

ROUND 2

TOSS-UP

1) GENERAL SCIENCE *Multiple Choice* Coal formed from the remains of plants that died more than 300 million years ago. In what period did these plants live?

- W) Precambrian
- X) Cenozoic
- Y) Carboniferous [*kahr-buh-NIF-er-uhs*]
- Z) Cretaceous [*kri-TAY-shuhs*]

ANSWER: Y) CARBONIFEROUS

BONUS

1) GENERAL SCIENCE *Multiple Choice* What is the difference between mitosis [*my-TOH-sis*] and meiosis [*my-OH-sis*]?

- W) Mitosis refers to cell division while meiosis refers to cell repair
- X) Mitosis produces haploid cells while meiosis produces diploid cells
- Y) Meiosis has fewer stages than mitosis
- Z) Meiosis typically produces haploid gametes while mitosis does not

ANSWER: Z) MEIOSIS TYPICALLY PRODUCES HAPLOID GAMETES WHILE MITOSIS DOES NOT

TOSS-UP

2) ENERGY *Short Answer* Our Sun is a power source that generates energy through nuclear fusion. In this process, lighter hydrogen nuclei combine to form what heavier element?

ANSWER: HELIUM

BONUS

2) ENERGY *Short Answer* Given a temperature of 95° Fahrenheit, the energy efficiency ratio (EER) is defined as the cooling capacity in Btu per hour over watts. Calculate the EER of an air conditioner with a cooling capacity of 10,000 Btu per hour and a watts unit consumption of 1000 watts.

ANSWER: 10

TOSS-UP

3) PHYSICAL SCIENCE *Multiple Choice* A student hears the siren of a steadily approaching police car. Which of the following is true?

- W) The sound waves decrease in speed as the car nears
- X) The sound waves increase in speed as the car nears
- Y) The perceived frequency of the siren is greater than the frequency heard when the police car is at rest
- Z) The perceived frequency of the siren is less than the frequency heard when the police car is at rest

ANSWER: Y) THE PERCEIVED FREQUENCY OF THE SIREN IS GREATER THAN THE FREQUENCY HEARD WHEN THE POLICE CAR IS AT REST

BONUS

3) PHYSICAL SCIENCE *Multiple Choice* The dynamic equilibrium [*ee-kwuh-LIB-ree-uhm*] of a reaction is best characterized by which of the following?

- W) Equal amounts of products, enzymes, and reactants
- X) Complete use of all enzymes
- Y) The forward rate of reaction has reached the maximum rate
- Z) The forward and reverse rates of reaction are equal

ANSWER: Z) THE FORWARD AND REVERSE RATES OF REACTION ARE EQUAL

TOSS-UP

4) LIFE SCIENCE *Multiple Choice* Which of the following cellular organelles does NOT contain DNA?

- W) Chloroplasts
- X) Mitochondria [*my-tuh-KON-dree-uh*]
- Y) Nuclei
- Z) Ribosomes [*RY-buh-sohms*]

ANSWER: Z) RIBOSOMES

BONUS

4) LIFE SCIENCE *Multiple Choice* Why are so-called nectar robbers a problem for plants?

- W) They cause inappropriate cross-pollination
- X) They do not help pollinate plants
- Y) They steal the plant's pollen
- Z) They cause self-pollination

ANSWER: X) THEY DO NOT HELP POLLINATE PLANTS

TOSS-UP

5) MATH *Short Answer* Once it breaks through the ground, a type of flower grows $\frac{3}{4}$ of an inch a day. How many days will it take to reach a height of 6 feet?

ANSWER: 96

BONUS

5) MATH *Short Answer* Identify all of the following five block letters that have rotational symmetry: M, T, S, O, X.

ANSWER: S, O, AND X

TOSS-UP

6) EARTH AND SPACE *Short Answer* What primary weather factor is driven by the pressure gradient caused by uneven heating of Earth's surface?

ANSWER: WIND

BONUS

6) EARTH AND SPACE *Multiple Choice* Which of the following states would have the least amount of mass wasting based on the state's topography?

- W) Virginia
- X) Colorado
- Y) South Dakota
- Z) Oregon

ANSWER: Y) SOUTH DAKOTA

TOSS-UP

7) GENERAL SCIENCE *Multiple Choice* Your body senses balance using semicircular canals, which are located in which of the following?

- W) Hippocampus
- X) Ears
- Y) Thyroid
- Z) Optic nerve

ANSWER: X) EARS

BONUS

7) GENERAL SCIENCE *Short Answer* Which members of our solar system left the majority of craters, scars, and apparent pockmarks on the surface of Earth's moon as a result of multiple impacts?

ANSWER: METEOROIDS (ACCEPT: ASTEROIDS, METEORITES; DO NOT ACCEPT: METEORS)

TOSS-UP

8) PHYSICAL SCIENCE *Multiple Choice* Pressure is defined as:

- W) Force divided by unit area
- X) Force divided by mass of air above the object
- Y) Force divided by unit volume
- Z) Power divided by unit force

ANSWER: W) FORCE DIVIDED BY UNIT AREA

BONUS

8) PHYSICAL SCIENCE *Multiple Choice* Which of the following is true about sound perception?

- W) The intensity of sound is independent of loudness
- X) The frequency of sound is logarithmically related to the intensity
- Y) The loudness of a sound is logarithmically related to the intensity
- Z) Sounds measured in decibels are independent of the threshold of hearing

ANSWER: Y) THE LOUDNESS OF A SOUND IS LOGARITHMICALLY RELATED TO THE INTENSITY

TOSS-UP

9) LIFE SCIENCE *Multiple Choice* In humans, red-green color blindness is caused by a recessive sex-linked trait on the X chromosome. If a man and a woman produce a color blind son, assuming no spontaneous mutation, which of the following must be true?

- W) The father is color blind
- X) Both parents carry the allele for color blindness
- Y) The mother carries the allele for color blindness
- Z) Neither parent carries the allele for color blindness

ANSWER: Y) THE MOTHER CARRIES THE ALLELE FOR COLOR BLINDNESS

BONUS

9) LIFE SCIENCE *Short Answer* Expressed as a fraction, what is the probability that the daughter of a color blind father and carrier mother will also be color blind?

ANSWER: 1/2

TOSS-UP

10) MATH *Multiple Choice* The slope of a line with equation $y = px + b$ is greater than the slope of the line with equation $y = qx + b$. Which of the following must be true about the relationship between p and q ?

- W) $p > q$
- X) $p < q$
- Y) $p = q$
- Z) $p \leq q$

ANSWER: W) $p > q$

BONUS

10) MATH *Short Answer* What fraction has 0.757575... as its infinite repeating decimal?

ANSWER: 25/33

TOSS-UP

11) EARTH AND SPACE *Multiple Choice* Which of the following is NOT a type of sediment load carried by a river?

- W) Dissolved
- X) Drifting
- Y) Suspended
- Z) Bed

ANSWER: X) DRIFTING

BONUS

11) EARTH AND SPACE *Short Answer* What is the name for the characteristic assigned to minerals that do NOT cleave in an organized fashion?

ANSWER: FRACTURE

TOSS-UP

12) GENERAL SCIENCE *Multiple Choice* *Wolbachia* [**wohl-BAK-eea**] bacteria are maternally transmitted in insect hosts. *Wolbachia* tend to localize to what region of their insect host?

- W) Digestive tract
- X) Head
- Y) Ovaries
- Z) Lungs

ANSWER: Y) OVARIES

BONUS

12) GENERAL SCIENCE *Multiple Choice* *Wolbachia* [**wohl-BAK-eea**] bacteria are maternally transmitted in insect hosts. Which of the following is NOT a method by which *Wolbachia* manipulate the reproductive processes of their hosts in order to promote their proliferation through a host population?

- W) Killing male offspring
- X) Inducing parthenogenesis [**par-thuh-noh-JEN-uh-sis**]
- Y) Causing infected males to develop as females
- Z) Increasing the proportion of haploid offspring

ANSWER: Z) INCREASING THE PROPORTION OF HAPLOID OFFSPRING

TOSS-UP

13) ENERGY *Multiple Choice* When exposed to the atmosphere, iron begins to rust. This surface process represents what type of reaction?

- W) Oxidation
- X) Electrolysis
- Y) Gas evolution
- Z) Reduction

ANSWER: W) OXIDATION

BONUS

13) ENERGY *Short Answer* Traditional incandescent light bulbs are being replaced by more energy efficient devices such as LEDs. What is the full term for the acronym LED?

ANSWER: LIGHT-EMITTING DIODE

TOSS-UP

14) PHYSICAL SCIENCE *Multiple Choice* The kinetic energy of an object is which of the following?

- W) Directly proportional to the square of the velocity
- X) Independent of the speed at which it is moving
- Y) Always a vector quantity
- Z) Independent of the mass of the object

ANSWER: W) DIRECTLY PROPORTIONAL TO THE SQUARE OF THE VELOCITY

BONUS

14) PHYSICAL SCIENCE *Multiple Choice* Which of the following is NOT true of metals?

- W) They exist as extended planes of atoms
- X) They are malleable and ductile
- Y) They conduct electricity but do not conduct heat
- Z) They can be combined to form alloys

ANSWER: Y) THEY CONDUCT ELECTRICITY BUT DO NOT CONDUCT HEAT

TOSS-UP

15) LIFE SCIENCE *Multiple Choice* The oxygen released into the air as a product of photosynthesis comes from what?

- W) Carbon dioxide
- X) Water
- Y) Glucose
- Z) Rubisco

ANSWER: X) WATER

BONUS

15) LIFE SCIENCE *Short Answer* Arrange the following four groupings of organisms from narrowest to broadest level of categorization: 1) genus, 2) phylum [**FY-luhm**], 3) domain, 4) class.

ANSWER: 1, 4, 2, 3 (ACCEPT: GENUS, CLASS, PHYLUM, DOMAIN)

TOSS-UP

16) MATH *Multiple Choice* For a system of two linear equations, which of the following is true if their graphs intersect and have the same slope?

- W) There is a unique solution
- X) There are exactly two solutions
- Y) There are infinitely many solutions
- Z) There is no solution

ANSWER: Y) THERE ARE INFINITELY MANY SOLUTIONS

BONUS

16) MATH *Short Answer* Solve the following equation for x over the real numbers:

$$(x - 5)(x + 5) = -16.$$

ANSWER: 3, - 3

TOSS-UP

17) EARTH AND SPACE *Short Answer* What is the meteorological term for the level of water vapor in a given air parcel?

ANSWER: HUMIDITY (DO NOT ACCEPT: RELATIVE HUMIDITY)

BONUS

17) EARTH AND SPACE *Multiple Choice* Which of the following is the crystal habit of halite?

- W) Cubic
- X) Hexagonal prism
- Y) Rhombohedra [*rom-buh-HEE-druh*]
- Z) Dodecahedra [*doh-dek-uh-HEE-druh*]

ANSWER: W) CUBIC

TOSS-UP

18) LIFE SCIENCE *Multiple Choice* An adaptation is any kind of modification in bodily structure or behavior that increases an organism's chance of survival in their environment. Which of the following is NOT an example of an adaptation in an organism to its current environment?

- W) The large eyes of an owl for improved night vision
- X) The spines of a cactus for improved water retention
- Y) The appendix of a human for improved protein digestion
- Z) The jaws of a Venus Flytrap for improved ability to capture insects

ANSWER: Y) THE APPENDIX OF A HUMAN FOR IMPROVED PROTEIN DIGESTION

BONUS

18) LIFE SCIENCE *Multiple Choice* Exopolymeric substances, or EPS, are exuded by microorganisms during times of environmental stress. Which of the following is NOT a function of EPS?

- W) Protection against starvation
- X) Protection against mechanical damage
- Y) Protection against desiccation
- Z) Protection against viral attack

ANSWER: W) PROTECTION AGAINST STARVATION

TOSS-UP

19) GENERAL SCIENCE *Multiple Choice* Tapeworms can infect the human digestive tract, where they grow and persist for long periods of time, causing relatively moderate symptoms such as diarrhea and anemia. Therefore, tapeworms are best described as which of the following?

- W) Commensalists
- X) Parasites
- Y) Mutualists
- Z) Parasitoids [**PAR-uh-si-toids**]

ANSWER: X) PARASITES

BONUS

19) GENERAL SCIENCE *Short Answer* What two products are most commonly formed when a strong acid and a strong base react?

ANSWER: WATER AND A SALT

TOSS-UP

20) ENERGY *Multiple Choice* Approximately which of the following percentages of U.S. electric power is generated by nuclear reactors?

- W) 2%
- X) 19%
- Y) 37%
- Z) 56%

ANSWER: X) 19%

BONUS

20) ENERGY *Short Answer* What is primarily used in Brazil as a source of sugar for the production of ethanol?

ANSWER: SUGAR CANE

TOSS-UP

21) PHYSICAL SCIENCE *Multiple Choice* Which of the following is NOT an example of an electromagnetic wave?

- W) Visible light
- X) Sound waves
- Y) Microwaves
- Z) Gamma rays

ANSWER: X) SOUND WAVES

BONUS

21) PHYSICAL SCIENCE *Short Answer* Rubbing alcohol has a density of 0.778 grams per milliliter. Providing your answer to two significant figures, what is the mass in grams of a sample that has a volume of 81.0 milliliters?

ANSWER: 63

TOSS-UP

22) LIFE SCIENCE *Multiple Choice* Which of the following is NOT made primarily out of glucose?

- W) Maltose
- X) Silk
- Y) Starch
- Z) Cotton

ANSWER: X) SILK

BONUS

22) LIFE SCIENCE *Short Answer* A simplified food chain for the Aleutian Islands consists of killer whales, sea otters, sea urchins, and kelp. Reducing the number of sea otters is likely to have what impact on the population of kelp?

ANSWER: REDUCTION

TOSS-UP

23) MATH *Multiple Choice* Divide 16 into two parts, such that twice the smaller number is 4 less than the larger number. What are the two numbers?

- W) 4, 12
- X) 6, 10
- Y) 7, 9
- Z) 8, 8

ANSWER: W) 4, 12

BONUS

23) MATH *Short Answer* What are the prime numbers between 70 and 82?

ANSWER: 71, 73, 79

TOSS-UP

24) EARTH AND SPACE *Multiple Choice* Which of the following intrusive rock deposits is largest in size?

- W) Dike
- X) Batholith [**BATH-uh-lith**]
- Y) Laccolith [**LAK-uh-lith**]
- Z) Sill

ANSWER: X) BATHOLITH

BONUS

24) EARTH AND SPACE *Short Answer* The presence of snow on sea ice has what effect on freeboard, the amount of snow and ice protruding above the surface?

ANSWER: IT LOWERS FREEBOARD

TOSS-UP

25) GENERAL SCIENCE *Multiple Choice* Which of the following is an example of abrasion weathering?

- W) Loose rocks collide with each other, wearing each other down
- X) Oxygen combines with iron to form iron oxide
- Y) Water enters the cracks of rocks and freezes, causing the cracks to expand
- Z) Hydrogen ions in water replace elements such as potassium or calcium in rocks

ANSWER: W) LOOSE ROCKS COLLIDE WITH EACH OTHER, WEARING EACH OTHER DOWN

BONUS

25) GENERAL SCIENCE *Short Answer* In 1912, the German scientist Alfred Wegener proposed the theory of continental drift, the theory that the continents had moved. However, he wasn't completely sure how or why. It wasn't until the 1960s that enough evidence had been found to propose a theory of how continental drift occurred, the theory we still use today. What is the name for this theory?

ANSWER: PLATE TECTONICS