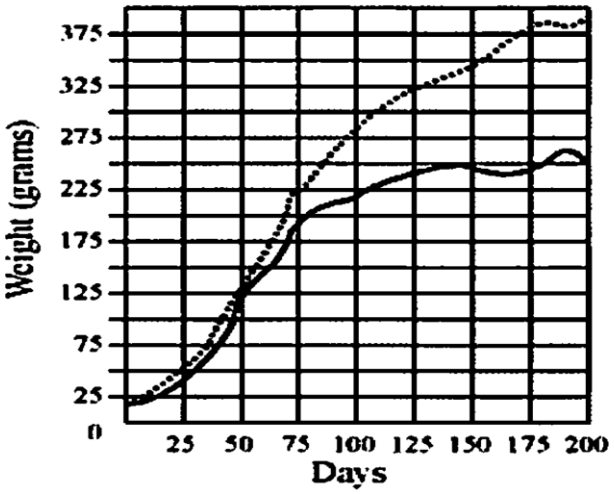
NMSBA Test Prep Science

Student Version

Name: _____ Date: _____ Period: _____

Lesson 1

Multiple Choice

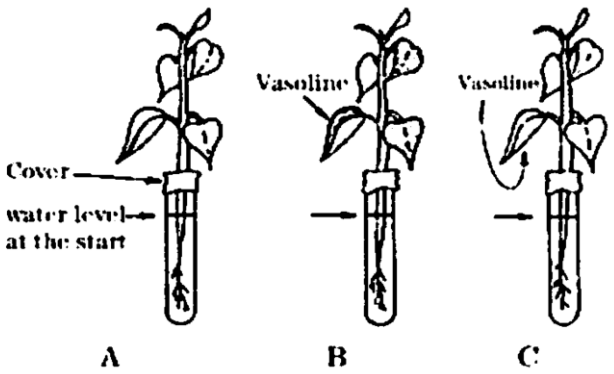


_____ Average growth of 38 untreated littermates (control)
_ _ _ _ _ _ average growth of 38 rats injected with anterior pituitary extract (experimental)

1. The graph above shows the average growth rate for 38 pairs of newborn rats. One of each pair was injected with anterior pituitary extract. The other member of each pair served as a control. At 75 days, what was the average weight of the rats injected with pituitary extract?
   a. 65 grams
   b. 125 grams
   c. 200 grams
   d. 225 grams

2. A student reported that a wilted stalk of celery became crisp when placed in a container of ice water. The student's statement was based on
   a. a deduction
   b. a hypothesis
   c. a conclusion
   d. an observation

3. The diagram shown below represents an investigation concerning the growth of bean plants. The roots of three identical bean plants were each placed through a hole in covered tubes containing water as shown in the diagrams. Nothing was done to plant A. Vaseline was used to cover the upper surface of the leaves of plant B. Vaseline was used to cover the lower surface of plant C. The water level of each tube was marked and the plants were placed together near a window. After 24 hours, the water level in each tube was measured.



Which tube represents the control for this investigation?

a. A
b. B
c. C

4. The number of meadow mice in a certain grassy field was determined each year from 1977 to 1989. The results are represented in the data table. Which inference can best be drawn from this study?

Year	Number of Meadow Mice
1977	130
1978	325
1979	50
1980	175
1981	125
1982	170
1983	125
1984	175
1985	30
1986	180
1987	125
1988	225
1989	75

a. Food for the meadow mice was plentiful between 1977 and 1978.
b. Herbivores that prey on meadow mice increased between 1977 and 1978.
c. Meadow mice populations decreased during years of plentiful rain.
d. The largest population was exactly double that of the smallest population.

5. In an investigation designed to determine the effect of the amount of water on plant growth, two groups of equal-sized bean plants of the same species were grown under identical conditions, except for the amount of water they were given. One group was watered with 400 milliliters of water once a day. After several days, the heights of the plants were measured. It was determined that the plants watered with 400 milliliters of water once a day showed more growth. The variable in this investigation is the
    a. type of bean plants used in the experiment.
    b. amount of water given the plants each day.
    c. types of soil the bean plants were growing in.
    d. group of bean plants watered with 200mL of water.

6. Which question cannot be answered using scientific methods?
    a. What is the most nutritious food for cats?
    b. How far is Jupiter from the sun?
    c. Who deserves to be vaccinated in a time of crisis?
    d. Which fuel source is the most economical to replace coal?

Constructed Response

Describe a situation that uses the processes of the scientific method. Explain how the scientific processes are used in that situation.

_____

_____

_____

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Lesson 2

Multiple Choice

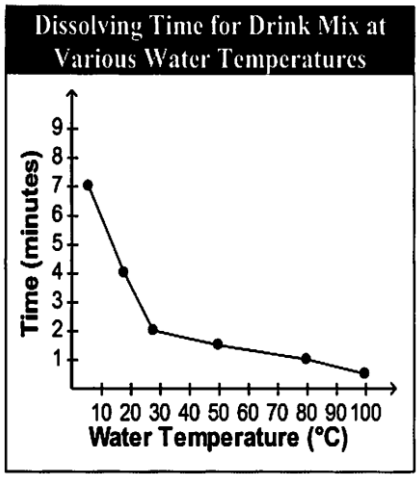
1. For a scientific theory to be valid, it must allow you to
   a. perform experiments.
   b. obtain new results each time.
   c. find a new, more complex explanation.
   d. make predictions.

2. Read the description below. If Amanda uses a scientific method to study this problem, which step should she do first?

   Each morning as Amanda waits for the school bus, she enjoys watching a bird feeder in a nearby yard that has many different types of birds around it. One day, Amanda observes that there are no birds at the feeder.

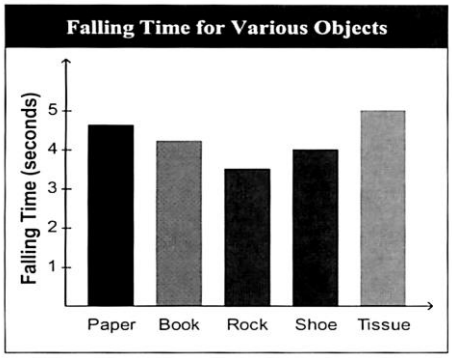
   a. Ask her neighbor to move the bird feeder to another location.
   b. Set up a bird feeder in her own yard.
   c. Ask her neighbor to add food to the bird feeder.
   d. Record observations related to the bird feeder each day for several days.

3. Joseph wants to find out if there is a relationship between the temperature of water and how fast drink mix will dissolve in water. He develops a hypothesis and designs a way to test it. The test involves adding drink mix to water at a given temperature and recording both the temperature of the water as well as how long it takes the drink mix to dissolve. He collects the data shown here. How did Joseph design the experiment to ensure that the data really shows what he was trying to measure?



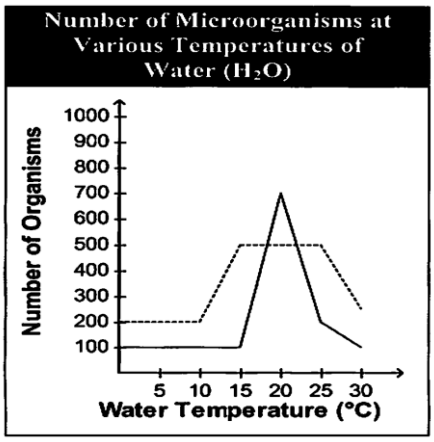
   a. He used different amounts of drink mix in each trial.
   b. He used different amounts of water in each trial.
   c. He used water at different temperatures in each trial.
   d. He stirred the water in some trials and did not stir it in others.

4. Roberto and Tate dropped objects from a third-story window. They measured the time, in seconds, it took each object to reach the ground. The data they collected is shown below. The time required for each object to reach the ground is _____ in this experiment.



a. the dependent variable
b. the hypothesis
c. the independent variable
d. a constant

5. A researcher experimenting with two different types of microorganisms generates the data shown here. The population of organism A at various temperatures is indicated by the dotted line, while the population of organism B at various temperatures is indicated with a solid line. Is it necessary for other researchers to repeat this experiment?



a. Yes. Repeating a study can prove that the data generated was valid.
b. No. This data has no importance in the scientific community.
c. No. The researcher made no errors during the experiment.
d. Yes. The researcher should have included data across a broader temperature range.

6. Read the information below. Why is it important not to eliminate unusual data points prior to data analysis?

> Approximately halfway into an experiment, the lead scientist on a research team notices that a small but significant number of unusual readings have consistently appeared in the data. These unusual data points are the only ones which fall outside of the range expected by the team, and the researcher is concerned.

a. These unusual data points can never be experimentally achieved again.
b. All of the other data points will be ignored during data analysis to focus on these.
c. This is the only relevant data in the experiment.
d. This data reflects something which took place in the experiment.

Constructed Response

If unexpected results are obtained and confirmed through repeated experiments, why must a model or hypothesis be abandoned or revised?

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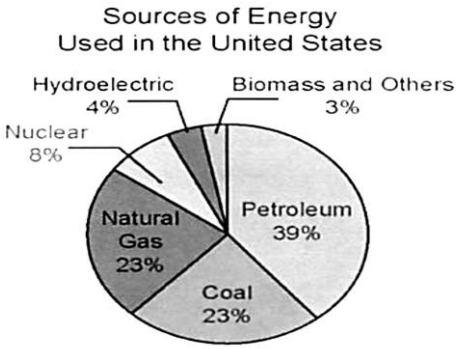
Lesson 3

Multiple Choice

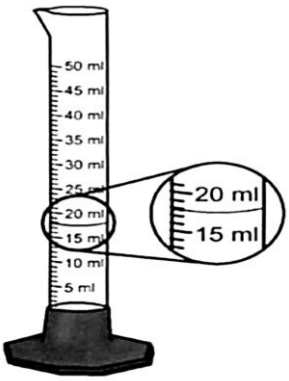
The graph below shows the sources of energy used in the United States. Use the graph to answer Qestions 1 and 2.



1. Which statement about the sources of energy used in the US is true?
    a. Nuclear power and hydroelectric power provide almost one-quarter of US energy needs.
    b. Petroleum, coal and natural gas supply 85% of US energy needs.
    c. Natural gas and coal provide over 50% of US energy needs.
    d. More energy is supplied by hydroelectric power in the US than by nuclear power.

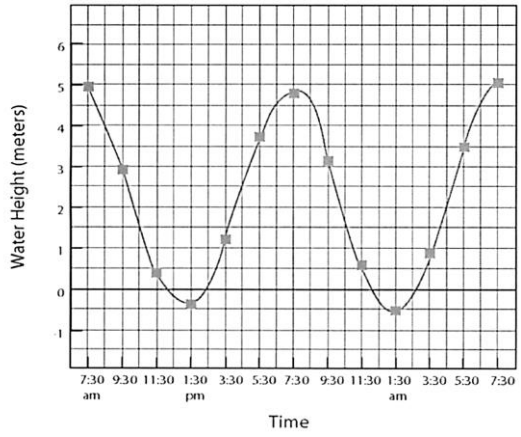
2. What two energy sources combined provide a greater percentage of energy than petroleum alone?
    a. Coal and natural gas
    b. Coal and hydroelectric power
    c. Coal and nuclear energy
    d. Natural gas and nuclear energy

3. Study the image of the graduated cylinder. What property of an object does this instrument measure?



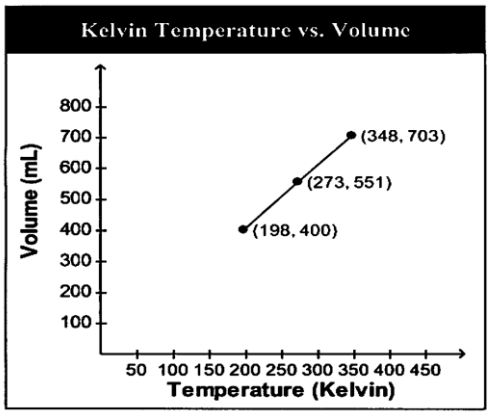
    a. Mass
    b. Volume
    c. Length
    d. Temperature

4. The data shows water levels during a 24-hour period at St. Augustine Beach, Florida, during March 19 and 20, 2004. Which statement about the data is true?



a. There is no pattern evident in the data?
b. Based on the data, high tides in the area occur about six hours apart.
c. Based on the data, high tides in this area occur about 12 hours apart.
d. The pattern of tides in this area is two high tides followed by two low tides.

5. A researcher who wants to learn about the behavior of a particular gas examines the relationship between temperature and gas volume when the gas is held at a constant pressure. The graph below shows the data collected. What would the data show if the temperature were decreased to 100 Kelvin?

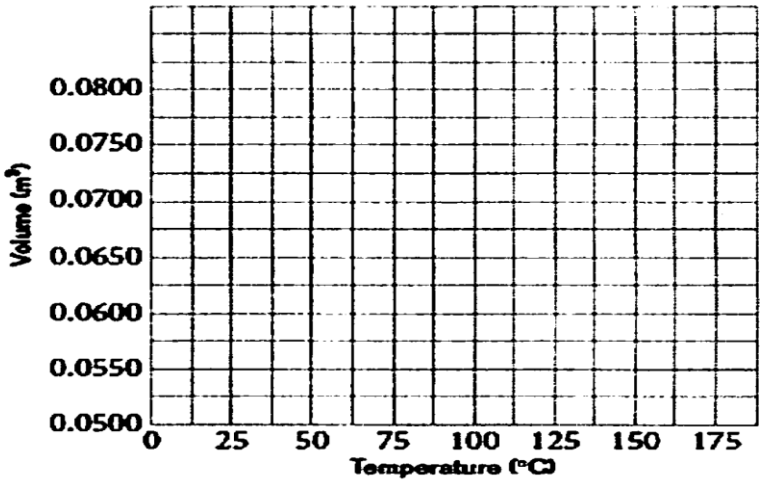


a. The volume would decrease.
b. The volume would not change.
c. The volume would increase rapidly and then decrease.
d. The volume would increase.

Constructed Response

The table below contains measurements of the temperature and volume of an air balloon as it heats up. Sketch a graph that best describes these data.

Temperature (˚C)	Volume (m^3)
2	0.0502
27	0.0553
52	0.0598
77	0.0646
102	0.0704
127	0.0748
152	0.0796



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Lesson 4

Multiple Choice

1. Which state of matter has a definite volume but not a definite shape?
    a. Plasma
    b. Liquid
    c. Gas
    d. Solid

2. Which statement about the atomic nucleus is correct?
    a. The nucleus is made of protons and neutrons and has a negative charge.
    b. The nucleus is made of protons and neutrons and has a positive charge.
    c. The nucleus is made of electrons and has a positive charge.
    d. The nucleus is made of electrons and has a negative charge.

3. A mixture is different from a compound because each substance in a mixture
    a. retains its own properties.
    b. forms an ion.
    c. changes its electric charge.
    d. changes from a solid to a liquid.

4. Gases take up a lot of space because gas molecules
    a. have weak chemical bonds.
    b. contain very few atoms.
    c. are not attracted to one another.
    d. have a small molar mass.

5. Which of the following is a basic solution?
    a. Household ammonia
    b. Vinegar
    c. HCl dissolved in water
    d. Pure water

6. Radioactive materials have unstable
    a. electrons.
    b. protons.
    c. nuclei.
    d. neutrons.

7. Fusion occurs when nuclei
    a. split.
    b. mutate.
    c. combine.
    d. gain energy.

8. Which of the following is not a type of nuclear radiation?
    a. Alpha particles
    b. Neutron emission
    c. Beta particles
    d. X-rays

9. In radioactive decay, with each successive half-life, half the remaining sample decays to form another
    a. nucleus.
    b. life-form.
    c. element.
    d. proton.

10. The opposite reaction to fusion is called
    a. beta decay.
    b. fission.
    c. alpha particle.
    d. neutron transmission.

11. Which of the following is an example of a heterogeneous mixture?
    a. Tap water
    b. Chunky peanut butter
    c. Orange-colored sugar water
    d. Gold ring

12. What is the difference between a mixture and a compound?
    a. All mixtures have a uniform composition.
    b. Mixtures can be separated by physical processes.
    c. Mixtures are made of at least two different elements.
    d. All mixtures are heterogeneous.

13. Which of the following is a pure substance?
    a. Air
    b. Granite
    c. Water
    d. Stainless steel

14. Electrons can be found
    a. inside protons.
    b. inside neutrons.
    c. attached to the nucleus.
    d. moving rapidly outside the nucleus.

15. Most of an atom is
    a. dense.
    b. fluid.
    c. empty space.
    d. the nucleus.

16. Isotopes are atoms of the same element that have different
    a. masses.
    b. charges.
    c. number of electrons.
    d. atomic numbers.

17. Which of the following elements has the greatest ionization energy?
    a. Ga
    b. K
    c. Bi
    d. As

18. Since the Kinetic Theory says that heavy particles move more slowly than lighter particles, which of the following organic compounds will have the highest boiling point?
    a. CH_3OH
    b. C_2H_5OH
    c. C_3H_7OH
    d. C_4H_9 OH

Constructed Response

19. You are given 7 identical film canisters that contain pennies all post 1982. Five of the canisters have labels telling you how many pennies are contained in them but the labels have fallen off of the other two. The masses of all 7 containers are given below.

# of pennies	Mass (g)
2	11.2
5	18.4
7	23.5
10	31.0
13	38.7
Unknown #1	13.5
Unknown #2	43.7

    a. Draw a graph to represent the above data.

    b. Use your graph to find the average mass of a penny.

    c. Use your graph to find the mass of an empty film canister.

    d. Use your graph to find the number of pennies in the first unlabeled canister.

    e. Use your graph to find the number of pennies in the second unlabeled canister.

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Lesson 5

Multiple Choice

1. In the reaction $H_2S + O_2 \rightarrow H_2SO_4$, the law of definite proportions predicts that for every mole of H_2S you will need how many moles of O_2?
   a. 1 mol
   b. 3 mol
   c. 2 mol
   d. 4 mol

2. In a balanced reaction, the total mass of the products always equals the
   a. molar mass of the reactants.
   b. total mass of the reactants.
   c. atomic mass of the reactants.
   d. proportional masses of the reactants.

3. When a chemical reaction and its reverse are occurring at the same time and at the same rate, the reaction has achieved
   a. displacement.
   b. imbalance.
   c. equilibrium.
   d. decomposition.

4. What will always be produced by an acid and a base when they react?
   a. A new acid
   b. A new base
   c. H_2O and NaCl
   d. H_2O and a salt

5. The salt sodium sulfate, Na_2SO_4, can be formed by a reaction between
   a. NaOH and HCl
   b. NaOH and H_2SO_4
   c. NaCl and H_2O
   d. NaCl and NH_3

6. Use the following reaction to answer the following questions.

   ____ $Pb(NO_3)_2$ (aq) + ____ NaOH (aq) $\rightarrow$ ____ $Pb(OH)_2$ (s) + ____ $NaNO_3$ (aq)

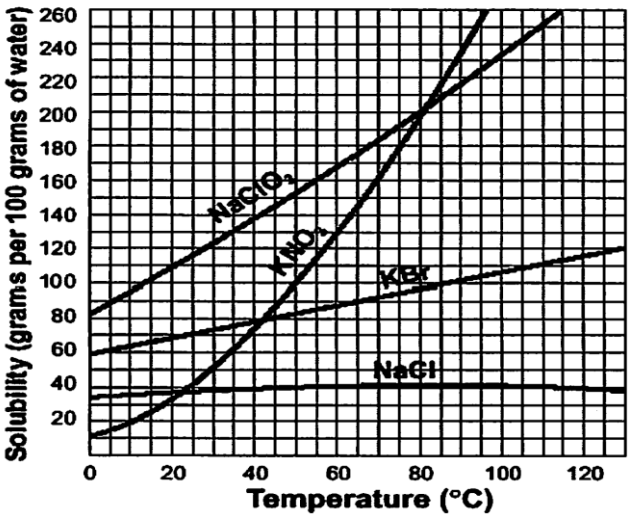
   a. List 2 of the 5 indicators that provide evidence of a reaction. Which of the 5 will be observed in this reaction?

   b. Balance the reaction.

c. What is meant by Conservation of Mass and how is it used in balancing the reaction?

Constructed Response

Use the following graph to answer Questions 7-12.



7. Which salt's solubility is least affected by an increase in temperature?

8. Which salt's solubility is most affected by an increase in temperature?

9. What is the solubility of KNO_3 at 60˚C?

10. At approximately what temperature is the solubility the same for KNO_3 as NaCl?

11. Which 2 salts have the same solubility at 80˚C?

12. Which salt is least soluble at 10˚C?

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Lesson 6

Multiple Choice

1. Which of the following is an example of mechanical energy?
    a. Nuclear energy
    b. Chemical energy
    c. Potential energy
    d. Light energy

2. The kind of energy associated with atomic bonds is
    a. nuclear energy.
    b. chemical energy.
    c. light energy.
    d. kinetic energy.

3. According to Einstein, which of the following can behave like a wave and also like a stream of particles?
    a. A noble gas
    b. The atomic nucleus
    c. Electromagnetic radiation
    d. A hydrogen atom in the ground state

4. The line-emission spectrum of an atom is caused by the energies released when electrons
    a. 'jump' from a lower energy level to a higher energy level.
    b. 'jump' from a higher energy level to a lower energy level.
    c. 'jump' from the ground state to an excited state.
    d. None of the above

5. Which color of light in the visible spectrum has the longest wavelength?
    a. Yellow
    b. Red
    c. Green
    d. Blue

6. A motor produces less mechanical energy than the energy it uses because the motor
    a. gains some energy through motion.
    b. stores some energy as electrons.
    c. converts some energy into heat and sound.
    d. uses some energy to increase in mass.

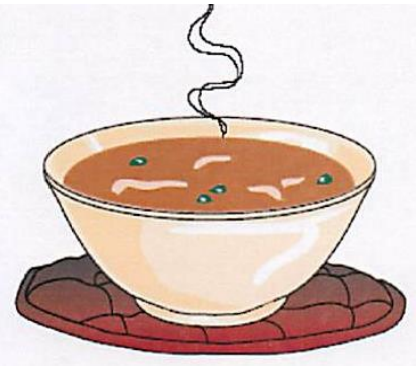
7. Which of the following energy forms is ***not*** involved in hitting a tennis ball?
    a. Kinetic energy
    b. Gravitational potential energy
    c. Chemical potential energy
    d. Elastic potential energy

8. The main difference between kinetic energy and potential energy is that
    a. kinetic energy involves position and potential energy involves motion.
    b. kinetic energy involves motion and potential energy involves position.
    c. although both energies involve motion, only kinetic energy involves position.
    d. although both energies involve position, only potential energy involves motion.

9. Which of the following best describes the process producing most of the Sun's energy?
    a. Hydrogen combusts to produce energy.
    b. Helium atoms split in a fission reaction, forming hydrogen atoms and releasing energy.
    c. Hydrogen atoms fuse to form helium atoms, releasing energy.
    d. Helium atoms decompose in a chemical reaction, producing energy.

10. The composition of a star can be identified by
    a. its apparent brightness.
    b. the lines in its spectrum.
    c. the size of the star.
    d. the intensity of its radiation.

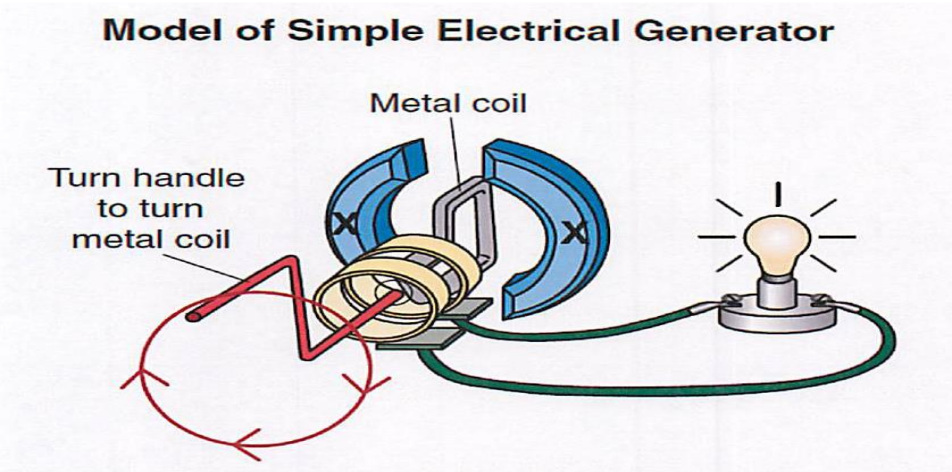
11. A hot bowl of soup is sitting on a thick cloth pad. Heat from the soup is transferred in several ways.



    a. List 2 ways in which heat is transferred away from the soup in this situation.

    b. Compare the 2 methods of heat transfer listed in A.

12. The diagram below shows a model of a simple electrical generator.



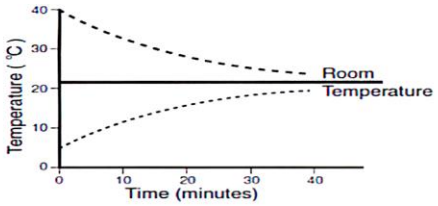
- There are conducting pieces that allow the circuit to remain closed as the handle is turned.
- The bulb can be lit as current electricity is produced in the wires when the handle turns the metal coil.

a. State what the pieces labeled "X" represent.

b. Describe how an electrical current is produced when the coil is turned.

13. A cup of water at 40˚C and a cup of water at 5˚C are left on a table. Which graph correctly shows the temperature of the two cups of water as time passes?

A



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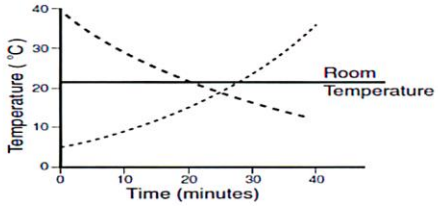

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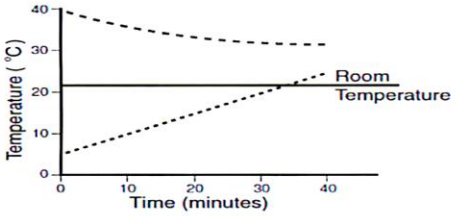

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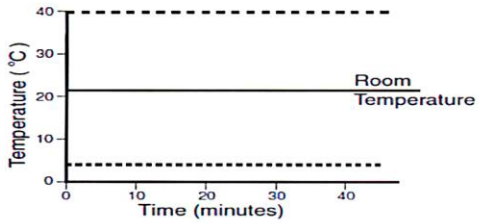

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Lesson 7

Multiple Choice

1. For a fixed amount of gas at a constant temperature, the volume increases as the pressure
    a. remains steady.
    b. increases.
    c. decreases.
    d. fluctuates.

2. When a fixed sample of gas has a constant volume, the pressure increases as the temperature
    a. remains steady.
    b. increases.
    c. decreases.
    d. fluctuates.

3. Part of a pencil that is placed in a glass of water appears bent in relation to the part of the pencil that extends out the water. What is this phenomenon called?
    a. Interference
    b. Diffraction
    c. Refraction
    d. Reflection

4. According to the Law of Reflection, the angle of incidence is _____ the angle of reflection?
    a. less than
    b. equal to
    c. greater than
    d. always twice

5. The combining of waves as they meet is known as
    a. a crest.
    b. interference.
    c. noise.
    d. the Doppler effect.

6. A passenger on a bus moving east sees a man standing on a curb. From the passenger's perspective, the man appears to
    a. stand still.
    b. move west at a speed that is less than the bus's speed.
    c. move west at a speed that is equal to the bus's speed.
    d. move east at a speed that is equal to the bus's speed.

Constructed Response

7. You collected the following data for the volume of a gas at different pressures.

Pressure (atm)	Volume (L)
0.100	224
0.200	112
0.400	56
0.600	37.3
0.800	28

a. Graph the data.

b. What type of relationship does the graph show? How do you know?

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Lesson 8

Multiple Choice

1. Soil contains many important nutrients. Which of the following provides the most nutrients to the soil?
    a. Decomposition of dead animals
    b. Manmade fertilizers
    c. Recycled animal waste
    d. Rain water

2. An energy pyramid shows the transfer of energy in an ecosystem. How much energy is transferred from one level of the pyramid to the next?
    a. 100%
    b. 90%
    c. 50%
    d. 10%

3. What abiotic factor is the initial energy source in most food webs?
    a. Producers
    b. Sun
    c. Bacteria
    d. Rain

4. Most of the minerals within an ecosystem are recycled and returned to the environment by the direct activities of organisms known as
    a. producers.
    b. consumers.
    c. scavengers.
    d. decomposers.

5. The symbiotic relationship between a flower and the insect that feeds on its nectar is an example of
    a. mutualism because the flower provides the insect with food and the insect pollinates the flower.
    b. commensalism because the insect lives off the nectar but the flower does not benefit.
    c. parasitism because the insect harms the flower by removing the nectar.
    d. predation because the insect feeds on the flower and the flower dies.

Constructed Response

6. Use the passage below to help answer the two questions which follow.

> In a grassland habitat, the rabbits, herbivorous insects and field mice eat the grasses. The herbivorous insects are eaten by predaceous insects. The mice eat both types of insects. Both the rabbits and field mice are eaten by snakes in this habitat. Hawks flying in the area eat the rabbits, field mice and the snakes.

a. Draw a food web showing all of the organisms in this grassland habitat?

b. Which organism is the primary producer? How does it obtain its energy?

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Lesson 9

Multiple Choice

1. Evolution is often described as "the theme that ties together all aspects of biology". This is because the process of evolution
    a. explains how organisms become adapted to their environment.
    b. explains the diversity of organisms.
    c. explains why all organisms have characteristics in common.
    d. explains why distantly related organisms sometimes resemble one another.
    e. All of the above are appropriate answers.

2. Which of the following is an example of an evolutionary adaptation?
    a. A change in frequency of a neutral allele by genetic drift.
    b. Constancy in the rate of accumulation of genetic changes in a molecule over time.
    c. The loss of an allele in a population due to a population bottleneck.
    d. Fixation in a population of a selectively advantageous allele.
    e. None of the above is an example of an evolutionary adaptation.

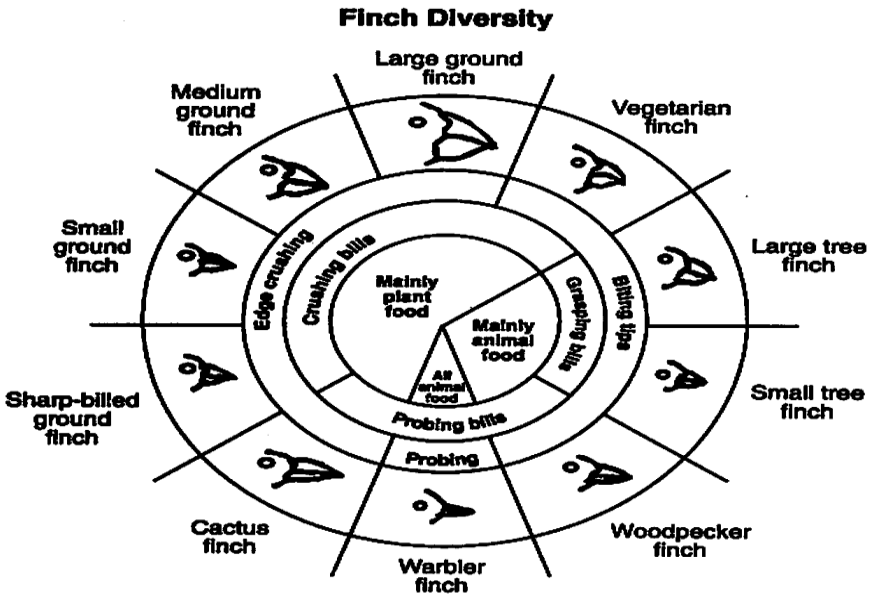
3. Natural selection can be most closely equated with
    a. assortative mating.
    b. genetic drift.
    c. differential reproductive success.
    d. bottlenecking of a population.
    e. gene flow.

4. Which of the following is an element of the writings of Malthus that influenced Darwin?
    a. Artificial selection
    b. Differential reproductive success
    c. The potential for population growth exceeds what the environment can support.
    d. Species become better adapted to their local environments through natural selection.
    e. Favorable variations accumulate in a population after many generations of being perpetuated by natural selection.

5. Which of the following is ***not*** a factor inference of Darwin's theory of evolution by natural selection?
    a. There is heritable variation among individuals.
    b. There is struggle for limited resources.
    c. Individuals whose inherited characteristics best fit them to the environment will, on average, leave more offspring.
    d. Offspring inherit characteristics acquired by their parents during the parents' lifetime.
    e. All of the above are correct statements.

Constructed Response

6. Base your answer to the following questions on the finch diversity chart below, which contains information concerning the finches found on the Galapagos Islands.



a. Identify one bird that would most likely compete for food with the large tree finch. Support your answer.

b. State what could happen to a species in a changing environment if the members of that species do not express any genetic variations.

Name: _____ Date: _____ Period: _____

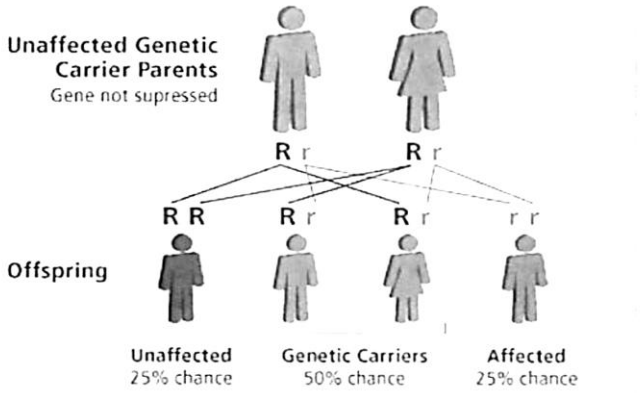
Lesson 10

Multiple Choice

1. If the template of a strand of DNA is 5' AGATGCATC 3', the complementary strand will be
    a. 3' TCTACGTAG 5'
    b. 5' CTACGTAGA 3'
    c. 3' AGATGCATC 5'
    d. 5' AGACGTCTA 3'
    e. None of the above

2. In DNA, which of the following determines the traits of an organism?
    a. Amount of adenine
    b. Number of sugars
    c. Sequence of nitrogen bases
    d. Strength of hydrogen bonds
    e. Sequence of genes

3. The following diagram is a representation of



    a. Law of Independent Assortment
    b. Law of Dominance
    c. Law of Segregation
    d. Law of Mutations
    e. Law of Punnett Squares

4. One example of a genetic variation within a bird species is individuals having
    a. beaks of different lengths.
    b. broken wings.
    c. double stranded DNA.
    d. pairs of chromosomes.
    e. multiple copies of genes.

5. The presence of hair on the middle section of the fingers (H) is a dominant trait in humans. Two parents with this dominant trait have children. Some of the children have this trait, and some children do not. Which of the following Punnett squares shows the genotype of the parents and children in this family?

A.

	H	h
H	HH	Hh
h	Hh	hh

B.

	H	H
H	HH	HH
H	HH	HH

C.

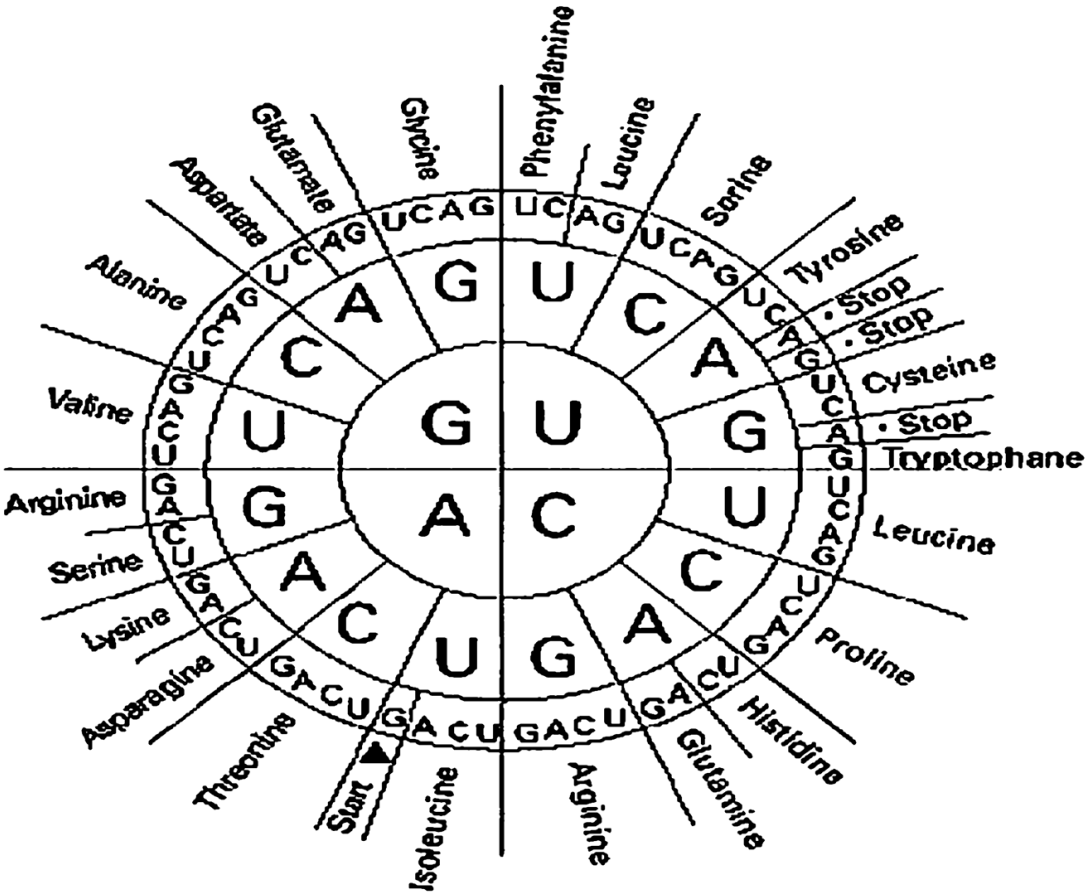
	h	h
h	hh	hh
h	hh	hh

D.

	H	H
H	HH	HH
h	Hh	Hh

Constructed Response

6. How would the genetic mRNA code of GAC differ from the mRNA code of GAG? Be sure to give an explanation as to what may have caused this difference.



Name: _____ Date: _____ Period: _____

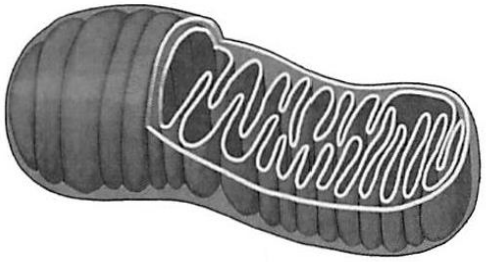
Lesson 11

Multiple Choice

1. You are told that cells on a microscope slide are plant, animal, or bacterial. You look at them through a microscope and see cell walls and membrane-bound organelles. You conclude that the cells
   a. are plant cells.
   b. are animal cells.
   c. are bacteria.
   d. could be either plant or bacterial.
   e. could be plant, animal, or bacterial.

2. Which one of the following statements is ***false***? Enzymes
   a. increase the rate of chemical reactions.
   b. function as chemical catalysts.
   c. regulate virtually all chemical reactions in a cell.
   d. are produced by cells.
   e. are monomers used to build proteins.

3. The cell organelle shown below produces ATP and is found in most eukaryotic cells that require large amounts of energy. The highest concentration of such organelles would be found in which type of human cell?



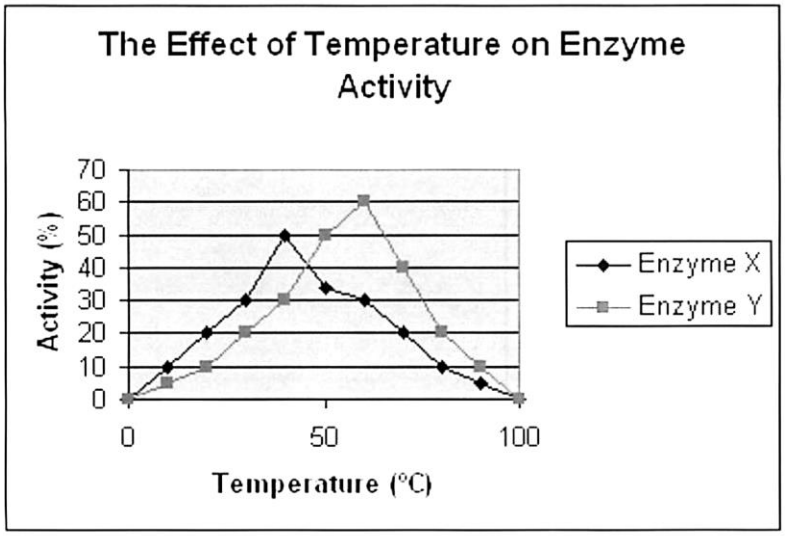
   a. Bone
   b. Skin
   c. Muscle
   d. Fat

4. Which cellular process takes place in the organelle represented in Question 3?
   a. Photosynthesis
   b. Alcoholic fermentation
   c. Aerobic respiration
   d. Lactic acid fermentation
   e. None of the above

5. Glucose molecules are to starch as _____ are to proteins.
   a. oils
   b. amino acids
   c. fatty acids
   d. waxes
   e. lards

Constructed Response

6. Which enzyme would you expect to find in a bacterium growing in a hot spring? Explain your answer.

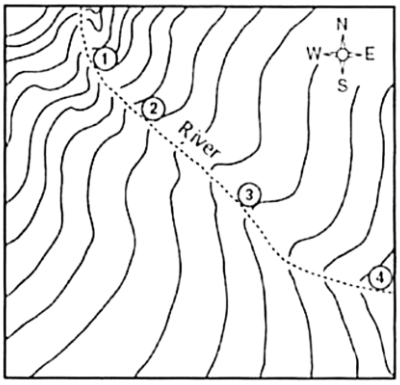


Name: _____ Date: _____ Period: _____

Lesson 12

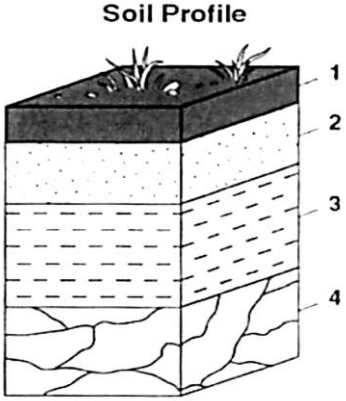
Multiple Choice

1. The river shown on the topographic map flows fastest at point?



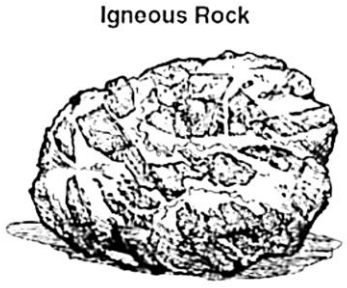
   a. 1
   b. 2
   c. 3
   d. 4

2. Which layer of the soil profile would be affected the most by weathering and erosion?



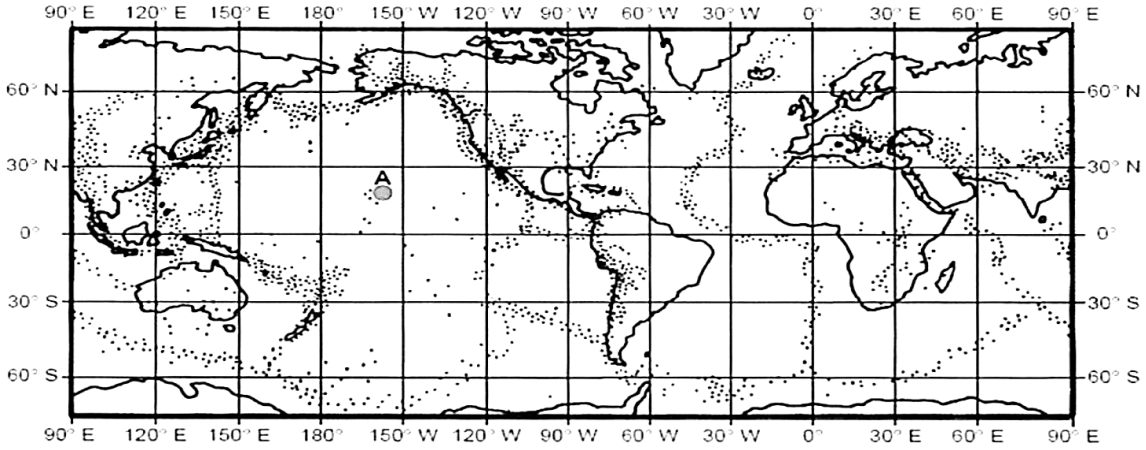
   a. 1
   b. 2
   c. 3
   d. 4

3. The rock shown is composed primarily of large crystals that were formed by



   a. Cooling magma
   b. Compacting shells
   c. Weathering
   d. Faulting

Use the map below to answer Questions 4 and 5. Dots on the map show the distribution of major earthquake epicenters. The shaded circle labeled A represents a location on Earth's surface.



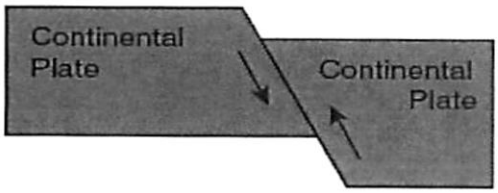
4. Which conclusion can best be inferred from the data shown on this map?
   a. Earthquakes generally are evenly distributed over the surface of Earth.
   b. Most earthquakes occur west of the Prime Meridian and north of the Equator.
   c. Most earthquakes are concentrated in zones along plate boundaries.
   d. Most earthquakes occur on continents.

5. Location A is best described as an area that is
   a. within a rift valley at a mid-ocean ridge.
   b. at the boundary between two diverging plates.
   c. within a deep-sea trench between two converging plates.
   d. above a mantle hot spot near the center of a crustal plate.

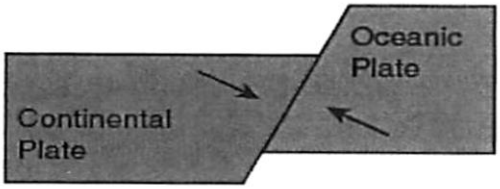
Constructed Response

6. The diagram shows overhead views of two different plate boundaries. The arrows indicate the direction of movement for each plate. Explain which plate boundary would be more likely to result in volcanoes and why.

A



B

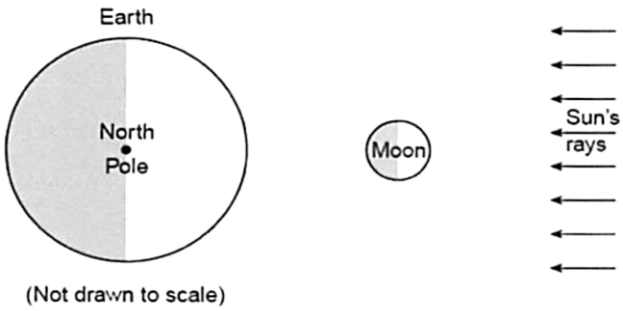


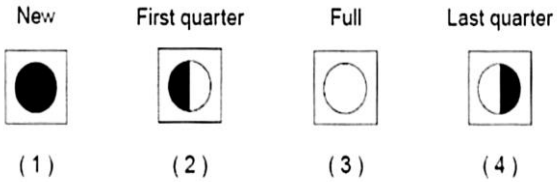
Name: _____ Date: _____ Period: _____

Lesson 13

Multiple Choice

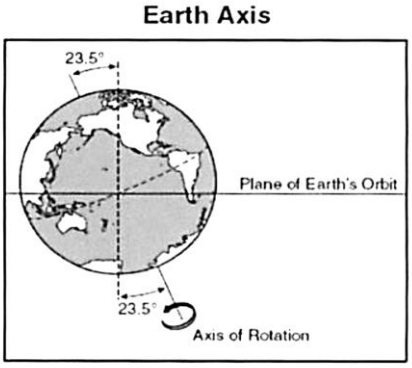
1. The diagram shows Earth, the Moon, and the Sun's rays as viewed from space. For observers on Earth, which phase of the Moon is represented by the diagram?





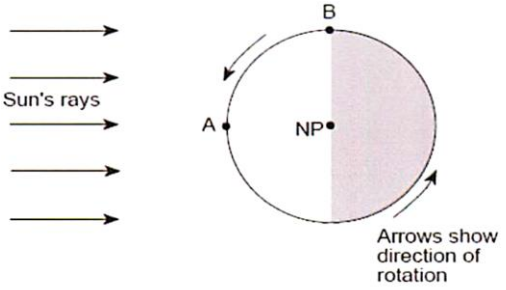
2. Earth's axis of rotation is tilted 23.5° relative to the plane of its orbit, which helps to cause

   a. the seasons
   b. day and night
   c. the lunar phases
   d. high and low tides

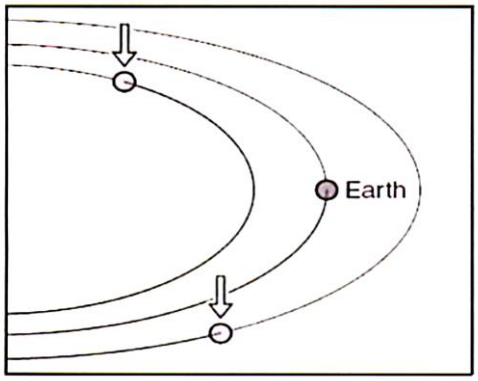


3. The diagram below shows Earth as viewed from above the North Pole (NP). Points A and B are locations on Earth's surface. At location A, the time is 12 noon. What is the time at location B?

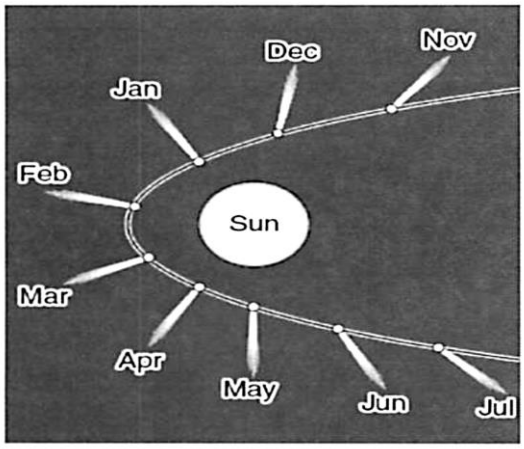
   a. 6 am
   b. 6 pm
   c. 3 pm
   d. 12 midnight



4. In addition to Earth's orbit, which planets' orbits are shown?
    a. Mars and Jupiter
    b. Jupiter and Saturn
    c. Venus and Mars
    d. Mercury and Venus



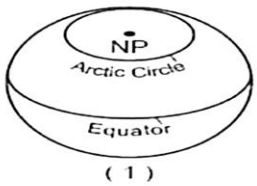
5. Why does a comet's tall point away from the Sun?
    a. The solar wind blows the tail away from the Sun.
    b. It is being pulled by a nearby black hole.
    c. The Moon's light only shines on part of the comet.
    d. The comet's tail is following the path of Jupiter.



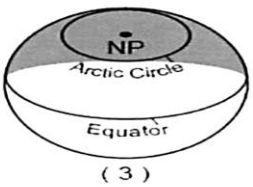
Constructed Response

6. Which diagram most correctly shows the portion of Earth that is illuminated by sunlight and the portion that is in shadow on the first day of summer in the Northern Hemisphere? Explain your answer.

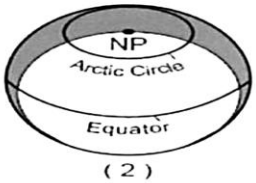
Key: ▭ = Illuminated NP= North Pole
▬ = Shadow



(1)



(3)



(2)

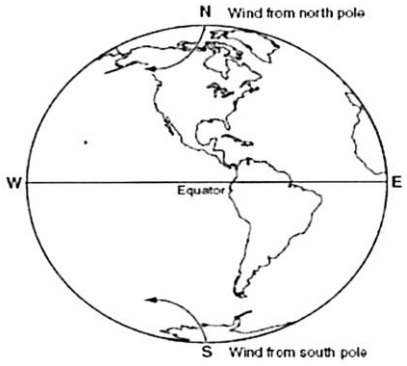
(4)

Name: _____ Date: _____ Period: _____

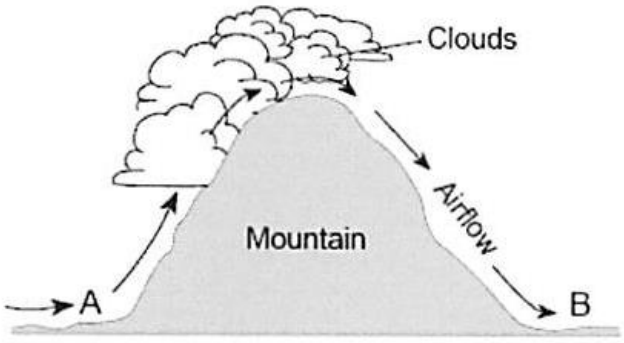
Lesson 14

Multiple Choice

1. What causes the wind deflection from the North and South Poles?
   a. The rotation of Earth on its axis.
   b. The oblate shape of Earth.
   c. The tilt of Earth's axis relative to its orbital plane
   d. The difference in total land mass of the two hemispheres.



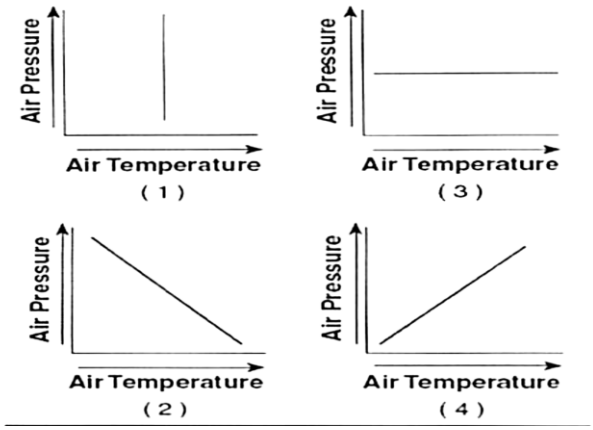
Use the following diagram to answer Questions 2 and 3.



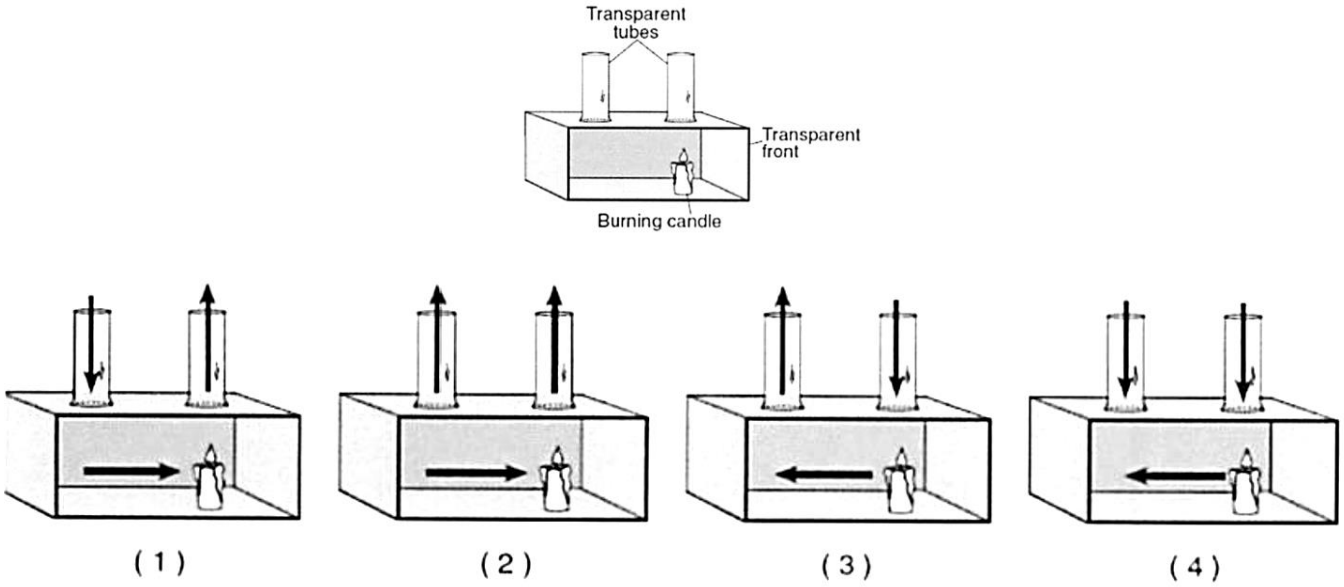
2. As the air moves up the windward side of the mountain, the air
   a. compresses and warms
   b. compresses and cools
   c. expands and warms
   d. expands and cools

3. Compared to the temperature and humidity conditions at location A, the conditions at location B are
   a. warmer and less humid
   b. warmer and more humid
   c. cooler and less humid
   d. cooler and more humid

4. Which graph best represents the change in air pressure as air temperature increases at Earth's surface?



5. The diagram below shows a laboratory box used to demonstrate the process of convection in the atmosphere. Which diagram has arrows that show the direction of airflow that occurs when the candle is burning?



Constructed Response

The reading passage below discusses acid rain. Map I shows the locations of some major United States producers of nitrogen oxide and sulfur dioxide that are released into Earth's atmosphere. Map II shows the pH concentration of acid rain in the United States.

Acid Rain

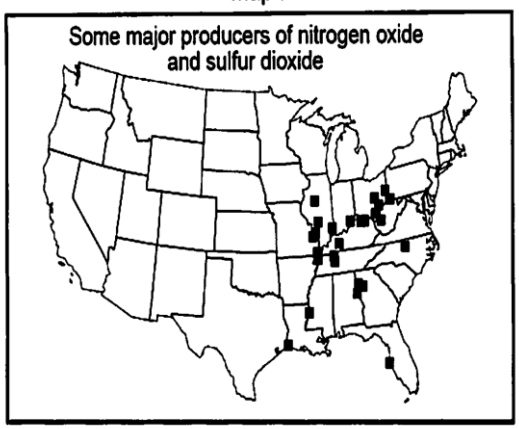
Acid deposition consists of acidic substances that fall to Earth. The most common type of acid deposition is rain containing nitric acid and sulfuric acid. Acid rain forms when nitrogen oxide and sulfur dioxide gases combine with water and oxygen in the atmosphere.

Human-generated sulfur dioxide results primarily from coal-burning electric utility plants and industrial plants. Human-generated nitrogen oxide results primarily from burning fossil fuels in motor vehicles and electric utility plants.

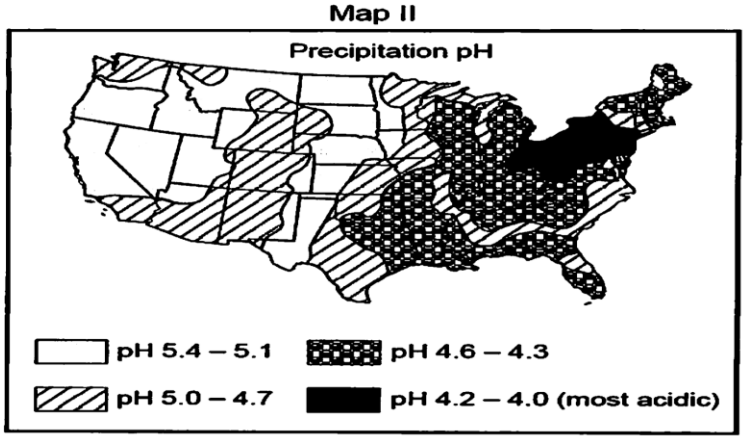
Natural events, such as volcanic eruptions, forest fires, hot springs and geysers, also produce nitrogen oxide and sulfur dioxide.

Acid rain affects trees, human-made structures and surface water. Acid damages tree leaves and decreases the tree's ability to carry on photosynthesis. Acid also damages tree bark and exposes trees to insects and disease. Many statues and buildings are composed of rocks containing the mineral calcite, which reacts with acid and chemically weathers more rapidly than other common minerals. Acid deposition lowers the pH of surface water. Much of the surface water of the Adirondack region has pH values too acidic for plants to animals to survive.

Map I



Map II



State one reason that the northeastern part of the United States has more acid deposition than other regions of the country.

Name: _____ Date: _____ Period: _____

Lesson 15

Multiple Choice

Decomposition of the Ozone Layer

The Earth has long been protected from the harmful radiations of the Sun by a layer of the atmosphere known as the ozone layer. This layer absorbs ultraviolet light. Recent evidence indicates that this protective layer is starting to decompose and "holes" are being formed.

The first "hole" was observed in 1983 over Antarctica. Now there is evidence of a second "hole" over Norway. It is believed that the atmosphere has had an annual ozone loss of three percent.

Some scientists believe that the "holes" are linked to the use of certain chemicals such as chlorofluorocarbons (CFC's). CFC's are found in some aerosol sprays, refrigerants and even in Styrofoam. When CFC's are exposed to sunlight, chlorine is released from the CFC's. This chlorine acts as a catalyst in the breakdown of ozone. Other scientists believe that the "holes" are related to solar activity, changing weather patterns and volcanic activity.

Whatever the cause, scientists agree that the potential dangers are significant. The Environmental Protection Agency (EPA) estimates that a one percent drop in global ozone could cause an additional 20,000 cases of skin cancer in the United States. Increases in ultraviolet radiation could also increase the mutation rate in plants, animals, and micro-organisms, endangering the existence of some life forms.

1. Based on the reading passage, which statement can be made about the decomposition of the ozone layer?
    a. The decomposition is due to very reactive oxygen.
    b. The decomposition rate is increasing three percent every ten years.
    c. "Holes" in the ozone layer are caused by ozone decomposition.
    d. All scientists agree on the cause of the decomposition of the ozone layer.

Acid Rain

Acid rain is a serious environmental problem in large areas of Canada and the northeastern United States, including New York State. It is partly created as rain "washes out" sulfur and nitrogen pollutants from the air. Acid rain alters the fundamental chemistry of sensitive freshwater environments and results in the death of many freshwater species. The principal sources of this pollution have been identified as smokestack gases released by coal-burning facilities located mainly in the midwestern United States.

"Unpolluted" rain normally has a pH of 6.5. Acid rain, however, has been measured at pH values as low as 1.5, which is more than 10,000 times more acidic than normal. Commonly, acid rain has a pH range of 3 to 5, which changes the avidity level of the freshwater environment into which it falls. The effect of the acid rain depends upon the environment's ability to neutralize it. Evidence is accumulating, however, that many environments are adversely affected by the acid rain. As a result, the living things within lakes and streams that cannot tolerate the increasing acidity gradually die off.

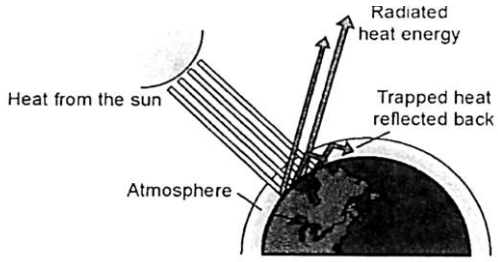
There are many environmental problems that result from acid rain. Most of these problems center around the food web upon which all living things, including humans, depend. If freshwater plants, animals, and protists are destroyed by the acid conditions, then terrestrial predators and scavengers dependent on these organisms for food are forced to migrate or starve. These changes in a food web can eventually affect the human level or food consumption.

2. Which pollutant is produced by the burning of coal and oil and can result in the production of acid rain?
    a. Phosphate
    b. Sulfur dioxide
    c. Lead
    d. Hydrogen chloride

3. Scientists worldwide are concerned about the spread of the HIV virus which causes AIDS, or Acquired Immune Deficiency Syndrome. Many in the scientific community are working to find ways to fight this virus and counter its effects. By the end of 2003, scientists had _____
    a. cured individuals who have this disease.
    b. halted the spread of the disease throughout the worldwide population.
    c. developed a drug treatment course extending the good health and life span of patients.
    d. developed a vaccine which immunizes people against this virus.

4. Increasingly, US citizens have become aware of the need to use natural resources wisely. Scientists have played an important role in communicating this fact to the public. Which of these positive responses from the American public has occurred as a result of education about resource conservation?
    a. Americans increasingly purchase large vehicles which get poor gas mileage.
    b. The fast food industry uses more paper and polystyrene packaging each year.
    c. Most Americans do not wash cars or water lawns in an effort to conserve water.
    d. The amount of glass, plastic and aluminum recycled by Americans has increased during the last decade.

5. The diagram below illustrates a natural Earth process through which the atmosphere traps heat. Many scientists hypothesize that human activities are accelerating this process, resulting in a global warming trend. What human activity is believed to have an adverse effect on the natural process pictured here?



    a. Production of chlorofluorocarbons (CFC's).
    b. Spilling oil into ocean waters.
    c. Recycling of materials including aluminum and plastic.
    d. Burning of fossil fuels.

Constructed Response

Use the reading passage "Decomposition of the Ozone Layer" to answer the following questions.

6. Based on the reading passage, state one hypothesis to explain the appearance of "holes" in the ozone layer.

7. Discuss the health effects of damage to the ozone layer and the steps being taken to help deal with the problem.

Name: _____ Date: _____ Period: _____

Lesson 16

Multiple Choice

Read the following passages and answer the questions that follow.

The periodic table is probably the most important tool in chemistry. Among other things, it is very useful for understanding the predicting the properties of the elements. For example, if you know the physical and chemical properties of one element in a group or family (vertical column) of the periodic table, you can make a good guess about the physical and chemical properties of the other elements in the same group—and perhaps even of the elements in neighboring groups.

Of the three major subatomic particles, the electron plays the most significant role in determining the physical and chemical properties of an element. The arrangement of elements in the periodic table depends on these properties. Thus, there should be some relationship between the electron configurations of the elements and their placement in the table.

Elements can be classified into categories according to their electron configurations. You will find it useful to refer to your periodic table as you read about these classifications.

A. **The noble gases**- These are elements in which the outermost 's' and 'p' sublevels are filled completely. The elements in this group are sometimes referred to as the inert gases because they do not participate in many chemical reactions .The noble gases belong to group 18 on your periodic table. Some periodic tables call group 18, group 8A.
B. **The alkali metals**- These are metallic elements in which the outermost 's' sublevel contains only one electron. The alkali metals belong to group 1 on your periodic table. Some periodic tables refer to group 1 as group 1A.
C. **The alkaline earth metals**- These are metallic elements in which the outermost 's' sublevel contains two electrons. The alkaline earth metals belong to group 2 on your periodic table. Some periodic tables refer to group 2 as group 2A.
D. **The transition metals**- These are metallic elements in which the outermost 's' sublevel and nearby 'd' sublevel contain electrons. The transition elements, also called the Group B elements, are groups 3-12.
E. **The inner transition metals**- These are metallic elements in which the outermost 's' sublevel and nearby 'f' sublevel generally contain electrons. They are characterized by the filling of the 'f' orbitals. The inner transition metals are located in the bottom two rows of your periodic table.

1. The best summary of this passage is:
    a. The periodic table is one of the most important tools in chemistry.
    b. The periodic table has different categories of elements: the noble gases, alkali metals, alkaline earth metals, transition metals, and inner transition metals.
    c. Of the three major subatomic particles, the electron plays the most significant role in determining the physical and chemical properties of an element.
    d. The periodic table is a tool that is arranged by physical and chemical properties and reflects the elements' electron configurations.

2. In this passage, the author-
    a. Describes the relationship between an element's electron configuration and its chemical and physical properties.
    b. Describes the electron configuration as having different energy levels and sublevels.
    c. Describes the different categories of elements and their electron configurations.
    d. Describes how to guess about the physical and chemical properties of elements in the same group.

3. Judging by the passage-
    a. An element's electron configuration can be predicted from its physical and chemical properties.
    b. An element's physical and chemical properties can be predicted from its electron configuration.
    c. An element's physical and chemical properties can be predicted from its group.
    d. An element's category can be predicted by its 's' electrons.

4. In this passage, the word group means-
    a. A category of elements.
    b. Several elements that are close together on the periodic table.
    c. How electrons are arranged in electron configurations.
    d. A column on the periodic table that goes up and down.

5. Based on this passage, you can conclude that-
    a. Not all periodic tables have the same group numbers.
    b. That the proton and neutron are not important.
    c. That chemistry involves a lot of predicting and guessing.
    d. Chemists don't use many tools other than the periodic table.

Read the following passage and answer the questions that follow.

Group trends describe the changes that happened in the different groups. One trend is the size of the atom or the atomic size. Atomic size generally increases as you move down a group of the periodic table. As you descend, electrons are added to successively higher energy levels and the nuclear charge increased by the addition of positive- charged protons. The outermost orbital is larger as you move downward. The shielding of the nucleus by electrons also increases with the additional occupied orbitals between the outermost orbital and the nucleus. Although you might expect the increase in charge on the nucleus to attract the outer electrons and shrink the size of the atom, this is not the case. The enlarging effect of the greater distance of the outer electrons from the nucleus overcomes the shrinking effect caused by the increasing charge of the nucleus. Therefore, the atomic size increases.

Periodic trends describe the changes that happened in a period, which are the horizontal rows on the periodic table. Atomic size generally decreases as you move from left to right across a period. As you go across a period, the energy level remains the same. Each element has one more proton and one more electron than the preceding element. The electrons are added to the same energy level. The effect of the increasing nuclear charge on the outermost electrons is to pull them closer to the nucleus. Atomic size therefore decreases.

6. In this passage, the word trend means-
    a. How you move in a group or period.
    b. The changes that happen in a group or period.
    c. The increase or decrease in atomic size.
    d. Descending in a group.

7. In this passage, the word period means-
    a. A row on the periodic table that goes from left to right.
    b. The changes that happen in a trend.
    c. A repeating trend of chemical and physical properties.
    d. The end of a sentence.

8. The expression nuclear charge in this passage means-
    a. The mass number of an atom.
    b. The amount of energy in the nucleus.
    c. The amount of positive charge a nucleus has.
    d. The number of energy levels in an atom.

9. This passage provide evidence that-
    a. Adding energy levels to an atom increases the size of the atom.
    b. Going left to right in a period increases the size of the atom.
    c. Increasing the nuclear charge increases the size of the atom.
    d. Adding one more electron always increases the size of the atom.

10. Based on this passage, you can conclude that-
    a. The nuclear charge does not affect the size of the atom.
    b. The atomic size increases as you go down a group and decreases as you go across a period.
    c. The most important periodic trend is atomic size.
    d. The most important factor for the atomic size is the nuclear charge.

11. Based on this passage, you can conclude that-
    a. The size of the atom is based on the number of energy levels occupied by the electrons.
    b. The size of the atom is based on the periodic trends.
    c. The size of the atom is based on a tug-of-war between the shrinking effect of the nuclear charge and the enlarging effect of adding outer electrons in higher energy levels.
    d. The size of the atom is based on how big the nucleus is.

Read the passage below and decide which type of error, if any, appears in each underlined section.

When an atom gains or loses an electron, it becomes an ion. The energy required to overcome the atraction of the nuclear charge and remove an electron from an atom is called the ionization energy (12). Removing one electron results in the formation of a positive ion with a 1+ charge. The energy required to remove this first outermost electron is called the First Ionization Energy (13). To remove the second electron from the atom requires an amount of energy called the second ionization energy, and so forth.

As you move down a group, the first ionization energy generally decreases. This is because the size of the atoms increases as you descend. The size of the atom increases because the electrons fill higher energy levels. In addition, adding electrons shield the nuclear charge and the outermost electrons arent held as tightly by the nucleus (14). Therefore, the outermost electron can be more easily removed, and the element should have a lower ionization energy (15).

As you move across a period from left to right the ionization energy generally increases (16). The nuclear charge increases and the shielding effect is constant as you move across. A greater attraction of the nucleus for the electron leads to the increase in ionization energy.

12.
    a. Spelling error
    b. Capitalization error
    c. Punctuation error
    d. No error
13.
    a. Spelling error
    b. Capitalization error
    c. Punctuation error
    d. No error

14.
    a. Spelling error
    b. Capitalization error
    c. Punctuation error
    d. No error

15.
    a. Spelling error
    b. Capitalization error
    c. Punctuation error
    d. No error

16.
    a. Spelling error
    b. Capitalization error
    c. Punctuation error
    d. No error

Read the passage. Some sections are underlined. The underlined sections may be one of the following:

- Incomplete sentences
- Run-on sentence
- Correctly written sentences that should be combined
- Correctly written sentences that do not need to be rewritten

Choose the best way to write each underlined section and mark the letter for your answer. If the underlined section needs no change, mark the choice “Correct as is.”

The electronegativity of an element is the tendency for the atoms of one element to attract another atom's electrons. When the two atoms are chemically combined (17). Electronegativities have been calculated for the elements and are expressed in arbitrary units on the Pauling electronegativity scale. Electronegativity generally decreases as you move down a group and as you go across a period from left to right, the electronegativity of the representative elements increase (18). The metallic elements at the far left of the periodic table have low electronegativities. By contrast, the non-metallic elements at the far right (excluding the noble gases) have high electronegativities (19). Electronegativity values help to predict the type of bonding that can exist between atoms in a compound (20).

17.

a. The electronegativity of an element is the tendency for the atoms of one element to attract another atom's electrons when the two atoms are chemically combined.
b. The electronegativity of an element is the tendency for the atoms of one element to attract another atom. Then two atoms are chemically combined.
c. When two atoms are chemically combined and one element attracts another element they are said to be electronegative.
d. Correct as is.

18.

a. Electronegativity generally decreases as you move down a group and as you go across a period from left to right. The electronegativity of the representative elements increases.
b. Electronegativity generally decreases as you move down a group. As you go across a period from left to right, the electronegativity of the representative elements increases.
c. Electronegativity generally decreases as you move down a group and as you go across a period from left to right, the electronegativity of the representative elements increases.
d. Correct as is.

19.

a. The metallic elements at the far left of the periodic table have low electronegativities, by contrast, the non-metallic elements at the far right (excluding the noble gases) have high electronegativities.
b. Contrasting the metallic elements at the far left of the periodic table and the non-metallic elements at the far right (excluding the noble gases) the metallic elements have low electronegativities.
c. If one was to contrast the metallic and non-metallic elements they would be on the far left of the periodic table and have low electronegativities.
d. Correct as is.

20.

a. The values for electronegativity helps to predict the type of bonds that different atoms in a compound can have.
b. The types of bonding that can exist between atoms in a compound are predicted by the electronegativity values.
c. Electronegativity values and type of bonding predict the atoms in a compound.
d. Correct as is.