

**ROUND 1**

**TOSS-UP**

1) **BIOLOGY** *Short Answer* Rough endoplasmic reticulum is named rough because it possesses what cellular structures?

ANSWER: RIBOSOMES

**BONUS**

1) **BIOLOGY** *Short Answer* In humans, backflow of blood from ventricles into atria during contraction is prevented primarily by what structures?

ANSWER: VALVES

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**TOSS-UP**

2) **CHEMISTRY** *Short Answer* What are the names for positive and negative ions, respectively?

ANSWER: POSITIVE = CATIONS; NEGATIVE = ANIONS

**BONUS**

2) **CHEMISTRY** *Short Answer* Arrange the following 4 substances in order of increasing pH: orange juice; human gastric juice; blood; aqueous ammonia

ANSWER: HUMAN GASTRIC JUICE; ORANGE JUICE; BLOOD; AQUEOUS AMMONIA

**TOSS-UP**

3) PHYSICS *Short Answer* What is the scientific term for a change in velocity per unit time?

ANSWER: ACCELERATION

**BONUS**

3) PHYSICS *Short Answer* What is the most common term in physics for the product of mass times velocity?

ANSWER: MOMENTUM

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**TOSS-UP**

4) MATH *Short Answer* What is the 5<sup>th</sup> term in the geometric progression whose first three terms are: 64, 16, 4

ANSWER: 1/4 (ACCEPT: 0.25)

**BONUS**

4) MATH *Short Answer* Giving your answer in centimeters to the first decimal place, if one leg of an isosceles right triangle is 100 centimeters long, how long is the hypotenuse?

ANSWER: 141.4

(Solution:  $c = a\sqrt{2} = 100\sqrt{2} = 141.4\text{cm}$ )

### TOSS-UP

5) EARTH SCIENCE *Short Answer* As a percentage by volume in Earth's atmosphere, what are the two most abundant gases in Earth's atmosphere?

ANSWER: NITROGEN AND OXYGEN (in any order)

### BONUS

5) EARTH SCIENCE *Short Answer* What type of glacier flows outward from a center as opposed to down a mountain valley?

ANSWER: CONTINENTAL

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### TOSS-UP

6) GENERAL SCIENCE *Multiple Choice* One kilogram is nearly equivalent to how many pounds:

- W) 454
- X) 4.54
- Y) 220
- Z) 2.2

ANSWER: Z) 2.2

### BONUS

6) GENERAL SCIENCE *Multiple Choice* Which of the following reagents would be labeled as highly flammable because of its low flash point:

- W) glycerol
- X) methanol
- Y) carbon tetrachloride
- Z) sulfuric acid

ANSWER: X) METHANOL

**TOSS-UP**

7) ASTRONOMY *Short Answer* What is the most common term for the celestial phenomenon that causes a comet's tail in our solar system to point away from the Sun?

ANSWER: THE SOLAR WIND

**BONUS**

7) ASTRONOMY *Multiple Choice* Which of the following is the BEST description of our Sun:

- W) a cool large star similar to Proxima Centauri
- X) a small-sized star about 6 billion years old
- Y) a mid-sized yellow dwarf star
- Z) a large-sized red giant about 4.7 billion years old

ANSWER: Y) A MID-SIZED YELLOW DWARF STAR

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**TOSS-UP**

8) BIOLOGY *Multiple Choice* Which of the following occurs in meiosis but NOT in mitosis:

- W) spindle apparatus attaches to kinetochores
- X) nuclear membrane is not visible
- Y) crossing over
- Z) chromosomes line up at central area of cell

ANSWER: Y) CROSSING OVER

**BONUS**

8) BIOLOGY *Short Answer* What is the anatomical term for the specific section of the small intestine into which the pancreatic duct delivers its digestive enzymes?

ANSWER: DUODENUM

**TOSS-UP**

9) CHEMISTRY *Short Answer* In the combustion of methane, if the supply of oxygen is somewhat insufficient, what colorless, odorless and poisonous gas is produced?

ANSWER: CARBON MONOXIDE (ACCEPT: CO)

**BONUS**

9) CHEMISTRY *Short Answer* Element number 19 has an isotope named potassium-40. How many neutrons does this isotope contain?

ANSWER: 21

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**TOSS-UP**

10) PHYSICS *Multiple Choice*. The amplitude of a sound wave most closely relates to its:

- W) frequency
- X) wavelength
- Y) loudness
- Z) overtones

ANSWER. Y) LOUDNESS

**BONUS**

10) PHYSICS *Short Answer* What property of a sound wave most directly determines the pitch of a violin's note?

ANSWER: FREQUENCY

**TOSS-UP**

11) MATH *Short Answer* Solve the following equation for  $x$ :  $-3|x| = -15$  (read as: minus 3 times the absolute value of  $x$  equals minus 15)

ANSWER: 5 AND  $-5$

**BONUS**

11) MATH *Short Answer* One-half of a number added to one third of the same number is 68 less than the number. What is the number?

ANSWER: 408

(Solution:  $x/2 + x/3 = x - 68$ ;  $x = 408$ )

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**TOSS-UP**

12) EARTH SCIENCE *Short Answer* Giving your answer as north, south, east, or west, from what general direction does the jet stream flow?

ANSWER: WEST

**BONUS**

12) EARTH SCIENCE *Multiple Choice* In which of the following locations would you typically expect the average salinity of surface sea water to be the HIGHEST:

- W) at the mouth of the Mississippi River
- X) in the waters above the Arctic Circle
- Y) in the Black Sea
- Z) in the Dead Sea

ANSWER: Z) IN THE DEAD SEA

**TOSS-UP**

13) GENERAL SCIENCE *Short Answer* In the mks system, what are the 3 fundamental units?

ANSWER: METERS; KILOGRAMS; SECONDS

**BONUS**

13) GENERAL SCIENCE *Short Answer* Giving your answer in scientific notation, convert 10 square meters into square millimeters:

ANSWER:  $1 \times 10^7$  (DO NOT ACCEPT:  $10^7$ )

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**TOSS-UP**

14) ASTRONOMY *Multiple Choice* Which of the following is NOT true:

- W) most of the meteorites that have been found have a high iron content
- X) a bolometer is used to measure the energy output of the Sun
- Y) the celestial coordinate analogous to latitude is called ascension
- Z) sunlight reflecting off the Earth is called Earthshine

ANSWER: Y) THE CELESTIAL COORDINATE ANALOGOUS TO LATITUDE IS CALLED ASCENSION

**BONUS**

14) ASTRONOMY *Multiple Choice* Which of the following BEST describes the zenith:

- W) the point in the sky that is at 180 degrees of inclination to the horizon
- X) 90 degrees opposite to the nadir
- Y) the opposite position on the ecliptic to an observer
- Z) the point on the celestial sphere directly overhead of an observer

ANSWER: Z) THE POINT ON THE CELESTIAL SPHERE DIRECTLY OVERHEAD OF AN OBSERVER

**TOSS-UP**

15) BIOLOGY *Multiple Choice* Which of the following MOST closely represents the location of the temporal bone in humans:

- W) above the eye
- X) cheek or lateral border of the eye
- Y) back of skull
- Z) top of skull

ANSWER: X) CHEEK OR LATERAL BORDER OF THE EYE

**BONUS**

15) BIOLOGY *Short Answer* What is the common name for the joint that is formed by the articulation of the tibia, the fibula, and the femur?

ANSWER: KNEE

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**TOSS-UP**

16) CHEMISTRY *Short Answer* How many unpaired electrons are in a neutral bromine atom?

ANSWER: 1

**BONUS**

16) CHEMISTRY *Multiple Choice* Which of the following is the term used to describe the resistance to flow of a liquid:

- W) viscosity
- X) surface tension
- Y) malleability
- Z) vapor pressure

ANSWER: W) VISCOSITY



**TOSS-UP**

17) PHYSICS *Multiple Choice* Which of the following is the most common term for the general type of wave that results from the vibration of a physical medium:

- W) mechanical
- X) electromagnetic
- Y) perfect
- Z) pulsed

ANSWER: W) MECHANICAL

**BONUS**

17) PHYSICS *Multiple Choice* Which of the following is LEAST accurate:

- W) alpha particles are the same as helium nuclei
- X) polarization of light supports the particle behavior of light
- Y) a photon is a particle of light
- Z) light slows down when it moves from a vacuum into glass

ANSWER: X) POLARIZATION OF LIGHT SUPPORTS THE PARTICLE BEHAVIOR OF LIGHT

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**TOSS-UP**

18) MATH *Short Answer* Evaluate the expression,  $x(y + z)^2$ , when  $x = 2$ ,  $y = -8$ ; and  $z = 3$ :

ANSWER: 50

**BONUS**

18) MATH *Short Answer* If Emily can paint a fence in 4 hours but Kathy takes 6 hours, how many hours will it take them to paint the fence if they work together?

ANSWER:  $2\frac{2}{5}$  (ACCEPT:  $\frac{12}{5}$  or 2.4)

(Solution:  $1/x = 1/4 + 1/6$ ;  $x = 12/5$  hrs or  $2\frac{2}{5}$  hrs)

### TOSS-UP

19) EARTH SCIENCE *Multiple Choice* Which of the following is considered the principal volcanic gas:

- W) carbon dioxide
- X) water vapor
- Y) sulfur dioxide
- Z) methane

ANSWER: X) WATER VAPOR

### BONUS

19) EARTH SCIENCE *Multiple Choice* Calcite belongs to which of the following mineral groups:

- W) oxide
- X) sulfate
- Y) carbonate
- Z) calcium silicate

ANSWER: Y) CARBONATE

(Solution:  $\text{CaCO}_3$ )

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### TOSS-UP

20) GENERAL SCIENCE *Multiple Choice* Which of the following is NOT a fermentation product of yogurt:

- W) acetaldehyde
- X) formaldehyde
- Y) acetic acid
- Z) lactic acid

ANSWER: X) FORMALDEHYDE

### BONUS

20) GENERAL SCIENCE *Short Answer* Convert 1 cubic decimeter into cubic centimeters:

ANSWER: 1,000

**TOSS-UP**

21) ASTRONOMY *Short Answer* What is the Latin-derived term for the relatively smooth lunar plains that are areas of the Moon that appear dark as viewed from Earth?

ANSWER: MARE (ACCEPT: MARIA)

**BONUS**

21) ASTRONOMY *Short Answer* What planet has the greatest variation in temperature over a single one of its planetary days?

ANSWER: MERCURY

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**TOSS-UP**

22) BIOLOGY *Short Answer* What is typically the largest organelle of a mature plant cell and can comprise up to 80% of the cell's volume?

ANSWER: CENTRAL VACUOLE (ACCEPT: VACUOLE)

**BONUS**

22) BIOLOGY *Short Answer* What eukaryotic cell organelle primarily functions to modify, sort, and package products for exocytosis?

ANSWER: GOLGI (ACCEPT: GOLGI APPARATUS, COMPLEX or STACK)

**TOSS-UP**

23) CHEMISTRY *Short Answer* What scientific principle BEST describes why fresh pickles soaked in brine shrivel up after a period of time?

ANSWER: OSMOSIS

**BONUS**

23) CHEMISTRY *Multiple Choice* If two solutions that are separated by a semipermeable membrane have the same osmotic pressure, they are said to be:

- W) isotonic
- X) hypotonic
- Y) hypertonic
- Z) hyperosmotic

ANSWER: W) ISOTONIC

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**TOSS-UP**

24) PHYSICS *Multiple Choice* A circuit with 2 different resistors wired in series will have a total resistance that is:

- W) equal to the sum of the two resistances
- X) less than either resistance
- Y) equal to that of the greater resistance
- Z) equal to that of the lesser resistance

ANSWER: W) EQUAL TO THE SUM OF THE TWO RESISTANCES

**BONUS**

24) PHYSICS *Short Answer* What is the most common isotope of carbon?

ANSWER: CARBON-12 (ACCEPT: C-12 or 12)

**TOSS-UP**

25) BIOLOGY *Short Answer* How many walking legs are found in arachnids?

ANSWER: 8

**BONUS**

25) BIOLOGY *Short Answer* What is the MOST common term for the general type of nourishment characteristic of mushrooms where the organism derives its nutrients by absorbing the biological products of another organism?

ANSWER: SAPROPHYTIC (ACCEPT: SAPROBE or SAPROPHAGE or SAPROPHYTE)