

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

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### 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

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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

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**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: ETHYLY 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:  $105\pi$

**BONUS**

10) Math – *Short Answer* Solve the following equation for  $x$ :  $x/3 + 5 = 2x + 1/2$ .

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

**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

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**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

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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 NH_4^+ 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

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**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<sub>2</sub>SO<sub>4</sub>
- Y) H<sub>3</sub>PO<sub>4</sub>
- Z) HC<sub>2</sub>H<sub>3</sub>O<sub>2</sub>

ANSWER: X) H<sub>2</sub>SO<sub>4</sub>

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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