ROUND 3

TOSS-UP

1) LIFE SCIENCE  *Short Answer*  During which phase of mitosis [*my-TOH-sis*] do chromosomes line up along the center of the cell nucleus?

ANSWER: METAPHASE

BONUS

1) LIFE SCIENCE  *Multiple Choice*  Old growth forests and ancient cypress swamps would be examples of which of the following?

W) Primary successive species  
X) Secondary successive species  
Y) Climax communities  
Z) Commensalism

ANSWER: Y) CLIMAX COMMUNITIES

TOSS-UP

2) PHYSICAL SCIENCE  *Multiple Choice*  Which of the following kinds of solutions is a mixture in which the solvent has dissolved all the solute it can at a given temperature?

W) Saturated  
X) Unsaturated  
Y) Supersaturated  
Z) Concentrated

ANSWER: W) SATURATED

BONUS

2) PHYSICAL SCIENCE  *Multiple Choice*  When calculating the equilibrium constant for a reaction, the concentration of which of the following is generally included?

W) Pure liquids  
X) Pure solids  
Y) Solvents  
Z) Solutes

ANSWER: Z) SOLUTES
TOSS-UP

3) GENERAL SCIENCE  Multiple Choice  Which of the following is a pyrimidine [py-RIM-i-deen]?  

W) Guanine [GWAH-neen]  
X) Thymine  
Y) Adenine [AD-n-een]  
Z) Xanthine [ZAN-theen]  

ANSWER: X) THYMINE  

BONUS

3) GENERAL SCIENCE  Short Answer  To a very good approximation, a golf club hitting a ball is an example of what kind of collision?  

ANSWER: ELASTIC  

TOSS-UP

4) EARTH AND SPACE  Short Answer  What mountain chain composes the majority of the Western Continental Divide in North America?  

ANSWER: THE ROCKY MOUNTAINS  

BONUS

4) EARTH AND SPACE  Multiple Choice  Which of the following is NOT a characteristic of estuaries?  

W) Bottom dominated by course sands  
X) Physical connection to the ocean  
Y) Physical connection with a freshwater source  
Z) Lower average water salinity than ocean water  

ANSWER: W) BOTTOM DOMINATED BY COURSE SANDS
TOSS-UP

5) MATH  Short Answer  Nick’s car costs $450 per month for car payment and insurance, and 25 cents per mile driven. What is the total monthly cost in dollars in terms of $m$, the miles driven?

ANSWER: $0.25m + 450$ (ACCEPT: $m/4 + 450$)

BONUS

5) MATH  Short Answer  A rectangular field has an area of 300 square meters and a perimeter of 80 meters. What are the dimensions of the field in meters?

ANSWER: 30 AND 10

TOSS-UP

6) ENERGY  Short Answer  Environmentalists are most concerned about the environmental impact of hydroelectric plants on what group of organisms?

ANSWER: FISH

BONUS

6) ENERGY  Multiple Choice  Which of the following areas of the United States accounts for approximately half of the total hydroelectric power generation in the United States?

W) Northeast  
X) Northwest  
Y) Southeast  
Z) Southwest

ANSWER: X) NORTHWEST
TOSS-UP

7) LIFE SCIENCE  *Multiple Choice*  Organisms of the same class would also share which of the following?

W) Genus  
X) Family  
Y) Phylum  [*FY-luhm*]  
Z) Order

ANSWER: Y) PHYLUM

BONUS

7) LIFE SCIENCE  *Multiple Choice*  Scientists are using genetic engineering to develop a wheat crop that is resistant to a particular kind of moth. How would they determine if the plants are moth resistant?

W) Determine the length of the moth reproductive cycle in normal wheat  
X) Monitor moth populations in separate fields planted with control and experimental wheat crops  
Y) Monitor numbers of moth species infesting normal wheat  
Z) Determine whether moths in test wheat can be controlled with chemical sprays

ANSWER: X) MONITOR MOTH POPULATIONS IN SEPARATE FIELDS PLANTED WITH CONTROL AND EXPERIMENTAL WHEAT CROPS

TOSS-UP

8) PHYSICAL SCIENCE  *Short Answer*  What is the name for the individual repeating units of polymers?

ANSWER: MONOMERS

BONUS

8) PHYSICAL SCIENCE  *Short Answer*  Identify by number all of the following that are related to the origin of the name of the Large Hadron Collider (LHC) located at CERN: 1) composite particles made from quarks, 2) particle beams of protons that the LHC was built to collide, 3) lead nuclei that the LHC was built to collide, 4) a famous physicist.

ANSWER: 1, 2 AND 3
TOSS-UP

9) GENERAL SCIENCE  *Short Answer*  What is the term for the tendency for an object to resist change in its motion?

ANSWER: INERTIA

BONUS

9) GENERAL SCIENCE  *Short Answer*  Identify all of the following four choices which are possible examples of fossils: 1) seeds, 2) footprints, 3) teeth, 4) cave drawings.

ANSWER: 1, 2, 3 (ACCEPT: SEEDS, FOOTPRINTS, TEETH)

TOSS-UP

10) EARTH AND SPACE  *Short Answer*  What adjective describes an air parcel when it reaches a relative humidity of 100%?

ANSWER: SATURATED

BONUS

10) EARTH AND SPACE  *Short Answer*  In fluvial systems, what is the name of the crescent-shaped lake that is formed when a meander of a river is cut off from the main channel?

ANSWER: OXBOW LAKE (ACCEPT: OXBOW, HORSESHOE LAKE)
TOSS-UP

11) MATH  Short Answer  If \(|200 - x| = 10\) [the absolute value of the quantity 200 minus x equals 10], what are the possible values for x?

ANSWER: 190 AND 210

BONUS

11) MATH  Short Answer  Solve the inequality \(-5 + |p + 2| \geq 0\) [negative 5 plus the absolute value of the quantity p plus 2 is greater than or equal to 0].

ANSWER: \(p \leq -7\) OR \(p \geq 3\) (MUST GIVE BOTH ANSWERS)

TOSS-UP

12) ENERGY  Multiple Choice  Which of the following is NOT an example of a biomass energy source?

W) Coal
X) Wood
Y) Grain
Z) Sugar

ANSWER: W) COAL

BONUS

12) ENERGY  Multiple Choice  In the summer, why is it best to do high energy consumption tasks, such as laundry and dishwashing, after 8 pm?

W) It will increase the reliability and accessibility of electricity for critical needs in the electrical grid
X) It takes more energy to run a dishwasher during the day
Y) More energy is produced at night
Z) Hot water heaters are programmed to operate at maximum efficiency after 8 pm

ANSWER: W) IT WILL INCREASE THE RELIABILITY AND ACCESSIBILITY OF ELECTRICITY FOR CRITICAL NEEDS IN THE ELECTRICAL GRID
TOSS-UP

13) LIFE SCIENCE Multiple Choice Of the following habitats, which is the most likely to have the highest amount of biodiversity?

W) Desert
X) Tropical rainforest
Y) Deciduous forest [di-SIJ-oo-uhs]
Z) Prairie

ANSWER: X) TROPICAL RAINFOREST

BONUS

13) LIFE SCIENCE Multiple Choice Which of the following cats is the largest?

W) African lion
X) Snow leopard
Y) Siberian tiger
Z) King cheetah

ANSWER: Y) SIBERIAN TIGER

TOSS-UP

14) MATH Short Answer An isosceles triangle has a perimeter of 62 inches. If the base of the triangle is 18 inches, what is the length of each of the congruent legs?

ANSWER: 22

BONUS

14) MATH Short Answer What is the standard form of the equation of the line that passes through (-2, 4) and is parallel to $y = (-3/2)x + 3$?

ANSWER: $3x + 2y = 2$ (DO NOT ACCEPT: $-(3/2)x + 1$)
TOSS-UP

15) LIFE SCIENCE  Multiple Choice  Which of the following is the least likely to be a characteristic of an invasive species?

W) It will outcompete native species  
X) It will only survive under a narrow range of environmental conditions  
Y) It will have a longer reproductive cycle than native species  
Z) It will do economic and/or environmental harm in a new environment

ANSWER: X) IT WILL ONLY SURVIVE UNDER A NARROW RANGE OF ENVIRONMENTAL CONDITIONS

BONUS

15) LIFE SCIENCE  Multiple Choice  Which of the following is an example of a jawless fish?

W) Sea horse  
X) Lamprey  
Y) Shark  
Z) Lungfish

ANSWER: X) LAMPREY

TOSS-UP

16) PHYSICAL SCIENCE  Multiple Choice  Einstein concluded that $E = mc^2$, where $m$ is mass and $c$ is speed of light. According to this formula, which of the following statements is true?

W) All objects have energy only if they are moving at the speed of light  
X) An object at rest cannot possess an amount of energy due to its mass  
Y) All objects have energy of being, or rest mass energy  
Z) Small relativistic objects all propagate at the speed of light

ANSWER: Y) ALL OBJECTS HAVE ENERGY OF BEING, OR REST MASS ENERGY

BONUS

16) PHYSICAL SCIENCE  Short Answer  When the force on a falling object is equal to the force of air friction on that object, it will fall at a constant rate. What is this rate called?

ANSWER: TERMINAL VELOCITY
TOSS-UP

17) GENERAL SCIENCE  
Short Answer  What is the name of the warm water event originally recognized by anchovy fishermen off the coast of Peru that sometimes occurs near Christmas?

ANSWER: EL NIÑO

BONUS

17) GENERAL SCIENCE  
Multiple Choice  By crushing a tablet of medicine before you take it, you are changing the reaction rate by changing which of the following characteristics of the tablet?

W) Surface area 
X) Amount of reactants 
Y) Activation energy 
Z) Km of the reaction

ANSWER: W) SURFACE AREA

TOSS-UP

18) EARTH AND SPACE  
Multiple Choice  The spring 2011 earthquake in Japan occurred because Japan is located on which of the following?

W) A spreading center 
X) A rift zone 
Y) A subduction zone 
Z) A mantle plume

ANSWER: Y) A SUBDUCTION ZONE

BONUS

18) EARTH AND SPACE  
Short Answer  It is common for roads in mid latitudes to develop severe potholes after the spring thaw. What form of mechanical weathering is responsible?

ANSWER: FREEZING AND THAWING (ACCEPT: FROST ACTION; FROST WEDGING; ICE WEDGING)
19) MATH  Short Answer  Evaluate $\frac{12y}{5x}$  when $y = 2$ and $x = 0$.

ANSWER: UNDEFINED

19) MATH  Multiple Choice  Between which of the following two whole numbers does $\sqrt[3]{515}$  fall?

W) 5 and 6  
X) 6 and 7  
Y) 7 and 8  
Z) 8 and 9

ANSWER: Z) 8 AND 9

20) ENERGY  Multiple Choice  Which of the following did NOT come from a once-living organism?

W) Gasohol  
X) Crude oil  
Y) Uranium  
Z) Charcoal

ANSWER: Y) URANIUM

20) ENERGY  Multiple Choice  Which of the following statements best describes a benefit of using alternative energy resources?

W) It reduces the amount of fossil fuels that must be used  
X) It repairs the ozone layer  
Y) It reduces the amount of renewable resources used  
Z) It reduces the costs of producing energy

ANSWER: W) IT REDUCES THE AMOUNT OF FOSSIL FUELS THAT MUST BE USED
TOSS-UP

21) LIFE SCIENCE  Multiple Choice  Which of the following is NOT a source of food for polar bears in the wild?

W) Emperor penguins
X) Beluga whales
Y) Walruses
Z) Ringed seals

ANSWER: W) EMPEROR PENGUINS

BONUS

21) LIFE SCIENCE  Short Answer  What is the name of the organ found in birds and some invertebrates which is used to temporarily store food but also aids in preliminary digestion?

ANSWER: CROP

TOSS-UP

22) PHYSICAL SCIENCE  Short Answer  A substance with a pH of 2 has what pOH?

ANSWER: 12

BONUS

22) PHYSICAL SCIENCE  Multiple Choice  Should oxygen-17 undergo alpha decay, the resulting atom would have which of the following masses in amu?

W) 11
X) 13
Y) 15
Z) 17

ANSWER: X) 13
TOSS-UP

23) GENERAL SCIENCE  Short Answer  What is the term for the part of the eye that contains various colored pigments?

ANSWER: IRIS

BONUS

23) GENERAL SCIENCE  Multiple Choice  A material with which of the following specific heats in joules per kilogram Kelvin will require the least heat to change its temperature?

W) 10
X) 50
Y) 100
Z) 1000

ANSWER: W) 10

TOSS-UP

24) EARTH AND SPACE  Multiple Choice  Which of the following is the name for the hills made from glacial drift and deposited by meltwater from retreating glaciers?

W) Kettle
X) Drumlín
Y) Kame
Z) Esker

ANSWER: Y) KAME

BONUS

24) EARTH AND SPACE  Short Answer  Disappearing streams, dolines, sink holes, and caves are distinctive features in northern Florida, central Tennessee, and south-central Kentucky and, are indicative of what kind of topography?

ANSWER: KARST
TOSS-UP

25) MATH  Short Answer  What is twenty and 55 hundredths expressed as a decimal, a mixed number in simplest form, and a percent?

ANSWER: 20.55, 20 11/20, 2055%

BONUS

25) MATH  Multiple Choice  For positive values of x, the function f(x) = \( \frac{x^6 - x^3}{x^4} \) [the fraction with numerator x to the sixth minus x cubed and denominator x squared] is which of the following types?

W) Quartic
X) Cubic
Y) Hyperbolic
Z) Parabolic

ANSWER: W) QUARTIC