

## ROUND 9

### TOSS-UP

1) MATH *Short Answer* Find the product of  $2^3 \times 3^2$ :

ANSWER: 72

### BONUS

1) MATH *Short Answer* Arrange the following 4 choices in INCREASING order:  
 $200^1$ ;  $5^3$ ;  $3^5$ ;  $20^2$

ANSWER:  $5^3$ ;  $200^1$ ;  $3^5$ ;  $20^2$

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### TOSS-UP

2) GENERAL SCIENCE *Multiple Choice* A blimp or airship that uses helium as its lifting gas primarily controls its buoyancy by doing which of the following:

- W) adding or removing small amounts of hydrogen gas because it is lighter than helium
- X) heating or cooling the helium gas within the outside bladder of the blimp
- Y) intaking or venting air
- Z) producing or destroying helium gas

ANSWER: Y) INTAKING OR VENTING AIR

### BONUS

2) GENERAL SCIENCE *Short Answer* Arrange the following 4 choices from the one with the LOWEST mass to the HIGHEST mass: virus; mouse spleen; mosquito; water molecule

ANSWER: WATER MOLECULE; VIRUS; MOSQUITO; MOUSE SPLEEN

### TOSS-UP

3) LIFE SCIENCE *Short Answer* What is the most common name for the junctions across which nerve cells carry chemical messages from cell to cell?

ANSWER: SYNAPSE

### BONUS

3) LIFE SCIENCE *Short Answer* What is the most common name of the part of a neuron that takes its name from the Greek word for tree, and functions to carry electrical messages from other nerve cells to the soma?

ANSWER: DENDRITE

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### TOSS-UP

4) PHYSICAL SCIENCE *Multiple Choice* A fifty-fifty solution of distilled water and pure ethanol will appear:

- W) clear
- X) cloudy
- Y) purple
- Z) heterogeneous

ANSWER: W) CLEAR

### BONUS

4) PHYSICAL SCIENCE *Multiple Choice* Which of the following chemical names is NOT correctly matched with its chemical formula:

- W)  $\text{H}_2\text{SO}_4$  and sulfuric acid
- X)  $\text{HCl}$  and hydrochloric acid
- Y)  $\text{BeCl}_2$  and boron dichloride
- Z)  $\text{SO}_2$  and sulfur dioxide

ANSWER: Y)  $\text{BeCl}_2$  AND BORON DICHLORIDE

### TOSS-UP

5) EARTH SCIENCE *Multiple Choice* Which of the following is a feature made by a continental glacier and NOT made by an alpine glacier:

- W) cirque
- X) hanging valley
- Y) truncated spur
- Z) drumlin

ANSWER: Z) DRUMLIN

### BONUS

5) EARTH SCIENCE *Short Answer* What type of moraine forms along the valley walls of an alpine glacier?

ANSWER: LATERAL (DO NOT ACCEPT ANY OTHER MORaine TYPE)

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### TOSS-UP

6) MATH *Short Answer* Evaluate  $|-x|$  (read as: the absolute value of negative  $x$ ) for  $x = -5$ :

ANSWER: 5

### BONUS

6) MATH *Short Answer* Maxine buys a stock for \$100.00 and then sells it for \$75.00. She repurchases the stock for \$125.00, and 3 months later sells it for \$200.00. What was her profit, in dollars?

ANSWER: 50

(Solution:  $-100 + 75 - 125 + 200 = \$50.00$ )

### TOSS-UP

7) GENERAL SCIENCE *Short Answer* What is the physical state of a saturated fat and a polyunsaturated fat, respectively, at room temperature, if both have 18 carbons per molecule?

ANSWER: SATURATED FAT = SOLID; UNSATURATED FAT = LIQUID

### BONUS

7) GENERAL SCIENCE *Multiple Choice* Which of the following is closest to the maximum running speed of a human:

- W) 0.3 meters per second
- X) 30 meters per second
- Y) 18 kilometers per hour
- Z) 38 kilometers per hour

ANSWER: Z) 38 KILOMETERS PER HOUR

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### TOSS-UP

8) LIFE SCIENCE *Multiple Choice* In which of the following cells would myelin most likely be found:

- W) oocyte
- X) red blood cell
- Y) neuron
- Z) skin cell

ANSWER: Y) NEURON

### BONUS

8) LIFE SCIENCE *Short Answer* Name all of the following 4 choices of eukaryotic sub-cellular structures that do NOT have their own specific membrane: chloroplast; lysosome; centriole; golgi

ANSWER: CENTRIOLE



**TOSS-UP**

9) PHYSICAL SCIENCE *Short Answer* How many times as much momentum does a truck have traveling at 40 kilometers per hour if it triples its mass?

ANSWER: 3

**BONUS**

9) PHYSICAL SCIENCE *Short Answer* Name all of the following 4 substances that will turn blue litmus paper red: citric acid; carbonated water; ammonia; sodium hydroxide

ANSWER: CITRIC ACID; CARBONATED WATER

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**TOSS-UP**

10) EARTH SCIENCE *Multiple Choice* The hard coral of coral reefs are primarily made of:

- W) basalt
- X) calcium carbonate
- Y) silicates
- Z) halite

ANSWER: X) CALCIUM CARBONATE

**BONUS**

10) EARTH SCIENCE *Multiple Choice* According to the Rock Cycle, once conglomerate sedimentary rocks are formed, the most direct pathway in the formation of sediments is by which of the following:

- W) weathering and erosion
- X) compaction and cementation
- Y) cooling and crystallization
- Z) heat and pressure

ANSWER: W) WEATHERING AND EROSION

### TOSS-UP

11) MATH *Multiple Choice* Which of the following is NOT true:

- W) a line that intersects 2 other lines at different points is called a transversal
- X) if  $a \leq 0$  (read as: if  $a$  is less than or equal to 0), then the absolute value of  $a$  equals  $a$
- Y) the square of an integer is called a perfect square
- Z) the real numbers include all rational and irrational numbers

ANSWER: X) IF  $A \leq 0$  THEN THE ABSOLUTE VALUE OF  $A$  EQUALS  $A$

### BONUS

11) MATH *Short Answer* A college student has a budget of \$600.00 per month. If at the end of a given month she spent \$350.00 and earned an extra \$150.00 in wages, how much is left in the budget at month's end?

ANSWER: \$400.00

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### TOSS-UP

12) GENERAL SCIENCE *Short Answer* What fossil fuel is the greatest fuel source for electricity generation in the world?

ANSWER: COAL

### BONUS

12) GENERAL SCIENCE *Short Answer* The acidity of a water sample with a pH of 5 is how many times as great as that of a sample with a pH of 6?

ANSWER: 10

### TOSS-UP

13) LIFE SCIENCE *Multiple Choice* What is the most important function of fiber tracheids (read as: TRAY-key-ids) in woody plants:

- W) energy storage
- X) structural support
- Y) sugary sap movement
- Z) absorption of nutrients from the soil

ANSWER: X) STRUCTURAL SUPPORT

### BONUS

13) LIFE SCIENCE *Multiple Choice* Which of the following is the smallest object that a typical student compound light microscope is able to allow a person to see:

- W) mRNA
- X) ribosomes
- Y) *E.coli*
- Z) polio virus

ANSWER: Y) *E.COLI*

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### TOSS-UP

14) PHYSICAL SCIENCE *Short Answer* According to Charles's gas law, the volume of a fixed amount of gas varies directly with what property?

ANSWER: TEMPERATURE

### BONUS

14) PHYSICAL SCIENCE *Multiple Choice* Which of the following processes is exothermic:

- W) solid water changes to water vapor
- X) solid water changes to liquid water
- Y) liquid water changes to solid water
- Z) liquid water changes to water vapor

ANSWER: Y) LIQUID WATER CHANGES TO SOLID WATER

(Solution: freezing is exothermic)

### TOSS-UP

15) EARTH SCIENCE *Multiple Choice* An igneous rock in which individual mineral grains or crystals are visible to the naked eye most likely was formed by which of the following processes:

- W) rapid cooling
- X) slow cooling
- Y) quenching
- Z) metamorphosis

ANSWER: X) SLOW COOLING

### BONUS

15) EARTH SCIENCE *Short Answer* What type of boundary exists where plates are neither produced nor destroyed, an example of which is the San Andreas fault?

ANSWER: TRANSFORM FAULT BOUNDARY (ACCEPT: TRANSFORM MARGIN or TRANSFORM)

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### TOSS-UP

16) MATH *Short Answer* By words or number, name all of the following 3 statements which are always TRUE:

- 1) the smaller angle formed by the hands of a clock at 2 o'clock is acute
- 2) two non-vertical parallel lines have the same slope
- 3) an altitude of an equilateral triangle forms two, 45°, 45°, 90° triangles

ANSWER: 1 AND 2

### BONUS

16) MATH *Short Answer* If a staple-gun misfires 5 times for every 200 shots, how many times will it be expected to misfire in 4,000 shots?

ANSWER: 100

### TOSS-UP

17) GENERAL SCIENCE *Short Answer* If a star has a mass of 10 solar masses, how many times as much mass does it have as the Sun?

ANSWER: 10

### BONUS

17) GENERAL SCIENCE *Multiple Choice* The majority of stars in the universe are thought to have surface temperatures of:

- W) about 20,000 K
- X) about 10,000 K
- Y) about 6,000 K
- Z) less than 3,500 K

ANSWER: Z) LESS THAN 3,500 K

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### TOSS-UP

18) LIFE SCIENCE *Multiple Choice* Adipose tissue stores mostly:

- W) lipid
- X) protein
- Y) starch
- Z) glycogen

ANSWER: W) LIPID

### BONUS

18) 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 (read as: oh-LEE-go-SACK-ah-rides)
- X) carbohydrates
- Y) phospholipids
- Z) proteins

ANSWER: Y) PHOSPHOLIPIDS



### TOSS-UP

19) PHYSICAL SCIENCE *Short Answer* Giving your answer in scientific notation to the second decimal place, how many molecules are in 10 moles of H<sub>2</sub>O?

ANSWER:  $6.02 \times 10^{24}$

(Solution:  $(10 \text{ mol H}_2\text{O})(6.023 \times 10^{23} \text{ molecules/mole}) = 6.023 \times 10^{24} \text{ molecules}$ )

### BONUS

19) PHYSICAL SCIENCE *Short Answer* Using proper chemical formulas, finish balancing the following equation:  $\text{N}_2 + 3\text{H}_2 \rightarrow$  what?

ANSWER:  $2\text{NH}_3$

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### TOSS-UP

20) EARTH SCIENCE *Multiple Choice* Which of the following forms of winter precipitation is most likely to cause downed power lines and broken tree limbs:

- W) freezing rain
- X) sleet
- Y) snow
- Z) hail

ANSWER: W) FREEZING RAIN

### BONUS

20) EARTH SCIENCE *Multiple Choice* Which of the following is NOT one of the 10 major cloud types:

- W) cirrus
- X) cirrocumulus
- Y) cirrostratus
- Z) cirronimbus

ANSWER: Z) CIRRONIMBUS

**TOSS-UP**

21) MATH *Short Answer* Solve the following inequality for  $x$ :  $3(x + 1) \geq 9$

ANSWER:  $x \geq 2$

**BONUS**

21) MATH *Short Answer* Evaluate the following complex fraction, giving your answer as an

improper fraction in lowest terms:  $\frac{2 - \frac{1}{7}}{1 - \frac{1}{2}}$

ANSWER:  $\frac{26}{7}$

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**TOSS-UP**

22) GENERAL SCIENCE *Short Answer* What is the name for the time zone immediately east of the Eastern Time Zone?

ANSWER: ATLANTIC TIME ZONE (ACCEPT: ATLANTIC)

**BONUS**

22) GENERAL SCIENCE *Short Answer* Ignoring boundary adjustments, most individual time zones are how many degrees of longitude apart?

ANSWER: 15

### TOSS-UP

23) LIFE SCIENCE *Multiple Choice* Keratins are considered structural proteins. This is because they are most often arranged in which of the following shapes:

- W) long, thin fibers
- X) spherical and smooth
- Y) short and irregular
- Z) small, irregular, and hydrophilic

ANSWER: W) LONG THIN FIBERS

### BONUS

23) LIFE SCIENCE *Short Answer* Name all of the following 4 molecules that are storage forms of glucose: starch; wax; glycogen; maltose

ANSWER: STARCH; GLYCOGEN

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### TOSS-UP

24) PHYSICAL SCIENCE *Short Answer* What is the name of the particle that carries the electromagnetic force?

ANSWER: PHOTON

### BONUS

24) PHYSICAL SCIENCE *Short Answer* If a wave has a frequency of 2,000 hertz, what is its period, in seconds?

ANSWER: 0.0005 (ACCEPT:  $5 \times 10^{-4}$ )

(Solution: period =  $1/f$ )

### TOSS-UP

25) EARTH SCIENCE *Multiple Choice* Which of the following is indicated by the following forecast: “A front moves through New England Monday with a few showers. Chillier air moves in behind the front gradually changing to lake-effect snows, followed by clear skies on Tuesday”:

- W) cold front
- X) warm front
- Y) stationary front
- Z) inverted front

ANSWER: W) COLD FRONT

### BONUS

25) EARTH SCIENCE *Multiple Choice* Which of the following is CLOSEST to the estimate of how many million years ago the first bacteria appeared on Earth:

- W) 65
- X) 280
- Y) 1,500
- Z) 3,800

ANSWER: Z) 3,800