

## ROUND 1

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### TOSS-UP

1) LIFE SCIENCE *Multiple Choice* For reasons known only to her, Susie wants her houseplant Reggie the Radish to make as much oxygen as possible. Which of the following should Susie do to increase Reggie's rate of oxygen production?

- W) Bring in more plants to reduce the levels of carbon dioxide in the room
- X) Put the plant in the corner of the room where there is less light present
- Y) Put a humidifier next to the plant
- Z) Set the thermostat to the lowest temperature possible in the room

ANSWER: Y) PUT A HUMIDIFIER NEXT TO THE PLANT

### BONUS

1) LIFE SCIENCE *Short Answer* Place the following four levels of life in order from the level that refers to the lowest number and variety of organisms to the level that refers to the highest number and variety of organisms: 1) biosphere, 2) communities, 3) ecosystems, 4) organisms.

ANSWER: 4, 2, 3, 1 (ACCEPT: ORGANISMS, COMMUNITIES, ECOSYSTEMS, BIOSPHERE)

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### TOSS-UP

2) GENERAL SCIENCE *Multiple Choice* The universe is which of the following, according to the latest theory?

- W) Continuously expanding
- X) Continuously contracting
- Y) Sometimes expanding and sometimes contracting
- Z) Staying the same size

ANSWER: W) CONTINUOUSLY EXPANDING

### BONUS

2) GENERAL SCIENCE *Short Answer* What force keeps planets and their moons in orbit?

ANSWER: GRAVITY

**TOSS-UP**

3) MATH *Short Answer* What is the slope of a line parallel to the line  $3x - y = 8$ ?

ANSWER: 3

**BONUS**

3) MATH *Multiple Choice* A class of 10 students earns the following 10 grades: 100, 80, 79, 40, 75, 90, 95, 74, 100, 100. What is the median grade?

- W) 80
- X) 83.3
- Y) 85
- Z) 90

ANSWER: Y) 85

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**TOSS-UP**

4) ENERGY *Multiple Choice* Which of the following can NOT be a direct source of energy for living organisms?

- W) Heat
- X) Sunlight
- Y) Water
- Z) Radiation

ANSWER: Y) WATER

**BONUS**

4) ENERGY *Short Answer* In a hydrogen fuel cell, the anodic reaction is hydrogen oxidation at 0.00 volts and the cathodic reaction is at 1.23 volts. What is the electric potential of the cell in volts?

ANSWER: +1.23 (ACCEPT: 1.23; DO NOT ACCEPT: -1.23)

### TOSS-UP

5) EARTH AND SPACE *Multiple Choice* Which of the following major cities is located next to a major subduction zone?

- W) London, England
- X) Victoria, Canada
- Y) Los Angeles, USA
- Z) Paris, France

ANSWER: X) VICTORIA, CANADA

### BONUS

5) EARTH AND SPACE *Short Answer* What is the name of the transform plate boundary that runs along the western edge of southern California to the Mendocino triple junction in northern California?

ANSWER: SAN ANDREAS FAULT

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### TOSS-UP

6) PHYSICAL SCIENCE *Multiple Choice* Using the International System of Units, which of the following units would be most appropriate to express force?

- W) Electron volts
- X) Watts
- Y) Newtons
- Z) Joules

ANSWER: Y) NEWTONS

### BONUS

6) PHYSICAL SCIENCE *Multiple Choice* Which of the following usually indicates a physical change?

- W) Change in odor
- X) Release of light
- Y) Formation of a gas
- Z) Change of phase

ANSWER: Z) CHANGE OF PHASE

### TOSS-UP

7) LIFE SCIENCE *Multiple Choice* Imagine you are dropped at a random place on planet Earth. You are not told where you are. However, you are told that the average temperature here is 78° Fahrenheit and that over 180 inches of rain fall here every year. In what kind of biome do you most likely find yourself?

- W) Taiga [**TY-guh**]
- X) Temperate rain forest
- Y) Tropical seasonal forest
- Z) Tropical rain forest

ANSWER: Z) TROPICAL RAIN FOREST

### BONUS

7) LIFE SCIENCE *Short Answer* Equal numbers of fruit flies, ducks, blue jays, and raccoons are each found in their own ideal environment with no natural predators. Assuming that resources are plentiful, which species will grow to have the largest population after one year?

ANSWER: FRUIT FLIES

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### TOSS-UP

8) GENERAL SCIENCE *Multiple Choice* Which of the following structures is present in plant cells but absent in animal cells?

- W) Mitochondrion [**my-tuh-KON-dree-uhn**]
- X) Cell wall
- Y) Nucleolus [**noo-KLEE-uh-luhs**]
- Z) Endoplasmic reticulum [**EN-duh-plaz-mik ri-TIK-yuh-luhm**]

ANSWER: X) CELL WALL

### BONUS

8) GENERAL SCIENCE *Short Answer* What process provides the main source of energy for a star?

ANSWER: NUCLEAR FUSION (ACCEPT: FUSION) (DO NOT ACCEPT: NUCLEAR)

### TOSS-UP

9) MATH *Multiple Choice* Which of the following statements is NOT true about the diagonals of a rectangle?

- W) They are always congruent
- X) They are always perpendicular
- Y) They always bisect each other
- Z) They intersect at one point

ANSWER: X) THEY ARE ALWAYS PERPENDICULAR

### BONUS

9) MATH *Multiple Choice* Given points A with coordinates  $(5, k)$ , B with coordinates  $(2, 0)$ , and C with coordinates  $(-2, 6)$ , what is the value of  $k$  for which the measure of angle  $ABC = 90^\circ$ ?

- W) 2
- X)  $\frac{1}{2}$
- Y) -2
- Z) -3

ANSWER: W) 2

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### TOSS-UP

10) ENERGY *Multiple Choice* Hot springs are sources of which of the following types of energy?

- W) Hydroelectric
- X) Geothermal
- Y) Solar
- Z) Fossil fuel

ANSWER: X) GEOTHERMAL

### BONUS

10) ENERGY *Multiple Choice* Which of the following factors does NOT affect solar panel performance?

- W) Panel orientation
- X) Roof slope
- Y) Energy price
- Z) Elevation

ANSWER: Y) ENERGY PRICE

### TOSS-UP

11) EARTH AND SPACE *Multiple Choice* What type of fault is associated with the Basin and Range Province of the southwestern United States?

- W) Normal
- X) Reverse
- Y) Strike-slip
- Z) Thrust

ANSWER: W) NORMAL

### BONUS

11) EARTH AND SPACE *Multiple Choice* If Yellowstone Caldera suffered a catastrophic eruption today, which of the following types of volcanic hazard is most likely to have the farthest reaching effects?

- W) Lahars
- X) Ash fall
- Y) Pyroclastic flows
- Z) Lava bombs

ANSWER: X) ASH FALL

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### TOSS-UP

12) PHYSICAL SCIENCE *Multiple Choice* Which of the following is NOT a method by which heat travels?

- W) Radiation
- X) Convection
- Y) Conduction
- Z) Convention

ANSWER: Z) CONVENTION

### BONUS

12) PHYSICAL SCIENCE *Short Answer* In order to kill microorganisms, materials can be placed under pressurized hot steam in an autoclave. If the temperature of the autoclave is 121° Celsius, what is the temperature in Kelvin to the nearest whole number?

ANSWER: 394

### TOSS-UP

13) LIFE SCIENCE *Multiple Choice* Which of the following environmental limits on population growth is density-independent?

- W) Disease
- X) Parasites
- Y) Competition
- Z) Weather

ANSWER: Z) WEATHER

### BONUS

13) LIFE SCIENCE *Multiple Choice* Cell theory, one of the most fundamental principles of modern biology, consists of three main ideas. Which of the following is NOT one of cell theory's main ideas?

- W) All organisms are composed of one or more cells
- X) Cells cause infectious disease
- Y) The cell is the basic unit of organization for organisms
- Z) All cells come from preexisting cells

ANSWER: X) CELLS CAUSE INFECTIOUS DISEASE

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### TOSS-UP

14) GENERAL SCIENCE *Multiple Choice* Coal deposits today are the remains of which of the following prehistoric organisms that have undergone carbonization?

- W) Plants
- X) Water animals
- Y) Land animals
- Z) Bacteria

ANSWER: W) PLANTS

### BONUS

14) GENERAL SCIENCE *Multiple Choice* Which of the following is true regarding mass and weight?

- W) The weight of an object determines its mass
- X) Mass and weight are independent of each other
- Y) Weight is affected by gravity; mass is not
- Z) An object's mass can vary depending on the environment, but its weight will not

ANSWER: Y) WEIGHT IS AFFECTED BY GRAVITY; MASS IS NOT

### TOSS-UP

15) MATH *Multiple Choice* Adam drove 126 miles in 2 hours and 15 minutes. What was his average speed in miles per hour?

- W) 46
- X) 56
- Y) 59
- Z) 63

ANSWER: X) 56

### BONUS

15) MATH *Short Answer* Find all real numbers that satisfy the inequality  $|3 - 2x| > 7$  [**the absolute value of the quantity 3 minus 2 x is greater than 7**].

ANSWER:  $x < -2$  OR  $x > 5$  (MUST GIVE BOTH ANSWERS)

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### TOSS-UP

16) ENERGY *Multiple Choice* If a system expends a 2 newton force over a 3 meter distance, then the energy state of the system does which of the following?

- W) Increases by 6 joules
- X) Increases by 18 joules
- Y) Decreases by 6 joules
- Z) Decreases by 18 joules

ANSWER: Y) DECREASES BY 6 JOULES

### BONUS

16) ENERGY *Multiple Choice* Electromagnetic radiation is carried by photons. The speed of photons through vacuum does which of the following?

- W) Remains constant
- X) Varies depending on the amount of energy they carry
- Y) Varies depending on their frequency
- Z) Varies depending on their temperature

ANSWER: W) REMAINS CONSTANT

**TOSS-UP**

17) EARTH AND SPACE *Short Answer* Los Angeles is located on what tectonic plate?

ANSWER: PACIFIC

**BONUS**

17) EARTH AND SPACE *Short Answer* What type of lava rock is currently erupting from the Hawaiian Island volcanic vent of Pu'u O'o [***POO-oo oh-oh***]?

ANSWER: BASALT

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**TOSS-UP**

18) PHYSICAL SCIENCE *Multiple Choice* Which of the following is the same for all electromagnetic waves traveling in a vacuum?

- W) Speed
- X) Velocity
- Y) Energy
- Z) Wavelength

ANSWER: W) SPEED

**BONUS**

18) PHYSICAL SCIENCE *Multiple Choice* A 10 kilogram block is suspended from a thick cord of negligible mass attached to the ceiling. Given that  $g$  is 10 meters per second squared, What is the force on the ceiling by the cord, in newtons?

- W) 0
- X) 1
- Y) 100
- Z) 10,000

ANSWER: Y) 100

### TOSS-UP

19) LIFE SCIENCE *Multiple Choice* What is the primary purpose of floral nectar?

- W) It is produced as a food source for the plant
- X) It is produced as a byproduct of plant metabolism
- Y) It reduces the randomness of pollination
- Z) It is used as an antibiotic to protect the plant from microbes

ANSWER: Y) IT REDUCES THE RANDOMNESS OF POLLINATION

### BONUS

19) LIFE SCIENCE *Multiple Choice* What is the greatest source of organic material that reaches the sea floor?

- W) Dissolved organic material
- X) Minerals dissolved in superheated water from hydrothermal vents
- Y) Dead and sinking phytoplankton
- Z) Dead and sinking animals

ANSWER: Y) DEAD AND SINKING PHYTOPLANKTON

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### TOSS-UP

20) GENERAL SCIENCE *Short Answer* DNA and RNA are both nucleotides **[NOO-klee-uh-tyds]**, but are built with different sugars. What sugar is found in RNA?

ANSWER: RIBOSE

### BONUS

20) GENERAL SCIENCE *Short Answer* What is the most abundant element in air?

ANSWER: NITROGEN

**TOSS-UP**

21) MATH *Multiple Choice* The first month of business for Becky's Comics produced \$1200 in sales. The second month produced \$800 in sales. To the nearest whole number percent, what was the percent decrease in sales?

- W) 33%
- X) 40%
- Y) 50%
- Z) 67%

ANSWER: W) 33%

**BONUS**

21) MATH *Short Answer* The sum of eight consecutive integers is 2012. What is the largest of these eight integers?

ANSWER: 255

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**TOSS-UP**

22) EARTH AND SPACE *Short Answer* What is the mineral form of sodium chloride, or common table salt?

ANSWER: HALITE

**BONUS**

22) EARTH AND SPACE *Short Answer* In what type of Earth's crust is gabbro most often found?

ANSWER: OCEANIC CRUST

### TOSS-UP

23) PHYSICAL SCIENCE *Multiple Choice* Which of the following is an accurate description of the liquid phase of matter?

- W) Constant volume and fixed shape
- X) Constant volume, but variable shape
- Y) Constant shape, but variable volume
- Z) Variable volume and shape

ANSWER: X) CONSTANT VOLUME, BUT VARIABLE SHAPE

### BONUS

23) PHYSICAL SCIENCE *Multiple Choice* A friend tells you that he thinks that all processes that change a substance's color are chemical changes. Which of the following processes could you use as an example of a color change that is NOT a chemical change?

- W) Dilution
- X) Tarnishing
- Y) Burning
- Z) Rusting

ANSWER: W) DILUTION

### TOSS-UP

24) LIFE SCIENCE *Short Answer* Name the molecule that adenosine diphosphate [**uh-DEN-uh-seen dy-FOS-fayt**] is converted to during the chemical processes of fermentation, anaerobic respiration, and aerobic respiration.

ANSWER: ADENOSINE TRIPHOSPHATE (ACCEPT: ATP)

### BONUS

24) LIFE SCIENCE *Multiple Choice* Which of the following is NOT a method by which speciation is known to occur?

- W) A group of similar animals moves to a new landmass with no natural predators
- X) A busy highway is built through a forest
- Y) A predator randomly selects animals from a prey population to consume
- Z) Chromosome ploidy changes during plant reproduction

ANSWER: Y) A PREDATOR RANDOMLY SELECTS ANIMALS FROM A PREY POPULATION TO CONSUME

### TOSS-UP

25) GENERAL SCIENCE *Multiple Choice* Which of the following types of rock is formed directly from magma or lava?

- W) Metamorphic
- X) Igneous
- Y) Stationary
- Z) Sedimentary

ANSWER: X) IGNEOUS

### BONUS

25) GENERAL SCIENCE *Multiple Choice* In which of the following types of rock would you expect to find fossils?

- W) Stationary
- X) Metamorphic
- Y) Igneous
- Z) Sedimentary

ANSWER: Z) SEDIMENTARY