

ROUND ROBIN – ROUND 12

TOSS-UP

1) Earth & Space – *Short Answer* In what phase must the moon be during a total solar eclipse?

ANSWER: NEW MOON (ACCEPT: NEW)

BONUS

1) Earth & Space – *Multiple Choice* Stony-iron meteorites are most similar in composition to what part of the Earth?

- W) Core-mantle boundary
- X) Outer core
- Y) Inner core
- Z) Crust

ANSWER: W) CORE-MANTLE BOUNDARY

TOSS-UP

2) Energy – *Multiple Choice* Scientists at the Joint BioEnergy Institute are using CRISPR/Cas9 technology on fungi. Which of the following best describes what they are trying to do to the fungi?

- W) Edit their genomes
- X) Sequence their DNA
- Y) Capture ribosomal protein products
- Z) Analyze their transcriptome [*trans-SCRIPT-ohm*]

ANSWER: W) EDIT THEIR GENOMES

BONUS

2) Energy – *Short Answer* Scientists at the Joint Genome Institute reported that a group of microbes can synthesize methyl benzene. What is the preferred IUPAC name for this compound?

ANSWER: TOLUENE

TOSS-UP

3) Life Science – *Short Answer* Other than skeletal and smooth muscle, vertebrates also possess what type of muscle characterized by high electrical conductivity?

ANSWER: CARDIAC (ACCEPT: HEART)

BONUS

3) Life Science – *Multiple Choice* Which of the following animals best exhibits aposematic [*ap-oh-seh-MAT-ik*] coloration as a defense mechanism?

- W) Leopard
- X) Zebra
- Y) Chameleon
- Z) Bee

ANSWER: Z) BEE

TOSS-UP

4) Physical Science – *Short Answer* If a projectile is dropped from a height of one kilometer with no initial speed, how many meters will it fall in 10 seconds?

ANSWER: 490

BONUS

4) Physical Science – *Short Answer* The level of glucose in Rishi's blood is 90 milligrams per deciliter [*DEH-sih-liter*]. If the molar mass of glucose is 180 grams per mole, what is the molarity of glucose in Rishi's blood, to the nearest millimolar?

ANSWER: 5

TOSS-UP

5) Math – *Short Answer* What is $24^2 - 21^2$?

ANSWER: 135

BONUS

5) Math – *Short Answer* To the nearest whole number, 128 kilometers per hour is how many meters per second?

ANSWER: 36

TOSS-UP

6) Earth & Space – *Multiple Choice* Which of the following types of clouds would most likely result in precipitation?

- W) Nimbostratus [*NIM-bo-stratus*]
- X) Altostratus [*AL-toh-stratus*]
- Y) Cirrus [*SEER-us*]
- Z) Cumulus [*KYOOM-yoo-lus*]

ANSWER: W) NIMBOSTRATUS

BONUS

6) Earth & Space – *Short Answer* Identify all of the following three ocean floor features that are associated with convergent plate boundaries: 1) Deep-ocean trench; 2) Accretionary wedge; 3) Rift valley.

ANSWER: 1, 2

TOSS-UP

7) Energy – *Multiple Choice* Scientists at Lawrence Berkeley National Lab are working on methods to increase the recyclability of PET, a common material in plastic. Which of the following terms best describes PET?

- W) Inorganic material
- X) Organic polymer
- Y) Biopolymer
- Z) Alkane

ANSWER: X) ORGANIC POLYMER

BONUS

7) Energy – *Short Answer* Scientists at Lawrence Berkeley Lab are studying the binding properties of N-acetylglucosamine [*N-ah-setil-glue-KOH-sah-meen*]. This is a sugar in which an acetyl group has been attached to what element in glucosamine?

ANSWER: NITROGEN (ACCEPT: N)

TOSS-UP

8) Life Science – *Short Answer* Rhizobium [*rye-ZOH-bee-um*] bacteria, which are often found in legume roots, are responsible for helping their host plant obtain what essential element?

ANSWER: NITROGEN

BONUS

8) Life Science – *Short Answer* In order to fix nearsightedness, a lens must have at least one surface with what type of curvature?

ANSWER: CONCAVE

TOSS-UP

9) Earth & Space – *Short Answer* Uranus has an inclination to orbit of approximately 98 degrees and an orbital period of approximately 84 Earth years. Giving your answer to the nearest whole Earth year, how much time will pass between the summer solstice and the closest vernal equinox on Uranus?

ANSWER: 21

BONUS

9) Earth & Space – *Short Answer* The Chandrasekhar [*chan-drah-SAY-kar*] limit is an upper bound on the mass of what type of star?

ANSWER: WHITE DWARF

TOSS-UP

10) Physical Science – *Multiple Choice* Ejecting electrons from the ground state of a metal atom typically requires light from which of the following regions of the electromagnetic spectrum?

- W) Radio
- X) X-ray
- Y) Infrared
- Z) Visible

ANSWER: X) X-RAY

BONUS

10) Physical Science – *Short Answer* Suppose that a projectile is thrown vertically upwards with a speed of 20 meters per second from the top of a building. The projectile takes 6 seconds to reach the ground. How high was the building in meters, given to one significant figure?

ANSWER: 60

TOSS-UP

11) Math – *Multiple Choice* A rectangle has side lengths that are integers greater than one. Which of the following could be its area?

- W) 83
- X) 89
- Y) 91
- Z) 97

ANSWER: Y) 91

BONUS

11) Math – *Short Answer* The mean number of weekly work hours for 16 part-time employees at a store is 17. The mean number of hours for 5 of the employees is 13. To the nearest whole number, what is the mean number of hours for the rest of the employees?

ANSWER: 19

TOSS-UP

12) Energy – *Short Answer* Scientists at Oak Ridge National Lab are using carbon nanotubes to remove salt from water. What is the VSEPR [*VES*S-*pur*] hybridization of the carbon atoms in these nanotubes?

ANSWER: SP2

BONUS

12) Energy – *Short Answer* In order to study post-translational modifications on proteins, Pacific Northwest National Lab researchers are employing a technique that involves two steps of mass spectrometry, in which ions are fragmented between the two mass spectrometry stages. What is the general term for this type of mass spectrometry?

ANSWER: MS/MS (ACCEPT: MS SQUARED, TANDEM MASS SPECTROMETRY)

TOSS-UP

13) Life Science – *Short Answer* What organ in the inner ear serves to detect sound and translate the signal into neurological activity?

ANSWER: COCHLEA (ACCEPT: ORGAN OF CORTI, SPIRAL ORGAN)

BONUS

13) Life Science – *Short Answer* Under physiological conditions, which nitrogenous [*nigh-TRAH-jen-us*] base has the ability to pair with more than one other type of nitrogenous base?

ANSWER: A (ACCEPT: ADENINE)

TOSS-UP

14) Math – *Short Answer* One night, Mary started reading at the top of page 124 in her latest science fiction book and finished at the bottom of page 255. How many pages did she read?

ANSWER: 132

BONUS

14) Math – *Short Answer* What is the remainder when the polynomial $x^3 + 4x^2 + x - 7$ is divided by $x + 5$?

ANSWER: -37

TOSS-UP

15) Earth & Space – *Multiple Choice* Which of the following is found in the littoral *[literal]* zone?

- W) Deep sea trench
- X) Seamount
- Y) Continental rise
- Z) Beach

ANSWER: Z) BEACH

BONUS

15) Earth & Space – *Short Answer* Identify all of the following three minerals that do not exhibit cleavage: 1) Feldspar; 2) Fluorite; 3) Quartz.

ANSWER: 3

TOSS-UP

16) Physical Science – *Short Answer* What is the term for the upward force exerted by a fluid on any object submerged in the fluid?

ANSWER: BUOYANT FORCE

BONUS

16) Physical Science – *Short Answer* What type of current is produced by a generator that produces electricity by spinning a loop of wire in a magnetic field?

ANSWER: ALTERNATING CURRENT (ACCEPT: AC)

TOSS-UP

17) Math – *Short Answer* When 25 trillion is expressed in scientific notation, what is the exponent of 10?

ANSWER: 13

BONUS

17) Math – *Short Answer* A circle with radius 12 is inscribed in a square. To the nearest 10, what is the area of the region inside the square but outside the circle?

ANSWER: 120

TOSS-UP

18) Life Science – *Short Answer* What is the term for the type of symmetry that characterizes the body plan of Cnidarians [*nye-DARE-ee-ens*]?

ANSWER: RADIAL

BONUS

18) Life Science – *Short Answer* Place the following three events in the history of life on Earth in chronological order: 1) Emergence of shelled animals; 2) Emergence of fish; 3) Emergence of amphibians.

ANSWER: 1, 2, 3

TOSS-UP

19) Physical Science – *Multiple Choice* Which of the following is closest to the diameter, in meters, of the nucleus of a zinc atom?

- W) 10^{-8}
- X) 10^{-10}
- Y) 10^{-12}
- Z) 10^{-14}

ANSWER: Z) 10^{-14}

BONUS

19) Physical Science – *Short Answer* Vince measures a cube’s volume in liters, an SI derived unit. If he wants to express the volume in SI base units, what unit should he use?

ANSWER: METERS CUBED (ACCEPT: CUBIC METERS)

TOSS-UP

20) Earth & Space – *Short Answer* What planet in the solar system has prominent surface features called “coronae” [*kor-OH-nee*]?

ANSWER: VENUS

BONUS

20) Earth & Space – *Short Answer* The temperature at the core of the Sun, in kelvins, is closest to ten raised to what power?

ANSWER: SEVEN

TOSS-UP

21) Math – *Short Answer* What is the slope-intercept equation of the line through the origin that contains the point (3, -36) ?

ANSWER: $y = -12x$ (ACCEPT: $y = -12x + 0$)

BONUS

21) Math – *Short Answer* How many positive integers are divisors of both 60 and 144?

ANSWER: 6

TOSS-UP

22) Physical Science – *Multiple Choice* Which of the following triples of quantum numbers n, l, m are NOT allowed?

- W) 2, 1, -1
- X) 2, 0, 0
- Y) 1, 0, -1
- Z) 3, 2, 0

ANSWER: Y) 1, 0, -1

BONUS

22) Physical Science – *Short Answer* What is the term for the bending of a wave as it moves from one medium to another?

ANSWER: REFRACTION (DO NOT ACCEPT: DIFFRACTION)

TOSS-UP

23) Life Science – *Short Answer* Sequencing in the Human Genome Project involved a process of first fragmenting DNA into many overlapping segments, sequencing each fragment, then piecing everything back together. What is the term for this approach to sequencing?

ANSWER: SHOTGUN

BONUS

23) Life Science – *Short Answer* Identify all of the following three plants that possess vascular tissues:
1) Ferns; 2) Mosses; 3) Gymnosperms.

ANSWER: 1, 3