

ROUND 6

TOSS-UP

- 1) CHEMISTRY *Multiple Choice* Which of these elements has only one stable isotope:
- W) hydrogen
 - X) neon
 - Y) sodium
 - Z) tin

ANSWER: Y) SODIUM

BONUS

- 1) CHEMISTRY *Short Answer* The fourth principal energy level of an atom has a shell capacity of how many electrons?

ANSWER: 32

TOSS-UP

- 2) PHYSICS *Short Answer* Wolfgang Pauli is probably best known for the formulation of what principle?

ANSWER: PAULI EXCLUSION PRINCIPLE (ACCEPT: EXCLUSION PRINCIPLE)

BONUS

- 2) PHYSICS *Short Answer* What is the wavelength of a sound wave that has a frequency of 1,600 hertz and a speed in a certain medium of 320 meters per second?

ANSWER: 0.2 METERS

(Solution: $\text{wavelength} = \text{speed} / f = 320 / 1,600 = 0.2 \text{ meters}$)

TOSS-UP

- 3) BIOLOGY *Multiple Choice* Which of the following accounts for the largest increase in cancer death rate in the USA between the years 1900 and 1990:

- W) lung
- X) breast
- Y) colon
- Z) stomach

ANSWER: W) LUNG

BONUS

- 3) BIOLOGY *Short Answer* Give the respective morphological scientific names for spherical, rod and spiral shaped bacteria?

ANSWER: COCCUS, BACILLUS, SPIRILLUM

TOSS-UP

- 4) ASTRONOMY *Multiple Choice* A pulsar is:

- W) a rapidly rotating neutron star
- X) a Cepheid (Pron: SEF-ee-id) variable star
- Y) an eclipsing binary star
- Z) an RR Lyrae (Pron: LIE-ree) variable

ANSWER: W) A RAPIDLY ROTATING NEUTRON STAR

BONUS

- 4) ASTRONOMY *Short Answer* What is the name of the largest canyon system on the planet Mars?

ANSWER: VALLES MARINERIS

TOSS-UP

- 5) MATH *Short Answer* Solve the following inequality: $x + \frac{1}{3} \geq \frac{3}{4}$

ANSWER: $x \geq \frac{5}{12}$ (ACCEPT: $x \geq 0.42$)

BONUS

- 5) MATH *Short Answer* On a math test, 20 students averaged a score of 80% while the remaining 10 students averaged 90%. To the nearest whole percentage point, what is the mean score of the entire class?

ANSWER: 83% (ACCEPT: 83)

TOSS-UP

- 6) EARTH SCIENCE *Multiple Choice* On a weather map, what are the lines drawn that represent places having the same atmospheric pressure and help to predict the strength of winds:

- W) contours
- X) isotherms
- Y) isobars
- Z) isohyets

ANSWER: Y) ISOBARS

BONUS

- 6) EARTH SCIENCE *Short Answer* What is the name given to sediment, soil or bedrock, that remains continuously frozen for more than two years, and is currently found in regions of Canada, Alaska and Russia:

ANSWER: PERMAFROST

TOSS-UP

- 7) GENERAL SCIENCE *Short Answer* What are the values for standard temperature and pressure in degrees centigrade and millimeters of mercury:

ANSWER: ZERO DEGREES CENTIGRADE AND 760 MILLIMETERS OF MERCURY

BONUS

- 7) GENERAL SCIENCE *Multiple Choice* A typical drip-brewed 6-ounce cup of coffee contains about how many milligrams of caffeine:

- W) 10
- X) 50
- Y) 100
- Z) 150

ANSWER: Y) 100

TOSS-UP

- 8) COMPUTER SCIENCE *Multiple Choice* Which broadband internet service requires that the user be within 3 miles of the local telephone provider:

- W) DSL
- X) ISDN
- Y) MMDS
- Z) cable

ANSWER: W) DSL

BONUS

- 8) COMPUTER SCIENCE *Multiple Choice* Which of the following is a serial port on a PC:

- W) COM 2
- X) LPT 1
- Y) CON
- Z) USB

ANSWER: W) COM 2

TOSS-UP

- 9) CHEMISTRY *Short Answer* What is the chemical formula for Iron (II) carbonate?

ANSWER: FeCO_3

BONUS

- 9) CHEMISTRY *Short Answer* Calculate the equivalent weight in grams of H_3PO_4 , whose molar mass is 98, assuming all hydrogens react:

ANSWER: 33 (ACCEPT: 32 - 33 GRAMS)

(Solution: $\text{equiv} = 98\text{g}/3\text{equiv} = 32.7$)

TOSS-UP

- 10) PHYSICS *Short Answer* What is the most common term for the measure of opposition of a circuit to a variable electrical current?

ANSWER: IMPEDENCE

BONUS

- 10) PHYSICS *Multiple Choice* William Bragg explained that “when rays struck atoms in the rarefied gas they caused the atoms to emit...”

- W) light
- X) x rays
- Y) beta positrons
- Z) high speed electrons

ANSWER: Z) HIGH SPEED ELECTRONS

TOSS-UP

- 11) BIOLOGY *Short Answer* What is the most common name for the anaerobic degradation of glucose to lactic acid?

ANSWER: GLYCOLYSIS

BONUS

- 11) BIOLOGY *Multiple Choice* Which of the following scientists was responsible for helping to dispel the theory of spontaneous generation:

- W) Spallanzani
- X) Koch
- Y) Darwin
- Z) Hooke

ANSWER: W) SPALLANZANI

TOSS-UP

- 12) ASTRONOMY *Multiple Choice* The density of a neutron star is:

- W) about the same as that of a white dwarf
- X) about the same as that of the sun
- Y) about the same as an atomic nucleus
- Z) about the same as a water molecule

ANSWER: Y) ABOUT THE SAME AS AN ATOMIC NUCLEUS

BONUS

- 12) ASTRONOMY *Short Answer* Hot star-like objects with too little mass to initiate hydrogen fusion are most commonly known as:

ANSWER: BROWN DWARFS

TOSS-UP

13) MATH *Short Answer* If y varies directly as x , and $y = 24$ when $x = 30$, find y if $x = 40$:

ANSWER: 32

BONUS

13) MATH *Short Answer* In how many orders can 6 people be arranged around a round table?

ANSWER: 120

(Solution: $(n-1)! = (6-1)! = 5! = 120$)

TOSS-UP

14) EARTH SCIENCE *Multiple Choice* Two common igneous rocks derived from basaltic magma are:

- W) andesite and diorite
- X) basalt and diorite
- Y) rhyolite and gabbro
- Z) gabbro and basalt

ANSWER: Z) GABBRO AND BASALT

BONUS

14) EARTH SCIENCE *Multiple Choice* Which of the following is considered the principal volcanic gas:

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

ANSWER: X) WATER VAPOR

TOSS-UP

15) GENERAL SCIENCE *Multiple Choice* What type of microscope uses UV light to excite molecules to emit light of different wavelengths:

- W) transmission electron
- X) fluorescent
- Y) phase-contrast
- Z) scanning electron

ANSWER: X) FLUORESCENT

BONUS

15) GENERAL SCIENCE *Multiple choice* Which of the following is the closest current estimate for the age of the Earth:

- W) 7.0×10^9 years
- X) 5.5×10^{10} years
- Y) 4.6×10^9 years
- Z) 4.0×10^{10} years

ANSWER: Y) 4.6×10^9 YEARS

TOSS-UP

16) COMPUTER SCIENCE *Multiple Choice* If an application freezes while running in Windows 98, the default setup allows the application to be closed by pressing:

- W) Escape key
- X) Control + Escape keys
- Y) Control + Alt + Delete keys
- Z) Control + Delete keys

ANSWER: Y) CONTROL + ALT + DELETE KEYS

BONUS

16) COMPUTER SCIENCE *Short Answer* What is a measure of memory or storage capacity that is 2 to the 50th power bytes or, in decimal, approximately a thousand terabytes?

ANSWER: PETABYTE

TOSS-UP

- 17) CHEMISTRY *Short Answer* What is the general term for the amount of energy that must be supplied to break a chemical bond in an isolated molecule in the gaseous state?

ANSWER: BOND DISSOCIATION ENERGY

BONUS

- 17) CHEMISTRY *Multiple Choice* Which of the following has the highest average bond dissociation energy:

- W) $\text{C}\equiv\text{C}$ (read as: C triple bond C)
- X) $\text{N}\equiv\text{N}$ (read as: N triple bond N)
- Y) $\text{H}-\text{F}$ (read as: H single bond F)
- Z) $\text{C}=\text{O}$ (read as: C double bond O)

ANSWER: X) $\text{N}\equiv\text{N}$

(Solution: $\text{H}-\text{F} = 570$; $\text{C}=\text{O} = 732$; $\text{C}\equiv\text{C} = 835$; $\text{N}\equiv\text{N} = 945$)

TOSS-UP

- 18) PHYSICS *Short Answer* A change in velocity per change in time is most commonly known as what?

ANSWER: ACCELERATION

BONUS

- 18) PHYSICS *Short Answer* If 4 coulombs of charge pass through a conductor in half a second, what was the average current in amperes?

ANSWER: 8

TOSS-UP

19) BIOLOGY *Multiple Choice* An erythrocyte (Pron: ee-rith-row-sight) placed in a solution of 0.1% saline will:

- W) shrink
- X) lyse (Pron: lie-s)
- Y) crenate (Pron: kre-nate)
- Z) remain the same

ANSWER: X) LYSE

BONUS

19) BIOLOGY *Short Answer* What is the most common chemical messenger used in neuromuscular junctions of skeletal muscles:

ANSWER: ACETYLCHOLINE

TOSS-UP

20) ASTRONOMY *Multiple Choice* The greenhouse effect on Venus occurs because:

- W) the atmosphere contains ozone
- X) the atmosphere is rich in carbon dioxide
- Y) the atmosphere contains sulfur compounds
- Z) the atmosphere contains abundant methane

ANSWER: X) THE ATMOSPHERE IS RICH IN CARBON DIOXIDE

BONUS

20) ASTRONOMY *Short Answer* What moon of Jupiter is believed to have an ocean of liquid water beneath a frozen surface:

ANSWER: EUROPA

TOSS-UP

21) MATH *Short Answer* What is the area of a square whose diagonal is 10?

ANSWER: 50

(Solution: $A = \text{diagonal}^2 / 2; = 10^2/2; = 50$)

BONUS

21) MATH *Short Answer* To the nearest whole number, find the volume of a cone that has a diameter of 4 and a height of 10:

ANSWER: 42

(Solution: $V = 1/3 \pi r^2 h; = 1/3 (3.14)(4)(10); = 41.87$)

TOSS-UP

22) GENERAL SCIENCE *Multiple Choice* What form of energy is the gasoline that fuels an internal combustion engine considered:

- W) mechanical
- X) electrical
- Y) chemical
- Z) nuclear

ANSWER: Y) CHEMICAL

BONUS

22) GENERAL SCIENCE *Multiple Choice* Noted for its durability and resistance to chemical attack and high temperatures, which glass formula is widely employed for cooking utensils, laboratory glassware, and chemical process equipment:

- W) soda-lime
- X) potassium silicate
- Y) borosilicate
- Z) lead

ANSWER: Y) BOROSILICATE

TOSS-UP

23) CHEMISTRY *Multiple Choice* A solution at 25°C with a hydroxide ion concentration of 1×10^{-2} moles per liter is generally considered:

- W) weakly acidic
- X) strongly acidic
- Y) weakly basic
- Z) strongly basic

ANSWER: Z) STRONGLY BASIC

(Solution: pH = 12)

BONUS

23) CHEMISTRY *Short Answer* If a mixture of 2 liquids is in an open beaker, what are the maximum number of phases that can be present?

ANSWER: 3

TOSS-UP

24) PHYSICS *Short Answer* As an object falls through air in the earth's atmosphere, the velocity gradually approaches a limiting value most commonly called what?

ANSWER: TERMINAL VELOCITY

BONUS

24) PHYSICS *Short Answer* Give the corresponding SI units for indicating area, volume, and velocity respectively:

ANSWER: METERS SQUARED; METERS CUBED; AND METERS PER SECOND

TOSS-UP

25) BIOLOGY *Multiple Choice* The margin of an American Elm tree leaf would most generally be called:

- W) divided
- X) entire
- Y) dentate
- Z) lacerate

ANSWER: Y) DENTATE

BONUS

25) BIOLOGY *Multiple Choice* Which of the following genera of plants contains a species that traps and digests insects:

- W) *Cypripedium* (Pron: sip-ri-PID-ee-um)
- X) *Drosera*
- Y) *Podocarpus*
- Z) *Dicentra* (Pron: di-cen-tra)

ANSWER: X) DROSEREA