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

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

TOSS-UP

4) MATH  Short Answer  What is the 5th 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√2  = 100√2  - 141.4cm)
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

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

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

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: $x/2 + x/3 = x – 68; x = 408$)

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: $10^7$)

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
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**

**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) maleability  
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

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

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

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

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)