

## ROUND 3A

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### TOSS-UP

1) EARTH AND SPACE *Multiple Choice* What sedimentary rock consists of angular rock fragments that are cemented together in a fine-grained cement?

- W) Sandstone
- X) Conglomerate
- Y) Till
- Z) Breccia [**BRECH-ee-uh**]

ANSWER: Z) BRECCIA

### BONUS

1) EARTH AND SPACE *Short Answer* Put the following three minerals in order of increasing hardness: 1) plagioclase [**PLAY-jee-uh-klays**], 2) corundum, 3) gypsum.

ANSWER: 3, 1, 2 (ACCEPT: GYPSUM, PLAGIOCLASE, CORUNDUM)

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### TOSS-UP

2) GENERAL SCIENCE *Multiple Choice* When two tectonic plates meet in a subduction zone and a mountain forms over time, what type of boundary does this create?

- W) Convergent
- X) Divergent
- Y) Transformative
- Z) Continental

ANSWER: W) CONVERGENT

### BONUS

2) GENERAL SCIENCE *Multiple Choice* Isotopes are atoms of an element that are different because they have a different number of which of the following?

- W) Protons
- X) Neutrons
- Y) Electrons
- Z) Nuclei [**NOO-klee-eye**]

ANSWER: X) NEUTRONS

### TOSS-UP

3) PHYSICAL SCIENCE *Multiple Choice* As a ball rolls down an inclined plane in free motion, what is the normal force acting on the ball?

- W) Equal to the ball's weight
- X) Less than the ball's weight
- Y) Greater than the ball's weight
- Z) Depends on the volume of the ball

ANSWER: X) LESS THAN THE BALL'S WEIGHT

### BONUS

3) PHYSICAL SCIENCE *Short Answer* The molecular weight of sodium is 22.99 grams per mole, and the molecular weight of chlorine is 35.45 grams per mole. What is the molecular weight in grams per mole of sodium chloride?

ANSWER: 58.44

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### TOSS-UP

4) MATH *Multiple Choice* What is the mean of the set of four numbers: 5, -5, 5, -5?

- W) -1
- X) 0
- Y) 1/5
- Z) 1

ANSWER: X) 0

### BONUS

4) MATH *Short Answer* In centimeters, how long is a sweater that is woven at a rate of 70 centimeters per hour if you start a timer when the sweater is 45 centimeters long, and you measure the entire sweater when the timer reads 3 hours?

ANSWER: 255

**TOSS-UP**

5) LIFE SCIENCE *Multiple Choice* A sea star would NOT be found in which of the following marine environments?

- W) Intertidal zone
- X) Pelagic zone
- Y) Benthic zone
- Z) Littoral zone

ANSWER: X) PELAGIC ZONE

**BONUS**

5) LIFE SCIENCE *Multiple Choice* Which of the following is NOT an illness caused by bacteria?

- W) Strep throat
- X) Toxic shock syndrome
- Y) Scarlet fever
- Z) Influenza

ANSWER: Z) INFLUENZA

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**TOSS-UP**

6) EARTH AND SPACE *Short Answer* Which of Jupiter's moons shows the most volcanic activity?

ANSWER: IO

**BONUS**

6) EARTH AND SPACE *Multiple Choice* Which of the following is NOT part of a delta?

- W) Prodelta
- X) Delta lake
- Y) Delta plain
- Z) Delta front

ANSWER: X) DELTA LAKE

**TOSS-UP**

7) ENERGY *Multiple Choice* When ingested, which of the following provides the greatest number of calories per gram?

- W) Fat
- X) Protein
- Y) Carbohydrates
- Z) Ethanol

ANSWER: W) FAT

**BONUS**

7) ENERGY *Short Answer* Where is the site of the most significant accident in the U.S. commercial nuclear energy industry?

ANSWER: THREE MILE ISLAND (ACCEPT: DAUPHIN COUNTY, PENNSYLVANIA)

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**TOSS-UP**

8) GENERAL SCIENCE *Short Answer* What is the name for the process by which plants absorb light from the Sun and convert it to chemical energy?

ANSWER: PHOTOSYNTHESIS

**BONUS**

8) GENERAL SCIENCE *Short Answer* A convex lens will cause parallel beams of light to converge. What will happen to parallel beams of light passed through a concave lens?

ANSWER: THEY DIVERGE

### TOSS-UP

9) PHYSICAL SCIENCE *Multiple Choice* An atom containing only a single proton and no electrons is which of the following?

- W) An anion [**AN-y-uhn**]
- X) A noble gas
- Y) A cation [**KAT-eye-uhn**]
- Z) A radioactive metal

ANSWER: Y) A CATION

### BONUS

9) PHYSICAL SCIENCE *Short Answer* The carbon atoms in diamond are held together by what type of bond?

ANSWER: COVALENT (ACCEPT: SIGMA)

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### TOSS-UP

10) MATH *Short Answer* What is the thousandths place digit in the decimal form of  $11/9$ ?

ANSWER: 2

### BONUS

10) MATH *Multiple Choice* The price of a certain cell phone was originally marked \$250 on Thursday. On Friday, the price was reduced by 20% and then the new price was increased by 20% on Saturday. What was the cost of the cell phone on Saturday?

- W) \$100
- X) \$120
- Y) \$240
- Z) \$250

ANSWER: Y) \$240

**TOSS-UP**

11) LIFE SCIENCE *Multiple Choice* Human epidermis is MOSTLY composed of which of the following basic animal tissue types?

- W) Epithelial [*ep-uh-THEE-lee-al*]
- X) Connective
- Y) Nervous
- Z) Muscle

ANSWER: W) EPITHELIAL

**BONUS**

11) LIFE SCIENCE *Short Answer* Which type of jawed fish can detect prey under the sand through electrical sensitivity?

ANSWER: SHARK (ACCEPT: RAY OR EEL)

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**TOSS-UP**

12) EARTH AND SPACE *Short Answer* What process is responsible for the first appearance of oxygen in our atmosphere?

ANSWER: PHOTOSYNTHESIS (ACCEPT: LIGHT DEPENDENT REACTION)

**BONUS**

12) EARTH AND SPACE *Short Answer* What two very valuable gemstones are variations of the mineral corundum?

ANSWER: RUBY AND SAPPHIRE

### TOSS-UP

13) GENERAL SCIENCE *Multiple Choice* Imagine that you are conducting an experiment to test the effects of temperature on plant height. Which of the following describes plant height in this experiment?

- W) Dependent variable
- X) Controlled variable
- Y) Independent variable
- Z) Predictor variable

ANSWER: W) DEPENDENT VARIABLE

### BONUS

13) GENERAL SCIENCE *Multiple Choice* What are the three major climatic zones?

- W) Tropical, subtropical and arctic
- X) Tropical, subarctic, and arctic
- Y) Tropical, temperate, and polar
- Z) Subtropical, tropical, and temperate

ANSWER: Y) TROPICAL, TEMPERATE, AND POLAR

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### TOSS-UP

14) ENERGY *Multiple Choice* The ultimate energy source for geothermal energy is which of the following?

- W) Radioactive decay of elements in the Earth's interior
- X) Gravitational contraction of the Earth's interior
- Y) Leftover thermal energy from the formation of the Earth's interior
- Z) Energy from earthquakes in the Earth's interior

ANSWER: W) RADIOACTIVE DECAY OF ELEMENTS IN THE EARTH'S INTERIOR

### BONUS

14) ENERGY *Short Answer* Petroleum is a non-renewable resource. What term refers to the point in the future when the maximum rate of petroleum extraction will be reached, and supplies will begin to decrease?

ANSWER: PEAK OIL

### TOSS-UP

15) PHYSICAL SCIENCE *Short Answer* If a reaction is carried out and there is no change in temperature, it would be considered what type of reaction?

ANSWER: ISOTHERMIC (ACCEPT: ISOTHERMAL)

### BONUS

15) PHYSICAL SCIENCE *Multiple Choice* During science lab, several students discovered that iodine dissolved readily in ethanol. In this case, the ethanol could be classified as which of the following?

- W) An alloy
- X) A solute
- Y) A solution
- Z) A solvent

ANSWER: Z) A SOLVENT

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### TOSS-UP

16) MATH *Short Answer* Express  $81^x$  [**81 raised to the power of x**] with a prime base.

ANSWER:  $3^{4x}$

### BONUS

16) MATH *Multiple Choice* Ignoring dimensions, the volume of a sphere of radius  $r$  is equal to how many times its surface area?

- W)  $r/3$
- X)  $r$
- Y)  $2r$
- Z)  $3r$

ANSWER: W)  $r/3$



### TOSS-UP

17) LIFE SCIENCE *Multiple Choice* Which of the following is NOT a monomer?

- W) Amino acid
- X) Glucose
- Y) Maltose
- Z) Nucleotide [**NOO-klee-uh-tyd**]

ANSWER: Y) MALTOSE

### BONUS

17) LIFE SCIENCE *Short Answer* On a sunny day, if the stomata on a plant leaf are forced to close, what two molecules, used by animals, would be prevented from leaving the leaf?

ANSWER: OXYGEN (ACCEPT: O<sub>2</sub>) AND WATER (ACCEPT: H<sub>2</sub>O)

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### TOSS-UP

18) EARTH AND SPACE *Short Answer* What is the cataclysmic event in which a star with a mass 15 times that of the Sun will end its life?

ANSWER: SUPERNOVA

### BONUS

18) EARTH AND SPACE *Multiple Choice* Which of the following is not true of seawater?

- W) Seawater is denser than fresh water
- X) The freezing point of seawater decreases as salt concentration increases
- Y) Seawater is uniformly saline throughout the world
- Z) The thermal conductivity of seawater decreases with increasing salinity

ANSWER: Y) SEAWATER IS UNIFORMLY SALINE THROUGHOUT THE WORLD

### TOSS-UP

19) GENERAL SCIENCE *Multiple Choice* What is true about lines of longitude?

- W) They are measured east or west of the prime meridian
- X) They are measured in equidistant lines
- Y) The lines run parallel to the equator
- Z) They are measured starting from the International Date Line

ANSWER: W) THEY ARE MEASURED EAST OR WEST OF THE PRIME MERIDIAN

### BONUS

19) GENERAL SCIENCE *Short Answer* What enzyme catalyzes the formation of DNA from deoxyribonucleoside [*dee-ok-si-ry-boh-NOO-klee-uh-syd*] 5'-triphosphates [*5-prime try-FOS-fayts*], using DNA as a template?

ANSWER: DNA POLYMERASE

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### TOSS-UP

20) PHYSICAL SCIENCE *Multiple Choice* When four moles of solid aluminum react with three moles of oxygen gas to form aluminum oxide, this reaction is known as which of the following types of reaction?

- W) Decomposition
- X) Synthesis
- Y) Neutralization
- Z) Displacement

ANSWER: X) SYNTHESIS

### BONUS

20) PHYSICAL SCIENCE *Multiple Choice* A man stands in front of a concave mirror with a focal length of 200 centimeters and sees an upright image of his face at twice its actual size. How far, in centimeters, is he from the mirror?

- W) 25
- X) 50
- Y) 100
- Z) 200

ANSWER: Y) 100

### TOSS-UP

21) MATH *Short Answer* What is the value of  $x$  that makes the following equation true:  
 $x = -3(x - 4)$ ?

ANSWER: 3

### BONUS

21) MATH *Short Answer* Simplify the expression  $(12a^3 b^4 c^2)^{-2}$  [**open parenthesis, 12 times a cubed times b raised to the 4<sup>th</sup> times c squared, close parenthesis, raised to the negative 2 power**].

ANSWER:  $1/(144a^6 b^8 c^4)$

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### TOSS-UP

22) ENERGY *Multiple Choice* What happens as the activation energy of a reaction increases?

- W) The reaction rate increases
- X) The reaction rate decreases
- Y) The products have lower energy
- Z) The reactants have lower energy

ANSWER: X) THE REACTION RATE DECREASES

### BONUS

22) ENERGY *Short Answer* A weight is suspended from a string. You pull back on the weight and release it. Identify all of the following three factors that will affect the period of the resulting motion: 1) acceleration of gravity, 2) length of the string, 3) mass of the weight

ANSWER: 1, 2 (ACCEPT: ACCELERATION OF GRAVITY, LENGTH OF THE STRING)

### TOSS-UP

23) LIFE SCIENCE *Multiple Choice* What environmental condition is mandatory for yeast to complete fermentation?

- W) Absence of oxygen
- X) High temperature
- Y) Low pH
- Z) High osmotic pressure

ANSWER: W) ABSENCE OF OXYGEN

### BONUS

23) LIFE SCIENCE *Multiple Choice* Which of the following is the most basic function of human eye lashes?

- W) To shade the eye from bright sun
- X) To prevent small particles from entering the eyes
- Y) To attract a mate
- Z) To help disperse tears when blinking

ANSWER: X) TO PREVENT SMALL PARTICLES FROM ENTERING THE EYES