

THE UNIVERSITY OF THE STATE OF NEW YORK

GRADE 8

INTERMEDIATE-LEVEL SCIENCE TEST

WRITTEN TEST

JUNE 2, 2014

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.

Part I

DIRECTIONS

There are 45 questions on Part I of the test. Each question is followed by four choices, numbered 1 through 4. 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 number as the answer you have chosen.

Read the sample question below.

<p style="text-align: center;">Sample Question</p> <p>Earth gets most of its light from</p> <ul style="list-style-type: none">(1) the stars(2) the Sun(3) the Moon(4) other planets

The correct answer is **the Sun**, which is choice number **2**. On your answer sheet, look at the box showing the row of answer circles for the sample question. Since choice number **2** is the correct answer for the sample question, the circle with the number **2** 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.

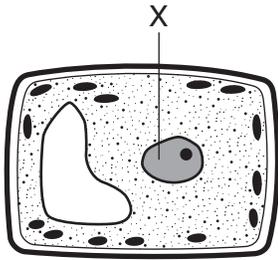
You may use a calculator if needed.

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 diagram below represents a plant cell. Letter X represents a structure in the cell.



Which cell structure is represented by X?

- (1) nucleus (2) cytoplasm (3) cell wall (4) cell membrane
- 2 A major function of a plant's roots is to
- (1) produce flowers (2) release oxygen (3) transport carbon dioxide (4) take in water
- 3 Which type of relationship exists when a certain type of tree's roots need a fungus present in order to grow normally?
- (1) beneficial (2) competitive (3) harmful (4) infectious
- 4 Which process releases energy from digested food?
- (1) photosynthesis (2) cellular respiration (3) vitamin production (4) fertilization
- 5 Most hormones are produced by which human organ system?
- (1) digestive (2) endocrine (3) respiratory (4) nervous
- 6 Which process results in the formation of a new cell with a full set of chromosomes?
- (1) respiration (2) digestion (3) fertilization (4) evolution
- 7 Specialized cells protect the human body from disease-causing microbes by
- (1) producing chemicals that destroy the microbes (2) dissolving wastes from the microbes (3) creating recessive genes in the microbes (4) supplying oxygen and nutrients to the microbes
- 8 Which model can be used to trace genetic inheritance?
- (1) life cycle (2) pedigree chart (3) food web (4) energy pyramid
- 9 The transfer of a section of DNA from one organism into the DNA of another organism by scientists is called
- (1) selective breeding (2) genetic engineering (3) natural selection (4) internal fertilization
- 10 A green plant absorbs light. A frog eats flies. These are both examples of how organisms
- (1) obtain energy (2) escape predators (3) produce offspring (4) excrete waste
- 11 A body cell that is undergoing abnormal cell division is most likely
- (1) producing sex cells (2) transporting nutrients (3) forming cancerous cells (4) developing an infection
- 12 A main function of a plant's seed is to
- (1) store food to be used during early development (2) attract pollen to be used during development (3) take in light energy to be used during photosynthesis (4) produce chlorophyll to be used during photosynthesis

13 The drawings below represent three different birds. The beak shape makes it easy for each bird to obtain food in a different way.

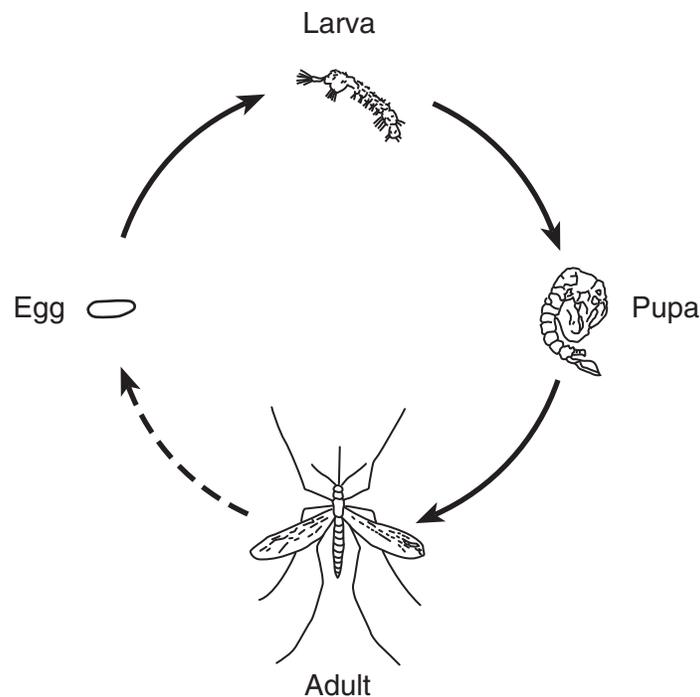


(Not drawn to scale)

The differences in beak shape are examples of

- (1) camouflage
- (2) competition
- (3) dynamic equilibrium
- (4) biological adaptation

14 The diagram below represents the stages of development in a mosquito.

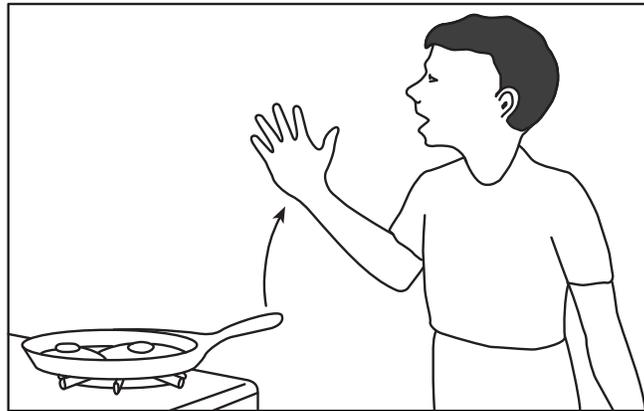


(Not drawn to scale)

Which process is represented by the four stages in this diagram?

- (1) fertilization
- (2) metabolism
- (3) metamorphosis
- (4) succession

15 The diagram below represents a person cooking eggs on a stove. The person has touched the hot frying pan and pulled his hand away.

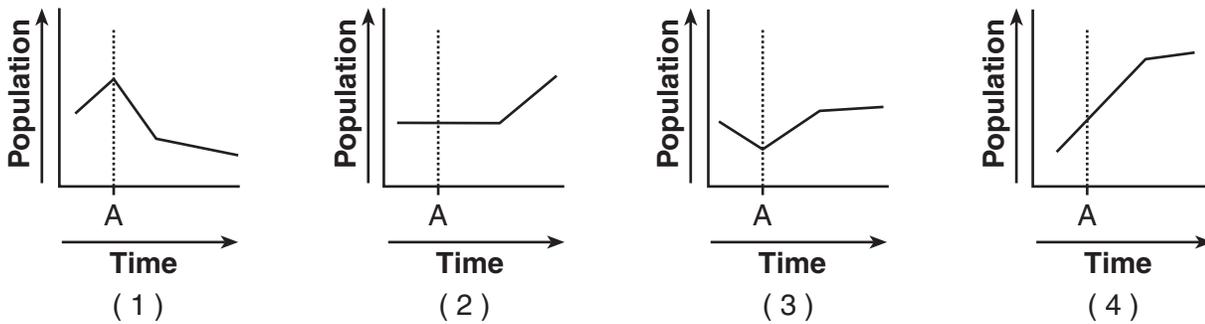


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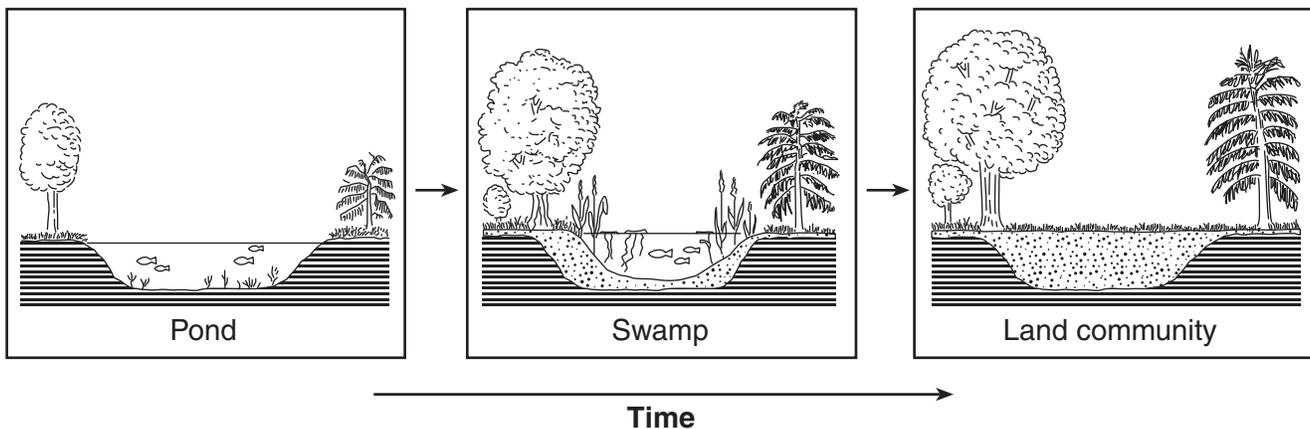
Which title is the best one for this diagram?

- (1) A Human Requires Oxygen to Survive
- (2) Metabolism is Influenced by Diet
- (3) All Living Things Require Energy
- (4) A Human Responds to a Stimulus

16 Which graph shows what most likely would happen to the population of a certain animal if a new predator were introduced at time A?



17 The diagrams below represent the same location over a period of many years.



The sequence of diagrams best shows that, over time,

- (1) erosion increases
- (2) climates get colder
- (3) communities stay the same
- (4) ecological succession occurs

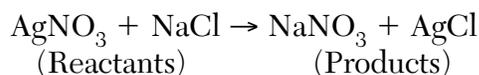
18 Which process in an apple tree primarily results from cell division?

- (1) growth (3) gas exchange
(2) photosynthesis (4) waste removal

19 A single human body cell typically contains thousands of

- (1) genes (3) chloroplasts
(2) nuclei (4) bacteria

20 The equation below shows the products formed when a solution of silver nitrate (AgNO_3) reacts with a solution of sodium chloride (NaCl).



In this equation, the total mass of the reactants is

- (1) greater than the total mass of the products
(2) equal to the total mass of the products
(3) equal to the mass of AgCl
(4) less than the mass of AgCl

21 A lamp converts electrical energy to light energy. In addition to the light energy, much of this electrical energy is also converted to

- (1) mechanical energy (3) heat energy
(2) chemical energy (4) nuclear energy

22 One example of matter is

- (1) magnetism (3) water
(2) heat (4) radiation

23 Volcanic eruptions are caused primarily by the movement of

- (1) rock by erosion (3) planetary winds
(2) Earth in its orbit (4) tectonic plates

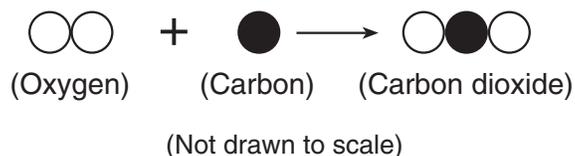
24 Which type of air mass forms over the ocean near the equator?

- (1) moist and warm (3) dry and warm
(2) moist and cool (4) dry and cool

25 Which energy resource is considered *non-renewable*?

- (1) solar energy
(2) fossil fuels
(3) geothermal energy
(4) hydroelectric power

26 The diagram below represents two atoms in a molecule of oxygen that combine chemically with one atom of carbon to form a carbon dioxide molecule.



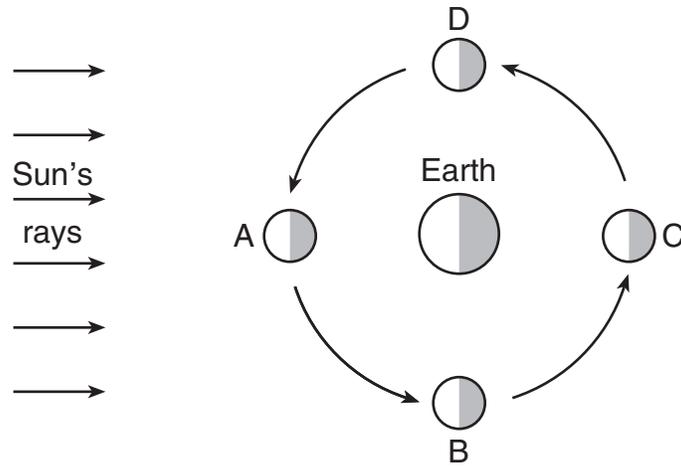
Carbon dioxide is an example of

- (1) a mixture (3) a solution
(2) an element (4) a compound

27 Which weather condition commonly occurs along a cold front?

- (1) clear skies
(2) precipitation
(3) warm temperatures
(4) dry air

28 Letters *A*, *B*, *C*, and *D* in the diagram below represent four positions of the Moon in its orbit around Earth.

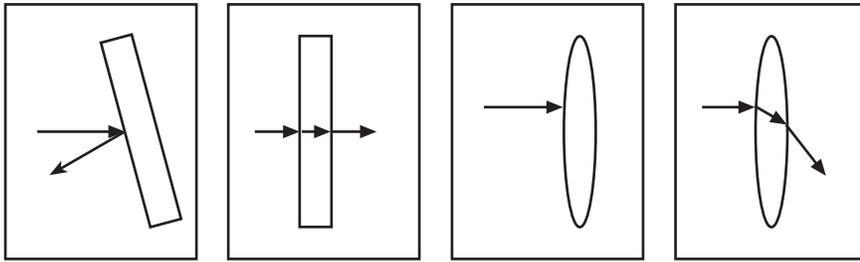


(Not drawn to scale)

At which Moon position would a person on Earth see the entire lighted half of the Moon (full-Moon phase)?

- (1) *A*
- (2) *B*
- (3) *C*
- (4) *D*

29 The arrows in the diagrams below represent the path of light as it strikes four different objects. Which diagram best represents the refraction of light?



- (1)
- (2)
- (3)
- (4)

Base your answers to questions 30 through 32 on the portion of the Periodic Table of the Elements below and on your knowledge of science. Four spaces on the table have been labeled *a*, *b*, *c*, and *d*.

Portion of the Periodic Table of the Elements

Groups					18
13	14	15	16	17	
5 B Boron 10.81	6 C Carbon 12.01	7 N Nitrogen 14.01	8 O Oxygen 16.00	9 F Fluorine 18.998	2 He Helium 4.003
10 Ne Neon 20.18	13 Al Aluminum 26.98	14 Si Silicon 28.09	15 P Phosphorus 30.97	16 S Sulfur 32.07	17 Cl Chlorine 35.45
18 Ar Argon 39.95	<i>a</i>	33 As Arsenic 74.92	34 Se Selenium 78.96	35 Br Bromine 79.90	36 Kr Krypton 83.80
	<i>b</i>	51 Sb Antimony 121.8	52 Te Tellurium 127.6	53 I Iodine 126.9	54 Xe Xenon 131.3
	<i>c</i>	<i>d</i>		85 At Astatine (210)	86 Rn Radon (222)

Key
 Atomic number
 Element symbol
 Element name
 Atomic mass

1 H Hydrogen 1.01

30 Information for the element lead (Pb) is shown below.

82 Pb Lead 207.2

In which labeled space on the portion of the table should the element lead (Pb) be placed?

- (1) *a*
- (2) *b*
- (3) *c*
- (4) *d*

31 Which element from this portion of the table chemically reacts in a way similar to the way the element chlorine (Cl) reacts?

- (1) Si
- (2) O
- (3) Xe
- (4) I

32 Which element is classified as a noble gas?

- (1) sulfur
- (2) oxygen
- (3) argon
- (4) nitrogen

Base your answers to questions 33 through 35 on the table below and on your knowledge of science. The table shows some physical properties of four minerals.

Physical Properties of Four Minerals

Mineral	Physical Properties				
	Luster	Density	Streak	Color	Hardness
magnetite	metallic	5.2 g/cm ³	black	black	hard
muscovite mica	nonmetallic	2.8 g/cm ³	colorless to white	colorless to yellow	soft
pyrite	metallic	5.0 g/cm ³	greenish black	brassy yellow	hard
sulfur	nonmetallic	2.0 g/cm ³	white to yellow	yellow to amber	soft

33 Which mineral is hard and has the same color and streak?

- (1) magnetite
- (2) muscovite mica
- (3) pyrite
- (4) sulfur

34 The volume of a sample of sulfur was measured to be 5.0 cm³. Based on the equation below, what is the mass of this sample?

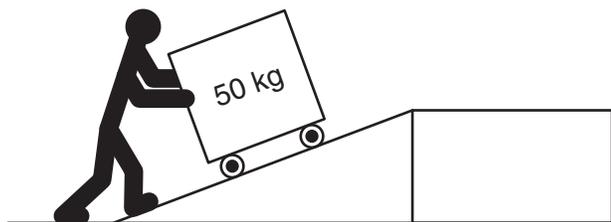
$$\text{Density} = \frac{\text{Mass}}{\text{Volume}}$$

- (1) 2.5 grams
- (2) 2.0 grams
- (3) 5.0 grams
- (4) 10.0 grams

35 Which physical property best distinguishes magnetite from pyrite?

- (1) luster
- (2) streak
- (3) color
- (4) hardness

Base your answers to questions 36 and 37 on the diagram below and on your knowledge of science. The diagram represents a person pushing a 50-kg box up a ramp.



36 Which two simple machines are being used in the diagram?

- (1) inclined plane; pulley
- (2) inclined plane; wheel and axle
- (3) lever; pulley
- (4) lever; wheel and axle

37 Which force will *decrease* if the surface of the ramp is made smoother?

- (1) gravity
- (2) magnetism
- (3) friction
- (4) electricity

38 A substance in the solid phase (state) of matter has

- (1) a definite shape and a definite volume
- (2) a definite shape, but no definite volume
- (3) no definite shape, but a definite volume
- (4) no definite shape and no definite volume

39 Which atmospheric gas has the greatest effect on the weather conditions associated with an air mass?

- (1) oxygen
- (2) nitrogen
- (3) methane
- (4) water vapor

40 Which process transfers heat when particles collide in a solid?

- (1) convection
- (2) conduction
- (3) radiation
- (4) evaporation

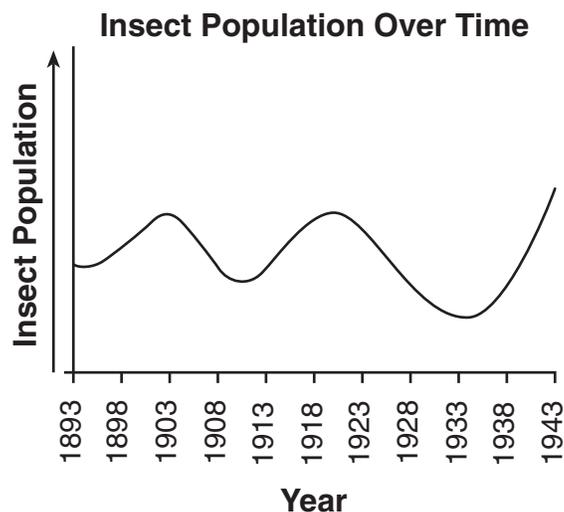
41 In a car accident, a seat belt helps prevent injuries by applying a force

- (1) less than the force of the moving passenger
- (2) greater than the force of the moving car
- (3) in the same direction as the car's motion
- (4) in the opposite direction of the passenger's motion

42 The force of gravitational attraction between two objects depends on the distance between the objects and their

- (1) buoyancies
- (2) temperatures
- (3) masses
- (4) shapes

43 The graph below shows population data for one kind of insect over a 50-year period.



Which statement best describes the population of this insect over the 50-year period?

- (1) It decreased steadily.
- (2) It increased steadily.
- (3) It remained constant.
- (4) It followed a cyclic pattern.

44 The data table below shows times that an observer in New York State saw the Moon rise during a 5-day period. The time of the Moon rise on Wednesday is *not* shown.

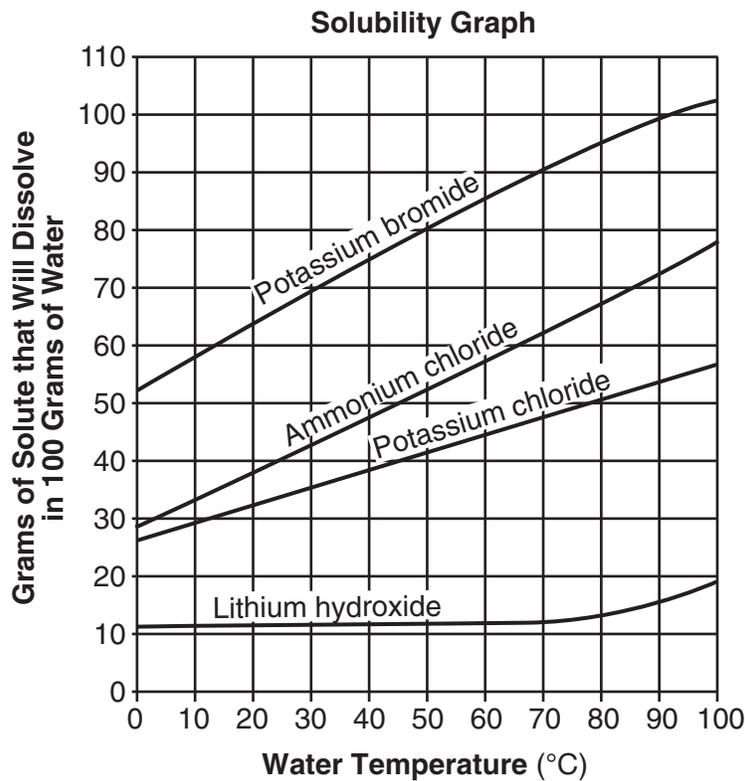
Time of the Moon Rise for 5 Days

Day of the Week	Monday	Tuesday	Wednesday	Thursday	Friday
Time of the Moon Rise	9:00 p.m.	9:52 p.m.	???	11:36 p.m.	12:28 a.m.

Based on the pattern in the data table, at what time did the Moon rise on Wednesday?

- (1) 10:00 p.m.
- (2) 10:44 p.m.
- (3) 11:00 p.m.
- (4) 11:15 p.m.

45 The solubility graph below shows the amounts of four substances that will dissolve in 100 grams of water at various water temperatures.



Which substance has 80 grams of solute dissolved in 100 grams of water at 50°C?

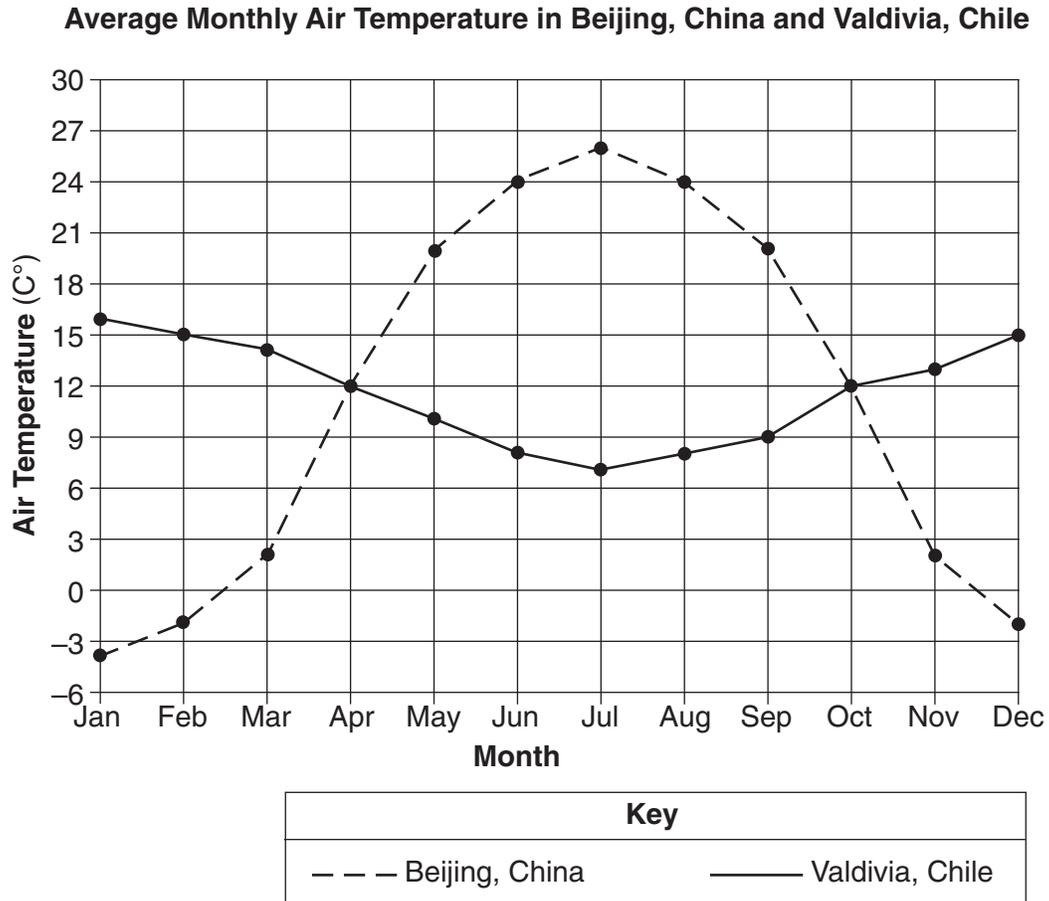
- (1) potassium bromide
- (2) ammonium chloride
- (3) potassium chloride
- (4) lithium hydroxide

Part II

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

Base your answers to questions 46 and 47 on the information below and on your knowledge of science.

The graph below shows the average monthly air temperatures in a one-year period for two cities: Beijing, China and Valdivia, Chile.



46 Determine the *two* months in which these two cities had the same average monthly air temperature. [1]

_____ and _____

47 Identify the scientific instrument used to measure air temperature. [1]

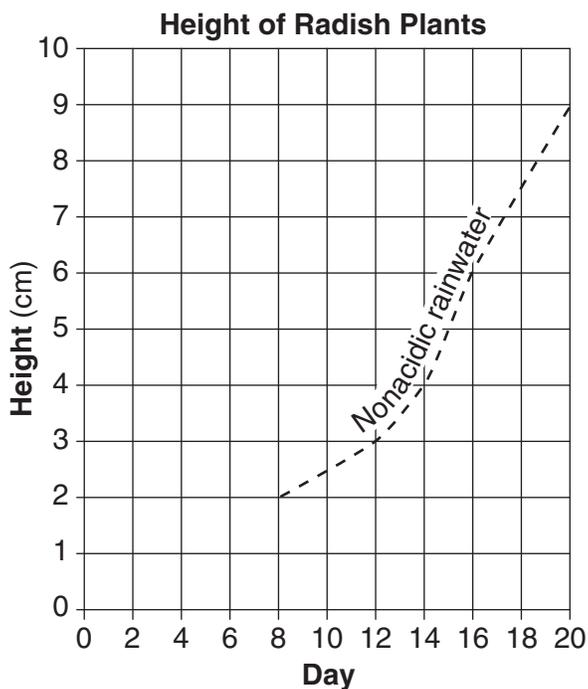
Base your answers to questions 48 through 50 on the information below and on your knowledge of science.

A group of students conducted an experiment to test the hypothesis that radish plants watered with acidic rainwater would not be as tall as radish plants watered with *nonacidic* rainwater. The students planted two identical radish seeds in equal amounts of soil. One was watered with *nonacidic* rainwater, and the other was watered with an equal amount of acidic rainwater. All other variables that would affect plant growth were the same for both plants. The students measured the heights of the plants in centimeters (cm). The height of the plant watered with acidic rainwater on various days is shown in the table below.

Data Table

Day	Height of Plant Watered with Acidic Rainwater (cm)
8	1
12	2
14	3
17	4
20	7

- 48 The height of the plant watered with *nonacidic* rainwater is shown by the dashed line on the graph below. On the graph, use an **X** to plot the height of the plant watered with acidic rainwater for each day shown in the data table. Connect the **X**s with a solid line. [1]

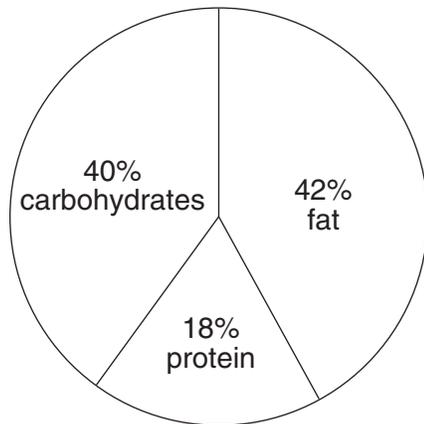


49 Describe how the data support the student's original hypothesis. [1]

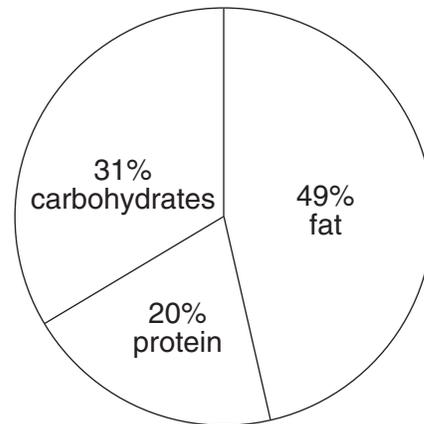
50 Describe *one* way in which the students might improve the design of this experiment if it were repeated. [1]

Base your answers to questions 51 and 52 on the pie graphs below. The graphs show the percentage of Calories from different nutrients found in two different cheeseburgers, A and B.

Percentage of Calories from Different Nutrients



Cheeseburger A



Cheeseburger B

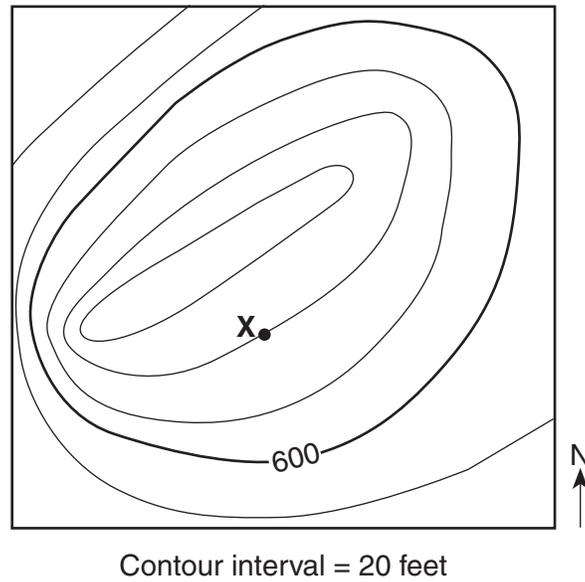
51 Determine the difference between the percentage of Calories that come from fat in cheeseburger A and the percentage of Calories that come from fat in cheeseburger B. [1]

_____ %

52 Cheeseburger B contains 600 total Calories. Calculate the number of these Calories that come from protein. [1]

_____ **Calories**

Base your answers to questions 53 and 54 on the topographic map of a hill below and on your knowledge of science. The contour lines on the map show the elevation of the land above sea level. Point X represents a location on the hill.



53 Determine the elevation of location X. [1]

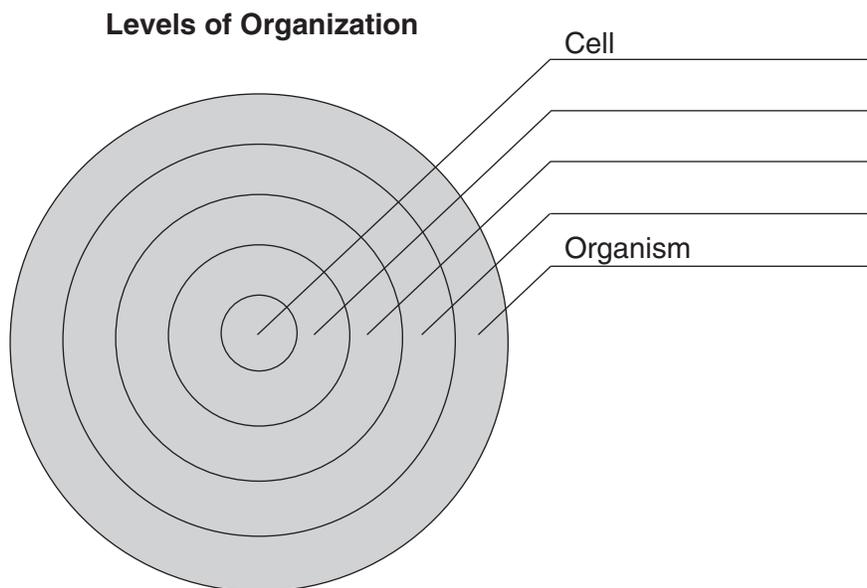
_____ ft

54 Describe *one* piece of evidence on the map that indicates that the western side of the hill has the steepest slope. [1]

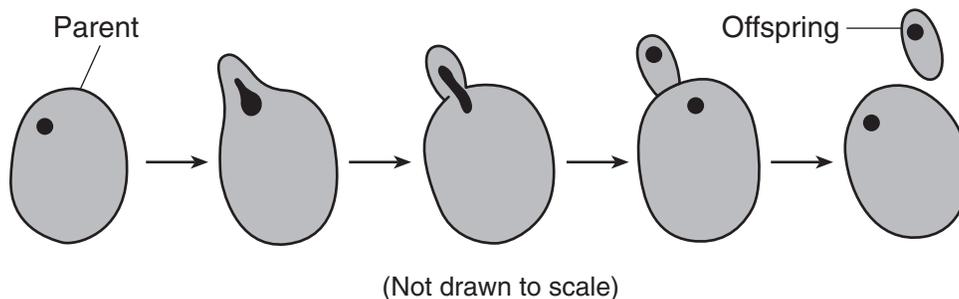
55 Pea plants can produce pods that are green or yellow. The gene for green color (G) is dominant and the gene for yellow color (g) is recessive. Complete the Punnett square below to show the results of a cross between two green pea plants with Gg genes. [1]

	G	g
G		
g		

56 In multicellular organisms, cells are organized so that the organism can carry out life functions. The diagram below represents the five levels of organization. Two levels are labeled: cell and organism. Complete the diagram by placing each of the labels, **organ**, **organ system**, and **tissue**, at the correct level. [1]



57 The diagram below represents a yeast cell budding during asexual reproduction.



Give *one* reason why this type of reproduction is considered to be asexual. [1]

Base your answers to questions 58 through 60 on the chart below and on your knowledge of science. The chart shows the levels of classification for five different organisms.

Levels of Classification for Five Organisms

Level of Classification	Organism				
	Domestic Dog	Orange Day Lily	<i>E. coli</i> Bacteria	White Button Mushroom	Wolf Spider
Kingdom	Animalia	Plantae	Monera	Fungi	Animalia
Phylum	Chordata	Magnoliophyta	Proteobacteria	Basidiomycota	Arthropoda
Class	Mammalia	Liliopsida	Gamma Proteobacteria	Agaricomycetes	Arachnida
Order	Carnivora	Liliales	Enterobacteriales	Agaricales	Araneae
Family	Canidae	Liliaceae	Enterobacteriaceae	Agaricaceae	Lycosidae
Genus	<i>Canis</i>	<i>Hemerocallis</i>	<i>Escherichia</i>	<i>Agaricus</i>	<i>Pardosa</i>
Species	<i>familiaris</i>	<i>fulva</i>	<i>coli</i>	<i>bisporus</i>	<i>atlantica</i>

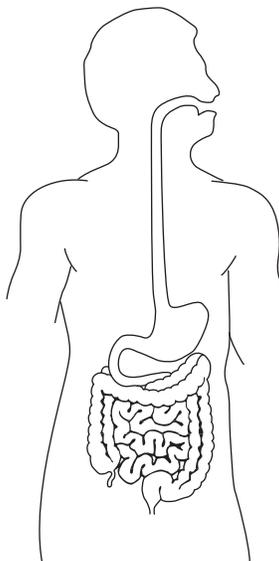
58 Identify the most general level of classification shown for the *E. coli* bacteria. [1]

59 Identify the *two* organisms in the chart most closely related by level of classification. [1]

_____ and _____

60 Identify *one* organism in the chart that is a decomposer. [1]

Base your answers to questions 61 and 62 on the diagram below, which represents several parts of the human digestive system, and on your knowledge of science.



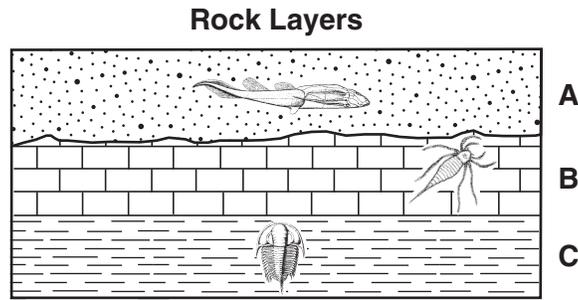
61 Describe *one* way that food is mechanically changed during the process of digestion. [1]

62 Two other human body systems are listed below. Circle *one* body system from the list and describe how that body system works together with the digestive system. [1]

Circle one: circulatory skeletal

Description: _____

Base your answers to questions 63 and 64 on the diagram below and on your knowledge of science. The diagram represents a cross section of rock layers A, B, and C and some fossils found within them. The rock layers have *not* been overturned.



(Not drawn to scale)

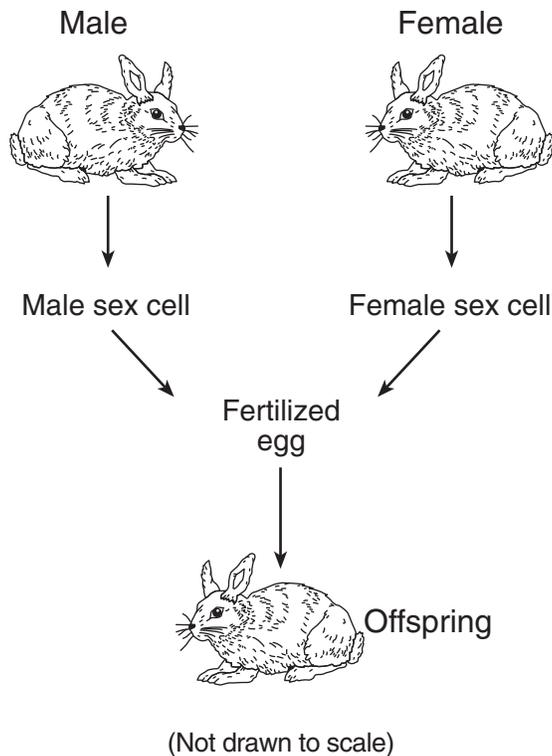
63 Describe *one* piece of evidence in the diagram that shows rock layer A formed after rock layer B. [1]

64 Are the rock layers shown most likely igneous, metamorphic, or sedimentary? Circle your answer below and describe *one* piece of evidence in the diagram that supports your answer. [1]

Circle one: igneous metamorphic sedimentary

Evidence: _____

Base your answers to questions 65 and 66 on the diagram below and on your knowledge of science. The diagram represents the process of reproduction in rabbits.

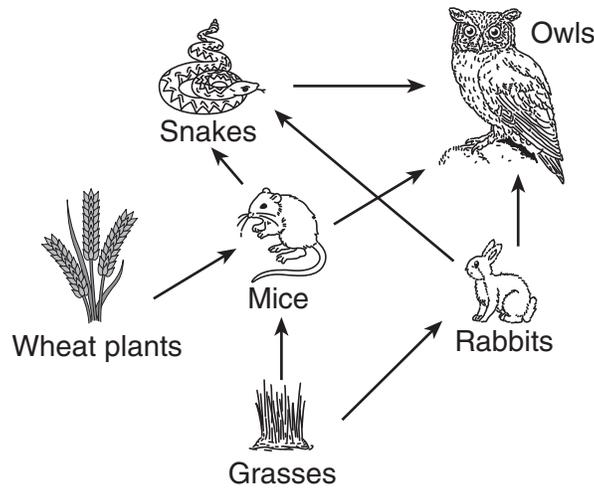


65 Identify the male sex cell. [1]

66 The female sex cell has 22 chromosomes. How many chromosomes are in each body cell of the female rabbit? [1]

_____ **chromosomes**

Base your answers to questions 67 and 68 on the partial food web below and on your knowledge of science.



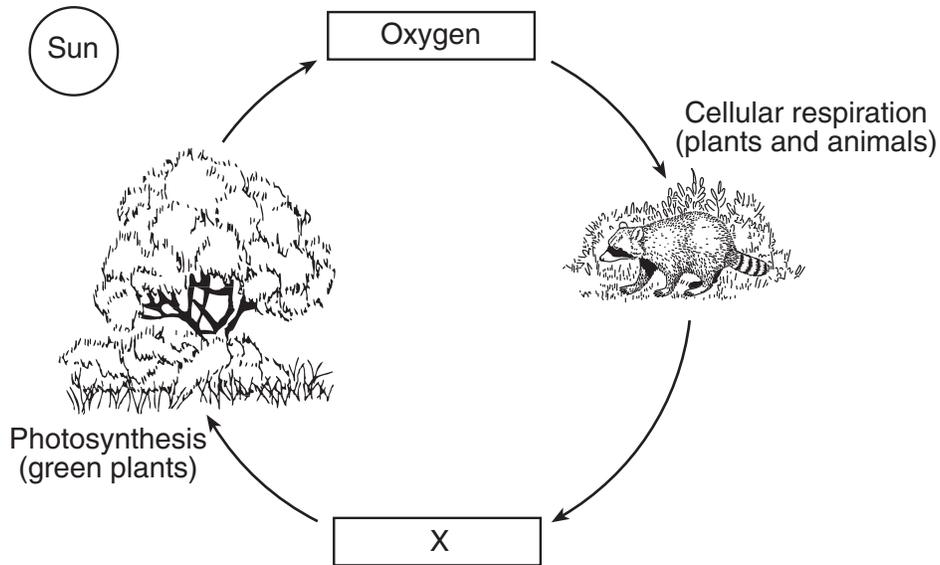
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67 These organisms can be classified according to the way they obtain energy. Complete the chart below by identifying *one* example of each type of organism labeled in this food web. [1]

Type of Organism	Example in Food Web
carnivore	
herbivore	
producer	

68 Explain why the population of rabbits might *decrease* if the population of mice decreased. [1]

69 The diagram below represents two gases being cycled through an ecosystem. Letter X represents one of those gases.



Identify the gas represented by X. [1]

70 The map below shows the location of a nature preserve and the surrounding area. The preserve is an ecosystem that is home to several endangered species.



Based on the map, describe *one* human activity that could have a *negative* effect on the nature preserve. [1]

Base your answers to questions 71 through 73 on the diagrams below and on your knowledge of science. Diagram 1 represents different forms of energy in the electromagnetic spectrum. Diagram 2 represents what happens to the different forms of electromagnetic waves when they pass through Earth's atmosphere.

Diagram 1
Electromagnetic Spectrum

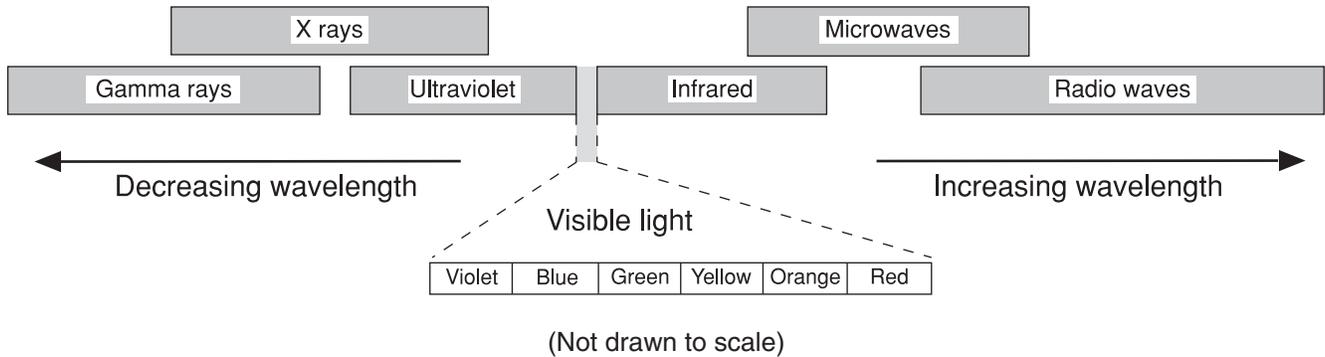
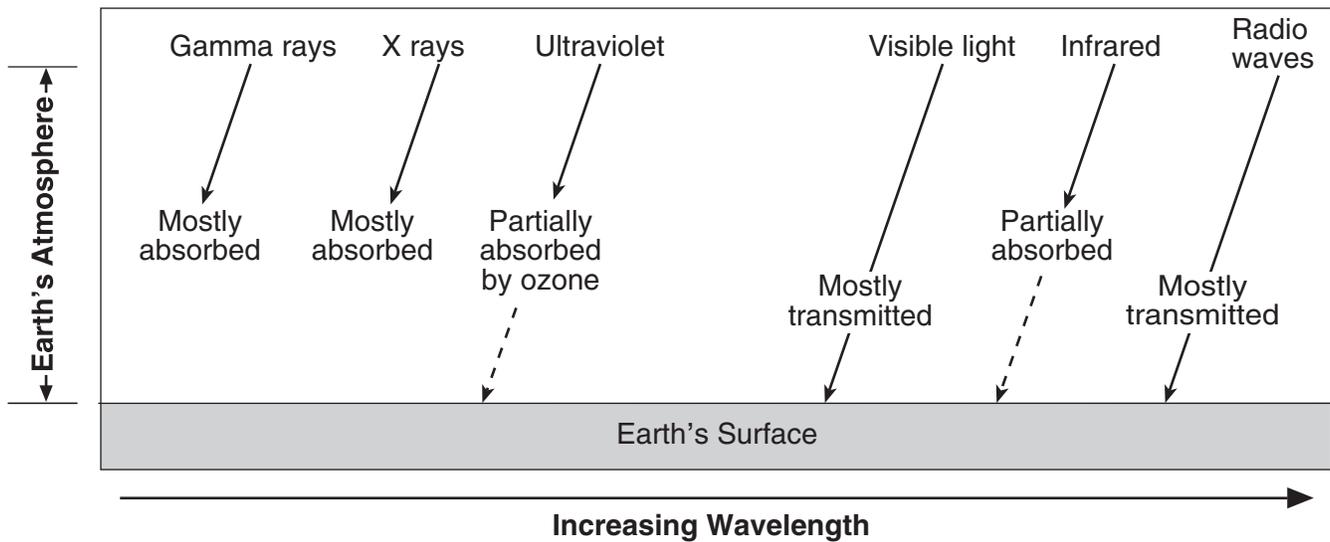


Diagram 2
Effects of Earth's Atmosphere on Electromagnetic Waves



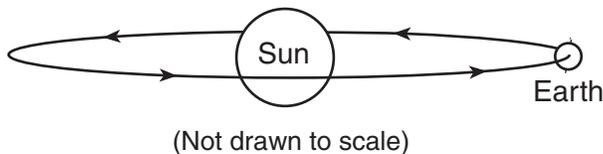
71 Identify the color of visible light with the longest wavelength. [1]

72 According to diagram 2, which *two* forms of electromagnetic energy mostly pass through the atmosphere to Earth's surface? [1]

_____ and _____

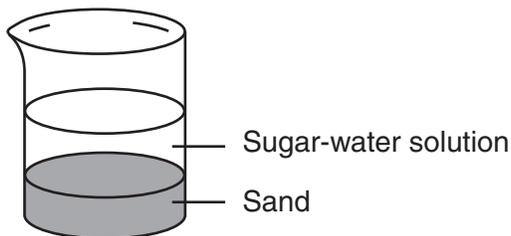
73 Ultraviolet rays can cause skin cancer in humans and other living things. Explain why the depletion of the ozone layer by pollutants has increased the risk of skin cancer. [1]

74 The diagram below represents Earth orbiting the Sun.



Approximately how long does it take Earth to complete one orbit around the Sun? [1]

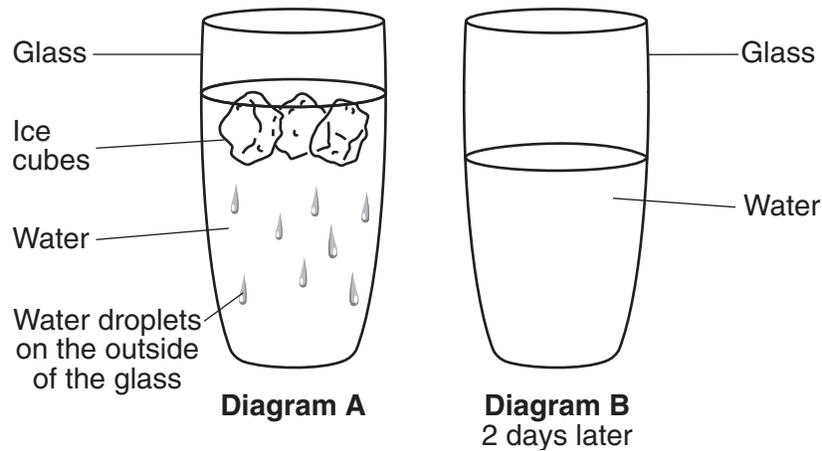
Base your answers to questions 75 and 76 on the diagram below and on your knowledge of science. The diagram represents a beaker containing sugar, water, and sand. The sugar is dissolved in the water, creating a solution. The sand has settled to the bottom of the beaker.



75 Describe *one* method to separate the sand from the other substances in the beaker. [1]

76 Describe *one* method to separate the dissolved sugar from the sugar-water solution. [1]

Base your answers to questions 77 and 78 on diagrams A and B below and on your knowledge of science. Diagram A represents a glass of water containing ice cubes. As the water and glass cooled, droplets formed on the outside of the glass. Diagram B represents the same undisturbed glass of water two days later.

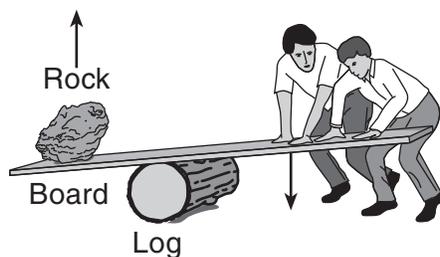


77 Complete the chart below by identifying the phase change that caused each event. [1]

Event	Phase Change
Water droplets formed on the outside of the glass in diagram A.	
Ice is no longer visible in diagram B.	
The level of water in the glass dropped in diagram B.	

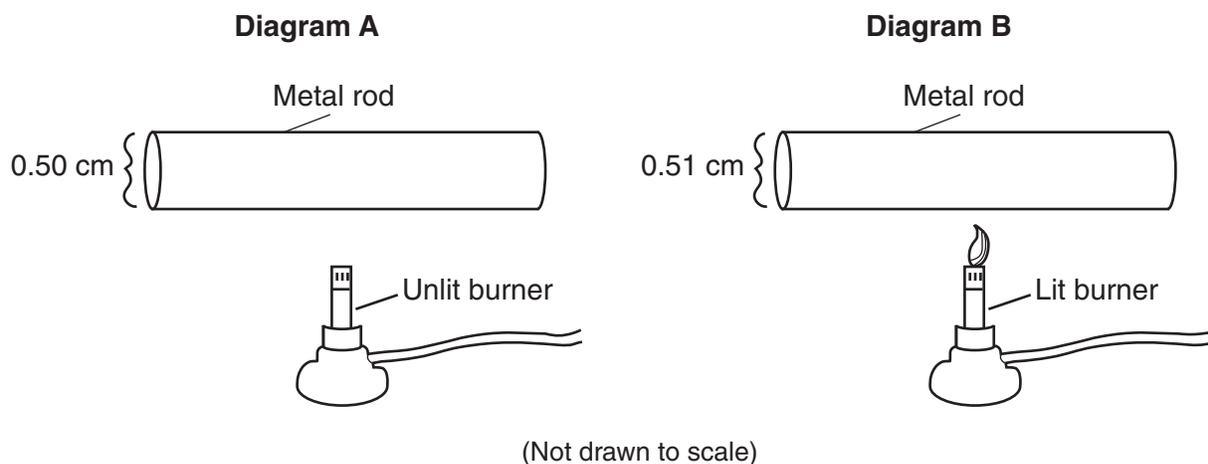
78 Explain why the ice floats in the liquid water in diagram A. [1]

79 The diagram below represents two people using a board and a log as a simple machine to lift a large rock.



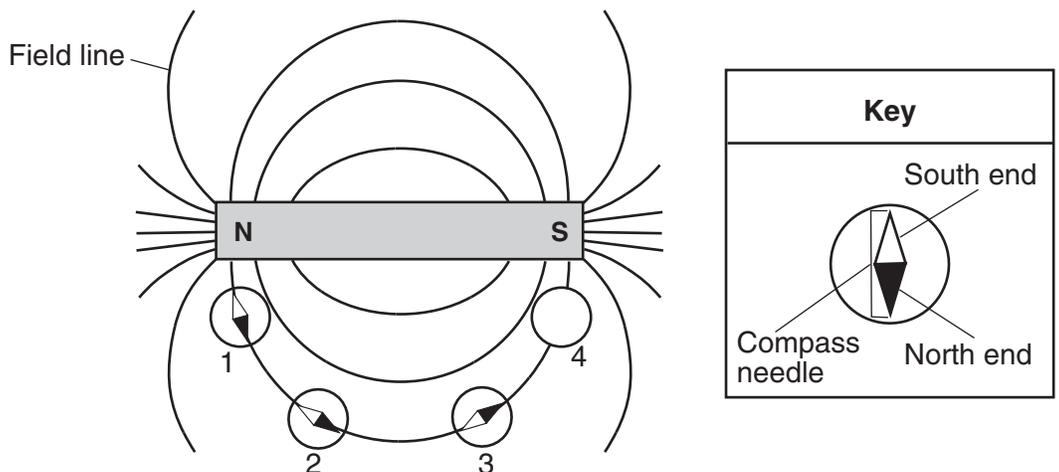
What force must the people overcome in order to lift the rock? [1]

80 Diagram A below represents a solid metal rod before heating. Diagram B represents the same rod after heating for 5 minutes. The diameter of the rod is noted in both diagrams.



Explain why the diameter of the metal rod changed slightly when the rod was heated. [1]

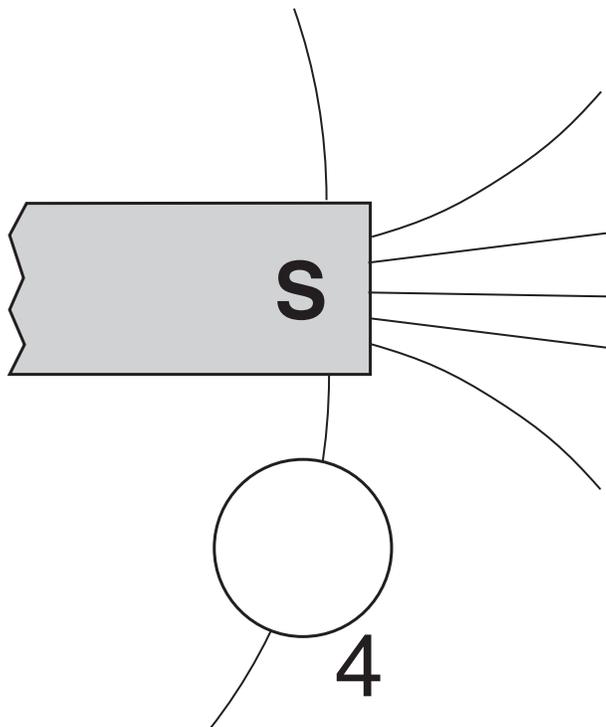
Base your answers to questions 81 through 83 on the information and diagram below and on your knowledge of science. The diagram represents the magnetic field lines of a bar magnet. Four magnetic compasses, labeled 1, 2, 3, and 4, are located along one of the field lines. The compass needle inside compass 4 has been left out.



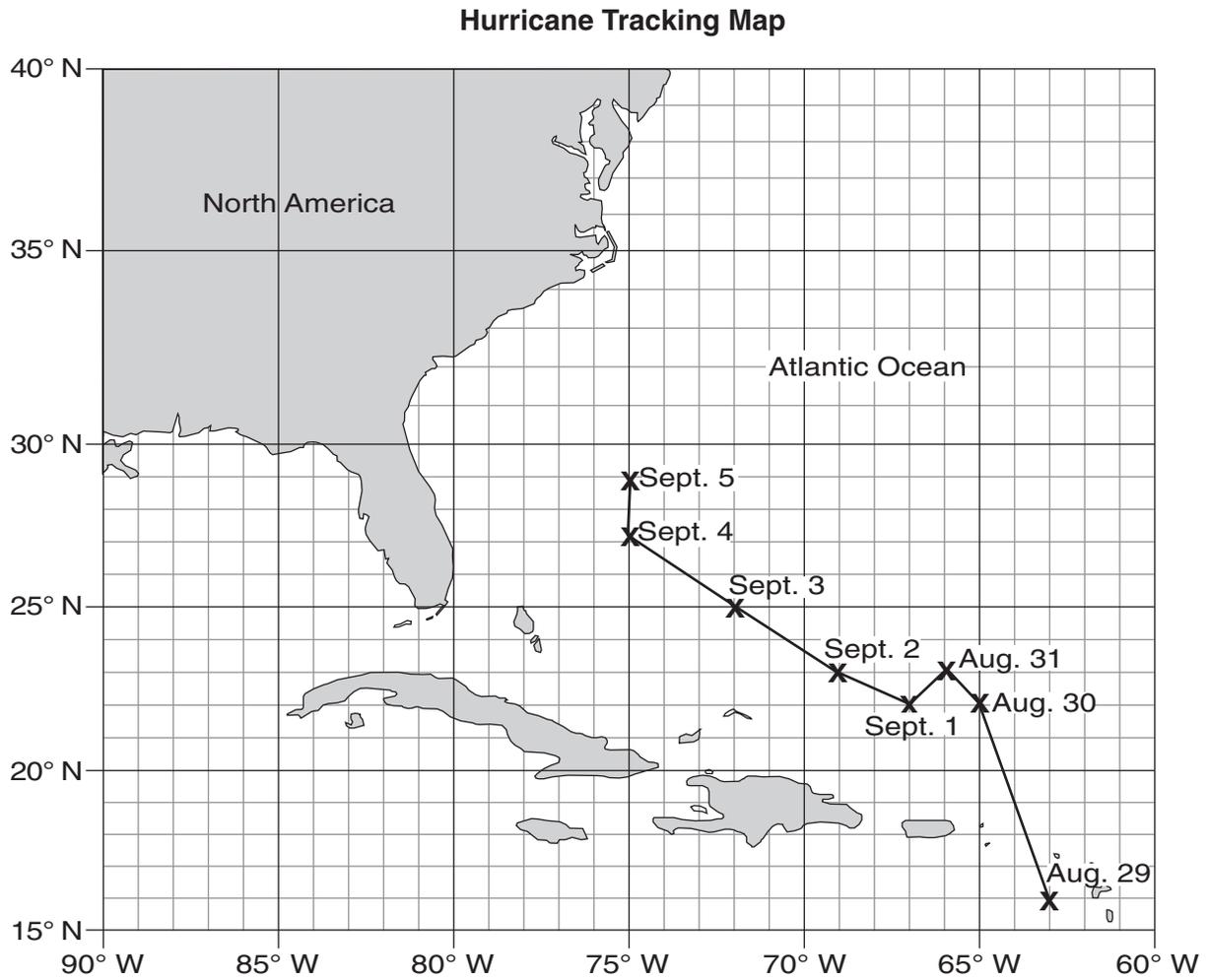
81 Explain why the south end of the needle in compass 1 is pointing toward the north pole of the magnet. [1]

82 Explain why the magnetic force acting on compass 1 is greater than the magnetic force acting on compass 3. [1]

83 On the diagram of compass 4 below, draw the needle of the compass correctly oriented to the magnet, and shade the north end of the compass needle to show how the compass should appear at that position. [1]



Base your answers to questions 84 and 85 on the map below and on your knowledge of science. The **X**s on the map show the location of the center of Hurricane Betsy over the Atlantic Ocean at noon on several dates in 1965.



84 In which compass direction did Hurricane Betsy move between September 1 and September 4? [1]

85 Determine the latitude and longitude position of the center of Hurricane Betsy at noon on September 3. [1]

_____ ° N _____ ° W

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	
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76	1	
77	1	
78	1	
79	1	
80	1	
81	1	
82	1	
83	1	
84	1	
85	1	
Total	40	