

## ROUND 8A

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### TOSS-UP

1) EARTH AND SPACE *Multiple Choice* Compressive forces that result in brittle deformation yield what formation?

- W) Normal faults
- X) Reverse faults
- Y) Synclines [**SIN-klyns**]
- Z) Grabens [**GRAH-buhns**]

ANSWER: X) REVERSE FAULTS

### BONUS

1) EARTH AND SPACE *Short Answer* In which constellation is the nearest major galaxy, M31?

ANSWER: ANDROMEDA

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### TOSS-UP

2) GENERAL SCIENCE *Multiple Choice* Why is coal a non-renewable fuel source?

- W) It is formed from ancient fossilized biomass
- X) It is expensive
- Y) It releases carbon dioxide into the atmosphere
- Z) It is used faster than it is formed

ANSWER: Z) IT IS USED FASTER THAN IT IS FORMED

### BONUS

2) GENERAL SCIENCE *Short Answer* Unlike prokaryotic [**proh-KAR-ee-oh-tik**] cells, the cytoplasm [**SY-tuh-plaz-uhm**] of eukaryotic [**yoo-KAR-ee-oh-tik**] cells is filled with a variety of membrane bound structures that enable the cell to function properly. What is the name for this group of structures?

ANSWER: ORGANELLES

### TOSS-UP

3) PHYSICAL SCIENCE *Multiple Choice* The combination of two deuterium [**doo-TEER-ee-uhm**] atoms to form a single helium atom is known as which of the following?

- W) Alpha decay
- X) Beta decay
- Y) Nuclear fission
- Z) Nuclear fusion

ANSWER: Z) NUCLEAR FUSION

### BONUS

3) PHYSICAL SCIENCE *Multiple Choice* On the periodic table, potassium is in what family?

- W) Halogen
- X) Alkali metal
- Y) Alkaline earth metal
- Z) Chalcogen [**KAL-kuh-juhn**]

ANSWER: X) ALKALI METAL

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### TOSS-UP

4) MATH *Short Answer* After 3 tests, a student has an average score of 80%. What does the student need to score on a fourth test to increase the average score to exactly 84%?

ANSWER: 96% (ACCEPT: 96)

### BONUS

4) MATH *Multiple Choice* If  $a$ ,  $b$  and  $c$  are numbers such that  $a/b = 3$  [**a over b equals 3**] and  $b/c = 7$  [**b over c equals 7**] then  $(a+b)/(b+c)$  [**the quantity a plus b over the quantity b plus c**] is equal to which of the following?

- W)  $7/2$  [**seven halves**]
- X)  $7/8$  [**seven-eighths**]
- Y)  $3/7$  [**three-sevenths**]
- Z)  $1/7$  [**one-seventh**]

ANSWER: W)  $7/2$

### TOSS-UP

5) LIFE SCIENCE *Multiple Choice* What is the purpose of the lateral line in fish?

- W) Seeing particular colors
- X) Carrying blood to the gills
- Y) Producing sound waves
- Z) Detecting vibration

ANSWER: Z) DETECTING VIBRATION

### BONUS

5) LIFE SCIENCE *Multiple Choice* Which of the following would be an example of a mycorrhizal **[my-kuh-RY-zuhl]** symbiosis?

- W) A parasitic wasp laying eggs on a caterpillar
- X) The bacterium *Rhizobium* **[ry-ZOH-bee-uhm]** infecting the roots of a peanut plant
- Y) Ants living in *Acacia* **[uh-KAY-shuh]** thorns and protecting the host plant
- Z) Ants that harvest honeydew from aphids **[AY-fids]** feeding on plants

ANSWER: X) THE BACTERIUM *RHIZOBIUM* INFECTING THE ROOTS OF A PEANUT PLANT

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### TOSS-UP

6) EARTH AND SPACE *Multiple Choice* Which of the following rocks is NOT metamorphic?

- W) Limestone
- X) Marble
- Y) Gneiss **[NYS]**
- Z) Schist **[SHIST]**

ANSWER: W) LIMESTONE

### BONUS

6) EARTH AND SPACE *Short Answer* Not including brown dwarfs, what is the second coolest class of star?

ANSWER: K

### TOSS-UP

7) ENERGY *Multiple Choice* Which of the following sources of radiation is most commonly used to irradiate food?

- W) Uranium-235
- X) Cobalt-60
- Y) Radium-226
- Z) Potassium-40

ANSWER: X) COBALT-60

### BONUS

7) ENERGY *Short Answer* Over time, the amplitude of a swing decreases. This is because the rider's mechanical energy is converted to what instead?

ANSWER: HEAT (ACCEPT: HEAT ENERGY, THERMAL ENERGY)

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### TOSS-UP

8) GENERAL SCIENCE *Short Answer* Name the method by which new genetic material can be introduced into a population.

ANSWER: MUTATION (ACCEPT: GENE FLOW; DO NOT ACCEPT: SEXUAL REPRODUCTION)

### BONUS

8) GENERAL SCIENCE *Multiple Choice* Lateritic [*lat-uh-RIT-ik*] soils would be found in which biome?

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

ANSWER: W) TROPICAL RAIN FOREST

### TOSS-UP

9) PHYSICAL SCIENCE *Short Answer* Central processing units have evolved heavily over the past 30 years. They are responsible for a great deal of computational research, and in addition, have changed the way many people live their lives. What basic circuit element can be found on the order of billions inside many modern CPUs?

ANSWER: TRANSISTORS

### BONUS

9) PHYSICAL SCIENCE *Multiple Choice* Which of the following statements about precipitation is FALSE?

- W) Can occur by converting a soluble substance into an insoluble form
- X) Results in a higher purity solid if higher concentration solutions are used
- Y) Can be used to remove metal ions from aqueous solutions **[AK-wee-uhs]**
- Z) Can occur by changing the composition of a solvent to diminish the solubility of a substance in it

ANSWER: X) RESULTS IN A HIGHER PURITY SOLID IF HIGHER CONCENTRATION SOLUTIONS ARE USED

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### TOSS-UP

10) MATH *Multiple Choice* Add  $8x$  to  $2x$  and then subtract 5 from the sum. If  $x$  is a positive integer, the result must be an integer multiple of which of the following?

- W) 2
- X) 5
- Y) 8
- Z) 10

ANSWER: X) 5

### BONUS

10) MATH *Short Answer* If  $x$  varies directly as the square of  $y$  and  $x$  equals 0.5 when  $y$  is 1, what is  $x$  when  $y = 4$ ?

ANSWER: 8

**TOSS-UP**

11) LIFE SCIENCE *Short Answer* In human extremities what term is used to describe the evidence that veins are weakening and valves do NOT close properly?

ANSWER: VARICOSE VEINS

**BONUS**

11) LIFE SCIENCE *Multiple Choice* Which is NOT one of the essential activities that occurs in the digestive process?

- W) Ingestion
- X) Propulsion
- Y) Mechanical digestion
- Z) Adsorption

ANSWER: Z) ADSORPTION

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**TOSS-UP**

12) EARTH AND SPACE *Multiple Choice* Which of the following is NOT considered part of a beach's foreshore environment?

- W) Surf zone
- X) Tidal flat
- Y) Berm
- Z) Swash zone

ANSWER: Y) BERM

**BONUS**

12) EARTH AND SPACE *Short Answer* Around what two points do stars appear to rotate in the sky over the course of a day?

ANSWER: NORTH AND SOUTH CELESTIAL POLES (ACCEPT: CELESTIAL POLES; NORTH AND SOUTH POLES)

### TOSS-UP

13) GENERAL SCIENCE *Multiple Choice* Mendel's experiments crossing different colored pea plants demonstrated what genetic concept?

- W) Haploid and diploid variation
- X) Recessive and dominant genes
- Y) Gametophyte reproductive cycles [guh-MEE-tuh-fyt]
- Z) Mitotic division [my-TOT-ik]

ANSWER: X) RECESSIVE AND DOMINANT GENES

### BONUS

13) GENERAL SCIENCE *Short Answer* What specific chamber of the heart is responsible for pumping blood to the lungs?

ANSWER: RIGHT VENTRICLE

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### TOSS-UP

14) ENERGY *Multiple Choice* The energy stored in a candle that can be changed into heat and light energy in burning is what type of energy?

- W) Potential
- X) Heat
- Y) Light
- Z) Chemical

ANSWER: Z) CHEMICAL

### BONUS

14) ENERGY *Multiple Choice* What is the amperage in a circuit with a 14 volt power source and three 6 ohm light bulbs in parallel?

- W) 3
- X) 5
- Y) 7
- Z) 9

ANSWER: Y) 7

**TOSS-UP**

15) PHYSICAL SCIENCE *Multiple Choice* The escape velocity from the event horizon of a black hole is which of the following?

- W) The speed of light
- X) Greater than the speed of light
- Y) Infinity
- Z) Negative infinity

ANSWER: W) THE SPEED OF LIGHT

**BONUS**

15) PHYSICAL SCIENCE *Short Answer* In what type of current do electrons frequently reverse their direction of travel?

ANSWER: ALTERNATING CURRENT (ACCEPT: AC)

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**TOSS-UP**

16) MATH *Multiple Choice* What is the value of  $(1/2)^{-2}$  [**one-half raised to the negative two power**]?

- W) -4
- X) -1/4
- Y) 1/4
- Z) 4

ANSWER: Z) 4

**BONUS**

16) MATH *Short Answer* Evaluate the following:  $\log_{216}6$  [**log base two hundred sixteen of 6**].

ANSWER: 1/3



**TOSS-UP**

17) LIFE SCIENCE *Multiple Choice* In which ocean zone would coral reside?

- W) Pelagic [*puh-LAJ-ik*]
- X) Benthic
- Y) Neritic [*nuh-RIT-ik*]
- Z) Intertidal

ANSWER: Y) NERITIC

**BONUS**

17) LIFE SCIENCE *Multiple Choice* What is the correct term for a marine organism whose internal salt concentration varies with that of their environment?

- W) Osmoregulator
- X) Ion-concentrators
- Y) Osmoconformers
- Z) Urea-concentrators

ANSWER: Y) OSMOCONFORMERS

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**TOSS-UP**

18) EARTH AND SPACE *Short Answer* What is the source of the helium-3 found in the lunar regolith?

ANSWER: THE SUN (ACCEPT: SOLAR WIND)

**BONUS**

18) EARTH AND SPACE *Multiple Choice* Which of the following is the reason that a lunar eclipse does not occur during every full moon?

- W) The Moon's orbit is inclined relative to the Earth's
- X) Lunar eclipses only occur during an equinox
- Y) Lunar eclipses only occur during a solstice
- Z) Lunar eclipses only occur during a new moon

ANSWER: W) THE MOON'S ORBIT IS INCLINED RELATIVE TO THE EARTH'S

### TOSS-UP

19) GENERAL SCIENCE *Multiple Choice* Which of the following does NOT contribute to eutrophication [*yoo-tro-fi-KAY-shun*]?

- W) Excess fertilizer usage
- X) Untreated sewage and waste water
- Y) Increased oxygen inputs
- Z) Industrial animal waste

ANSWER: Y) INCREASED OXYGEN INPUTS

### BONUS

19) GENERAL SCIENCE *Multiple Choice* What is true about the drifting of North America and Europe?

- W) It is away from each other at approximately 2.5 centimeters per year
- X) It is toward each other at approximately 2.5 centimeters per year
- Y) It is away from each other at approximately 2.5 millimeters per year
- Z) It is toward each other at approximately 2.5 millimeters per year

ANSWER: W) IT IS AWAY FROM EACH OTHER AT APPROXIMATELY 2.5 CENTIMETERS PER YEAR

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### TOSS-UP

20) PHYSICAL SCIENCE *Multiple Choice* Two objects have the same size and shape, but one is twice as heavy as the other. They are dropped simultaneously from a building. If air resistance is negligible, which of the following is true?

- W) The heavy one lands on the ground before the light one
- X) They land on the ground at the same time but the heavy one has more speed upon impact
- Y) They land on the ground at the same time and have the same speed upon impact.
- Z) They land on the ground at the same time but the heavy object has a lower acceleration

ANSWER: Y) THEY LAND ON THE GROUND AT THE SAME TIME AND HAVE THE SAME SPEED UPON IMPACT

### BONUS

20) PHYSICAL SCIENCE *Short Answer* What is the term that describes the factor by which the speed of light is decreased when traveling through a given material?

ANSWER: REFRACTIVE INDEX

**TOSS-UP**

21) MATH *Short Answer* If an event has a 45% chance of success in any single trial, how many successful events would one expect to have occurred after 5,000 trials?

ANSWER: 2,250

**BONUS**

21) MATH *Multiple Choice* In which quadrants do the solutions to the inequality  $2x + 3 < y < -(1/2)x - 5$  [**two x plus three is less than y is less than negative one half x minus five**] lie?

- W) I and II
- X) II, III and IV
- Y) II and III
- Z) I, II and III

ANSWER: Y) II AND III

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**TOSS-UP**

22) ENERGY *Short Answer* Other than a battery, what else will produce a direct current with no moving parts?

ANSWER: THERMOCOUPLES (ACCEPT: SOLAR CELLS)

**BONUS**

22) ENERGY *Short Answer* In a northern climate, what should be the orientation of windows in a passively heated solar home?

ANSWER: SOUTH

### TOSS-UP

23) LIFE SCIENCE *Short Answer* What is the primary chemical constituent of the cell wall in plants?

ANSWER: CELLULOSE

### BONUS

23) LIFE SCIENCE *Multiple Choice* The process of nitrogen fixation is extremely energy intensive due to which of the following?

- W) Atoms of free nitrogen are triply bound to other nitrogen atoms
- X) Atoms of free nitrogen are highly reactive
- Y) The nitrogen atom is highly unreactive
- Z) Nitrogen atoms are usually found tightly bound to alkaline earth metals

ANSWER: W) ATOMS OF FREE NITROGEN ARE TRIPLY BOUND TO OTHER NITROGEN ATOMS