

ROUND 16

TOSS-UP

1) LIFE SCIENCE *Short Answer* What do you call a microorganism that lives and grows in extremely hot environments that would kill most other microorganisms?

ANSWER: THERMOPHILE (ACCEPT: EXTREMOPHILE)

BONUS

1) LIFE SCIENCE *Multiple Choice* Which of the following statements about thermophiles in Yellowstone National Park is NOT true?

- W) Many thermophiles live in hot pools of water
- X) Studies of thermophiles have been helpful to the process of DNA fingerprinting
- Y) Most thermophiles are in the kingdom Eubacteria (read as: juh-bahk-TIR-ee-ah)
- Z) Thermophiles are often brightly colored

ANSWER: Y) MOST THERMOPHILES ARE IN THE KINGDOM EUBACTERIA

TOSS-UP

2) GENERAL SCIENCE *Short Answer* What is the heaviest element produced in a main sequence star?

ANSWER: IRON

BONUS

2) GENERAL SCIENCE *Multiple Choice* Which of the following is NOT considered a variable star?

- W) Cepheid (read as: SEH-feed)
- X) Supernova
- Y) Eclipsing binary star
- Z) Brown dwarf

ANSWER: Z) BROWN DWARF

TOSS-UP

3) EARTH AND SPACE SCIENCE *Short Answer* In which of the three spheres of Earth does life exist throughout much of the sphere?

ANSWER: HYDROSPHERE

BONUS

3) EARTH AND SPACE SCIENCE *Multiple Choice* Which of the following lists the four upper spheres of Earth in the correct order of their chronological development?

W) Atmosphere, biosphere, lithosphere, hydrosphere

X) Hydrosphere, lithosphere, biosphere, atmosphere

Y) Lithosphere, atmosphere, hydrosphere, biosphere

Z) Biosphere, atmosphere, hydrosphere, lithosphere

ANSWER: Y) LITHOSPHERE, ATMOSPHERE, HYDROSPHERE, BIOSPHERE

TOSS-UP

4) MATH *Short Answer* What is the area of the unit circle?

ANSWER: π

BONUS

4) MATH *Short Answer* What is the length, in inches to the nearest whole number, of the arc corresponding to a sector with angle 45 degrees and radius 10 inches?

ANSWER: 8

TOSS-UP

5) EARTH AND SPACE SCIENCE *Multiple Choice* Which of the following was a storm observed on Saturn – a large, bright, convective storm that appeared in Saturn's southern hemisphere?

- W) Dust storms
- X) Great Dark Spot
- Y) Dragon Storm
- Z) Great Red Spot

ANSWER: Y) DRAGON STORM

BONUS

5) EARTH AND SPACE SCIENCE *Short Answer* The Dragon Storm on Saturn emitted radiation similar to that generated by lightning on Earth. In what part of the electromagnetic spectrum are these emissions found?

ANSWER: RADIO

TOSS-UP

6) PHYSICAL SCIENCE *Multiple Choice* Which of the following is true of tension?

- W) It is the same as stress
- X) Its magnitude is independent of mass
- Y) It can be defined as the opposite of compression
- Z) It is equivalent to force

ANSWER: Y) IT CAN BE DEFINED AS THE OPPOSITE OF COMPRESSION

BONUS

6) PHYSICAL SCIENCE *Short Answer* Neglecting the effect of air resistance, what is the shape of the trajectory of a projectile launched upward at a 50 degree angle from ground level?

ANSWER: PARABOLA

TOSS-UP

7) GENERAL SCIENCE *Short Answer* What is the Gibbs energy sign in aerobic cellular respiration during the Krebs cycle?

ANSWER: NEGATIVE

BONUS

7) GENERAL SCIENCE *Short Answer* Giving your answer in amps to the nearest hundredth (read as: hun-DREDTH), how much current flows through a circuit containing a 3.6 ohm resistor and a 9 volt battery?

ANSWER: 2.5

TOSS-UP

8) LIFE SCIENCE *Short Answer* What is the name for the five long, cylindrical bones in the hand that extend from the base of the wrist to the base of each finger.

ANSWER: METACARPAL

BONUS

8) LIFE SCIENCE *Short Answer* How many phalanges do most people have in their left foot?

ANSWER: 14

TOSS-UP

9) EARTH AND SPACE SCIENCE *Short Answer* What is the name for the point in the orbit of a planet, asteroid or comet where it is nearest to the Sun?

ANSWER: PERIHELION

BONUS

9) EARTH AND SPACE SCIENCE *Multiple Choice* If the Earth's axis lost its tilt, which of the following would least likely occur?

- W) Changes in ocean surface currents
- X) Increased amount of seasonal changes across the planet
- Y) Cooler temperatures in winter and hotter temperatures in summer
- Z) Days and nights which are equal throughout the entire year across the planet

ANSWER: Y) COOLER TEMPERATURES IN WINTER AND HOTTER TEMPERATURES IN SUMMER

TOSS-UP

10) GENERAL SCIENCE *Multiple Choice* Which of the following choices is the controlling force behind mass wasting?

- W) The triggering event
- X) Saturation of the material with water
- Y) Gravity
- Z) Removal of anchoring vegetation

ANSWER: Y) GRAVITY

BONUS

10) GENERAL SCIENCE *Multiple Choice* Which of the following statements is NOT true about rock avalanches?

- W) Rock and debris can hurtle downslope at speeds exceeding 125 miles per hour
- X) They can be dated based on isotopes formed from the rock's exposure to cosmic rays
- Y) They can be caused by earthquakes
- Z) The movement of rocks downslope in an avalanche is called a flow

ANSWER: Z) THE MOVEMENT OF ROCKS DOWNSLOPE IN AN AVALANCHE IS CALLED A FLOW

TOSS-UP

11) ENERGY *Short Answer* If plants convert 1% of the sunlight they receive into energy, and 10% of the energy exchanged between trophic levels is converted into biomass, then what percent of the energy in the incident sunlight is embodied in a secondary consumer?

ANSWER: 0.01%

BONUS

11) ENERGY *Multiple Choice* Which of the following types of organism obtains energy primarily from inorganic compounds?

- W) Chemolithotroph (read as: kee-mōe-LI-thah-trōef)
- X) Chemoorganotroph (read as: kee-mōe-ohr-GAH-nōe-trōef)
- Y) Photolithotroph (read as: fōe-tōe-LI-toh-trōef)
- Z) Photoorganotroph (read as: fōe-tōe-ohr-GAH-nōe- trōef)

ANSWER: W) CHEMOLITHOTROPH

TOSS-UP

12) GENERAL SCIENCE *Multiple Choice* A new virus is discovered and its genetic code is examined. Which of the following cannot be true concerning its genome?

- W) It is composed of double-stranded DNA
- X) It is composed of single-stranded RNA
- Y) It is composed of single-stranded DNA
- Z) It is composed of double-stranded proteins

ANSWER: Z) IT IS COMPOSED OF DOUBLE-STRANDED PROTEINS

BONUS

12) GENERAL SCIENCE *Multiple Choice* Ebola hemorrhagic fever is a severe, often fatal, disease in humans and nonhuman primates. It is caused by infection with the Ebola virus. Which of the following statements is NOT true about Ebola?

- W) Ebola typically occurs in sporadic outbreaks
- X) Health care workers should wear protective clothing such as masks, gowns, goggles, and gloves
- Y) The Ebola virus originated in monkeys
- Z) The disease takes between 2 days to 3 weeks to incubate

ANSWER: Y) THE EBOLA VIRUS ORIGINATED IN MONKEYS

TOSS-UP

13) PHYSICAL SCIENCE *Short Answer* What prevents objects in free fall on Earth from continuously accelerating?

ANSWER: AIR RESISTANCE (ACCEPT: ATMOSPHERE)

BONUS

13) PHYSICAL SCIENCE *Multiple Choice* Why do many bridges have expansion joints?

- W) To reduce the vibration of cars traveling across the bridge
- X) To permit quick disassembly in case of flooding or other disasters
- Y) To increase resistance to UVB-induced photo-degradation
- Z) To prevent buckling when the bridge expands and contracts with temperature changes

ANSWER: Z) TO PREVENT BUCKLING WHEN MATERIALS IN THE BRIDGE EXPAND AND CONTRACT WITH TEMPERATURE CHANGES

TOSS-UP

14) EARTH AND SPACE SCIENCE *Short Answer* What does a barometer measure?

ANSWER: ATMOSPHERIC PRESSURE

BONUS

14) EARTH AND SPACE SCIENCE *Multiple Choice* Which of the following is NOT evidence that supports the notion of Snowball Earth?

- W) Stable concentrations of atmospheric carbon dioxide
- X) Dropstones in tropical waters
- Y) Large clay deposits
- Z) Cap carbonates

ANSWER: W) STABLE CONCENTRATIONS OF ATMOSPHERIC CARBON DIOXIDE

TOSS-UP

15) MATH *Multiple Choice* Which of the following values is smallest?

W) 4! (read as: four factorial)

X) 5^2

Y) $|\sqrt{100}| \times 4$ (read as: the absolute value of the square root of 100 times 4)

Z) $|\sqrt{625}|$ (read as: the absolute value of the square root of 625)

ANSWER: W) 4!

BONUS

15) MATH *Short Answer* What is the sum of the numbers 1 through 250?

ANSWER: 31,375

TOSS-UP

16) PHYSICAL SCIENCE *Short Answer* What is the acceleration, in meters per second squared, of a 20 kilogram object that is being pushed with an unbalanced force of 10 newtons?

ANSWER: 0.5

BONUS

16) PHYSICAL SCIENCE *Short Answer* Providing your answer to the nearest integer, what is the force in newtons required to horizontally accelerate a 20 pound object on a frictionless surface to 10 meters per second squared?

ANSWER: 91

TOSS-UP

17) LIFE SCIENCE *Short Answer* Most enzymes are polymers of which kind of molecules?

ANSWER: AMINO ACIDS (DO NOT ACCEPT: PROTEINS)

BONUS

17) LIFE SCIENCE *Multiple Choice* Which of the following amino acids must we obtain in our diets?

W) Cysteine (read as: SIS-teh-een)

X) Leucine (read as: LUH-seen)

Y) Glutamine

Z) Glycine

ANSWER: X) LEUCINE

TOSS-UP

18) MATH *Short Answer* What is the degree of the polynomial $7x^2y^4 + 6x + 7y + 10$ (read as: 7 x squared y to the fourth plus 6 x plus 7 y plus 10)?

ANSWER: 6

BONUS

18) MATH *Short Answer* What is the equation of the axis of symmetry for the parabola:
 $y = 2x^2 - 3x - 5$?

ANSWER: $x = 3/4$ OR $x = 0.75$

TOSS-UP

19) ENERGY *Multiple Choice* Name the circuit element that stores energy in the form of a magnetic field.

- W) Meter
- X) Ground
- Y) Resistor
- Z) Inductor

ANSWER: Z) INDUCTOR

BONUS

19) ENERGY *Short Answer* Find the energy, in joules, stored in an inductor of 10 henries with a current of 2 amperes flowing through it.

ANSWER: 20

TOSS-UP

20) PHYSICAL SCIENCE *Multiple Choice* Which of the following increases with the addition of sodium chloride to water?

- W) The boiling point of the solution
- X) The freezing point of the solution
- Y) The temperature of the solution
- Z) The vapor pressure of the solution

ANSWER: W) THE BOILING POINT OF THE SOLUTION

BONUS

20) PHYSICAL SCIENCE *Multiple Choice* The addition of equal moles of which of the following to water will decrease the freezing point the most?

- W) Magnesium sulfate
- X) Hydrochloric acid
- Y) Sulfuric acid
- Z) Hydrofluoric acid

ANSWER: Y) SULFURIC ACID

TOSS-UP

21) MATH *Multiple Choice* Which of the following regular polygons will NOT tessellate?

- W) Triangles
- X) Squares
- Y) Hexagons
- Z) Octagons

ANSWER: Z) OCTAGONS

BONUS

21) MATH *Short Answer* ABC is a 3-4-5 triangle. If a similar triangle, DEF, has a perimeter of 144, find the area of DEF in square units.

ANSWER: 864

TOSS-UP

22) LIFE SCIENCE *Short Answer* What is the specific term for the mutualistic association between a fungus and the roots of a plant?

ANSWER: MYCORRHIZA

BONUS

22) LIFE SCIENCE *Multiple Choice* Which of the following choices does NOT represent a benefit of Mycorrhiza (read as: my-koh-RY-zah)?

- W) Enhanced absorption of water
- X) Better survival of root diseases
- Y) Enhanced uptake of nitrogen
- Z) Enhanced soil structure

ANSWER: Y) ENHANCED UPTAKE OF NITROGEN

TOSS-UP

23) EARTH AND SPACE SCIENCE *Multiple Choice* Of the following locations, where on the Earth's surface are you closest to the center of the Earth?

- W) The geographic North Pole
- X) The equator
- Y) Costa Rica
- Z) Saudi Arabia

ANSWER: W) THE GEOGRAPHIC NORTH POLE

BONUS

23) EARTH AND SPACE SCIENCE *Multiple Choice* Which of the following describes the temperature and productivity of surface ocean water in an upwelling zone?

- W) High temperature and low productivity
- X) High temperature and high productivity
- Y) Low temperature and high productivity
- Z) Low temperature and low productivity

ANSWER: Y) LOW TEMPERATURE AND HIGH PRODUCTIVITY

TOSS-UP

24) MATH *Short Answer* What is the center of the hyperbola $\frac{(x - 3)^2}{25} - \frac{(y + 1)^2}{49} = 1$ (read as: the quantity x minus 3 squared over 25 minus the quantity y plus 1 squared over 49 equals 1)?

ANSWER: (3, -1)

BONUS

24) MATH *Short Answer* What is one equation in slope intercept form of an asymptote of the hyperbola $\frac{(x - 3)^2}{25} - \frac{(y + 1)^2}{49} = 1$

read as: the quantity x minus 3 squared over 25 minus the quantity y plus 1 squared over 49 equals 1)?

ANSWER: $y = \frac{7}{5}x - \frac{26}{5}$ OR $y = -\frac{7}{5}x + \frac{16}{5}$

TOSS-UP

25) ENERGY *Multiple Choice* A compact car and a large SUV are both driving down the freeway at 60 miles per hour. They both must stop to avoid an obstacle 0.3 miles in front of them. What does the SUV require more of relative to the car in order to stop in time to avoid hitting the obstacle?

- W) Force
- X) Momentum
- Y) Velocity
- Z) Torque

ANSWER: W) FORCE

BONUS

25) ENERGY *Multiple Choice* Electrochemical batteries convert chemical energy directly into electrical energy. Would you expect the efficiency of an electrochemical battery, in general, to be more or less efficient in generating electrical energy than a gas-powered electrical generator?

- W) It depends on the current
- X) The overall efficiency of a battery would be better than that of a gas-powered electrical generator
- Y) The overall efficiency of a battery would be worse than that of a gas-powered electrical generator
- Z) The overall efficiency of a battery would be the equal to that of a gas-powered electrical generator

ANSWER: X) THE OVERALL EFFICIENCY OF A BATTERY WOULD BE BETTER THAN THAT OF A GAS-POWERED ELECTRICAL GENERATOR