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

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

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 \textit{[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 \textit{[kal-kuh-site]}
X) Malachite \textit{[mal-uh-kite]}
Y) Sphalerite \textit{[sfah-luh-right]}
Z) Dolomite

ANSWER: Y) SPHALERITE

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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

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°?

ANSWER: 56

BONUS


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-uhr-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 1/5th and 1/3rd on the number line?

ANSWER: 4/15th

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, -2½)

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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

TOSS-UP

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

W) [He]2s^1 [H-E-2-S-1]
X) [He]2s^2 [H-E-2-S-2]
Y) [He]2s^22p^5 [H-E-2-S-2-P-5]
Z) [He] 2s^22p^6 [H-E-2-S-2-P-6]

ANSWER: Z) [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
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

17) General Science – Short Answer  

A Hall-Heroult cell is used industrially for the extraction of what metal?

ANSWER: ALUMINUM

18) Earth and Space – Short Answer  

What interstellar clouds consist of neutral hydrogen?

ANSWER: HI REGIONS

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

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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 Chondricthyes [*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