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Science Bowl Questions: Assorted Round 6

1. Toss-up: Chemistry: Multiple Choice: Given three cylinders containing O2 gas at the same volume and pressure, Cylinder A is at -20° C, Cylinder B is at -15° F, and Cylinder C is at 260 K. Which cylinder has the largest oxygen density?

W. Cylinder A

X. Cylinder B

Y. Cylinder C

Z. All have the same density.

ANSWER: X

Bonus: Chemistry: Multiple Choice: Cyanogen is a covalent compound containing Carbon and Nitrogen. Which of the following is the most likely formula for Cyanogen?

W. CN

X. C2N2

Y. C3N5

Z. C4N5

ANSWER: X

1. Toss-up: Chemistry: Multiple Choice: Given that a solution X turns yellow when exposed to methyl orange, turns orange when exposed to methyl red, and turns yellow when exposed to bromothymol blue, what is the pH range of solution X?

W. 3.2 – 4.4

X. 4.4 -6.0

Y. 6.0-7.6

Z. 8.2-10.0

ANSWER: X

Bonus: Chemistry: Multiple Choice: Potassium Chromate is slowly added to a solution contain 0.20 M AgNO3 and Ba(NO3)2. Describe what happens.

W. The BaCrO4 precipitates first out of solution.

X. The Ag2CrO4 precipitates first out of solution, and then the BaCrO4 precipitates.

Y. Both BaCrO4 and Ag2CrO4 precipitate simultaneously out of solution.

Z. Neither BaCrO4 nor Ag2CrO4 precipitates out of solution.

ANSWER: X

1. Toss-up: Chemistry: Multiple Choice: Which of the following combinations of chemicals could be used to make a buffer solution?

W. HCl / NaOH

X. HCl / NH3

Y. HCl / H3PO4

Z. NaOH / NH3

ANSWER: X

Bonus: Chemistry: Short Answer: In the Alkaline version of the dry cell battery solid Ammonium Chloride is replaced by what?

ANSWER: KOH, or NaOH

1. Toss-up: Chemistry: Multiple Choice: Which of the following compounds will exhibit cis-trans isomerism?

W. 1, 2 –dichloroethane

X. dichloroethyne

Y. 1, 2 –dichloroethene

Z. ethylene

ANSWER: Y

Bonus: Chemistry: Short Answer: What types of polymers are produced by the reaction of diacid chlorides with diamines?

ANSWER: Polyamides

1. Toss-up: Physics: Multiple Choice: The electromotive force ε in the secondary coil must be proportional to the rate of change of current in the primary coil, . What is the name for the constant of proportionality?

W. Self-Inductance

X. Mutual Inductance

Y. Flux Inductance

Z. Back Inductance

ANSWER: X

Bonus: Physics: Short Answer: The average power dissipated by a RLC circuit is equal to the rms current multiplied by the rms voltage, multiplied by the cosine of the phase angle. What is the factor cos θ referred to as?

ANSWER: Power Factor

1. Toss-up: Physics: Multiple Choice: What is the phenomenon that predicts that light will be reflected in many different directions if incident upon a rough surface?

W. Refraction

X. Light Diversion

Y. Coarse Reflection

Z. Diffuse Reflection

ANSWER: Z

Bonus: Physics: Short Answer: In the Michelson interferometer, Michelson and Morley were looking for this, which they believed would prove the existence of the ether wind.

ANSWER: Fringe shift

1. Toss-up: Physics: Multiple Choice: What is the name of the aberration that is a result of variation of magnification at different distances from the lens axis, making a straight-line object some distance from the axis to form a curved image? A square grid of lines may therefore be distorted to produce a barrel-like image.

W. Curvature of Field

X. Off-axis Astigmatism

Y. Coma

Z. Distortion

ANSWER: Z

Bonus: Physics: Short Answer: What are the names of holograms that do not require a laser to see the image, but can be viewed with ordinary white light? These holograms are made not on thin film, but thick emulsion, and create a three-dimensional diffraction pattern.

ANSWER: Volume/White Light Holograms

1. Toss-up: Physics: Short Answer: What series of absorption lines in the Hydrogen spectrum contain lines with wavelengths from 91 nm to 122 nm in the UV range of the EM spectrum?

W. Lyman Series

X. Balmer Series

Y. Paschen Series

Z. Rydberg Series

ANSWER: W

Bonus: Physics: Short Answer: An nucleus remaining after radioactive decay is usually in an excited state. In some cases a nucleus may remain in an excited states for some time before it emits a γ ray. What is said of nucleus that is in this usually stable excited state?

ANSWER: Metastable State, also accept Isomer

1. Toss-up: Biology: Short Answer: In ecology, what is the name given to the pattern of spacing among individuals within the boundaries of the population?

ANSWER: Dispersion

Bonus: Biology: Multiple Choice: What is the name of the ecological study that focuses on the complex interactions between biotic and abiotic factors that cause variations in the size of populations?

W. Logistic Growth

X. Demographic Transition

Y. Population Dynamics

Z. Density Ecology

ANSWER: Y

1. Toss-up: Biology: Multiple Choice: If an infertile hybrid propagates itself asexually, various mechanism can change a sterile hybrid into a fertile polyploid. What is a polyploidy produced by this method?

W. Autopolyploid

X. Hybrid Polyploid

Y. Allopolyploid

Z. Sympolyploid

ANSWER: Y

Bonus: Biology: Short Answer: What is the name of the term cointed by Stephen Jay Gould that described periods of apparent stasis punctuated by sudden change to explain the fossil record, which includes many episodes in which new species appear suddenly in a geologic stratum, persist essentially unchanged through several strata, and then disappear?

ANSWER: Punctuated Equilibria

1. Toss-up: Biology: Multiple Choice: What is the name of the model of the first eukaryotic cells that supposes that mitochondria evolved before plastids through a sequence of events between prokaryotes?

W. Stromatolitic Endosymbiosis

X. Aerobic Endosymbiosis

Y. Protobiont Model

Z. Serial Endosymbiosis

ANSWER: Z

Bonus: Biology: Short Answer: What is the name of the theory proposed by Jack King and Thomas Jukes at UC Berkeley and Motoo Kimura, at the Japanese National Institute of Genetics, that stated that evolutionary change in genes and proteins has no effect on fitness and therefore is not influence by Darwinian selection?

ANSWER: Neutral Theory

1. Toss-up: Biology: Multiple Choice: Which of the following is NOT a type of intercellular junctions in animal cells?

W. Tight Junctions

X. Gap Junctions

Y. Plasmodesmata

Z. Desmosomes

ANSWER: Y

Bonus: Biology: Short Answer: What is the name of cell surface receptors that span the plasma membrane and bind on their cytoplasmic side to associated proteins attached to the cytoskeleton?

ANSWER: Integrins

1. Toss-up: Math: Multiple Choice: Given that a jar holds six blue marbles and three red marbles, what is the chances of picking a red and a blue marble without replacement, in no particular order?

W. 1/9

X. 7/36

Y. 1/4

Z. 1/3

ANSWER: Y

Bonus: Math: Short Answer: Two runners, running at different speeds, start at two ends of a 700 meter long road and meet. If Runner 1 was traveling at 40% of the speed of runner two, what will be the distance between the position at which the meet and the closest end of the road?

ANSWER: 200 meters

1. Toss-up: Math: Multiple Choice: If 2100 was written in exponential scientific notation, which of the following would most likely be the exponent on the ten?

W. 10

X. 20

Y. 30

Z. 40

ANSWER: Y

Bonus: Math: Short Answer: Find the exact answer for the sin(π/8) in simplest possible radical form.

ANSWER: Accept

1. Toss-up: Math: Multiple Choice: Which of the following represents all solutions to the equation: xx=x?

W. 0

X. 0 and 1

Y. 1

Z. 1 and -1

ANSWER: Z

Bonus: Math: Short Answer: Find all solutions of x in the equation .

ANSWER: x=-1

1. Toss-up: Math: Multiple Choice: Which of the following is the name of the graph formed by the graphing of the polar equation r2=13sin2θ?

W. Circle

X. Dimpled Limacon

Y. Lemniscate

Z. Cardiod

ANSWER: Y

Bonus: Math: Short Answer: Find the infinite summation of the geometric series with a ratio r such that r=0.6 with a first term equal to 5.

ANSWER: 25/2

1. Toss-up: ERSC: Multiple Choice: Which of the following epochs market many of the major recent ice ages we know today that affected early homo development?

W. Oligocene

X. Miocene

Y. Pleistocene

Z. Holocene

ANSWER: Y

Bonus: ERSC: Short Answer: What was the name of a prehistoric proglacial lake in western Montana that existed as the Pleistocene ice age was drawing to a close around 15,000 and 13,000 years ago?

ANSWER: Lake Missoula

1. Toss-up: ERSC: Multiple Choice: This glacial feature, commonly at the head of a glacial valley and often an imposing feature associated with an alpine glacier, is a bowl-shaped depression that usually has precipitous walls on three sides but is open on the down valley side.

W. Arete

X. Horn

Y. Fiord

Z. Cirque

ANSWER: Z

Bonus: ERSC: Short Answer: What are the names of grooves formed when ice at the bottom of a glacier contains large rock fragments, which gouge these grooves into the bedrock?

ANSWER: Glacial Striations

1. Toss-up: ERSC: Short Answer: What are the names of geologic structures associated with rock deformation that are flat-lying sedimentary and volcanic rocks bent into a series of wavelike undulations?

ANSWER: Folds

Bonus: ERSC: Multiple Choice: What is the period that witnessed the creation of the coastal Sierra Nevada mountain ranges on the west?

W. Early Tertiary

X. Late Tertiary

Y. Early Quaternary

Z. Late Quaternary

ANSWER: X

1. Toss-up: Astro: Multiple Choice: Which of the following is responsible, in comets, for pushing dust particles away from the coma?

W. Solar Wind

X. Gravity

Y. Heat

Z. Radiation Pressure

ANSWER: Y

Bonus: Astro: Short Answer: What is the name of the Japanese probe, which, in November 2005, landed on a small near-Earth asteroid name 25143 Itokawa and is scheduled to return samples to Earth by June 2010?

ANSWER: Hayabusa

1. Toss-up: Astro: Short Answer: What are the name of the small Texas-sized particles that are numerous small, bright markings dotting the photosphere of the sun?

ANSWER: Granules

Bonus: Astro: Multiple Choice: What are huge, cloudlike structures, which have the appearances of hanging motionless for days at a time, consisting of concentrations of chromospheric gases, that are seen jutting out of the sun when they are on the edge, or limb, of the Sun?

W. Quiescent Prominences

X. Eruptive Prominences

Y. Eruptive Solar Flares

Z. Sun Spots

ANSWER: W

1. Toss-up: Astro: Short Answer: During their collapse from red giants to white dwards, medium mass stars are believed to cast off their bloated outer atmosphere, creating an expanding spherical cloud of gas, which is heated and caused to glow by white dwarfs. What are these gleaming spherical clouds called?

ANSWER: Planetary Nebulae

Bonus: Astro: Multiple Choice: Which of the following supernova events cannot create a neutron star?

W. Type II

X. Type 1b

Y. Type 1c

Z. Type 1d

ANSWER: Z