

ROUND 5A

TOSS-UP

1) Life Science – *Multiple Choice* The difference between eukaryotic and prokaryotic cells, is that prokaryotic cells lack what organelle?

- W) Cell membrane
- X) DNA
- Y) Nucleus
- Z) Ribosomes

ANSWER: Y) NUCLEUS

BONUS

1) Life Science – *Multiple Choice* Which of the following biological molecules make up the main part of the bilayer and hydrophobic region of the plasma cell membrane?

- W) Oligosaccharides
- X) Carbohydrates
- Y) Phospholipids
- Z) Proteins

ANSWER: Y) PHOSPHOLIPIDS

~~~~~

### TOSS-UP

2) Math – *Short Answer* Two to the 4th power divided by 2 to the 3rd power equals 2 to what power?

ANSWER: 1st (ACCEPT: 1)

### BONUS

2) Math – *Multiple Choice* Nick, Anna, and Sherry go on a vacation and agree to split the costs evenly. During the trip, Nick paid \$105, Anna paid \$125, and Sherry paid \$175. In order to share the costs evenly, Nick gave Sherry  $x$  dollars and Anna gave Sherry  $y$  dollars. What is  $x + y$ ?

- W) 20
- X) 30
- Y) 40
- Z) 50

ANSWER: Y) 40

### TOSS-UP

3) Physical Science – *Multiple Choice* Which of the following defines a pure substance that cannot be broken down by any chemical means?

- W) Compound
- X) Element
- Y) Solid
- Z) Solution

ANSWER: X) ELEMENT

### BONUS

3) Physical Science – *Short Answer* How many lone pairs of electrons exist in a single water molecule?

ANSWER: TWO



### TOSS-UP

4) Earth and Space – *Short Answer* In what two seasons do lakes undergo turnovers?

ANSWER: SPRING AND FALL (ACCEPT: AUTUMN IN PLACE OF FALL)

### BONUS

4) Earth and Space – *Multiple Choice* The deepest known point of the oceans is found in which of the following?

- W) Atlantic Ocean
- X) Pacific Ocean
- Y) Dead Sea
- Z) North Sea

ANSWER: X) PACIFIC OCEAN

### TOSS-UP

5) General Science – *Multiple Choice* A keystone species is:

- W) Required for maintaining the health of an ecosystem
- X) Necessary for the survival of another species
- Y) The last to go extinct after a disturbance
- Z) The hardiest species in an ecosystem

ANSWER: W) REQUIRED FOR MAINTAINING THE HEALTH OF AN ECOSYSTEM

### BONUS

5) General Science – *Multiple Choice* The property of metalloids which makes them useful in computer chips is their:

- W) Brittle structure
- X) Varying ability to conduct electricity
- Y) Somewhat reactive nature
- Z) Hardness

ANSWER: X) VARYING ABILITY TO CONDUCT ELECTRICITY



### TOSS-UP

6) Earth and Space – *Multiple Choice* Which of the following is true about spiral galaxies?

- W) They emit mainly in the ultraviolet range of energy
- X) They are usually similar to our galaxy
- Y) They originate from supernova explosions
- Z) They typically contain a few thousand stars

ANSWER: X) THEY ARE USUALLY SIMILAR TO OUR GALAXY

### BONUS

6) Earth and Space – *Multiple Choice* Which of the following stars can someone in North America see year-round?

- W) Sirius
- X) Rigel
- Y) Betelgeuse
- Z) Polaris

ANSWER: Z) POLARIS

### TOSS-UP

7) General Science – *Multiple Choice* Which of the following is a group of organic compounds that is often added to foods to enhance flavors such as strawberry or banana and are also found in sweet-smelling flowers?

- W) Amines
- X) Esters
- Y) Alcohols
- Z) Halogenated hydrocarbons

ANSWER: X) ESTERS

### BONUS

7) General Science – *Short Answer* To the nearest whole number, how many minutes does it take for the earth to rotate through one degree of longitude?

ANSWER: 4



### TOSS-UP

8) Energy – *Multiple Choice* Approximately what percent of global energy production currently comes from renewable sources?

- W) 1%
- X) 5%
- Y) 16%
- Z) 20%

ANSWER: Y) 16%

### BONUS

8) Energy – *Short Answer* What greenhouse gas is the simplest hydrocarbon?

ANSWER: METHANE

### TOSS-UP

9) Physical Science – *Multiple Choice* What is the process of comparing a property of an object to a well-defined and agreed-upon referent?

- W) Generalizing
- X) Measurement
- Y) Graphing
- Z) Scientific Investigation

ANSWER: X) MEASUREMENT

### BONUS

9) Physical Science – *Short Answer* What law or principle relates the applied force to the amount of elongation in a spring when these quantities are linearly related?

ANSWER: HOOKE'S LAW

~~~~~

TOSS-UP

10) Math – *Short Answer* You spend a total of \$21.43 at the store, but want to return an item with marked price \$5.00. If the sales tax is 7%, how much will you receive back for the item?

ANSWER: \$5.35

BONUS

10) Math – *Short Answer* From a 7-cup package, a cat eats $1\frac{3}{5}$ cups of food on Tuesday and $2\frac{3}{4}$ cups on Wednesday. How many cups are left in the package?

ANSWER: 2 and $\frac{13}{20}$ (ACCEPT: 2.65)

TOSS-UP

11) Life Science – *Short Answer* Female members of what order of animals contain pouches used to complete development of their young?

ANSWER: MARSUPIALIA

BONUS

11) Life Science – *Short Answer* What structures, composed of flexible tissue, connect two or more bones together at joints?

ANSWER: LIGAMENTS



TOSS-UP

12) General Science – *Multiple Choice* What type of map or chart is commonly used in navigation to eliminate distortion?

- W) Sextant
- X) Latitudinal Chart
- Y) North-up Map
- Z) Mercator Projection

ANSWER: Z) MERCATOR PROJECTION

BONUS

12) General Science – *Short Answer* What is the SI base unit for measuring temperature?

ANSWER: KELVIN (DO NOT ACCEPT: ANY ANSWER WITH “DEGREE” IN IT)

TOSS-UP

13) Earth and Space – *Short Answer* When a group of living organisms and non-living components in an environment interact as a system, what is the system called?

ANSWER: ECOSYSTEM

BONUS

13) Earth and Space – *Short Answer* What dark areas occur on the Sun due to intense magnetic activity?

ANSWER: SUNSPOTS



TOSS-UP

14) Life Science – *Multiple Choice* Which of the following is common to both bacteria and viruses?

- W) Metabolism
- X) Ribosomes
- Y) Nucleic acids
- Z) Cell division

ANSWER: Y) NUCLEIC ACIDS

BONUS

14) Life Science – *Short Answer* What molecule is released from muscles as a waste product, transported to the lungs in blood, and exhaled as a gas?

ANSWER: CARBON DIOXIDE (ACCEPT: CO₂)

TOSS-UP

15) Physical Science – *Multiple Choice* Under what conditions does the behavior of real gases deviate most from that predicted by the ideal gas law?

- W) Low Pressure, Low Temperature
- X) High Pressure, Low Temperature
- Y) Low Pressure, High Temperature
- Z) High Pressure, High Temperature

ANSWER: X) HIGH PRESSURE, LOW TEMPERATURE

BONUS

15) Physical Science – *Multiple Choice* A cubic meter is a measure of which of the following?

- W) Weight
- X) Mass
- Y) Distance
- Z) Volume

ANSWER: Z) VOLUME



TOSS-UP

16) Math – *Short Answer* The sum of two numbers is 16. Their difference is 2. What are the numbers?

ANSWER: 7, 9

BONUS

16) Math – *Short Answer* Given that x represents a number for which the denominator is defined, simplify the following expression completely: the fraction with numerator $x^2 + 4x + 4$ and denominator $x^2 - x - 6$.

ANSWER: $(x + 2)/(x - 3)$

TOSS-UP

17) Energy – *Short Answer* When creating electric current using steam, the electric generator is attached to what type of equipment that catches the steam to rotate the generator?

ANSWER: TURBINE

BONUS

17) Energy – *Short Answer* What type of alternative energy production relies on energy provided by the Moon rather than energy provided by the Sun?

ANSWER: TIDAL (ACCEPT: TIDAL POWER, TIDAL ENERGY)



TOSS-UP

18) Math – *Short Answer* Place the following 3 polyhedra in increasing order of the number of faces: 1) tetrahedron; 2) dodecahedron; 3) octahedron.

ANSWER: 1, 3, 2 (ACCEPT: TETRAHEDRON, OCTAHEDRON, DODECAHEDRON)

BONUS

18) Math – *Short Answer* Triangle ABC is similar to Triangle DEF. If $AB = 4$, $DE = 10$, and $EF = 15$, what is the length of BC?

ANSWER: 6

TOSS-UP

19) Earth and Space – *Multiple Choice* The region of the atmosphere closest to the Earth’s surface is the:

- W) Thermosphere
- X) Ionosphere
- Y) Troposphere
- Z) Stratosphere

ANSWER: Y) TROPOSPHERE

BONUS

19) Earth and Space – *Multiple Choice* The temperature in the stratosphere increases with altitude due to absorption of what type of radiation?

- W) Microwave
- X) Infrared
- Y) Visible
- Z) Ultraviolet

ANSWER: Z) ULTRAVIOLET

~~~~~

### TOSS-UP

20) Life Science – *Short Answer* To what class do humans belong?

ANSWER: MAMMALIA

### BONUS

20) Life Science – *Multiple Choice* Imagine that you conducted an experiment where you tested the effects of different fertilizers on plant growth over the course of one month. You have to present your data in a graph. What variable would you plot on the y-axis?

- W) Time of year
- X) Type of fertilizer
- Y) Day of experiment
- Z) Plant Height

ANSWER: Z) PLANT HEIGHT

### TOSS-UP

21) General Science – *Short Answer* How many nodes are found in a 1s orbital?

ANSWER: ZERO

### BONUS

21) General Science – *Multiple Choice* To the nearest degree, how many degrees Fahrenheit is equivalent to 283 Kelvin?

W) 25

X) 46

Y) 50

Z) 58

ANSWER: Y) 50

---

### TOSS-UP

22) Physical Science – *Short Answer* What is the term for the time required for a vibrating object to complete one full cycle?

ANSWER: PERIOD

### BONUS

22) Physical Science – *Multiple Choice* The ejection of an alpha particle from a nucleus results in which of the following?

W) An increase in the atomic number by one

X) An increase in the mass number by four

Y) A decrease in the atomic number by two

Z) A decrease in the mass number by two

ANSWER: Y) A DECREASE IN THE ATOMIC NUMBER BY TWO

### **TOSS-UP**

23) Energy – *Multiple Choice* Clean coal research is currently NOT focused on which of the following?

- W) Improving the purity of coal ore
- X) Increasing efficiency of power plants using coal
- Y) Capturing carbon generated when burning coal
- Z) Reusing carbon dioxide generated when burning coal

ANSWER: W) IMPROVING THE PURITY OF COAL ORE

### **BONUS**

23) Energy – *Multiple Choice* As an energy source, fuel cells have all of the following advantages over conventional sources except for which one?

- W) Virtually pollution free
- X) Operate very quietly
- Y) Highly efficient
- Z) Low cost

ANSWER: Z) LOW COST