Sriram Pendyala

Science Bowl

Assorted Lightning Round 7: 25 Toss-ups

1. Chemistry: Multiple Choice: The molecules in a sample of solid CH2F2 are attracted to each other by a combination of:

W. London forces and Hydrogen-bonding

X. Hydrogen-bonding and ionic bonding

Y. London forces and dipole-dipole interactions

Z. Covalent bonding and dipole-dipole interactions

ANSWER: Y

1. Biology: Multiple Choice: What enzyme repairs DNA Thymine and Cytosine dimers by absorbing visible light to break the bonds and correct the fragment?

W. AP Endonucleases

X. DNA Glycosylase

Y. Nucleotide Exicase

Z. Photolyase

ANSWER: Z

1. Toss-up: ERSC: Short Answer: What term in meteorology is defined as a ration of the air's actual water-vapor content compared with the amount of water vapor require for saturation at that temperature and pressure?

ANSWER: Relative Humidity

1. Physics: Multiple Choice: Which of the following statements about capacitors is NOT TRUE?

W. Capacitors used in computers and electronics usually have low capacitances that are measured in microfarads or picofarads

X. Capacitor hum is caused by the phenomenon of magnetostriction, when the metal from the cathode oscillates and creates noise

Y. The capacitance is directly proportional to both the applied voltage and charge on the plates

Z. A parallel plate capacitor has a capacitance which depends on ε0

ANSWER: Y

1. Astro: Multiple Choice: Which of the following is TRUE of Population 1 stars?

W. The Sun is a Population I star

X. Population I stars have the lowest metallicities

Y. Population I stars are younger than Population II stars

Z. The Large Magellanic Clouds

ANSWER: X

1. Math: Multiple Choice: Which of the following is not true about bases of numbering systems?

W. The Mayans used base 20 as their numbering system

X. Time is measured in base 60

Y. The week measures days in base 8

Z. Milliseconds are measured in base 10

ANSWER: Y

1. GENSCI: Multiple Choice: If current projections for global warming hold accurate, what will be the difference between the global mean temperature at 2050, and the mean temperature at approximately 1850 (pre-industrial)?

W. 0.5 degrees C

X. 1.5 degree C

Y. 2.5 degrees C

Z. 5 degrees C

ANSWER: X

1. Chemistry: Multiple Choice: Which of the following is the correct molecular geometry for the Bromine Pentafluoride molecule?

W. Trigonal Bipyramidal

X. Square Pyramidal

Y. See-Saw

Z. Distorted Octahedral

ANSWER: X

1. Biology: Multiple Choice: For every 2 electrons that complete one turn through the two electron transport chains of the thylakoid membrane

W. 1 NADPH is created

X. 2 H+ are brought into the thylakoid compartment

Y. 3 ATP is produced

Z. 1 Molecule of Glucose is produced

ANSWER: W

1. Earth Science: Multiple Choice: About how old is the Sahara desert?

W. 10,000 years

X. 3 million years

Y. 40 million years

Z. 100 million years

ANSWER: X

1. Physics: Multiple Choice: On June 5, 1995, Eric Cornell and Carl Weinman cooled a dilute vapor of Rubidium-87 atoms to below 170nK using laser cooling, and observed an anomaly in the velocity distribution of the gas atoms. What did they find?

ANSWER: Bose-Einstein Condensate

1. Astro: Multiple Choice: What is the name given to a curve that plots the orbital velocity of stars on the y-axis, as a function of their distance from the galaxy center, on the x-axis?

W. Velocity Curve

X. Momentum Curve

Y. Angular Momentum Curve

Z. Rotation Curve

ANSWER: Z

1. Math: Multiple Choice: Which of the following quartic polynomials does not have any real roots, and has two complex double roots, which are conjugates of each other?

W. x4 + 18x2 + 81

X. x4 - 18x2 + 81

Y. x4 + 18x2 - 81

Z. x4 + 81

ANSWER: W

1. GENSCI: Multiple Choice: Large quantities of liquid oxygen are produced for commerical use by:

W. Electrolysis of water, and then cooling of oxygen by liquid helium

X. Fractional distillation of liquid air, then cooling by joule-thompson effect

Y. Electrolysis of water, and then cooling by liquid nitrogen

Z. Fractional distillation of liquid air, and then cooling by liquid helium

ANSWER: X

1. Chemistry: Multiple Choice: Which of the following compounds is not used as a catalyst in the steps taken to produce industrial grade nitric acid?

W. Iron oxide

X. Vanadium pentoxide

Y. Platinum-Rhodium alloy

Z. All of the above catalysts are used

ANSWER: X

1. Earth Science: Multiple Choice: What is the name for a measure of the maximum size of particles that a stream can transport?

W. Capacity

X. Competence

Y. Velocity

Z. Suspension Limit

ANSWER: X

1. Astro: Multiple Choice: If an inferior planet is on the opposite side of the sun:

W. It is in superior conjunction with the sun

X. It is in inferior conjunction with the sun

Y. It is in superior conjunction with the earth

Z. It is in inferior conjunction with the earth

ANSWER: W

1. Physics: Short Answer: A ball is dropped from a tall building and requires 6 seconds to drop to the ground. Ignoring air resistance, what is the height of the building, in the correct units, if g is rounded off to the nearest whole number?

ANSWER: 180 meters

1. Biology: Multiple Choice: The enzyme renin, also known as angiotensinogenase, is an enzyme that participates in the Renin-Angiotensin system in the human body. What molecule does renin break down?

W. Atrial Natriuretic Peptide

X. Angiotensin I

Y. Angiotensin II

Z. Juxtomedullary molecule

ANSWER: X

1. Math: Short Answer: Find the derivative of the equation: f(x) = 1/(ex +1)

ANSWER: f'(x) = - ex/(ex +1)2

1. Biology: Short Answer: What is the name for the hypothetical signaling molecule for flowering which is still unidentified after 70 years, possibly because plant scientists had focused on small hormone-like molecules?

ANSWER: Florigen

1. Earth Science: Multiple Choice: What is the name for a site of continued gas activity from a flank eruption off the side of a volcano, which is a form of secondary vent?

W. Secondary conduit

X. Fissure

Y. Fumarole

Z. Parasitic Cone

ANSWER: Y

1. Chemistry: Multiple Choice: This question is designed to annoy Andrew Chen. Consider the following scenario: You have eight empty vials, and you choose aliquots of two of them randomly, each to add to the other seven. You do this experiment, and find 7 white precipitates in all. Given that the solutions are Acetic Acid, Sodium Bisulfite, Silver Nitrate, Potassium Dichromate, Sodium Thiosulfate, Potassium Iodide, Hydrochloric acid, and Barium Nitrate, what were the two you chose initially? Oh yeah, this was in Zumdahl Chapter 15 in the solubility table.

ANSWER: Silver Nitrate and Sodium Thiosulfate

1. GENSCI: Multiple Choice: Which of the following describes El-Nino?

W. Periodic

X. Quasi-periodic

Y. Stochastic

Z. Phase-Locked

ANSWER: X

1. Physics: Short Answer: What is the name of the thermodynamic cycle which consists of an isothermal expansion, a constant-volume heat removal, an isothermal compression, and a constant-volume heat-addition?

ANSWER: Stirling engine