

## ROUND 4A

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### TOSS-UP

1) Life Science – *Multiple Choice* What is the name for the microscopic pores on the surface of leaves and stems in plants through which gas exchange occurs ?

- W) Stele [*STEEL-ee*]
- X) Phloem [*FLOW-em*]
- Y) Cambium [*KAM-bee-um*]
- Z) Stomata [*stow-MAH-tah*]

ANSWER: Z) STOMATA

### BONUS

1) Life Science – *Multiple Choice* Which of the following is NOT true of sister chromatids [*CROW-mah-tids*]?

- W) They are connected by centromeres [*SEN-troh-meers*]
- X) They are identical
- Y) They are diploid [*DIH-ployd*]
- Z) They contain different alleles [*Ah-LEELZ*]

ANSWER: Z) THEY CONTAIN DIFFERENT ALLELES

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### TOSS-UP

2) Math – *Short Answer* What is  $83 - 19 + 17$ ?

ANSWER: 81

### BONUS

2) Math – *Short Answer* A triangle has two exterior angles that have degree measures of 115 and 120, respectively. What is the degree measure of their common remote interior angle?

ANSWER: 55

### **TOSS-UP**

3) Life Science – *Multiple Choice* The breakdown of molecules to obtain energy is which of the following?

- W) Catabolism [*cah-TAB-eh-lizm*]
- X) Anabolism [*an-AB-beh-lizm*]
- Y) Respiration
- Z) Transpiration

ANSWER: W) CATABOLISM

### **BONUS**

3) Life Science – *Multiple Choice* Which of the following human diseases is dominant?

- W) Red-green color blindness
- X) Cystic fibrosis
- Y) Hemophilia
- Z) Huntington's disease

ANSWER: Z) HUNTINGTON'S DISEASE

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### **TOSS-UP**

4) Earth and Space – *Multiple Choice* Which of the following types of rocks typically exhibits stratification?

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

ANSWER: Y) SEDIMENTARY

### **BONUS**

4) Earth and Space – *Multiple Choice* What is the term for small distinctive groups of stars within constellations?

- W) Asterisms
- X) Clusters
- Y) Bands
- Z) Cliques

ANSWER: W) ASTERISMS

### **TOSS-UP**

5) Physical Science – *Multiple Choice* For which of the following molecules would elemental analysis give you the molecular formula?

- W) C<sub>3</sub>H<sub>6</sub>O<sub>9</sub>
- X) SiO<sub>2</sub>
- Y) C<sub>6</sub>H<sub>14</sub>
- Z) H<sub>8</sub>O<sub>8</sub>

ANSWER: X) SiO<sub>2</sub>

### **BONUS**

5) Physical Science – *Short Answer* Rank the following three isotopes from least to greatest in terms of their numbers of neutrons: 1) Carbon-14; 2) Nitrogen-14; 3) Oxygen-18.

ANSWER: 2, 1, 3

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### **TOSS-UP**

6) Energy – *Multiple Choice* What role is fission-based nuclear power used for in the energy production and distribution grid?

- W) Baseload
- X) Peak
- Y) Arbitrage
- Z) Peak shaving

ANSWER: W) BASELOAD

### **BONUS**

6) Energy – *Short Answer* Increasing the amount of thermal energy contained in an object also increases what quantifiable property of the object?

ANSWER: TEMPERATURE

**TOSS-UP**

7) Math – *Short Answer* Simplify the following expression:  $a^7$  times  $a^5$

ANSWER:  $a^{12}$

**BONUS**

7) Math – *Short Answer* At the start of school, Jack scored 63 on his pre-test. At the end of the first week, he scored 68 on his post-test. Rounded to the nearest tenth of a percent, what is his percent increase?

ANSWER: 7.9

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**TOSS-UP**

8) Energy – *Multiple Choice* In which of the following states would you not expect to find a coal mine?

- W) Nevada
- X) Illinois
- Y) Louisiana
- Z) North Dakota

ANSWER: W) NEVADA

**BONUS**

8) Energy – *Multiple Choice* Coal is primarily used to generate electricity. Which of the following is the second largest use of coal?

- W) Heating homes
- X) Running factories
- Y) Fueling trains
- Z) Smelting and steelmaking

ANSWER: Z) SMELTING AND STEELMAKING

**TOSS-UP**

9) Physical Science – *Multiple Choice* If the temperature of a gaseous medium through which a sound wave passes is decreased, what will happen to the speed of the wave?

- W) It will increase
- X) It will decrease
- Y) It will remain the same
- Z) It will fluctuate

ANSWER: X) IT WILL DECREASE

**BONUS**

9) Physical Science – *Short Answer* Identify all of the following three quantities that, when changed, would affect the period of a pendulum: 1) Mass of the bob; 2) Density of the bob; 3) Length of the string.

ANSWER: 3 (ACCEPT: LENGTH OF THE STRING)

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**TOSS-UP**

10) Math – *Short Answer* What is the area of a right triangle with legs of length 4 and 7?

ANSWER: 14

**BONUS**

10) Math – *Short Answer* A cell phone plan costs a fixed rate per month plus a charge per text message. One month, Sarah had 200 texts and her total bill was \$34. The next month, she had 500 texts and her total bill was \$52. In dollars, what is the fixed rate per month?

ANSWER: 22

## **TOSS-UP**

11) Life Science – *Multiple Choice* Which of the following is a protein?

- W) Triglycerides [*try-GLIH-sir-ides*]
- X) Myoglobin [*MY-oh-glow-bin*]
- Y) Uracil [*YUR-ah-sil*]
- Z) Ribose [*RYE-bose*]

ANSWER: X) MYOGLOBIN

## **BONUS**

11) Life Science – *Multiple Choice* Which of the following is not an ectotherm?

- W) Otter
- X) Gold fish
- Y) Turtle
- Z) Beetle

ANSWER: W) OTTER

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## **TOSS-UP**

12) Earth and Space – *Multiple Choice* The temperature of a body of water influences which of the following?

- W) The temperature of the air above it
- X) The formation of deserts
- Y) Global climate change
- Z) Salt concentration

ANSWER: W) THE TEMPERATURE OF THE AIR ABOVE IT

## **BONUS**

12) Earth and Space – *Short Answer* ENSO is an acronym for an irregular periodical variation in sea surface temperatures and winds in the eastern tropical Pacific Ocean. What does ENSO stand for?

ANSWER: EL NIÑO-SOUTHERN OSCILLATION

## **TOSS-UP**

13) Physical Science – *Short Answer* An alpha particle is the nucleus of an atom of what element?

ANSWER: HELIUM

## **BONUS**

13) Physical Science – *Multiple Choice* What is the SI derived unit used to express power?

W) Joule [*joo-l*]

X) Erg

Y) Watt

Z) Newton

ANSWER: Y) WATT

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## **TOSS-UP**

14) Life Science – *Multiple Choice* Which of the following cells can be described as totipotent [*tow-TIH-puh-tent*]?

W) IPS cell

X) Bone marrow cell

Y) Fibroblast stem cell

Z) Zygote [*ZYE-goat*]

ANSWER: Z) ZYGOTE

## **BONUS**

14) Life Science – *Multiple Choice* In which of the following classifications is a bacteriophage?

W) Moneran [*mo-NEER-en*]

X) Chordate [*KOR-date*]

Y) Virus

Z) Protist [*PRO-tist*]

ANSWER: Y) VIRUS

**TOSS-UP**

15) Earth and Space – *Short Answer* What is the term for glacier-cut inlets that are now filled with water?

ANSWER: FJORD

**BONUS**

15) Earth and Space – *Multiple Choice* A comet's gas tail points in which of the following directions?

- W) Trailing behind its orbit
- X) Leading ahead along its orbit
- Y) Directly towards the Sun
- Z) Directly away from the Sun

ANSWER: Z) DIRECTLY AWAY FROM THE SUN

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**TOSS-UP**

16) Energy – *Multiple Choice* Which of the following is not a form of energy?

- W) Petroleum
- X) Nuclear
- Y) Chemical
- Z) Thermal

ANSWER: W) PETROLEUM

**BONUS**

16) Energy – *Short Answer* Identify all of the following four products that can be produced from the processing and refinement of petroleum: 1) Asphalt; 2) Paraffin; 3) Kerosene; 4) Propane.

ANSWER: ALL (1, 2, 3, 4)

### **TOSS-UP**

17) Physical Science – *Multiple Choice* Which of the following is NOT true about magnets?

- W) As two magnets move apart, the repelling force increases
- X) Opposite poles attract each other
- Y) If you break a magnet you have two new magnets
- Z) Compasses are affected by magnetic fields

ANSWER: W) AS TWO MAGNETS MOVE APART, THE REPELLING FORCE INCREASES

### **BONUS**

17) Physical Science – *Short Answer* If the speed of an object is tripled, by what factor is the kinetic energy multiplied?

ANSWER: NINE

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### **TOSS-UP**

18) Math – *Short Answer* Find the value of the following expression: open parenthesis  $49^2 + 49$  close parenthesis divided by 49.

ANSWER: 50

### **BONUS**

18) Math – *Short Answer* What is the slope of the line through  $(-3, 3)$  and  $(6, -4)$ ?

ANSWER:  $-7/9$

### **TOSS-UP**

19) Physical Science – *Short Answer* Over some period of time, a radioactive isotope decays until only 1/8 of the original element is present. How many half-lives passed during this time period?

ANSWER: 3

### **BONUS**

19) Physical Science – *Multiple Choice* What physical quantity can be defined as the sum of all the possible microstates of a system?

- W) Free energy
- X) Enthalpy [*EN-thul-pee*]
- Y) Entropy [*EN-troh-pee*]
- Z) Heat

ANSWER: Y) ENTROPY

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### **TOSS-UP**

20) Earth and Space – *Multiple Choice* Which of the following types of stars has the weakest hydrogen Balmer lines?

- W) A
- X) F
- Y) G
- Z) B

ANSWER: Y) G

### **BONUS**

20) Earth and Space – *Multiple Choice* Which of the following components of the interstellar medium is typically the least dense?

- W) HI clouds
- X) Molecular clouds
- Y) Coronal gas
- Z) Intercloud medium

ANSWER: Y) CORONAL GAS

**TOSS-UP**

21) Life Science – *Short Answer* Microtubules [*micro-TUBE-yules*] and microfilaments make up what cellular structure in eukaryotes [*YOU-care-ee-oats*]?

ANSWER: CYTOSKELETON

**BONUS**

21) Life Science – *Short Answer* If 6 molecules of CO<sub>2</sub> and 6 molecules of H<sub>2</sub>O combine to form one glucose molecule, how many molecules of O<sub>2</sub> are also produced?

ANSWER: 6

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**TOSS-UP**

22) Math – *Short Answer* A triangle has two angles measuring 22 and 67 degrees, respectively. What is the degree measure of the third angle?

ANSWER: 91

**BONUS**

22) Math – *Short Answer* Two dice are rolled. What is the probability that the product of the two numbers rolled is prime?

ANSWER: 1/6

**TOSS-UP**

23) Earth and Space – *Short Answer* Disks of gas contract to form stars via what process?

ANSWER: ACCRETION

**BONUS**

23) Earth and Space – *Short Answer* Identify all of the following three rocks that are likely generated by rapid cooling of lava: 1) Obsidian; 2) Pumice; 3) Rhyolite.

ANSWER: ALL OF THEM (ACCEPT: 1, 2, AND 3)