Merck State Science Day 2006

Integrated Science

Multiple Choice

Identify the letter of the choice that best completes the statement or answers the question and fill in the selection on the answer sheet.

1. A physics student during a metric lab noticed a bug crawling along a meter stick and decided to record the bug's position in five second intervals. After the bug crawled off the meter stick, the student created the table below.

| time(s) | position (cm) |
|---------|---------------|
| 0.00 | 49.6 |
| 5.00 | 39.2 |
| 10.0 | 42.5 |
| 15.0 | 41.0 |
| 20.0 | 65.7 |

What is the displacement of the bug between t = 0.00 and t = 20.0 s?

- A) +39.9 cm B) -39.9 cm C) +65.7 cm D) -16.1 cm E) +16.1 cm
- **2.** A souped-up 700hp race car, traveling at constant speed, makes one lap around a circular track of radius *r* in a time *t*. *Note:* The circumference of a circle is given by $C = 2\pi r$.

When the car has traveled halfway around the track, what is the magnitude of its *displacement* from the starting point?

- **A**) *r*
- **B**) 2*r*
- **C**) π*r*
- **D**) 2π*r*
- E) zero

A) r B) 2r C) πr D) $2\pi r$ E) zero

- **3.** A tennis ball is thrown vertically upward by a tennis player who happens to be on the surface of the earth. Consider the following quantities:
 - (1) the speed of the ball
 - (2) the velocity of the ball
 - (3) the acceleration of the ball

Which of these is (are) zero when the ball has reached the maximum height?

A) 1 only B) 2 only C) 1 and 2 D) 1 and 3 E) 1, 2, and 3

4. A soccer ball is kicked *horizontally* at a speed of 10 m/s from the edge of a cliff. The soccer ball strikes the ground 55 m from the foot of the cliff of height H as shown in the sketch below. Neglect air resistance. How long (time) is the ball in the air before it hits the ground?



- A) 1.0 s B) 1.2 s C) 3.4 s D) 5.5 s E) 11.2 s
- 5. A horse pulls a cart along a horizontal straight road. Consider the following four forces that arise in this situation.

(1) the force of the horse pulling on the cart

(2) the force of the cart pulling on the horse

(3) the force of the horse pushing on the road

(4) the force of the road pushing on the horse

Which two forces form an "action-reaction" pair which obeys Newton's third law?

- A) 1 and 4 B) 1 and 3 C) 2 and 4 D) 3 and 4 E) 2 and 3
- 6. Two point masses *m* and *M* are separated by a distance *d*. If the distance between the masses is increased to 3*d*, how does the gravitational force between them change?
 - A) The force will be one-third as great.
 - **B**) The force will be one-ninth as great.
 - C) The force will be three times as great.
 - **D**) The force will be nine times as great.
 - E) It is impossible to determine without knowing the numerical values of *m*, *M*, and *d*.
- 7. Which force listed below is responsible for keeping a car in an *unbanked* curve from leaving that curve?A) the car's weight
 - B) the force of friction
 - C) the reaction force to the car's weight
 - **D**) the vertical component of the normal force
 - E) the horizontal component of the normal force
- **8.** A NASA shuttle is in orbit around the earth at an altitude of 400 miles. Which one of the following statements best explains why the astronauts have a feeling that they are experiencing "weightlessness?"
 - A) The centripetal force of the earth on the astronaut in orbit is zero.
 - **B**) The pull of the earth on the spaceship is canceled by the pull of moon.
 - C) The spaceship is in free fall and its floor cannot press upwards on the astronauts.
 - **D**) The force of gravity decreases as the inverse square of the distance from the earth's center.
 - **E**) The force of the earth on the spaceship and the force of the spaceship on the earth cancel because they are equal in magnitude but opposite in direction.

9. During a physics laboratory activity, a 0.20-kg block is suspended from a vertical spring. The spring stretches from its original length of 0.050 m to 0.060 m. Later, the same block is attached to the same spring and placed on a horizontal, frictionless surface as shown below.



The block is then pulled so that the spring stretches to a total length of 0.10 m. The block is released at time t = 0 and undergoes simple harmonic motion. Which one of the following statements is true concerning the motion of the block?

- A) Its acceleration is constant.
- **B**) The period of its motion depends on its amplitude.
- C) Its acceleration is greatest when the spring returns to the 5.0 cm position.
- **D**) Its velocity is greatest when the mass has reached its maximum displacement.
- E) Its acceleration is greatest when the mass has reached its maximum displacement.
- **10.** Which one of the following statements concerning the buoyant force on an object submerged in a liquid is true?
 - A) The buoyant force depends on the mass of the object.
 - B) The buoyant force depends on the weight of the object.
 - C) The buoyant force is independent of the density of the liquid.
 - **D**) The buoyant force depends on the volume of the liquid displaced.
 - E) The buoyant force will increase with depth if the liquid is incompressible.
- **11.** The accepted SI (Standard Internationale) units of heat are equivalent to those of which one of the following quantities?
 - A) force/time
 - **B**) work

D) specific heat capacity • timeE) power

- C) temperature
- 12. Which one of the following will result in *beats*?
 - A) the superposition of waves that travel with different speeds
 - B) the superposition of identical waves that travel in the same direction
 - C) the superposition of identical waves that travel in opposite directions
 - **D**) the superposition of waves that are identical except for slightly different amplitudes.
 - **E**) the superposition of waves that are identical except for slightly different frequencies.

13. Four resistors and a 6-V battery are arranged as shown in the circuit diagram below. The smallest current passes through which resistor(s)?



- A) the $10-\Omega$ resistor
- **B**) the 20- Ω resistor
- C) the 30- Ω resistor
- **D**) the 60- Ω resistor
- **E**) It is the same and the smallest in the 30- Ω and 60- Ω resistors.
- 14. Acandle (represented by an arrow below) is placed in front of a concave spherical mirror as shown. The three rays 1, 2, and 3, leave the top of the object and, after reflection, converge at a point on the top of the image. Ray 1 is parallel to the principal axis, ray 2 passes through *F*, and ray 3 passes through *C*. Which ray(s) will reflect back on itself (themselves)?



- 15. The Michelson-Morley experiment
 - A) confirmed that time dilation occurs.
 - **B**) proved that length contraction occurs.
 - C) verified the conservation of momentum in inertial reference frames.
 - **D**) supported the relationship between mass and energy.
 - E) indicated that the speed of light is the same in all inertial reference frames.
- 16. The energy of a photon depends upon which one of the following parameters?
 - A) mass
 - **B**) amplitude
 - C) polarization
 - **D**) frequency
 - **E**) phase relationships

17. You are a biochemist and have recently discovered a new macromolecule. Studies of the bond types found in this macromolecule reveal many hydrogen bonds and peptide linkages. This is most likely what type of macromolecule? **D**) nucleic acid

E) not enough information is given

- A) carbohydrate
- **B**) lipid
- C) protein
- **18.** Ospreys and other top predators in food chains are most severly affected by pesticides such as DDT because A) their systems are very sensitive to the chemicals
 - **B**) of their rapid reproductive rate
 - **C)** of biological amplification
 - **D**) they cannot store the pesticides in their tissues
 - **E**) of their long live spans
- **19.** Which of the following are produced by reactions that take place in the thylakoids and consumed by reactions in the stroma?

D) glucose and O₂

E) \overline{CO}_2 and ATP

- A) CO_2 and H_2O
- **B**) glucose and ADP
- **C)** ATP and NADPH
- 20. Sports physiologists at an Olympic training center wanted to monitor athletes to determine at what point their muscles were functioning anaerobically. They could do this by checking for a buildup of: **D**) ADP
 - A) ATP
 - **B**) lactic acid E) ethyl alcohol
 - **C**) carbon dioxide
- 21. The concentration of solutes in a red blood cell is about 2%. Sucrose cannot pass through the membrane, but water and urea can. Osmosis would cause red blood cells to shrink the most when immersed in which of the following solutions?
 - **A)** a hypertonic sucrose solution
 - **B**) a hypotonic sucrose solution
 - **C**) a hypertonic urea solution
- **D**) a hypotonic urea solution
- **E)** pure (distilled) water
- 22. A micrograph of a dividing cell from a mouse showed 19 chromosomes, each consisting of two sister chromatids. During which of the following stages of cell division could this picture have been taken?
 - **A)** prophase of mitosis

- **D**) anaphase of mitosis E) prophase II of meiosis
- **B**) telophase II of meiosis
- **C**) telophase of mitosis
- **23.** Which of the following ranks the structures correctly in order of size, from largest to smallest?
 - A) gene chromosome nucleotide codon
- **B**) chromosome gene codon nucleotide C) chromosome - nucleotide - gene - codon
- 24. Which of the following best illustrates dynamic equilibrium (homeostasis)?
 - A) Most adult humans are between 5 and 6 feet tall
 - **B**) The lungs and intestines have large surface areas for gas exchange
 - C) When blood glucose is high, the pancreas releases insulin: when the level is low, the pancreas releases glucagon
 - **D**) All the cells of the body are about the same size
 - E) When oxygen in the blood decreases, you may feel light-headed

- **D**) chromosome nucleotide codon gene
- E) gene chromosome codon nucleotide

- **25.** Which of the following is the biggest difference between a human cardiovascular system and the cardiovascular system of a fish?
 - A) In a fish, blood is oxygenated by passing through a capillary bed
 - **B**) A human heart has two chambers; a fish heart has four
 - C) Human circulation has two major circuits: fish circulation has one circuit
 - **D**) Human heart chambers are called atria and ventricles: fish only have ventricles
 - E) Humans have a closed system; fish have an open circulatory system
- 26. As filtrate passes through the loop of Henle, salt is removed and concentrated in the interstitial fluid of the kidney medulla. Because of this high salt concentration, the nephron is able to
 - A) excrete the maximum amount of salt
- **D**) excrete a large amount of water
- **B**) control the pH of the interstitial fluid
- **E**) reabsorb water most efficiently
- **C)** neutralize toxins that might accumulate in
- 27. Which of the following correctly traces the path of light into your eye?
 - A) lens cornea pupil retina **D**) lens - pupil - cornea - retina
 - **B**) cornea pupil lens retina E) pupil - cornea - lens - retina
 - **C)** cornea lens pupil retina

the kidney

- **28.** Which of the following best illustrates the effects of a density-dependent limiting factor when describing population dynamics?
 - A) A forest fire kills all the pine trees in a patch of a forest
 - **B**) Early rainfall triggers the explosion of a locust population
 - **C)** Drought decimates the wheat crop
 - **D**) Voles multiply, and foxes switch to voles as a food source
 - E) Silt from logging kills half the young salmon in a stream
- **29.** A bat locates insect prev in the dark by bouncing high-pitched sounds off them. One species of moth escapes predation by diving to the ground when it hears "sonar" of a particular bat species. This is an example of ____ between the bat and the moth.
 - A) coevolution
 - **B**) mutualism

D) ecological succession

C) competitive exclusion

- E) commensalism
- **30.** Ants carry dead ants out of the anthill and dump them on a "trash pile." If a live ant is painted with a chemical from dead ants, other ants carry it, kicking and struggling, to the trash pile, until the substance wears off. Which of the following best explains this behavior?
 - A) The chemical is a sign stimulus for a fixed action pattern
 - **B**) The ants have become imprinted on the chemical
 - C) The ants continue the behavior until they become habituated
 - **D**) The ants can only learn by trial and error
 - E) The chemical triggers a negative taxis
- **31.** Which of the following best illustrates ecological succession?
 - A) A mouse eats seeds, an owl eats the mouse
 - **B**) Decomposition in soil releases nitrogen that plants can use
 - C) Grass grows on a sand dune, then shrubs, and then trees
 - **D**) Imported pheasants increase, while local quail disappear
 - E) Overgrazing causes a loss of nutrients from the soil

- **32.** Which of the following is a true statement concerning the role of redox reactions in photosynthesis and cellular respiration?
 - A) Photosynthesis involves only reductions; respiration involves only oxidations
 - B) Photosynthesis involves only oxidations; respiration involves only reductions
 - C) In photosynthesis, carbon dioxide is oxidized to form sugar; in respiration, sugar is reduced to form carbon dioxide
 - **D**) In photosynthesis, carbon dioxide is reduced to form sugar; in respiration, sugar is oxidized to form carbon dioxide
 - **E**) Both a and d are correct
- **33.** Fungi are found associated with the earliest plant fossils. Which of the following is a way in which fungi may have helped plants become terrestrial?
 - A) by protecting early plants from desiccation
 - **B**) by providing simple organic compounds in return for sugars
 - C) by forming mycorrhizal associations and helping early plants
 - **D**) by forming lichen-like associations with ancestral plants
 - E) both b and c
- **34.** In guinea pigs, black hair is dominant to brown hair, and short hair is dominant to long hair. A hybrid black, hybrid short-haired male guinea pig mates with a brown, long-haired female guinea pig. What are the expected results?
 - A) 1 black short hair, 1 black long hair, 1 brown short hair and 1 brown long hair
 - B) 3 black short hair, 1 brown long hair, 3 black long hair and 1 brown short hair
 - C) 9 black short hair, 3 black long hair, 3 brown short hair and 1 brown long hair
 - D) 9 black short hair, 3 brown long hair, 3 black long hair and 1 brown short hair
 - E) all black short hair
- **35.** We could state as a biological 'law' that all food chains begin with photosynthetic producers if it was not for the exception of:
 - A) lichens that can make their own food energy
 - **B**) anaerobic bacteria such as the tetanus bacteria
 - C) fungi that are neither photosynthetic producers nor herbivores or carnivores
 - D) chemosynthetic bacteria found around deep ocean thermal vents
 - **E**) humans can make synthetic food
- **36.** In the figure below of a chloroplast, letter _____ represents an area that contains chlorophyll, whereas letter _____ represents an area associated with carbon dioxide reduction, respectively.



37. In the figure below, the structure at number 1 represents the ____, and the structure at number 2 represents the ____.

D) umbilical cord, embryo

E) chorion, amnion



- A) yolk sac, chorion
- **B**) amnion, chorion
- C) embryo, amnion
- **38.** In 1909 Robert Millikan determined the charge on an electron by
 - A) bombarding a piece of gold foil with alpha particles.
 - **B**) measuring the rate of fall of an X-rayed oil droplet.
 - C) the use of a magnet to deflects a beam of electrons within a cathode ray tube.
 - **D**) connecting a voltmeter to a battery.
 - E) exposing photographic film to a sample of radioactive ore.
- **39.** What is the formula for iron (III) sulfate?

A) FeS B) Fe_2S_3 C) $FeSO_4$ D) $Fe_2(SO_4)_3$ E) Fe_3SO_4

- **40.** What is the mass of 2.76 mole oxygen gas?
 - A) 5.80 g B) 11.6 g C) 88.3 g D) 44.2 g E) 60.2 g
- **41.** When the following chemical equation is balanced, using the lowest, whole number coefficients possible, the coefficient for N_2 is

$$NH_3 + NO \rightarrow N_2 + H_2O$$

$$B) 3 C) 4 D) 5 E) 6$$

42. When the following ionic equation is balanced, using the lowest, whole number coefficients possible, the coefficient for Fe^{2+} is:

 $MnO_4^- + H^+ + Fe^{2+} \rightarrow Mn^{2+} + Fe^{3+} + H_2O$ A) 1 B) 2 C) 3 D) 4 E) 5

A) 2

43. A student burns magnesium ribbon in a crucible. Use the following lab data to calculate the percent yield from the experiment.

| | 2 Mg(s) |) + | $O_2(g)$ | - | \rightarrow | 2 MgO | (s) | | | | |
|-------|---------|-------|-------------|------|---------------|--------|-----|-------|------|----|------|
| | | mass | s of empty | cru | cible | e | | = 10. | 78 g | | |
| | | mass | s of crucib | le 8 | k Mg | ribbon | | = 12. | 78 g | | |
| | | mass | s of crucib | le 8 | k pro | duct | | = 13. | 78 g | | |
| 60.2% | B) | 79.49 | % | C) 8 | 35.6% | 6 | D) | 90.4% | | E) | 100% |

- **44.** Calculate the molar mass of 23.6 grams of gas in a 10.0 liter container at a pressure of 1.00 atmosphere and 300 Kelvin.
 - A) 18.0 g/mol B) 44.0 g/mol C) 58.1 g/mol D) 111 g/mol E) 708 g/mol
- **45.** A student is given a test tube containing a small quantity of a white powder to be identified. When the student pours a few milliliters of 0.1M HCl into the test tube, the mixture vigorously bubbles. The mixture eventually becomes a colorless solution. The powder could be
 - A) $CaCO_3$ B) $Fe_2(CO_3)_3$ C) $CuCO_3$ D) $CaCl_2$ E) $Zn(NO_3)_2$
- **46.** Five identical balloons are filled separately to identical volumes with different gases, all at the same temperature and pressure. Assume each balloon has the same number of holes and are the same size holes. Which balloon would have the largest volume the following day?
 - A) H_2 B) He C) N_2 D) CO_2 E) $C_2F_3Cl_3$

47. Which atom or ion has an electron configuration identical to Ca^{2+} ?

- A) K B) Cl^- C) S^- D) Cl^+ E) Ar^+
- **48.** A burner flame turns bright yellow when the salt of this alkali metal is sprinkled into the flame.
 - A) K B) Li C) Rb D) Sr E) Na
- 49. The bond that attaches the hydrogen atom to the fluorine atom in HF (g) is the
 - A) London Dispersion ForceD) ionic bond
 - B) polar covalent bond E) metallic bond
 - C) nonpolar covalent bond

A)

- **50.** $MgBr_2$ would be most soluble in liquid
 - A) H_2O B) CCl_4 C) NaCl D) Cu E) N_2
- **51.** Calculate the molarity of a solution containing 10.0g NaOH in enough distilled water to produce 250.0 mL of NaOH solution.
 - A) 0.0400 M B) 1.00 M C) 2.00 M D) 3.00 M E) 4.00 M

- **52.** The following system is at equilibrium. Which change in conditions will cause this system to shift to the right?
 - $C(s) + O_2(g) \rightarrow CO_2(g) \Delta H = -394 \text{ kJ/mol}$
 - A) add more solid carbon
 - **B**) lower the temperature
 - C) add more CO_2 gas

- D) increase the pressureE) decrease the pressure
- 53. What voltage would a student view on the voltmeter connected by wires to the following system?



- A) 0.0 v B) -0.76 v C) +0.34 v D) +0.42 v E) +1.10 v
- 54. What is the oxidation number for vanadium in $Na_2V_2O_6$?
 - A) +2 B) +3 C) +4 D) +5 E) +10
- 55. Determine the rate expression based on the following experimental data:

 $2 \operatorname{ClO}_{2}(\operatorname{aq}) + 2 \operatorname{OH}_{(\operatorname{aq})} \rightarrow \operatorname{ClO}_{3}(\operatorname{aq}) + \operatorname{ClO}_{2}(\operatorname{aq}) + \operatorname{H}_{2}\operatorname{O}_{(\operatorname{l})}$

| where rate = $-\Delta[ClO_2^-]$ | | | | | |
|---------------------------------|------------|--------------|--|--|--|
| | Δt | | | | |
| $[ClO_2^-]$ | $[OH^{-}]$ | Initial rate | | | |
| (mol/L's) | (mol/L's) | (mol/L's) | | | |
| 0.20 | 0.20 | 0.060 | | | |
| 0.40 | 0.20 | 0.240 | | | |
| 0.40 | 0.40 | 0.480 | | | |

- A) Rate = $k[ClO_2^-]^2 [OH^-]^2$
- **B**) Rate = $k[ClO_2^-][OH^-]^2$
- C) Rate = $k[ClO_2^{-}]^2 [OH^{-}]$
- **D**) Rate = $k[ClO_2^-][OH^-]$
- **E**) Rate = $k[ClO_2^{-1}]^2$

56. Which subatomic particle is produced by the radioactive decay of C-14 into N-14?

 $_{6}C \rightarrow _{7}N + ?$

- A) beta particle **D**) alpha particle
- **B**) positron
- C) proton
- 57. What type of organic compound is the following molecule?

A) alcohol

D) ether

E) neutron

- B) ketone E) carboxylic acid
- C) aldehyde
- Determine the molarity of a sulfuric acid solution when 20.00 mL of 0.1000 M NaOH neutralizes 15.00 mL H₂SO₄.
 - A) 0.06667 M B) 0.07500 M C) 0.1333 M D) 0.2667 M E) 0.3276 M
- **59.** What is the concentration of OH^{-} solution where the pH = 11.6?
 - A) $2.5 \ge 10^{-12} \ M$ D) $4.0 \ge 10^{-3} \ M$ B) $5.6 \ge 10^{-8} \ M$ E) $1.06 \ M$ C) $3.1 \ge 10^{-6} \ M$
- 60. Which 0.1 molal solutions will have the highest freezing point?
 - A) $C_6H_{12}O_6$ D) $Al(NO_3)_3$

 B) KCl
 E) $Al(C_2H_3O_2)_3$
 - C) $MgCl_2$
- **61.** Although diamonds and graphite both consist of the element carbon, their physical properties are very different. The most likely explanation for this difference is that
 - A) the internal arrangement of carbon atoms is different in each mineral.
 - B) graphite contains impurities not found in diamonds.
 - C) graphite contains radioactive carbon-14 but diamonds do not.
 - D) diamonds contain silicate tetrahedral but graphite does not.
- 62. On what basis do scientists conclude that fossil corals require a warm, shallow-water environment?
 - A) Radiocarbon temperature determinations
 - B) The geographic distributions of fossil corals
 - C) Most modern corals live in this type of environment
 - **D**) The composition of the rocks in which fossil coral are formed

63. The graph below is a computer-generated forecast of air temperature and dew point for a city during a period of $2\frac{1}{2}$ days.



At which time during this period is the rate of evaporation expected to be highest?

- A) April 27 at 10 am
- **B**) April 28 at 10 am
- C) April 28 at 4 pm
- D) April 29 at 4 am
- **64.** Refer to the graph in the previous question above, **#63**. At which time during this period will the relative humidity reach its highest value?
 - A) April 27 at 10 am
 - **B**) April 28 at 10 am
 - C) April 28 at 10 pm
 - **D**) April 29 at 4 am
- 65. *Ice Storms* form when one of the following explanations occurs:
 - A) A warm front rises over a cold air mass. It begins to rain. As the rain falls through the colder air mass the rain drops freeze.
 - **B**) After a rain storm in the winter, the air temperature falls below freezing. The surfaces become icy.
 - C) During a rain storm in the winter, as the rain falls it freezes on colder surfaces producing an icy glaze.
 - **D**) After a snow storm ends and the temperature rises above freezing, it begins to rain. An icy glaze will form on the snow surface.
- **66.** Useful information regarding the composition of the interior of the Earth can be derived from earthquakes because earthquake waves
 - A) release materials from within the Earth.
 - B) travel through the Earth at a constant velocity.
 - C) travel at different rates through different materials.
 - D) change radioactive decay rates of the interior rocks.

67. The diagram below shows the apparent paths of the Sun in relation to a house in New Jersey on June 21 and December 21 every year.



Which statement below best explains the cause of this apparent change in the Sun's path?

- A) The Sun's orbital velocity changes as it revolves around the Earth.
- **B**) The Earth's orbital velocity changes as it revolves around the Sun.
- C) The Earth's axis is tilted $23 \frac{1}{2}$ degrees.
- **D**) The Sun's axis is tilted $23 \frac{1}{2}$ degrees.
- 68. The following diagram represents layers of rock. Answer question below.



Rock layer A is inferred to be older than intrusion B because

- A) layer A is composed of sedimentary rock.
- **B**) layer **B** is located between layer **A** and layer **C**.
- C) parts of layer A were altered by intrusion B.
- **D**) parts of layer *C* were altered by intrusion *B*.
- 69. Semidiurnal tidal patterns
 - A) produce one high tide and one low tide each day.
 - **B**) produce one high tide and two low tides each day.
 - C) produce two high tides and one low tide each day.
 - **D**) produce two high tides and two low tides each day.
- 70. What is the major source of dissolved minerals that affect the salinity of ocean waters?
 - A) Submarine volcanoes
 - **B**) Deep ocean currents
 - C) Shells of sea animals
 - D) Sediments from the land
- 71. How are longitude and latitude shown on a map of the world?

- A) Longitude lines are parallel and latitude lines meet at the equator.
- **B**) Latitude lines are parallel and longitude lines meet at the poles.
- C) Longitude lines are parallel and latitude lines meet at the poles.
- **D**) Latitude lines are parallel and longitude lines meet at the equator.
- 72. Winter storms along the coast tend to change ocean beaches by
 - A) building beach and dunes.
 - B) building beach and eroding off-shore bars.
 - C) eroding beach and building off-shore bars.
 - **D**) eroding beach and sandbars.
- 73. Index fossils, such as trilobites, are useful to geologists for correlating rocks because each species
 - A) was narrowly distributed and became extinct after a long period of time.
 - **B**) was widely distributed and became extinct after a short geologic existence.
 - C) is easily found and is living today.
 - **D**) is rarely found and is no longer living today.
- 74. Base your answers to questions **#74**, **75**, **76** and **77** on the diagram below. The diagram represents a geologic cross section of a portion of the Earth's crust. The rock layers have not been overturned.



The top of which mountain is composed of the youngest bedrock?

A) D B) C C) B D) A

- **75.** What type(s) of bedrock can be found in this area?
 - A) Igneous only
 - B) Sedimentary only
 - C) Igneous and Sedimentary only
 - D) Igneous, Sedimentary, and Metamorphic
- **76.** The two conglomerate layers represented in the diagram have the same texture, but only one layer contains sandstone pebbles. This observation leads to the inference that these two rocks probably were
 - A) affected by contact metamorphism.
 - **B**) solidified deep in the Earth's crust.
 - C) formed from sediments originating from different sources.
 - **D**) formed from sediments deposited at the same geological time.

- 77. Which inference is best supported by this diagram?
 - A) The region shows no evidence of crustal movement.
 - B) The region shows evidence of several extinct volcanoes.
 - C) The region has had extensive crustal movement, especially folding.
 - **D**) The region has had extensive crustal movement, especially faulting.
- **78.** Base your answers to questions **#78 and 79** on the diagram below. The diagram represents latitude and longitude lines on Earth. Points *A* through *E* represent locations on Earth. Arrows represent direction of rotation.



What is the approximate latitude and longitude of C?

- A) 160 degrees North Latitude by 15 degrees East Longitude
- **B**) 160 degrees South Latitude by 15 degrees West Longitude
- C) 40 degrees South Latitude by 160 degrees East Longitude
- D) 40 degrees North Latitude by 160 degrees West Longitude
- **79.** Refer to the diagram in the previous question. When the local time at location C is 3 pm Tuesday, the local **time** at location D is?
 - **A**) 1 pm **B**) 5pm **C**) 3pm **D**) 3am
- **80.** Which condition causes glaciers to retreat?
 - A) They encounter the ocean.
 - **B**) The crust beneath them is uplifted.
 - C) Earth's average temperature decreases.
 - **D**) Their rate of melting exceeds their rate of advancing.

END OF TEST

Merck State Science Day 2006 Answer Section

Integrated Science

MULTIPLE CHOICE

- **1.** ANS: E
 - **2.** ANS: B
 - **3.** ANS: C
 - 4. ANS: D
 - 5. ANS: D
 - 6. ANS: B
 - 7. ANS: B
 - 8. ANS: C
 - **9.** ANS: E
 - 10. ANS: D
- **11.** ANS: B
- **12.** ANS: E
- 13. ANS: D
- **14.** ANS: C
- **15.** ANS: E
- **16.** ANS: D
- **17.** ANS: C **18.** ANS: C
- **19.** ANS: C
- **20.** ANS: B
- 21. ANS: A
- 22. ANS: E
- 23. ANS: B
- 24. ANS: C
- **25.** ANS: C
- **26.** ANS: E
- 27. ANS: B
- 28. ANS: D
- 29. ANS: A
- **30.** ANS: A
- **31.** ANS: C **32.** ANS: D
- 52. ANS. D
- **33.** ANS: C **34.** ANS: A
- **35.** ANS: D
- **36.** ANS: E
- **37.** ANS: B
- **38.** ANS: B
- **39.** ANS: D
- **40.** ANS: C
- **41.** ANS: D
- **42.** ANS: E

| 43. | ANS: | D |
|------------|------|---|
| 44. | ANS: | С |
| 45. | ANS: | А |
| 46. | ANS: | Е |
| 47. | ANS: | В |
| 48. | ANS: | Е |
| 49. | ANS: | В |
| 50. | ANS: | С |
| 51. | ANS: | В |
| 52. | ANS: | В |
| 53. | ANS: | А |
| 54. | ANS: | D |
| 55. | ANS: | С |
| 56. | ANS: | А |
| 57. | ANS: | В |
| 58. | ANS: | А |
| 59. | ANS: | D |
| 60. | ANS: | А |
| 61. | ANS: | А |
| 62. | ANS: | С |
| 63. | ANS: | А |
| 64. | ANS: | В |
| 65. | ANS: | С |
| 66. | ANS: | С |
| 67. | ANS: | С |
| 68. | ANS: | С |
| 69. | ANS: | D |
| 70. | ANS: | D |
| 71. | ANS: | В |
| 72. | ANS: | В |
| 73. | ANS: | В |
| 74. | ANS: | В |
| 75. | ANS: | В |
| 76. | ANS: | С |
| 77. | ANS: | С |
| 78. | ANS: | D |
| 79. | ANS: | В |
| 80. | ANS: | D |

