

ROUND 12

TOSS-UP

1) GENERAL SCIENCE *Multiple Choice* Which of the following is a prosimian [*proh-SIM-ee-uhn*]?

- W) Orangutan
- X) Panda
- Y) Iguana
- Z) Lemur

ANSWER: Z) LEMUR

BONUS

1) GENERAL SCIENCE *Short Answer* Given that up is positive and that g is 10 meters per second squared, if a ball is thrown vertically upward with an initial velocity of 20 meters per second, what will be its velocity in meters per second after 3 seconds?

ANSWER: -10

TOSS-UP

2) EARTH AND SPACE *Multiple Choice* Which of the following statements is NOT true about the jet stream?

- W) It is found at the altitude at which winds are the strongest
- X) It is strongest when there is a large temperature contrast between two air masses
- Y) It is usually composed of easterly winds
- Z) It is caused by a combination of the Earth's rotation on its axis and atmospheric heating

ANSWER: Y) IT IS USUALLY COMPOSED OF EASTERLY WINDS

BONUS

2) EARTH AND SPACE *Multiple Choice* Which of the following NASA missions has a primary objective to map variations in Earth's gravity field?

- W) GRACE
- X) LAGEOS
- Y) Nimbus
- Z) SMAP

ANSWER: W) GRACE

TOSS-UP

3) PHYSICAL SCIENCE *Short Answer* What term describes a thermodynamic process that is constantly in equilibrium, such that an infinitesimal change can lead to a redirection of that process without any release or loss of energy?

ANSWER: REVERSIBLE

BONUS

3) PHYSICAL SCIENCE *Multiple Choice* Which of the following is coherent light?

- W) Polarized light that has passed through a coherent filter
- X) Light of one wavelength, traveling in one direction, with crests and troughs aligned
- Y) Light of one wavelength, spreading out in all directions, and vibrating in several planes
- Z) Light made up of waves that vibrate in only one plane

ANSWER: X) LIGHT OF ONE WAVELENGTH, TRAVELING IN ONE DIRECTION, WITH CRESTS AND TROUGHS ALIGNED

TOSS-UP

4) ENERGY *Multiple Choice* Which of the following reflects the approximate percentage range of coal produced from surface mines as a fraction of total coal production in the U.S.?

- W) 10-20%
- X) 30-40%
- Y) 40-50%
- Z) More than 60%

ANSWER: Z) MORE THAN 60%

BONUS

4) ENERGY *Multiple Choice* Burning rock refers to which of the following energy sources?

- W) Coal
- X) Oil shale
- Y) Tar sands
- Z) Peat

ANSWER: X) OIL SHALE

TOSS-UP

5) LIFE SCIENCE *Short Answer* On a DNA electrophoresis [*e-lek-troh-fuh-REE-sis*] gel, what moves the DNA from one end to the other?

ANSWER: AN ELECTRICAL CURRENT (ACCEPT: ELECTRICAL FIELD, ELECTRICITY, POWER SOURCE, VOLTAGE DIFFERENCE)

BONUS

5) LIFE SCIENCE *Multiple Choice* Parasitic flatworms, commonly called flukes, that infect the internal organs of their hosts are in which of the following classes?

W) Turbellarians [*tur-buh-LAIR-ee-uhns*]

X) Trematoda [*trem-uh-TOH-duh*]

Y) Cestoda [*ses-TOHD-uh*]

Z) Nematoda [*nem-uh-TOH-duh*]

ANSWER: X) TREMATODA

TOSS-UP

6) MATH *Short Answer* If the height of a pyramid is doubled, but the base remains unchanged, what happens to its volume?

ANSWER: DOUBLES

BONUS

6) MATH *Short Answer* A tour bus traveled 3 kilometers east, proceeded 12 kilometers south, then 7 kilometers west, and finally 7 kilometers north. In simplest form, how far in kilometers is it from its starting point?

ANSWER: $\sqrt{41}$

TOSS-UP

7) GENERAL SCIENCE *Multiple Choice* The ABO blood classification system is determined by which of the following types of biological molecules on the surface of red blood cells?

- W) Nucleic acids
- X) Carbohydrates
- Y) Proteins
- Z) Lipids

ANSWER: X) CARBOHYDRATES

BONUS

7) GENERAL SCIENCE *Short Answer* What are the numbers, respectively, of protons, neutrons, and electrons in an isotope of titanium with a mass number of 50?

ANSWER: PROTONS = 22; ELECTRONS = 22; NEUTRONS = 28

TOSS-UP

8) EARTH AND SPACE *Multiple Choice* Compared to continental crust, oceanic crust melts at which of the following?

- W) Lower temperatures
- X) The same temperature
- Y) Higher temperatures
- Z) Higher pressures and temperatures

ANSWER: Y) HIGHER TEMPERATURES

BONUS

8) EARTH AND SPACE *Multiple Choice* Which of the following sets of two variables controls how fast a soil forms?

- W) Type of parent rock and climate
- X) Type and age of parent rock
- Y) Temperature and pressure
- Z) Residual and transported soil

ANSWER: W) TYPE OF PARENT ROCK AND CLIMATE

TOSS-UP

9) PHYSICAL SCIENCE *Short Answer* Stating your answer in kilojoules per mole, what is the change in Gibbs free energy for a reaction at equilibrium?

ANSWER: 0

BONUS

9) PHYSICAL SCIENCE *Multiple Choice* Which of the following actions would NOT change the strength of an air core electromagnet?

- W) Increasing the amount of current
- X) Changing the current's direction
- Y) Inserting an iron core inside the loop
- Z) Increasing the number of loops

ANSWER: X) CHANGING THE CURRENT'S DIRECTION

TOSS-UP

10) ENERGY *Multiple Choice* Which of the following types of light bulbs is most energy efficient?

- Y) Fluorescent
- X) Incandescent
- Y) Halogen
- Z) White L.E.D.

ANSWER: Z) WHITE L.E.D.

BONUS

10) ENERGY *Multiple Choice* Which of the following best describes why horizontal axis turbines produce more power than vertical axis turbines?

- W) Horizontal turbines are facing the wind at all times
- X) The power coefficient for a horizontal turbine is twice the power coefficient of a vertical turbine
- Y) Vertical turbines are placed at lower heights
- Z) The Betz limit specifies that power extracted from the wind for vertical axis turbines is limited to 57%

ANSWER: X) THE POWER COEFFICIENT OF A HORIZONTAL TURBINE IS TWICE THE POWER COEFFICIENT OF A VERTICAL TURBINE

TOSS-UP

11) LIFE SCIENCE *Multiple Choice* How many net molecules of ATP does glycolysis [**gly-KOL-uh-sis**] produce?

- W) 2
- X) 3
- Y) 4
- Z) 6

ANSWER: W) 2

BONUS

11) LIFE SCIENCE *Multiple Choice* Which of the following statements is NOT true about the plant *Mimosa pudica* [**mee-MO-suh POO-dee-kuh**]?

- W) It is an herb
- X) Its leaves fold inward and droop when it is touched or shaken
- Y) It is native to Africa
- Z) Aqueous [**AY-kwee-uhs**] extracts of its roots inhibit cobra venom

ANSWER: Y) IT IS NATIVE TO AFRICA

TOSS-UP

12) MATH *Short Answer* What values cannot be part of the domain for the following function:

$f(x) = \frac{x(x-2)}{(x+3)(x-5)}$ [**f of x equals the fraction with numerator x times the quantity x minus 2 and denominator open parenthesis, x plus 3, close parenthesis, open parenthesis, x minus 5, close parenthesis**]?

ANSWER: -3 AND 5

BONUS

12) MATH *Short Answer* You have a sugar cone that has a radius of 3 inches, and a height of 8 inches. You drop a perfect sphere of ice cream with a radius of 3 inches onto the cone so that the ball of ice cream is now half in the cone, half out. Providing your answer in terms of pi, what is the volume in cubic inches of the air space left in the cone?

ANSWER: 6π

TOSS-UP

13) EARTH AND SPACE *Multiple Choice* Many lakes in agricultural regions are eutrophic [**yoo-TRO-fik**] due to which of the following?

- W) Excessive nutrients
- X) Minimal algae growth
- Y) Increased number of irrigation wells
- Z) Excessive sunlight

ANSWER: W) EXCESSIVE NUTRIENTS

BONUS

13) EARTH AND SPACE *Multiple Choice* Which of the following statements is NOT true about the recently discovered circumbinary planet?

- W) It orbits two stars
- X) It is about 200 light years from Earth
- Y) It was detected by the James Webb space telescope
- Z) It is cold and gaseous

ANSWER: Y) IT WAS DETECTED BY THE JAMES WEBB SPACE TELESCOPE

TOSS-UP

14) LIFE SCIENCE *Multiple Choice* An individual with Turner syndrome has which of the following genotypes?

- W) XO
- X) XYY
- Y) XXY
- Z) XXYY

ANSWER: W) XO

BONUS

14) LIFE SCIENCE *Short Answer* What polysaccharide [**pol-ee-SAK-uh-ryd**], found in yogurt, chocolate milk, toothpaste, and deodorant, comes from algae or seaweed, and can be used in the place of animal-based products like gelatin?

ANSWER: CARRAGEENAN

TOSS-UP

15) GENERAL SCIENCE *Multiple Choice* Which of the following can astronomers use to directly measure the distance between a star and Earth?

- W) Parallax
- X) Brightness
- Y) Blue shift
- Z) Size

ANSWER: W) PARALLAX

BONUS

15) GENERAL SCIENCE *Multiple Choice* During the March equinox, at which of the following latitudes is the Sun's noon position directly overhead?

- W) 46.5° North
- X) 23.5° North
- Y) 23.5° South
- Z) 0°

ANSWER: Z) 0°

TOSS-UP

16) EARTH AND SPACE *Multiple Choice* Which of the following ocean life zones contains the least variety of ocean life?

- W) Intertidal
- X) Neritic
- Y) Bathyal [**BATH-ee-uhl**]
- Z) Abyssal

ANSWER: Z) ABYSSAL

BONUS

16) EARTH AND SPACE *Short Answer* What weather phenomenon has the following characteristics: 1) large-scale wind circulation around a central region of high atmospheric pressure; 2) it circulates clockwise in the Northern Hemisphere and counterclockwise in the Southern Hemisphere; 3) it usually advances at 20 to 30 miles per hour.

ANSWER: ANTICYCLONE

TOSS-UP

17) PHYSICAL SCIENCE *Multiple Choice* In thermodynamics, the change in enthalpy [**EN-thal-pee**] of a process can be equated with heat transferred if which of the following quantities is held constant?

- W) Volume
- X) Pressure
- Y) Temperature
- Z) Entropy

ANSWER: X) PRESSURE

BONUS

17) PHYSICAL SCIENCE *Short Answer* A car is moving along a road when the passenger side front tire hits a snow drift. Identify all of the following that happens to the motion of the car:
1) It speeds up, 2) It slows down, 3) It veers towards the right, 4) It veers towards the left.

ANSWER: 2 AND 3

TOSS-UP

18) ENERGY *Multiple Choice* Which of the following fuels is cooled cryogenically to -260° Fahrenheit?

- W) Compressed coal
- X) Liquefied shale gas
- Y) Liquefied natural gas
- Z) Purified gasoline

ANSWER: Y) LIQUEFIED NATURAL GAS

BONUS

18) ENERGY *Short Answer* What are the two gases that municipal solid waste produces in large concentrations?

ANSWER: CARBON DIOXIDE, METHANE

TOSS-UP

19) LIFE SCIENCE *Short Answer* A sea cucumber is an example of an organism that displays what type of symmetry?

ANSWER: RADIAL (ACCEPT: PENTAMOROUS, BILATERAL)

BONUS

19) LIFE SCIENCE *Short Answer* Identify all of the following five organisms that are considered sac fungi: 1) morel mushroom, 2) powdery mildew, 3) blue-green mold, 4) puffball, 5) stem rot.

ANSWER: 1, 2, 3 (ACCEPT: MOREL MUSHROOM, POWDERY MILDEW, BLUE-GREEN MOLD)

TOSS-UP

20) MATH *Short Answer* Triangle CAT has sides measuring 6 inches, 8 inches, and 10 inches. Triangle DOG has sides measuring 3 inches, 4 inches, and 5 inches. In either order, what is the ratio of the measures of the smallest angles in the two triangles?

ANSWER: 1 TO 1 (ACCEPT: 1)

BONUS

20) MATH *Multiple Choice* The distance between the points (11, 1) and (-3.5, 16.5) is between which of the following pairs of numbers?

- W) 20 and 21
- X) 21 and 22
- Y) 22 and 23
- Z) 23 and 24

ANSWER: X) 21 AND 22

TOSS-UP

21) GENERAL SCIENCE *Short Answer* What is the name for the process of coating a corrosive metal with a thin layer of zinc?

ANSWER: GALVANIZATION

BONUS

21) GENERAL SCIENCE *Short Answer* Name all of the following four cells or organisms that may contain chloroplasts: 1) chlomydomonas [*kla-mid-uh-MOH-nas*], 2) plasmodium, 3) diatoms, 4) spirogyra [*spy-ruh-JY-ruh*].

ANSWER: 1, 3, 4 (ACCEPT: CHLAMYDOMONAS, DIATOMS, SPIROGYRA)

TOSS-UP

22) EARTH AND SPACE *Short Answer* What planet in our solar system has retrograde rotation?

ANSWER: VENUS (ALSO ACCEPT URANUS)

BONUS

22) EARTH AND SPACE *Short Answer* What is the name of the largest calving glacier in North America?

ANSWER: HUBBARD

TOSS-UP

23) PHYSICAL SCIENCE *Multiple Choice* According to molecular orbital theory, which of the following molecules contains pi bonds?

- W) Ammonia
- X) Molecular hydrogen
- Y) Molecular nitrogen
- Z) Water

ANSWER: Y) MOLECULAR NITROGEN

BONUS

23) PHYSICAL SCIENCE *Multiple Choice* Which of the following molecules contains the largest bond angle?

- W) Sulfur hexafluoride [*hek-suh-FLOHR-yd*]
- X) Water
- Y) Carbon dioxide
- Z) Boron trifluoride

ANSWER: Y) CARBON DIOXIDE

TOSS-UP

24) MATH *Short Answer* If $5x + 3y = 8$ and $6x + 2y = 10$, what is $y - x$?

ANSWER: -2

BONUS

24) MATH *Short Answer* An aquarium is 12 inches long, 10 inches wide, and 10 inches deep. It is filled with 8 inches of water. A rock is dropped into the water, and the water level rises 2 inches. What is the volume of the rock in cubic inches?

ANSWER: 240

TOSS-UP

25) LIFE SCIENCE *Multiple Choice* A trans-Pacific flight passenger experiences difficulty adjusting to the difference in time zones. Which of the following supplements may ease the symptoms of jet lag?

- W) Melatonin
- X) Progestin
- Y) Cortisol
- Z) Thymosin

ANSWER: W) MELATONIN

BONUS

25) LIFE SCIENCE *Short Answer* What are the three basic shapes of bacteria?

ANSWER: COCCUS (ACCEPT: SPHERE OR OVAL), BACILLUS (ACCEPT: ROD), SPIRAL