

Name: \_\_\_\_\_

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Key

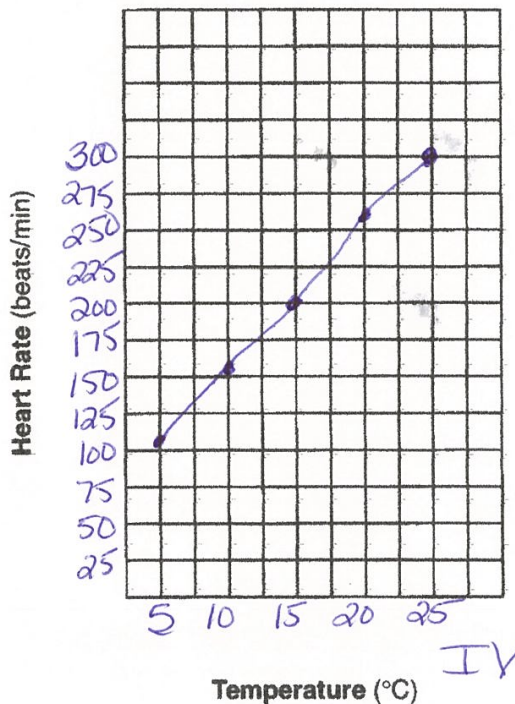
1. A biologist in a laboratory reports a new discovery based on experimental results. If the experimental results are valid, biologists in other laboratories should be able to
- A. repeat the same experiment with a different variable and obtain the same results
  - B. perform the same experiment and obtain different results
  - C. repeat the same experiment and obtain the same results
  - D. perform the same experiment under different experimental conditions and obtain the same results

2. Base your answer(s) to the following question(s) on the information below and on your knowledge of biology.

A student performed a laboratory investigation to determine the effect of temperature on the heart rate of *Daphnia* (water flea). The following temperatures and heart rates were recorded:

20°C—260 beats/min; 10°C—152 beats/min;  
25°C—300 beats/min; 5°C—108 beats/min;  
15°C—200 beats/min

Construct a line graph on the grid following the directions below.



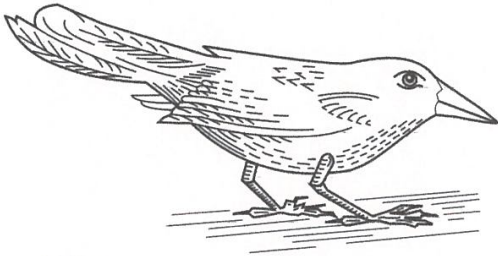
During which temperature interval did the greatest change in heart rate occur?

- A. 5–10°C
- B. 10–15°C
- C. 15–20°C
- D. 20–25°C

3. Why is a mushroom considered a heterotroph?

- A. It manufactures its own food. autotroph
- B. It divides by mitosis.
- C. It transforms light energy into chemical energy.
- D. It obtains nutrients from its environment.

4. The diagram below represents a woodpecker finch.



This bird may best be described as

- A. a decomposer that most likely feeds on nectar (a sugary liquid) from flowers
- B. a heterotroph that may eat insects and is more closely related to a robin than to an earthworm Bird
- C. a scavenger that feeds on animals and reproduces asexually
- D. an autotroph that probes tree bark for insects and is pathogenic

5. The data table below shows the presence or absence of DNA in four different cell organelles.

**Data Table**

Organelle	DNA
cell membrane	absent
cell wall	absent
mitochondrion	present
nucleus	present

outside  
inside

Information in the table suggests that DNA functions

- A. within cytoplasm and outside of the cell membrane
- B. both inside and outside of the nucleus
- C. only within energy-releasing structures
- D. within cell vacuoles

6. Muscle cells in athletes often have more mitochondria than muscle cells in nonathletes. Based on this observation, it can be inferred that the muscle cells in athletes

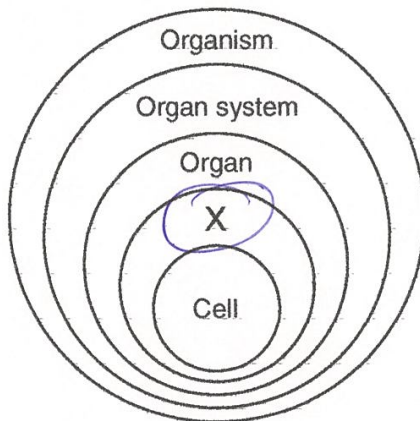
- A. have a smaller demand for cell proteins than the muscle cells of nonathletes
- B. reproduce less frequently than the muscle cells of nonathletes
- C. have nuclei containing more DNA than nuclei in the muscle cells of nonathletes
- D. have a greater demand for energy than the muscle cells of nonathletes

mitochondria = energy center of the cell.

7. Which sequence of terms is in the correct order from simplest to most complex?

- ☒ A. cells → tissues → organs → organ systems
- ☐ B. tissues → organisms → cells → organ systems
- ☐ C. cells → tissues → organ systems → organs
- ☐ D. organs → organisms → organ systems → cells

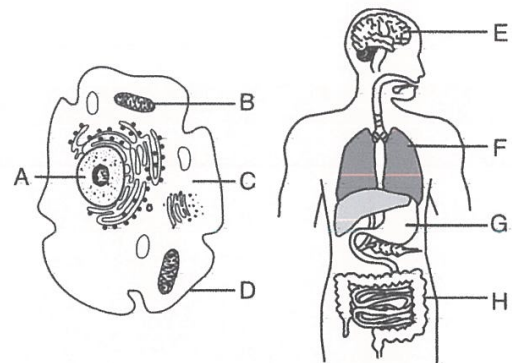
8. The diagram below represents levels of organization in living things.



Which term would best represent X?

- ☐ A. human
- ☒ B. tissue
- ☐ C. stomach
- ☐ D. organelle

9. A single cell and a multicellular organism are represented below.



Which structures are correctly paired with their primary function?

- ☐ A. A and G—transmission of nerve impulses
- ☐ B. B and E—photosynthesis
- ☐ C. C and H—digestion of food
- ☒ D. D and F—gas exchange

D is cell membrane  
F is lungs  
Both function as gas exchange.

10. The accompanying data table summarizes the results of an investigation in which seeds from the same plant were grown under different conditions of temperature and relative humidity.

Temperature: 20°C Relative Humidity: 20%		Temperature: 31°C Relative Humidity: 95%	
Genes Present in Cells of Organism	Appearance of Organism	Genes Present in Cells of Organism	Appearance of Organism
AA	red	AA	white
Aa	red	Aa	white
aa	white	aa	white

Which conclusion can be drawn from the information in the data table?

- A. Color in this species is determined by genes, only.
- B. Many characteristics are not inherited.
- C. Mutations occur only when plants are grown at low temperatures.
- D. There is an interaction between environment and heredity.

Same = constant  
different = independent variable

11. Plants inherit genes that enable them to produce chlorophyll, but this pigment is not produced unless the plants are exposed to light. This is an example of how the environment can

- A. cause mutations to occur
- B. influence the expression of a genetic trait
- C. result in the appearance of a new species
- D. affect one plant species, but not another

12. To determine the identity of their biological parents, adopted children sometimes request DNA tests. These tests involve comparing DNA samples from the child to DNA samples taken from the likely parents. Possible relationships may be determined from these tests because the

- A. base sequence of the father determines the base sequence of the offspring
- B. DNA of parents and their offspring is more similar than the DNA of nonfamily members
- C. position of the genes on each chromosome is unique to each family
- D. mutation rate is the same in closely related individuals

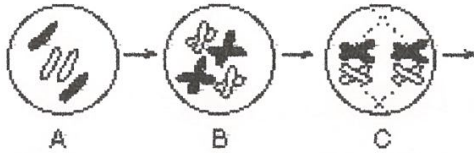
13. Young birds that have been raised in isolation from members of their species build nests characteristic of their species. This suggests that the nest-building behavior is

- A. genetically inherited from parents
- B. learned by watching members of their species
- C. a disadvantage to the survival of the species
- D. a direct result of the type of food the bird eats

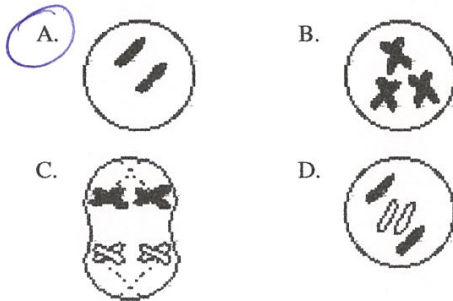
The behavior was instinct, ~~inherited~~



14. The accompanying diagrams represent some events in a cell undergoing normal meiotic cell division.



Which diagram most likely represents a new cell resulting from meiotic cell division of the cell shown above?



meiosis > new cell has  $\frac{1}{2}$  the chromosomes.

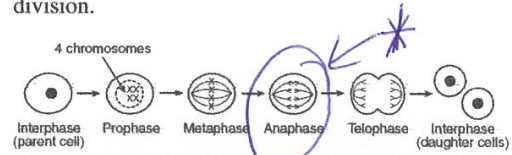
mitosis > daughter cells are identical to parent cell.

15. The great variety of possible gene combinations in a sexually reproducing species is due in part to the

- A. sorting of genes as a result of gene replication
- B. pairing of genes as a result of mitosis
- C. pairing of genes as a result of differentiation
- D. sorting of genes as a result of meiosis

↓  
sex  
cells

16. The diagram below illustrates the process of cell division.



What is the significance of anaphase in this process?

- A. Anaphase usually ensures that each daughter cell has the same number of chromosomes as the parent cell.
- B. Anaphase usually ensures that each daughter cell has twice as many chromosomes as the parent cell.
- C. In anaphase, the cell splits in half.
- D. In anaphase, the DNA is being replicated.

17. The sequence of events occurring in the life cycle of a bacterium is listed below.

- (A) The bacterium copies its single chromosome.
- (B) The copies of the chromosome attach to the cell membrane of the bacterium.
- (C) As the cell grows, the two copies of the chromosome separate.
- (D) The cell is separated by a wall into equal halves.
- (E) Each new cell has one copy of the chromosome.

(identical cell)

This sequence most closely resembles the process of

- A. recombination
- B. zygote formation
- ☒ C. mitotic cell division
- D. meiotic cell division

18. When tested, a solution turns red litmus to blue. This indicates that the solution contains more

- A.  $H^+$  ions than  $OH^-$  ions
- B.  $H_3O^+$  ions than  $OH^-$  ions
- ☒ C.  $OH^-$  ions than  $H_3O^+$  ions
- D.  $H^+$  and  $OH^-$  ions than  $H_2O$  molecules

Blue = Base

$OH^-$  = Base (H in back)

$H^+$  = acid (H in front)

19. Which products are formed when an acid reacts with a base?

- A. an alcohol and carbon dioxide
- B. an ester and water
- C. a soap and glycerine
- ☒ D. a salt and water

Neutralization

20. Red litmus will turn blue when placed in a 0.1 M solution of

- ☒ A. NaOH
- ~~B.  $CH_3OH$~~  alcohol
- C. HCl acid
- D.  $HNO_3$  acid

Blue = Base

21. Which type of matter is composed of two or more different elements that are chemically combined in a definite ratio?

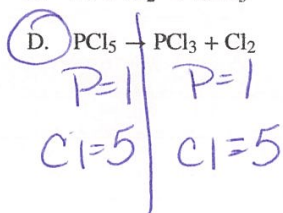
- A. a solution
- ☒ B. a compound
- C. a homogeneous mixture
- D. a heterogeneous mixture

> Physically Combined

homogeneous = looks same

heterogeneous = can see the parts

22. Which equation shows a conservation of mass?



23. An atom of any element must contain

A. an equal number of protons and neutrons

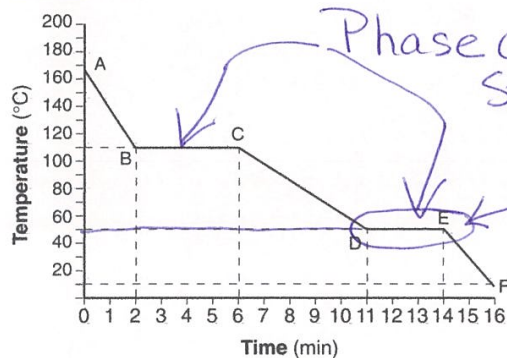
B. an equal number of protons and electrons

C. more electrons than neutrons

D. more electrons than protons

Example: Boron  
5 Protons  
5 Electrons  
Neutral atom

24. Base your answer(s) to the following question(s) on the graph below, which represents the cooling of a substance starting at a temperature above its boiling point. \*



Phase change the temperature stays the same.

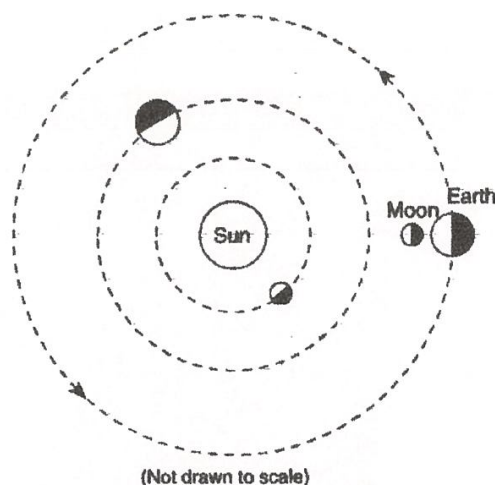
melting or freezing

What is the melting point of this substance?  $50^\circ\text{C}$

melting point = freezing point

Vaporization point = condensation point.  
(Boiling)

25. The diagram below represents a portion of the solar system.



(Not drawn to scale)

In addition to Earth, which planets are represented by the diagram?

A. Saturn and Pluto

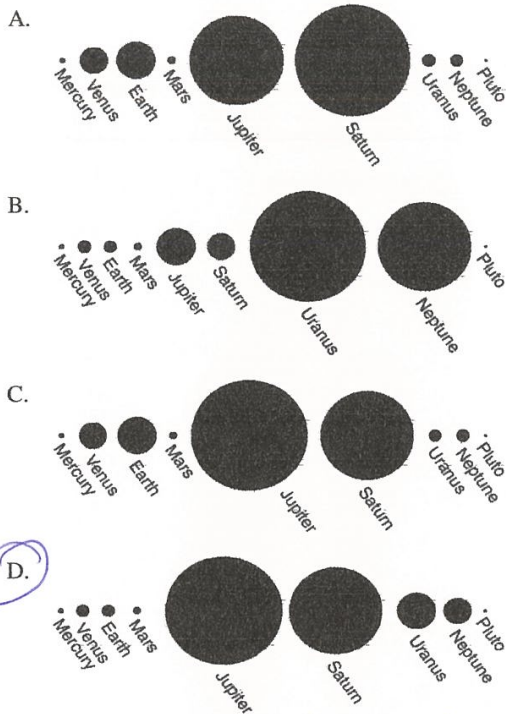
B. #1 and #2  
Mercury and Venus

C. Uranus and Neptune

D. Jupiter and Mars

My Very Educated Mother Just Served us Nachos.

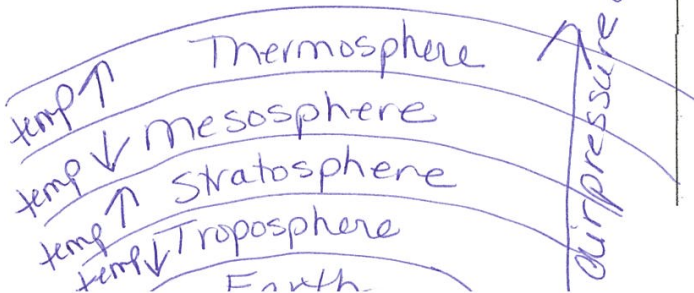
26. Which sequence correctly shows the relative size of the nine planets of our solar system?



\* Jupiter is the biggest.  
\* Earth & Venus are similar in size.

27. As the altitude increases within Earth's stratosphere, air temperature generally

- A. decreases, only  
☒ B. increases, only  
 C. decreases, then increases  
 D. increases, then decreases



28. An increase in the amount of which atmospheric gas is thought to cause global climate warming?

- A. oxygen  
 B. hydrogen  
 C. nitrogen  
☒ D. carbon dioxide - traps heat

our atmosphere

78% Nitrogen

21% Oxygen

1% other gases > Argon, CO<sub>2</sub>, water vapor

29. The ozone layer helps life on Earth because ozone

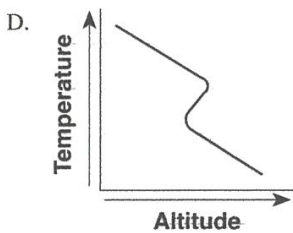
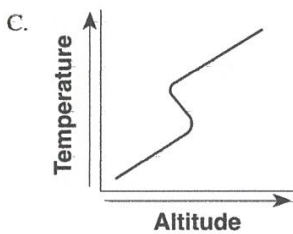
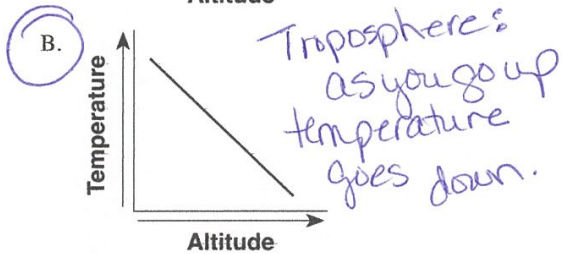
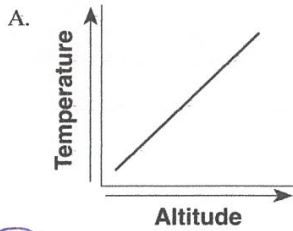
- A. modifies the normal El Niño weather pattern  
 B. reflects insolation from the Sun  
☒ C. absorbs damaging ultraviolet radiation from the Sun  
 D. deflects winds from a straight line to a curved path

30. The gases in Earth's early atmosphere are inferred to have come primarily from

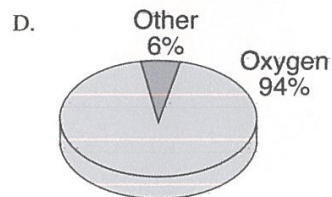
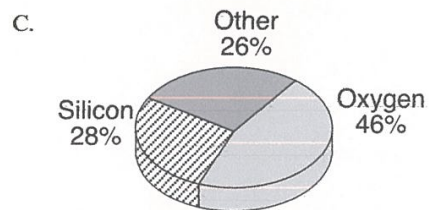
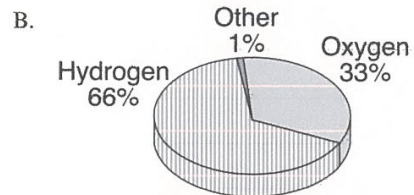
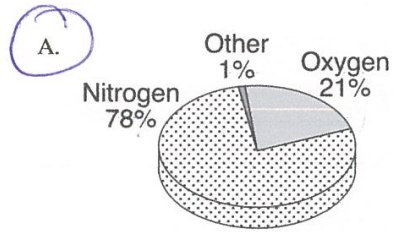
- A. meteor showers  
 B. melting of glacial ice  
☒ C. volcanic eruptions  
 D. evaporation of seawater



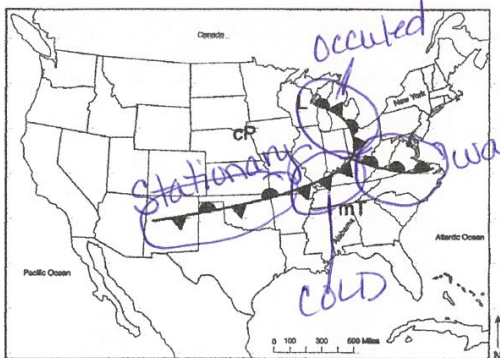
31. Which graph best shows the general relationship between altitude and temperature in the troposphere?



32. Which pie graph correctly shows the percentage of elements by volume in Earth's troposphere?



33. Base your answer(s) to the following question(s) on the *Earth Science Reference Tables*, the weather map below, and your knowledge of Earth science. The map shows a weather system that is affecting part of the United States.



What is the total number of different kinds of weather fronts shown on this weather map?

- A. 1    B. 2    C. 3    D. 4

Cold front: cooler temperatures and violent storms.

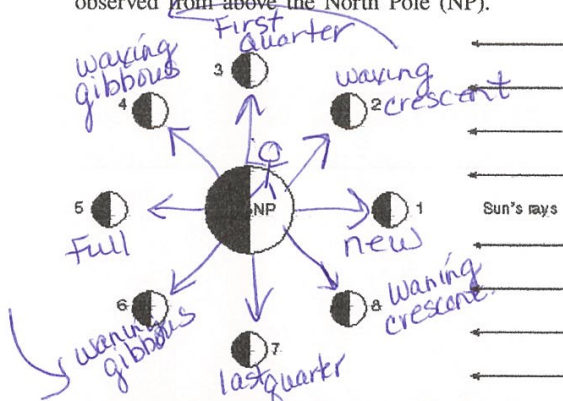
Warm front: warmer temperatures  
Steady rain/snow

Stationary front: long steady rain/snow

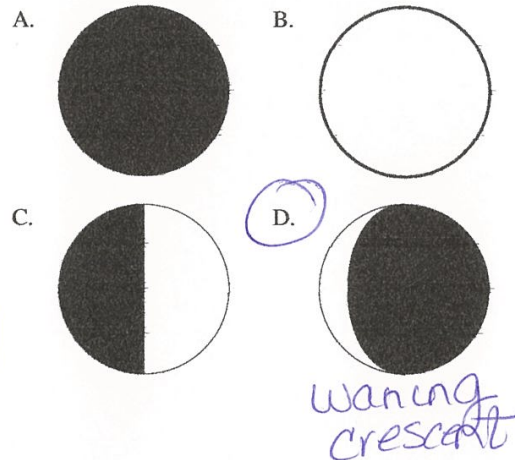
H = high pressure = happy weather (clear)

L = Low pressure = Lousy weather

34. The accompanying diagram shows the Moon in different positions as it revolves around Earth, as observed from above the North Pole (NP).



Which image correctly represents the Moon at position 8, as observed from Earth?



I left my car in the wane,  
I had to wax it to make it right.

35. Which of the following electromagnetic radiations has the *shortest* wavelength?

- A. radio    B. infrared  
C. visible    D. ultraviolet

radio    microwave    infrared    visible    UV    X-ray    gamma

ROYGBIV

36. Which of the following electromagnetic radiations has the shortest wavelength?

- A. ultraviolet      B. visible  
C. infrared      D. radio

37. A prism disperses white light, forming a spectrum. The best explanation for this phenomenon is that different frequencies of visible light

- A. move at different speeds in the prism  
B. are reflected inside the prism  
C. are absorbed inside the prism  
D. undergo constructive interference inside the prism

38. More than <sup>most</sup> two-thirds of the elements of the Periodic Table are

- A. metalloids      B. metals  
C. nonmetals      D. noble gases

metalloids - touch stairstep  
metals - to the left  
non-metals - to the right plus Hydrogen

39. Which element is a member of the halogen family?

- A. K      B. B      C. I      D. S

Iodine

40. What is the total number of electrons in an atom with an atomic number of 13 and a mass number of 27?

- A. 13      B. 14      C. 27      D. 40

Atomic Number = Protons, Electrons

Atomic Mass: Protons + Neutrons

Neutrons:  $\frac{\text{Atomic Mass} - \text{Atomic Number}}{\text{Neutrons}}$

Ex      13  
Al      P = 13      N = 14  
27      E = 13