TOSS-UP

1) EARTH AND SPACE Multiple Choice What sedimentary rock consists of angular rock fragments that are cemented together in a fine-grained cement?

W) Sandstone  
X) Conglomerate  
Y) Till  
Z) Breccia [BRECH-ee-uh]

ANSWER: Z) BRECCIA

BONUS

1) EARTH AND SPACE Short Answer Put the following three minerals in order of increasing hardness: 1) plagioclase [PLAY-jee-uh-klays], 2) corundum, 3) gypsum.

ANSWER: 3, 1, 2 (ACCEPT: GYPSUM, PLAGIOCLASE, CORUNDUM)

TOSS-UP

2) GENERAL SCIENCE Multiple Choice When two tectonic plates meet in a subduction zone and a mountain forms over time, what type of boundary does this create?

W) Convergent  
X) Divergent  
Y) Transformative  
Z) Continental

ANSWER: W) CONVERGENT

BONUS

2) GENERAL SCIENCE Multiple Choice Isotopes are atoms of an element that are different because they have a different number of which of the following?

W) Protons  
X) Neutrons  
Y) Electrons  
Z) Nuclei [NOO-klee-eye]

ANSWER: X) NEUTRONS
TOSS-UP

3) PHYSICAL SCIENCE  Multiple Choice  As a ball rolls down an inclined plane in free motion, what is the normal force acting on the ball?

W) Equal to the ball’s weight  
X) Less than the ball’s weight  
Y) Greater than the ball’s weight  
Z) Depends on the volume of the ball

ANSWER: X) LESS THAN THE BALL’S WEIGHT

BONUS

3) PHYSICAL SCIENCE  Short Answer  The molecular weight of sodium is 22.99 grams per mole, and the molecular weight of chlorine is 35.45 grams per mole. What is the molecular weight in grams per mole of sodium chloride?

ANSWER: 58.44

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TOSS-UP

4) MATH  Multiple Choice  What is the mean of the set of four numbers: 5, -5, 5, -5?

W) -1  
X) 0  
Y) 1/5  
Z) 1

ANSWER: X) 0

BONUS

4) MATH  Short Answer  In centimeters, how long is a sweater that is woven at a rate of 70 centimeters per hour if you start a timer when the sweater is 45 centimeters long, and you measure the entire sweater when the timer reads 3 hours?

ANSWER: 255
TOSS-UP
5) LIFE SCIENCE Multiple Choice A sea star would NOT be found in which of the following marine environments?

W) Intertidal zone
X) Pelagic zone
Y) Benthic zone
Z) Littoral zone

ANSWER: X) PELAGIC ZONE

BONUS
5) LIFE SCIENCE Multiple Choice Which of the following is NOT an illness caused by bacteria?

W) Strep throat
X) Toxic shock syndrome
Y) Scarlet fever
Z) Influenza

ANSWER: Z) INFLUENZA

TOSS-UP
6) EARTH AND SPACE Short Answer Which of Jupiter’s moons shows the most volcanic activity?

ANSWER: IO

BONUS
6) EARTH AND SPACE Multiple Choice Which of the following is NOT part of a delta?

W) Prodelta
X) Delta lake
Y) Delta plain
Z) Delta front

ANSWER: X) DELTA LAKE
TOSS-UP

7) ENERGY Multiple Choice When ingested, which of the following provides the greatest number of calories per gram?

W) Fat
X) Protein
Y) Carbohydrates
Z) Ethanol

ANSWER: W) FAT

BONUS

7) ENERGY Short Answer Where is the site of the most significant accident in the U.S. commercial nuclear energy industry?

ANSWER: THREE MILE ISLAND (ACCEPT: DAUPHIN COUNTY, PENNSYLVANIA)

TOSS-UP

8) GENERAL SCIENCE Short Answer What is the name for the process by which plants absorb light from the Sun and convert it to chemical energy?

ANSWER: PHOTOSYNTHESIS

BONUS

8) GENERAL SCIENCE Short Answer A convex lens will cause parallel beams of light to converge. What will happen to parallel beams of light passed through a concave lens?

ANSWER: THEY DIVERGE
TOSS-UP

9) PHYSICAL SCIENCE Multiple Choice An atom containing only a single proton and no electrons is which of the following?

W) An anion [AN-y-uhn]
X) A noble gas
Y) A cation [KAT-eye-uhn]
Z) A radioactive metal

ANSWER: Y) A CATION

BONUS

9) PHYSICAL SCIENCE Short Answer The carbon atoms in diamond are held together by what type of bond?

ANSWER: COVALENT (ACCEPT: SIGMA)

TOSS-UP

10) MATH Short Answer What is the thousandths place digit in the decimal form of 11/9?

ANSWER: 2

BONUS

10) MATH Multiple Choice The price of a certain cell phone was originally marked $250 on Thursday. On Friday, the price was reduced by 20% and then the new price was increased by 20% on Saturday. What was the cost of the cell phone on Saturday?

W) $100
X) $120
Y) $240
Z) $250

ANSWER: Y) $240
TOSS-UP

11) LIFE SCIENCE *Multiple Choice* Human epidermis is MOSTLY composed of which of the following basic animal tissue types?

W) Epithelial  *[ep-uh-THEE-lee-al]*
X) Connective
Y) Nervous
Z) Muscle

ANSWER: W) EPITHELIAL

BONUS

11) LIFE SCIENCE *Short Answer* Which type of jawed fish can detect prey under the sand through electrical sensitivity?

ANSWER: SHARK (ACCEPT: RAY OR EEL)

TOSS-UP

12) EARTH AND SPACE *Short Answer* What process is responsible for the first appearance of oxygen in our atmosphere?

ANSWER: PHOTOSYNTHESIS (ACCEPT: LIGHT DEPENDENT REACTION)

BONUS

12) EARTH AND SPACE *Short Answer* What two very valuable gemstones are variations of the mineral corundum?

ANSWER: RUBY AND SAPPHIRE
TOSS-UP

13) GENERAL SCIENCE Multiple Choice Imagine that you are conducting an experiment to test the effects of temperature on plant height. Which of the following describes plant height in this experiment?

W) Dependent variable
X) Controlled variable
Y) Independent variable
Z) Predictor variable

ANSWER: W) DEPENDENT VARIABLE

BONUS

13) GENERAL SCIENCE Multiple Choice What are the three major climatic zones?

W) Tropical, subtropical and arctic
X) Tropical, subarctic, and arctic
Y) Tropical, temperate, and polar
Z) Subtropical, tropical, and temperate

ANSWER: Y) TROPICAL, TEMPERATE, AND POLAR

TOSS-UP

14) ENERGY Multiple Choice The ultimate energy source for geothermal energy is which of the following?

W) Radioactive decay of elements in the Earth’s interior
X) Gravitational contraction of the Earth’s interior
Y) Leftover thermal energy from the formation of the Earth’s interior
Z) Energy from earthquakes in the Earth’s interior

ANSWER: W) RADIOACTIVE DECAY OF ELEMENTS IN THE EARTH’S INTERIOR

BONUS

14) ENERGY Short Answer Petroleum is a non-renewable resource. What term refers to the point in the future when the maximum rate of petroleum extraction will be reached, and supplies will begin to decrease?

ANSWER: PEAK OIL
TOSS-UP

15) PHYSICAL SCIENCE Short Answer If a reaction is carried out and there is no change in temperature, it would be considered what type of reaction?

ANSWER: ISOTHERMIC (ACCEPT: ISOTHERMAL)

BONUS

15) PHYSICAL SCIENCE Multiple Choice During science lab, several students discovered that iodine dissolved readily in ethanol. In this case, the ethanol could be classified as which of the following?

W) An alloy
X) A solute
Y) A solution
Z) A solvent

ANSWER: Z) A SOLVENT

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TOSS-UP

16) MATH Short Answer Express $81^x$ with a prime base.

ANSWER: $3^{4x}$

BONUS

16) MATH Multiple Choice Ignoring dimensions, the volume of a sphere of radius $r$ is equal to how many times its surface area?

W) $r/3$
X) $r$
Y) $2r$
Z) $3r$

ANSWER: W) $r/3$
17) LIFE SCIENCE *Multiple Choice* Which of the following is NOT a monomer?

W) Amino acid  
X) Glucose  
Y) Maltose  
Z) Nucleotide [NOO-klee-uh-tyd]

**ANSWER:** Y) MALTOSE

**BONUS**

17) LIFE SCIENCE *Short Answer* On a sunny day, if the stomata on a plant leaf are forced to close, what two molecules, used by animals, would be prevented from leaving the leaf?

**ANSWER:** OXYGEN (ACCEPT: O₂) AND WATER (ACCEPT: H₂O)

18) EARTH AND SPACE *Short Answer* What is the cataclysmic event in which a star with a mass 15 times that of the Sun will end its life?

**ANSWER:** SUPERNOVA

**BONUS**

18) EARTH AND SPACE *Multiple Choice* Which of the following is not true of seawater?

W) Seawater is denser than fresh water  
X) The freezing point of seawater decreases as salt concentration increases  
Y) Seawater is uniformly saline throughout the world  
Z) The thermal conductivity of seawater decreases with increasing salinity

**ANSWER:** Y) SEAWATER IS UNIFORMLY SALINE THROUGHOUT THE WORLD
TOSS-UP

19) GENERAL SCIENCE *Multiple Choice* What is true about lines of longitude?

W) They are measured east or west of the prime meridian  
X) They are measured in equidistant lines  
Y) The lines run parallel to the equator  
Z) They are measured starting from the International Date Line

ANSWER: W) THEY ARE MEASURED EAST OR WEST OF THE PRIME MERIDIAN

BONUS

19) GENERAL SCIENCE *Short Answer* What enzyme catalyzes the formation of DNA from deoxyribonucleoside [dee-ok-si-ry-boh-NOO-klee-uh-syd] 5′-triphosphates [5-prime try-FOS-fayts], using DNA as a template?

ANSWER: DNA POLYMERASE

TOSS-UP

20) PHYSICAL SCIENCE *Multiple Choice* When four moles of solid aluminum react with three moles of oxygen gas to form aluminum oxide, this reaction is known as which of the following types of reaction?

W) Decomposition  
X) Synthesis  
Y) Neutralization  
Z) Displacement

ANSWER: X) SYNTHESIS

BONUS

20) PHYSICAL SCIENCE *Multiple Choice* A man stands in front of a concave mirror with a focal length of 200 centimeters and sees an upright image of his face at twice its actual size. How far, in centimeters, is he from the mirror?

W) 25  
X) 50  
Y) 100  
Z) 200

ANSWER: Y) 100
TOSS-UP

21) MATH Short Answer What is the value of \( x \) that makes the following equation true: 
\[ x = -3(x - 4)? \]

ANSWER: 3

BONUS

21) MATH Short Answer Simplify the expression \((12a^3 b^4 c^2)^{-2}\) [open parenthesis, 12 times a cubed times b raised to the 4th times c squared, close parenthesis, raised to the negative 2 power].

ANSWER: 1/(144a^6 b^8 c^4)

TOSS-UP

22) ENERGY Multiple Choice What happens as the activation energy of a reaction increases?

W) The reaction rate increases  
X) The reaction rate decreases  
Y) The products have lower energy  
Z) The reactants have lower energy

ANSWER: X) THE REACTION RATE DECREASES

BONUS

22) ENERGY Short Answer A weight is suspended from a string. You pull back on the weight and release it. Identify all of the following three factors that will affect the period of the resulting motion: 1) acceleration of gravity, 2) length of the string, 3) mass of the weight

ANSWER: 1, 2 (ACCEPT: ACCELERATION OF GRAVITY, LENGTH OF THE STRING)
TOSS-UP

23) LIFE SCIENCE Multiple Choice What environmental condition is mandatory for yeast to complete fermentation?

W) Absence of oxygen
X) High temperature
Y) Low pH
Z) High osmotic pressure

ANSWER: W) ABSENCE OF OXYGEN

BONUS

23) LIFE SCIENCE Multiple Choice Which of the following is the most basic function of human eye lashes?

W) To shade the eye from bright sun
X) To prevent small particles from entering the eyes
Y) To attract a mate
Z) To help disperse tears when blinking

ANSWER: X) TO PREVENT SMALL PARTICLES FROM ENTERING THE EYES