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

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

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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: \( g(x) = \frac{2x - 2}{4x^2 - 36x + 81} \).

ANSWER: All real numbers except \( x = 9/2 \)

BONUS

9) Math – Short Answer  Simplify the following expression, if \( a \) and \( b \) are non-zero:
\[
\frac{96a^7b^3 - 64a^3b^2}{8a^2b}.
\]

ANSWER: \( 12a^5b^2 - 8a \)

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 WA VE 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

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**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

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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

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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