Iolani Science Bowl Invitational
Round Robin 1

Tossup

Earth and Space - *Short Answer* Identify all of the following 3 types of faults that only form in areas of compressive stress. I. Thrust fault; II. Reverse fault; III. Normal fault

Answer: I and II [RE]

Bonus

Earth and Space - *Short Answer* What general name is given to the cycle of El Niño and La Niña in the southern pacific?

Answer: EL NIÑO SOUTHERN OSCILLATION (Accept: ENSO) [RE]

Tossup

Biology - *Multiple Choice* Which one of the following is NOT a phase in mitosis?

W) Prophase
X) Metaphase
Y) Anaphase
Z) Postphase

Answer: Z) Postphase

Bonus

Biology - *Short Answer* What term describes a molecule that has both hydrophobic and hydrophilic regions?

Answer: AMPHIPHATIC

Tossup

Chemistry - *Short Answer* What is the name of the compound with chemical formula II_2O_2?

Answer: HYDROGEN PEROXIDE

Bonus

Chemistry - *Short Answer* How many iron atoms are in one formula unit of iron (III) oxide?

Answer: 2 [AI]

Tossup

Math - *Short Answer* A slice of pie of area 9 pi inches squared has radius 6 inches. What percent of the full pie does this slice include?

Answer: 25% [RE]

Bonus

Math - *Multiple Choice* Brennan the farmer is tasked with forming a pen for his cows. What shape should he make his field in order to maximize the area the cows have given a fixed amount of fencing?

W) Equilateral triangle
X) Square
Y) Octagon
Z) Circle

Answer: Z) CIRCLE [RE]

Tossup

Physics - *Short Answer* Brennan slides a 3 kg block at 10 m/s towards a 12 kg block that is initially at rest. If the blocks stick together, at what speed do the blocks move after the collision?

Answer: 2 m/s [RE]

Bonus

Physics - *Multiple Choice* The gravitational force is dependent on the distance between two bodies raised to what power?

W) 2
X) 1
Y) -1
Z) -2

Answer: Z) -2 [RE]

Tossup

Earth and Space - *Short Answer* What is the name for the theoretical remnant of a white dwarf that has cooled until it no longer emits significant light?

Answer: BLACK DWARF [AE]

Bonus

Earth and Space - *Short Answer* Brennan observes a star to have a parallax angle of 0.02 arcseconds. In parsecs, how far away is it?

Answer: 50 parsecs [AE]

Tossup

Biology - *Short Answer* What tissue transports water and minerals from the roots of the plant to the shoots?

Answer: XYLEM

Bonus

Biology - *Short Answer* Bramblebacks eat Porgs, and Porgs eat Krugs. In percent, how much of the original energy of a Krug do you expect to transfer to a Brambleback?

Answer: 1%

Tossup

Chemistry - *Short Answer* Dr. Hee creates a 2 liter solution with water and 0.5 moles of ammonium chloride. What is the molarity of the chloride ions in the solution?

Answer: 0.25 (moles per liter OR molar)

Bonus

Chemistry - *Short Answer* Dr. Hee is now working with a saturated solution of copper (II) chloride. To this solution, he adds solid potassium chloride. Which of the following three statements are true?
I. No potassium chloride will dissolve.
II. A copper (II) chloride precipitate will form.
III. The Ksp value of the copper chloride will decrease.

Answer: II ONLY

Tossup

Math - *Multiple Choice* - Compute tan(-405°)

W) Sqrt(2)/2
X) -Sqrt(2)/2
Y) 1
Z) -1

Answer: Z) -1 [EC]

Bonus

Math - *Short Answer* - Compute cos^-1(sqrt3/2)+sin^-1(sqrt2/2). [Inverse cosine of quantity square root 3 divided by 2 close quantity plus inverse sine of quantity square root 2 divided by 2 close quantity].

Answer: 5pi/12 [EC]

Commented [1]: degrees or radians?

Tossup

Physics - *Short Answer* If the mass of an object is quadrupled and its volume is doubled, by what factor is its density changed?

Answer: 2 [RE]

Bonus

Physics - *Short Answer* What is the absolute difference, in atmospheres, between the gauge pressure and absolute pressure at the bottom of a 10 meter column of water under standard temperature and pressure conditions?

Answer: 1 atm [RE]

Tossup

Earth and Space - *Short Answer* Order the following 3 volcanic features in terms of increasing silica in erupted lava. I. Yellowstone; II. Hawaiian Islands; III. Andes Mountains

Answer: II, III, I [RE]

Bonus

Earth and Space - *Multiple Choice* Two mountainous glaciers travel down separate valleys then merge into a single glacier in a single valley. How many lateral moraines are produced?

W) 2
X) 3
Y) 4
Z) 5

Answer: W) 2 [RE]

Tossup

Biology - *Short Answer* What term describes the short fragments of DNA produced by the discontinuous replication of the lagging strand?

Answer: OKAZAKI FRAGMENTS

Bonus

Biology - *Short Answer* What process describes when organisms diversify rapidly from an ancestral species into a multitude of new forms?

Answer: ADAPTIVE RADIATION

Tossup

Chemistry - *Multiple Choice* Consider the reaction 3A plus 8B yields 2C. If 17 moles of A are reacted with 17 moles of B, which substance will be the limiting reactant?
W) A

X) B
Y) C
Z) The reactants are in stoichiometric proportions

Answer: X) B [AI]

Bonus

Chemistry - *Short Answer* Rank the following three salts in order of increasing lattice energy.
I. Potassium iodide
II. Calcium sulfide
III. Lithium chloride

Answer: I, III, II

Tossup

Math - *Short Answer* What is the x coordinate of the vertex of the parabola with equation -x^2 + 2x - 3?

Answer: 1 [RE]

Bonus

Math - *Short Answer* What is the area of a triangle with sides 11, 60, and 61?

Answer: 330 [RE]

Tossup

Physics - *Multiple Choice* Bernoulli's principle is derived from the conservation of what quantity?

W) Momentum

X) Energy
Y) Mass
Z) Volume

Answer: X) ENERGY [RE]

Bonus

Physics - *Multiple Choice* Which of the following laws best quantifies the electrostatic force acting between two charged particles?

W) Gauss's Law
X) Ampere's Law
Y) Faraday's Law of Induction
Z) Coulomb's Law

Answer: Z) COULOMB'S LAW [RE]

Tossup

Earth and Space - *Short Answer* The gravitational influence of what two planets cause the Kirkwood Gaps?

Answer: MARS, JUPITER [AE]

Bonus

Earth and Space - *Multiple Choice* Which of the following statements about Earth's Moon is false?

W) Lunar maria are more basaltic than lunar highlands
X) The division between night and day on the Moon is called the terminator
Y) The moon's far side is more cratered than the side facing Earth
Z) The moon has no magnetosphere

Answer: Z) THE MOON HAS NO MAGNETOSPHERE [AE]

Tossup

Biology - *Multiple Choice* Which of the following is not one of Mendel's Laws?

W) Independent Assortment
X) Segregation
Y) Dominance

Z) Continuous Inheritance

Answer: Z) CONTINUOUS INHERITANCE

Bonus

Biology - *Short Answer* What term describes the state of steady internal, physical, chemical, and social conditions maintained by living systems?

Answer: HOMEOSTASIS

Tossup

Chemistry - *Multiple Choice* Which of the following temperatures is closest to the melting point of potassium chloride?
W) 1 Kelvin
X) 10 Kelvin
Y) 100 Kelvin
Z) 1000 Kelvin

Answer: Z) 1000 KELVIN [AI]

Bonus

Chemistry - *Short Answer* Identify all of the following compounds that are soluble in water.
I. Lithium hydroxide;
II. Silver chloride;
III. Magnesium bromide;

Answer: I, III [AE]

Tossup

Math - *Short Answer* Brennan's height varies directly with how much he sleeps and inversely with how much he works. If he doubles the amount of sleep he gets and halves the amount he works, how many times taller will Brennan be?

Answer: 4 [RE]

Bonus

Math - *Multiple Choice* How many proper subsets are there in a set with 5 distinct elements?

W) 32
X) 31
Y) 30
Z) 29

Answer: X) 31 [RE]

Commented [2]: short answer

Tossup

Physics - *Short Answer* What name is given to the effect in which the frequency of a wave is changed due to a relative velocity between the source and observer?

Answer: DOPPLER EFFECT [RE]

Bonus

Physics - *Multiple Choice* A proton is made up of which of the following combinations of quarks?

W) 3 up
X) 2 up, 1 down
Y) 1 up, 2 down
Z) 3 down

Answer: X) 2 UP, 1 DOWN [RE]