

ROUND 17A

TOSS-UP

1) Energy – *Short Answer* What technology is designed to harvest energy from the thermal gradient in the oceans?

ANSWER: OTEC (ACCEPT: OCEAN THERMAL ENERGY CONVERSION)

BONUS

1) Energy – *Multiple Choice* Which of the following is NOT possible using a solar box cooker?

- W) Boiling water
- X) Sterilizing water
- Y) Pasteurizing milk
- Z) Purifying anhydrous ethanol

ANSWER: Z) PURIFYING ANHYDROUS ETHANOL

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### TOSS-UP

2) Physical Science – *Multiple Choice* What is the molecular geometry of methane?

- W) Linear
- X) Bent
- Y) Trigonal pyramidal
- Z) Tetrahedral

ANSWER: Z) TETRAHEDRAL

### BONUS

2) Physical Science – *Short Answer* What principle states that each point on a wave front is a source of a new wavelet?

ANSWER: HUYGEN'S PRINCIPLE

### TOSS-UP

3) Math – *Short Answer* Express the following as a mixed number: the fraction with numerator 5/6 and denominator 25/72.

ANSWER: 2 AND 2/5

### BONUS

3) Math – *Short Answer* Find the volume, in cubic meters, of a rectangular pyramid measuring 17 meters and 18 meters along the base and 17 meters in height.

ANSWER: 1734

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TOSS-UP

4) Life Science – *Short Answer* Identify all of the following three organisms that are considered gastropods: 1) Snails; 2) Clam; 3) Squid.

ANSWER: 1

BONUS

4) Life Science – *Multiple Choice* Which of the following are not found in both prokaryotes and eukaryotes?

- W) Flagella
- X) Ribosomes
- Y) Mitochondria
- Z) Plasma membrane

ANSWER: Y) MITOCHONDRIA

TOSS-UP

5) Earth and Space – *Short Answer* Type IA [*ONE-A*] supernovas are associated with what type of star?

ANSWER: WHITE DWARF

BONUS

5) Earth and Space – *Multiple Choice* Which of the following is an ore of zinc?

- W) Chalcocite [*kal-kuh-site*]
- X) Malachite [*mal-uh-kite*]
- Y) Sphalerite [*sfah-luh-right*]
- Z) Dolomite

ANSWER: Y) SPHALERITE

TOSS-UP

6) General Science – *Short Answer* What mechanism controls the passage of substances from the blood to the cerebrospinal fluid and is a structure composed of astrocytes?

ANSWER: BLOOD-BRAIN BARRIER

BONUS

6) General Science – *Short Answer* What term describes the change in displacement per unit time?

ANSWER: VELOCITY (DO NOT ACCEPT: SPEED)

TOSS-UP

7) Life Science – *Multiple Choice* Which of the following hormones plays a major role in the male reproductive system?

- W) Androgens
- X) Estrogens
- Y) Mineralocorticoids
- Z) Glucocorticoids

ANSWER: W) ANDROGENS

BONUS

7) Life Science – *Short Answer* What reproductive cells do ferns release into the air?

ANSWER: SPORES

TOSS-UP

8) Energy – *Multiple Choice* Oil components are separated using what process?

- W) Evaporation
- X) Fractional distillation
- Y) Fracking
- Z) Chromatography

ANSWER: X) FRACTIONAL DISTILLATION

BONUS

8) Energy – *Short Answer* The U.S. Department of Energy has created safety measures for the disposal of compact fluorescent lightbulbs because they contain what hazardous element?

ANSWER: MERCURY

TOSS-UP

9) Physical Science – *Multiple Choice* Hydrogen, with its one electron, produces a line spectrum in the visible light range with:

- W) One color line
- X) Two color lines
- Y) Three color lines
- Z) Four color lines

ANSWER: Z) FOUR COLOR LINES

BONUS

9) Physical Science – *Multiple Choice* The Doppler effect occurs:

- W) Only in sound waves
- X) Only in longitudinal waves
- Y) Only in transverse waves
- Z) In all types of waves

ANSWER: Z) IN ALL TYPES OF WAVES

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### TOSS-UP

10) Earth and Space – *Short Answer* A bowshock is found where a planet's magnetic field deflects what?

ANSWER: SOLAR WIND

### BONUS

10) Earth and Space – *Short Answer* Xerophytes are plants most likely to be found in what biome?

ANSWER: DESERT

### TOSS-UP

11) Math – *Short Answer* Points A, B, and C all lie on circle O. What is the measure of Angle ABC in degrees if it intercepts an arc of  $112^\circ$ ?

ANSWER: 56

### BONUS

11) Math – *Short Answer* Convert 102 in base 10 to base 7.

ANSWER: 204

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TOSS-UP

12) General Science – *Multiple Choice* Which of the following terms is used to describe substances that reduce pain without causing unconsciousness?

W) Analgesic [*an-uhl-jee-sik*]

X) Anesthetic

Y) Astringent

Z) Anaboloid

ANSWER: W) ANALGESIC

BONUS

12) General Science – *Short Answer* Which general type of material is added to a reaction in order to lower the activation energy, thus making it proceed faster?

ANSWER: CATALYST

TOSS-UP

13) Math – *Short Answer* What fraction is halfway between $1/5$ th and $1/3$ rd on the number line?

ANSWER: $4/15$ th

BONUS

13) Math – *Short Answer* If b and c satisfy the system of equations $6b + 7 = 12c$ and $3b - 9c = 4$, what is c ?

ANSWER: $-5/2$ (ACCEPT: -2.5 , $-2\frac{1}{2}$)



TOSS-UP

14) Life Science – *Short Answer* What genomic elements are capable of moving randomly throughout the genome?

ANSWER: TRANSPOSONS (ACCEPT: JUMPING GENES)

BONUS

14) Life Science – *Short Answer* What type of virus solely infects bacteria?

ANSWER: BACTERIOPHAGES (ACCEPT: PHAGES)

TOSS-UP

15) Energy – *Short Answer* What process breaks down heavy hydrocarbons into smaller ones?

ANSWER: CRACKING

BONUS

15) Energy – *Short Answer* The Fischer-Tropsch process converts hydrogen and carbon dioxide into what?

ANSWER: HYDROCARBONS

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### TOSS-UP

16) Physical Science – *Multiple Choice* Which of the following electron configurations would be the most chemically stable?

W)  $[\text{He}]2s^1$  [*H-E-2-S-1*]

X)  $[\text{He}]2s^2$  [*H-E-2-S-2*]

Y)  $[\text{He}]2s^22p^5$  [*H-E-2-S-2-P-5*]

Z)  $[\text{He}] 2s^22p^6$  [*H-E-2-S-2-2-P-6*]

ANSWER: Z)  $[\text{He}]2s^22p^6$

### BONUS

16) Physical Science – *Multiple Choice* A permanent magnet has magnetic properties due to which of the following?

W) The magnetic fields of its electrons are balanced

X) Magnetic monopoles accumulate at the ends

Y) The magnetic domains have parallel magnetizations

Z) Its magnetic dipole moment is zero

ANSWER: Y) THE MAGNETIC DOMAINS HAVE PARALLEL MAGNETIZATIONS



### TOSS-UP

17) General Science – *Multiple Choice* Taxol is a drug used to treat which of the following disorders?

- W) Malaria
- X) Cystic fibrosis
- Y) Tuberculosis
- Z) Cancer

ANSWER: Z) CANCER

### BONUS

17) General Science – *Short Answer* A Hall-Heroult cell is used industrially for the extraction of what metal?

ANSWER: ALUMINUM

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TOSS-UP

18) Earth and Space – *Short Answer* What interstellar clouds consist of neutral hydrogen?

ANSWER: HI REGIONS

BONUS

18) Earth and Space – *Multiple Choice* Which of the following correctly explains why liquid fuel rockets are preferred over solid fuel rockets for long term space missions?

- W) Liquid fuel rockets can store more fuel
- X) The use of liquid fuel rockets can be stopped and restarted
- Y) Liquid fuel is safer than solid fuel
- Z) Liquid fuel is less volatile than solid fuel

ANSWER: X) THE USE OF LIQUID FUEL ROCKETS CAN BE STOPPED AND RESTARTED

TOSS-UP

19) Math – *Short Answer* What is the greatest common factor of the terms in the polynomial $3x^2y^2 + 12yz^2 + 6xy^3z$?

ANSWER: $3y$

BONUS

19) Math – *Short Answer* Jason needs to buy 2 pairs of jeans and 4 shirts. Jeans costs \$15.24 and shirts cost \$12.56. He gave the cashier \$100 and received his change. If he also wants to buy a coat that costs \$30.75, how much more money does he need?

ANSWER: \$11.47

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### TOSS-UP

20) Physical Science – *Short Answer* Identify all of the following units that are considered SI units: 1) Kilogram; 2) Metric ton; 3) Fahrenheit.

ANSWER: 1

### BONUS

20) Physical Science – *Short Answer* You are standing 100 meters from a concrete wall and your friend Billy is 200 meters farther away, on the same side of the wall. When you make a loud, barbaric yelling sound, Billy hears both the original sound and the echo. If the speed of sound in air is taken to be 300 meters per second, what is the difference in time, in seconds as a decimal rounded to the hundredths place, between when Billy hears the original yell versus the echoed yell off of the concrete building?

ANSWER: 0.67

### TOSS-UP

21) General Science – *Multiple Choice* In the brain, the occipital lobe is primarily involved in which bodily function?

- W) Movement
- X) Vision
- Y) Body sensation
- Z) Hearing

ANSWER: X) VISION

### BONUS

21) General Science – *Short Answer* What extract from red seaweed is used as a gelling agent in microbiology labs for making bacterial cell cultures?

ANSWER: AGAR



### TOSS-UP

22) Earth and Space – *Short Answer* What type of optical aberration occurs because different wavelengths of light have slightly different indices of refraction?

ANSWER: CHROMATIC ABERRATION

### BONUS

22) Earth and Space – *Short Answer* What kind of particles will be detected in a massive surge just before a supernova?

ANSWER: NEUTRINOS

### **TOSS-UP**

23) Life Science – *Short Answer* Sharks are in the class Chondrichthyes [*kon-drik-theez*], because they have a skeleton made of what substance?

ANSWER: CARTILAGE

### **BONUS**

23) Life Science – *Short Answer* What type of plant cells have thin, flexible primary walls and perform most of the metabolic functions of the plant?

ANSWER: PARENCHYMA