

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-she-EE-kee-ah*] coli [*KOH-lye*] cell.

ANSWER: 4, 3, 2, 1

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### 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

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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

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**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

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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

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**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

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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

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**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

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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

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**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

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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

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**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)