

## ROUND 5A

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### TOSS-UP

1) MATH *Multiple Choice* The sum of the measures of complementary angles is equal to which of the following?

- W) 45°
- X) 90°
- Y) 180°
- Z) 360°

ANSWER: X) 90°

### BONUS

1) MATH *Short Answer* Two hikers set off from the same point. One hikes due south for 0.7 miles, the other hikes due west for 2.4 miles. How far apart are they, in miles, when they reach these points?

ANSWER: 2.5

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### TOSS-UP

2) LIFE SCIENCE *Short Answer* In the late 1800s, who was the first person to isolate and grow numerous pathogenic monerans [*muh-NEER-uhns*]?

ANSWER: ROBERT KOCH

### BONUS

2) LIFE SCIENCE *Multiple Choice* Which of the following are generally unable to generate organic carbon from inorganic carbon?

- W) Cyanobacteria [*sy-uh-noh-bak-TEER-ee-uh*]
- X) Diatoms
- Y) Fungi
- Z) Purple-sulfur bacteria

ANSWER: Y) FUNGI

**TOSS-UP**

3) EARTH AND SPACE *Short Answer* The energy of a photon is given by Planck's constant multiplied by frequency. As wavelength decreases, what happens to the energy of a photon?

ANSWER: IT INCREASES

**BONUS**

3) EARTH AND SPACE *Multiple Choice* The principle asserting that processes operating in the present world can be used to interpret events of the past, i.e., "the present is the key to the past," is called which of the following?

- W) Catastrophism
- X) Conformity
- Y) Uniformitarianism
- Z) Plutonism

ANSWER: Y) UNIFORMITARIANISM

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**TOSS-UP**

4) GENERAL SCIENCE *Short Answer* The prime meridian is the line of what degree longitude?

ANSWER: 0 (ACCEPT: 0 DEGREES LONGITUDE)

**BONUS**

4) GENERAL SCIENCE *Multiple Choice* In the northern hemisphere, the thickest ice sheet is found in which of the following?

- W) The Arctic
- X) Canada
- Y) Iceland
- Z) Greenland

ANSWER: Z) GREENLAND

**TOSS-UP**

5) PHYSICAL SCIENCE *Multiple Choice* A space heater converts what forms of energy?

- W) Electric energy to heat energy
- X) Heat energy to electric energy
- Y) Mechanical energy to heat energy
- Z) Chemical energy to electric energy

ANSWER: W) ELECTRIC ENERGY TO HEAT ENERGY

**BONUS**

5) PHYSICAL SCIENCE *Short Answer* The specific heat of water is 1 calorie per gram Kelvin. How many thermal calories of energy must be supplied to 50 grams of water to raise it 3 Kelvin?

ANSWER: 150

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**TOSS-UP**

6) MATH *Multiple Choice* Which of the following fractions has a decimal representation that terminates?

- W)  $\frac{5}{6}$
- X)  $\frac{9}{11}$
- Y)  $\frac{5}{9}$
- Z)  $\frac{6}{15}$

ANSWER: Z)  $\frac{6}{15}$

**BONUS**

6) MATH *Short Answer* For a roll of one six-sided die numbered 1 through 6, what is the percent probability that the number will be prime?

ANSWER: 50%

### TOSS-UP

7) ENERGY *Multiple Choice* Ocean thermal energy conversion utilizes the difference in temperature between cold and warm water to produce power by which of the following?

- W) A motor
- X) A heat engine
- Y) An alternator
- Z) A generator

ANSWER: X) A HEAT ENGINE

### BONUS

7) ENERGY *Multiple Choice* Which of the following is the relationship comparing the kinetic energy of an object moving at 5 feet per second to that of the same object moving at 10 feet per second?

- W) One-fourth as much
- X) Half as much
- Y) Twice as much
- Z) Four times as much

ANSWER: W) ONE-FOURTH AS MUCH

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### TOSS-UP

8) LIFE SCIENCE *Multiple Choice* Which of the following ocean organisms is the predator of an oyster?

- W) Sea star
- X) Snail
- Y) Shark
- Z) Squid

ANSWER: W) SEA STAR

### BONUS

8) LIFE SCIENCE *Short Answer* What is the term for the general class of chemical substances within cells that help to maintain a constant intracellular pH?

ANSWER: BUFFERS

### TOSS-UP

9) EARTH AND SPACE *Multiple Choice* The city of Los Angeles is famous for its hazy “smoggy” days. Which of the following pollutants is a major contributor to smog?

- W) Carbon dioxide
- X) CFCs
- Y) Ozone
- Z) Chloromethane [*klohr-uh-METH-ayn*]

ANSWER: Y) OZONE

### BONUS

9) EARTH AND SPACE *Short Answer* By weight, what is the dominant chemical compound constituent of granites?

ANSWER: SILICON DIOXIDE (ACCEPT: SILICA, SiO<sub>2</sub>)

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### TOSS-UP

10) GENERAL SCIENCE *Multiple Choice* Which of the following is a type of rock that forms from cooling magma?

- W) Igneous [*IG-nee-uhs*]
- X) Sedimentary
- Y) Lava
- Z) Metamorphic

ANSWER: W) IGNEOUS

### BONUS

10) GENERAL SCIENCE *Short Answer* What is the electrical insulation that surrounds the axons of many neurons?

ANSWER: MYELIN (ACCEPT: MYELIN SHEATH, SHEATH)

### TOSS-UP

11) PHYSICAL SCIENCE *Short Answer* What is the term for the length of time it takes for half of a radioactive material to decay?

ANSWER: HALF-LIFE

### BONUS

11) PHYSICAL SCIENCE *Multiple Choice* Why do noble gases almost never form chemical bonds?

- W) It is difficult for gases to form bonds
- X) They have completely filled outer valence shells
- Y) They have very small atomic radii [**RAY-dee-eye**]
- Z) They are very rare

ANSWER: X) THEY HAVE COMPLETELY FILLED OUTER VALENCE SHELLS

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### TOSS-UP

12) MATH *Multiple Choice* A music player can be bought either by \$1800 cash in full, or \$800 cash as down payment and \$1100 to be paid after one year. What is the rate of interest charged in the second option?

- W) 5%
- X) 10%
- Y) 20%
- Z) 25%

ANSWER: X) 10%

### BONUS

12) MATH *Short Answer* The following five numbers represent student's scores on a math test. Find the median and mean scores: 90, 92, 80, 84, 96.

ANSWER: MEDIAN SCORE = 90, MEAN SCORE = 88.4

### TOSS-UP

13) LIFE SCIENCE *Multiple Choice* Given typical environmental abundances, which would you expect to be MOST abundant in a drop of seawater?

- W) Copepods [**KOH-puh-pods**]
- X) Diatoms [**DY-uh-tuhms**]
- Y) Bacteria
- Z) Viruses

ANSWER: Z) VIRUSES

### BONUS

13) LIFE SCIENCE *Short Answer* What two inorganic compounds are required for photosynthesis?

ANSWER: CARBON DIOXIDE (ACCEPT: CO<sub>2</sub>) AND WATER (ACCEPT: H<sub>2</sub>O)

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### TOSS-UP

14) EARTH AND SPACE *Multiple Choice* Which of the following is NOT associated with fumaroles [**FYOO-muh-rohls**]?

- W) Hot-water fountain spouting intermittently
- X) Emissions of gas fumes and steam
- Y) Vents becoming encrusted with deposits
- Z) Formation of valuable minerals

ANSWER: W) HOT-WATER FOUNTAIN SPOUTING INTERMITTENTLY

### BONUS

14) EARTH AND SPACE *Short Answer* Give the velocity, in meters per second, for a typical wave with a wavelength of 32 meters and a period of 8 seconds?

ANSWER: 4

**TOSS-UP**

15) GENERAL SCIENCE *Multiple Choice* The ability of the skin to stretch and recoil is largely due to the presence of which of the following components?

- W) Melanin
- X) Carotene
- Y) Collagen
- Z) Keratin

ANSWER: Y) COLLAGEN

**BONUS**

15) GENERAL SCIENCE *Short Answer* What group of fungi reproduces only by asexual means or has a sexual cycle that has not yet been observed?

ANSWER: FUNGI IMPERFECTI (ACCEPT: IMPERFECT FUNGI, DEUTEROMYCOTA)

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**TOSS-UP**

16) ENERGY *Multiple Choice* Which of the following is NOT an environmental concern associated with hydraulic fracturing?

- W) Overheating of land surface
- X) Contamination of local water sources
- Y) Small earthquakes
- Z) Production of wastewater

ANSWER: W) OVERHEATING OF LAND SURFACE

**BONUS**

16) ENERGY *Short Answer* What is the final output voltage if the following batteries are connected in series: 1.5 volts, 1.5 volts, 3.5 volts and 1.7 volts?

ANSWER: 8.2

**TOSS-UP**

17) PHYSICAL SCIENCE *Multiple Choice* Which of the following energy sources is considered a fossil fuel?

- W) Hydroelectric
- X) Aeroelectric
- Y) Crude oil
- Z) Solar power

ANSWER: Y) CRUDE OIL

**BONUS**

17) PHYSICAL SCIENCE *Short Answer* Identify all of the following four properties of matter that are extensive: 1) hardness, 2) weight, 3) mass, 4) density.

ANSWER: 2 AND 3 (ACCEPT: WEIGHT, MASS)

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**TOSS-UP**

18) MATH *Multiple Choice* What is the least common denominator of  $\frac{1}{8}$ ,  $\frac{4}{9}$ ,  $\frac{2}{3}$  and  $\frac{5}{2}$ ?

- W) 18
- X) 24
- Y) 72
- Z) 144

ANSWER: Y) 72

**BONUS**

18) MATH *Short Answer* Convert the following equation to slope-intercept form:  $y - 14 = 6(x - 5)$ .

ANSWER:  $y = 6x - 16$

### TOSS-UP

19) LIFE SCIENCE *Short Answer* In insects, what is the name for chemicals that can travel many miles and are capable of influencing the behavior of others in the same species?

ANSWER: PHEROMONES

### BONUS

19) LIFE SCIENCE *Multiple Choice* Hormones regulate the concentration of glucose in the blood. Which of the following hormones is properly described by its role in this regulation?

W) Insulin decreases blood glucose levels

X) Epinephrine [*e-puh-NE-fruhn*] suppresses release of glucagon [*GLOO-kuh-gon*] and insulin

Y) Thrombopoietin [*throm-boh-poi-ET-n*] destroys platelets

Z) Somatostatin [*suh-mat-uh-STAT-in*] enhances release of glucose from glycogen

ANSWER: W) INSULIN DECREASES BLOOD GLUCOSE LEVELS

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### TOSS-UP

20) ENERGY *Multiple Choice* According to the U.S. Energy Information Administration, which of the following sectors consumes the most energy in the U.S.?

W) Residential

X) Commercial

Y) Transportation

Z) Industrial

ANSWER: Z) INDUSTRIAL

### BONUS

20) ENERGY *Multiple Choice* What are the DC voltages from conventional A, AA and D cell batteries?

W) 1.5 volts, .75 volts and 3.0 volts respectively

X) 1.0 volts, 2.0 volts and 3.0 volts respectively

Y) 1.5 volts, 1.5 volts and 3.0 volts respectively

Z) All are 1.5 volts

ANSWER: Z) ALL ARE 1.5 VOLTS

### TOSS-UP

21) EARTH AND SPACE *Multiple Choice* Which of the following properties characterizes a water mass?

- W) Geographic location and salinity
- X) Salinity and temperature
- Y) Salinity and depth
- Z) Geographic location and depth

ANSWER: X) SALINITY AND TEMPERATURE

### BONUS

21) EARTH AND SPACE *Short Answer* The United States Geologic Survey has replaced the Richter scale with what scale to help better describe the energy released during large magnitude earthquakes?

ANSWER: MOMENT MAGNITUDE SCALE (ACCEPT: MMS)

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### TOSS-UP

22) GENERAL SCIENCE *Short Answer* You are a community ecologist studying the population dynamics of sea urchins on the West coast. Over time, you found that as the sea otter population increased, the sea urchin population decreased, and giant kelp increased. In this situation, the sea otters would be considered to be what kind of species in the community?

ANSWER: KEYSTONE SPECIES

### BONUS

22) GENERAL SCIENCE *Multiple Choice* What is the name given to chromosomes acquired from different parents?

- W) Related chromosomes
- X) Orthologous chromosomes **[or-THUH-loh-juhs]**
- Y) Homologous chromosomes **[huh-MOL-uh-guhs]**
- Z) Analogous chromosomes

ANSWER: Y) HOMOLOGOUS CHROMOSOMES

### TOSS-UP

23) PHYSICAL SCIENCE *Multiple Choice* For an ideal simple pendulum [**PEN-juh-luhm**], where is the position of maximum speed of the pendulum bob located?

- W) At the points corresponding to maximum displacement
- X) At the equilibrium position [**ee-kwuh-LIB-ree-uhm**]
- Y) At a point corresponding to a displacement of twice the amplitude
- Z) At the points corresponding to a displacement of one third of the amplitude

ANSWER: X) AT THE EQUILIBRIUM POSITION

### BONUS

23) PHYSICAL SCIENCE *Multiple Choice* A stone of mass  $m$  is tossed directly above to a height  $h$ . If the acceleration due to gravity is  $g$ , what is the net gravitational force acting on the stone?

- W)  $mg$
- X)  $mgh$
- Y)  $2mg$
- Z)  $mg/4$

ANSWER: W)  $mg$