

ROUND 3

TOSS-UP

1) CHEMISTRY *Multiple Choice* Which of the following is never considered evidence of a chemical change?

- W) Phase change
- X) Color change
- Y) Formation of a precipitate
- Z) Formation of a gas

ANSWER: W) PHASE CHANGE

BONUS

1) CHEMISTRY *Multiple Choice* Which of the following represents a chemical property of sodium?

- W) It is less dense than water
- X) It has a melting point of 98.7 degrees Celsius
- Y) It reacts with water to release hydrogen gas
- Z) When cut with a knife, it has a shiny surface with a metallic luster

ANSWER: Y) IT REACTS WITH WATER TO RELEASE HYDROGEN GAS

TOSS-UP

2) PHYSICS *Multiple Choice* A rock is dropped from a building, and a second rock is dropped one second later. Ignoring air resistance, what happens to the distance between the two rocks over time until one lands?

- W) The distance between them will depend on the masses of the rocks
- X) The distance between them will decrease
- Y) The distance between them will stay the same
- Z) The distance between them will increase

ANSWER: Z) THE DISTANCE BETWEEN THEM WILL INCREASE

BONUS

2) PHYSICS *Short Answer* When the drag force acting on a skydiver and the force of gravity are equal, how can you characterize his or her velocity?

ANSWER: TERMINAL (ACCEPT: CONSTANT)

TOSS-UP

3) BIOLOGY *Multiple Choice* Which of the following could be considered a multicellular eukaryotic (read as: yew-KEHR-ee-otic) heterotroph whose cells lack cell walls?

- W) Fern
- X) Bacterium
- Y) Euglena
- Z) Whip scorpion

ANSWER: Z) WHIP SCORPION

BONUS

3) BIOLOGY *Multiple Choice* Euglena are unicellular organisms classified into the Kingdom Protista. Which of the following characteristics is NOT true of euglena?

- W) They can make their own food by photosynthesis
- X) They can absorb food from their environment
- Y) They move by the motion of their flagella
- Z) They prefer saltwater

ANSWER: Z) THEY PREFER SALTWATER

TOSS-UP

4) EARTH AND SPACE *Multiple Choice* Destruction due to an earthquake does NOT vary because of:

- W) Rock type
- X) Amount of human infrastructure
- Y) Proximity to a volcano
- Z) Distance from the epicenter

ANSWER: Y) PROXIMITY TO A VOLCANO

BONUS

4) EARTH AND SPACE *Multiple Choice* Waves of energy that come from an earthquake:

- W) Travel through and along the surface of the earth
- X) Can be felt at every single point on the surface of the earth
- Y) Travel only along the surface of the earth
- Z) Are unrelated to movements of magma beneath the surface

ANSWER: W) TRAVEL THROUGH AND ALONG THE SURFACE OF THE EARTH

TOSS-UP

5) BIOLOGY *Multiple Choice* Bananas, citrus fruits, and day lilies are all examples of plants that have more than two sets of chromosomes. What is the term for this phenomenon?

- W) Polyploidy
- X) Genetic variability
- Y) Mutation
- Z) Diploidy

ANSWER: W) POLYPLOIDY

BONUS

5) BIOLOGY *Multiple Choice* People with insulin-dependent diabetes are now treated with pure human insulin produced by human genes inserted into bacteria. What is the name for an organism produced by taking genes from one organism and inserting them into the cells of a different organism?

- W) Clone
- X) A transgenic organism
- Y) Hybrid
- Z) A mutagenic organism

ANSWER: X) A TRANSGENIC ORGANISM

TOSS-UP

6) MATH *Short Answer* What type of growth does $y = 36 \times 7^x$ (read as: y equals 36 times 7 to the power of x) represent?

ANSWER: EXPONENTIAL

BONUS

6) MATH *Short Answer* Find the length and width in meters of a rectangle with perimeter of 200 meters and maximum possible area.

ANSWER: LENGTH AND WIDTH = 50

TOSS-UP

7) EARTH AND SPACE *Multiple Choice* Which of the following tectonic environments would lead to the formation of the most felsic, silica-rich magma?

- W) Subduction associated with the Andes Mountains
- X) East African Rift Valley
- Y) Volcanic island arc of Japan
- Z) Hot spot underneath Yellowstone

ANSWER: Z) HOT SPOT UNDERNEATH YELLOWSTONE

BONUS

7) EARTH AND SPACE *Multiple Choice* Which of the following will NOT help crystallize magma?

- W) Cooling the liquid
- X) Increasing pressure
- Y) Removing water to raise the melting point
- Z) Increasing temperature

ANSWER: Z) INCREASING TEMPERATURE

TOSS-UP

8) PHYSICS *Multiple Choice* Which one of the following terms is used to indicate the natural tendency of an object to remain at rest or in motion at a constant speed along a straight line?

- W) Equilibrium
- X) Inertia (read as: i-NEHR-shah)
- Y) Stability
- Z) Interaction

ANSWER: X) INERTIA

BONUS

8) PHYSICS *Multiple Choice* What are the two kinds of motion displayed by the motion of a bowling ball?

- W) Oscillatory and rotational
- X) Periodic and translational
- Y) Translational and rotational
- Z) Random and periodic

ANSWER: Y) TRANSLATIONAL AND ROTATIONAL

TOSS-UP

9) BIOLOGY *Short Answer* Name the process in which a parent cell divides into two identical daughter cells.

ANSWER: MITOSIS (ACCEPT: CYTOKINESIS)

BONUS

9) BIOLOGY *Short Answer* What is the name of the sex-linked genetic disorder that is characterized by excessive bleeding?

ANSWER: HEMOPHILIA

TOSS-UP

10) CHEMISTRY *Short Answer* What is the most electronegative element?

ANSWER: FLUORINE

BONUS

10) CHEMISTRY *Multiple Choice* Based on trends in the periodic table, which of the following elements is the least electronegative?

- W) Nitrogen
- X) Carbon
- Y) Beryllium
- Z) Oxygen

ANSWER: Y) BERYLLIUM

TOSS-UP

11) PHYSICS *Short Answer* How does the center of mass of an object change when going from a 1 g to a 0 g environment?

ANSWER: IT DOES NOT CHANGE

BONUS

11) PHYSICS *Multiple Choice* The acceleration of two different masses connected by a light string suspended by a light frictionless pulley is:

- W) Less than 9.8 meters per second squared
- X) Greater than 9.8 meters per second squared
- Y) Equal to 9.8 meters per second squared
- Z) 0

ANSWER: W) LESS THAN 9.8 METERS PER SECOND SQUARED

TOSS-UP

12) CHEMISTRY *Multiple Choice* Which of the following is NOT a strong acid?

- W) Hydrochloric Acid
- X) Phosphoric Acid
- Y) Sulfuric Acid
- Z) Perchloric Acid

ANSWER: X) PHOSPHORIC ACID

BONUS

12) CHEMISTRY *Multiple Choice* According to the Brønsted-Lowry acid-base theory, which of the following species cannot function as an acid?

- W) Water
- X) Hydrogen carbonate ion
- Y) Phosphate
- Z) Hydroxide

ANSWER: Y) PHOSPHATE

TOSS-UP

13) MATH *Short Answer* When the discriminant of a quadratic function $ax^2 + bx + c = 0$ is greater than 0, how many x intercepts does the graph have?

ANSWER: 2

BONUS

13) MATH *Short Answer* Give all solutions for h in the following equation: $h^2 + 3h = -2$.

ANSWER: $h = -2$ AND $h = -1$

TOSS-UP

14) ENERGY *Multiple Choice* What is the challenge with regard to wind energy and transmission line capacity?

- W) Not enough transmission lines connect cities to the windiest parts of the country
- X) Transmission lines only have the capacity to transfer wind energy from small turbines
- Y) Transmission lines must be buried
- Z) We have more transmission lines than our power plants can currently support

ANSWER: W) NOT ENOUGH TRANSMISSION LINES CONNECT CITIES TO THE WINDIEST PARTS OF THE COUNTRY

BONUS

14) ENERGY *Short Answer* A wind energy system first converts the kinetic energy of the wind into what type of energy?

ANSWER: MECHANICAL

TOSS-UP

15) EARTH AND SPACE *Multiple Choice* Approximately what percentage of the Earth's surface is covered by ocean?

- W) 50%
- X) 70%
- Y) 90%
- Z) 99%

ANSWER: X) 70%

BONUS

15) EARTH AND SPACE *Multiple Choice* Where is the youngest ocean floor found?

- W) Mid-ocean ridges
- X) Subduction zones
- Y) Top of Himalayas
- Z) The abyssal plains

ANSWER: W) MID-OCEAN RIDGES

TOSS-UP

16) MATH *Short Answer* If Jill takes three blouses, two pairs of pants, and two pairs of shoes for a weekend trip, how many different complete outfit combinations can she put together?

ANSWER: 12

BONUS

16) MATH *Short Answer* Give the numerical value for the number of different orders in which 7 people can line up at a cash register?

ANSWER: 5,040

TOSS-UP

17) ENERGY *Multiple Choice* Roberto lives in Florida. Which of the following is NOT a way that he could use less energy at home?

- W) Close the window curtains during the day in the summer
- X) Open the curtains on south-facing windows during the day in the winter
- Y) Hang his wet clothes on clotheslines outside when it is sunny
- Z) Turn thermostats to a colder temperature during the summer

ANSWER: Z) TURN THERMOSTATS TO A COLDER TEMPERATURE DURING THE SUMMER

BONUS

17) ENERGY *Multiple Choice* A clothes dryer can be a high consumer of household electricity. Which of the following options is NOT a way in which to reduce energy consumption when using your clothes dryer?

- W) Purchase a dryer model that has an ENERGY STAR label
- X) Use the moisture sensor option, if you have one
- Y) Clean the lint filter to improve the efficiency of the dryer
- Z) Scrub the lint filter if you use dryer sheets

ANSWER: W) PURCHASE A DRYER MODEL THAT HAS AN ENERGY STAR LABEL*

[*NOTE: THERE ARE NO ENERGY STAR DRYERS- SEE WWW.ENERGYSTAR.GOV]

TOSS-UP

18) EARTH AND SPACE *Multiple Choice* Which of the following units are typically used when measuring a star's lifespan?

- W) Months
- X) Thousands of years
- Y) Millions or billions of years
- Z) Light years

ANSWER: Y) MILLIONS OR BILLIONS OF YEARS

BONUS

18) EARTH AND SPACE *Short Answer* Rank the following stars from that with the shortest lifespan to that with the longest lifespan: red dwarf, supergiant, main sequence.

ANSWER: SUPERGIANT, MAIN SEQUENCE, RED DWARF

TOSS-UP

19) ENERGY *Multiple Choice* Which of the following best defines biodiesel?

- W) Ethanol
- X) Raw vegetable oil
- Y) Alternative diesel fuel produced from renewable resources
- Z) U.S. diesel fuel

ANSWER: Y) ALTERNATIVE DIESEL FUEL PRODUCED FROM RENEWABLE RESOURCES

BONUS

19) ENERGY *Short Answer* Gas to liquids, or GTL, fuels are produced by converting natural gas into liquid fuels. Which of the following is NOT a benefit for production and use of GTL fuels?

- W) They are cleaner than conventional petroleum-based diesel fuel
- X) They are compatible with the current petroleum infrastructure
- Y) They can be produced domestically
- Z) GTL plants are relatively inexpensive to build

ANSWER: Z) GTL PLANTS ARE RELATIVELY INEXPENSIVE TO BUILD

TOSS-UP

20) EARTH AND SPACE *Multiple Choice* Which of the following is a characteristic of an intrusive, igneous rock?

- W) Vesicles
- X) Large interlocking crystals
- Y) Tightly compressed grains of sand
- Z) Glassy luster

ANSWER: X) LARGE INTERLOCKING CRYSTALS

BONUS

20) EARTH AND SPACE *Multiple Choice* Which of the following processes would most likely lead to the formation of a metamorphic rock?

- W) Precipitate forming at the bottom of the oceans
- X) Mountain building
- Y) High speed ejection from a cone
- Z) Crystals cooling from magma

ANSWER: X) MOUNTAIN BUILDING

TOSS-UP

21) BIOLOGY *Multiple Choice* Down syndrome is caused by:

- W) A missing copy of chromosome 21
- X) Genetic mutations on various chromosomes
- Y) An extra copy of chromosome 21
- Z) A contagious disease passed from mother to fetus

ANSWER: Y) AN EXTRA COPY OF CHROMOSOME 21

BONUS

21) BIOLOGY *Multiple Choice* Which of the following statements best describes the sex chromosome content of female and male cells in birds?

- W) Females are ZW, males are ZZ
- X) Females are WW, males are ZW
- Y) Females are ZZ, males are ZW
- Z) Females are ZZ, males are WW

ANSWER: W) FEMALES ARE ZW, MALES ARE ZZ

TOSS-UP

22) MATH *Short Answer* What is the fifth number in the geometric sequence that begins: 27, 9, 3, 1?

ANSWER: 1/3

BONUS

22) MATH *Short Answer* AB and CD are parallel line segments intersected by the line segment EF. Endpoint E lies on AB, and endpoint F lies on CD. If angle CEF is 18° and angle CFE is 125° , what is the measure of angle AEC?

ANSWER: 37°

TOSS-UP

23) PHYSICS *Multiple Choice* What is the term for the rate at which an object's velocity changes with time?

- W) Instantaneous velocity
- X) Motion
- Y) Speed
- Z) Acceleration

ANSWER: Z) ACCELERATION

BONUS

23) PHYSICS *Multiple Choice* In 1901, 63-year-old retired schoolteacher Annie Edson Taylor went over the Niagara Falls in a barrel. The Horseshoe Falls have a height of about 51 meters. Using 9.8 meters per second squared as the acceleration due to gravity; about how long in seconds did it take for her to reach the water surface? Assume that her initial velocity was zero, and neglect the effect of the air on the barrel during the fall.

- W) Between 3 and 4 seconds
- X) Between 5 and 6 seconds
- Y) Between 10 and 11 seconds
- Z) Between 27 and 28 seconds

ANSWER: W) BETWEEN 3 AND 4 SECONDS

TOSS-UP

24) MATH *Short Answer* Bethany and Charlene are 7 years apart in age. In two years, Charlene will be twice Bethany's age. What is Bethany's current age?

ANSWER: 5

BONUS

24) MATH *Short Answer* Evaluate $y = 5x^2 + 4x^3 + 12$ (read as: 5x squared plus 4 x cubed plus 12) when $x = -2$.

ANSWER: 0

TOSS-UP

25) CHEMISTRY *Multiple Choice* Which of the following is characteristic of a compound?

- W) Elements must be combined in a very specific ratio
- X) Properties can vary throughout the sample
- Y) It can be classified as a colloid
- Z) It can be classified as heterogeneous

ANSWER: W) ELEMENTS MUST BE COMBINED IN A VERY SPECIFIC RATIO

BONUS

25) CHEMISTRY *Multiple Choice* Which of the following results will identify an unknown substance as a mixture instead of a compound?

- W) It cannot be separated by distillation
- X) It is homogeneous
- Y) It has a constant melting point
- Z) Centrifuging can separate the components

ANSWER: Z) CENTRIFUGING CAN SEPARATE THE COMPONENTS