

ROUND 15

TOSS-UP

1) LIFE SCIENCE *Multiple Choice* Which of the following terms describes the ability of a mutation in gene X to affect the expression of gene Y?

- W) Pleiotropy [*play-O-truh-pee*]
- X) Epistasis
- Y) Codominance
- Z) Incomplete dominance

ANSWER: X) EPISTASIS

BONUS

1) LIFE SCIENCE *Short Answer* In glaucoma, what liquid substance in the eye is prevented from draining due to blocked ducts?

ANSWER: AQUEOUS HUMOR

TOSS-UP

2) PHYSICAL SCIENCE *Multiple Choice* Which of the following is the function of the carbon rod that runs down the center of a dry cell?

- W) To create resistance
- X) To keep the chemical paste moist
- Y) To conduct electrons between materials involved in the chemical reaction
- Z) To break a circuit if it overheats

ANSWER: Y) TO CONDUCT ELECTRONS BETWEEN MATERIALS INVOLVED IN THE CHEMICAL REACTION

BONUS

2) PHYSICAL SCIENCE *Multiple Choice* Which of the following ions has the smallest radius?

- W) Lithium ion
- X) Beryllium ion
- Y) Nitride
- Z) Fluoride

ANSWER: X) BERYLLIUM ION

TOSS-UP

3) GENERAL SCIENCE *Multiple Choice* A certain molecule from the human body is broken down and is found to contain significant amounts of phosphorus. Which of the following is this molecule most likely to be?

- W) A strand of RNA
- X) A polypeptide [*pol-ee-PEP-tyd*]
- Y) A fatty acid
- Z) A glycogen molecule [*GLY-kuh-juhn*]

ANSWER: W) A STRAND OF RNA

BONUS

3) GENERAL SCIENCE *Multiple Choice* Over the eastern tropical Pacific Ocean during an El Niño event, which of the following changes occur in sea surface temperature and atmospheric pressure?

- W) Sea surface temperature is cooler than average and barometric pressure is lower than average
- X) Sea surface temperature is warmer than average and barometric pressure is higher than average
- Y) Sea surface temperature is warmer than average and barometric pressure is lower than average
- Z) Sea surface temperature is cooler than average and barometric pressure is higher than average

ANSWER: Y) SEA SURFACE TEMPERATURE IS WARMER THAN AVERAGE AND BAROMETRIC PRESSURE IS LOWER THAN AVERAGE

TOSS-UP

4) EARTH AND SPACE *Multiple Choice* Which of the following minerals is capable of scratching garnet?

- W) Gold
- X) Corundum
- Y) Apatite
- Z) Pyrite

ANSWER: X) CORUNDUM

BONUS

4) EARTH AND SPACE *Short Answer* What kind of foliated metamorphic rock with a lustrous silver-colored and sometimes wrinkled surface is made up of very finely-grained mica [*MY-kuh*]?

ANSWER: PHYLLITE

TOSS-UP

5) MATH *Short Answer* What is the numerical value of 85^2 [**85 squared**]?

ANSWER: 7225

BONUS

5) MATH *Short Answer* Three fair standard dice are rolled. Given that one of the numbers rolled is even, as a fraction in lowest terms, what is the probability that at least two of them are even?

ANSWER: 4/7

TOSS-UP

6) ENERGY *Multiple Choice* Which of the following is the typical operating voltage of a fuel cell?

- W) 0.28
- X) 0.7
- Y) 1.4
- Z) 12.5

ANSWER: X) 0.7

BONUS

6) ENERGY *Short Answer* By number, order the following four alkali metal halides from least to greatest lattice energies: 1) lithium fluoride, 2) sodium chloride, 3) potassium bromide, 4) rubidium iodide.

ANSWER: 4, 3, 2, 1

TOSS-UP

7) LIFE SCIENCE *Multiple Choice* Which of the following characteristics will NOT help distinguish monocots from dicots **[DY-kots]**?

- W) Number of flower petals
- X) Leaf pattern
- Y) Differences in mesophyll **[MEZ-uh-fil]**
- Z) Vascular bundle anatomy

ANSWER: Y) DIFFERENCES IN MESOPHYLL

BONUS

7) LIFE SCIENCE *Multiple Choice* Which of the following neurotransmitters is NOT generally inhibitory?

- W) Glutamate
- X) GABA
- Y) Glycine **[GLY-seen]**
- Z) Serotonin

ANSWER: W) GLUTAMATE

TOSS-UP

8) PHYSICAL SCIENCE *Short Answer* What is the name of the principle that states that no more than two electrons can occupy any one orbital, and that if two electrons occupy the same orbital, then their spins must be paired?

ANSWER: PAULI EXCLUSION

BONUS

8) PHYSICAL SCIENCE *Multiple Choice* Which of the following acids has the smallest dipole moment?

- W) Hydroiodic **[hy-dro-eye-OD-ik]**
- X) Hydrobromic
- Y) Hydrochloric
- Z) Hydrofluoric

ANSWER: W) HYDROIODIC

TOSS-UP

9) GENERAL SCIENCE *Multiple Choice* A bat is pursuing a moth using echolocation. The velocity of the bat is 2 meters per second north, and the velocity of the moth is 1.5 meters per second north. If the bat emits a call at a given frequency, which of the following will happen to the frequency of the returning echo?

- W) It will be higher than the sound of the original call
- X) It will be the same as the sound of the original call
- Y) It will be lower than the frequency of the returning call
- Z) Such a relationship cannot be determined without knowing the distance between the bat and the moth

ANSWER: W) IT WILL BE HIGHER THAN THE SOUND OF THE ORIGINAL CALL

BONUS

9) GENERAL SCIENCE *Short Answer* Given that hemophilia is a sex-linked trait, in a cross between a man with hemophilia and a female carrier, what percentage of their female offspring will be afflicted with hemophilia?

ANSWER: 50%

TOSS-UP

10) EARTH AND SPACE *Multiple Choice* Peridotite [**PER-i-doh-tyt**] and dunite have which of the following compositions?

- W) Felsic
- X) Intermediate
- Y) Ultramafic
- Z) Mafic

ANSWER: Y) ULTRAMAFIC

BONUS

10) EARTH AND SPACE *Multiple Choice* Which of the following elements is able to escape Earth's gravitational field in significant amounts?

- W) Radon
- X) Argon
- Y) Oxygen
- Z) Hydrogen

ANSWER: Z) HYDROGEN

TOSS-UP

11) MATH *Short Answer* In simplest radical form, what is $\frac{\sqrt{4}}{2\sqrt{20}}$ [*the square root of 4 over the quantity 2 times the square root of 20*]?

ANSWER: $\frac{\sqrt{5}}{10}$

BONUS

11) MATH *Short Answer* What is the least common multiple of 20, 24, and 28?

ANSWER: 840

TOSS-UP

12) ENERGY *Multiple Choice* Which of the following does the elastic rebound theory describe?

- W) The build up and release of stress during an earthquake
- X) The fluctuations in groundwater prior to an earthquake
- Y) The formation of mountain ranges by successive earthquakes
- Z) The strength of an earthquake

ANSWER: W) THE BUILD UP AND RELEASE OF STRESS DURING AN EARTHQUAKE

BONUS

12) ENERGY *Multiple Choice* In which of the following are the term and its description accurately matched?

- W) Rockfalls – large blocks of bedrock break off a cliff face and tumble downslope
- X) Earthslides – heavy rainfall saturates the soil, which under the extra weight breaks loose and becomes a slurry that takes everything with it
- Y) Slumps – masses of soil moving down a slip face, usually the top of the bedrock
- Z) Debris flows – the rotation of a cohesive unit of soil or rock down a slip surface

ANSWER: W) ROCKFALLS – LARGE BLOCKS OF BEDROCK BREAK OFF A CLIFF FACE AND TUMBLE DOWNSLOPE

TOSS-UP

13) LIFE SCIENCE *Multiple Choice* In a heart transplant patient, which of the following cells causes transplant rejection by attacking the heart?

- W) B
- X) T
- Y) Macrophage
- Z) Antigen-presenting

ANSWER: X) T

BONUS

13) LIFE SCIENCE *Multiple Choice* The process of Gram staining bacteria can be used to classify bacteria based on the structure of which of the following organelles?

- W) Cell wall
- X) Cell membrane
- Y) Ribosome [*RY-buh-sohm*]
- Z) Pilus

ANSWER: W) CELL WALL

TOSS-UP

14) EARTH AND SPACE *Multiple Choice* Which of the following statements is NOT true about the Novarupa eruption of 1912?

- W) It became the most powerful volcanic eruption of the 20th century
- X) It erupted for about 60 hours
- Y) It created the world's most extensive ignimbrite [*IG-nim-bryt*]
- Z) It originated at Mount Katmai [*KAT-mahy*]

ANSWER: Z) IT ORIGINATED AT MOUNT KATMAI

BONUS

14) EARTH AND SPACE *Short Answer* The gyroradius of a charged particle describes the radius of the circular motion the particle executes as it gyrates around what?

ANSWER: MAGNETIC FIELD LINE (ACCEPT: MAGNETIC FIELD)

TOSS-UP

15) LIFE SCIENCE *Short Answer* In the life cycle of a moss, what generation is always composed of a leafy and usually green stage?

ANSWER: GAMETOPHYTE (ACCEPT: 1N)

BONUS

15) LIFE SCIENCE *Short Answer* Flower color is determined by two alleles, R for red and w for white. Flower color exhibits incomplete dominance, meaning a flower with genotype Rw will be pink in color. If a pink flower and a white flower are crossed, what percentage of the offspring will become red?

ANSWER: 0%

TOSS-UP

16) PHYSICAL SCIENCE *Multiple Choice* When an object reaches terminal velocity, the net force on the object becomes zero and the object will do which of the following?

- W) Slow down
- X) Stop accelerating
- Y) Speed up
- Z) Stop falling

ANSWER: X) STOP ACCELERATING

BONUS

16) PHYSICAL SCIENCE *Short Answer* How much work in joules is done if a load is pushed with 40 newtons of force over a distance of 35 meters?

ANSWER: 1400

TOSS-UP

17) GENERAL SCIENCE *Short Answer* Identify all of the following four organisms which may be considered benthic during at least part of their lives: 1) snail, 2) dinoflagellates [*din-uh-FLAJ-uh-layts*], 3) shark, 4) jellyfish.

ANSWER: 1, 2, 4 (ACCEPT: SNAIL, DINOFLAGELLATES, JELLYFISH)

BONUS

17) GENERAL SCIENCE *Short Answer* What is the name of the equation that biologists use to calculate the frequencies of alleles in a population?

ANSWER: HARDY-WEINBERG

TOSS-UP

18) EARTH AND SPACE *Multiple Choice* Which of the following statements is true about the crustal magnetic fields of Mars?

- W) They protect the areas near them from space weathering
- X) They merge to create a very weak global magnetic field
- Y) They only cover the polar caps
- Z) They only cover craters

ANSWER: W) THEY PROTECT THE AREAS NEAR THEM FROM SPACE WEATHERING

BONUS

18) EARTH AND SPACE *Short Answer* What is the term for the ability, most commonly observed in birds, to detect a magnetic field to perceive direction, altitude, or location?

ANSWER: MAGNETOCEPTION (ACCEPT: MAGNETORECEPTION)

TOSS-UP

19) MATH *Multiple Choice* Which of the following lists is NOT the beginning of an arithmetic sequence?

- W) -1, 0, 1, 2
- X) 3, 5, 7, 9
- Y) 3, 6, 12, 24
- Z) 8, 6, 4, 2

ANSWER: Y) 3, 6, 12, 24

BONUS

19) MATH *Multiple Choice* Which of the following real-number functions is continuous at $x = -1$?

- W) $\frac{x+1}{x^3+1}$ [the fraction with numerator x plus 1 and denominator x cubed plus 1]
- X) $\frac{15}{x+1}$ [the fraction with numerator 15 and denominator x plus 1]
- Y) $\frac{x^2+3x+5}{x^2+3x-4}$ [the fraction with numerator x squared plus 3 x plus 5 and denominator x squared plus 3 x minus 4]
- Z) $\sqrt{x^3-7}$ [the square root of the quantity x cubed minus 7]

ANSWER: Y) $\frac{x^2+3x+5}{x^2+3x-4}$

TOSS-UP

20) ENERGY *Multiple Choice* Which of the following statements is NOT true about Tesla coils?

- W) They take DC current and step it up to extremely high voltages
- X) Voltages are discharged in the form of electrical arcs
- Y) They can create powerful electric fields
- Z) Some Tesla coils can wirelessly light up fluorescent lights up to 50 feet away

ANSWER: W) THEY TAKE DC CURRENT AND STEP IT UP TO EXTREMELY HIGH VOLTAGES

BONUS

20) ENERGY *Short Answer* Match the terms conduction, convection, and radiation with the three following scenarios: 1) occurs between a stove and a pot; 2) occurs in a microwave oven cooking your dinner; 3) can cause wind.

ANSWER: 1 = CONDUCTION, 2 = RADIATION, 3 = CONVECTION

TOSS-UP

21) LIFE SCIENCE *Multiple Choice* As an adaptation to arid environments, Crassulacean **[kras-uh-LAY-shuhn]** acid metabolizing (CAM) plants open their stomata during the night and close them during the day. Which of the following is a CAM plant?

- W) Corn
- X) Apple
- Y) Sugarcane
- Z) Pineapple

ANSWER: Z) PINEAPPLE

BONUS

21) LIFE SCIENCE *Short Answer* What biome generally has the following five characteristics: 1) mild temperatures; 2) abundant precipitation in the fall, winter, and spring; 3) dominant plants of Douglas fir, Sitka spruce, and Western hemlock; 4) rocky acidic soils; and 5) dominant wildlife of elk, deer, and bears?

ANSWER: NORTHWESTERN CONIFEROUS FOREST (ACCEPT: CONIFEROUS FOREST, TAIGA)

TOSS-UP

22) PHYSICAL SCIENCE *Short Answer* To the nearest Kelvin, at what temperature are the Fahrenheit and Celsius temperature scales equal?

ANSWER: 273

BONUS

22) PHYSICAL SCIENCE *Multiple Choice* If 90 grams of metal has a volume of 8.7 cubic centimeters, which of the following metals is it?

- W) Lead, with a specific gravity of 11.3
- X) Silver, with a specific gravity of 10.3
- Y) Nickel, with a specific gravity of 8.9
- Z) Tin, with a specific gravity of 7.3

ANSWER: X) SILVER, WITH A SPECIFIC GRAVITY OF 10.3

TOSS-UP

23) GENERAL SCIENCE *Short Answer* The fact that a plant blooms and sets fruits at the same time each year is explained by what process?

ANSWER: PHOTOPERIODISM

BONUS

23) GENERAL SCIENCE *Multiple Choice* Which of the following geologic eras contains the greatest number of periods?

- W) Mesozoic
- X) Paleozoic
- Y) Cenozoic
- Z) Paleoproterozoic

ANSWER: X) PALEOZOIC

TOSS-UP

24) EARTH AND SPACE *Multiple Choice* Which of the following layers within the Earth is undergoing convection?

- W) Lithosphere
- X) Crust
- Y) Asthenosphere [*as-THEN-uh-sfeer*]
- Z) Inner core

ANSWER: Y) ASTHENOSPHERE

BONUS

24) EARTH AND SPACE *Multiple Choice* In trying to identify an unknown rock, you place a drop of hydrochloric acid on the rock and note that it fizzes. Which of the following is likely to be the rock?

- W) Granite
- X) Pumice
- Y) Limestone
- Z) Schist [*SHIST*]

ANSWER: Y) LIMESTONE

TOSS-UP

25) MATH *Short Answer* Artie has quarters and dimes in his pocket. The number of dimes is one more than twice the number of quarters. The probability of randomly picking a quarter from his pocket is $\frac{1}{4}$. How many dimes are in his pocket?

ANSWER: 3

BONUS

25) MATH *Short Answer* The areas on three sides of a box are 6 square inches, 14 square inches, and 21 square inches, respectively. What is the volume of the box in cubic inches?

ANSWER: 42