

ROUND 9A

TOSS-UP

1) Life Science – *Multiple Choice* In a population of colorful parakeets, hunters often only kill the red parakeets because they are so easy to spot. What type of selection pressure does this illustrate?

- W) Directional
- X) Disruptive
- Y) Stabilizing
- Z) Bilateral

ANSWER: W) DIRECTIONAL

BONUS

1) Life Science – *Short Answer* Rank the following four structures from smallest to largest: 1) Amoeba [*ah-MEE-bah*] proteus cell; 2) Human skin cell; 3) Human X chromosome; 4) Escherichia [*eh-sher-EE-kee-ah*] coli [*KOH-lye*] cell.

ANSWER: 4, 3, 2, 1

TOSS-UP

2) Energy – *Multiple Choice* It is estimated that up to 350 billion tons of carbon dioxide could be stored around the world in un-mineable coal beds. What is the term for processes that secure carbon dioxide and prevent its emission into the atmosphere?

- W) Carbon corraling
- X) Carbon isolation
- Y) Carbon sequestration
- Z) Carbon seclusion

ANSWER: Y) CARBON SEQUESTRATION

BONUS

2) Energy – *Short Answer* Order the following three types of light bulb from least to most efficient:

- 1) LED; 2) Fluorescent; 3) Incandescent.

ANSWER: 3, 2, 1

TOSS-UP

3) Earth and Space – *Short Answer* What soil horizon contains the most humus?

ANSWER: O

BONUS

3) Earth and Space – *Multiple Choice* What group of silicates is the most abundant group of minerals in Earth's crust?

- W) Feldspars
- X) Quartzes
- Y) Zeolites
- Z) Micas

ANSWER: W) FELDSPARS

TOSS-UP

4) Math – *Short Answer* Jim brings 20 candy bars to class and divides them so that each of his classmates receives an equal share of $\frac{4}{5}$ of a bar. How many classmates does Jim have?

ANSWER: 25

BONUS

4) Math – *Short Answer* Find the coordinates of all points of intersection of the parabola with equation $y = x^2 + 7x + 10$ and the line with equation $y = -x - 6$.

ANSWER: (-4, -2)

TOSS-UP

5) Physical Science – *Multiple Choice* How would you turn carbon-12 into the isotope carbon-13?

- W) Add a neutron
- X) Add a proton
- Y) Take away an electron
- Z) Add two quarks

ANSWER: W) ADD A NEUTRON

BONUS

5) Physical Science – *Short Answer* An atom of what element is produced when an atom of krypton-81 undergoes an electron capture?

ANSWER: BROMINE

TOSS-UP

6) Math – *Multiple Choice* 4,800 meters is how many kilometers?

- W) 4.8
- X) 48
- Y) 480,000
- Z) 4,800,000

ANSWER: W) 4.8

BONUS

6) Math – *Short Answer* Maria went shopping in two stores with her birthday gift money. In the first store, she spent two-thirds of what she had plus \$3. In the second store, she spent three-fifths of what was left plus \$2. She then had \$8 left. How many dollars did she begin with?

ANSWER: 84

TOSS-UP

7) Energy – *Multiple Choice* You installed a brand new Energy Star-rated range in your kitchen, and you discover that it has an induction cooktop. Which of the following cookware materials would best function on an induction cooktop?

- W) Cast iron
- X) Anodized *[ANN-oh-dized]* aluminum
- Y) Copper
- Z) Non-magnetic stainless steel

ANSWER: W) CAST IRON

BONUS

7) Energy – *Multiple Choice* According to the US Energy Information Administration, in cents per kilowatt-hour, which of the following is closest to the average cost of electricity for an American household in 2014?

- W) 2
- X) 6
- Y) 12
- Z) 16

ANSWER: Y) 12

TOSS-UP

8) Earth and Space – *Multiple Choice* Territorial waters are defined as extending how many nautical miles from a shoreline?

- W) 7
- X) 12
- Y) 50
- Z) 65

ANSWER: X) 12

BONUS

8) Earth and Space – *Short Answer* Titan is Saturn's satellite and shares similarities with Earth. However, it may become depressing during a long-term visit, due to the fact that, rounded to a single significant figure, Titan receives what percent of the sunlight Earth receives?

ANSWER: ONE

TOSS-UP

9) Life Science – *Short Answer* Most extremophiles are placed into what biological domain?

ANSWER: ARCHAEA (ACCEPT: ARCHAEABACTERIA)

BONUS

9) Life Science – *Short Answer* Identify all of the following three characteristics that are possessed by both plants and animals: 1) Nuclear envelope; 2) Mitochondria [*my-tow-KON-dree-ah*]; 3) Chloroplasts [*KLOR-oh-plasts*].

ANSWER: 1 AND 2

TOSS-UP

10) Physical Science – *Multiple Choice* What will occur if a wave strikes a medium boundary at an angle greater than the critical angle?

- W) Refraction
- X) Diffraction
- Y) Dispersion
- Z) Reflection

ANSWER: Z) REFLECTION

BONUS

10) Physical Science – *Short Answer* Identify all of the following three particles that would be deflected by a magnetic field: 1) Electron; 2) Neutron; 3) Proton.

ANSWER: 1 AND 3

TOSS-UP

11) Energy – *Multiple Choice* Which of the following sources provides the most water for drinking and industrial purposes in the US?

- W) Fresh surface water
- X) Saline groundwater
- Y) Fresh groundwater
- Z) Oceans

ANSWER: W) FRESH SURFACE WATER

BONUS

11) Energy – *Multiple Choice* A team of physicists and engineers at DOE’s Brookhaven National Laboratory has tested a 20-ton cylindrical magnet that could form the heart of an upgraded particle detector at the Relativistic Heavy Ion Collider. Which of the following would the magnet do?

- W) Bend the trajectories of charged particles emerging from proton and ion collisions
- X) Form new ions in the collider
- Y) Heat charged particles in the collider
- Z) Cool charged particles in the collider

ANSWER: W) BEND THE TRAJECTORIES OF CHARGED PARTICLES EMERGING FROM PROTON AND ION COLLISIONS

TOSS-UP

12) Math – *Short Answer* Solve the following equation for x : open parenthesis $x - 12$ close parenthesis divided by 8 equals $\frac{1}{2}$.

ANSWER: 16

BONUS

12) Math – *Short Answer* What is the perimeter of a square having the same area as a circle of radius 6?

ANSWER: $24\sqrt{\pi}$

TOSS-UP

13) Life Science – *Short Answer* By what process do bacteria divide?

ANSWER: BINARY FISSION

BONUS

13) Life Science – *Short Answer* After a cell undergoes the process of mitosis [*my-TOW-sis*], how many daughter cells are formed?

ANSWER: TWO

TOSS-UP

14) Physical Science – *Multiple Choice* Which of the following groups of the periodic table contain nearly all of the metalloid elements?

- W) Groups 1 and 2
- X) Groups 3 through 12
- Y) Groups 13 through 16
- Z) Groups 17 and 18

ANSWER: Y) GROUPS 13 THROUGH 16

BONUS

14) Physical Science – *Short Answer* A green light looks blue when seen in the reflection from the surface of a piece of non-absorbing glass. What color does the light appear when looking through the glass?

ANSWER: YELLOW

TOSS-UP

15) Earth and Space – *Multiple Choice* Which of the following most contributes to marine pollution?

- W) Airborne emissions from land
- X) Runoff and discharge from land
- Y) Shipping and accidental spills
- Z) Ocean dumping

ANSWER: X) RUNOFF AND DISCHARGE FROM LAND

BONUS

15) Earth and Space – *Short Answer* What type of dripstone grows from the floor upward?

ANSWER: STALAGMITE

TOSS-UP

16) Physical Science – *Multiple Choice* Which of the following has the highest energy photons?

- W) Blue light
- X) Yellow light
- Y) Infrared
- Z) Microwaves

ANSWER: W) BLUE LIGHT

BONUS

16) Physical Science – *Short Answer* What is the SI unit for luminosity [*loo-min-AW-sih-tee*]?

ANSWER: CANDELA

TOSS-UP

17) Earth and Space – *Multiple Choice* What is the difference between hail and sleet?

- W) Hail forms during warm weather while sleet forms in cold weather
- X) Hail forms via freezing within a cloud, while sleet forms via freezing as precipitation falls
- Y) Hail forms within cumulonimbus clouds while sleet forms within cirrus clouds
- Z) Hail is the term for frozen raindrops larger than 0.5 millimeters, while sleet is the term for frozen raindrops less than 0.5 millimeters

ANSWER: X) HAIL FORMS VIA FREEZING WITHIN A CLOUD, WHILE SLEET FORMS VIA FREEZING AS PRECIPITATION FALLS

BONUS

17) Earth and Space – *Short Answer* The SNO experiment uses heavy water in order to detect what particles emitted by the sun?

ANSWER: NEUTRINOS

TOSS-UP

18) Math – *Short Answer* If the intercepts of a line are (0,5) and (5,0), what is the slope-intercept equation of the line?

ANSWER: $y = -x + 5$

BONUS

18) Math – *Short Answer* Find the surface area of a square pyramid with slant height 5 whose base has sides of length 6.

ANSWER: 96

TOSS-UP

19) Earth and Space – *Multiple Choice* A line of thunderstorms that can form along or ahead of a cold front is known as which of the following?

- W) Squall line
- X) Rain shield
- Y) Wake low
- Z) Line echo wave pattern

ANSWER: W) SQUALL LINE

BONUS

19) Earth and Space – *Short Answer* Identify all of the following three statements that are true of Venus and the Earth; 1) Venus and the Earth have similar densities; 2) Earth is slightly smaller in diameter than Venus; 3) Venus has slightly stronger surface gravity than the Earth.

ANSWER: 1

TOSS-UP

20) Physical Science – *Multiple Choice* A C-H bond is an example of what type of bonding?

- W) Covalent [*koh-VAY-lent*]
- X) Ionic
- Y) Hydrogen
- Z) Metallic

ANSWER: W) COVALENT

BONUS

20) Physical Science – *Short Answer* What type of reaction always has a product of carbon dioxide and water?

ANSWER: COMBUSTION

TOSS-UP

21) Life Science – *Short Answer* What is the human organ that produces the majority of peptide digestion enzymes for the small intestine?

ANSWER: PANCREAS

BONUS

21) Life Science – *Short Answer* What biochemical pathway breaks down glucose to two molecules of pyruvate [*pie-ROO-vate*]?

ANSWER: GLYCOLYSIS

TOSS-UP

22) Math – *Short Answer* What is 36% of 3?

ANSWER: 1.08 (ACCEPT: 27/25, 1 2/25)

BONUS

22) Math – *Short Answer* The average of a list of 9 numbers is 57. The average of the first 4 numbers is 53. What integer is nearest the average of the remaining 5 numbers?

ANSWER: 60

TOSS-UP

23) Life Science – *Short Answer* What organelle [*organ-ELL*] gives the "roughness" to the rough ER?

ANSWER: RIBOSOME

BONUS

23) Life Science – *Short Answer* At what specific area of the cell is rRNA transcribed?

ANSWER: NUCLEOLUS (DO NOT ACCEPT: NUCLEUS)