

ROUND 11

TOSS-UP

1) LIFE SCIENCE *Multiple Choice* Chromosomal polyploidy results in which of the following phenotypic differences in fruits and vegetables?

- W) Shape
- X) Weight
- Y) Taste
- Z) Flavor

ANSWER: X) WEIGHT

BONUS

1) LIFE SCIENCE *Multiple Choice* Which of the following animals completes a round-trip migration over several generations?

- W) Leatherback turtle
- X) Caribou
- Y) Globe skimmer dragonfly
- Z) Humpback whale

ANSWER: Y) GLOBE SKIMMER DRAGONFLY

TOSS-UP

2) PHYSICAL SCIENCE *Multiple Choice* Which of the following molecular geometries contains the smallest bond angle?

- W) Octahedral
- X) Trigonal planar
- Y) Tetrahedral
- Z) Linear

ANSWER: W) OCTAHEDRAL

BONUS

2) PHYSICAL SCIENCE *Short Answer* Name all of the following five items that are both magnetic and conductive: 1) iron nail, 2) wooden block, 3) aluminum can, 4) steel can, 5) copper penny.

ANSWER: 1, 4 (ACCEPT: IRON NAIL, STEEL CAN)

TOSS-UP

3) GENERAL SCIENCE *Multiple Choice* Which of the following is NOT a recessive trait?

- W) Cystic fibrosis
- X) Colorblindness
- Y) Huntington's disease
- Z) Hemophilia

ANSWER: Y) HUNTINGTON'S DISEASE

BONUS

3) GENERAL SCIENCE *Multiple Choice* Colorblindness is considered a sex-linked inheritance. If the father is not colorblind but the mother is a carrier of the trait, which of the following is true regarding their genetic risk?

- W) 50% of their daughters will be carriers of the colorblindness trait
- X) All of their children will be carriers for the colorblindness trait
- Y) All of their sons will be colorblind
- Z) None of their children will be colorblind

ANSWER: W) 50% OF THEIR DAUGHTERS WILL BE CARRIERS OF THE COLORBLINDNESS TRAIT

TOSS-UP

4) MATH *Short Answer* Given the hypotenuse of an isosceles right triangle has a length of $7\sqrt{2}$, what are the lengths of the two legs?

ANSWER: 7 AND 7 (ACCEPT: 7)

BONUS

4) MATH *Multiple Choice* Given a figure and its image under a line reflection. The line of reflection can be located using which of the following?

- W) One perpendicular bisector
- X) Two perpendicular bisectors
- Y) Two parallel lines
- Z) Two circles

ANSWER: W) ONE PERPENDICULAR BISECTOR

TOSS-UP

5) ENERGY *Multiple Choice* Much attention is being given to solid-state lighting because it can do which of the following?

- W) Improve the power factor of power lines
- X) Reduce lighting power consumption by one fourth
- Y) Improve immunity to noise
- Z) Compete, in terms of efficacy, with current lighting technology

ANSWER: X) REDUCE LIGHTING POWER CONSUMPTION BY ONE FOURTH

BONUS

5) ENERGY *Multiple Choice* A dry steam geothermal power plant produces electricity in which of the following ways?

- W) Heating and condensing a working fluid
- X) Using heat to boil a working fluid that is vaporized through a heat exchanger and drives a generator
- Y) Using water at high temperatures to convert ground water into steam
- Z) Using steam from underground wells to rotate a turbine, activating an electricity generator

ANSWER: Z) USING STEAM FROM UNDERGROUND WELLS TO ROTATE A TURBINE, ACTIVATING AN ELECTRICITY GENERATOR

TOSS-UP

6) MATH *Short Answer* In simplest form, what is the fifth number in the following geometric sequence: 1, $-\frac{2}{3}$, $\frac{4}{9}$, $-\frac{8}{27}$?

ANSWER: 16/81

BONUS

6) MATH *Short Answer* If $y = 5x - 12$, find the inverse of this function.

ANSWER: $y = \frac{x + 12}{5}$

TOSS-UP

7) LIFE SCIENCE *Multiple Choice* Which of the following is NOT a mollusk [**MOL-uhsk**]?

- W) Monopod
- X) Gastropod
- Y) Cephalopod [**SEF-uh-luh-pod**]
- Z) Scaphopod

ANSWER: W) MONOPOD

BONUS

7) LIFE SCIENCE *Multiple Choice* Which of the following can prevent cell desiccation [**des-i-KAY-shuhn**] due to the osmotic pressure?

- W) An extra cellular membrane
- X) Carrier protein
- Y) Sodium channel
- Z) Hydrogen diffusion pump

ANSWER: Y) SODIUM CHANNEL

TOSS-UP

8) PHYSICAL SCIENCE *Multiple Choice* Hydrocarbons that contain at least one double bond between carbon atoms are classified as which of the following?

- W) Single
- X) Aromatic
- Y) Unsaturated
- Z) Saturated

ANSWER: Y) UNSATURATED

BONUS

8) PHYSICAL SCIENCE *Short Answer* Calculate the force in newtons required to compress a spring with a stiffness of 2 newtons per meter 3.5 centimeters from equilibrium.

ANSWER: 0.07

TOSS-UP

9) GENERAL SCIENCE *Short Answer* In which chamber of the human heart is the sinoatrial **[sy-noh-AY-tree-uhl]** node, which is responsible for initiating the action potential for heart contraction, located?

ANSWER: RIGHT ATRIUM

BONUS

9) GENERAL SCIENCE *Multiple Choice* Which of the following statements is true of microbial biofilms?

- W) Cells within the biofilm are encased within a layer of polysaccharide **[pol-ee-SAK-uh-ryd]**
- X) Biofilms almost always consist of only a single bacterial species
- Y) Biofilms are restricted to freshwater environments
- Z) Biofilms typically are small because resources are unable to circulate through them

ANSWER: W) CELLS WITHIN THE BIOFILM ARE ENCASED WITHIN A LAYER OF POLYSACCHARIDE

TOSS-UP

10) EARTH AND SPACE *Short Answer* Ice forming over a dark ocean induces further cooling by changing what reflective property of the surface?

ANSWER: ALBEDO

BONUS

10) EARTH AND SPACE *Multiple Choice* Which of the following numbers represents apatite on Moh's scale of hardness?

- W) 2
- X) 3
- Y) 4
- Z) 5

ANSWER: Z) 5

TOSS-UP

11) MATH *Multiple Choice* Which of the following values of x makes the following equation true: $2^x = \frac{1}{8}$ [**2 to the power of x equals one eighth**]?

- W) -4
- X) -3
- Y) 1/3
- Z) 4

ANSWER: X) -3

BONUS

11) MATH *Short Answer* If 6 painters can paint 48 doors in 2 hours, then, in minutes, how long would it take a painter to paint 3 doors?

ANSWER: 45

TOSS-UP

12) ENERGY *Short Answer* When a sound wave moves from left to right, air particles collide with nearby air particles and form an area of compression. Then the first set of air particles moves to the left while the second set vibrates and moves to the right, leaving a space containing fewer particles. What is this called?

ANSWER: RAREFACTION

BONUS

12) ENERGY *Multiple Choice* A 16.8 kilogram boy is riding in a 4.5 kilogram wagon. A 12 kilogram girl pushes the wagon and exerts a constant force of 2.6 newtons over a distance of 3.5 meters. How much work in joules is done by the girl pushing the wagon?

- W) 0.26
- X) 9.1
- Y) 66.4
- Z) 127

ANSWER: X) 9.1

TOSS-UP

13) LIFE SCIENCE *Multiple Choice* In which of the following environments are extremophiles most likely to be found?

- W) Pond
- X) Hydrothermal vent
- Y) Intestine
- Z) Human skin

ANSWER: X) HYDROTHERMAL VENT

BONUS

13) LIFE SCIENCE *Short Answer* When immersed in a hypertonic solution, a plant cell membrane will pull away from the cell wall. What is the name of this phenomenon?

ANSWER: PLASMOLYSIS

TOSS-UP

14) EARTH AND SPACE *Short Answer* What shape best describes Earth's current orbit around the Sun?

ANSWER: ELLIPSE

BONUS

14) EARTH AND SPACE *Short Answer* Methane in the atmosphere will react with sunlight and oxygen to form what gas?

ANSWER: CARBON DIOXIDE

TOSS-UP

15) LIFE SCIENCE *Short Answer* How many different amino acids are used to synthesize proteins?

ANSWER: 20

BONUS

15) LIFE SCIENCE *Multiple Choice* Arginine [**AHR-juh-neen**] is a positively charged amino acid in water. This amino acid is considered which of the following?

- W) Acidic
- X) Basic
- Y) Neutral
- Z) Amphoteric [**am-fuh-TER-ik**]

ANSWER: X) BASIC

TOSS-UP

16) PHYSICAL SCIENCE *Short Answer* A student has a mass of 60 kilograms when standing on the ground. He jumps into the air with an initial velocity of 1 meter per second. What is his mass, in kilograms, while in the air?

ANSWER: 60

BONUS

16) PHYSICAL SCIENCE *Short Answer* What is the name of a device that measures electrical potential difference?

ANSWER: VOLTMETER

TOSS-UP

17) GENERAL SCIENCE *Multiple Choice* The bark on a woody stem is made up of which of the following?

- W) Xylem [**ZY-luhm**] and phloem [**FLOH-em**]
- X) Sapwood
- Y) Phloem and cork
- Z) Mesophyll [**MEZ-uh-fil**]

ANSWER: Y) PHLOEM AND CORK

BONUS

17) GENERAL SCIENCE *Short Answer* A Venus flytrap's response to an insect is an example of what kind of movement?

ANSWER: NASTIC (ALSO ACCEPT THIGMONASTIC)

TOSS-UP

18) EARTH AND SPACE *Short Answer* Cows and termites are able to digest cellulose with the help of special microorganisms that produce large quantities of which greenhouse gas?

ANSWER: METHANE

BONUS

18) EARTH AND SPACE *Short Answer* Hydraulic fracturing is a natural gas mining technique that targets what kind of sedimentary rock?

ANSWER: SHALE

TOSS-UP

19) MATH *Short Answer* If a plane intersects a right circular cone parallel to its base, what are the names of all the types of geometric figures that can be formed?

ANSWER: CIRCLE AND POINT

BONUS

19) MATH *Short Answer* Sue went shopping in two stores with her birthday gift money. In the first store, she spent two-thirds of what she had plus \$4. In the second store, she spent half of what was left plus \$3. She had \$4 left. How many dollars did she begin with?

ANSWER: 54

TOSS-UP

20) ENERGY *Multiple Choice* A flywheel battery consists of which of the following?

W) A voltage source providing power to a spinning disk

X) A voltage applied to a motor to make a flywheel rotate, storing energy as the motion of a spinning wheel

Y) Energy converted when a disk is rotated backwards

Z) Potential energy converted into magnetic energy

ANSWER: X) A VOLTAGE APPLIED TO A MOTOR TO MAKE A FLYWHEEL ROTATE, STORING ENERGY AS THE MOTION OF A SPINNING WHEEL

BONUS

20) ENERGY *Short Answer* Order the following four electromagnetic waves from least to greatest in terms of the energy of their photons: 1) microwave, 2) infrared, 3) x-ray, 4) ultraviolet.

ANSWER: 1, 2, 4, 3 (ACCEPT: MICROWAVE, INFRARED, ULTRAVIOLET, X-RAY)

TOSS-UP

21) LIFE SCIENCE *Multiple Choice* Which of the following is the term for a plant that can be found living on top of another plant but which obtains its nutrients and water independently?

- W) Parasite
- X) Epiphyte [**EP-uh-fyt**]
- Y) Lycophyte [**LY-kuh-fyt**]
- Z) Saprophyte [**SAP-ruh-fyt**]

ANSWER: X) EPIPHYTE

BONUS

21) LIFE SCIENCE *Multiple Choice* A mutant fly is observed with an antenna growing out of the abdomen, rather than the head. Which of the following gene types is most likely involved in this kind of mutation?

- W) Immunoglobulin
- X) Sensory
- Y) Homeotic
- Z) Receptor

ANSWER: Y) HOMEOTIC

TOSS-UP

22) PHYSICAL SCIENCE *Short Answer* How many electrons does a neutral atom of oxygen have?

ANSWER: EIGHT

BONUS

22) PHYSICAL SCIENCE *Short Answer* Car A has a mass of 1000 kilograms and is traveling at 30 meters per second. Car B has a mass of 1200 kilograms and is traveling at 20 meters per second. Car A and Car B travel in opposite directions when they collide and stick together. Assuming the cars do not break apart into pieces, how fast do they travel in meters per second, to the nearest tenth, immediately after the crash?

ANSWER: 2.7

TOSS-UP

23) GENERAL SCIENCE *Multiple Choice* As people age, their eyes exhibit increasing difficulties in focusing on objects. This condition, known as presbyopia [*prez-bee-OH-pee-uh*], likely results from the loss of elasticity in which of the following parts of the eye?

- W) Lens
- X) Cornea
- Y) Iris
- Z) Retina

ANSWER: W) LENS

BONUS

23) GENERAL SCIENCE *Multiple Choice* Which of the following substances will NOT conduct electricity well when in liquid form?

- W) Aluminum chloride
- X) Titanium tetrachloride
- Y) Carbon tetrachloride
- Z) Sodium chloride

ANSWER: Y) CARBON TETRACHLORIDE

TOSS-UP

24) EARTH AND SPACE *Multiple Choice* Which of the following types of proxy evidence used in studying climate change chronicles the longest climate record?

- W) Ocean sediment cores
- X) Lake sediment cores
- Y) Tree rings
- Z) Ice sheet cores

ANSWER: W) OCEAN SEDIMENT CORES

BONUS

24) EARTH AND SPACE *Short Answer* What is the name of the mineral that makes up both rubies and sapphires?

ANSWER: CORUNDUM

TOSS-UP

25) MATH *Short Answer* What is the solution set of $6 + |x| = 9$ [**6 plus the absolute value of x equals 9**]?

ANSWER: {3, -3}

BONUS

25) MATH *Short Answer* Interest accrues on a loan at a constant rate. If the loan is \$2000 initially and \$2120 after one year, what is the yearly interest rate?

ANSWER: 6%