

ROUND 14A

TOSS-UP

1) PHYSICAL SCIENCE *Multiple Choice* A car rounds a curve on a level road. What most directly provides the centripetal force on the car?

- W) Inertia
- X) Gravity
- Y) Friction between the tires and the road
- Z) The force applied to the steering wheel

ANSWER: Y) FRICTION BETWEEN THE TIRES AND THE ROAD

BONUS

1) PHYSICAL SCIENCE *Multiple Choice* Two resistors of equal resistance R are in parallel. What is the equivalent resistance of this circuit?

- W) 0 R
- X) $\frac{1}{2}$ R
- Y) R
- Z) 2 R

ANSWER: X) $\frac{1}{2}$ R

TOSS-UP

2) EARTH AND SPACE *Short Answer* The Basin and Range region of Nevada is characterized by an abundance of what kind of faults?

ANSWER: NORMAL (ACCEPT: DIP-SLIP)

BONUS

2) EARTH AND SPACE *Multiple Choice* You are looking west, at a fault in a region of shear. Across the fault, on the western side, the stream bed has been offset to the south, though no vertical movement has been detected. How do you describe this fault?

- W) Low angle thrust fault
- X) Left-lateral fault
- Y) Right normal fault
- Z) Oblique-slip fault

ANSWER: X) LEFT-LATERAL FAULT

TOSS-UP

3) MATH *Short Answer* What is the smallest integer radius of a circle centered at the point (3, 4) such that the point (9, 9) is within the interior of the circle?

ANSWER: 8

BONUS

3) MATH *Multiple Choice* In triangle ABC, angle C measures 90 degrees and angle A measures 41 degrees. The length of AC is 5 feet. Which expression is equivalent to the length of BC?

W) $5 \tan 41$ [**5 tangent 41**]

X) $5 \tan 49$ [**5 tangent 49**]

Y) $5 \sin 49$ [**5 sine 49**]

Z) $5 \sin 41$ [**5 sine 41**]

ANSWER: W) $5 \tan 41$

TOSS-UP

4) ENERGY *Short Answer* Which group of gases, commonly produced from refrigerator coolants, is largely responsible for the destruction of Earth's ozone layer?

ANSWER: CHLOROFLUOROCARBONS (ACCEPT: CFCS)

BONUS

4) ENERGY *Multiple Choice* What prevents most of the consequences of a solar flare from reaching the Earth's surface?

W) Earth's ionosphere

X) Earth's magnetic field

Y) Nothing - it all reaches the Earth's surface

Z) Earth's stratosphere

ANSWER: X) EARTH'S MAGNETIC FIELD

TOSS-UP

5) LIFE SCIENCE *Multiple Choice* Which of the following parts of the cytoskeleton is involved in moving chromosomes during cell division?

- W) Microfilaments
- X) Microtubules
- Y) Intermediate filaments
- Z) Vesicles [**VES-i-kuhls**]

ANSWER: X) MICROTUBULES

BONUS

5) LIFE SCIENCE *Short Answer* A plant cell contains two external layers. One layer gives support to the cell but does not filter what may enter and exit. The other layer does not provide support but does filter compounds. Respectively, name the two layers.

ANSWER: CELL WALL AND PLASMA MEMBRANE (ACCEPT: CELL MEMBRANE)

TOSS-UP

6) GENERAL SCIENCE *Multiple Choice* Which of the following best describes hypothesis-based inquiry?

- W) Deductive reasoning
- X) Logical reasoning
- Y) Inductive reasoning
- Z) Intuitive reasoning

ANSWER: W) DEDUCTIVE REASONING

BONUS

6) GENERAL SCIENCE *Short Answer* Put the following four solutions in order from least acidic to most acidic: vinegar, human blood, battery acid, and seawater.

ANSWER: SEAWATER, HUMAN BLOOD, VINEGAR, BATTERY ACID

TOSS-UP

7) PHYSICAL SCIENCE *Multiple Choice* Which of the following electromagnetic waves has a shorter wavelength than visible light waves?

- W) Radar
- X) Infrared
- Y) Ultraviolet
- Z) Microwave

ANSWER: Y) ULTRAVIOLET

BONUS

7) PHYSICAL SCIENCE *Multiple Choice* Which of the following properties of an atomic electron is not associated with a quantum number?

- W) Energy
- X) Mass
- Y) Spin
- Z) Angular momentum

ANSWER: X) MASS

TOSS-UP

8) ENERGY *Multiple Choice* What highly efficient technology is currently employed to allow satellites to maintain their orbits without carrying large quantities of fuel?

- W) Warp drive
- X) Chemical propulsion
- Y) Solar sails
- Z) Ion thruster

ANSWER: Z) ION THRUSTER

BONUS

8) ENERGY *Short Answer* By number, in descending order, rank the potential energy of an object in the following three situations: 1) 30 kilogram at 10 meters from the Moon's surface; 2) 30 kilogram at 20 meters from the Earth's surface; 3) 10 kilogram at 70 meters from the Earth's surface

ANSWER: 3, 2, 1

TOSS-UP

9) EARTH AND SPACE *Multiple Choice* At the most basic level, wind is caused by differences in atmospheric pressure. When there is a difference, air moves in which of the following directions?

- W) Clockwise to anticlockwise direction
- X) Area of low friction to area of high friction
- Y) Higher to lower pressure area
- Z) Lower to higher pressure area

ANSWER: Y) HIGHER TO LOWER PRESSURE AREA

BONUS

9) EARTH AND SPACE *Multiple Choice* Which of the following is NOT true of the Cretaceous [*kri-TAY-shuhs*] geologic time period?

- W) It follows the Jurassic period
- X) It is the last period in the Mesozoic era
- Y) It was a period of relatively warm climate
- Z) The period began with a large mass extinction

ANSWER: Z) THE PERIOD BEGAN WITH A LARGE MASS EXTINCTION

TOSS-UP

10) MATH *Short Answer* What is the remainder when 6^4 [**6 raised to the power of 4**] is divided by 5?

ANSWER: 1

BONUS

10) MATH *Short Answer* Given a line segment in a plane, how many different 30-60-90 right triangles in the plane have the given line segment as a side?

ANSWER: 12

TOSS-UP

11) LIFE SCIENCE *Multiple Choice* Which of the following traits is NOT a characteristic of modern birds?

- W) Feathers
- X) A three-chambered heart
- Y) A beak with no teeth
- Z) A lightweight but strong skeleton

ANSWER: X) A THREE-CHAMBERED HEART

BONUS

11) LIFE SCIENCE *Short Answer* What are the two major organs that degrade hormones?

ANSWER: LIVER AND KIDNEYS

TOSS-UP

12) GENERAL SCIENCE *Multiple Choice* Which of the following can be found in both prokaryotic [*proh-KAR-ee-oh-tik*] and eukaryotic [*yoo-KAR-ee-oh-tik*] cells?

- W) Nuclei [*NOO-klee-eye*]
- X) Chloroplasts
- Y) Mitochondria [*my-tuh-KON-dree-uh*]
- Z) Flagella

ANSWER: Z) FLAGELLA

BONUS

12) GENERAL SCIENCE *Multiple Choice* Which of the following best describes how metamorphic rock turn into igneous rock [*IG-nee-uhs*]?

- W) Erosion followed by sedimentation
- X) Melting
- Y) Tectonic burial
- Z) Melting followed by crystallization

ANSWER: Z) MELTING FOLLOWED BY CRYSTALLIZATION

TOSS-UP

13) PHYSICAL SCIENCE *Multiple Choice* The speed needed to put a satellite into orbit does NOT depend on which of the following?

- W) The mass of the satellite
- X) The radius of the orbit
- Y) The shape of the orbit
- Z) The gravity at the orbit

ANSWER: W) THE MASS OF THE SATELLITE

BONUS

13) PHYSICAL SCIENCE *Multiple Choice* Which of these types of heat transfer explains how the water molecules in coffee carry scent molecules across a restaurant?

- W) Radiation
- X) Conduction
- Y) Convection
- Z) Osmosis

ANSWER: Y) CONVECTION

TOSS-UP

14) EARTH AND SPACE *Multiple Choice* Which of the following is NOT a component of the continental margin of western South America?

- W) Shallow abyssal plain [*uh-BIS-uhl*]
- X) Narrow continental shelf
- Y) Active volcanic belt inland
- Z) Trench offshore

ANSWER: W) SHALLOW ABYSSAL PLAIN

BONUS

14) EARTH AND SPACE *Short Answer* You are walking along an eroded dome structure. How will the age of strata change if you start from the center and walk outward?

ANSWER: DECREASE IN AGE (ACCEPT: GET YOUNGER; DECREASE)

TOSS-UP

15) MATH *Multiple Choice* In a coordinate system, a lattice point is a location with integer coordinates. How many lattice points lie on the circle $x^2 + y^2 = 25$ [***x squared plus y squared equals 25***]?

- W) 4
- X) 6
- Y) 12
- Z) 20

ANSWER: Y) 12

BONUS

15) MATH *Short Answer* A manufacturing facility wants to stack identical boxes along the side wall of a storage room. The wall is 18 feet wide and 8 feet tall. Each box is 18 inches by 18 inches by 2 feet. They are stacked against the wall from floor to ceiling and are placed so that the height of each box is 2 feet. How many boxes can be stacked against the wall?

ANSWER: 48

TOSS-UP

16) LIFE SCIENCE *Short Answer* What is the name of a mat of absorptive filaments of fungus?

ANSWER: MYCELIUM (ACCEPT: MYCELIA)

BONUS

16) LIFE SCIENCE *Multiple Choice* Which of the following is an example of metamorphosis?

- W) A rabbit giving birth to eight young
- X) A bumble bee larva forming a pupa and emerging as a mature adult
- Y) A baby bird emerging from the egg
- Z) A stink bug transitioning through multiple instars eventually becoming a mature adult

ANSWER: X) A BUMBLE BEE LARVA FORMING A PUPA AND EMERGING AS A MATURE ADULT

TOSS-UP

17) GENERAL SCIENCE *Multiple Choice* Which of the following archipelagos is an example of a geologic "hot spot"?

- W) Hawaiian Islands
- X) British Virgin Islands
- Y) Samoan Islands
- Z) Philippines

ANSWER: W) HAWAIIAN ISLANDS

BONUS

17) GENERAL SCIENCE *Short Answer* What are the two types of human cells that are haploid?

ANSWER: EGG (ACCEPT: SECONDARY OOCYTES, OOCYTES, OVA, OVUM) AND SPERM CELLS (ACCEPT: SECONDARY SPERMATOCYTES, SPERMATOZOA, SPERMATIDS; DO NOT ACCEPT: SEX CELLS)

TOSS-UP

18) PHYSICAL SCIENCE *Multiple Choice* Which of the following is a physical change?

- W) Combustion
- X) Electrolysis
- Y) Sublimation
- Z) Fermentation

ANSWER: Y) SUBLIMATION

BONUS

18) PHYSICAL SCIENCE *Multiple Choice* Why does sodium become positively charged when it combines with chlorine?

- W) It loses one electron
- X) It gains one electron
- Y) It forms a covalent bond
- Z) It has more electrons than protons

ANSWER: W) IT LOSES ONE ELECTRON

TOSS-UP

19) ENERGY *Multiple Choice* How is energy transported in the layer of the Sun just below the photosphere?

- W) Conduction
- X) Convection
- Y) Radiation
- Z) Wave motion

ANSWER: X) CONVECTION

BONUS

19) ENERGY *Short Answer* A conventional home pressure cooker can increase the pressure to about twice that of atmospheric pressure. In degrees Fahrenheit rounded to the nearest 10, what would be the boiling point of water held at twice atmospheric pressure?

ANSWER: 250

TOSS-UP

20) EARTH AND SPACE *Short Answer* Dip-slip faults are associated with what two kinds of forces?

ANSWER: COMPRESSIONAL AND TENSIONAL (ACCEPT: COMPRESSION AND TENSION)

BONUS

20) EARTH AND SPACE *Multiple Choice* How do sediments found on continental shelves of active margins compare to those at passive margins?

- W) Limestone is only present at passive margins
- X) Terrigenous and carbonate sediments are limited to active margins **[te-RIJ-uh-nuhs]**
- Y) Both margins are devoid of river-carried sediments
- Z) Active margins are more likely to have ash and other volcanic materials

ANSWER: Z) ACTIVE MARGINS ARE MORE LIKELY TO HAVE ASH AND OTHER VOLCANIC MATERIALS

TOSS-UP

21) MATH *Multiple Choice* What is the product of the unique prime factors of 72?

- W) 6
- X) 24
- Y) 72
- Z) 144

ANSWER: W) 6

BONUS

21) MATH *Short Answer* Given that a particular right triangle has two sides of length 5 and 11, what are the possible lengths of the third side?

ANSWER: $4\sqrt{6}$ AND $\sqrt{146}$

TOSS-UP

22) LIFE SCIENCE *Multiple Choice* Which of the following birds dives below the ocean surface to find fish?

- W) Jaegers [**JAY-gers**]
- X) Gulls
- Y) Petrels
- Z) Frigates

ANSWER: Y) PETRELS

BONUS

22) LIFE SCIENCE *Multiple Choice* Which of the following statements about flatworms is NOT correct?

- W) Flatworms have no true body cavity and an incomplete digestive system
- X) Flatworms do not have a respiratory system
- Y) There are true blood vessels present in the flatworms
- Z) The flatworms have a ladder-like nervous system with a distinct head region that includes nerve cells and sensory organs

ANSWER: Y) THERE ARE TRUE BLOOD VESSELS PRESENT IN THE FLATWORMS

TOSS-UP

23) GENERAL SCIENCE *Multiple Choice* Which of the following is NOT an anticipated result of global climate change?

- W) Increased ocean acidity
- X) Rise in average global temperatures
- Y) More severe and frequent storms
- Z) Increased permafrost coverage

ANSWER: Z) INCREASED PERMAFROST COVERAGE

BONUS

23) GENERAL SCIENCE *Multiple Choice* Petrified wood is formed by which of the following fossilization types?

- W) Molds and casts
- X) Compression
- Y) Permineralization
- Z) Preserved remains

ANSWER: Y) PERMINERALIZATION