

REGIONAL ROUND 1B

TOSS-UP

1. *BIOLOGY Short Answer* An assemblage of nucleic acid and proteins that is an obligate intracellular parasite is called a

ANSWER: VIRUS

BONUS

1. *BIOLOGY Short Answer* The general term for a type of plastid that contains color pigments is

ANSWER: CHROMOPLAST

TOSS-UP

2. *MATH Multiple Choice* Which of the following is not a conic section?

- W) ellipse
- X) hyperbola
- Y) parabola
- Z) sigmoid

ANSWER: Z) SIGMOID

BONUS

2. *MATH Short Answer* What is the area in square meters of a trapezoid that has a height of 4 meters and parallel sides of length 3 and 4 meters?

ANSWER: 14 SQUARE METERS

TOSS-UP

3. *CHEMISTRY Multiple Choice* Which of the following ions will be most likely to form when Selenium ionizes?

- W) Se^{6+} (read as: selenium six plus)
- X) Se^{4+}
- Y) Se^{2-}
- Z) Se^{4-}

ANSWER: Y) Se^{2-}

BONUS

3. *CHEMISTRY Multiple Choice* Which of the following atoms can expand its valence shell when bonding?

- W) nitrogen
- X) carbon
- Y) oxygen
- Z) phosphorus

ANSWER: Z) PHOSPHORUS

TOSS-UP

4. *ASTRONOMY Multiple Choice* The moons of Mars are

- W) very small
- X) similar in size to our Moon
- Y) not in synchronous orbits
- Z) completely made of ice

ANSWER: W) VERY SMALL

BONUS

4. *ASTRONOMY Multiple Choice* The layer which we see as the surface of the Sun is the

- W) core
- X) corona
- Y) chromosphere
- Z) photosphere

ANSWER: Z) PHOTOSPHERE

TOSS-UP

5. *CHEMISTRY Multiple Choice* The enthalpy change is the thermal energy transferred when a change occurs

- W) under constant temperature
- X) under constant pressure
- Y) spontaneously
- Z) non-spontaneously

ANSWER: X) UNDER CONSTANT PRESSURE

BONUS

5. *CHEMISTRY Multiple Choice* The common name for the compound CHCl_3 is

- W) carbon hydrogen trichloride
- X) carbon trichloride
- Y) trichlorocarbide
- Z) chloroform

ANSWER: Z) CHLOROFORM

TOSS-UP

6. *COMPUTER SCIENCE Multiple Choice* The field of computer science in which the goal is to program the computer to mimic intelligent human behavior is

- W) CICS
- X) AI
- Y) ATX
- Z) API

ANSWER: X) AI

BONUS

6. *COMPUTER SCIENCE Short Answer* What is the term for the process employed by most video displays that translates bit-mapped images to scan lines on a screen?

ANSWER: RASTERIZING

TOSS-UP

7. *GENERAL SCIENCE Multiple Choice* The form of pollution that is increasing annually is

- W) air pollution
- X) light pollution
- Y) noise pollution
- Z) all of the above

ANSWER: Z) ALL OF THE ABOVE

BONUS

7. *GENERAL SCIENCE Short Answer* What is the branch of geometry concerned with the properties of geometrical objects that are unchanged by continuous deformations such as twisting and stretching?

ANSWER: TOPOLOGY

TOSS-UP

8. *PHYSICS Multiple Choice* An artificial Earth satellite in an elliptical orbit has its greatest centripetal acceleration when it is at what location?

- W) nearest the Earth
- X) farthest from the Earth
- Y) between Earth and the moon
- Z) between Earth and the sun

ANSWER: W) NEAREST THE EARTH

BONUS

8. *PHYSICS Multiple Choice* In a carbon microphone, the change in resistance in the microphone as the sound wave moves the diaphragm back and forth is caused by what change in the carbon resistance?

- W) length
- X) temperature
- Y) voltage
- Z) velocity

ANSWER: W) LENGTH

TOSS-UP

9. *EARTH SCIENCE Multiple Choice* The shape of the magnetosphere is influenced by

- W) the lithosphere
- X) the hydrosphere
- Y) the Van Allen belts
- Z) solar winds

ANSWER: Z) SOLAR WINDS

BONUS

9. *EARTH SCIENCE Multiple Choice* The rock type found covering the largest area of the earth's land surface is

- W) igneous
- X) sedimentary
- Y) metamorphic
- Z) none of the above

ANSWER: X) SEDIMENTARY

TOSS-UP

10. *COMPUTER SCIENCE Short Answer* What is the term for a data communications network that extends over a large geographical area but is typically owned and maintained by a single organization?

ANSWER: WAN (ACCEPT: WIDE AREA NETWORK)

BONUS

10. *COMPUTER SCIENCE Short Answer* What does URL stand for?

ANSWER: UNIFORM RESOURCE LOCATOR

TOSS-UP

11. *MATH Short Answer* The class (or set) of all things that are not members of a given set is the

ANSWER: COMPLEMENT

BONUS

11. *MATH Short Answer* For the quadratic equation $ax^2 + bx + c + 0$, the discriminant is

ANSWER: $B^2 - 4AC$

TOSS-UP

12. *CHEMISTRY Multiple Choice* Which type of solid would have the greatest tendency to shatter upon impact with a hammer?

- W) a metal
- X) a metalloid
- Y) a nonmetal
- Z) an inner transition element

ANSWER: Y) A NONMETAL

BONUS

12. *CHEMISTRY Multiple Choice* Which of the following elements is paramagnetic?

- W) krypton
- X) zinc
- Y) strontium
- Z) francium

ANSWER: Z) FRANCIUM

TOSS-UP

13. *COMPUTER SCIENCE Short Answer* In UNIX what command is used to delete a file?

ANSWER: RM

BONUS

13. *COMPUTER SCIENCE Short Answer* What does the acronym MIME stand for?

ANSWER: MULTIPURPOSE INTERNET MAIL EXTENSIONS

TOSS-UP

14. *CHEMISTRY Short Answer* Substances that when present in small amounts can make reactions occur more rapidly but are not themselves used up during the reaction (or are regenerated during the reaction) are

ANSWER: CATALYSTS

BONUS

14. *CHEMISTRY Multiple Choice* Select the element with the least metallic character.

- W) lanthanum
- X) strontium
- Y) thallium
- Z) germanium

ANSWER: Z) GERMANIUM

TOSS-UP

15. *ASTRONOMY Multiple Choice* Which of the following numbers has the same meaning as 8,670?

- W) $8.67 * 10^3$ (read as: eight point sixty-seven times ten to the third power)
- X) $8.67 * 10^2$
- Y) $8.67 * 10$
- Z) $0.867 * 10^3$

ANSWER: W) $8.67 * 10^3$

BONUS

15. *ASTRONOMY Multiple Choice* A better knowledge of which of the following would most aid us in determining whether the universe is open or closed?

- W) the age of the Earth
- X) the age of the solar system
- Y) the size of the Galaxy
- Z) the average density of the universe

ANSWER: Z) THE AVERAGE DENSITY OF THE UNIVERSE

TOSS-UP

16. *EARTH SCIENCE Multiple Choice* Erathosthenes was able to figure out the circumference of the earth by using

- W) the angle of a shadow
- X) an eclipse of the moon
- Y) meridians and parallels
- Z) a polar map projection

ANSWER: W) THE ANGLE OF A SHADOW

BONUS

16. *EARTH SCIENCE Multiple Choice* The longest units of time in the geologic timetable are

- W) periods
- X) eras
- Y) epochs
- Z) years

ANSWER: X) ERAS

TOSS-UP

17. *GENERAL SCIENCE Short Answer* What is the name for a portion of land that is lower than the surrounding area or the area drained by a river and its tributaries?

ANSWER: BASIN

BONUS

17. *GENERAL SCIENCE Short Answer* Which Greek letter symbolizes density, specific resistance, reflectance, or mass concentration?

ANSWER: RHO

TOSS-UP

18. *BIOLOGY Multiple Choice* A major function of hyaline cartilage is to

- W) decrease the motion between bones and muscles
- X) reduce friction between bones
- Y) send signals throughout the body
- Z) give shape to the body

ANSWER: X) REDUCE FRICTION BETWEEN BONES

BONUS

18. *BIOLOGY Multiple Choice* Which of the following hormones is made by the adrenal medulla?

- W) cortisol
- X) aldosterone
- Y) glucagon
- Z) epinephrine

ANSWER: Z) EPINEPHRINE (ACCEPT: ADRENALIN)

TOSS-UP

19. *GENERAL SCIENCE Multiple Choice* Water scarcity during a period when precipitation is lower than normal and evaporation is higher than normal is called

- W) water stress
- X) aridity
- Y) drought
- Z) desiccation

ANSWER: Y) DROUGHT

BONUS

19. *GENERAL SCIENCE Multiple Choice* The earth's protective ozone layer is located in what layer of the atmosphere?

- W) ionosphere
- X) troposphere
- Y) mesosphere
- Z) stratosphere

ANSWER: Z) STRATOSPHERE

TOSS-UP

20. *CHEMISTRY Multiple Choice* Molecular orbitals lower in energy than those atomic orbitals from which they are formed are

- W) bonding orbitals
- X) antibonding orbitals
- Y) nonbonding orbitals
- Z) lone pairs of electrons

ANSWER: W) BONDING ORBITALS

BONUS

20. *CHEMISTRY Multiple Choice* Select the element with the largest first ionization energy.

- W) sodium
- X) calcium
- Y) chlorine
- Z) technetium

ANSWER: Y) CHLORINE

TOSS-UP

21. *COMPUTER SCIENCE Short Answer* What is the meaning of the domain name extension .mil? (read as: dot-m-i-l)

ANSWER: MILITARY

BONUS

21. *COMPUTER SCIENCE Short Answer* What is the term for the amount of time required for data to be communicated from the hard disk or tape controller to the central processing unit?

ANSWER: TRANSFER RATE

TOSS-UP

22. *MATH Short Answer* Find the value of the summation from $i = 0$ to 4 of the expression i .

ANSWER: 10

BONUS

22. *MATH Multiple Choice* A dihedral angle is formed by the

- W) intersection of two lines
- X) intersection of two curves
- Y) intersection of two parallel lines
- Z) intersection of two planes

ANSWER: Z) INTERSECTION OF TWO PLANES

TOSS-UP

23. *EARTH SCIENCE Short Answer* What theory expresses that sea floor crust forms at mid-ocean ridges and spreads away from those ridges in opposite directions?

ANSWER: SEA FLOOR SPREADING (ACCEPT PLATE TECTONICS)

BONUS

23. *EARTH SCIENCE Multiple Choice* The rate of increase of temperature with depth in the Earth is the

- W) Moho discontinuity
- X) geothermal gradient
- Y) hydrothermal energy
- Z) tectonic slope

ANSWER: X) GEOTHERMAL GRADIENT

TOSS-UP

24. *COMPUTER SCIENCE Short Answer* Eight bits represent a byte of information. What is the name for the ninth bit used for error detection?

ANSWER: PARITY BIT

BONUS

24. *COMPUTER SCIENCE Multiple Choice* An auxiliary file that contains the second-most-recent version of a file bears the extension of

- W) .bak (read as: dot – b – a – k)
- X) .exe
- Y) .bat
- Z) .bmp

ANSWER: W) .BAK

TOSS-UP

25. *CHEMISTRY Short Answer* What rule states that electrons added to atomic orbitals of the same energy will remain unpaired with parallel spins until the subshell is more than half filled?

ANSWER: HUND'S RULE

BONUS

25. *CHEMISTRY Multiple Choice* Which of the following is a metalloid?

- W) carbon
- X) sulfur
- Y) germanium
- Z) iridium

ANSWER: Y) GERMANIUM

REGIONAL ROUND 2B

TOSS-UP

1. *EARTH SCIENCE Multiple Choice* An important development in the rise of reptiles from amphibians was

- W) development of feet
- X) a means for controlling body temperature
- Y) amniotic egg
- Z) development of gills

ANSWER Y) AMNIOTIC EGG

BONUS

1. *EARTH SCIENCE Multiple Choice* Which of the following is a pluvial lake?

- W) Lake Bonneville
- X) Lake Superior
- Y) Crater Lake
- Z) Lake Pontchartrain (ponch - e - train)

ANSWER: W) LAKE BONNEVILLE

TOSS-UP

2. *GENERAL SCIENCE Short Answer*

What is the term for the interaction between two populations of animals in which members of one population captures, and kills the members of the other for food?

ANSWER: PREDATION

BONUS

2. *GENERAL SCIENCE Short Answer* What is the name for a part of an ocean, sea, or other body of water that extends inland and is smaller than a gulf?

ANSWER: BAY

TOSS-UP

3. *MATH Short Answer* A ladder rests against a wall making a 30 degree angle with the wall. The bottom of the ladder is 10 feet from the wall. How long is the ladder?

ANSWER: 20 FEET

BONUS

3. *MATH Short Answer* At a critical point of a function, the curve of the function has a vertical tangent, and the function has a first derivative of

ANSWER: INFINITY

TOSS-UP

4. *CHEMISTRY Multiple Choice* Transition metals are primarily used

- W) as fuel for nuclear reactors
- X) for transforming metalloids into metals
- Y) as pigmentation in paints
- Z) for structural purposes

ANSWER: Z) FOR STRUCTURAL PURPOSES

BONUS

4. *CHEMISTRY Multiple Choice* The formula of a magnesium ion is

- W) Mg^{2+} (read as: magnesium two plus)
- X) Mg^+ (read as: magnesium plus)
- Y) Mg^{2-} (read as: magnesium two minus)
- Z) Mg^-

ANSWER: W) Mg^{2+}

TOSS-UP

5. *MATH Multiple Choice* A regular polygon constructed by marking off, on the circumference of a circle, chords equal in length to its radius is a

- W) square
- X) pentagon
- Y) hexagon
- Z) heptagon

ANSWER: Y) HEXAGON

BONUS

5. *MATH Short Answer* What is the term for a circle drawn on the surface of a sphere that has the same radius as the sphere and is used to show the shortest distance between two points on the surface

ANSWER: GREAT CIRCLE

TOSS-UP

6. *BIOLOGY Short Answer* What is the term for the movement of minerals and chemical compounds within a plant?

ANSWER: TRANSLOCATION

BONUS

6. *BIOLOGY Short Answer* Name the two types of plankton?

ANSWER: ZOOPLANKTON AND PHYTOPLANKTON

TOSS-UP

7. *ASTRONOMY Multiple Choice* To begin a new nuclear reaction in a star after the hydrogen has burned out requires greater

- W) amounts of hydrogen
- X) amounts of iron
- Y) temperature
- Z) size of the star

ANSWER: Y) TEMPERATURE

BONUS

7. *ASTRONOMY Multiple Choice* The phase of the Moon at the time of lunar eclipse

- W) is full
- X) is new
- Y) is first quarter
- Z) can be any phase

ANSWER: W) IS FULL

TOSS-UP

8. *PHYSICS Multiple Choice* In simple harmonic motion, the acceleration is

- W) Constant
- X) Greatest when velocity is zero
- Y) Greatest when the velocity is greatest
- Z) None of the above

ANSWER: X) GREATEST WHEN VELOCITY IS ZERO

BONUS

8. *PHYSICS Short Answer* The surfaces of a Dewar flask are silvered for the purpose of minimizing heat transfer by what process?

ANSWER: RADIATION

TOSS-UP

9. *BIOLOGY Multiple Choice* Which of the following is NOT a characteristic of the sporozoans?

- W) require two or more different hosts
- X) complex life cycle
- Y) have a free-living stage
- Z) exhibit both sexual and asexual reproduction

ANSWER: Y) HAVE A FREE-LIVING STAGE

BONUS

9. *BIOLOGY Short Answer* What type of viruses that cause their host cell to break open and die?

ANSWER: LYTIC OR CYTOLYTIC

TOSS-UP

10. *ASTRONOMY Multiple Choice* The bands in the atmosphere of Jupiter can be explained by a combination of

- W) cyclonic flow and convection
- X) differentiation and convection
- Y) circulation and differentiation
- Z) convection and rotation

ANSWER: Z) CONVECTION AND ROTATION

BONUS

10. *ASTRONOMY Multiple Choice* When the Moon and Sun are in line with each other and the Earth, a condition results known as

- W) neap tide
- X) flood tide
- Y) ebb tide
- Z) spring tide

ANSWER: Z) SPRING TIDE

TOSS-UP

11. *COMPUTER SCIENCE Short Answer* What is the meaning of the domain name extension .org (read as: dot - o - r - g)?

ANSWER: NONPROFIT ORGANIZATION

BONUS

11. *COMPUTER SCIENCE Multiple Choice* A kilobit is how many bits

- W) 10,000
- X) 100,000
- Y) 1,000
- Z) None of the above

ANSWER: Y) 1,000

TOSS-UP

12. *PHYSICS Short Answer* Acceleration due to gravity on the moon's surface is 1/6th that on Earth. An astronaut's life support backpack weighs 300 lb on Earth. What does it weigh on the moon?

ANSWER: 50LB

BONUS

12. *PHYSICS Short Answer* Two resistors of values 6 and 12 Ohms are connected in parallel. This combination in turn is hooked in series with a 4 Ohm resistor. What is the overall resistance of this combination?

ANSWER: 8.0 OHMS

TOSS-UP

13. *BIOLOGY Short Answer* What is waste product of cellular respiration?

ANSWER: CARBON DIOXIDE

BONUS

13. *BIOLOGY Short Answer* Interruptions in pre-mRNA, or intervening sequences, are called

ANSWER: INTRONS

TOSS-UP

14. *PHYSICS Multiple Choice* The Earth moves about the Sun in an elliptical orbit. As the Earth moves closer to the Sun, which of the following best describes the Earth- Sun system's moment of inertia?

- W) decreases
- X) increases
- Y) remains constant
- Z) decreases, then increases

ANSWER: W) DECREASES

BONUS

14. *PHYSICS Multiple Choice* Somewhere between the Earth and the moon is a point where the gravitational attraction of the Earth is canceled by the pull of the moon. The mass of the moon is 1/81 that of the Earth. How far from the center of the Earth is this point?

- W) 8/9 the way to the moon
- X) 9/10 the way to the moon
- Y) 3/4 the way to the moon
- Z) 80/81 the way to the moon

ANSWER: X) 9/10 THE WAY TO THE MOON

TOSS-UP

15. *BIOLOGY Short Answer* Cellular “digestion” occurs largely in which organelle in the cell?

ANSWER: LYSOSOME

BONUS

15. *BIOLOGY Multiple Choice* The RNA copy of the information transcribed from DNA is called

- W) tRna
- X) mRna
- Y) pRna
- Z) rRna

ANSWER: X) mRNA

TOSS-UP

16. *ASTRONOMY Multiple Choice* Jupiter's moon Io has a surface that is

- W) Covered with active volcanoes
- X) Rocky and covered with craters
- Y) Covered with ice similar to a frozen ocean
- Z) Blocked from our view by dense clouds

ANSWER: W) COVERED WITH ACTIVE VOLCANOS

BONUS

16. *ASTRONOMY Multiple Choice* The thin, kinky, braided ring just beyond the outer edge of the A ring of Saturn is called the

- W) B ring
- X) E ring
- Y) F ring
- Z) K ring

ANSWER: Y) F RING

TOSS-UP

17. *COMPUTER SCIENCE Short Answer* What is the name for intra organizational internets that usually enforce some security measures that hinder outsiders from accessing them?

ANSWER: INTRANETS

BONUS

17. *COMPUTER SCIENCE Multiple Choice* The disk directory containing information on the names, sizes, number of blocks and locations of files on that disk is called

- W) DRAM
- X) directory list
- Y) file allocation table
- Z) groupware

ANSWER: Y) FILE ALLOCATION TABLE

TOSS-UP

18. *EARTH SCIENCE Multiple Choice* Tiny, shrimp like creatures that live in water off Antarctica are called

- W) kelp
- X) oyster
- Y) krill
- Z) salmon

ANSWER: Y) KRILL

BONUS

18. *EARTH SCIENCE Multiple Choice* The crystals that form in slowly cooling magma are

- W) tiny
- X) invisible
- Y) colorful
- Z) large

ANSWER: Z) LARGE

TOSS-UP

19. *ASTRONOMY Multiple Choice* The dark plains on the Moon are

- W) ancient sedimentary basins
- X) deserts
- Y) seas
- Z) flood basalt plains

ANSWER: Z) FLOOD BASALT PLAINS

BONUS

19. *ASTRONOMY Multiple Choice* What is the difference between a meteor and a meteorite

- W) A meteorite is the pit made on the Earth or a planet when a meteor hits
- X) A meteor is the flash of light in the sky. A meteorite is the solid body ending up on the ground
- Y) A meteorite is the flash of light in the sky. A meteor is the solid body ending up on the ground
- Z) A meteorite comes from a comet. A meteor comes from an asteroid

ANSWER: X) A METEOR IS THE FLASH OF LIGHT IN THE SKY. A METEORITE IS THE SOLID BODY ENDING UP ON THE GROUND

TOSS-UP

20. *CHEMISTRY Multiple Choice* Avogadro's Law relates the number of molecules of a gas to its

- W) pressure
- X) temperature
- Y) molar mass
- Z) volume

ANSWER: Z) VOLUME

BONUS

20. *CHEMISTRY Multiple Choice* Rutherford bombarded gold foil with alpha particles and found that a small percentage of the particles were deflected. Which of the following was not accounted for by the model he proposed for the structure of atoms?

- W) the small size of the nucleus
- X) the charge on the nucleus
- Y) the total mass of the atom
- Z) the existence of protons

ANSWER: Y) THE TOTAL MASS OF THE ATOM

TOSS-UP

21. *BIOLOGY Short Answer* In a mammal, the liver converts most ammonia to what substance?

ANSWER: UREA

BONUS

21. *BIOLOGY Short Answer* Starting with heterozygous, pure-breeding parents, and assuming complete dominance, the ratio of dominant to recessive phenotypes in the F1 generation is

ANSWER: 3:1

TOSS-UP

22. *GENERAL SCIENCE Short Answer* What is the name for a strong river of high winds in the upper atmosphere that travels from west to east in middle latitudes?

ANSWER: JETSTREAM

BONUS

22. *GENERAL SCIENCE Short Answer* Name five of the six simple machines that humans use to perform work

ANSWER: SCREW, WHEEL/AXLE, WEDGE, LEVER, INCLINED PLANE, OR PULLEY

TOSS-UP

23. *MATH Short Answer* The non-negative real number equal to a given real number but disregarding its sign is called

ANSWER: ABSOLUTE VALUE

BONUS

23. *MATH Multiple Choice* Find the slope of the line that has y-intercept equal to 3.5 and passes through the point (3,5)

- W) -2
- X) 2
- Y) $\frac{1}{2}$
- Z) $-\frac{1}{2}$

ANSWER: Y) $\frac{1}{2}$

TOSS-UP

24. *EARTH SCIENCE Short Answer* What was the name of Alfred Wegener's super continent?

ANSWER: PANGAEA

BONUS

24. *EARTH SCIENCE Multiple Choice* The A horizon in a soil profile has more of which of the following than the other horizons?

- W) humus
- X) sediments
- Y) nutrients
- Z) all of the above

ANSWER: ALL OF THE ABOVE

TOSS-UP

25. *CHEMISTRY Short Answer* What kind of cation contains an unpaired electron resulting from loss of an electron from a neutral species?

ANSWER: RADICAL

BONUS

25. *CHEMISTRY Multiple Choice* What accounts for the intermolecular forces between CCl_4 molecules?

- W) hydrogen bonding
- X) ionic bonding
- Y) dipole forces
- Z) van der Waals forces

ANSWER: Z) VAN DER WAALS FORCES

REGIONAL ROUND 3B

TOSS-UP

1. *COMPUTER SCIENCE Short Answer* What is the term for the capacity to execute two or more processes over a given span of time?

ANSWER: MULTIPROGRAMMING OR MULTITASKING

BONUS

1. *COMPUTER SCIENCE Multiple Choice* A collection of bookmarks is sometimes referred to as a

- W) hotlist
- X) list of favorites
- Y) bookmark list
- Z) All of the above

ANSWER: Z) ALL OF THE ABOVE

TOSS-UP

2. *BIOLOGY Multiple Choice* In the immune system, T and B are names given to 2 kinds of

- W) erythrocytes
- X) lymphocytes
- Y) thrombocytes
- Z) neutrophils

ANSWER: X) LYMPHOCYTES

BONUS

2. *BIOLOGY Multiple Choice* In a population, a type of selection that acts against the extremes in the phenotype so that the average is favored is this kind of selection

- W) stabilizing
- X) directional
- Y) sexual
- Z) allelic

ANSWER: W) STABILIZING

TOSS-UP

3. *ASTRONOMY Multiple Choice* Radio telescopes need not have finely polished surfaces because

- W) we are not interested in detail in the radio image
- X) the speed of radio waves is less than that of light
- Y) the speed of radio waves is greater than that of light
- Z) radio waves are much longer than light waves

ANSWER: Z) RADIO WAVES ARE MUCH LONGER THAN LIGHT WAVES

BONUS

3. *ASTRONOMY Multiple Choice* The overall composition of Jupiter most nearly resembles:

- W) the Sun
- X) the Earth
- Y) chondrite meteorites
- Z) water ice

ANSWER: W) THE SUN

TOSS-UP

4. *EARTH SCIENCE Multiple Choice* A single boulder standing in a field would most likely have been deposited by

- W) running water
- X) wind
- Y) a glacier
- Z) a mountain

ANSWER: Y) A GLACIER

BONUS

4. *EARTH SCIENCE Multiple Choice* Why did earth scientists begin to change their mind about the theory of continental drift?

- W) they found the San Andreas Fault
- X) they learned about sea floor spreading
- Y) they found fossils of old continents
- Z) they learned about earthquakes in the ocean

ANSWER: X) THEY LEARNED ABOUT SEA FLOOR SPREADING

TOSS-UP

5. *PHYSICS Short Answer* A light bulb has resistance of 240 Ohms when operating at 120 Volts. Find the current in the light bulb (in Amperes).

ANSWER: 0.5 AMPERES

BONUS

5. *PHYSICS Multiple Choice* A weightless spherical balloon is filled with gasoline (density 0.80 grams per cubic centimeter) and placed in seawater (density 1.025 grams per cubic centimeter). The balloon has which of the following percent of its volume under water?

- W) 60%
- X) 68%
- Y) 72%
- Z) 78%

ANSWER: Z) 78%

TOSS-UP

6. *CHEMISTRY Short Answer* The symbol of the element potassium is

ANSWER: K

BONUS

6. *CHEMISTRY Multiple Choice* An f-block element is

- W) Calcium
- X) Cadmium
- Y) Cerium
- Z) Carbon

ANSWER: Y) CERIUM

TOSS-UP

7. *MATH Short Answer* A proposition or subsidiary theorem that follows directly from the statement or the proof of another proposition is a

ANSWER: COROLLARY

BONUS

7. *MATH Short Answer* What are the zeroes of $f(x) = x^4 - x^2$?

ANSWER: X = 0, 1, -1 (ALL THREE ANSWERS ARE REQUIRED)

TOSS-UP

8. *GENERAL SCIENCE Multiple Choice* A motor where alternating current is fed to a stationary coil, which both creates the magnetic field and creates a current in the rotating coil which it surrounds, is what type of motor?

- W) induction
- X) synchronous
- Y) universal
- Z) shunt wound

ANSWER: W) INDUCTION

BONUS

8. *GENERAL SCIENCE Short Answer* What is the term for a layer of sedimentary or igneous rock that has been spread out on or below the earth's surface?

ANSWER: STRATUM (ACCEPT: STRATA)

TOSS-UP

9. *COMPUTER SCIENCE Short Answer* The method of storing and representing color in digital images into the three distinct primary color components or channels is called what?

ANSWER: RGB COLOR SYSTEM (ACCEPT RED, GREEN, BLUE COLOR SYSTEM)

BONUS

9. *COMPUTER SCIENCE Short Answer* What are the three primary Boolean operators?

ANSWER: AND, OR, NOT

TOSS-UP

10. *ASTRONOMY Multiple Choice* Which one of the following does not contribute to modifying the Earth's surface?

- W) wind
- X) chemical processes
- Y) magnetic fields
- Z) water

ANSWER: Y) MAGNETIC FIELDS

BONUS

10. *ASTRONOMY Multiple Choice* The temperature range on the planets in our solar system is approximately

- W) 300 - 500 degrees Kelvin
- X) 0 - 100 degrees Kelvin
- Y) 40 - 700 degrees Kelvin
- Z) 500 - 100,000 degrees Kelvin

ANSWER: Y) 40 - 700 DEGREES KELVIN

TOSS-UP

11. *ASTRONOMY Short Answer* Name the discoverer after which the four large satellites of Jupiter are named?

ANSWER: GALILEO

BONUS

11. *ASTRONOMY Multiple Choice* Which planet's largest moon has an atmosphere?

- W) Jupiter
- X) Earth
- Y) Saturn
- Z) Uranus

ANSWER: Y) SATURN

TOSS-UP

12. *BIOLOGY Multiple Choice* Human erythrocytes are

- W) phagocytic
- X) gas transporters
- Y) ion transporters
- Z) infection fighters

ANSWER: X) GAS TRANSPORTERS

BONUS

12. *BIOLOGY Multiple Choice* Choose the one item from the following list that is NOT true according to our current understanding of membrane structure and function.

- W) a lipid bilayer
- X) molecules can move freely within the plane of the membrane
- Y) phospholipids are neither hydrophilic nor hydrophobic
- Z) some membrane proteins help transport molecules across the membrane

ANSWER: Y) PHOSHOLIPIDS ARE NEITHER HYDROPHILIC NOR HYDROPHOBIC

TOSS-UP

13. *BIOLOGY Multiple Choice* Stretch receptors are found in the

- W) cerebrum
- X) hypothalamus
- Y) lungs
- Z) trachea

ANSWER: Y) LUNGS

BONUS

13. *BIOLOGY Multiple Choice* What human disease, which previously has been successfully treated with antibiotics, has shown a resurgence because of antibiotic-resistant strains?

- W) chicken pox
- X) tuberculosis
- Y) malaria
- Z) influenza

ANSWER: X) TUBERCULOSIS

TOSS-UP

14. *PHYSICS Multiple Choice* A unit commonly used to measure electrical energy is the

- W) ampere-second
- X) kilowatt-hour
- Y) volt-second
- Z) coulomb per second

ANSWER: X) KILOWATT-HOUR

BONUS

14. *PHYSICS Multiple Choice* Which is not an example of approximate simple harmonic motion?

- W) a ball bouncing on the floor
- X) a child swinging on a swing
- Y) a piano string that has been struck
- Z) a car radio's antenna as it waves back and forth

ANSWER: W) A BALL BOUNCING ON THE FLOOR

TOSS-UP

15. *ASTRONOMY Multiple Choice* The kinetic energy of an impacting meteoroid is converted principally into

- W) light
- X) sound
- Y) nuclear radiation
- Z) heat

ANSWER: Z) HEAT

BONUS

15. *ASTRONOMY Short Answer* Venus is the brightest planet in the night sky. Which planet is the second brightest?

ANSWER: JUPITER

TOSS-UP

16. *GENERAL SCIENCE Multiple Choice* A barrel of oil is equivalent to

- W) 31 gallons
- X) 10 gallons
- Y) 42 gallons
- Z) 50 gallons

ANSWER: Y) 42 GALLONS

BONUS

16. *GENERAL SCIENCE Multiple Choice* In measurement of circles and arcs, 60 degrees is equivalent to

- W) 1 minute
- X) 1 sign
- Y) 1 sextant
- Z) 1 quadrant

ANSWER: Y) 1 SEXTANT

TOSS-UP

17. *MATH Multiple Choice* In statistics, degrees of freedom is usually

- W) one more than the number of variables
- X) equal to the number of variables
- Y) one less than the number of variables
- Z) undefined

ANSWER: Y) ONE LESS THAN THE NUMBER OF VARIABLES

BONUS

17. *MATH Short Answer* Express the decimal number 22 in Base 16

ANSWER: 16

TOSS-UP

18. *BIOLOGY Short Answer* The diffusion of water across a selectively permeable membrane is called

ANSWER: OSMOSIS

BONUS

18. *BIOLOGY Multiple Choice* Carrier proteins are involved in a process called

- W) phagocytosis
- X) pinocytosis
- Y) facilitated diffusion
- Z) osmosis

ANSWER: Y) FACILITATED DIFFUSION

TOSS-UP

19. *COMPUTER SCIENCE Short Answer* What does HTML stand for?

ANSWER: HYPERTEXT MARKUP LANGUAGE

BONUS

19. *COMPUTER SCIENCE Short Answer* What is the term for graphic images in which the image is composed of lines, curves and figures that are defined mathematically, rather than composed of pixels?

ANSWER: VECTOR GRAPHICS OR OBJECT-ORIENTED GRAPHICS

TOSS-UP

20. *PHYSICS Multiple Choice* Which of the following is an example of a vector quantity?

- W) velocity
- X) temperature
- Y) volume
- Z) mass

ANSWER: W) VELOCITY

BONUS

20. *PHYSICS Multiple Choice* The moment of inertia for a solid, uniform disk or cylinder whose axis is through the center is expressed as

- W) $\text{mass} \times R^2$
- X) $\frac{2}{5} \text{mass} \times R^2$
- Y) $\frac{1}{2} \text{mass} \times R^2$
- Z) $2 \text{mass} \times R^2$

ANSWER: Y) $\frac{1}{2} \text{MASS} \times R^2$

TOSS-UP

21. *MATH Short Answer* A step-by-step procedure by which an operation can be carried out without need for deductive reasoning, for example by a machine, is called

ANSWER: ALGORITHM

BONUS

21. *MATH Multiple Choice* A real function $y = f(x)$ (read: y equal f of x) is continuous at a point "a" if and only if it is defined at $x = a$ and the limit as x approaches a of $f(x)$ equals

- W) $f(x - a)$
- X) $f(x + a)$
- Y) $f(a \cdot x)$ (read as: f of a times x)
- Z) $f(a)$

ANSWER: Z) F(A)

TOSS-UP

22. *BIOLOGY Short Answer* The two most abundant gases in inhaled air are

ANSWER: NITROGEN AND OXYGEN

BONUS

22. *BIOLOGY Multiple Choice* Oxygen and carbon dioxide are transported through the alveolar wall by

- W) active transport
- X) diffusion
- Y) endocytosis
- Z) pulmonary transport

ANSWER: X) DIFFUSION

TOSS-UP

23. *GENERAL SCIENCE Short Answer* What is the name for the practice of accurately measuring and recording the relative altitudes, angles, and distances of features on, above, or below the land surface from which maps can be plotted?

ANSWER: SURVEYING

BONUS

23. *GENERAL SCIENCE Short Answer* What is the name for the outer layer of skin in animals?

ANSWER: EPIDERMIS

TOSS-UP

24. *PHYSICS Short Answer* A person on a bridge attached to a bungee cord would be advised to know which law of physics relating to the bungee before he jumps?

ANSWER: HOOKE'S LAW

BONUS

24. *PHYSICS Multiple Choice* According to the second law of thermodynamics, which of the following applies to the heat received from high temperature reservoir by a heat engine operating in a complete cycle?

- W) must be completely converted to work
- X) equals the entropy increase
- Y) converted completely into internal energy
- Z) cannot be completely converted to work

ANSWER: Z) CANNOT BE COMPLETELY CONVERTED TO WORK

TOSS-UP

25. *MATH Short Answer* The method of assigning ordered number pairs to points in a plane is named after the seventeenth century mathematician and philosopher

ANSWER: RENE' DESCARTES (ACCEPT: DESCARTES)

BONUS

25. *MATH Multiple Choice* The conjunction, of P and Q, where P is true and Q is false, is

- W) true
- X) false
- Y) could be either true or false
- Z) neither true or false

ANSWER: X) FALSE

REGIONAL ROUND 4B

TOSS-UP

1. *CHEMISTRY Multiple Choice* The sample containing the largest number of molecules is

- W) 25 grams NH_3
- X) 25grams N_2H_4
- Y) 15 grams NH_2CONH_2
- Z) 25 grams $(\text{NH}_4)_2\text{SO}_4$

ANSWER: W) 25 grams NH_3

BONUS

1. *CHEMISTRY Multiple Choice* In line formulas, each line represents a

- W) carbon atom
- X) hydrogen atom
- Y) atom other than carbon
- Z) bond between atoms

ANSWER: Z) BOND BETWEEN ATOMS

TOSS-UP

2. *ASTRONOMY Multiple Choice* A light year is defined as

- W) the speed of light in a vacuum
- X) the average distance from the Earth to the Sun
- Y) the length of the Solar Year
- Z) the distance light travels in one year

ANSWER: Z) THE DISTANCE LIGHT TRAVELS IN ONE YEAR

BONUS

2. *ASTRONOMY Multiple Choice* Which of the following was created earliest in the Universe?

- W) electrons
- X) the Sun
- Y) helium nuclei
- Z) the Milky Way galaxy

ANSWER: W) ELECTRONS

TOSS-UP

3. *MATH Multiple Choice* Which of the following correlation coefficients between two random variables indicate the greatest correlation?

- W) 0.71
- X) 0.32
- Y) -0.83
- Z) -0.38

ANSWER: Y) -0.83

BONUS

3. *MATH Multiple Choice* At what value of x does the following function have a removable discontinuity, the quantity $x + 1$ squared divided by the quantity $x^2 - 1$

- W) 2
- X) -1
- Y) 1
- Z) -2

ANSWER: X) -1

TOSS-UP

4. *CHEMISTRY Multiple Choice* Helium and beryllium are both the second elements in their respective intervals. They are not placed directly above and below each other in the periodic table because they

- W) have different atomic masses
- X) have a different number of protons
- Y) do not have similar properties
- Z) are arranged alphabetically

ANSWER: Y) DO NOT HAVE SIMILAR PROPERTIES

BONUS

4. *CHEMISTRY Multiple Choice* The arrangement of the electrons in an atom or ion can be shown by any of the following except

- W) a complete electron configuration
- X) an shortened electron configuration
- Y) the first ionization energy
- Z) an orbital diagram

ANSWER: Y) THE FIRST IONIZATION ENERGY

TOSS-UP

5. *BIOLOGY Short Answer* Where in the body are red blood cells produced?

ANSWER: BONE MARROW

BONUS

5. *BIOLOGY Short Answer* What hormone stimulates uterine contractions during childbirth?

ANSWER: OXYTOCIN

TOSS-UP

6. *CHEMISTRY Multiple Choice* If the temperature of a gas is increased from 200 degrees Kelvin to 400 degrees Kelvin, the average speed of the individual gas molecules will increase by a factor of

- W) 1.41
- X) 4
- Y) 8
- Z) 2

ANSWER: W) 1.41

BONUS

6. *PHYSICS Multiple Choice* When the compression of a spring is doubled, the potential energy stored in the spring is

- W) doubled
- X) halved
- Y) quadrupled
- Z) unaffected

ANSWER: Y) QUADRUPLED

TOSS-UP

7. *COMPUTER SCIENCE Multiple Choice* What is a hyperlink?

- W) a string of clickable text or a click able graphic that points to another Web page or document
- X) a software tool used to view Web pages
- Y) an entity on the Internet that publishes Web pages
- Z) none of the above

ANSWER: W) A STRING OF CLICK ABLE TEXT OR A CLICK ABLE GRAPHIC THAT POINTS TO ANOTHER WEB PAGE OR DOCUMENT

BONUS

7. *COMPUTER SCIENCE Multiple Choice* A CD-ROM currently has almost how many times the capacity of a standard floppy disk?

- W) 20
- X) 100
- Y) 400
- Z) 10000

ANSWER: Y) 400

TOSS-UP

8. *GENERAL SCIENCE Short Answer* What is the common name for a mixture of gaseous hydrocarbons such as methane, ethane, and propane that is found in porous sedimentary rock in the earth's crust?

ANSWER: NATURAL GAS

BONUS

8. *GENERAL SCIENCE Short Answer* What is the term used to describe the way light is reflected off of a mineral's surface?

ANSWER: LUSTER

TOSS-UP

9. *ASTRONOMY Multiple Choice* Which of the following objects has the largest diameter?

- W) globular cluster
- X) white dwarf
- Y) the Local group
- Z) red giant star

ANSWER: Y) THE LOCAL GROUP

BONUS

9. *ASTRONOMY Multiple Choice* After a star becomes a red giant, hydrogen burning

- W) does not occur
- X) occurs in the center of the core
- Y) occurs in a shell
- Z) occurs only during a nova

ANSWER: Y) OCCURS IN A SHELL

TOSS-UP

10. *EARTH SCIENCE Multiple Choice* What holds mercury in a column in a mercury barometer?

- W) heavy mercury
- X) mercury pressure
- Y) air pressure
- Z) the weight of mercury

ANSWER: Y) AIR PRESSURE

BONUS

10. *EARTH SCIENCE Short Answer* What large, flat areas of sediment cover much of the deep ocean basin?

ANSWER: ABYSSAL PLAINS

TOSS-UP

11. *BIOLOGY Short Answer* Aquatic animals excrete nitrogenous wastes in the form of

ANSWER: AMMONIA (accept NH_3)

BONUS

11. *BIOLOGY Short Answer* What neurotransmitter is secreted at the neuromuscular junction?

ANSWER: ACETYLCHOLINE

TOSS-UP

12. *ASTRONOMY Multiple Choice* In studying the large Galilean satellites of Jupiter, we see that the density of the moons decreases and the albedo increases as we go from the inner moons to the outer moons. This tells us

- W) the inner moons are mainly ice
- X) the outer moons are mainly ice
- Y) the inner moons are the largest
- Z) the outer moons are the largest

ANSWER: X) THE OUTER MOONS ARE MAINLY ICE

BONUS

12. *ASTRONOMY Multiple Choice* The spectral class of the Sun is G2, and that of the star Enif is K2. From this information, we know with certainty that Enif is

- W) intrinsically brighter than the Sun
- X) hotter than the Sun
- Y) cooler than the Sun
- Z) intrinsically fainter than the Sun

ANSWER: Y) COOLER THAN THE SUN

TOSS-UP

13. *EARTH SCIENCE Multiple Choice* Smooth, flat sides on the surface of a crystal are called crystal

- W) faces
- X) angles
- Y) patterns
- Z) properties

ANSWER: W) FACES

BONUS

13. *EARTH SCIENCE Short Answer* Which layer of Earth is made of iron and nickel in liquid form?

ANSWER: OUTER CORE

TOSS-UP

14. *CHEMISTRY Multiple Choice* The following formula that does NOT represent a stable ionic compound is

- W) MgO
- X) PbCl₂
- Y) Sr₂O
- Z) CsBr

ANSWER: Y) Sr₂O

BONUS

14. *CHEMISTRY Short Answer* An anion in which an element, usually a nonmetal, is bonded to one or more oxygen atoms is called a

ANSWER: OXYANION

TOSS-UP

15. *BIOLOGY Multiple Choice* A cell or individual with an abnormal number of chromosomes is said to be

- W) teratological
- X) hominid
- Y) aneuploid
- Z) homozygous

ANSWER: Y) ANEUPLOID

BONUS

15. *BIOLOGY Multiple Choice* Which of the following is not a common characteristic of mollusks?

- W) radial symmetry
- X) visceral mass
- Y) mantle
- Z) nephridia

ANSWER: W) RADIAL SYMMETRY

TOSS-UP

16. *ASTRONOMY Multiple Choice* Mercury has a high surface temperature because of its

- W) strong greenhouse effect
- X) proximity to the Sun
- Y) elongated orbit
- Z) rapid rotation

ANSWER: X) PROXIMITY TO THE SUN

BONUS

16. *ASTRONOMY Multiple Choice* The orbits of short period comets are

- W) circular
- X) mainly located near the ecliptic
- Y) randomly oriented with respect to the ecliptic
- Z) almost identical to Pluto's orbit

ANSWER: X) MAINLY LOCATED NEAR THE ECLIPTIC

TOSS-UP

17. *MATH Short Answer* The property of a mathematical operator to yield the same results irrespective of the order of arguments, such as $a + b = b + a$, is called

ANSWER: COMMUTATIVE

BONUS

17. *MATH Short Answer* What is the slope and y-intercept of the line $3x + 4y = 5$? (read: 3x plus 4y equals 5)

ANSWER: SLOPE = $-3/4$; Y-INTERCEPT = $5/4$

TOSS-UP

18. *PHYSICS Multiple Choice* According to Newton's second law, the angular acceleration experienced by an object is directly proportional to

- W) its moment of inertia
- X) the net applied torque
- Y) the object's size
- Z) none of the above

ANSWER: X) THE NET APPLIED TORQUE

BONUS

18. *PHYSICS Multiple Choice* The pressure and volume of an ideal gas can double, when the temperature is changed how?

- W) doubled
- X) halved
- Y) quadrupled
- Z) quartered

ANSWER: Y) QUADRUPLED

TOSS-UP

19. *CHEMISTRY Short Answer* Who was the first scientist to propose that the atom had a dense nucleus that occupied only a small fraction of the volume of the atom?

ANSWER: RUTHERFORD

BONUS

19. *CHEMISTRY Multiple Choice* Which of the following gases will be the slowest to diffuse through a room?

- W) methane
- X) hydrogen sulfide
- Y) carbon dioxide
- Z) water

ANSWER: Y) CARBON DIOXIDE

TOSS-UP

20. *BIOLOGY Multiple Choice* Three polypeptide chains wound around each other form a type of secondary protein structure called a

- W) isomeric coil
- X) collagen helix
- Y) alpha helix
- Z) beta sheet

ANSWER: X) COLLAGEN HELIX

BONUS

20. *BIOLOGY Short Answer* What did Jacob and Monod call a stretch of DNA that includes several genes under coordinated control?

ANSWER: OPERON

TOSS-UP

21. *PHYSICS Short Answer* One end of a steel bar is in a Bunsen flame and the other end in an ice cube. By what factor is the rate of heat flow changed when the bar's cross-sectional area is doubled?

ANSWER: TWO

BONUS

21. *PHYSICS Multiple Choice* There are six books in a stack, each with a weight of 5 N. The coefficient of friction between all the books is 0.2. With what horizontal force must I push to start sliding the top five books off the bottom one?

- W) 1.0 N
- X) 5.0 N
- Y) 3.0 N
- Z) 7.0 N

ANSWER: X) 5.0 N

TOSS-UP

22. *CHEMISTRY Short Answer* In a single atom, what is the maximum number of electrons which can have quantum number $n=4$?

ANSWER: 32

BONUS

22. *CHEMISTRY Multiple Choice* The size of an atomic orbital is associated with

- W) the principal quantum number
- X) the angular momentum quantum number
- Y) the magnetic quantum number
- Z) the spin quantum number

ANSWER: W) THE PRINCIPAL QUANTUM NUMBER

TOSS-UP

23. *COMPUTER SCIENCE Short Answer* What does the acronym CD-ROM stand for?

ANSWER: COMPACT DISC READ-ONLY MEMORY

BONUS

23. *COMPUTER SCIENCE Short Answer* What is the term used to describe the main Web page that acts as the container for frames?

ANSWER: FRAMESET

TOSS-UP

24. *MATH Short Answer* What is the probability of flipping a coin 3 times and getting: first a head, then two tails?

ANSWER: 1/8

BONUS

24. *MATH Short Answer* The next Fibonacci number in the sequence of integers 0, 1, 1, 2, 3, 5, 8, 13, is

ANSWER: 21

TOSS-UP

25. *BIOLOGY Short Answer* The rings in the wall of the trachea are made from what material?

ANSWER: CARTILAGE

BONUS

25. *BIOLOGY Multiple Choice* Which of the following is a way that cells regulate the expression of genes?

- W) post-transcriptional control
- X) post-translational control
- Y) translational control
- Z) all of the above

ANSWER: Z) ALL OF THE ABOVE

REGIONAL ROUND 5B

TOSS-UP

1. *ASTRONOMY Multiple Choice* Following the end of hydrogen nuclear reactions in the core of a star, which nuclear reaction may begin next?

- W) helium to carbon
- X) silicon to iron
- Y) oxygen to nitrogen
- X) wind to water

ANSWER: W) HELIUM TO CARBON

BONUS

1. *ASTRONOMY Multiple Choice* The Earth's atmosphere shields us from most radiations. The exceptions are

- W) visible light and radio waves
- X) x-rays and U-V radiation
- Y) only visible light frequencies
- Z) x-rays and gamma rays

ANSWER: W) VISIBLE LIGHT AND RADIO WAVES

TOSS-UP

2. *PHYSICS Short Answer* What term best describes a system made up of ice, water, and steam existing together?

ANSWER: TRIPLE POINT

BONUS

2. *CHEMISTRY Multiple Choice* An airplane flying with a constant velocity flies from a cold air mass into a warm air mass. The Mach number will

- W) increase
- X) decrease
- Y) stay the same
- Z) become unstable

ANSWER: X) DECREASE

TOSS-UP

3. *BIOLOGY Multiple Choice* The main function of the neuron is

- W) conduction
- X) contraction
- Y) protection
- Z) secretion

ANSWER: W) CONDUCTION

BONUS

3. *BIOLOGY Short Answer* A group of genetically identical cells or organisms derived from a single "parent" cell is called a

ANSWER: CLONE

TOSS-UP

4. *GENERAL SCIENCE Short Answer* What is the term for the cold woodlands located along the southern fringes of the Arctic tundra?

ANSWER: TAIGA

BONUS

4. *GENERAL SCIENCE Short Answer* What is the name for the scientific study of fossilized pollen, spores, and other micro-fossils?

ANSWER: MICROPALAEONTOLOGY OR PALYNOLOGY

TOSS-UP

5. *ASTRONOMY Multiple Choice* Which of the following characteristics of Mercury indicate that it should not have an atmosphere

- W) slow rotation
- X) small mass
- Y) fast orbital speed
- Z) presence of a magnetic field

ANSWER: X) SMALL MASS

BONUS

5. *ASTRONOMY Multiple Choice* Which of the following molecules is found in the spectrum of Uranus, Neptune, and Pluto?

- W) methane
- X) carbon dioxide
- Y) water vapor
- Z) nitrogen

ANSWER: W) METHANE

TOSS-UP

6. *EARTH SCIENCE Short Answer* What is the meaning of the term "strata"?

ANSWER: LAYERED ROCKS (ACCEPT: ROCK LAYERS)

BONUS

6. *EARTH SCIENCE Multiple Choice* The water on a wet-bulb thermometer will evaporate quickly and cool the bulb quickly when the relative humidity is

- W) high
- X) low
- Y) condensed
- Z) 100 percent

ANSWER: X) LOW

TOSS-UP

7. *BIOLOGY Short Answer* The epiglottis covers the opening of the

ANSWER: LARYNX

BONUS

7. *BIOLOGY Short Answer* What term is used to describe the liquid part of unclotted blood?

ANSWER: PLASMA

TOSS-UP

8. *EARTH SCIENCE Multiple Choice* The theory that Earth's landmasses move is called

- W) continental drift
- X) sea floor spreading
- Y) isostasy
- Z) subduction

ANSWER: W) CONTINENTAL DRIFT

BONUS

8. *EARTH SCIENCE Multiple Choice* Clay minerals are formed through the weathering of which of the following mineral "groups"?

- W) halides
- X) silicates
- Y) oxides
- Z) carbonates

ANSWER: X) SILICATES

TOSS-UP

9. *GENERAL SCIENCE Short Answer* What is the measurement of distance used by ships and airplanes that is equivalent to 1/60 of a degree of longitude at the equator, roughly equivalent to 6,080 feet?

ANSWER: NAUTICAL MILE

BONUS

9. *GENERAL SCIENCE Short Answer* What is the term given to factors such as climate, geology, and atmosphere that affect the biotic environment?

ANSWER: ABIOTIC

TOSS-UP

10. *ASTRONOMY Multiple Choice* What characteristic determines almost everything about the life of a star?

- W) its mass
- X) whether or not it has planets
- Y) its chemical composition
- Z) its color

ANSWER: W) ITS MASS

BONUS

10. *ASTRONOMY Multiple Choice* Binary stars are particularly important for determining stellar

- W) temperature
- X) luminosity
- Y) distance
- Z) mass

ANSWER: Z) MASS

TOSS-UP

11. *EARTH SCIENCE Multiple Choice* Calderas (CALL dare uhs) form

- W) by meteorite impacts
- X) by explosion
- Y) by collapse
- Z) by erosion

ANSWER: Y) BY COLLAPSE

BONUS

11. *EARTH SCIENCE Multiple Choice* Which is not an example of a concordant rock mass?

- W) buried lava flow
- X) sill
- Y) laccolith
- Z) dike

ANSWER: Z) DIKE

TOSS-UP

12. *CHEMISTRY Multiple Choice* Very large molecules made up of repeating units are called

- W) aromatic
- X) chiral
- Y) polymers
- Z) biodegradable

ANSWER: Y) POLYMERS

BONUS

12. *CHEMISTRY Short Answer* Who is credited with discovering the atomic nucleus?

ANSWER: RUTHERFORD

TOSS-UP

13. *BIOLOGY Short Answer* In the heart, what is the name of the “node” which, when it fires, causes the ventricles to contract?

ANSWER: ATRIO-VENTRICULAR NODE (ACCEPT: A-V NODE)

BONUS

13. *BIOLOGY Short Answer* The fastest signals are conducted by neurons covered with what substance?

ANSWER: MYELIN

TOSS-UP

14. *MATH Multiple Choice* In every triangle, the distance from the point of intersection of the medians to any vertex is what proportion of the length of the altitude to that vertex?

- W) $1/3$
- X) $2/3$
- Y) $1/4$
- Z) $3/4$

ANSWER: X) $2/3$

BONUS

14. *MATH Short Answer* The number represented by 1 followed by a hundred zeros is

ANSWER: GOOGOL

TOSS-UP

15. *CHEMISTRY Multiple Choice* The bonding in N_2O_4 is best described as

- W) five s and two p bonds
- X) three s and two p bonds
- Y) seven s bonds
- Z) five s bonds

ANSWER: W) FIVE S AND TWO P BONDS

BONUS

15. *CHEMISTRY Short Answer* What is the correct name for BrO_3^- ?

ANSWER: BROMATE ION

TOSS-UP

16. *ASTRONOMY Multiple Choice* The diameter of the disk of our galaxy is approximately

- W) 3 parsecs
- X) 25,000 parsecs
- Y) 250 parsecs
- Z) 3,000,000 parsecs

ANSWER: X) 25,000 PARSECS

BONUS

16. *ASTRONOMY Multiple Choice* The total time which the Sun will spend as a main sequence star is

- W) at least 200 billion years
- X) about 1 million years
- Y) about 4.5 million years
- Z) about 10 billion years

ANSWER: Z) ABOUT 10 BILLION YEARS

TOSS-UP

17. *BIOLOGY Short Answer* Glycolysis produces a net gain of how many ATP molecules per mole of glucose?

ANSWER: TWO

BONUS

17. *BIOLOGY Multiple Choice* What is the most common shape of a prokaryotic cell?

- W) tuberculus
- X) coccus
- Y) spirillum
- Z) bacillus

ANSWER: Z) BACILLUS

TOSS-UP

18. *GENERAL SCIENCE Short Answer* What is the name for the principle predicted by Einstein's theory of relativity that intervals of time are not absolute, but are relative to the motion of the observers?

ANSWER: TIME DILATION (ACCEPT: TIME DILATATION)

BONUS

18. *GENERAL SCIENCE Short Answer* Which Greek letter symbolizes electrical conductivity, surface tension, or cross section?

ANSWER: SIGMA

TOSS-UP

19. *BIOLOGY Short Answer* What term refers to the location on a chromosome where a gene is located?

ANSWER: LOCUS

BONUS

19. *BIOLOGY Short Answer* What are genes that can move around the genome and sometimes inactivate other genes?

ANSWER: TRANSPOSONS

TOSS-UP

20. *PHYSICS Multiple Choice* The average kinetic energy of individual gas molecules depends only on what property of the gas?

- W) pressure
- X) volume
- Y) temperature
- Z) pressure

ANSWER: Y) TEMPERATURE

BONUS

20. *PHYSICS Short Answer* List the following in order of lowest energy to greatest energy: gamma rays, infrared, radio, ultraviolet.

ANSWER: RADIO, INFRARED, ULTRAVIOLET, GAMMA RAYS

TOSS-UP

21. *MATH Short Answer* What is the value of 125 to the two-thirds power?

ANSWER: 25

BONUS

21. *MATH Short Answer* Two trains are headed directly toward each other at rates of 40 mph and 50 mph. How many miles apart are they 2 minutes before they impact?

ANSWER: 3

TOSS-UP

22. *CHEMISTRY Short Answer* What region of the electromagnetic spectrum is between the microwave and visible regions?

ANSWER: INFRARED REGION

BONUS

22. *CHEMISTRY Multiple Choice* In old fashioned flash bulbs, the light is produced by the reaction of magnesium metal sealed in the bulb with oxygen gas. Thus, after the flash, the mass of the bulb is

- W) greater than it was before use
- X) the same as it was before use
- Y) smaller than it was before use
- Z) unknown

ANSWER: X) THE SAME AS IT WAS BEFORE USE

TOSS-UP

23. *GENERAL SCIENCE Short Answer* What is the name for the scientific study of the near term physical phenomena and processes taking place in the atmosphere and the interactions with the ground surface?

ANSWER: METEOROLOGY

BONUS

23. *GENERAL SCIENCE Short Answer* What is term for a macromolecular material such as rubber that returns rapidly to approximately the initial dimensions and shape after substantial deformation by a weak stress and release of the stress?

ANSWER: ELASTOMER

TOSS-UP

24. *BIOLOGY Short Answer* Plants that contain two or more complete sets of chromosomes are said to be

ANSWER: POLYPLOID

BONUS

24. *BIOLOGY Multiple Choice* The plasma membrane is

- W) completely permeable
- X) selectively permeable
- Y) found only in eukaryotic cells
- Z) found only in prokaryotic cells

ANSWER: X) SELECTIVELY PERMEABLE

TOSS-UP

25. *COMPUTER SCIENCE Short Answer* What is the name for a program that simultaneously translates and executes the instructions of a high-level programming language one by one?

ANSWER: INTERPRETER

BONUS

25. *COMPUTER SCIENCE Multiple Choice* Which of the following HTML tags does not allow you to align an image with the highest or lowest object in the line?

- W) absbottom
- X) absmiddle
- Y) bottom
- Z) top

ANSWER: Y) BOTTOM

REGIONAL ROUND 6B

TOSS-UP

1. *GENERAL SCIENCE Short Answer* What is term for the branch of geology concerned with the study of earthquakes?

ANSWER: SEISMOLOGY

BONUS

1. *GENERAL SCIENCE Short Answer* What is the term for the line on a map or chart joining points or places of equal magnetic dip?

ANSWER: ISOCLINE

TOSS-UP

2. *ASTRONOMY Multiple Choice* The inflationary model helps to explain why the universe appears

- W) small
- X) flat
- Y) closed
- Z) green

ANSWER: X) FLAT

BONUS

2. *ASTRONOMY Multiple Choice* A spectral line of a star is observed at 5002 Angstroms, while the same line is observed in the laboratory at 5000 Angstroms. Which statement is true?

- W) the temperature of the star has decreased
- X) the star is approaching us
- Y) the star is receding from us
- Z) the star's temperature has increased

ANSWER: Y) THE STAR IS RECEDING FROM US

TOSS-UP

3. *CHEMISTRY Short Answer* What is the name for the lowest energy state of an atom?

ANSWER: GROUND

BONUS

3. *CHEMISTRY Short Answer* The energy involved in dissolving a solid is known as the heat of

ANSWER: SOLUTION

TOSS-UP

4. *BIOLOGY Short Answer* Plants fix carbon by what light- requiring process?

ANSWER: PHOTOSYNTHESIS

BONUS

4. *BIOLOGY Multiple Choice* Which biome has broad-leafed plants and black bears?

W) grassland

X) taiga

Y) temperate forest

Z) tundra

ANSWER: Y) TEMPERATE FOREST

TOSS-UP

5. *ASTRONOMY Multiple Choice* The most massive stars are believed to end up as

- W) black holes
- X) neutron stars
- Y) white dwarfs
- Z) planetary nebulae

ANSWER: W) BLACK HOLES

BONUS

5. *PHYSICS Multiple Choice* Gravity and electro-magnetism are both

- W) long range forces
- X) forces which can be attractive and repulsive
- Y) short range forces
- Z) forces which are always repulsive

ANSWER: W) LONG RANGE FORCES

TOSS-UP

6. *GENERAL SCIENCE Short Answer* What is an instrument called that has cups and a rotating spindle for measuring the speed of the wind?

ANSWER: ANEMOMETER

BONUS

6. *GENERAL SCIENCE Short Answer* What is the name of the yellow or reddish-brown fossil resin that often contains preserved insects or other previously living material?

ANSWER: AMBER

TOSS-UP

7. *COMPUTER SCIENCE Short Answer* RAM chips that require a constant source of electrical energy to maintain their contents are called what?

ANSWER: DRAM OR DYNAMIC RAM

BONUS

7. *COMPUTER SCIENCE Multiple Choice* A site that contains a duplicate copy of a Web presentation from another site is a

- W) Browser
- X) Hypermedia
- Y) Web master
- Z) Mirror site

ANSWER: Z) MIRROR SITE

TOSS-UP

8. *MATH Multiple Choice* The declination angle to a given line is measured in a

- W) clockwise direction from the y-axis
- X) clockwise direction from the x-axis
- Y) counter clockwise direction from the y-axis
- Z) counter clockwise direction from the x-axis

ANSWER: X) CLOCKWISE DIRECTION FROM THE X-AXIS

BONUS

8. *MATH Short Answer* A woman has an equal number of nickels, dimes and quarters. If she has \$12 in total, how many coins does she have?

ANSWER: 90 COINS

TOSS-UP

9. *ASTRONOMY Multiple Choice* Our sun is a

- W) main sequence star
- X) white dwarf
- Y) supergiant
- Z) red giant

ANSWER: W) MAIN SEQUENCE STAR

BONUS

9. *ASTRONOMY Multiple Choice* The speed at which distant galaxies are moving away from us

- W) increases with distance from us
- X) decreases with distance from us
- Y) does not change with distance from us
- Z) is randomly related to distance from us

ANSWER: W) INCREASES WITH DISTANCE FROM US

TOSS-UP

10. *PHYSICS Multiple Choice* A billiard ball collides in an elastic head- on collision with a second identical ball. What is the kinetic energy of the system after the collision compared to that before collision?

- W) the same as
- X) one fourth
- Y) twice
- Z) four times

ANSWER: W) THE SAME AS

BONUS

10. *PHYSICS Multiple Choice* Sea breezes that occur near the shore are attributed to a difference between land and water with respect to what property?

- W) mass density
- X) coefficient of volume expansion
- Y) specific heat
- Z) emissivity

ANSWER: Y) SPECIFIC HEAT

TOSS-UP

11. *COMPUTER SCIENCE Multiple Choice* The part of the central processing unit that performs arithmetic operations and evaluates expressions is the

- W) ALU
- X) ADT
- Y) ISAM
- Z) CERT

ANSWER: W) ALU

BONUS

11. *COMPUTER SCIENCE Short Answer* What is the term used for a program that searches the Web to add sites and documents to a database that can be subsequently accessed with a search engine?

ANSWER: SPIDER

TOSS-UP

12. *GENERAL SCIENCE Short Answer* What is the name for the scientific study of the sea floor and its sediments, the characteristics of ocean waters, and the types of flora and fauna within the oceans?

ANSWER: OCEANOGRAPHY

BONUS

12. *GENERAL SCIENCE Short Answer* What is the term for a device used to detect and measure the intensity of radiant energy which consists of a number of thermocouples connected together?

ANSWER: THERMOPILE

TOSS-UP

13. *ASTRONOMY Short Answer* Stars are spherical because of what phenomena?

ANSWER: GRAVITY

BONUS

13. *ASTRONOMY Multiple Choice* Venus is closest to which object in size and mass?

W) Mercury

X) Mars

Y) Earth

Z) Earth's Moon

ANSWER: Y) EARTH

TOSS-UP

14. *GENERAL SCIENCE Short Answer* What is the term for the number that provides a measure of the ability of a fuel to resist knocking when it is burnt in a spark-ignition engine?

ANSWER: OCTANE NUMBER

BONUS

14. *GENERAL SCIENCE Short Answer* What is the name for the device that provides the required starting voltage and operating current for fluorescent, mercury, and other electric discharge lamps?

ANSWER: BALLAST

TOSS-UP

15. *EARTH SCIENCE Short Answer* What broad area of air has about the same temperature and humidity throughout?

ANSWER: AIR MASS

BONUS

15. *EARTH SCIENCE Multiple Choice* All of the following are types of shoreline currents EXCEPT

- W) undertow
- X) Gulf Stream
- Y) rip current
- Z) long shore current

ANSWER: X) GULF STREAM

TOSS-UP

16. *MATH Short Answer* The independent variable in the equation $y = f(x)$ (read as y equals f of x) is

ANSWER: X

BONUS

16. *MATH Short Answer* What is the sum of the interior angles in a hexagon?

ANSWER: 720 DEGREES

TOSS-UP

17. *ASTRONOMY Multiple Choice* Where are elements heavier than iron formed?

- W) supernova explosions
- X) stars like the Sun
- Y) white dwarfs
- Z) protostars

ANSWER: W) SUPERNOVA EXPLOSIONS

BONUS

17. *ASTRONOMY Multiple Choice* Which of the following is not true for gaseous giant planets?

- W) they are the largest planets
- X) they have low densities
- Y) they are far from the Sun
- Z) they are very hot at the cloud surface

ANSWER: Z) THEY ARE VERY HOT AT THE CLOUD SURFACE

TOSS-UP

18. *GENERAL SCIENCE Short Answer* What is the common name for a device for transferring heat from a low temperature source to a high temperature region through the use of a vapor compression/expansion cycle?

ANSWER: HEAT PUMP

BONUS

18. *GENERAL SCIENCE Short Answer* What is the term for the scientific study of X-rays, radioactive materials, and other ionizing radiations for medical purposes?

ANSWER: RADIOLOGY

TOSS-UP

19. *ASTRONOMY Multiple Choice* A star's surface temperature is related to its

- W) spectral class
- X) parallax
- Y) distance
- Z) composition

ANSWER: W) SPECTRAL CLASS

BONUS

19. *ASTRONOMY Multiple Choice* Kepler determined that planets follow what types of paths around the Sun

- W) perfect circles
- X) ellipses
- Y) hyperbolas
- Z) intersecting

ANSWER: X) ELLIPSES

TOSS-UP

20. *EARTH SCIENCE Short Answer* What is the sharp boundary between two air masses called?

ANSWER: FRONT

BONUS

20. *EARTH SCIENCE Short Answer* What is the term for the place where water flows out of a stream or river and into another body of water?

ANSWER: MOUTH

TOSS-UP

21. *BIOLOGY Short Answer* In the cell, the process of transcription is followed by what process in order the manufacture a protein?

ANSWER: TRANSLATION

BONUS

21. *BIOLOGY Multiple Choice* “Dense” and “loose” are different kinds of

- W) epithelial cells
- X) muscle tissue
- Y) nerve tissue
- Z) connective tissue

ANSWER: Z) CONNECTIVE TISSUE

TOSS-UP

22. *CHEMISTRY Short Answer* How many calories does it take to warm 10 g of pure water from 90 degrees C to 100 degrees C?

ANSWER: ONE HUNDRED CALORIES

BONUS

22. *CHEMISTRY Multiple Choice* Which of the following compounds is covalent?

- W) CaCl_2
- X) MgO
- Y) PCl_3
- Z) Cs_2S

ANSWER: Y) PCl_3

TOSS-UP

23. *GENERAL SCIENCE Short Answer* A material or solution that has a pH greater than 7 is said to be:

ANSWER: ALKALINE (ALSO ACCEPT BASIC)

BONUS

23. *GENERAL SCIENCE Short Answer* What is the name for the scientific study of terrestrial or inland water before its discharge into the ocean or evaporation into the atmosphere and which has important applications such as flood control, irrigation, and hydroelectric power?

ANSWER: HYDROLOGY

TOSS-UP

24. *MATH Short Answer* In a two-dimensional system of Cartesian coordinates, the horizontal or x-coordinate of a point is called the

ANSWER: ABSCISSA

BONUS

24. *MATH Short Answer* What is the value of x at which the minimum of the function f of $x = x^2 - \frac{1}{2}$ occurs

ANSWER: 0

TOSS-UP

25. *GENERAL SCIENCE Short Answer* What is the name for the process where a lake can be negatively effected by the presence of fertilizers, leading to excessive growth of algae and subsequent depletion of oxygen content?

ANSWER: EUTROPHICATION

BONUS

25. *GENERAL SCIENCE Short Answer* What is the name for the hormone made by the human body that speeds the heart and dilates the blood vessels?

ANSWER: ADRENALINE (ACCEPT: EPINEPHRINE)

REGIONAL ROUND 7B

TOSS-UP

1. *EARTH SCIENCE Short Answer* What name is given to a crack in the rocks of the Earth's crust along which some movement has occurred?

ANSWER: FAULT

BONUS

1. *EARTH SCIENCE Multiple Choice* How are extrusive and intrusive rocks similar?

- W) both are sedimentary rocks
- X) both have coarse-grained texture
- Y) both are formed from magma
- Z) both are spewed forth from a volcano

ANSWER: Y) BOTH ARE FORMED FROM MAGMA

TOSS-UP

2. *CHEMISTRY Short Answer* When the hydroxide ion concentration equals 1×10^{-5} mol/L, what is the pH of the solution?

ANSWER: NINE

BONUS

2. *CHEMISTRY Short Answer* What is the pressure (in kilopascals) when a liquid is boiling at its normal boiling point?

ANSWER: 101 KILOPASCALS

TOSS-UP

3. *MATH Multiple Choice* Let f of $x = x + 3$ and let g of $x = 2x$. Find the value of the composite function $f \circ g$ of x when $x = 1$

- W) -5
- X) 5
- Y) 3
- Z) -3

ANSWER: X) 5

BONUS

3. *MATH Short Answer* Suppose $f(x) = (x^4 + x + 7)^{100}$, (read as: F of X equals the quantity X to the fourth plus X plus 7 end quantity to the 100th power) what is df/dx ? (read as: D F D X)

ANSWER: $100(x^4 + x + 7)^{99}(4x^3 + 1)$ (READ AS: ONE HUNDRED TIMES THE QUANTITY X TO THE FOURTH PLUS X PLUS SEVEN END QUANTITY TO THE NINETY-NINTH POWER TIMES QUANTITY FOUR X TO THE THIRD POWER PLUS ONE END QUANTITY)

TOSS-UP

4. *PHYSICS Multiple Choice* The unit for rate of energy transformation, the Watt, in an electric circuit is dimensionally equivalent to which of the following?

- W) Volt per sec
- X) Ampere Ohm
- Y) Volt Ampere
- Z) Volt per Ohm

ANSWER: Y) VOLT AMPERE

BONUS

4. *PHYSICS Multiple Choice* In a graph of displacement versus time, the slope of the line at any point

- W) is the displacement
- X) is the velocity
- Y) is the acceleration
- Z) has no physical significance

ANSWER: X) IS THE VELOCITY

TOSS-UP

5. *MATH Short Answer* A line segment connecting two points on a curve or surface is a

ANSWER: CHORD

BONUS

5. *MATH Short Answer* The following formula $\int u \, d.v. = UV - \int v \, du$ (read as: the indefinite integral $u \, d.v.$ equals uv minus the integral $v \, du$) is known as

ANSWER: INTEGRATION BY PARTS

TOSS-UP

6. *ASTRONOMY Short Answer* What gas is converted to helium and energy during the fusion process occurring within the Sun?

ANSWER: HYDROGEN

BONUS

6. *ASTRONOMY Multiple Choice* The volcanoes on Mars are

- W) stratovolcanoes
- X) shield volcanoes
- Y) cinder cones
- Z) flood basalts

ANSWER: X) SHIELD VOLCANOES

TOSS-UP

7. *PHYSICS Short Answer* What principle states that if the atmospheric pressure increases, the pressure in the fluid increases?

ANSWER: PASCAL'S PRINCIPLE

BONUS

7. *PHYSICS Multiple Choice* An object of mass M is lifted a vertical distance Y and then carried a horizontal distance X. The total work done is

W) $M(Y+X)$

X) MX

Y) MY

Z) $M(Y-X)$

ANSWER: Y) MY

TOSS-UP

8. *EARTH SCIENCE Short Answer* What is a naturally occurring inorganic solid substance with a definite chemical composition called?

ANSWER: MINERAL

BONUS

8. *EARTH SCIENCE Short Answer* Which geologist first proposed the principle of uniformitarianism?

ANSWER: JAMES HUTTON

TOSS-UP

9. *BIOLOGY Multiple Choice* The notochord is most closely associated with the

- W) nervous system
- X) spinal cord
- Y) skeletal system
- Z) skin system

ANSWER: Y) SKELETAL SYSTEM

BONUS

9. *BIOLOGY Short Answer* What term describes the likelihood that an individual with a dominant allele will show the phenotype usually associated with that genotype?

ANSWER: PENETRANCE

TOSS-UP

10. *PHYSICS Multiple Choice* When an object is dropped from a tower, what is the effect of the air resistance as it falls?

- W) does positive work
- X) increases the object's kinetic energy
- Y) increases the object's potential energy
- Z) None of the above choices are valid

ANSWER: Z) NONE OF THE ABOVE CHOICES ARE VALID

BONUS

10. *PHYSICS Multiple Choice* When the Kelvin temperature of a gas is quadrupled, what will happen to the v_{rms} ?

- W) it is halved
- X) it is doubled
- Y) it is quadrupled
- Z) it is unchanged

ANSWER: X) IT IS DOUBLED

TOSS-UP

11. *EARTH SCIENCE Multiple Choice* Which mineral is abundant in the continental crust but rare in the oceanic crust and mantle?

- W) Plagioclase
- X) Pyroxene
- Y) Quartz
- Z) Olivine

ANSWER: Y) QUARTZ

BONUS

11. *EARTH SCIENCE Multiple Choice* Which mineral accumulates the most in sand from weathering of granite?

- W) olivine
- X) pyroxene
- Y) amphibole
- Z) quartz

ANSWER: Z) QUARTZ

TOSS-UP

12. *ASTRONOMY Multiple Choice* The length of a day on Mars is

- W) 16 hours 27 minutes
- X) 24 hours 37 minutes
- Y) 31 hours 13 minutes
- Z) 37 hours 19 minutes

ANSWER: X) 24 HOURS 37 MINUTES

BONUS

12. *ASTRONOMY Multiple Choice* How many moons does Saturn have?

- W) 5
- X) 10
- Y) 18
- Z) 28

ANSWER: Y) 18

TOSS-UP

13. *CHEMISTRY Short Answer* How many different isomers are possible for a hydrocarbon with the molecular formula C_3H_8 ?

ANSWER: ONE

BONUS

13. *CHEMISTRY Short Answer* How many electrons are in the outermost shell of strontium (atomic number 38)?

ANSWER: TWO

TOSS-UP

14. *COMPUTER SCIENCE Short Answer* What is the file extension used that identifies encoded data streams that contain compressed audio and video information, using the format specified by the Moving Pictures Experts Group?

ANSWER: .MPG

BONUS

14. *COMPUTER SCIENCE Short Answer* What is the term for devices that connect networks of the same or different types and have the savvy to direct data across these networks for improved performance and efficiency?

ANSWER: ROUTERS

TOSS-UP

15. *ASTRONOMY Multiple Choice* The image in the radio part of the spectrum of radio galaxies looks like

- W) a spiral
- X) an ellipse
- Y) two lobes (a figure eight)
- Z) a disk

ANSWER: Y) TWO LOBES (A FIGURE EIGHT)

BONUS

15. *ASTRONOMY Multiple Choice* An "ephemeris" is

- W) an upright stick that casts a shadow
- X) a book of planetary positions
- Y) a map of the visible stars
- Z) a model of the Solar System

ANSWER: X) A BOOK OF PLANETARY POSITIONS

TOSS-UP

16. *CHEMISTRY Multiple Choice* Atoms are held together in compounds by

- W) chemical bonds
- X) electronegativity
- Y) lattice energy
- Z) free radicals

ANSWER: W) CHEMICAL BONDS

BONUS

16. *CHEMISTRY Multiple Choice* What types of hydrocarbons are more abundant in higher octane gasoline?

- W) highly branched hydrocarbons
- X) smaller and less massive hydrocarbons
- Y) larger and more massive hydrocarbons
- Z) hydrocarbons containing eight carbon atoms

ANSWER: W) HIGHLY BRANCHED HYDROCARBONS

TOSS-UP

17. *MATH Multiple Choice* "Strata" are groups of population units that

- W) form well defined subpopulations
- X) are selected for the study
- Y) form independent simple random samples
- Z) are relatively heterogeneous in nature

ANSWER: W) FORM WELL DEFINED SUBPOPULATIONS

BONUS

17. *MATH Multiple Choice* Using natural logarithms, the natural log of x plus the natural log of y equals,

- W) natural log of (x + y)
- X) natural log of (xy)
- Y) natural log of (x - y)
- Z) none of the above

ANSWER: X) NATURAL LOG OF (XY)

TOSS-UP

18. *COMPUTER SCIENCE Short Answer* What is the term used to describe a provisional version of a software product that is released to the public for testing through normal use and to report problems back to the programmers?

ANSWER: BETA VERSION

BONUS

18. *COMPUTER SCIENCE Short Answer* What is the acronym that describes the computer-aided design file format originally developed for use with the AutoCAD program to facilitate transfer of graphic files between applications?

ANSWER: DXF (ACCEPT: DRAWING INTERCHANGE FORMAT)

TOSS-UP

19. *ASTRONOMY Multiple Choice* Estimates of the age of the universe are generally in the range of

- W) 1 - 2 million years
- X) 1 - 2 billion years
- Y) 10 - 20 billion years
- Z) 100-200 billion years

ANSWER: Y) 10 - 20 BILLION YEARS

BONUS

19. *ASTRONOMY Multiple Choice* The planet Venus is often visible from central latitudes in the western evening sky or eastern morning sky, and does not appear to twinkle. The stars, however, do appear to twinkle. The reason or reasons that Venus does not twinkle is

- W) it shows a visible disk larger than an arc-second
- X) the angular range of light from Venus is larger than that of random atmospheric deflection
- Y) it is fairly close to us relative to the distance to the nearest stars
- Z) all of the above

ANSWER: Z) ALL OF THE ABOVE

TOSS-UP

20. *MATH Short Answer* What is the value of the natural logarithm of the quantity e^3 ?

ANSWER: 3

BONUS

20. *MATH Multiple Choice* The two major branches of statistics are

- W) populations and samples
- X) simple random and stratified random sampling
- Y) descriptive and inferential statistics
- Z) observational and experimental data

ANSWER: Y) DESCRIPTIVE AND INFERENCE STATISTICS

TOSS-UP

21. *BIOLOGY Short Answer* What enzyme joins two segments of DNA to make a single molecule?

ANSWER: DNA LIGASE

BONUS

21. *BIOLOGY Multiple Choice* Carbonic anhydrase is an enzyme found in

- W) brain cells
- X) erythrocytes
- Y) the liver
- Z) platelets

ANSWER: X) ERYTHROCYTES

TOSS-UP

22. *CHEMISTRY Short Answer* How many electrons are in the highest occupied energy level of copper?

ANSWER: ONE

BONUS

22. *CHEMISTRY Short Answer* Name the organometallic reagent in which magnesium metal inserts between an alkyl group and a halogen?

ANSWER: GRIGNARD (PRON: GRIN – YARD)

TOSS-UP

23. *PHYSICS Short Answer* An answering machine requires 12 volts of alternating current to function. Its power supply uses a transformer having a primary winding of 1800 turns to step down your house's 120 volt alternating current. How many turns are there on the secondary winding

ANSWER: 180 TURNS

BONUS

23. *PHYSICS Multiple Choice* How much work is done by a heat engine when it absorbs heat Q from a hot reservoir?

- W) Q
- X) must be less than Q
- Y) could be greater than Q
- Z) zero

ANSWER: X) MUST BE LESS THAN Q

TOSS-UP

24. *COMPUTER SCIENCE Short Answer* What is the name of the disk drive developed by Iomega that uses 3.5-inch removable disks capable of storing 100MB of data?

ANSWER: ZIP DRIVE

BONUS

24. *COMPUTER SCIENCE Multiple Choice* When describing font size, how many "points" are there per inch?

- W) 68
- X) 32
- Y) 72
- Z) 70

ANSWER: Y) 72

TOSS-UP

25. *ASTRONOMY Short Answer* What is the dark central portion of a shadow called?

ANSWER: UMBRA

BONUS

25. *ASTRONOMY Multiple Choice* The rate of cratering on the lunar highlands helps to show that:

- W) they are younger than the maria
- X) they are older than the maria
- Y) they are about 1 billion years old
- Z) they are about 2 billion years old

ANSWER: X) THEY ARE OLDER THAN THE MARIA

REGIONAL ROUND 8B

TOSS-UP

1. *CHEMISTRY Short Answer* What law states that the total pressure in a mixture of unreacting gases is equal to the sum of the partial pressures of the individual gases?

ANSWER: DALTON'S LAW

BONUS

1. *CHEMISTRY Multiple Choice* What physical property of hydrocarbons is used for fractional distillation?

- W) the molecular mass
- X) the molecular size
- Y) the viscosity
- Z) the boiling temperature

ANSWER: Z) THE BOILING TEMPERATURE

TOSS-UP

2. *ASTRONOMY Multiple Choice* The main problem with the Copernican model was

- W) it assumed the Sun was at the center of the solar system
- X) it assumed the Earth was at the center of the solar system
- Y) it was based on perfect circular motions
- Z) it was too complicated for anyone to understand

ANSWER: Y) IT WAS BASED ON PERFECT CIRCULAR MOTIONS

BONUS

2. *ASTRONOMY Multiple Choice* How many astronomical units are there between the Earth and Sun?

- W) one
- X) ten
- Y) one million
- Z) six trillion

ANSWER: W) ONE

TOSS-UP

3. *COMPUTER SCIENCE Short Answer* What is the term used to describe a logical expression that evaluates to either true or false?

ANSWER: BOOLEAN EXPRESSION

BONUS

3. *COMPUTER SCIENCE Short Answer* What is the software layer that is responsible for bringing pages from disk to main memory as needed?

ANSWER: BUFFER MANAGER

TOSS-UP

4. *EARTH SCIENCE Multiple Choice* Fossil corals found in Canada and marks left by glaciers in rocks of the Sahara are two clues to past changes in the

- W) kinds of living things
- X) climate
- Y) air
- Z) water

ANSWER: X) CLIMATE

BONUS

4. *EARTH SCIENCE Multiple Choice* Which of the following minerals is not likely to be associated with an evaporite deposit?

- W) gypsum
- X) halite
- Y) dolomite
- Z) bauxite

ANSWER: Z) BAUXITE

TOSS-UP

5. *GENERAL SCIENCE Short Answer* What is the term for a glowing electrical discharge from a metal object which has been subjected to a strong buildup of static electricity?

ANSWER: CORONA (ACCEPT: ST. ELMO'S FIRE)

BONUS

5. *GENERAL SCIENCE Short Answer* What is the name for the movement of nutrient rich bottom water to the ocean's surface?

ANSWER: UPWELLING

TOSS-UP

6. *BIOLOGY Multiple Choice* If an organism's enzymes are heated to a point where they lose their activity, they are said to be

- W) unstable
- X) denatured
- Y) motionless
- Z) all of the above

ANSWER: X) DENATURED

BONUS

6. *BIOLOGY Multiple Choice* Which of the following is NOT true of enzyme behavior?

- W) Each enzyme can catalyze a wide variety of different reactions
- X) The active site of an enzyme orients its substrate molecules, thereby promoting interaction of their reactive parts
- Y) All enzymes have an active site where substrates are temporarily bound
- Z) Enzyme shape may change during catalysis

ANSWER: W) EACH ENZYME CAN CATALYZE A WIDE VARIETY OF DIFFERENT REACTIONS

TOSS-UP

7. *CHEMISTRY Multiple Choice* A characteristic of ligands is that

- W) they are Lewis acids
- X) they are Lewis bases
- Y) they are ions
- Z) they are electron pair acceptors

ANSWER: X) THEY ARE LEWIS BASES

BONUS

7. *CHEMISTRY Multiple Choice* The compound expected when chlorine reacts with aluminum is

- W) Al_2Cl_3
- X) Al_3Cl_2
- Y) AlCl_3
- Z) Al_3Cl

ANSWER: Y) AlCl_3

TOSS-UP

8. *MATH Short Answer* Evaluate $\sin(\pi/4) + \cos(3\pi/4)$.

ANSWER: 0

BONUS

8. *MATH Short Answer* Solve the equation $|2x-1|=3$ (read: absolute value of the quantity 2x minus 1 equals 3)

ANSWER: $X=-1$ or $X=2$ (both answers are required)

TOSS-UP

9. *EARTH SCIENCE Multiple Choice* When water comes in contact with the mineral feldspar

- W) granite forms
- X) clay minerals form
- Y) carbon dioxide forms
- Z) rust forms

ANSWER: X) CLAY MINERALS FORM

BONUS

9. *EARTH SCIENCE Multiple Choice* Dinosaur tracks are examples of

- W) recrystallized fossils
- X) internal molds
- Y) trace fossils
- Z) replacement fossils

ANSWER: Y) TRACE FOSSILS

TOSS-UP

10. *COMPUTER SCIENCE Multiple Choice* Who was the inventor of the mouse?

- W) John Mauchly
- X) J.J. Fourier
- Y) Douglas Engelbart
- Z) J. Presper Eckert

ANSWER: Y) DOUGLAS ENGELBART

BONUS

10. *COMPUTER SCIENCE Multiple Choice* By typing this word at the operating system prompt, your default home page or main screen will appear.

- W) link
- X) lynx
- Y) bookmark
- Z) goto

ANSWER: X) LYNX

TOSS-UP

11. *ASTRONOMY Multiple Choice* What was one of the contributions made by Copernicus to astronomy?

- W) he discovered that the planets move around the Sun in Elliptical orbits
- X) he said that the Earth is not the center of the universe
- Y) he used a telescope to observe the heavens, thereby reinforcing the notion of heliocentricity
- Z) he made extensive and detailed observations of the positions of the planets

ANSWER: X) HE SAID THAT THE EARTH IS NOT THE CENTER OF THE UNIVERSE

BONUS

11. *ASTRONOMY Multiple Choice* The presence of a magnetic field is a good indication that

- W) a large amount of magnetic material, probably brought to Earth during a meteorite fall, is buried somewhere near the North Pole
- X) a quantity of liquid metal is swirling around in the Earth's core
- Y) the Earth is composed mostly of iron
- Z) the Earth is completely solid

ANSWER: X) A QUANTITY OF LIQUID METAL IS SWIRLING AROUND IN THE EARTH'S CORE

TOSS-UP

12. *BIOLOGY Short Answer* How many ATP molecules (net yield) are produced per molecule of glucose metabolized during glycolysis?

ANSWER: 2

BONUS

12. *BIOLOGY Short Answer* A neuron repolarizes by the outflux of what ions?

ANSWER: POTASSIUM

TOSS-UP

13. *EARTH SCIENCE Multiple Choice* "Lobe-finned" fish were important links between

- W) alligators and crocodiles
- X) snakes and snails
- Y) dinosaurs and birds
- Z) fish and amphibians

ANSWER: Z) FISH AND AMPHIBIANS

BONUS

13. *EARTH SCIENCE Multiple Choice* U-shaped valleys were shaped by the passage of

- W) glaciers
- X) running water
- Y) wind
- Z) all of the above

ANSWER: W) GLACIERS

TOSS-UP

14. *BIOLOGY Multiple Choice* The group of plants that has the most species is the

- W) mosses
- X) ferns
- Y) gymnosperms
- Z) dicots

ANSWER: Z) DICOTS

BONUS

14. *BIOLOGY Multiple Choice* The secretion of aldosterone stimulates the reabsorption of

- W) calcium
- X) sodium
- Y) potassium
- Z) iron

ANSWER: X) SODIUM

TOSS-UP

15. *PHYSICS Multiple Choice* A billiard ball collides in an elastic head- on collision with a second stationary identical ball. After the collision which of the following conditions applies to the first ball?

- W) maintains the same velocity as before
- X) has one half its initial velocity
- Y) comes to rest
- Z) moves in the opposite direction

ANSWER: Y) COMES TO REST

BONUS

15. *PHYSICS Short Answer* If the speed of an object triples, the work required to stop the car changes by a factor of what number?

ANSWER: NINE

TOSS-UP

16. *EARTH SCIENCE Multiple Choice* Erosion caused by the sandblasting effect of windblown sediments is called

- W) deflation
- X) abrasion
- Y) loess
- Z) outwash

ANSWER: X) ABRASION

BONUS

16. *EARTH SCIENCE Multiple Choice* The Cambrian fossil record includes large numbers of shelled

- W) trilobites
- X) vertebrates
- Y) reptiles
- Z) stromatolites

ANSWER: W) TRILOBITES

TOSS-UP

17. *MATH Multiple Choice* If a polynomial of degree m and a polynomial of degree n were multiplied together, and the resulting polynomial were set equal to zero, what is the maximum number of solutions this equation could have?

- W) $m + n$
- X) $m - n$
- Y) m times n
- Z) not enough information given

ANSWER: W) $M + N$

BONUS

17. *MATH Multiple Choice* For the graph of the function $f(x) = 1/x$, what does the line at $x = 0$ represent?

- W) circle
- X) hyperbola
- Y) vertical asymptote
- Z) horizontal asymptote

ANSWER: Y) VERTICAL ASYMPTOTE

TOSS-UP

18. *CHEMISTRY Multiple Choice* Compare the mass of the nucleus of an atom to the sum of the masses of the nucleons that compose the nucleus

- W) less than
- X) equal to
- Y) more than
- Z) the square of

ANSWER: W) LESS THAN

BONUS

18. *CHEMISTRY Multiple Choice* If an element of atomic number 118 is ever synthesized, it would be

- W) chemically inert
- X) a gas at room temperature
- Y) radioactive
- Z) all of the above

ANSWER: Z) ALL OF THE ABOVE

TOSS-UP

19. *EARTH SCIENCE Multiple Choice* From where does the organic matter added to soil in nature come?

- W) fertilizer
- X) minerals
- Y) coal, oil, and natural gas
- Z) the remains of plants and animals

ANSWER: Z) THE REMAINS OF PLANTS AND ANIMALS

BONUS

19. *EARTH SCIENCE Multiple Choice* Which of the following is the coldest layer of the atmosphere?

- W) troposphere
- X) mesosphere
- Y) stratosphere
- Z) thermosphere

ANSWER: X) MESOSPHERE

TOSS-UP

20. *PHYSICS Multiple Choice* Bernoulli's equation is a statement of conservation of

- W) energy for fluids of constant density
- X) momentum for fluids of constant density
- Y) mass for fluids of constant density
- Z) pressure for fluids of constant density

ANSWER: W) ENERGY FOR FLUIDS OF CONSTANT DENSITY

BONUS

20. *PHYSICS Short Answer* What is the power consumption (in amperes) of an electric iron if resistance is 5 ohms and it operates on a household circuit with a voltage of 120 Volts?

ANSWER: 24 AMPS

TOSS-UP

21. *GENERAL SCIENCE Short Answer* What is the term for a balloon mounted package with sensors and a radio that are released into the atmosphere to measure temperature, humidity, and wind?

ANSWER: RADIOSONDES

BONUS

21. *GENERAL SCIENCE Short Answer* What is the name for an apparatus used to measure the rate of water loss from a plant under natural or artificial conditions?

ANSWER: POTOMETER

TOSS-UP

22. *CHEMISTRY Short Answer* What is the general term used to describe a radioisotope that signals the presence of the species of interest?

ANSWER: TRACER

BONUS

22. *CHEMISTRY Multiple Choice* Which of the following changes will decrease the rate of collisions between gaseous molecules of type A and B in a closed container?

- W) Decrease the volume of the container
- X) Increase the temperature of the system
- Y) Add A molecules
- Z) Take away B molecules

ANSWER: Z) TAKE AWAY B MOLECULES

TOSS-UP

23. *BIOLOGY Short Answer* What does oxygen released in photosynthesis come from?

ANSWER: WATER

BONUS

23. *BIOLOGY Short Answer* The process of aerobic respiration involves electron transport and phosphorylation in which cytoplasmic organelle?

ANSWER: MITOCHONDRION

TOSS-UP

24. *COMPUTER SCIENCE Short Answer* What is the term used to describe the portion of an expert system that implements a reasoning strategy for manipulating the knowledge base?

ANSWER: INFERENCE ENGINE

BONUS

24. *COMPUTER SCIENCE Multiple Choice* What acronym describes a serial interface standard that allows for the connection of music synthesizers, musical instruments and computers?

- W) MIME
- X) MIDI
- Y) MILCON
- Z) MMX

ANSWER: X) MIDI (ACCEPT: MUSICAL INSTRUMENT DIGITAL INTERFACE)

TOSS-UP

25. *CHEMISTRY Short Answer* Which physical state of nitrogen has the highest entropy?

ANSWER: GAS

BONUS

25. *CHEMISTRY Multiple Choice* Which of the following elements is not extracted from sea water or sea water residues?

- W) potassium
- X) bromine
- Y) iodine
- Z) magnesium

ANSWER: Y) IODINE

REGIONAL ROUND 9B

TOSS-UP

1. *BIOLOGY Multiple Choice* In comparing two solutions, the solution with the higher solute concentration is termed what with respect to the other?

- W) osmotic
- X) isotonic
- Y) hypotonic
- Z) hypertonic

ANSWER: Z) HYPERTONIC

BONUS

1. *BIOLOGY Multiple Choice* The plasma of the blood is about what percent water?

- W) 0
- X) 50
- Y) 70
- Z) 90

ANSWER: Z) 90

TOSS-UP

2. *GENERAL SCIENCE Short Answer* What are the units of candlepower, or the luminous intensity of a light source?

ANSWER: CANDELAS

BONUS

2. *GENERAL SCIENCE Short Answer* What is the term used to describe the reflectivity of the earth's surface to incoming solar radiation?

ANSWER: ALBEDO

TOSS-UP

3. *PHYSICS Multiple Choice* Which of the following measurements of length is shortest?

- W) nanometer
- X) angstrom
- Y) fermi
- Z) micron

ANSWER: Y) FERMI

BONUS

3. *PHYSICS Multiple Choice* The dimensional equivalence of the quantity "momentum" in terms of the fundamental quantities (mass, length, time) is

- W) MLT^{-1}
- X) ML^2T^{-2}
- Y) MLT
- Z) MLT^{-2}

ANSWER: W) MLT^{-1}

TOSS-UP

4. *BIOLOGY Short Answer* This compound is the most likely end product of a human runner experiencing an oxygen debt in his or her muscles

ANSWER: LACTATE (ACCEPT: LACTIC ACID)

BONUS

4. *BIOLOGY Multiple Choice* Within the chloroplast, which of the following is NOT associated with the light-dependent reactions of photosynthesis

- W) ATP
- X) thylakoids
- Y) chlorophyll
- Z) stroma

ANSWER: Z) STROMA

TOSS-UP

5. *EARTH SCIENCE Multiple Choice* Sedimentary layering interrupted by erosion indicates

- W) a correlation
- X) a key bed
- Y) a trace fossil
- Z) an unconformity

ANSWER: Z) AN UNCONFORMITY

BONUS

5. *EARTH SCIENCE Multiple Choice* Bedded deposits of windblown silt are called

- W) lahars ("luh-harrs")
- X) loess ("luss")
- Y) bentonite
- Z) playas ("ply-uhs")

ANSWER: X) LOESS

TOSS-UP

6. *GENERAL SCIENCE Short Answer* What is the term for the permanent and continuing dimensional deformation of a material under a sustained load?

ANSWER: CREEP

BONUS

6. *GENERAL SCIENCE Short Answer* What is the typical spacing between wood studs in light weight wall construction?

ANSWER: SIXTEEN INCHES (ON CENTER)

TOSS-UP

7. *ASTRONOMY Multiple Choice* City lights can cause a background glow in the sky called by astronomers

- W) the dawn effect
- X) light pollution
- Y) refracted light
- Z) none of the above

ANSWER: X) LIGHT POLLUTION

BONUS

7. *ASTRONOMY Multiple Choice* In order to settle the question of the nature of spiral "nebulae," Hubble observed

- W) a supernova in a nearby spiral
- X) white dwarfs in the Magellanic Clouds
- Y) Cepheid (pron: se'-fid) variables in Andromeda
- Z) the recessional velocities of galaxies

ANSWER: Y) CEPHEID VARIABLES IN ANDROMEDA

TOSS-UP

8. *PHYSICS Multiple Choice* Which formula is dimensionally consistent with an expression yielding a value for velocity when a is acceleration, x is distance, and t is time?

- W) v/t^2
- X) vx^2
- Y) v^2/t
- Z) at

ANSWER: Z) at

BONUS

8. *PHYSICS Short Answer* In a 2-dimensional Cartesian coordinate system, the x-component of a given vector is equal to that vector's magnitude multiplied by which trigonometric function, with respect to the angle between vector and x-axis?

ANSWER: COSINE

TOSS-UP

9. *CHEMISTRY Multiple Choice* The boiling temperature of water is so much higher than that of methane because water molecules are

- W) more massive
- X) polar
- Y) composed of fewer atoms
- Z) smaller

ANSWER: X) POLAR

BONUS

9. *CHEMISTRY Short Answer* The addition of atoms to the same side of a molecule is known as

ANSWER: SYN ADDITION

TOSS-UP

10. *BIOLOGY Short Answer* What is the largest artery in the body?

ANSWER: AORTA

BONUS

10. *BIOLOGY Multiple Choice* In ecology, examples of "producers" are

- W) algae and plants
- X) algae and viruses
- Y) bacteria and viruses
- Z) fungi and plants

ANSWER: W) ALGAE AND PLANTS

TOSS-UP

11. *GENERAL SCIENCE Short Answer* What fine, inorganic, non-combustible material has been historically used as an insulation material but has been recently found to be a hazardous material?

ANSWER: ASBESTOS

BONUS

11. *GENERAL SCIENCE Multiple Choice* Overuse of groundwater can lead to

- W) saltwater intrusion
- X) subsidence
- Y) aquifer depletion
- Z) all of the above

ANSWER: Z) ALL OF THE ABOVE

TOSS-UP

12. *MATH Short Answer* How many faces are on a dodecahedron?

ANSWER: 12

BONUS

12. *MATH Multiple Choice* Find the largest value in the range of the function $f(x) = 7 - 2x$, if -1 is less than or equal to x is less than or equal to 6

- W) 7
- X) 1
- Y) 9
- Z) 6

ANSWER: Y) 9

TOSS-UP

13. *ASTRONOMY Multiple Choice* A pulsar is most probably formed

- W) in the center of a supernova explosion
- X) in the core of a star as it evolves through its main sequence phase
- Y) just after the formation of a protostar by gravitational condensation
- Z) within a huge gas cloud, by collisions between stars

ANSWER: W) IN THE CENTER OF A SUPERNOVA EXPLOSION

BONUS

13. *ASTRONOMY Short Answer* The location of the main sequence turn-off point on an H-R diagram is an indication of the cluster's what?

ANSWER: AGE

TOSS-UP

14. *BIOLOGY Short Answer* Glucose is released into the bloodstream from what organ?

ANSWER: LIVER

BONUS

14. *BIOLOGY Short Answer* What chemical released by helper T cells activate T and B cells, thus stimulating cell division?

ANSWER: INTERLEUKIN 2

TOSS-UP

15. *COMPUTER SCIENCE Multiple Choice* Who was the German mathematician who designed the first arithmetic calculating device capable of performing multiplication and division. This individual also was the first to explore the properties of binary numbering.

- W) Ada Lovelace
- X) John vonNeumann
- Y) G. W. von Leibniz
- Z) None of the above

ANSWER: Y) G. W. VON LEIBNIZ

BONUS

15. *COMPUTER SCIENCE Short Answer* What is the protocol for servers on the Internet that receive, store, and transmit e-mail and for clients on computers that connect to the servers that download and upload e-mail called?

ANSWER: POP OR POST OFFICE PROTOCOL

TOSS-UP

16. *GENERAL SCIENCE Short Answer* What is the term for the current-carrying capacity of a wire or cable?

ANSWER: AMPACITY

BONUS

16. *GENERAL SCIENCE Short Answer* What is the science of sound, including the generation, transmission, and effects of sound waves?

ANSWER: ACOUSTICS

TOSS-UP

17. *ASTRONOMY Multiple Choice* Which of the following objects has the greatest luminosity?

- W) Sun
- X) hot O-type star
- Y) white dwarf
- Z) diffuse cloud

ANSWER: X) HOT O-TYPE STAR

BONUS

17. *ASTRONOMY Multiple Choice* A lunar eclipse does not occur at every full moon because

- W) the path of the Sun is inclined at an angle of 5° C to the ecliptic
- X) the orbit of the Moon is not a perfect circle
- Y) the plane of the Moon's orbit is at an angle to the plane of the Earth's orbit
- Z) a lunar eclipse cannot occur after sunset

ANSWER: Y) THE PLANE OF THE MOON'S ORBIT IS AT AN ANGLE TO THE PLANE OF THE EARTH'S ORBIT

TOSS-UP

18. *PHYSICS Multiple Choice* In a two- body collision, if the momentum of the system is conserved, then which of the following best describes the kinetic energy after the collision?

- W) must be less
- X) must also be conserved
- Y) may also be conserved
- Z) is doubled in value

ANSWER: Y) MAY ALSO BE CONSERVED

BONUS

18. *PHYSICS Multiple Choice* Vector A points north and vector B points east. If $C = B - A$, then vector C points

- W) north of east
- X) south of east
- Y) north of west
- Z) south of west

ANSWER: X) SOUTH OF EAST

TOSS-UP

19. *MATH Short Answer* When two quantities are in inverse proportion, what is their graph called?

ANSWER: HYPERBOLA

BONUS

19. *MATH Short Answer* The derivative of the velocity of an object is

ANSWER: ACCELERATION

TOSS-UP

20. *CHEMISTRY Short Answer* The resistance of a liquid to flow is called

ANSWER: VISCOSITY

BONUS

20. *CHEMISTRY Short Answer* How many electrons are shared in a single covalent bond?

ANSWER: TWO

TOSS-UP

21. *GENERAL SCIENCE Short Answer* In degrees, what is the separation of The Tropic of Cancer and the Arctic Circle from the equator and the North Pole, respectively?

ANSWER: 23.5 DEGREES (ACCEPT 23 OR 24 DEGREES)

BONUS

21. *GENERAL SCIENCE Short Answer* The zones that compose a mature soil are known as what?

ANSWER: HORIZONS

TOSS-UP

22. *CHEMISTRY Short Answer* An ion that is present, but does not participate in an oxidation-reduction reaction is what kind of ion?

ANSWER: SPECTATOR

BONUS

22. *CHEMISTRY Short Answer* What salt is formed when a solution of NaOH is neutralized by H₂SO₄?

ANSWER: Na₂SO₄ (ACCEPT: SODIUM SULFATE)

TOSS-UP

23. *BIOLOGY Short Answer* The vascular tissue found in the center of a root is

ANSWER: XYLEM

BONUS

23. *BIOLOGY Multiple Choice* In the human heart, the inherent rhythm of the SA node is about how many beats per minute?

- W) 40
- X) 60
- Y) 80
- Z) 100

ANSWER Z) 100

TOSS-UP

24. *EARTH SCIENCE Short Answer* What is the name for a location where the elevation of the Earth has been carefully measured and marked with a small metal plate?

ANSWER: BENCHMARK

BONUS

24. *EARTH SCIENCE Multiple Choice* The lithosphere consists of

- W) the crust
- X) the mantle
- Y) the lower mantle and the upper crust
- Z) the crust and the uppermost mantle

ANSWER: Z) THE CRUST AND THE UPPERMOST MANTLE

TOSS-UP

25. *GENERAL SCIENCE Short Answer* What is the term for the rate at which temperature falls with height in the troposphere?

ANSWER: LAPSE RATE

BONUS

25. *GENERAL SCIENCE Short Answer* After what sailor and scientist was the original (and since modified) scale (0 for calm, 12 for hurricane) for winds speeds named?

ANSWER: ADMIRAL FRANCIS BEAUFORT