

ROUND 6

TOSS-UP

1) GENERAL SCIENCE *Multiple Choice* Which of the following best explains why it is possible to find nuggets of pure gold and silver in nature, but sodium appears only in compounds?

- W) Gold and silver are denser than sodium
- X) Gold and silver are less reactive than sodium
- Y) Gold and silver are less common than sodium
- Z) Gold and silver are solids at room temperature

ANSWER: X) GOLD AND SILVER ARE LESS REACTIVE THAN SODIUM

BONUS

1) GENERAL SCIENCE *Short Answer* An object has a mass of 3 kilograms and a force accelerates the object from rest to a speed of 4 meters per second over a distance of 2 meters. What is the work done in joules by this force?

ANSWER: 24

TOSS-UP

2) MATH *Multiple Choice* Which of the following is the least volume?

- W) 1.9 pints
- X) 3.5 cups
- Y) 1 quart
- Z) 1/3 of a gallon

ANSWER: X) 3.5 CUPS

BONUS

2) MATH *Short Answer* What are two consecutive positive odd integers whose product is 783?

ANSWER: 27 AND 29

TOSS-UP

3) PHYSICAL SCIENCE *Short Answer* What early scientific instrument was used to determine if an object was carrying an electric charge?

ANSWER: ELECTROSCOPE

BONUS

3) PHYSICAL SCIENCE *Short Answer* What volume, in milliliters, of a 10 molar hydrochloric acid stock solution is needed to make 2 liters of a 3 molar hydrochloric acid solution?

ANSWER: 600

TOSS-UP

4) LIFE SCIENCE *Multiple Choice* Which of the following is an example of a monotreme (read as: MOH-noh-treem)?

- W) Hedge-hog
- X) Platypus (read as: PLAH-ti-puhs)
- Y) Anteater
- Z) Wombat

ANSWER: X) PLATYPUS

BONUS

4) LIFE SCIENCE *Short Answer* What are the two types of bladders in the human body?

ANSWER: GALL AND URINARY

TOSS-UP

5) GENERAL SCIENCE *Short Answer* What is the most common type of cloud formed when warm air rises and reaches a level of cool air, where the moisture in the air cools and condenses?

ANSWER: CUMULUS

BONUS

5) GENERAL SCIENCE *Short Answer* A chemical is added to a cell that prevents endocytosis (read as: EHN-doh-sy-TŌE-sis) but does not prevent exocytosis (read as: ehk-sŏe -sy-TŌE-sis). As a result, what would be expected to happen to the volume of the cell over time?

ANSWER: IT WILL DECREASE

TOSS-UP

6) PHYSICAL SCIENCE *Multiple Choice* Which of the following pairs of elements are liquid at room temperature?

- W) Mercury and cesium
- X) Bromine and cesium
- Y) Mercury and gallium
- Z) Mercury and bromine

ANSWER: Z) MERCURY AND BROMINE

BONUS

6) PHYSICAL SCIENCE *Short Answer* The half-life of francium-212 is 19 minutes. How many minutes will it take for 1 gram of this isotope to decay to 0.125 grams?

ANSWER: 57

TOSS-UP

7) EARTH AND SPACE SCIENCE *Short Answer* The presence of clays on the surface of Mars strongly suggests the past presence of what substance?

ANSWER: LIQUID WATER (ACCEPT: WATER)

BONUS

7) EARTH AND SPACE SCIENCE *Short Answer* You look at a thin section of a sedimentary rock composed of quartz, plagioclase (read as: PLAY-jee-oh-klays), and amphibole (read as: AHM(P)-fi-bōel) grains surrounded by calcite cement. Which of those minerals formed last?

ANSWER: CALCITE CEMENT (ACCEPT: CALCITE)

TOSS-UP

8) PHYSICAL SCIENCE *Short Answer* What two monosaccharides make the disaccharide (read as: dy-SAH-keh-ryd) sucrose?

ANSWER: FRUCTOSE AND GLUCOSE

BONUS

8) PHYSICAL SCIENCE *Short Answer* By number, identify all of the following three statements that are TRUE about catalysts: 1) they change the rate of the reaction, 2) they change the chemical equilibrium of the reaction, 3) they decrease the activation energy.

ANSWER: 1 AND 3

TOSS-UP

9) ENERGY *Multiple Choice* Relative to conventional sources, such as liquid oil and natural gas, combustion of biomass for heat and electricity does NOT create more of which of the following?

- W) Greenhouse gases
- X) Particulates
- Y) Polyaromatic hydrocarbons
- Z) Dioxins

ANSWER: W) GREENHOUSE GASES

BONUS

9) ENERGY *Short Answer* What are the names of three processes through which thermal energy can be transferred?

ANSWER: (ACCEPT THREE) CONDUCTION, CONVECTION, MASS TRANSFER, ADVECTION, AND RADIATION

TOSS-UP

10) MATH *Short Answer* If the area of rhombus ABCD is 78 square centimeters and the altitude to the base CD is 7.5 centimeters, to the nearest integer, what is the length in centimeters of a side of the rhombus?

ANSWER: 10

BONUS

10) MATH *Short Answer* A juice container in the shape of a rectangular prism has a base of 7 inches by 5 inches. Given that there are 231 cubic inches in one gallon, and providing your answer to the nearest integer, how tall, in inches, must the container be to hold 6 gallons of juice?

ANSWER: 40

TOSS-UP

11) EARTH AND SPACE SCIENCE *Multiple Choice* Which of the following nutrients is most likely to benefit photosynthesizers in an upwelling region?

- W) Iron
- X) Oxygen
- Y) Nitrate
- Z) Magnesium

ANSWER: Y) NITRATE

BONUS

11) EARTH AND SPACE SCIENCE *Multiple Choice* Which of the following structures weakens rock, sometimes causing landslides?

- W) Bedding plane
- X) Concretions
- Y) Inselburg
- Z) Mudcracks

ANSWER: W) BEDDING PLANE

TOSS-UP

12) PHYSICAL SCIENCE *Multiple Choice* A precipitation reaction is used to make which of the following?

- W) Fudge
- X) Pickles
- Y) Poached eggs
- Z) Cornstarch gravy

ANSWER: W) FUDGE

BONUS

12) PHYSICAL SCIENCE *Short Answer* To which section of the periodic table does rhodium belong?

ANSWER: TRANSITION METALS

TOSS-UP

13) EARTH AND SPACE SCIENCE *Multiple Choice* Which of the following types of drainage is formed as streams flow toward a central depression?

- W) Rectangular
- X) Dendritic
- Y) Centripetal
- Z) Radial

ANSWER: Y) CENTRIPETAL

BONUS

13) EARTH AND SPACE SCIENCE *Short Answer* What modern scientific instrument is typically used to measure wind direction and speed?

ANSWER: ANEMOMETER

TOSS-UP

14) ENERGY *Multiple Choice* Which of the following is the fastest growing source of energy in the world since 1990?

- W) Solar
- X) Geothermal
- Y) Wind
- Z) Biofuel

ANSWER: Y) WIND

BONUS

14) ENERGY *Short Answer* By number, identify all of the following four choices that are TRUE of exergonic reactions: 1) they release energy, 2) they are spontaneous, 3) they have an equilibrium constant greater than one, 4) they can be coupled to endergonic reactions.

ANSWER: 1, 2, 3 AND 4 OR ALL

TOSS-UP

15) LIFE SCIENCE *Multiple Choice* During which of the following parts of mitosis do kinetochores (read as: ki-NEH-toh-kohrs) begin to mature and attach to the spindles?

- W) Prophase
- X) Metaphase
- Y) Anaphase
- Z) Telophase

ANSWER: W) PROPHASE

BONUS

15) LIFE SCIENCE *Short Answer* What stage of cellular respiration ends with the production of pyruvate (read as: py-RUH-vayt)?

ANSWER: GLYCOLYSIS

TOSS-UP

16) MATH *Short Answer* As a fraction in simplest form, what is the slope of the line that contains the points (2, 3) and (-2, 6)?

ANSWER: $-3/4$

BONUS

16) MATH *Short Answer* It takes 11,600 pecans stacked end-to-end to reach the top of the Empire State Building, which is 1,250 feet tall. To the nearest integer, how many whole pecans would be needed to reach the height of the Statue of Liberty at 150 feet?

ANSWER: 1,392

TOSS-UP

17) LIFE SCIENCE *Short Answer* A person with lactose intolerance most likely lacks which enzyme?

ANSWER: LACTASE

BONUS

17) LIFE SCIENCE *Short Answer* *Glycine max*, the species of soybean humans use for food, energy, and manufacturing, has a symbiotic relationship with soil bacteria called rhizobia. The soybean produces nodules where the rhizobia colonize and convert nitrogen gas into useable nitrogen for the plant. What type of symbiotic relationship does this represent?

ANSWER: MUTUALISM

TOSS-UP

18) ENERGY *Multiple Choice* Which of the following would be the most appropriate for providing power for water pumping?

- W) Stand alone wind turbine
- X) Wind turbine connected to a utility power grid
- Y) Wind turbine combined with a photovoltaic system
- Z) Wind plant

ANSWER: W) STAND ALONE WIND TURBINE

BONUS

18) ENERGY *Multiple Choice* According to the U.S. Fish and Wildlife Service, construction of communications towers may negatively impact migratory birds. Which of the following is LEAST dangerous to migrating birds ?

- W) Lighted towers with a height greater than 199 feet
- X) Unlighted towers with a height greater than 199 feet
- Y) Lighted towers with a height less than 199 feet
- Z) Unlighted towers with a height less than 199 feet

ANSWER: Z) UNLIGHTED TOWERS WITH A HEIGHT LESS THAN 199 FEET

TOSS-UP

19) PHYSICAL SCIENCE *Short Answer* What is the term for the difference in electrical potential between the anode and cathode of a galvanic cell?

ANSWER: CELL VOLTAGE (ACCEPT: VOLTAGE)

BONUS

19) PHYSICAL SCIENCE *Short Answer* A radio wave has a frequency of 100 megahertz. Providing your answer in scientific notation with two significant digits, what is its period in seconds?

ANSWER: 1.0×10^{-8} (DO NOT ACCEPT: 1×10^{-8})

TOSS-UP

20) LIFE SCIENCE *Short Answer* What is the general term that describes the ability of an organism to maintain a stable internal condition?

ANSWER: HOMEOSTASIS

BONUS

20) LIFE SCIENCE *Multiple Choice* The first evidence that nitrogen-fixing bacteria populations have become too low in a terrestrial biome would be a decline in which of the following populations?

- W) Decomposer
- X) Second-order consumer
- Y) First-order consumer
- Z) Producer

ANSWER: Z) PRODUCER

TOSS-UP

21) MATH *Short Answer* Evaluate the complex expression $(3i)^2$ (the quantity 3 i squared) .

ANSWER: -9

BONUS

21) MATH *Short Answer* Solve the following inequality: $4 - x < 6 + 3x$.

ANSWER: $x > -1/2$

TOSS-UP

22) GENERAL SCIENCE *Multiple Choice* Which of the following organisms does NOT have an external bilaterally symmetric body plan?

- W) Lobster
- X) Human
- Y) Sea star
- Z) Whale

ANSWER: Y) SEA STAR

BONUS

22) GENERAL SCIENCE *Short Answer* By name or number, identify all of the following five plants that are examples of invasive species in the United States: 1) multiflora rosa, 2) tree-of-heaven, 3) kudzu, 4) air potato, 5) musk thistle.

ANSWER: MULTIFLORA ROSA, TREE-OF-HEAVEN, KUDZU, AIR POTATO, MUSK THISTLE
(ACCEPT: 1, 2, 3, 4, AND 5 OR ALL)

TOSS-UP

23) EARTH AND SPACE SCIENCE *Multiple Choice* Which of the following minerals has a cubic, or isometric, crystal system?

- W) Quartz
- X) Pyrite (read as: PY-ryt)
- Y) Gypsum
- Z) Muscovite (read as: MUHS-koh-vyt) mica

ANSWER: X) PYRITE

BONUS

23) EARTH AND SPACE SCIENCE *Multiple Choice* Which of the following materials has a Moh's hardness between 3 and 4?

- W) Apatite
- X) Wire nail
- Y) Fingernail
- Z) Copper penny

ANSWER: Z) COPPER PENNY

TOSS-UP

24) GENERAL SCIENCE *Multiple Choice* Which of the following is the most important observable difference between primary and secondary earthquake waves?

- W) Speed of travel
- X) Place of origin
- Y) Strength of impact
- Z) Size of wave

ANSWER: W) SPEED OF TRAVEL

BONUS

24) GENERAL SCIENCE *Short Answer* What device, sometimes found in voltmeters and ammeters, measures current with a small electromagnet and needle on a pivot between the poles of a permanent magnet?

ANSWER: GALVANOMETER

TOSS-UP

25) EARTH AND SPACE SCIENCE *Multiple Choice* On a topographic map, you see a feature represented by a set of concentric circles. The outermost circle is labeled 1,000, and the innermost circle is labeled 1,300. You are most likely looking at which of the following features?

- W) Cliff
- X) River
- Y) Basin
- Z) Hill

ANSWER: Z) HILL

BONUS

25) EARTH AND SPACE SCIENCE *Multiple Choice* Which of the following types of stress is found in spreading environments such as the East African Rift?

- W) Compression
- X) Tension
- Y) Shear
- Z) Rotational

ANSWER: X) TENSION