ROUND 7A

TOSS-UP

1) Energy – Multiple Choice  Approximately what percentage of energy used by an incandescent lightbulb is converted to light?

W) 10  
X) 30  
Y) 50  
Z) 70

ANSWER: W) 10

BONUS

1) Energy – Multiple Choice  Which of the following is NOT a baseload power source?

W) Coal  
X) Geothermal  
Y) Solar  
Z) Natural gas

ANSWER: Y) SOLAR

TOSS-UP

2) General Science – Multiple Choice  Which of the following is a unit for air pressure?

W) Isotherm  
X) Degree  
Y) Millibar  
Z) Newton

ANSWER: Y) MILLIBAR

BONUS

2) General Science – Multiple Choice  In which of the following disciplines is there NOT a prize awarded by the Nobel committee?

W) Medicine  
X) Chemistry  
Y) Biology  
Z) Physics

ANSWER: Y) BIOLOGY
TOSS-UP

3) Life Science – *Short Answer* Charles Darwin studied what type of bird before positing his theory of natural selection?

ANSWER: FINCHES (ACCEPT: GALAPAGOS FINCHES)

BONUS

3) Life Science – *Multiple Choice* Pollination of flowering plant species is carried out primarily by which of the following?

W) Wind
X) Insects
Y) Birds
Z) Mammals

ANSWER: X) INSECTS

TOSS-UP

4) Earth and Space – *Multiple Choice* Which of the following minerals is softest?

W) Quartz
X) Topaz
Y) Calcite
Z) Orthoclase

ANSWER: Y) CALCITE

BONUS

4) Earth and Space – *Short Answer* Identify all of the following four processes of the water cycle that remove water vapor from Earth’s atmosphere: 1) Deposition; 2) Transpiration; 3) Sublimation; 4) Precipitation

ANSWER: 1 AND 4 (DEPOSITION AND PRECIPITATION)
TOSS-UP

5) Math – Short Answer  Round 4,197.56 to the nearest hundred.

ANSWER: 4,200

BONUS

5) Math – Short Answer  To the nearest whole number, what is the length of the hypotenuse in a right triangle with legs of length 14 and 9?

ANSWER: 17

TOSS-UP

6) Physical Science – Multiple Choice  When an object’s mass doubles and its velocity stays the same, by what factor is its kinetic energy multiplied?

W) 1/4
X) 1/2
Y) 2
Z) 4

ANSWER: Y) 2

BONUS

6) Physical Science – Short Answer  What type of heat transfer causes your bread to be heated in a toaster?

ANSWER: RADIATION
TOSS-UP

7) Energy  –  Short Answer  What renewable chemical, commonly derived from corn, is regularly added to gasoline in the United States?

ANSWER: ETHANOL (ACCEPT: ETHYL ALCOHOL)

BONUS

7) Energy  –  Short Answer  Identify all of the following 3 sources from which bioenergy can be derived: 1) Plants; 2) Forest waste; 3) Household waste.

ANSWER: ALL OF THEM

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TOSS-UP

8) General Science  –  Multiple Choice  Scientists in which of the following branches of Earth science are most likely to use a submersible, sonar, and bathymetry as tools?

W) Astronomy
X) Oceanography
Y) Hydrology
Z) Meteorology

ANSWER: X) OCEANOGRAPHY

BONUS

8) General Science  –  Multiple Choice  To extinguish a fire in a beaker containing a solvent, the first step should be to:

W) Cover the beaker with a glass plate
X) Pour water over the solvent
Y) Use a class D extinguisher
Z) Blow quickly and forcefully across the top of the beaker

ANSWER: W) COVER THE BEAKER WITH A GLASS PLATE
TOSS-UP

9) Life Science – Multiple Choice Conservation biology tries to preserve which of the following ecosystem characteristics?

W) Large population size for all inhabiting species
X) Large population size for all inhabiting mammals
Y) Elevated biodiversity for all forms of life
Z) Elevated biodiversity for all macroscopic forms of life

ANSWER: Y) ELEVATED BIODIVERSITY FOR ALL FORMS OF LIFE

BONUS

9) Life Science – Short Answer What group of signaling proteins increases the resistance of cells against viral attack?

ANSWER: INTERFERONS (ACCEPT: IFN’s)

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TOSS-UP

10) Math – Short Answer If two concentric circles have radii of 4 and 11, respectively, what is the area of the region between them?

ANSWER: 105π

BONUS

10) Math – Short Answer Solve the following equation for x: \( \frac{x}{3} + 5 = 2x + \frac{1}{2} \).

ANSWER: \( x = \frac{27}{10} \) (ACCEPT: 2.7 OR 2 7/10)
TOSS-UP

11) Physical Science – *Multiple Choice* Of solids, liquids, and gases, which of them can conduct thermal energy?

W) Solids only  
X) Liquids only  
Y) Solids and liquids only  
Z) Solids, liquids and gases

ANSWER: Z) SOLIDS, LIQUIDS AND GASES

BONUS

11) Physical Science – *Short Answer* Lithium is well-suited for use in lightweight batteries for fuel-efficient transportation like electric cars and aircraft such as the 787 Dreamliner because of its low atomic mass. Atoms of what two elements are less massive than lithium?

ANSWER: HYDROGEN, HELIUM

TOSS-UP

12) Earth and Space – *Short Answer* What blue star is the brightest star in the constellation Orion?

ANSWER: RIGEL

BONUS

12) Earth and Space – *Multiple Choice* Which of the following rock types is most likely to contain organic matter?

W) Metamorphic  
X) Sedimentary  
Y) Extrusive igneous  
Z) Intrusive igneous

ANSWER: X) SEDIMENTARY
TOSS-UP

13) Math – Short Answer  Evaluate negative 5 times open parenthesis –3a – 4b close parenthesis when a = 12 and b = 12.

ANSWER: 420

BONUS

13) Math – Short Answer  The sum of three numbers is 50. The smallest number is one-sixth the largest number. The sum of the two largest numbers is 45. What is the middle number?

ANSWER: 15

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TOSS-UP

14) Physical Science – Short Answer  As the wavelength of a wave increases, what happens to its frequency if the speed is constant?

ANSWER: IT DECREASES

BONUS

14) Physical Science – Short Answer  As coal is turned into electricity to run a computer, its energy will take several forms. Arrange the following types of energy into the order they will appear during this transformation: 1) Electrical; 2) Chemical; 3) Heat; 4) Mechanical.

ANSWER: 2, 3, 4, 1  (ACCEPT: CHEMICAL, HEAT, MECHANICAL, ELECTRICAL)
TOSS-UP

15) Life Science – Multiple Choice  Which of the following allows fungi to feed more efficiently?

W) Fruiting Body
X) Mycelium
Y) Spores
Z) Chitin

ANSWER: X) MYCELIUM

BONUS

15) Life Science – Short Answer  What part of a plant embryo develops into the roots?

ANSWER: RADICLE

TOSS-UP

16) General Science – Multiple Choice  Which of the following best explains why Erlenmeyer flasks are good for mixing samples?

W) Magnetic stirrers can easily enter and exit the mouth
X) They have straight sides that allow for complete mixing
Y) They have slanted sides that prevent spilling and don't require additional stirring equipment
Z) Their narrow necks make pouring and transferring spill resistant

ANSWER: Y) THEY HAVE SLANTED SIDES THAT PREVENT SPILLING AND DON'T REQUIRE ADDITIONAL STIRRING EQUIPMENT

BONUS

16) General Science – Short Answer  What is the SI unit for temperature?

ANSWER: KELVIN  (DO NOT ACCEPT: DEGREES KELVIN)
TOSS-UP

17) Energy – Short Answer  What U.S. state produced the most energy via hydropower in 2014?

ANSWER: WASHINGTON

BONUS

17) Energy – Short Answer  What is the chemical name of the gas found within underground coal beds that can be recovered and used as natural gas?

ANSWER: METHANE

TOSS-UP

18) Earth and Space – Multiple Choice  Which of the following is most responsible for the change of seasons?

W) The phases of the Moon  
X) The distribution of continents and oceans  
Y) The tilt of Earth's axis  
Z) The elliptical shape of Earth's orbit

ANSWER: Y) THE TILT OF EARTH'S AXIS

BONUS

18) Earth and Space – Multiple Choice  The color of a star is most closely related to which of its other properties?

W) Composition  
X) Pressure  
Y) Temperature  
Z) Magnetism

ANSWER: Y) TEMPERATURE
TOSS-UP

19) Physical Science – Short Answer  What is the common name of the NH₄⁺ ion?

ANSWER: AMMONIUM

BONUS

19) Physical Science – Short Answer  What is the speed of light, in meters per second and in scientific notation with one significant figure, through a medium with a refractive index of 1.5?

ANSWER: 2 TIMES 10 TO THE 8TH POWER

TOSS-UP

20) Math – Short Answer  If a right triangle has an exterior angle of measure 175 degrees, what is the degree measure of the larger of its acute interior angles?

ANSWER: 85

BONUS

20) Math – Short Answer  What are the mean and median, respectively, of the following list of six numbers: 10, 2, 5, 7, 3, 9?

ANSWER: 6 and 6
**TOSS-UP**

21) Physical Science – *Multiple Choice*  Which of the following forces always causes a loss of energy in a mechanical system?

W) Gravitational  
X) Normal  
Y) Buoyancy  
Z) Friction

ANSWER: Z) FRICTION

**BONUS**

21) Physical Science – *Multiple Choice*  Which of the following is a diprotic acid?

W) HCl  
X) H$_2$SO$_4$  
Y) H$_3$PO$_4$  
Z) HC$_2$H$_3$O$_2$

ANSWER: X) H$_2$SO$_4$

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**TOSS-UP**

22) Earth and Space – *Multiple Choice*  Which of the following best describes why Earth has a magnetic field?

W) The inner core contains solid iron  
X) The outer core contains liquid iron  
Y) The Moon exerts a gravitational pull  
Z) The Sun exerts a gravitational pull

ANSWER: X) THE OUTER CORE CONTAINS LIQUID IRON

**BONUS**

22) Earth and Space – *Short Answer*  The Nazca [NAZ-kah] Plate is located off the western margin of what continent?

ANSWER: SOUTH AMERICA
TOSS-UP

23) Life Science  –  Short Answer  What two structures in humans contain hydroxyapatite?

ANSWER: BONES AND TEETH

BONUS

23) Life Science  –  Multiple Choice  Which of the following adjectives best describes the spores that are produced during fungal asexual reproduction?

W) Haploid  
X) Diploid  
Y) Heterokaryotic  
Z) Zygotic

ANSWER: W) HAPLOID