

ROUND ROBIN – ROUND 6

TOSS-UP

1) Energy – *Short Answer* Scientists at Lawrence Berkeley National Lab are studying the oxygen-evolving complex in photosystem II. In eukaryotes, this complex is located in what organelle?

ANSWER: CHLOROPLAST

BONUS

1) Energy – *Short Answer* Scientists at Princeton Plasma Physics Lab are using 3D modeling to predict the behavior of Ganymede's [*GAN-ih-meeds*] magnetic field. Ganymede is a satellite of what planet?

ANSWER: JUPITER

TOSS-UP

2) Physical Science – *Short Answer* The energy carried by a sound wave most directly depends on what physical property of that wave?

ANSWER: AMPLITUDE

BONUS

2) Physical Science – *Multiple Choice* On a rolling bicycle wheel, which of the following parts of the wheel has the highest instantaneous speed relative to the ground?

- W) The center of the wheel
- X) The bottom of the wheel
- Y) The top of the wheel
- Z) The forward-most edge of the wheel

ANSWER: Y) THE TOP OF THE WHEEL

TOSS-UP

3) Earth & Space – *Multiple Choice* What time of day will a moonrise occur during a new moon?

- W) Midnight
- X) Dawn
- Y) Noon
- Z) Dusk

ANSWER: X) DAWN

BONUS

3) Earth & Space – *Multiple Choice* What minor component of Uranus and Neptune's atmospheres causes them to appear blue-green?

- W) Methane
- X) Hydrogen
- Y) Helium
- Z) Water

ANSWER: W) METHANE

TOSS-UP

4) Life Science – *Short Answer* Heartburn is generally caused by stomach acids flowing into which other organ?

ANSWER: ESOPHAGUS

BONUS

4) Life Science – *Short Answer* What is the term for the speed that an animal uses energy, which can be measured in units of liters of oxygen per hour?

ANSWER: METABOLIC RATE (ACCEPT: BASAL METABOLIC RATE, STANDARD METABOLIC RATE)

TOSS-UP

5) Math – *Short Answer* For a group of 60 Science Bowl players, 55 percent were eighth-graders, 25 percent were seventh-graders, and the rest were sixth-graders. How many players in the group were sixth-graders?

ANSWER: 12

BONUS

5) Math – *Short Answer* If two exterior angles of a triangle measure 133 degrees and 118 degrees, respectively, what is the degree measure of the interior angle not adjacent to either of the given exterior angles?

ANSWER: 71

TOSS-UP

6) Earth & Space – *Multiple Choice* Which of these minerals would most likely be used in making industrial abrasives such as sandpaper due to its hardness?

- W) Barite
- X) Calcite
- Y) Halite [*HAY-lite*]
- Z) Garnet

ANSWER: Z) GARNET

BONUS

6) Earth & Space – *Multiple Choice* Which of the following radioactive isotopes would be the most useful for dating rocks over 3 billion years old?

- W) Carbon-14
- X) Uranium-238
- Y) Bismuth-212
- Z) Cobalt-60

ANSWER: X) URANIUM-238

TOSS-UP

7) Physical Science – *Multiple Choice* Which of the following quantities is kept constant by a gas undergoing an isobaric [*eye-soh-BARE-ik*] process?

- W) Temperature
- X) Volume
- Y) Internal energy
- Z) Pressure

ANSWER: Z) PRESSURE

BONUS

7) Physical Science – *Short Answer* Identify all of the following three quantities that are components of a light wave: 1) Electric field; 2) Magnetic field; 3) Charged particle.

ANSWER: 1, 2

TOSS-UP

8) Energy – *Short Answer* Jefferson Lab scientists are studying the pressure on the subatomic particles in the nucleus. What two composite subatomic particles can be found in the nucleus?

ANSWER: PROTONS AND NEUTRONS

BONUS

8) Energy – *Short Answer* Savannah River National Lab researchers are analyzing the toxic effects of mercury compounds such as CH_3Hg^+ . In this ion, what functional group is attached to the mercury atom?

ANSWER: METHYL

TOSS-UP

9) Math – *Short Answer* What is the product of the two radical expressions $8\sqrt{3}$ and $4\sqrt{3}$?

ANSWER: 96

BONUS

9) Math – *Short Answer* Five and two-thirds chocolate bars are to be split equally among 7 people. Expressed as a decimal to the nearest hundredth, how much of a chocolate bar will each person receive?

ANSWER: 0.81

TOSS-UP

10) Life Science – *Short Answer* What disease, which is the leading cause of dementia, is characterized by the formation of beta-amyloid plaques in the brain?

ANSWER: ALZHEIMER'S

BONUS

10) Life Science – *Short Answer* The layers of an onion that are used for storing food are adapted versions of what plant organ?

ANSWER: LEAF

TOSS-UP

11) Physical Science – *Short Answer* Organic chemistry is a field of chemistry primarily devoted to studying compounds containing what element?

ANSWER: CARBON

BONUS

11) Physical Science – *Multiple Choice* Which of the following is an example of a class three lever?

- W) Wheelbarrow
- X) Scissors
- Y) Seesaw
- Z) Tweezers

ANSWER: Z) TWEEZERS

TOSS-UP

12) Energy – *Multiple Choice* Scientists at Argonne National Lab are developing algorithms that run on quantum computers to solve optimization problems. Which of the following is best described as an optimization problem?

- W) Finding the zero of a polynomial [*poly-NO-me-ul*]
- X) Solving a system of linear equations
- Y) Finding a line that fits a collection of points
- Z) Multiplying two large matrices

ANSWER: Y) FINDING A LINE THAT FITS A COLLECTION OF POINTS

BONUS

12) Energy – *Short Answer* Pacific Northwest and Savannah River National Lab researchers are working together to study the role of the iodate ion in bacteria as a potential terminal electron acceptor. What molecule is typically the terminal electron acceptor in aerobic respiration?

ANSWER: OXYGEN (ACCEPT: DIOXYGEN, O₂)

TOSS-UP

13) Math – *Short Answer* Simplify the fraction with numerator 32 minus 48 and denominator 4.

ANSWER: -4

BONUS

13) Math – *Short Answer* A right circular cylinder has radius 4 and height 10. A second right circular cylinder has radius 6 and height 7. What is the larger lateral surface area of the two cylinders?

ANSWER: 84π

TOSS-UP

14) Life Science – *Short Answer* When retrospectively associating a disease with an exposure, it is not enough to look at people with the disease. What is the term for the group of healthy individuals that the study must also investigate?

ANSWER: CONTROL

BONUS

14) Life Science – *Short Answer* Mammals have a double circulation, with one set of blood vessels supplying most of the body and the other set traveling to what organ?

ANSWER: LUNGS

TOSS-UP

15) Earth & Space – *Multiple Choice* Which of the following phenomena causes sunspots?

- W) Planetary shadows
- X) The Sun's magnetic field
- Y) Gravitational anomalies
- Z) Chemical reactions between oxygen and hydrogen

ANSWER: X) THE SUN'S MAGNETIC FIELD

BONUS

15) Earth & Space – *Short Answer* Identify all of the following three constellations that will be observed to pass behind the sun over the course a year: 1) Capricornus; 2) Ursa Major; 3) Taurus.

ANSWER: 1, 3

TOSS-UP

16) Physical Science – *Multiple Choice* In a circuit diagram, two parallel lines of equal length with a gap in between represents which of the following circuit components?

- W) Battery
- X) Inductor
- Y) Capacitor
- Z) Resistor

ANSWER: Y) CAPACITOR

BONUS

16) Physical Science – *Short Answer* In a transverse wave, what physical quantity is defined as one-half the distance between a crest and a trough?

ANSWER: AMPLITUDE

TOSS-UP

17) Life Science – *Short Answer* Organ transplantations do not always succeed because the body may attack and reject the donated tissue. What organ system is responsible for mounting this attack?

ANSWER: IMMUNE

BONUS

17) Life Science – *Short Answer* The most common form of color blindness results in the difficulty of distinguishing what two primary colors?

ANSWER: RED AND GREEN (ACCEPT IN ANY ORDER)

TOSS-UP

18) Earth & Space – *Short Answer* Wegener's [*VEHG-ners*] continental drift hypothesis suggested that approximately 200 million years ago, the continents were a giant landmass named what?

ANSWER: PANGAEA

BONUS

18) Earth & Space – *Multiple Choice* In which of the following locations would one most likely find a passive continental margin?

- W) Off the eastern coast of Japan
- X) Off the eastern coast of the US
- Y) Off the southern coast of Alaska
- Z) Off the western coast of Chile

ANSWER: X) OFF THE EASTERN COAST OF THE US

TOSS-UP

19) Math – *Short Answer* What is the equation of the horizontal line that passes through the point with coordinates (3, 5)?

ANSWER: $y = 5$

BONUS

19) Math – *Short Answer* What is the area of an equilateral triangle with sides of length 26?

ANSWER: $169\sqrt{3}$

TOSS-UP

20) Physical Science – *Short Answer* What is the mechanical advantage of a simple machine designed such that for an input force of 24 newtons, it provides an output force of 120 newtons?

ANSWER: 5

BONUS

20) Physical Science – *Short Answer* Identify all of the following three substances that are liquid at room temperature: 1) Mercury; 2) Methane; 3) Ammonia.

ANSWER: 1

TOSS-UP

21) Earth & Space – *Short Answer* O, B, A, and G are spectral types used to classify what objects?

ANSWER: STARS

BONUS

21) Earth & Space – *Short Answer* The lunar maria [*MAH-ree-ah*] are primarily composed of what rock type?

ANSWER: BASALT

TOSS-UP

22) Life Science – *Short Answer* Bacterial cells are an example of what type of cell that lacks a nucleus and membrane-bound organelles?

ANSWER: PROKARYOTIC (ACCEPT: PROKARYOTE)

BONUS

22) Life Science – *Short Answer* Identify all of the following three organs that are part of the lymphatic system: 1) Tonsils; 2) Spleen; 3) Bladder.

ANSWER: 1, 2

TOSS-UP

23) Math – *Short Answer* If the perimeter of a triangle is 51, and the lengths of two of its sides are 17 and 19, what is the length of its third side?

ANSWER: 15

BONUS

23) Math – *Short Answer* Given the right triangle with legs of length 5 and 6 and angle A opposite the side of length 5, what is $\tan A + \cot A$?

ANSWER: $61/30$ (ACCEPT: $2 \frac{1}{30}$)