ROUND 14A

TOSS-UP

1) Life Science – Short Answer
What transport proteins facilitate diffusion of water across plasma membranes in plants?

ANSWER: AQUAPORINS

BONUS

1) Life Science – Short Answer
What branch of the nervous system is responsible for “fight or flight” responses?

ANSWER: SYMPATHETIC

TOSS-UP

2) General Science – Multiple Choice
Liquefaction can happen during which natural hazard?

W) Earthquakes
X) Volcanoes
Y) Tsunamis
Z) Floods

ANSWER: W) EARTHQUAKES

BONUS

2) General Science – Multiple Choice
Kerr, Ressner-Nostrdrom, and Schwarzschild refer to solutions of which of the following set of equations?

W) Stokes law
X) Einstein field equations
Y) Poincare conjecture
Z) ABC theorem

ANSWER: X) EINSTEIN FIELD EQUATIONS
TOSS-UP

3) Math – Multiple Choice  Four daily high temperature readings in Blacksburg were 82°F, 79°F, 80°F, and 80°F. The temperature on the fifth day was 99°F. Which of the following temperature statistics was affected most by the 5th day’s temperature?

W) First quartile
X) Mean
Y) Mode
Z) Median

ANSWER: X) MEAN

BONUS

3) Math – Short Answer  How many different (that is, non-congruent) isosceles triangles that are not equilateral have the length of each side being an integer between 1 and 4 inclusive?

ANSWER: 8

TOSS-UP

4) Physical Science – Short Answer  What experiment disproved the existence of luminiferous ether?

ANSWER: MICHELSON-MORLEY EXPERIMENT

BONUS

4) Physical Science – Multiple Choice  Which of the following is a unit of pressure?

W) Newton
X) Kilogram
Y) Gram per centimeter cubed
Z) Newton per meter squared

ANSWER: Z) NEWTON PER METER SQUARED
TOSS-UP

5) Energy – Short Answer  What type of rechargeable battery, often used in cell phones and laptop computers, includes a lithium-cobalt oxide cathode and a carbon cathode?

ANSWER: LITHIUM-ION (DO NOT ACCEPT: LITHIUM)

BONUS

5) Energy – Short Answer  Of the three isotopes of uranium found in nature, which is used most commonly for energy production?


TOSS-UP

6) Earth and Space – Multiple Choice  Which of the following is a coarse-grained clastic rock that contains angular fragments?

W) Conglomerate  
X) Limestone  
Y) Breccia [breck-ee-uh]  
Z) Sandstone  

ANSWER: Y) BRECCIA

BONUS

6) Earth and Space – Short Answer  What is the name for the movement of a tectonic plate under the force of its own weight?

Answer: SLAB-PULL
TOSS-UP

7) Life Science – Short Answer  Synaptic vesicles contain what signaling molecules?

ANSWER: NEUROTRANSMITTERS

BONUS

7) Life Science – Short Answer  What phase of the cell cycle follows mitosis and is generally thought of as the time the cell performs normal, non-dividing functions?

ANSWER: INTERPHASE

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TOSS-UP

8) General Science – Short Answer  Identify all of the following three observations that are examples of qualitative data: 1) The bird flew in a zigzag motion; 2) The temperature decreased from 20 degrees Celsius to 15 degrees Celsius; 3) The population of robins hatched an average of three chicks each.

ANSWER: 1

BONUS

8) General Science – Multiple Choice  Which of the following groups on the periodic table is generally known to be unreactive?

W) Group 1
X) Group 10
Y) Group 15
Z) Group 18

ANSWER: Z) GROUP 18
TOSS-UP

9) Physical Science – Multiple Choice   A spaceship starts at rest at the origin. Later, the spaceship is at coordinate (2000 meters, 0) with a velocity of 200 meters per second in the positive x direction. If the spaceship accelerated uniformly, what was the magnitude, in meters per second squared, of its acceleration during this interval?

W) 5  
X) 10  
Y) 15  
Z) 20  

ANSWER: X) 10

BONUS

9) Physical Science – Multiple Choice   Maxwell based his theory of electromagnetic waves on the hypothesis that a changing electric field gives rise to which of the following?

W) An electric current  
X) A stream of electrons  
Y) A magnetic field  
Z) A universal constant

ANSWER: Y) A MAGNETIC FIELD

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TOSS-UP

10) Math – Multiple Choice   Two angles will necessarily be equal in measure if they are which of the following?

W) Alternate interior angles formed by a transversal  
X) Alternate exterior angles formed by a transversal  
Y) Corresponding angles formed by a transversal  
Z) Vertical angles

ANSWER: Z) VERTICAL ANGLES

BONUS

10) Math – Short Answer   To the nearest tenth, find the area of a circle that has a circumference of 4.

ANSWER: 1.3
TOSS-UP

11) Earth and Space – Short Answer  What term describes metamorphic rocks that are characterized by their layers and bands of minerals?

ANSWER: FOLIATED

BONUS

11) Earth and Space – Short Answer  The international treaties called the Montreal Protocols were agreements to ban the use of what chemicals?

ANSWER: CFCs (ALSO ACCEPT: CHLOROFLUOROCARBONS, HALOCARBONS, HFC’s, HCFC’s, OZONE-DEPLETING SUBSTANCES)

TOSS-UP

12) Energy – Multiple Choice  Which of the following engines runs using the Otto, spelled O-T-T-O, cycle?

W) Diesel engine
X) Gasoline engine
Y) Refrigerator motor
Z) Steam engine

ANSWER: X) GASOLINE ENGINE

BONUS

12) Energy – Short Answer  Identify all of the following three gases that would be reacted in the catalytic converter of an automobile: 1) Carbon monoxide; 2) Propane; 3) Nitrogen dioxide.

ANSWER: ALL OF THEM
TOSS-UP

13) Math – *Multiple Choice*  Which of the following subsets of the real numbers contains the square root of 2?

W) Integers  
X) Whole numbers  
Y) Rational numbers  
Z) Irrational numbers

ANSWER: Z) IRRATIONAL NUMBERS

BONUS

13) Math – *Short Answer*  If angle ABC is inscribed in a circle and measures 65 degrees, what is the degree measure of arc ABC?

ANSWER: 230

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TOSS-UP

14) Earth and Space – *Short Answer*  What type of stars are found at the lower left of the H-R diagram?

ANSWER: WHITE DWARF

BONUS

14) Earth and Space – *Short Answer*  Identify all of the following three planets that are Jovian: 1) Mars; 2) Neptune; 3) Earth.

ANSWER: 2
TOSS-UP

15) Physical Science – Short Answer  What ions are formed during the reaction between carbon dioxide and water?

ANSWER: HYDROGEN CARBONATE (ACCEPT BICARBONATE) AND HYDROGEN

BONUS

15) Physical Science – Short Answer  Order the following four elements from least electronegative to most electronegative: 1) carbon; 2) oxygen; 3) nitrogen; 4) fluorine.

ANSWER: CARBON, NITROGEN, OXYGEN, FLUORINE (ACCEPT: 1, 3, 2, 4)

TOSS-UP

16) General Science – Short Answer  Varicella [var-ih-sell-uh] zoster is the causative agent of which childhood disease?

ANSWER: CHICKEN POX

BONUS

16) General Science – Multiple Choice  Which two valves are located between the atria and ventricles of the heart?

W) Aortic and mitral
X) Pulmonary and aortic
Y) Mitral and tricuspid
Z) Tricuspid and pulmonary

ANSWER: Y) MITRAL AND TRICUSPID
TOSS-UP

17) Life Science – *Multiple Choice*  Pepsin is most active in the stomach due to the presence of which of the following acids?

W) Hydroiodic  
X) Sulfuric  
Y) Hydrofluoric  
Z) Hydrochloric

ANSWER: Z) HYDROCHLORIC

BONUS

17) Life Science – *Short Answer*  What cellular organelle is responsible for packaging and transporting proteins outside of the cell?

ANSWER: GOLGI BODY (ACCEPT: GOLGI APPARATUS, GOLGI, GOLGI COMPLEX)

TOSS-UP

18) Energy – *Short Answer*  Steam reforming is used to produce hydrogen from what fuel?

ANSWER: NATURAL GAS (ACCEPT: METHANE)

BONUS

18) Energy – *Short Answer*  Derricks and drilling rigs are used to mine what natural resource?

ANSWER: OIL (Accept: PETROLEUM)
TOSS-UP

19) Life Science – Short Answer  Sponges capture food particles suspended in water as it flows through their body. This type of organism is known as what type of feeder?

ANSWER: FILTER FEEDER (ACCEPT: SUSPENSION FEEDER)

BONUS

19) Life Science – Short Answer  Identify all of the following four diseases that are caused by nematodes: 1) Chagas disease; 2) Toxoplasmosis; 3) Elephantiasis; 4) Heartworm disease.

ANSWER: 3 AND 4

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TOSS-UP

20) Math – Short Answer  What is $61^2$?

ANSWER: 3721

BONUS

20) Math – Short Answer  Coach Myers bought pizza for her basketball team. She bought 8 pizzas. Each pizza contained 12 slices. Each player ate $\frac{1}{3}$ of a pizza. If there were $2\frac{1}{2}$ pizzas left, how many players were on the team?

ANSWER: 16
TOSS-UP

21) Physical Science – Short Answer  A rope inclined upward at 45 degrees pulls a suitcase horizontally across 100 meters while exerting a constant force of 20 newtons. To the nearest hundred joules, how much work does the rope do?

ANSWER: 1400

BONUS

21) Physical Science – Multiple Choice  A quantum number is not associated with an atomic electron’s:

W) Energy  
X) Mass  
Y) Spin  
Z) Angular momentum

ANSWER:  X) MASS

TOSS-UP

22) General Science – Multiple Choice  Which of the following conversions between English and metric units is exact?

W) One quart equals .946 liter  
X) One pound equals .454 kilogram  
Y) One inch equals 2.54 centimeters  
Z) One mile equals 1.61 kilometers

ANSWER: Y) ONE INCH EQUALS 2.54 CENTIMETERS

BONUS

22) General Science – Short Answer  What is the binomial scientific name of the common fruit fly?

ANSWER: DROSOPHILA MELANOGASTER
**TOSS-UP**

23) Earth and Space – *Short Answer*  
What element is the most abundant in Earth’s crust?

**ANSWER:** OXYGEN

**BONUS**

23) Earth and Space – *Short Answer*  
The measure of the level of particles such as sediment, plankton or organic by-products in a body of water is called what?

**ANSWER:** TURBIDITY