

ROUND 10A

TOSS-UP

1) Math – *Multiple Choice* Annie has 12 candy bars in a bag. Nine of them are Snick bars and 3 of them are Milky bars. If she randomly selects a candy bar from the bag, what are the odds that the bar will be a Milky bar?

- W) 1 to 12
- X) 1 to 4
- Y) 1 to 3
- Z) 3 to 1

ANSWER: Y) 1 to 3

BONUS

1) Math – *Multiple Choice* A student makes the following conjecture: “If a quadrilateral is a rectangle, then it must be a parallelogram.” If someone doesn’t believe this conjecture is true, which of the following would be necessary to have a counterexample to it?

- W) A rectangle that is a parallelogram
- X) A parallelogram that is a rectangle
- Y) A rectangle that is not a parallelogram
- Z) A parallelogram that is not a rectangle

ANSWER: Y) A RECTANGLE THAT IS NOT A PARALLELOGRAM

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### TOSS-UP

2) Physical Science – *Multiple Choice* A pencil sitting in a glass of water appears bent because light bends as it passes from water to the surrounding air and vice versa. This is an example of what process?

- W) Reflection
- X) Refraction
- Y) Diffraction
- Z) Absorption

ANSWER: X) REFRACTION

### BONUS

2) Physical Science – *Short Answer* Einstein received the Nobel Prize for his analysis of what physical phenomenon?

ANSWER: PHOTOELECTRIC EFFECT

**TOSS-UP**

3) Earth and Space – *Multiple Choice* The dynamo effect enables Earth's core to generate what?

- W) Electric field
- X) Mantle convection
- Y) Magnetic field
- Z) Radioactive elements

ANSWER: Y) MAGNETIC FIELD

**BONUS**

3) Earth and Space – *Short Answer* What devices are used to measure humidity?

ANSWER: HYGROMETERS (ACCEPT: PSYCHROMETERS)



**TOSS-UP**

4) Life Science – *Short Answer* What part of the brain is responsible for muscle coordination and is involved with muscle memory?

ANSWER: CEREBELLUM

**BONUS**

4) Life Science – *Short Answer* By what process do bacterial cells divide?

ANSWER: BINARY FISSION

### TOSS-UP

5) Energy – *Short Answer* What is the SI unit of electric current?

ANSWER: AMPERE (ACCEPT: AMPS)

### BONUS

5) Energy – *Short Answer* Order the following countries from least to greatest in terms of the percentage of their power generation that comes from renewable energy sources: 1) United States; 2) Iceland; 3) Brazil.

ANSWER: 1, 3, 2

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TOSS-UP

6) General Science – *Multiple Choice* Where are Haversian canals found?

- W) Pancreatic ducts
- X) Liver portal veins
- Y) Inside of bones
- Z) Hair follicles

ANSWER: Y) INSIDE OF BONES

BONUS

6) General Science – *Short Answer* What is the common name of the chemical NH_3 ?

ANSWER: AMMONIA (DO NOT ACCEPT: AMMONIUM)

TOSS-UP

7) Life Science – *Multiple Choice* At which of the following pH values would pepsin be most active?

- W) 2
- X) 4
- Y) 6
- Z) 8

ANSWER: W) 2

BONUS

7) Life Science – *Short Answer* What is the process of constructing an mRNA molecule from DNA?

ANSWER: TRANSCRIPTION

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### TOSS-UP

8) Physical Science – *Multiple Choice* The nucleus of the most common isotope of hydrogen is formed from which of the following?

- W) A single proton
- X) A single neutron
- Y) One proton and one electron
- Z) One neutron and one proton

ANSWER: W) A SINGLE PROTON

### BONUS

8) Physical Science – *Multiple Choice* An electron is emitted by an atomic nucleus in the process of:

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

ANSWER: X) BETA DECAY

### TOSS-UP

9) General Science – *Short Answer* If a computer’s hard drive can hold 2 to the 40th bytes, it can hold one of what unit of storage capacity?

ANSWER: TERABYTE

### BONUS

9) General Science – *Short Answer* What name is given to a group of organisms that are the first to establish themselves in an area after a disruption?

ANSWER: PIONEER SPECIES



### TOSS-UP

10) Math – *Multiple Choice* Fifty is multiplied by a number between 0 and 1. Which of the following must be true about the product?

- W) It is less than 1
- X) It is between 0 and 50
- Y) It is rational
- Z) It is irrational

ANSWER: X) IT IS BETWEEN 0 AND 50

### BONUS

10) Math – *Multiple Choice* Bobby saved \$32 when he purchased a jacket at a clearance sale. If the sale price was 40% off the regular price, what was the regular price of the jacket?

- W) \$48
- X) \$72
- Y) \$80
- Z) \$128

ANSWER: Y) \$80

### **TOSS-UP**

11) Energy – *Short Answer* In a photovoltaic cell, two types of semiconductors are placed next to each other. What is the term for this point of contact?

ANSWER: P-N JUNCTION

### **BONUS**

11) Energy – *Short Answer* Order the following three sectors from least to greatest in terms of propane consumption in the US: 1) Residential; 2) Transportation; 3) Chemical and industrial.

ANSWER: 2, 1, 3



### **TOSS-UP**

12) Earth and Space – *Short Answer* What is the spectral class of the Sun?

ANSWER: G (ACCEPT: G2)

### **BONUS**

12) Earth and Space – *Short Answer* What is the term for the continuous or broken ring of coral reef that surrounds a lagoon?

ANSWER: ATOLL

### TOSS-UP

13) General Science – *Short Answer* Place the following four steps of mitosis in their proper order: 1) Anaphase; 2) Telophase; 3) Metaphase; 4) Prophase.

ANSWER: 4, 3, 1, 2

### BONUS

13) General Science – *Short Answer* What is the name of the monosaccharide that RNA possesses and DNA does not?

ANSWER: RIBOSE

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TOSS-UP

14) Physical Science – *Multiple Choice* The ionosphere is a region of ionized gas in the upper atmosphere. The ionosphere is extremely important to:

- W) The color of the sky
- X) Rainbows
- Y) Radio communication
- Z) The ability of satellites to orbit earth

ANSWER: Y) RADIO COMMUNICATION

BONUS

14) Physical Science – *Short Answer* What property of water causes it to form small droplets and allows water striders to walk across pools of water?

ANSWER: SURFACE TENSION

TOSS-UP

15) Math – *Multiple Choice* Which of the following tests is most useful for determining whether or not a relation defined by a graph is a function?

- W) Horizontal line test
- X) Vertical line test
- Y) Increasing test
- Z) First derivative test

ANSWER: X) VERTICAL LINE TEST

BONUS

15) Math – *Short Answer* If each edge of a cube is decreased by 80%, by what percentage is the volume decreased?

ANSWER: 99.2 (ACCEPT: 99 1/5)

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### TOSS-UP

16) Life Science – *Short Answer* Photophosphorylation is used in the plant cell to generate what molecule?

ANSWER: ATP (ACCEPT: ADENOSINE TRIPHOSPHATE)

### BONUS

16) Life Science – *Short Answer* Identify all of the following three conditions that would denature a protein: 1) Heating to 130 degrees Celsius; 2) Adding 6 molar urea; 3) Adding 0.1 molar sodium chloride.

ANSWER: 1 AND 2



**TOSS-UP**

17) Earth and Space – *Short Answer* What type of volcano is characterized by gently sloping sides and fluid basaltic lavas?

ANSWER: SHIELD VOLCANO

**BONUS**

17) Earth and Space – *Short Answer* What is the term for large areas on continents that are composed of very ancient rocks?

ANSWER: CRATONS



**TOSS-UP**

18) Life Science – *Short Answer* In what organelle does the citric acid cycle occur?

ANSWER: MITOCHONDRIA

**BONUS**

18) Life Science – *Short Answer* Sponges are part of what phylum?

ANSWER: PORIFERA

**TOSS-UP**

19) Energy – *Short Answer* What state generates the most solar power in the United States?

ANSWER: CALIFORNIA

**BONUS**

19) Energy – *Short Answer* A photovoltaic cell doped with phosphorous will result in what type of semiconductor?

ANSWER: N-TYPE SEMICONDUCTOR



**TOSS-UP**

20) Math – *Short Answer* As a decimal rounded to the hundredths place, what is 20% of 80% of 14?

ANSWER: 2.24

**BONUS**

20) Math – *Short Answer* A mail order movie store is having a sale. For a limited time, DVD's are \$8.80 each and the shipping and handling charge for the order is \$3.27. What is the largest number of DVD's that can be bought for \$100?

ANSWER: 10

**TOSS-UP**

21) Earth and Space – *Short Answer* What term is used to describe recognizable groups of stars that are not constellations, such as the Big Dipper?

ANSWER: ASTERISM

**BONUS**

21) Earth and Space – *Short Answer* What atmospheric gas is most responsible for ocean acidification?

ANSWER: CARBON DIOXIDE (CO<sub>2</sub>)



**TOSS-UP**

22) General Science – *Short Answer* What type of process occurs without heat entering or leaving the system?

ANSWER: ADIABATIC

**BONUS**

22) General Science – *Short Answer* What pair of endocrine glands secrete epinephrine and norepinephrine?

ANSWER: ADRENAL GLANDS

### TOSS-UP

23) Physical Science – *Short Answer* According to Newton's Laws, the net force acting on a body is the product of what two quantities?

ANSWER: MASS AND ACCELERATION

### BONUS

23) Physical Science – *Short Answer* What functional group is represented by  $-NH_2$ ?

ANSWER: AMINE (ACCEPT: AMINO)