

ROUND 3

TOSS-UP

1) PHYSICS *Short Answer* What is the MOST common term for the type of energy that is most directly related to the energy of atoms, molecules and other small particles that are in random motion within a system?

ANSWER: THERMAL

BONUS

1) PHYSICS *Short Answer* In electrochemical cells, what is the most common term for the electrode that acts as the negative electrode?

ANSWER: CATHODE

TOSS-UP

2) CHEMISTRY *Short Answer* If the electronegativity difference in the bonding atoms is large, what general type of bond is formed?

ANSWER: IONIC

BONUS

2) CHEMISTRY *Multiple Choice* Which of the following molecules has a double covalent bond:

- W) hydrogen
- X) oxygen
- Y) nitrogen
- Z) methane

ANSWER: X) OXYGEN

TOSS-UP

3) BIOLOGY *Multiple Choice* Which of the following BEST describes the function of the golgi (read as: GOAL-gee) complex:

- W) metabolism of carbohydrates
- X) production of peroxides
- Y) modification and packaging of proteins for exocytosis
- Z) storage of lipids

ANSWER: Y) MODIFICATION AND PACKAGING OF PROTEINS FOR EXOCYTOSIS

BONUS

3) BIOLOGY *Short Answer* Most corticosteroids are synthesized in what specific part of the human body?

ANSWER: ADRENAL CORTEX (ACCEPT: ADRENAL GLANDS)

TOSS-UP

4) MATH *Short Answer* Simplify the following, giving your answer in proper scientific notation: $(6.0 \times 10^{12})(2.0 \times 10^{10})^2$

ANSWER: 2.4×10^{33}

BONUS

4) MATH *Short Answer* Factor the following expression completely: $81x^2 + 180xy + 100y^2$

ANSWER: $(9x + 10y)^2$

TOSS-UP

5) EARTH SCIENCE *Multiple Choice* In the oceans, waves and surf currents are generated by:

- W) wind
- X) El-Nino
- Y) salinity and temperature gradients
- Z) the Intertropical Convergence Zone

ANSWER: W) WIND

BONUS

5) EARTH SCIENCE *Short Answer* What is the name for the common ocean waves that are not driven by the wind but sustained by the energy they obtained by the sea?

ANSWER: SWELL(S)

TOSS-UP

6) GENERAL SCIENCE *Short Answer* A hexadecimal number is a numeral system with a radix or a base of what?

ANSWER: 16

BONUS

6) GENERAL SCIENCE *Short Answer* Convert a pressure of 1.2 atmospheres into millimeters mercury:

ANSWER: 912

(Solution: $1.2 \text{ atm} \times 760 \text{ mmHg}/1 \text{ atm} = 912 \text{ mmHg}$)

TOSS-UP

7) ASTRONOMY *Multiple Choice* The temperature of a star can be estimated most directly from its:

- W) distance
- X) elemental makeup
- Y) color
- Z) density

ANSWER: Y) COLOR

BONUS

7) ASTRONOMY *Short Answer* The local group is generally referred to as a collection of what celestial objects?

ANSWER: GALAXIES

TOSS-UP

8) PHYSICS *Short Answer* What is the SI unit of electric charge?

ANSWER: COULOMB

BONUS

8) PHYSICS *Short Answer* Giving your answer in kilometers per hour per second, what is the average acceleration of a truck traveling on a straight road from 10 kilometers per hour to 50 kilometers per hour in 1 minute and 20 seconds:

ANSWER: 0.5

(Solution: $40/80 = 0.5$ km/hr/sec)

TOSS-UP

9) CHEMISTRY *Short Answer* What is the name for the most malleable and ductile metal which can be dissolved in aqua regia but is unaffected by air and most other reagents?

ANSWER: GOLD

BONUS

9) CHEMISTRY *Short Answer* What is the molecular formula for the conjugate acid of the following Brønsted-Lowry base: SO_4^{2-}

ANSWER: HSO_4^-

TOSS-UP

10) BIOLOGY *Short Answer* What is the MOST common term for the division of a somatic cell into 2 nucleated cells following of mitosis?

ANSWER: CYTOKINESIS

BONUS

10) BIOLOGY *Short Answer* What is the anticodon on a tRNA for AAA (read as: A, A, A)?

ANSWER: UUU

TOSS-UP

11) MATH *Short Answer* Giving your answer as a proper fraction, what is the cube root of $\frac{125}{343}$?

ANSWER: $\frac{5}{7}$

BONUS

11) MATH *Short Answer* Find the following product, giving your answer in standard form:
 $(4x^3 + x)(7x^3 + 4x^2)$

ANSWER: $28x^6 + 16x^5 + 7x^4 + 4x^3$ (ACCEPT: $x^3(28x^3 + 16x^2 + 7x + 4)$)

TOSS-UP

12) EARTH SCIENCE *Multiple Choice* Which of the following cloud types is classified as a low cloud:

- W) altostratus
- X) cirrostratus
- Y) cumulonimbus
- Z) nimbostratus

ANSWER: Z) NIMBOSTRATUS

BONUS

12) EARTH SCIENCE *Multiple Choice* Panning is a simple mining technique that is used for extracting gold deposited in:

- W) banded gold formations
- X) evaporite deposits
- Y) placer deposits
- Z) lode deposits

ANSWER: Y) PLACER DEPOSITS

TOSS-UP

13) GENERAL SCIENCE *Short Answer* The lush forest of the Pacific northwest is classified as what type of rain forest?

ANSWER: TEMPERATE (ACCEPT: TEMPERATE RAIN FOREST)

BONUS

13) GENERAL SCIENCE *Short Answer* The reaction of lead oxide in the presence of what acid is fundamental to the operation of the lead-acid rechargeable battery found in most cars?

ANSWER: SULFURIC ACID (ACCEPT: SULFURIC or H₂SO₄)

TOSS-UP

14) ASTRONOMY *Short Answer* The stars Merak and Dubhe in the bowl of the big dipper are most commonly used to locate what star?

ANSWER: POLARIS (ACCEPT: POLE STAR; NORTH STAR; ALPHA URSA MINORIS)

BONUS

14) ASTRONOMY *Short Answer* The main asteroid belt is located immediately between what two planets?

ANSWER: MARS AND JUPITER (in any order)

TOSS-UP

15) PHYSICS *Short Answer* What is the most common term used to describe the velocity of an object at any one discrete moment along its path?

ANSWER: INSTANTANEOUS VELOCITY

BONUS

15) PHYSICS *Short Answer* What lepton was the first to be discovered?

ANSWER: ELECTRON

TOSS-UP

16) CHEMISTRY *Multiple Choice* A beaker of concentrated aqueous ammonia is placed next to a beaker of concentrated aqueous hydrochloric acid at room temperature. After a short while, a white cloud forms between the beakers. This is a demonstration of:

- W) effusion
- X) diffusion
- Y) efflorescence
- Z) effervescence

ANSWER: X) DIFFUSION

BONUS

16) CHEMISTRY *Multiple Choice* In addition to the “sniff test”, which of the following is a standard laboratory test for a sulfide, such as hydrogen sulfide gas:

- W) the gas passed over a filter paper soaked in colorless lead nitrate turns the paper brown
- X) when inserted into a flame, a glowing wooden splint bursts into flames
- Y) a flame test gives off a deep purple color
- Z) paper chromatography

ANSWER: W) THE GAS PASSED OVER A FILTER PAPER SOAKED IN COLORLESS LEAD NITRATE TURNS THE PAPER BROWN

(Solution: $\text{H}_2\text{S}_{(g)} + \text{Pb}(\text{NO}_3)_{2(aq)} \rightarrow 2\text{HNO}_3 + \text{PbS}_{(s)}$)

TOSS-UP

17) **BIOLOGY** *Multiple Choice* Which of the following would BEST describe the quaternary structure of collagen:

- W) fibrous
- X) globular
- Y) planar
- Z) transport

ANSWER: W) FIBROUS

BONUS

17) **BIOLOGY** *Multiple Choice* Which of the following BEST describes what the term virulence means:

- W) the specificity of a virus to cause disease in a certain host
- X) the ability of a microbe to cause cellular damage
- Y) any transmissible disease caused by a microbe
- Z) the degree to which a microbe causes disease or harm to its host

ANSWER: Z) THE DEGREE TO WHICH A MICROBE CAUSES DISEASE OR HARM TO ITS HOST

TOSS-UP

18) **MATH** *Multiple Choice* If triangle ABD is congruent with triangle EFG, which of the following MUST be true:

- W) side AB is congruent to side EF
- X) side AD is congruent to side FG
- Y) measure of angle B = measure of angle G
- Z) measure of angle A = measure of angle G

ANSWER: W) SIDE AB IS CONGRUENT TO SIDE EF

BONUS

18) **MATH** *Short Answer* Simplify the following rational expression by combining like terms,

assuming x is not equal to 4: $\frac{(x^2 - 16)}{(4x - x^2)}$

ANSWER: $-\frac{x+4}{x}$ (ACCEPT: $\frac{x+4}{-x}$ or $\frac{-(x+4)}{x}$ or $\frac{-x-4}{x}$)

TOSS-UP

19) EARTH SCIENCE *Multiple Choice* Which of the following best describes the luster of quartz:

- W) dull
- X) silky
- Y) metallic
- Z) vitreous

ANSWER: Z) VITREOUS

BONUS

19) EARTH SCIENCE *Multiple Choice* Which of the following is LEAST accurate regarding earthquakes:

- W) scientists agree that mega-quakes of magnitude 10 are very likely in the near future
- X) the world's greatest earthquake zone is the circum-Pacific seismic belt
- Y) Alaska has the greatest number of earthquakes in the U.S.
- Z) deep earthquakes are much less likely to be followed by aftershocks than shallow earthquakes

ANSWER: W) SCIENTISTS AGREE THAT MEGA-QUAKES OF MAGNITUDE 10 ARE LIKELY IN THE NEAR FUTURE

TOSS-UP

20) GENERAL SCIENCE *Short Answer* Identify the following 3 fabrics as derived from animals or plants, respectively: jute; linen; wool

ANSWER: JUTE = PLANTS; LINEN = PLANTS; WOOL = ANIMALS

BONUS

20) GENERAL SCIENCE *Short Answer* Rounded to the nearest whole degree, what is the obliquity of the ecliptic?

ANSWER: 23 (ACCEPT: 24)

TOSS-UP

21) ASTRONOMY *Short Answer* What is the proper name for the closest spiral galaxy to the Milky Way?

ANSWER: ANDROMEDA

BONUS

21) ASTRONOMY *Short Answer* What is the common name for the 88 sections into which the International Astronomical Society has divided the sky?

ANSWER: CONSTELLATIONS

TOSS-UP

22) PHYSICS *Short Answer* In one cycle of alternating current, 180° is given to the point at what fractional amount of the way through the cycle?

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

BONUS

22) PHYSICS *Short Answer* If the speed of sound in a certain medium is 360 meters per second, what is the wavelength, in meters, of a sound-wave that has a frequency of 60 hertz?

ANSWER: 6

(Solution: $\text{wavelength} = \text{speed}/f; = 360/60 = 6 \text{ meters}$)

TOSS-UP

23) CHEMISTRY *Multiple Choice* Which of the following is a gas that is tested for by ignition in air on contact with a lighted splint to produce a high-pitched “popping” sound:

- W) oxygen
- X) hydrogen
- Y) helium
- Z) nitrogen monoxide

ANSWER: X) HYDROGEN

BONUS

23) CHEMISTRY *Short Answer* The Lewis dot structure for the N^{+2} ion would show how many dots?

ANSWER: 3

TOSS-UP

24) BIOLOGY *Short Answer* What is the scientific term given to the shape of the *E. coli* bacterium?

ANSWER: BACILLUS (ACCEPT: ROD or BACILLI or BACILLIFORM)

BONUS

24) BIOLOGY *Short Answer* Name all of the following 4 plants that produce seeds with a fleshy covering that are eaten by animals and dispersed in their droppings: apple; orchid; cherry; sphagnum moss

ANSWER: APPLE; CHERRY

TOSS-UP

25) CHEMISTRY *Multiple Choice* Which of the following is NOT an endothermic process:

- W) sublimation
- X) melting
- Y) vaporization
- Z) condensation

ANSWER: Z) CONDENSATION

BONUS

25) CHEMISTRY *Short Answer* What is the molarity of a sodium hydroxide solution made by dissolving 4 grams NaOH in 250 milliliters of water?

ANSWER: 0.4

(Solution: $4.0 \text{ g} (1 \text{ mole} / 40 \text{ g}) = 0.1$; $0.1 \text{ moles} / 0.250 \text{ L} = 0.4 \text{ M}$ or moles/L)