

ROUND 5A

TOSS-UP

1) Life Science – *Multiple Choice* Immunoglobulins are an example of which of the following?

- W) Sugars
- X) Proteins
- Y) Phospholipids [*faws-foe-lipids*]
- Z) Starches

ANSWER: X) PROTEINS

BONUS

1) Life Science – *Multiple Choice* Which of the following can be found in eukaryotes [*YOU-care-ee-oats*], but not in prokaryotes [*PRO-care-ee-oats*]?

- W) Mitochondria [*my-tow-KON-dree-ah*]
- X) Plasma membrane
- Y) Chromosome
- Z) Cell wall

ANSWER: W) MITOCHONDRIA

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### TOSS-UP

2) Energy – *Multiple Choice* Which of the following is not a primary energy source?

- W) Electricity
- X) Solar radiation
- Y) Wind
- Z) Coal

ANSWER: W) ELECTRICITY

### BONUS

2) Energy – *Multiple Choice* Burning fossil fuels is the primary source of emissions for which of the following greenhouse gases?

- W) Carbon dioxide
- X) Fluorinate [*FLOOR-in-ate*] gases
- Y) Methane
- Z) Nitrous oxide

ANSWER: W) CARBON DIOXIDE

**TOSS-UP**

3) Earth and Space – *Multiple Choice* Bok globules are visible in the Orion Nebula. What does this imply is occurring in the star?

- W) Star formation
- X) Star cooling
- Y) Star death
- Z) Star obscuration

ANSWER: W) STAR FORMATION

**BONUS**

3) Earth and Space – *Multiple Choice* Bodies of water that do not flow into a sea, sometimes accumulating salts over time to become saline, are known as what type of lake?

- W) Eutrophic
- X) Oligotrophic
- Y) Endorheic
- Z) Dead

ANSWER: Y) ENDORHEIC

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TOSS-UP

4) Math – *Short Answer* Calculate the product of the following 3 numbers: 200, 300, and 100.

ANSWER: 6,000,000

BONUS

4) Math – *Multiple Choice* What is the equation of the axis of symmetry for the graph of $x = y^2 + 8y + 30$?

- W) $y = -15$
- X) $y = -4$
- Y) $y = 4$
- Z) $y = 15$

ANSWER: X) $y = -4$

TOSS-UP

5) Physical Science – *Short Answer* A boy holds a 5-kilogram weight in position on a shelf to prevent it from falling. After 10 minutes, how much work, in joules [*jools*], did he perform on the weight?

ANSWER: 0

BONUS

5) Physical Science – *Short Answer* What particle accelerator was responsible for the detection of the Higgs boson [*BOH-sawn*]?

ANSWER: LARGE HADRON COLLIDER (ACCEPT: LHC)

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### TOSS-UP

6) Life Science – *Multiple Choice* Which of the following is NOT found in both bacterial and human cells?

- W) Ribosomes [*RYE-beh-sohms*]
- X) DNA
- Y) Nucleus
- Z) RNA

ANSWER: Y) NUCLEUS

### BONUS

6) Life Science – *Multiple Choice* Which of the following statements is true regarding thymine [*THIGH-meem*], cytosine [*sigh-toh-seen*], and uracil [*YUR-ah-sil*]?

- W) They can all be found in RNA
- X) They can all be found in DNA
- Y) They are all purines [*PURE-eens*]
- Z) They are all pyrimidines [*pur-RIM-ih-deens*]

ANSWER: Z) THEY ARE ALL PYRIMIDINES

**TOSS-UP**

7) Math – *Short Answer* What is the product of the two binomials  $x + 2$  and  $x - 5$ ?

ANSWER:  $x^2 - 3x - 10$

**BONUS**

7) Math – *Short Answer* During football season, a player catches passes for 471 yards and averages 12.7 yards per catch, rounded to the nearest tenth. How many catches did the player make?

ANSWER: 37

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TOSS-UP

8) Energy – *Multiple Choice* Which of the following crops is NOT used widely in the western hemisphere as a biofuel feedstock?

- W) Sugarcane
- X) Corn
- Y) Wheat
- Z) Soybeans

ANSWER: Y) WHEAT

BONUS

8) Energy – *Short Answer* The power plant at Hoover Dam harvests what type of energy?

ANSWER: HYDROPOWER (ACCEPT: HYDRO, DO NOT ACCEPT: HYDROELECTRIC)

TOSS-UP

9) Life Science – *Multiple Choice* Ribosomes [**RYE-beh-sohms**] produce numerous proteins needed for cellular functions. In what organelle can you find embedded ribosomes?

W) Smooth endoplasmic [**EN-doh-PLAZ-mik**] reticulum [**reh-TIK-yoo-lum**]

X) Plasma membrane

Y) Microfilaments

Z) Rough endoplasmic [**EN-doh-PLAZ-mik**] reticulum [**reh-TIK-yoo-lum**]

ANSWER: Z) ROUGH ENDOPLASMIC RETICULUM

BONUS

9) Life Science – *Short Answer* Deoxygenated blood is pumped from the heart to the lungs through which part of the circulatory system?

ANSWER: PULMONARY ARTERIES

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### TOSS-UP

10) Earth and Space – *Multiple Choice* What is the sedimentary rock that is composed largely of calcium carbonate from the skeletal fragments of marine organisms?

W) Limestone

X) Marble

Y) Sandstone

Z) Coal

ANSWER: W) LIMESTONE

### BONUS

10) Earth and Space – *Short Answer* What is the point on the surface above the focus of an earthquake?

ANSWER: EPICENTER

**TOSS-UP**

11) Physical Science – *Multiple Choice* Which of the following regions of the EM spectrum is most energetic?

- W) Radio
- X) Microwave
- Y) Ultraviolet
- Z) Visible

ANSWER: Y) ULTRAVIOLET

**BONUS**

11) Physical Science – *Multiple Choice* Which of the following compounds contains an ionic bond?

- W) Magnesium bromide [*BROH-mide*]
- X) Dihydrogen
- Y) Fructose
- Z) Methane

ANSWER: W) MAGNESIUM BROMIDE

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TOSS-UP

12) Math – *Short Answer* In a right triangle, one leg has length 15 and one angle measures 45 degrees. What is the length of the hypotenuse?

ANSWER: $15\sqrt{2}$

BONUS

12) Math – *Multiple Choice* Which of the following represents the best price per item?

- W) Buy one and get a second one half off
- X) Buy 2 and get 30% off each
- Y) Buy 2 and get a third one free
- Z) Buy 3 and get 20% off each

ANSWER: Y) BUY 2 AND GET A THIRD ONE FREE

TOSS-UP

13) Earth and Space – *Short Answer* What type of rocks are formed by volcanism?

ANSWER: IGNEOUS (ACCEPT: EXTRUSIVE IGNEOUS)

BONUS

13) Earth and Space – *Short Answer* In our Solar System, what type of orbit or trajectory would allow a body to escape the gravity of the Sun?

ANSWER: HYPERBOLIC

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**TOSS-UP**

14) Physical Science – *Short Answer* What isotope has nuclei [*NEW-kee-eye*] that contain six protons and seven neutrons?

ANSWER: CARBON-13

**BONUS**

14) Physical Science – *Short Answer* Lawrencium-260 [*lah-REN-see-um two sixty*] undergoes alpha decay with a half-life of 2.7 minutes. What is the mass number of the product atom?

ANSWER: 256

**TOSS-UP**

15) Life Science – *Multiple Choice* Which of the following statements is TRUE regarding heterochromatin [*hetero-CROW-ma-tin*]?

- W) It is transcriptionally active
- X) It consists of DNA loosely wound around histones
- Y) During mitosis [*my-TOW-sis*], most nuclear DNA is found as heterochromatin
- Z) Chromatin [*CROW-mah-tin*] organization is determined by DNA modifications

ANSWER: Y) DURING MITOSIS, MOST NUCLEAR DNA IS FOUND AS HETEROCHROMATIN

**BONUS**

15) Life Science – *Multiple Choice* Which of the following are not considered to belong to the bryophyte [*BRYE-oh-fite*] group?

- W) Mosses
- X) Ferns
- Y) Liverworts
- Z) Hornworts

ANSWER: X) FERNS

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TOSS-UP

16) Math – *Short Answer* What is 4 times 8 minus 5 times 6?

ANSWER: 2

BONUS

16) Math – *Short Answer* What is the cube of open parenthesis $a^3 + 4b$ close parenthesis when $a = 2$ and $b = -3$?

ANSWER: -64

TOSS-UP

17) Physical Science – *Multiple Choice* Which of the following describes the image formed by a plane mirror?

- W) Real and upright
- X) Real and vertically inverted
- Y) Virtual and upright
- Z) Virtual and vertically inverted

ANSWER: Y) VIRTUAL AND UPRIGHT

BONUS

17) Physical Science – *Short Answer* What is the adjective for a physical process that results in no heat exchange with the environment?

ANSWER: ADIABATIC

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**TOSS-UP**

18) Energy – *Multiple Choice* When a ball rolls downhill, the gravitational potential energy of the ball is transformed into what type of energy?

- W) Kinetic
- X) Thermal
- Y) Chemical
- Z) Atomic

ANSWER: W) KINETIC

**BONUS**

18) Energy – *Multiple Choice* Which of the following energy sources emits the greatest amount of mercury into the atmosphere when it is combusted?

- W) Oil
- X) Natural gas
- Y) Coal
- Z) Kerosene

ANSWER: Y) COAL

### TOSS-UP

19) Physical Science – *Short Answer* If the mass of an astronaut is 100 kilograms on Earth, what would be the mass, to the nearest 10 kilograms, of the same astronaut on the moon?

ANSWER: 100

### BONUS

19) Physical Science – *Multiple Choice* A chemist is trying to pick a weak base for performing a titration. Which of the following could she choose?

- W) Potassium hydroxide
- X) Potassium chloride
- Y) Potassium acetate
- Z) Sodium chloride

ANSWER: Y) POTASSIUM ACETATE

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TOSS-UP

20) Earth and Space – *Multiple Choice* What rock type is dominant in the uppermost mantle?

- W) Basalt
- X) Granite
- Y) Peridotite
- Z) Komatiite

ANSWER: Y) PERIDOTITE

BONUS

20) Earth and Space – *Multiple Choice* Which of the following best explains why Triton can hold an atmosphere?

- W) It is very massive
- X) Its atmosphere is primarily composed of massive gases
- Y) Its atmosphere is primarily composed of light gases
- Z) It is very cold

ANSWER: Z) IT IS VERY COLD

TOSS-UP

21) Life Science – *Short Answer* What is the term for vesicles that contain digestive enzymes?

ANSWER: LYSOSOMES

BONUS

21) Life Science – *Short Answer* A scientist discovers a new protein that contains 20 amino acids. What is the minimum length, in nucleotides, of the mRNA that produces this protein?

ANSWER: 63

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**TOSS-UP**

22) Earth and Space – *Short Answer* In what celestial body in the solar system does the proton-proton chain occur?

ANSWER: SUN

**BONUS**

22) Earth and Space – *Short Answer* What is the most abundant chemical sedimentary rock?

ANSWER: LIMESTONE

**TOSS-UP**

23) Math – *Short Answer* If function  $f$  has an inverse and if  $f$  of  $-3$  equals 5, what is  $f$  inverse of 5?

ANSWER:  $-3$

**BONUS**

23) Math – *Short Answer* A prism with 30 edges has how many vertices?

ANSWER: 20