ROUND 8

TOSS-UP

1) MATH  Short Answer  What is the largest number of sides possible for a regular polygon that tessellates the plane?

ANSWER: 6

BONUS

1) MATH  Short Answer  The hypotenuse of a right triangle is 9 feet, and one leg is 6 feet. What is the area, in square feet, of the triangle in simplest radical form?

ANSWER: $9\sqrt{5}$

TOSS-UP

2) LIFE SCIENCE  Short Answer  Besides xylem and phloem (read as: FLÖE-ehm), what is the third tissue layer that comprises the stele in eudicot roots?

ANSWER: PERICYCLE

BONUS

2) LIFE SCIENCE  Short Answer  Give the common names of two of the principal species of Pacific salmon.

ANSWER: (ACCEPT TWO) SOCKEYE, CHUM, COASTAL CUTTHROAT TROUT, CHINOOK, COHO, STEELHEAD, OR PINK


TOSS-UP

3) ENERGY  Short Answer  What is the term for the minimum amount of fissile material required for a chain reaction to be self-sustaining?

ANSWER: CRITICAL MASS

BONUS

3) ENERGY  Short Answer  What is the name of a device which consists of dissimilar metals joined together at one end that is used as a sensor for measuring temperature?

ANSWER: THERMOCOUPLE

TOSS-UP

4) PHYSICAL SCIENCE  Multiple Choice  The mechanical advantage of a block and tackle depends on which of the following?

W) The size of the rope
X) The length of the rope
Y) The diameter of the wheels
Z) The number of sections of rope

ANSWER: Z) THE NUMBER OF SECTIONS OF ROPE

BONUS

4) PHYSICAL SCIENCE  Multiple Choice  Which of the following situations produces the MOST power?

W) 160 newton force acting over 20 meters in 32 seconds
X) 160 newton force acting over 2 meters in 3.2 seconds
Y) 16 newton force acting over 20 meters in 3.2 seconds
Z) 16 newton force acting over 200 meters in 3.2 seconds

ANSWER: Z) 16 NEWTON FORCE ACTING OVER 200 METERS IN 3.2 SECONDS
5) LIFE SCIENCE  Short Answer  Give the class of mollusks in which squid would be classified.

ANSWER: CEPHALOPODA

BONUS

5) LIFE SCIENCE  Multiple Choice  Unlike other mollusks, cephalopods (read as: SEH-fah-loh-pohds) have which of the following characteristics?

W) Gills  
X) Radula  
Y) Open circulatory system  
Z) Closed circulatory system

ANSWER: Z) CLOSED CIRCULATORY SYSTEM

TOSS-UP

6) MATH  Multiple Choice  Assuming that all of the following two dimensional shapes have the same area, which has the least perimeter?

W) Triangle  
X) Circle  
Y) Trapezoid  
Z) Square

ANSWER: X) CIRCLE

BONUS

6) MATH  Short Answer  At a special showing of “The Magic Flute,” all 300 tickets were sold for a total of $5,360. If an adult ticket was $20 and a youth ticket was $12, how many adult tickets were sold?

ANSWER: 220
TOSS-UP

7) GENERAL SCIENCE  Multiple Choice  For a certain genetic disorder in humans, the mother always passes the disease to all of her children, but a father never passes it to any of his children. Which of the following explanations best explains this phenomenon?

W) The gene for the disease is located on the X-chromosome  
X) The gene is dominant and is located on an autosomal chromosome  
Y) The gene is located on ribosomal (read as: RY-boh-sōm-ahl) DNA  
Z) The gene is located on mitochondrial (read as: my-toh-KOHN-dree-ahl) DNA

ANSWER: Z) THE GENE IS LOCATED ON MITOCHONDRIAL DNA

BONUS

7) GENERAL SCIENCE  Short Answer  What is the most stable isotope of rutherfordium (read as: ruh-the(r)-FOHR-dee-uhm)?

ANSWER: RUTHERFORDIUM-267

TOSS-UP

8) EARTH AND SPACE SCIENCE  Short Answer  What kind of rock fragments are produced when magma is torn apart by volcanic eruptions?

ANSWER: PYROCLASTS

BONUS

8) EARTH AND SPACE SCIENCE  Short Answer  What was the name of the space probe, launched in 2001, that orbited Mars to measure elements in its crust and search for signs of water?

ANSWER: MARS ODYSSEY
TOSS-UP

9) GENERAL SCIENCE  *Multiple Choice*  Sediment with a diameter between 2 millimeters and 4 millimeters would be classified as which of the following?

W) Silt  
X) Coarse sand  
Y) Medium sand  
Z) Cobble

**ANSWER:** Y) MEDIUM SAND

BONUS

9) GENERAL SCIENCE  *Short Answer*  When a free neutron undergoes beta decay, what three particles does it form?

**ANSWER:** ELECTRON, PROTON, AND ELECTRON ANTINEUTRINO (DO NOT ACCEPT: ELECTRON NEUTRINO)

TOSS-UP

10) LIFE SCIENCE  *Multiple Choice*  Which of the following is the most likely effect on the remaining bacteria after killing 90% of bacteria with antibacterial soap?

W) They will reproduce and form a colony of bacteria that are more resistant  
X) They will die because there are not enough bacteria left to reproduce  
Y) They will relocate  
Z) They can no longer cause infections because their numbers are too low

**ANSWER:** W) THEY WILL REPRODUCE AND FORM A COLONY OF BACTERIA THAT ARE MORE RESISTANT

BONUS

10) LIFE SCIENCE  *Short Answer*  Give the scientific names of the three small bones found in the human ear.

**ANSWER:** MALLEUS, INCUS, AND STAPES
TOSS-UP

11) GENERAL SCIENCE  Multiple Choice  Which of the following characteristics is NOT true of cannonball jellyfish?

W) They can make up more than 16% of biomass in shallow inshore areas off the southeastern coast of the United States
X) They commonly sting humans
Y) One of their main predators is the leatherback sea turtle
Z) They can reproduce both sexually and asexually

ANSWER: X) THEY COMMONLY STING HUMANS

BONUS

11) GENERAL SCIENCE  Short Answer  What is the genus of the oldest known vertebrate to show viviparity (read as: vy-vi-PAH-rit-ee)?

ANSWER: MATERPISCIS

TOSS-UP

12) MATH  Short Answer  Evaluate: \( \frac{10!}{8!3!} \) (read as: 10 factorial over the quantity 8 factorial times 3 factorial).

ANSWER: 15

BONUS

12) MATH  Short Answer  Harry bought a shirt that was marked 50% off the sale price, which was 40% off the original price. Providing your answer as a decimal to the nearest tenth, after paying a tax of 8%, what percent of the original sticker price did he pay?

ANSWER: 32.4%
TOSS-UP

13) PHYSICAL SCIENCE  *Multiple Choice*  In a transverse wave, the medium vibrates in which of the following ways?

W) In a direction opposite the wave direction
X) At right angles to the wave direction
Y) In the same direction as the wave
Z) At a 45 degree angle to the wave direction

ANSWER:  X) AT RIGHT ANGLES TO THE WAVE DIRECTION

BONUS

13) PHYSICAL SCIENCE  *Short Answer*  Name three ferromagnetic elements.

ANSWER:  (ACCEPT THREE) IRON, NICKEL, COBALT, DYSPROSIUM, PLUTONIUM, AND GADOLINIUM

TOSS-UP

14) LIFE SCIENCE  *Short Answer*  What is the name of the branch of science specifically concerned with the study of fungi?

ANSWER:  MYCOLOGY

BONUS

14) LIFE SCIENCE  *Short Answer*  The beta-galactosidase (read as: gah-lah-k-TÔE-si-days) enzyme aids in lactose digestion by separating lactose into what two monosaccharide (read as: moh-noh-SA-h-kah-ryd) molecules?

ANSWER:  GALACTOSE AND GLUCOSE
TOSS-UP

15) GENERAL SCIENCE  *Multiple Choice*  Which of the following nutrients is most often limiting in freshwater aquatic ecosystems?

W) Carbon  
X) Nitrogen  
Y) Phosphorus  
Z) Sulfur  

ANSWER: Y) PHOSPHORUS

BONUS

15) GENERAL SCIENCE  *Short Answer*  What is the common name of the only penguin that lives north of the equator in the wild?

ANSWER: GALAPAGOS PENGUIN

TOSS-UP

16) PHYSICAL SCIENCE  *Multiple Choice*  Which of the following does the slope on a distance-time graph represent?

W) Velocity  
X) Acceleration  
Y) Displacement  
Z) Motion  

ANSWER: W) VELOCITY

BONUS

16) PHYSICAL SCIENCE  *Short Answer*  In a second-class lever, where is the fulcrum located:
1) between the input and the output forces; 2) closer to the output force than the input force; or 3) closer to the input force than the output force?

ANSWER: CLOSER TO THE OUTPUT FORCE THAN THE INPUT FORCE (ACCEPT: 2)
**TOSS-UP**

17) EARTH AND SPACE SCIENCE  *Multiple Choice*  Which of the following types of sediments came from shells and skeletons of animals?

W) Terrigenous (read as: teh-RI-jeh-nuhs)
X) Sulfurous
Y) Hydrogenous
Z) Calcareous (read as: kahl-KAH-ree-uhhs)

ANSWER: Z) CALCAREOUS

**BONUS**

17) EARTH AND SPACE SCIENCE  *Short Answer*  What are the names of the two irregularly shaped moons of Mars?

ANSWER: PHOBOS AND DEIMOS

**TOSS-UP**

18) PHYSICAL SCIENCE  *Multiple Choice*  Which of the following elements has the highest melting point at standard atmospheric pressure?

W) Tungsten
X) Thallium
Y) Gold
Z) Copper

ANSWER: W) TUNGSTEN

**BONUS**

18) PHYSICAL SCIENCE  *Short Answer*  What is the kinetic energy, in joules, of a 70 kilogram tiger running at a speed of 8 meters per second?

ANSWER: 2240
TOSS-UP

19) ENERGY  *Multiple Choice*  Which of the following countries generates the greatest share of its electricity from wind power?

W) Denmark  
X) Spain  
Y) Germany  
Z) United States

ANSWER:  W) DENMARK

BONUS

19) ENERGY  *Short Answer*  By name or number, rank from greatest to least the total amount of each of the following four products produced from crude oil in the U.S. in 2009: 1) jet fuel, 2) gasoline, 3) diesel, 4) heating oil.

ANSWER:  GASOLINE, DIESEL, JET FUEL, HEATING OIL (ACCEPT: 2, 3, 1, 4)

TOSS-UP

20) MATH  *Multiple Choice*  If a polyhedron had seven faces, exactly six of which were triangles, which of the following could it be?

W) Hexagonal prism  
X) Hexagonal pyramid  
Y) Pentagonal prism  
Z) Pentagonal pyramid

ANSWER:  X) HEXAGONAL PYRAMID

BONUS

20) MATH  *Short Answer*  Solve for real numbers $x$ if $\sqrt{9x- x^2} > 0$ (read as: the square root of the quantity $9x$ minus $x$ squared is greater than 0).

ANSWER:  $0 < x < 9$
TOSS-UP

21) EARTH AND SPACE SCIENCE  Multiple Choice  Which of the following is an example of a well-known group of extinct marine arthropods that existed in abundance during the lower Paleozoic?

W) Brachiopods  
X) Ammonites  
Y) Trilobites  
Z) Nautiluses  

ANSWER: Y) TRILOBITES

BONUS

21) EARTH AND SPACE SCIENCE  Short Answer  If due north is 0°, what degree is the intercardinal direction southwest?

ANSWER: 225°

TOSS-UP

22) PHYSICAL SCIENCE  Multiple Choice  Which of the following best describes how the frequency of an ocean wave changes as its wavelength changes?

W) It increases as the wavelength increases  
X) It increases as the wavelength decreases  
Y) It decreases as the wavelength decreases  
Z) It decreases as the wavelength increases  

ANSWER: X) IT INCREASES AS THE WAVELENGTH DECREASES

BONUS

22) PHYSICAL SCIENCE  Short Answer  If a sound wave traveling through water has a speed of 1,450 meters per second and a frequency of 2900 hertz, providing your answer as a decimal to the nearest tenth, what is its wavelength in meters?

ANSWER: 0.5
TOSS-UP

23) EARTH AND SPACE SCIENCE  Multiple Choice  Which of the following characteristics is generally NOT used for classification of ocean waves?

W) Disturbing force  
X) Wavelength  
Y) Wave height  
Z) Restoring force

ANSWER: Y) WAVE HEIGHT

BONUS

23) EARTH AND SPACE SCIENCE  Multiple Choice  Which of the following is a characteristic of a turbidite?

W) Graded bedding  
X) Lived during the Cambrian  
Y) Found in alkaline bodies of water  
Z) Often found in caves

ANSWER: W) GRADED BEDDING

TOSS-UP

24) ENERGY  Multiple Choice  Which of the following states produces the most coal?

W) Wyoming  
X) West Virginia  
Y) Georgia  
Z) Montana

ANSWER: W) WYOMING

BONUS

24) ENERGY  Short Answer  Many factors affect the overall price of gasoline. By name or number, arrange the following four factors based on the extent to which their costs influence the price of gasoline in descending order: 1) taxes, 2) distribution, 3) crude oil, 4) refining.

ANSWER: CRUDE OIL, TAXES, REFINING, DISTRIBUTION (ACCEPT: 3, 1, 4, 2)
TOSS-UP

25) LIFE SCIENCE  Short Answer  By name or number, identify all of the following four substances that emulsify fat during digestion: 1) gastrin, 2) amylase, 3) motilin, 4) bile.

ANSWER: BILE (ACCEPT: 4)

BONUS

25) LIFE SCIENCE  Short Answer  When genetic drift results from the colonization of a new habitat by only a few individuals, what is the name of the resulting loss of genetic variation?

ANSWER: FOUNDER EFFECT