

ROUND 6A

TOSS-UP

1) Physical Science – *Short Answer* What metal is used as the filament in modern incandescent light bulbs?

ANSWER: TUNGSTEN

BONUS

1) Physical Science – *Short Answer* Name the process during which nuclear energy is released when the nuclei of hydrogen atoms are combined to form helium.

ANSWER: FUSION (ALSO ACCEPT: NUCLEAR FUSION)

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**TOSS-UP**

2) Earth and Space – *Multiple Choice* Which of the following is the underlying cause of most volcanoes on Earth?

- W) Meteor impacts
- X) Tidal forces
- Y) Plate tectonics
- Z) Weather patterns

ANSWER: Y) PLATE TECTONICS

**BONUS**

2) Earth and Space – *Multiple Choice* Which of the following solar system objects are made up of mostly dust and ice?

- W) Comets
- X) Asteroids
- Y) Dwarf planets
- Z) Jovian planets

ANSWER: W) COMETS

**TOSS-UP**

3) Energy – *Short Answer* What US state produces the most anthracite coal?

ANSWER: PENNSYLVANIA

**BONUS**

3) Energy – *Multiple Choice* The majority of nuclear fission technology currently utilizes what group of elements on the periodic table?

- W) Halogens
- X) Lanthanides
- Y) Actinides
- Z) Rare earth metals

ANSWER: Y) ACTINIDES

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TOSS-UP

4) Math – *Short Answer* A right triangle has hypotenuse with length 5 times the square root of 5. One of the legs is of length 5. What is the length of the other leg?

ANSWER: 10

BONUS

4) Math – *Short Answer* Compute the mean of the following list of 5 numbers: 23, 25, 27, 31, 34.

ANSWER: 28

TOSS-UP

5) Life Science – *Multiple Choice* Which of the following is the porcupine's primary mode of defense from predators?

- W) Throwing quills
- X) Poisoned quills
- Y) Barbed quills
- Z) Musky spray

ANSWER: Y) BARBED QUILLS

BONUS

5) Life Science – *Multiple Choice* Marsupials are far more abundant and diverse in Australia than in North and South America. Which of the following best explains why only three families of marsupials are found outside the Australian region?

- W) Divergent evolution
- X) Convergent evolution
- Y) Parallel evolution
- Z) Antiparallel evolution

ANSWER: W) DIVERGENT EVOLUTION

TOSS-UP

6) General Science – *Multiple Choice* In a chemical equation, the number of molecules of a given substance is indicated by which of the following?

- W) Coefficient
- X) Superscript
- Y) Subscript
- Z) Degree

ANSWER: W) COEFFICIENT

BONUS

6) General Science – *Multiple Choice* Which of the following is the best practice to follow to dilute a concentrated acid?

- W) Add small quantities of water to the acid sample
- X) Calculate and add the exact amount of water to the acid sample quickly, while stirring constantly
- Y) Add small quantities of acid to a quantity of water
- Z) Calculate and add the exact amount of acid to water quickly, while stirring constantly

ANSWER: Y) ADD SMALL QUANTITIES OF ACID TO A QUANTITY OF WATER

TOSS-UP

7) Energy – *Short Answer* In comparison to diesel, biodiesel contains virtually none of what element, the burning of which is known to contribute to acid rain?

ANSWER: SULFUR

BONUS

7) Energy – *Multiple Choice* Which of the following countries produces the greatest percentage of its electricity from nuclear energy?

- W) Germany
- X) Hungary
- Y) Russia
- Z) Switzerland

ANSWER: X) HUNGARY

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**TOSS-UP**

8) Physical Science – *Short Answer* When a sample of uranium undergoes a fission reaction, what type of particle initiates the chain reaction?

ANSWER: NEUTRONS

**BONUS**

8) Physical Science – *Short Answer* A ball is dropped from the top of a 100-foot-tall building. How long in seconds does it take to reach the ground?

ANSWER: 2.5 (ACCEPT: 5/2, 2 ½)

**TOSS-UP**

9) General Science – *Multiple Choice* Which of the following best describes a hypothesis?

- W) A proposed explanation for a narrow set of phenomena
- X) Broad explanations for a wide range of phenomena
- Y) A plan to measure observable phenomena
- Z) An opinion based on observations of phenomena

ANSWER: W) A PROPOSED EXPLANATION FOR A NARROW SET OF PHENOMENA

**BONUS**

9) General Science – *Multiple Choice* What metric prefix represents one quadrillionth?

- W) Femto
- X) Pico
- Y) Atto
- Z) Zepto

ANSWER: W) FEMTO

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TOSS-UP

10) Earth and Space – *Short Answer* Galena is the primary ore of what metal?

ANSWER: LEAD

BONUS

10) Earth and Space – *Multiple Choice* Which of the following is most responsible for the formation of the Great Lakes?

- W) Rain
- X) Wind
- Y) Glaciers
- Z) Meteor impacts

ANSWER: Y) GLACIERS

TOSS-UP

11) Math – *Short Answer* The regular price for jeans is \$35 per pair, but today's sale is ten percent off when you buy two pairs. What is the sale price for four pairs of jeans?

ANSWER: \$126

BONUS

11) Math – *Multiple Choice* If x varies inversely as the cube root of y and x equals 3 when y equals 27, what is the constant of proportionality?

- W) $1/3$
- X) 1
- Y) 3
- Z) 9

ANSWER: Z) 9

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**TOSS-UP**

12) Life Science – *Multiple Choice* What organelle in the cell contains enzymes for digestion?

- W) Central vacuole
- X) Endoplasmic reticulum
- Y) Lysosome
- Z) Golgi apparatus

ANSWER: Y) LYSOSOME

**BONUS**

12) Life Science – *Short Answer* What fibrous protein makes up fingernails and hair?

ANSWER: KERATIN

**TOSS-UP**

13) Physical Science – *Short Answer* What is the SI unit of electrical resistance?

ANSWER: OHM

**BONUS**

13) Physical Science – *Short Answer* What do AM and FM stand for as related to radio transmission?

ANSWER: AMPLITUDE MODULATION AND FREQUENCY MODULATION

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TOSS-UP

14) Life Science – *Multiple Choice* Which of the following plant structures is most closely associated with land plants?

- W) Vascular tissues
- X) Pollen grains
- Y) Leaves
- Z) Roots

ANSWER: X) POLLEN GRAINS

BONUS

14) Life Science – *Short Answer* What disease is caused by *Plasmodium* protozoans?

ANSWER: MALARIA

TOSS-UP

15) General Science – *Multiple Choice* During a dissection, which of the following is the best tool for cutting bone?

- W) Satterlee saw
- X) Scalpel
- Y) Blade
- Z) Scissors

ANSWER: W) SATTERLEE SAW

BONUS

15) General Science – *Multiple Choice* Which of the following is the SI derived unit of measurement of pressure?

- W) Atmosphere
- X) Millibar
- Y) Millimeter of mercury
- Z) Pascal

ANSWER: Z) PASCAL

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**TOSS-UP**

16) Earth and Space – *Multiple Choice* Which of the following planets has an orbital period less than one Earth year?

- W) Earth
- X) Mars
- Y) Venus
- Z) Jupiter

ANSWER: Y) VENUS

**BONUS**

16) Earth and Space – *Short Answer* Identify all of the following three landforms that are types of glacial lakes: 1) Kettle; 2) Drumlin; 3) Tarn.

ANSWER: 1 AND 3 (KETTLE AND TARN)



**TOSS-UP**

17) Math – *Multiple Choice* The equation open parenthesis  $x + 2$  close parenthesis  $+ 8 = x + 10$  illustrates the use of which of the following properties of whole-number addition?

- W) Associative
- X) Commutative
- Y) Distributive
- Z) Identity

ANSWER: W) ASSOCIATIVE

**BONUS**

17) Math – *Short Answer* Evaluate the following expression: 27 plus 3 times 4 minus 4.

ANSWER: 35

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TOSS-UP

18) Energy – *Short Answer* Many of the experiments at our National Laboratories need to take place at extremely low temperatures. What is the branch of physics called that deals with the production and effects of very low temperatures?

ANSWER: CRYOGENICS (ALSO ACCEPT: CRYONICS)

BONUS

18) Energy – *Multiple Choice* Which of the following is the most widely used form of renewable energy worldwide?

- W) Solar energy
- X) Hydroelectric energy
- Y) Wind energy
- Z) Natural gas

ANSWER: X) HYDROELECTRIC ENERGY

TOSS-UP

19) Math – *Short Answer* If the product of two binomials is $h^2 + 2h - 120$ and one factor is $h - 10$, what is the other factor?

ANSWER: $h + 12$

BONUS

19) Math – *Short Answer* A circle has an area of 9. What is its circumference?

ANSWER: $6\sqrt{\pi}$

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**TOSS-UP**

20) Life Science – *Short Answer* What is the term for the phenomenon, often found in plants, in which an organism contains more than two complete sets of chromosomes?

ANSWER: POLYPLOIDY (ACCEPT: POLYPLOID)

**BONUS**

20) Life Science – *Multiple Choice* Ornamentation often contributes to the mating behavior and choices of animals. Male elks are highly ornamented. Which of the following types of mating system would you expect?

- W) Promiscuous
- X) Monogamous
- Y) Polyandry
- Z) Polygyny

ANSWER: Z) POLYGYN

**TOSS-UP**

21) Earth and Space – *Multiple Choice* Most of the matter that makes up the Sun is in what phase?

- W) Gas
- X) Solid
- Y) Plasma
- Z) Liquid

ANSWER: Y) PLASMA

**BONUS**

21) Earth and Space – *Short Answer* What ocean layer receives sufficient sunlight for photosynthesis?

ANSWER: PHOTIC ZONE (ACCEPT: EUPHOTIC ZONE)



**TOSS-UP**

22) Physical Science – *Short Answer* In chemical thermodynamics, what term describes the number of states in which a system can be arranged and is often thought to be a measure of disorder?

ANSWER: ENTROPY

**BONUS**

22) Physical Science – *Short Answer* A manometer is used for measuring what property of a gas?

ANSWER: PRESSURE

### TOSS-UP

23) Math – *Short Answer* Multiply the following radicals: 5 times the square root of two times seven times the square root of two.

ANSWER: 70

### BONUS

23) Math – *Short Answer* What is the area of a right triangle with hypotenuse of length 7 and one leg of length 6?

ANSWER:  $3\sqrt{13}$