Round 42

1. BIOLOGY

Toss Up: Multiple Choice

Chitons, a type of mollusk, have oval-shaped bodies and a shell composed of how many dorsal plates?

W) 6

X) 7

Y) 8

Z) 9

Toss Up Answer: Y

Bonus: Short Answer

Gastropods undergo a distinct developmental process, which causes their visceral mass to rotate 180 degrees, and as a consequence its anus ends up above its head. What is this process called?

Bonus Answer: torsion

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2. EARTH and SPACE

Toss Up: Multiple Choice

Which of the following is NOT true regarding cirrus clouds?

W) They are typically found between 10,000 feet and 15,000 feet above sea level

X) They can be formed from any cloud that goes under glaciation

Y) They cover 25% of the Earth and have a heating effect

Z) They have been seen forming on other planets such as Mars and Jupiter

Toss Up Answer: W

Bonus: Multiple Choice

The most common cloud source for a majority of tornadoes is:

W) Cumulus

X) Nimbostratus

Y) Atlostratus

Z) Cumulonimbus

Bonus Answer: Z

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3. CHEMISTRY

Toss Up: Multiple Choice

Which of the following isoelectronic ions has the largest ionic radius?

W) Sulfur: 2-

X) Chlorine: 1-

Y) Potassium: 1+

Z) Calcium: 2+

Toss Up Answer: W

Bonus: Short Answer

Complete the sentence with one word: As the nuclear charge of an ion increases, the ionic radius _____.

Bonus Answer: decreases (Do not accept decrease)

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4. BIOLOGY

Toss Up: Multiple Choice

Hair cells in the ear form synapses on spiral ganglion cells. These spiral ganglion cells join what nerve that projects to

the medulla?
W) VI
X) VIII
Y) X
Z) XII
Toss Up Answer: X

Bonus: Short Answer
What are these hair cells, which have a mechanically gated TRPA1 channel, called?
Bonus Answer: Stereocilia

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5. CHEMISTRY

Toss Up: Short Answer
What element has the largest atomic radius?
Bonus Answer: Francium

Bonus: Multiple Choice
What is the most electronegative element?
W) Francium
X) Beryllium
Y) Fluorine
Z) Lithium

Bonus Answer: Y

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6. MATHEMATICS

Toss Up: Short Answer
Compute 100^2 - 98*102
Bonus Answer: 4

Bonus: Multiple Choice
The absolute value of n^2 - (n+x)(n-x), where n and x are positive integers, is always:
W) -(x^2)
X) n^2
Y) 2*x*n
Z) x^2

Bonus Answer: Z

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7. EARTH and SPACE

Toss Up: Short Answer
What compound are most cave stalagmites and stalactites made of?
Bonus Answer: Calcium Carbonate, CaCO3, limestone, calcite, dolomite, marble, chalk, etc.

Bonus: Multiple Choice
Why do many rivers around the world meander when a straight path would be shorter?
W) curves create eddies, which are more stable configurations
X) a slight curve has faster moving water on the outside, which further erodes and enlargens the curve
Y) there are slightly elevated regions that prevent a straight path
Z) random drift

Bonus Answer: X

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8. MATHEMATICS

Toss Up: Short Answer

For all positive integers n, what is the degree of the polynomial (x^2 - 3)^(2n) in terms of n.

Bonus Answer: 4n

Bonus: Short Answer

State the solutions, in increasing value, for the equation (x+1)^3 - x^3 - x^2 = 0

Bonus Answer: (Only accept the answers read in this order): -1 , -1/2

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9. CHEMISTRY

Toss Up: Multiple Choice

Which of the following radioactive isotopes is used in the treatment of thyroid cancer?

W) Carbon-12

X) Iodine-131

Y) Uranium-238

Z) Technetium-99

Toss Up Answer: X

Bonus: Short Answer

If a radioactive isotope has a half life of 2 years, how long would it take for 1/8 of the original material to remain?

Bonus Answer: 6 years

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10. MATHEMATICS

Toss Up: Short Answer

What is the derivative of x^2?

Bonus Answer: 2x

Bonus: Short Answer

What is the derivative of 42x^2

Bonus Answer: 84x

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11. CHEMISTRY

Toss Up: Short Answer

What is the largest ion with an equal amount of protons and neutrons?

Bonus Answer: Ca20+

Bonus: Short Answer

Who is regarded as the father of the modern periodic table? (1st and last name)

Bonus Answer: Dmitri Mendeleev

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12. BIOLOGY

Toss Up: Multiple Choice

If I cut your left optic tract, what part of your visual field will you lose?

W) The left temporal section only

X) The left temporal and left nasal sections

Y) The right nasal section only

Z) The right temporal and right nasal sections

Toss Up Answer: Z

Bonus: Short Answer

What is the name of the spot where the left optic tract and the right optic tract intersect?

Bonus Answer: optic chiasm

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13. CHEMISTRY

Toss Up: Multiple Choice

What does Pauli's Exclusion Principle state?

W) Electrons of an atom must have the same spin

X) No two electrons of an atom travel in the same orbital

Y) no two electrons in an atom can be at the same time in the same state or configuration

Z) Electrons can switch spin automatically

Toss Up Answer: Y

Bonus: Short Answer

What law states that electrons in the same orbitals reorganize themselves to maximize spin?

Bonus Answer: Hund's law

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14. EARTH and SPACE

Toss Up: Multiple Choice

How many comet-like bodies are estimated to exist in the Oort cloud?

W) a billion

X) a trillion

Y) a quadrillion

Z) a quntillion

Toss Up Answer: X

Bonus: Short Answer

What is the name of the telescope which has produced the most scientific papers out of all telescopes on the ground, located in the Atacama desert?

Bonus Answer: Very Large Telescope

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15. PHYSICS

Toss Up: Multiple Choice

Two trucks are 50 kilometers apart and traveling toward each other. One automobile is moving at 60km/h and the other is moving at 40km/h mph. How long will it take for them meet?

W) 15 minutes

X) 20 minutes

Y) 24 minutes

Z) 30 minutes

Toss Up Answer: Z

Bonus: Short Answer

The position of a particle in meters is given by $x(t) = 25t - 3t^3$ (READ AS: 16 times t minus 3 times t cubed) , where the time t is in seconds. The particle is momentarily at rest at what time t rounded to the nearest hundredth?

Bonus Answer: 1.67 seconds, accept 1.67

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16. BIOLOGY

Toss Up: Short Answer

What is the G Protein Coupled Receptor for the G protein transducin?

Bonus Answer: Rhodopsin

Bonus: Short Answer

The phototransduction pathway controlled by light striking rhodopsin ultimately affects a sodium channel. What is the second messenger that controls the channel? Be sure to give your answer as “cyclic _ _ _(Read as: “the word cyclic followed by a three letter acronym”)”.

Bonus Answer: cGMP (accept: cyclic guanosine monophosphate)

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17. MATHEMATICS

Toss Up: Multiple Choice

Which of the following has the largest amplitude?

W) 9sin(x) - 2

X)) 2cos(6x) + 5

Y) cos(2x)

Z)) 4sin(10x)

Toss Up Answer: W

Bonus: Short Answer

What power of 10 is closest to 255?

Bonus Answer: 10 to the 16

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18. PHYSICS

Toss Up: Short Answer

What is the German term for the energy released when high voltage electrons decelerate at impact with a metal and is also known as "breaking radiation"?

Bonus Answer: Bremsstrahlung

Bonus: Short Answer

Given that Planck's constant is 4*10^(-15) eV*s (READ AS: 4 times 10 to the power of negative 15 electron volt second), what is the maximum kinetic energy, in electron volts, of an electron released from a metal with work function of 1 eV when a photon of frequency of 300 terahertz strikes the metal's surface?

Bonus Answer: 0.2 electron volts

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19. BIOLOGY

Toss Up: Short Answer

What is the phenomenon that describes the pupil continuously adjusting to different ambient light levels?

Bonus Answer: Pupillary Light Reflex

Bonus: Short Answer

How large, in degrees, is the visual field for the right eye?

Bonus Answer: 150

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20. PHYSICS

Toss Up: Multiple Choice

A Newton is equal to which of the following?

W) w) kilogram-meter per second

X) x) meter per second squared

Y) y) kilogram-meter per second squared

Z) z) kilogram per meter-second

Toss Up Answer: Y

Bonus: Short Answer

Work is what type of quantity?

Bonus Answer: Scalar quantity.

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21. BIOLOGY

Toss Up: Multiple Choice

Which of the following most closely approximates the number of
protein-coding genes in the human genome?

W) 10,000

X) 20,000

Y) 50,000

Z) 100,000

Toss Up Answer: X

Bonus: Short Answer

Arrange the following to depict the conduction pathway in the
vertebrate heart: 1) atrioventricular node, 2) right and left bundle branches, 3) sinoatrial node, 4) Bundle of His, 5) Purkinje fibers.

Bonus Answer: 3) SINOATRIAL NODE
1) ATRIOVENTRICULAR NODE
4) BUNDLE OF HIS
2)RIGHT AND LEFT BUNDLE BRANCHES
5) PURKINJE FIBERS

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22. PHYSICS

Toss Up: Short Answer

In a totally inelastic collision, what happens to the two colliding
objects?

Bonus Answer: They STICK together!

Bonus: Short Answer

r For a uniformly rotating object, what do we call the rate of change
in the angle through which the object turns in one second?

Bonus Answer: ANGULAR VELOCITY

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23. BIOLOGY

Toss Up: Short Answer

What is the most abundant element in the human body?

Bonus Answer: Oxygen

Bonus: Short Answer

What is the function of the alveoli?

Bonus Answer: to allow oxygen and carbon dioxide to move between the lungs and bloodstream

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24. PHYSICS

Toss Up: Multiple Choice

Aaron, whose mass is 45 kilograms, is riding his 5.0 kilogram skateboard down the sidewalk with a constant speed of 6.0 meters per second when he rolls

across a 10.0 meter long patch of sand on the pavement. The sand provides force of friction of 6.0 newtons. What is Aaron's speed in meters per second as he emerges from the sand?

W) 0

X) 1.8

Y) 3.8

Z) 5.8

Toss Up Answer: Z

Bonus: Short Answer

Which of the following does NOT contain a scalar quantity? Force, energy, or acceleration?

Bonus Answer: Acceleration

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25. BIOLOGY

Toss Up: Short Answer

What family are fruit flies apart of?

Bonus Answer: Drosophilidae

Bonus: Short Answer

Which species of animals are the most abundant on Earth?

Bonus Answer: nematodes

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