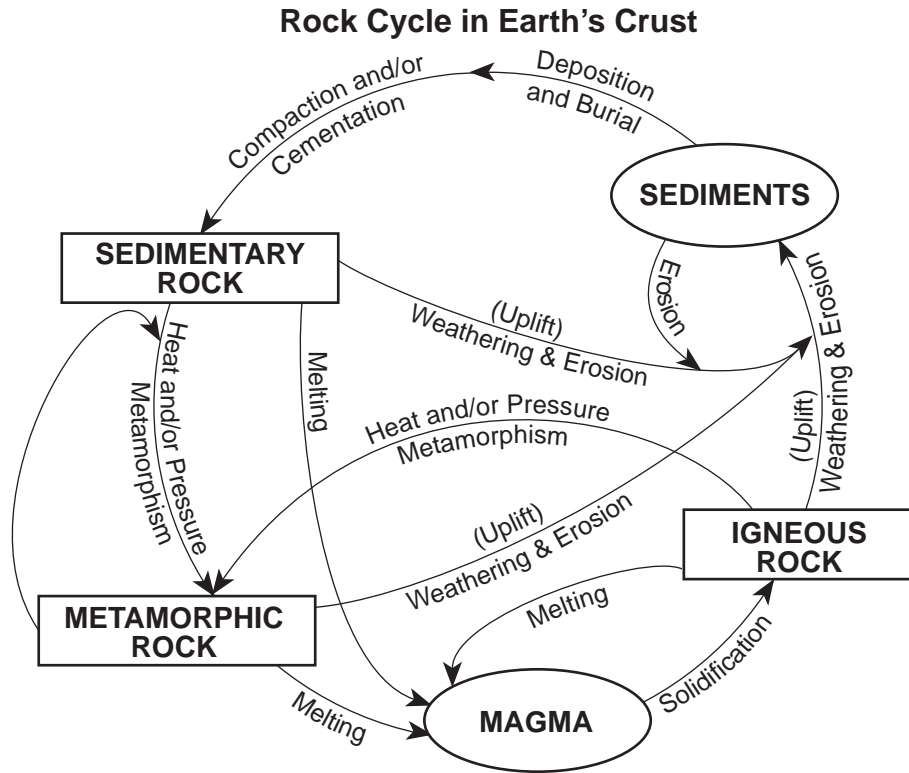
Wind Chill Temperature (°F)

Wind Speed (mph)	Air Temperature (°F)												
	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20
5	36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34
10	34	27	21	15	9	3	-4	-10	-16	-22	-22	-35	-41
15	32	25	19	13	6	0	-7	-13	-19	-26	-22	-39	-45
20	30	24	17	11	4	-2	-9	-15	-22	-29	-22	-42	-48
25	29	23	16	9	3	-4	-11	-17	-24	-31	-22	-44	-51
30	28	22	15	8	1	-5	-12	-19	-26	-33	-22	-46	-53
35	28	21	14	7	0	-7	-14	-21	-27	-34	-22	-48	-55
40	27	20	13	6	-1	-8	-15	-22	-29	-36	-22	-50	-57
45	26	19	12	5	-2	-9	-16	-23	-30	-37	-22	-51	-58

Which conditions would produce a wind chill of -24°F ?

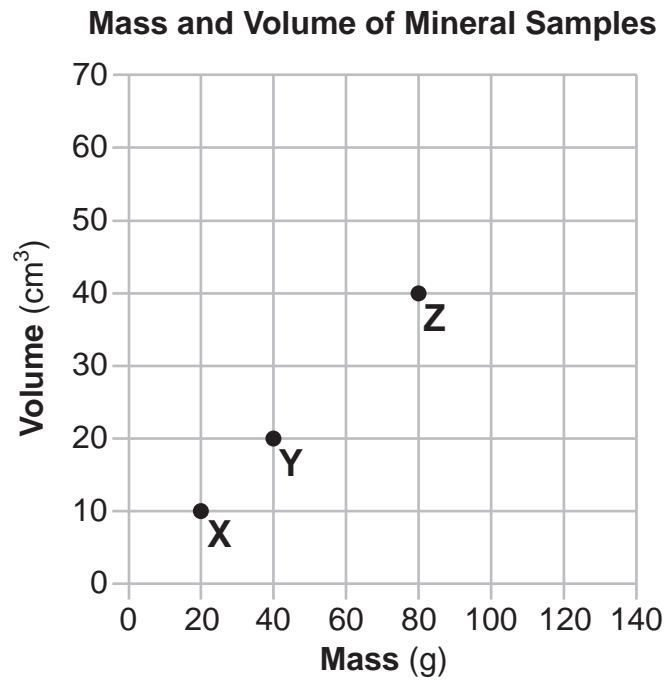
- A wind speed 20 mph; air temperature 0°F
- B wind speed 35 mph; air temperature 20°F
- C wind speed 20 mph; air temperature 35°F
- D wind speed 25 mph; air temperature 0°F

Base your answers to questions 43 and 44 on the diagram below and on your knowledge of science. The diagram represents materials and processes that form three rock types.



- 43 Two processes that change metamorphic rock to igneous rock are
- | | |
|----------------------|------------------------------|
| A uplift and erosion | C melting and solidification |
| B heat and pressure | D burial and cementation |
- 44 The rock cycle is a model that shows how all rocks are
- | | |
|-------------------------------------|------------------------------|
| A transformed into other rock types | C formed from magma |
| B unchanging and remain the same | D made from buried sediments |

45 The graph below shows the mass and volume of three different samples of the same mineral, X, Y, and Z.



Based on the graph, the volume of a 120-gram sample of this mineral is

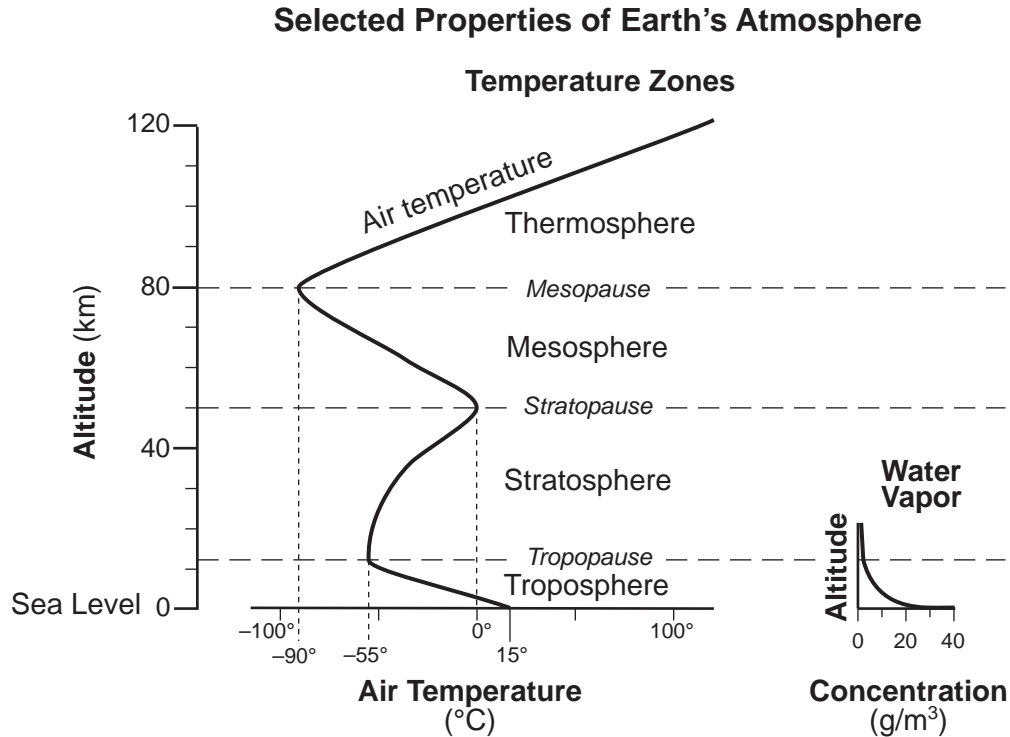
- A 40 cm³
- B 50 cm³

- C 60 cm³
- D 70 cm³

Part II

Directions (46–85): Record your answers in the spaces provided below each question.

Base your answers to questions 46 and 47 on the graphs below and on your knowledge of science. The graphs show some selected properties of Earth's atmosphere.



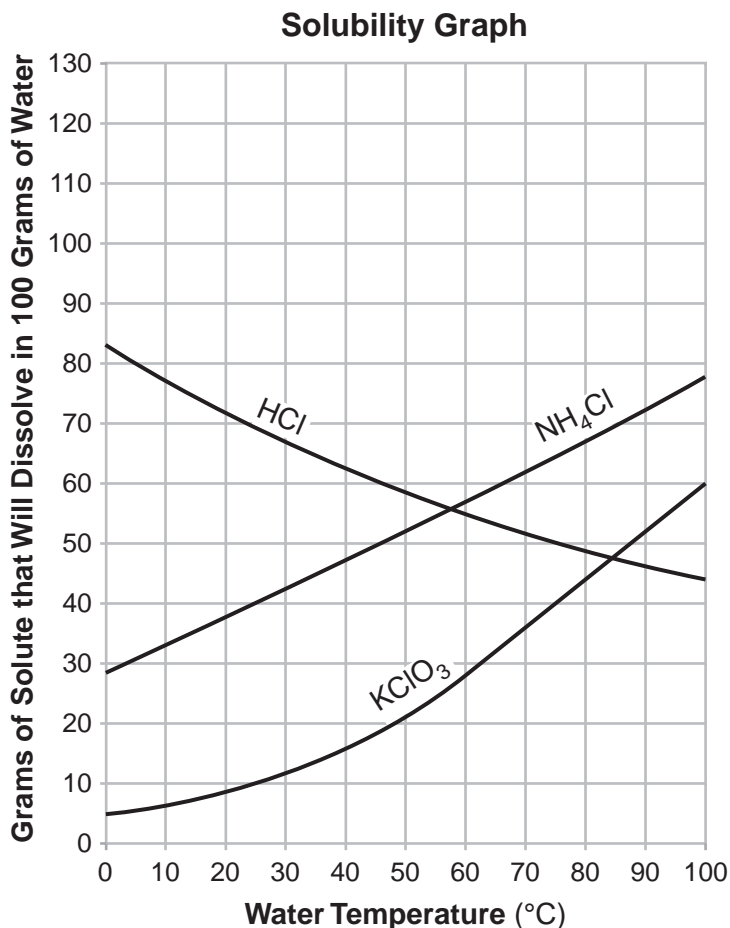
46 Identify the air temperature at the stratopause and the mesopause. [1]

Stratopause _____ °C

Mesopause _____ °C

47 State the general relationship between water vapor concentration and altitude within the troposphere. [1]

Base your answers to questions 48 through 50 on the graph and data table below and on your knowledge of science. The solubility graph shows the mass of three substances that dissolve in 100 grams (g) of water at various temperatures. The data table shows the mass of copper sulfate that will dissolve in 100 grams of water at various temperatures.



Solubility of Copper Sulfate in 100 Grams of Water

Temperature (°C)	0	20	60	100
Copper Sulfate (g)	23	32	62	114

48 On the graph above, use an **X** to plot the solubility of copper sulfate for each temperature in degrees Celsius (°C) shown in the data table. Connect the **X**s with a line. [1]

49 Determine the temperature, in degrees Celsius (°C), at which 100 grams of water will dissolve equal amounts of HCl and KClO₃. [1]

_____ °C

50 Describe *one* way, other than increasing temperature, that would make a solid piece of NH_4Cl dissolve faster in water. [1]

Base your answers to questions 51 through 53 on the information below and on your knowledge of science.

A student conducted an experiment to see if a popular brand of plant food had any effect on bean plants growing in sand. Ten plants were started from seed. Each seed was planted in a small container filled with sand. Plant food was added to the sand in only five of the containers. All other physical factors were kept the same for all ten plants. The experiment continued for 35 days. The student kept a journal during the experiment. Three of the entries are shown in the table below.

Journal Entries

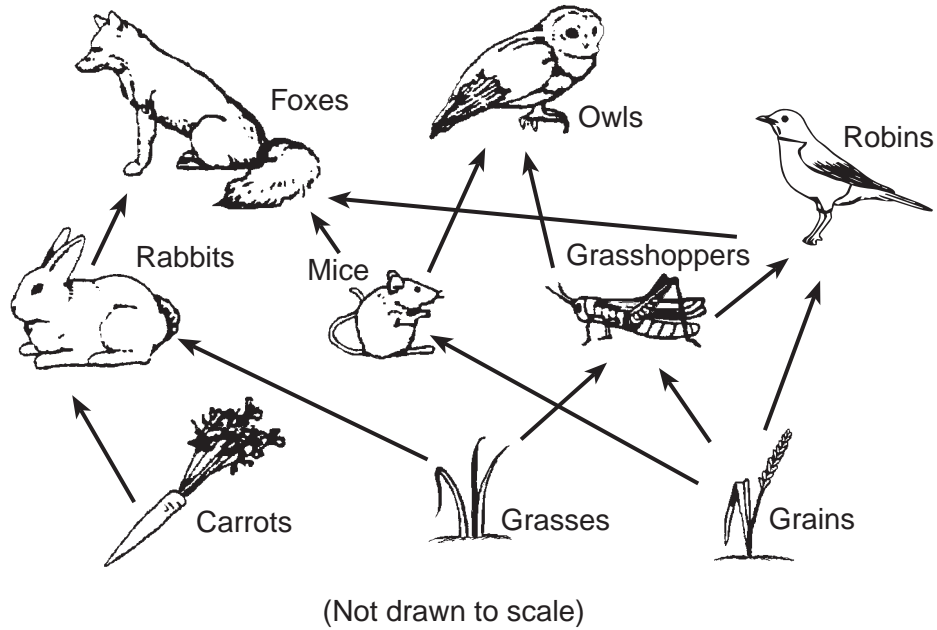
Day	Entry
15	During the first 15 days, the plants all looked the same. There was no difference between the plant food group and the other group without plant food.
30	Observed the plants today. The five seeds given plant food were all at least 5 cm taller than the group without plant food. They also had at least two more leaves than the group without plant food. Some of the leaves on the group without plant food were yellowish.
35	My experiment shows that bean plant growth is increased by adding plant food to sand.

51 Explain why plant food was *not* given to five of the ten seeds in this experiment. [1]

52 Identify the independent (manipulated) variable. [1]

53 Describe *one* piece of evidence from the entries in the student's journal that would support the conclusion made on day 35. [1]

Base your answers to questions 54 through 56 on the diagram below and on your knowledge of science. The diagram represents a partial food web.



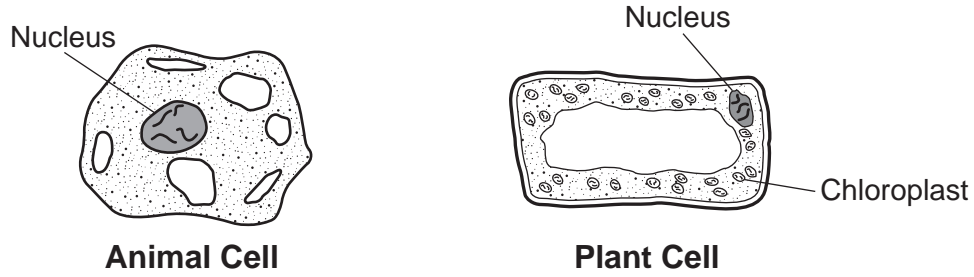
54 Identify *one* herbivore in this food web. [1]

55 Based on the food web, complete the food chain below, showing a flow of energy that includes the owls. [1]

_____ → _____ → _____

56 Explain why a *decrease* in the rabbit population could lead to a *decrease* in the population of mice. [1]

Base your answers to questions 57 through 59 on the diagrams below and on your knowledge of science. The diagrams represent an animal cell and a plant cell. Some cell structures are labeled.



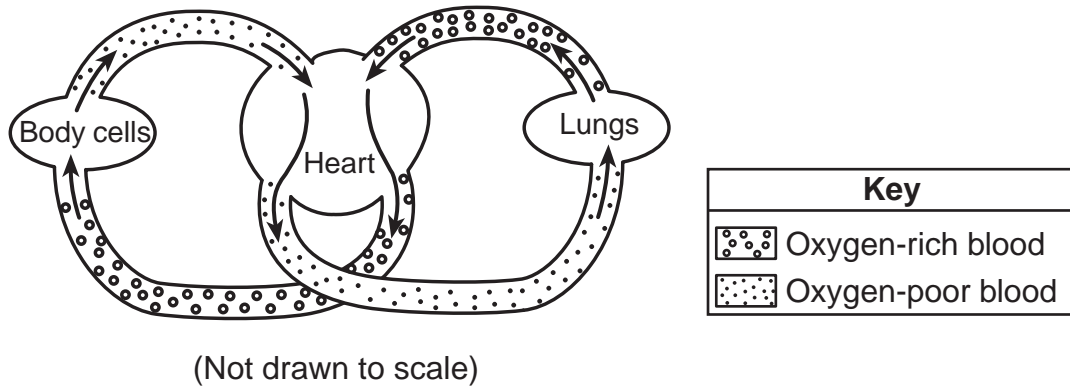
(Not drawn to scale)

57 Identify the scientific tool that is used to see cell structures in detail. [1]

58 Explain why chloroplasts are important to plant cells. [1]

59 Identify *one* cell structure, other than a chloroplast, that is found in plant cells but *not* found in animal cells. [1]

Base your answers to questions 60 and 61 on the diagram below and on your knowledge of science. The diagram represents a model of a human organ system.

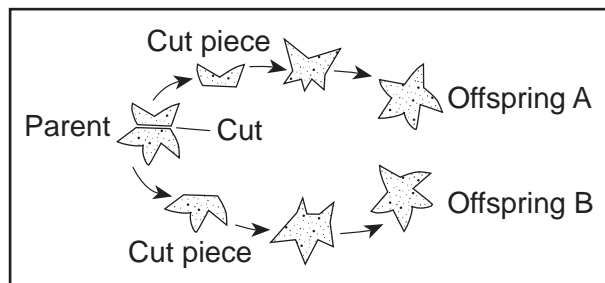


60 Identify the human organ system that includes the heart. [1]

_____ system

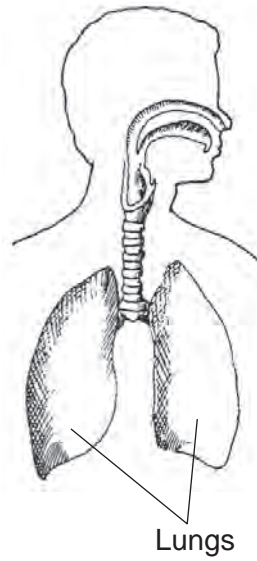
61 Describe *one* way a student could determine how fast a person's heart is beating. [1]

62 The diagram below represents a type of reproduction in a sea star, an animal found in the ocean.



Explain why offspring A is genetically identical to offspring B. [1]

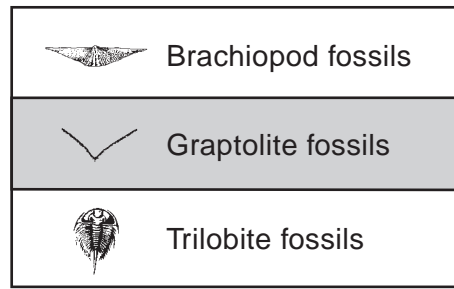
Base your answers to questions 63 and 64 on the diagram below and on your knowledge of science. The diagram represents the location of the human lungs. Tuberculosis is an infectious disease that mainly affects the lungs. It is caused by a germ (bacterium) called *Mycobacterium tuberculosis*.



63 Explain why a disease caused by a harmful microbe, like *Mycobacterium tuberculosis*, is considered to be an infectious disease. [1]

64 Describe *one* body response used to fight this disease after a person becomes infected with the tuberculosis bacterium. [1]

Base your answers to questions 65 and 66 on the diagram below and on your knowledge of science. The diagram represents a cross section of rock layers containing fossils. The rock layers have *not* been overturned.



(Not drawn to scale)

65 State the evidence in the diagram that supports the inference that the rock layer that contains graptolite fossils formed more recently than the rock layer that contains trilobite fossils. [1]

66 Identify the type of rock where fossils are most likely found. [1]

67 The diagram below represents two bar magnets labeled A and B. They are positioned close enough to attract or repel each other.



State whether the two magnets will attract or repel each other and explain why this will occur. [1]

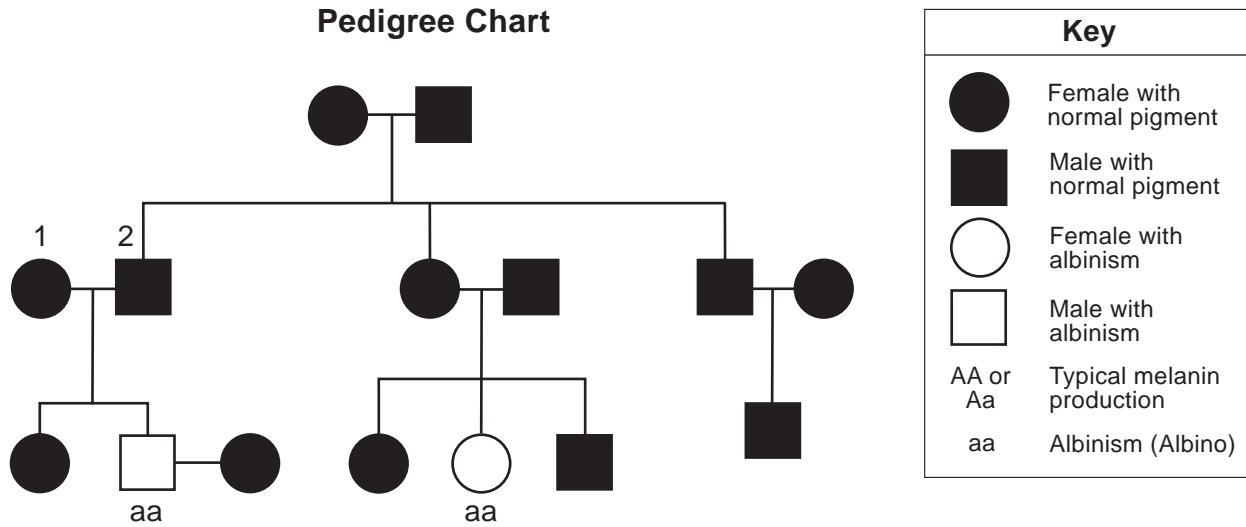
Attract or Repel: _____

Explanation: _____

Base your answers to questions 68 and 69 on the information and pedigree chart below and on your knowledge of science. The pedigree chart traces the appearance of albinism in several generations of a family. One set of parents are labeled 1 and 2. The letter combinations underneath some of the individuals indicate their genetic makeup.

Albinism

Individuals with albinism produce less melanin than individuals without albinism. Melanin is a pigment made by the human body that is responsible for a person's skin tone, eye color, and hair color.



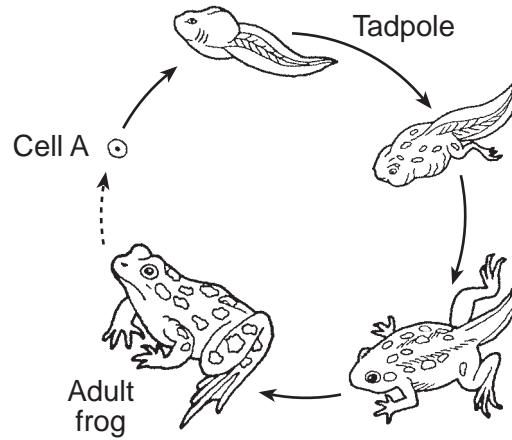
68 Identify *one* human body characteristic affected by albinism. [1]

69 Determine the genetic makeup of parents 1 and 2, who have a son with albinism. [1]

Parent 1: _____

Parent 2: _____

Base your answers to questions 70 and 71 on the diagram below and on your knowledge of science. The diagram represents the life cycle of a frog.

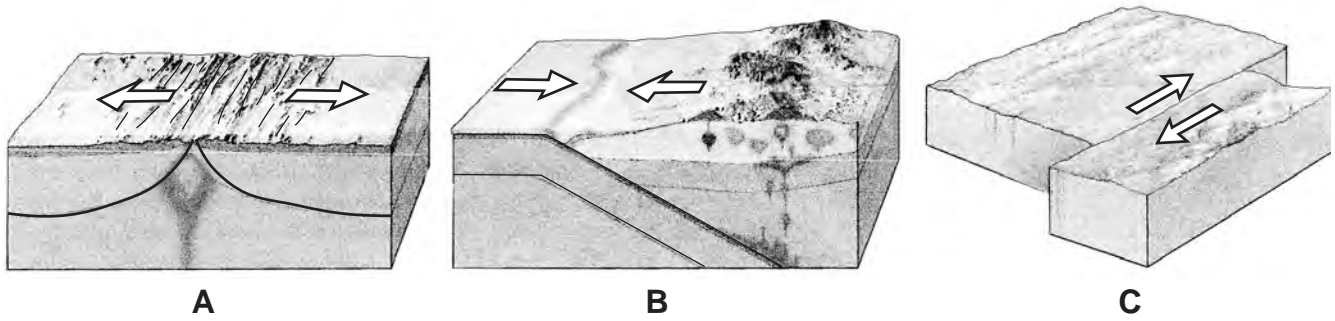


70 Identify *one* piece of evidence from the life cycle diagram that shows metamorphosis is taking place. [1]

71 Identify the *two* types of cells that combine to produce cell A, which has been fertilized. [1]

_____ and _____

Base your answers to questions 72 and 73 on the diagrams below and on your knowledge of science. The diagrams, labeled A through C, represent enlarged sections of three different types of tectonic plate boundaries.

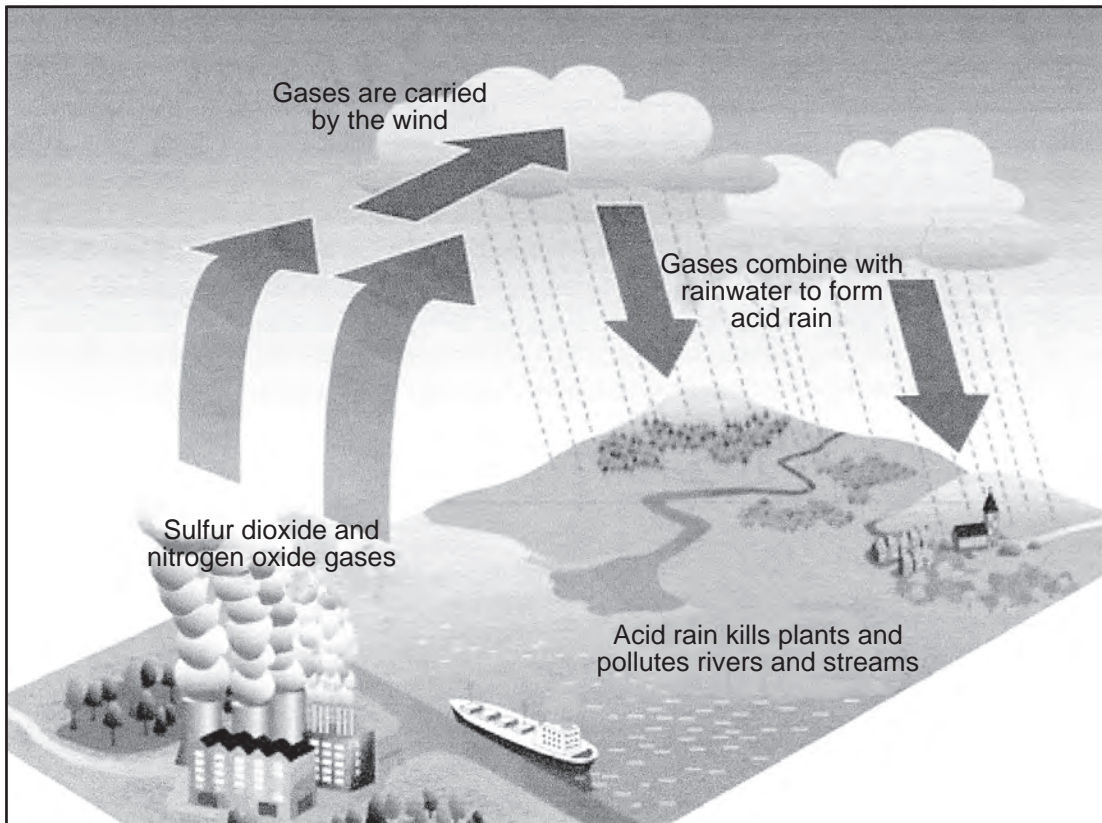


72 Complete the chart below by placing a check mark (✓) for the main type of plate motion represented by the arrows in diagrams A, B, and C. [1]

Plate Boundary	Plates Sliding Past Each Other	Plates Colliding	Plates Moving Apart
A			
B			
C			

73 Identify *one* geologic event or surface feature that occurs at a tectonic plate boundary. [1]

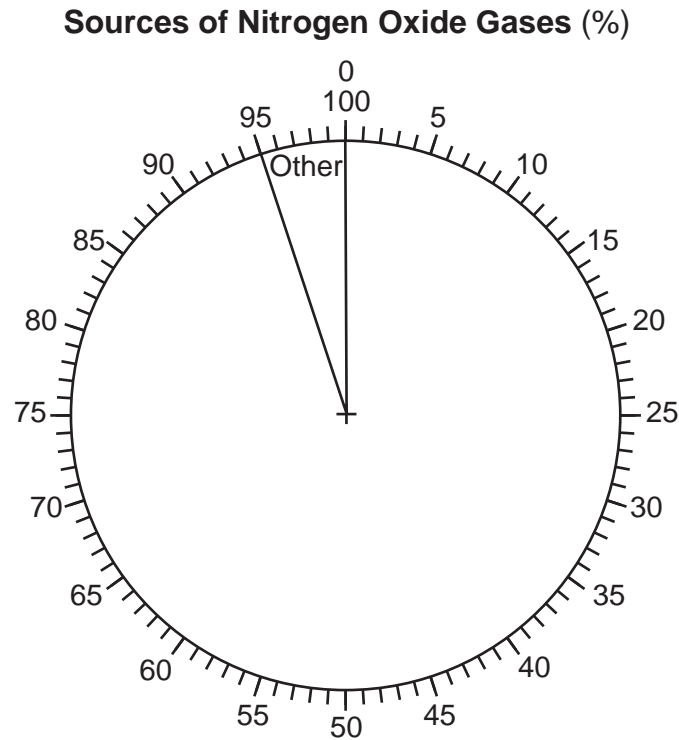
Base your answers to questions 74 through 76 on the diagram and data table below and on your knowledge of science. The diagram represents how acid rain is produced from nitrogen oxides and sulfur dioxide gases. The data table shows the percent of nitrogen oxides and sulfur dioxide gases released by different sources.



Sources of Acid Rain Gases

Source	Nitrogen Oxides (%)	Sulfur Dioxide (%)
electric utilities	32	69
vehicles (cars and trucks)	43	4
industrial processes	20	24
other	5	3

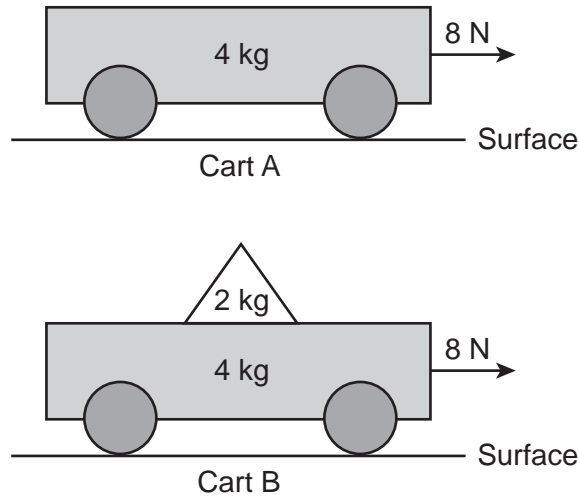
- 74 On the pie graph below, complete the graph to show the percent of nitrogen oxides produced by each source. Label each section of the pie graph with the source. The “other” source has already been completed. [1]



- 75 Compare the percent of sulfur dioxide produced by vehicles to the percent of sulfur dioxide produced by industrial processes. [1]

- 76 Describe *one* way humans can reduce pollution from sulfur dioxide and nitrogen oxides released into the atmosphere. [1]

Base your answers to questions 77 and 78 on the diagram below and on your knowledge of science. The diagram represents two identical carts, A and B, each with a mass of 4 kilograms (kg). An object with a mass of 2 kg is placed on cart B. An equal force of 8 newtons (N) is used to pull each cart over the same surface.



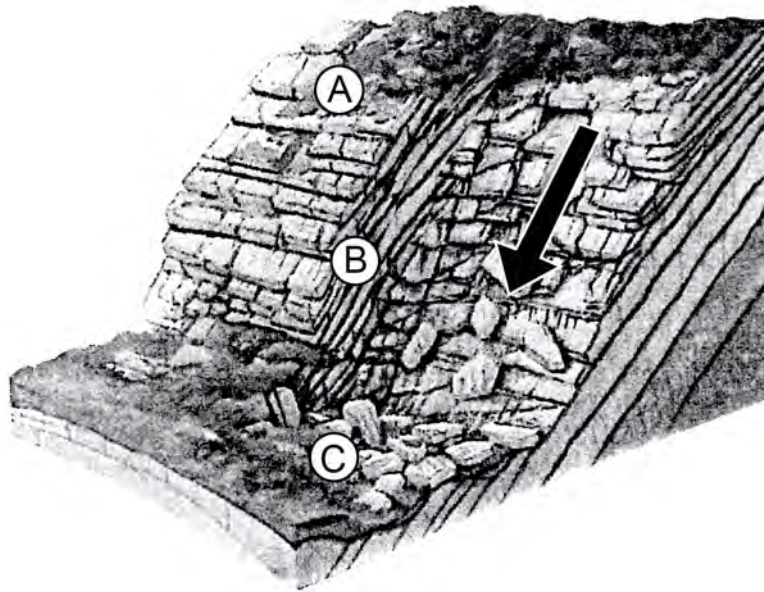
77 Using the equation below, calculate the acceleration of cart A, in meters per second squared (m/s^2). [1]

$$\text{Acceleration} = \frac{\text{Force}}{\text{Mass}}$$

_____ m/s^2

78 Explain why the acceleration of cart B is *less* than the acceleration of cart A. [1]

Base your answers to questions 79 and 80 on the diagram below and on your knowledge of science. The diagram represents a cross section of an area where a rock slide has occurred. Letters A through C represent locations along the slope.



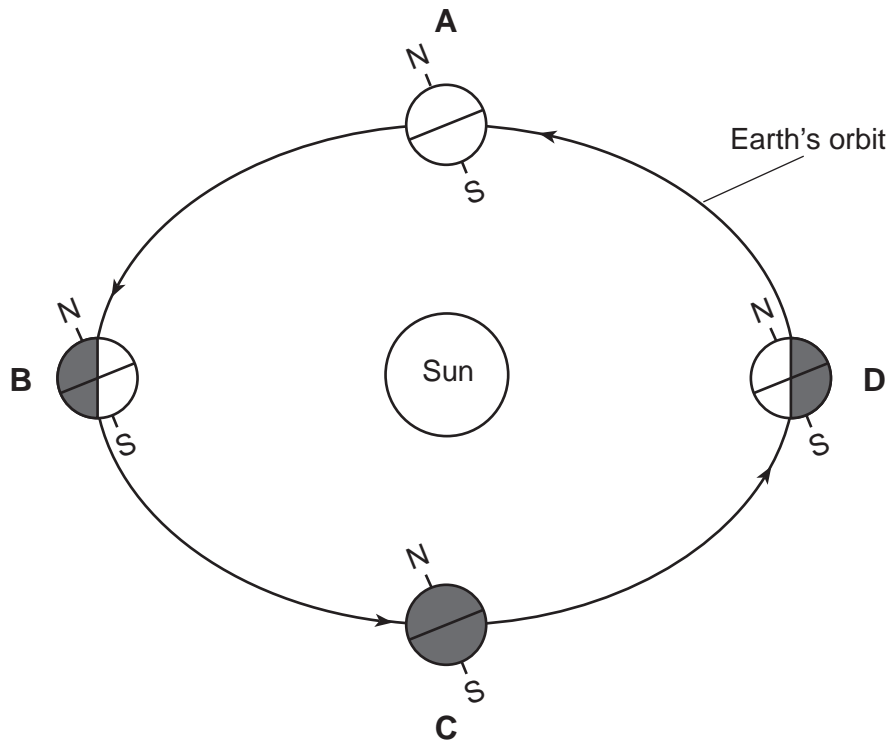
79 Identify the lettered location where the potential energy of the rock pieces having the same mass would be the greatest and explain why. [1]

Location: _____

Explanation: _____

80 Identify the force responsible for moving the rock material shown in the diagram. [1]

Base your answers to questions 81 through 83 on the diagram below and on your knowledge of science. The diagram represents Earth in its orbit around the Sun. Letters *A* through *D* represent Earth on the first day of each season. Letter *N* represents the North Pole. Letter *S* represents the South Pole.



(Not drawn to scale)

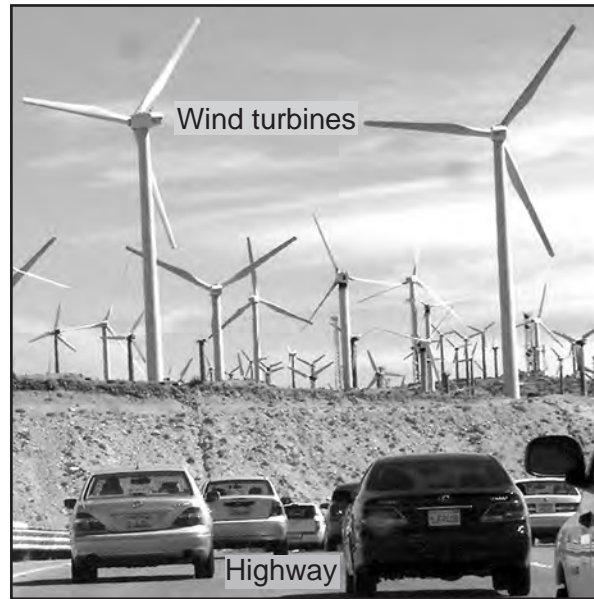
81 Identify the lettered position where an observer in New York State would experience the first day of winter. [1]

82 Determine the length of time, in months, it takes for Earth to move in its orbit from position *A* to position *B* in the diagram. [1]

_____ months

83 State *one* cause of Earth's seasons. [1]

Base your answers to questions 84 and 85 on the photograph below and on your knowledge of science. The photograph shows wind turbines that are used to generate electricity and a highway that humans have built in the area. Wind turbines and highways have *both* beneficial and harmful effects.



84 Describe *one* way that using wind turbines might benefit the environment. [1]

85 Describe *one* harmful effect that building the highway might have on the animals living in the area. [1]

GRADE 8 INTERMEDIATE-LEVEL SCIENCE

For Teacher Use Only

Part II Credits

Question	Maximum Credit	Credit Allowed
46	1	
47	1	
48	1	
49	1	
50	1	
51	1	
52	1	
53	1	
54	1	
55	1	
56	1	
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73	1	
74	1	
75	1	
76	1	
77	1	
78	1	
79	1	
80	1	
81	1	
82	1	
83	1	
84	1	
85	1	
Total	40	