

ROUND 13A

TOSS-UP

1) General Science – *Short Answer* What is the name of the deepest trench in the world's oceans?

ANSWER: MARIANA TRENCH (ACCEPT: MARIANAS)

BONUS

1) General Science – *Short Answer* What type of biologically relevant molecule includes phosphatidylcholine [*foss-fah-tie-dal-koh-leen*] and is generally found in cellular membranes?

ANSWER: PHOSPHOLIPIDS

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### TOSS-UP

2) Math – *Short Answer* What percent of 80 is 12?

ANSWER: 15

### BONUS

2) Math – *Multiple Choice* The three vertices of a triangle have coordinates (-2, 6), (2, 1), and (4, 7). The longest side of the triangle is opposite which of these three vertices?

W) (-2, 6)

X) (2, 1)

Y) (4, 7)

Z) There is not enough information to determine the answer

ANSWER: Y) (4, 7)

### TOSS-UP

3) Energy – *Short Answer* Performing electrolysis on water results in the production of what two diatomic gases?

ANSWER: HYDROGEN AND OXYGEN

### BONUS

3) Energy – *Multiple Choice* What is the major component of crude oil, by weight?

- W) Alkanes
- X) Naphthenes
- Y) Aromatics
- Z) Carbon dioxide

ANSWER: X) NAPHTHENES

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TOSS-UP

4) Physical Science – *Short Answer* Identify all of the following three statements that are true regarding the kinetic molecular theory of gases: 1) Particles have negligible volume; 2) Particles are always in motion; 3) Particles exert no force on each other except during collisions.

ANSWER: ALL OF THEM

BONUS

4) Physical Science – *Multiple Choice* What subatomic particle is principally responsible for the differences in chemical properties between elements?

- W) Proton
- X) Neutron
- Y) Electron
- Z) Hadron

ANSWER: Y) ELECTRON

TOSS-UP

5) Earth and Space – *Short Answer* What is the largest layer of the Sun's atmosphere, in which temperatures reach as high as 2 million kelvins?

ANSWER: CORONA

BONUS

5) Earth and Space – *Multiple Choice* Which of the following is the streak color of the mineral fluorite?

- W) Green
- X) White
- Y) Yellow
- Z) Violet

ANSWER: X) WHITE

TOSS-UP

6) Life Science – *Short Answer* What is the primary oxygen-carrying protein found in red blood cells?

ANSWER: HEMOGLOBIN

BONUS

6) Life Science – *Multiple Choice* The human ABO blood group system is an example of which of the following?

- W) Complete dominance
- X) Incomplete dominance
- Y) Co-dominance
- Z) Epistatic dominance

ANSWER: Y) CO-DOMINANCE

TOSS-UP

7) Earth and Space – *Short Answer* What term refers to the top-most layer of a thermally stratified lake?

ANSWER: EPILIMNION

BONUS

7) Earth and Space – *Short Answer* What specific type of eclipse occurs when the edges of the sun's photosphere are visible around the edges of the moon?

ANSWER: ANNULAR ECLIPSE



TOSS-UP

8) Energy – *Short Answer* Until the 1900s, what was the major source of energy for businesses and industry in the United States?

ANSWER: COAL

BONUS

8) Energy – *Multiple Choice* Which of the following is considered a non-renewable resource?

- W) Biomass
- X) Wind
- Y) Ethanol
- Z) Uranium

ANSWER: Z) URANIUM

TOSS-UP

9) Math – *Short Answer* Determine the domain of the function: $g(x)$ = the fraction with numerator $2x - 2$ and denominator $4x^2 - 36x + 81$.

ANSWER: All real numbers except $x = 9/2$

BONUS

9) Math – *Short Answer* Simplify the following expression, if a and b are non-zero:
open parenthesis $96a^7b^3 - 64a^3b$ close parenthesis over $8a^2b$.

ANSWER: $12a^5b^2 - 8a$

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### TOSS-UP

10) Physical Science – *Multiple Choice* What type of heat transfer is demonstrated when a metal spoon placed in an operational frying pan heats up enough to burn anyone that directly touches the spoon?

- W) Convection
- X) Conduction
- Y) Enthalpy
- Z) Radiation

ANSWER: X) CONDUCTION

### BONUS

10) Physical Science – *Short Answer* What specific type of intermolecular force occurs between two atoms of neon?

ANSWER: LONDON DISPERSION

### TOSS-UP

11) Life Science – *Multiple Choice* Which of the following cells stimulate macrophages, B cells, and T cells?

- W) Suppressor T cells
- X) Memory cells
- Y) Helper T cells
- Z) Cytotoxic T cells

ANSWER: Y) HELPER T CELLS

### BONUS

11) Life Science – *Multiple Choice* Which of the following types of plant cell tissue is considered the least specialized?

- W) Apical meristematic
- X) Parenchyma [*pahr-ehn-ky-muh*]
- Y) Collenchyma [*cohl-ehn-ky-muh*]
- Z) Sclerenchyma [*skleh-rehn-ky-muh*]

ANSWER: X) PARENCHYMA

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TOSS-UP

12) General Science – *Multiple Choice* Which of the following is not found in proteins?

- W) Nitrogen
- X) Hydrogen
- Y) Oxygen
- Z) Phosphorous

Answer: Z) PHOSPHOROUS

BONUS

12) General Science – *Multiple Choice* Which of the following is correct about catalysts?

- W) All catalysts are proteins
- X) All catalysts lower activation energy
- Y) All catalysts are consumed during reactions
- Z) All catalysts are enzymes

Answer: X) ALL CATALYSTS LOWER ACTIVATION ENERGY

TOSS-UP

13) Physical Science – *Multiple Choice* A longitudinal mechanical wave causes particles of a material to move:

- W) Back and forth in the same direction the wave is moving
- X) Perpendicular to the direction the wave is moving
- Y) In a circular motion parallel to the direction the wave is moving
- Z) In a circular motion perpendicular to the direction the wave is moving

ANSWER: W) BACK AND FORTH IN THE SAME DIRECTION THE WAVE IS MOVING

BONUS

13) Physical Science – *Multiple Choice* Which of the following laws would be most useful for determining the change in volume of a gas as it changes temperature at constant pressure?

- W) Charles' law
- X) Boyle's law
- Y) Gay-Lussac's law
- Z) Avogadro's law

ANSWER: W) CHARLES' LAW

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### TOSS-UP

14) General Science – *Short Answer* What is the term for the catalytically-active complex that consists of an apoenzyme and the cofactor that gives it activity?

ANSWER: HOLOENZYME

### BONUS

14) General Science – *Short Answer* Name the three domains of life.

ANSWER: ARCHAEA, BACTERIA, AND EUKARYA (EUKARYOTES)

**TOSS-UP**

15) Earth and Space – *Short Answer* If a star was twice as far away than it originally was, how much fainter would it appear to be?

ANSWER: FOUR TIMES

**BONUS**

15) Earth and Space – *Short Answer* What is the third most common gas in the atmosphere?

ANSWER: ARGON



**TOSS-UP**

16) Energy – *Short Answer* Approximately one-third of the electricity in the United States comes from what fossil fuel source?

ANSWER: COAL

**BONUS**

16) Energy – *Short Answer* What series of elements which includes neodymium, has a variety of applications, including magnets, superconductors, catalysis, and quantification of antibodies?

ANSWER: LANTHANIDES

### TOSS-UP

17) Math – *Short Answer* If the radius of a right circular cylinder is quadrupled, by what factor must the height be multiplied in order to keep the volume the same?

ANSWER: 1/16

### BONUS

17) Math – *Short Answer* Two people take turns counting, starting by saying “1,” then “1, 2,” then “1, 2, 3,” and so on. What is the 54th number spoken?

ANSWER: NINE



### TOSS-UP

18) Life Science – *Multiple Choice* Which of the following is not considered a plant organ?

- W) Roots
- X) Stems
- Y) Leaves
- Z) Sieve-tube elements

ANSWER: Z) SIEVE-TUBE ELEMENTS

### BONUS

18) Life Science – *Short Answer* What functional group is characteristic of ketones and aldehydes?

ANSWER: CARBONYL

### TOSS-UP

19) Earth and Space – *Short Answer* The temperature and luminosity of what celestial objects are plotted on Hertzsprung-Russel diagrams?

ANSWER: STARS

### BONUS

19) Earth and Space – *Short Answer* What planet in the solar system is less dense than water?

ANSWER: SATURN



### TOSS-UP

20) Life Science – *Short Answer* RNA molecules can be catalysts that are called what?

ANSWER: RIBOZYMES

### BONUS

20) Life Science – *Multiple Choice* The cardiac center is located in which of the following structures?

W) Medulla [*meh-dull-ah*]

X) Pons

Y) Hypothalamus

Z) Cerebellum

ANSWER: W) MEDULLA

### TOSS-UP

21) General Science – *Multiple Choice* A scientist has a sample containing lithium, sodium, sulfur, and magnesium. In a flame test, which of the following elements will burn red?

- W) Lithium
- X) Sodium
- Y) Sulfur
- Z) Magnesium

ANSWER: W) LITHIUM

### BONUS

21) General Science – *Short Answer* What acid-base indicator is colorless below pH 8 and was previously used as a laxative?

ANSWER: PHENOLPHTHALEIN



### TOSS-UP

22) Math – *Multiple Choice* Which of the following illustrates a pair of dependent events?

- W) Choose a pair of jeans. Then choose a shirt.
- X) Roll two dice. Then pick a card.
- Y) Choose a food from a buffet. Then choose a different food.
- Z) Choose a marble from a bag. Replace it. Choose a marble again.

ANSWER: Y) CHOOSE A FOOD FROM A BUFFET. THEN CHOOSE A DIFFERENT FOOD.

### BONUS

22) Math – *Short Answer* If the length and width of a rectangle are each increased by 50%, by what factor is the perimeter multiplied?

ANSWER: 1.5 (ACCEPT: 3/2, 150%)

### TOSS-UP

23) Physical Science – *Short Answer* At what point on a pressure-temperature diagram does gas, liquid, and solid coexist?

ANSWER: TRIPLE POINT

### BONUS

23) Physical Science – *Multiple Choice* An atom of radon-222 loses an alpha particle to become a more stable atom of which of the following?

- W) Radium
- X) Bismuth
- Y) Polonium
- Z) Radon

ANSWER: Y) POLONIUM