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Science Bowl Round (12 Questions)   
  
Toss-up   
  
1) BIOLOGY Short Answer Which plant hormone inhibits growth, promotes stomatal closure during drought stress, promotes leaf senescence, and helps in dessication tolerance?   
  
ANSWER: Abcissic Acid (accept ABA)

BONUS

BIOLOGY Short Answer: Assign the elements calcium, manganese, and zinc to their major functions in plants:  
1) Helps form chlorophyll   
2) Helps in formation and stability of cell walls  
3) Required for water-splitting step in photosynthesis  
ANSWER: 1) zinc, 2) calcium, 3) manganese  
  
Toss-up  
  
2) Math Short Answer: In a regular hexagon of side length 8, what is the length of a line segment drawn from a vertex to the center?   
  
ANSWER: 4 root 3  
  
BONUS

Math Short Answer: What is the definite integral of 3sin(3x) from pi/3 to 2pi/3?   
  
ANSWER: -2  
  
Toss-up  
  
3) CHEMISTRY Short Answer: A sample of neon of volume 10 L at 450 Torr is allowed to expand isothermally into an evactuated tube with a volume of 15 L. What is the finally pressure of the neon in the tube?   
  
ANSWER: 300 Torr  
  
BONUS  
  
CHEMISTRY Short Answer: A gas in a container of fixed volume of 20 atm is heated from 0 degrees Celsius to 28 degrees Celsius. Approximate the change in pressure to the nearest ones digit.   
ANSWER: 22 atm  
  
Toss-up   
  
4) PHYSICS Short Answer: Who discovered the theoretical limit at which the photon pressure would exceed the gravitational attraction of a light-emitting body and break up from its own photon pressure.  
ANSWER: Eddington    
  
BONUS  
PHYSICS Multiple Choice: Which statement is false about the Balmer series?   
W) It’s describes spectral line emissions of the hydrogen atom.  
X) The visible light spectrum of hydrogen displays four wavelengths.  
Y) The series is characterized by transitioning from n is greater or equal to five to n is equal to 2. N is the electron’s radial quantum number or principal quantum number.  
Z)  The visible spectrum of light from hydrogen displays at least the wavelengths 410 nm and 434 nm.   
ANSWER: Y  
  
Toss-up  
  
5) EARTH/ ASTRO Short Answer: Approximately how many sidereal minutes are in 9 sidereal hours?   
ANSWER: 540 minutes  
  
BONUS  
  
EARTH/ ASTRO Short Answer: By name of number, indicate which of the following metamorphic rocks are foliated.  
  
1) marble  
2) quartzite  
3) schist  
4) phyllite  
  
ANSWER: 3 and 4

Toss-up   
  
6) ENERGY Short Answer: Name one of the two types of natural gas sources that come from either seams of coal or decaying garbage.   
  
ANSWER: coalbed methane or landfill gas  
  
BONUS   
  
ENERGY Short Answer: By name of number, indicate which of the following 3 statements are false.   
1) Liquefied natural gas is harder to store than the gaseous form.   
2) Today, we can drill shallow wells into landfills to recover methane gas.  
3) Researchers estimate that there is more carbon trapped in methane hydrates than in all the available fossil fuels.  
ANSWER: 1

Toss-up   
  
7) BIOLOGY Short Answer: In Hardy Weinberg equilibrium, you know that the frequency of the dominant allele is 0.8 in a certain population. What percent of this population is heterozygous for this specific trait?   
ANSWER: 32%  
  
BONUS  
  
BIOLOGY Short Answer: Which of the following enzymes function in the lumen of small intestines?  
1) salivary amylase  
2) pepsin  
3) disaccharidase  
4) nucleotidase  
ANSWER: none

TOSS-UP  
  
8) MATH Short Answer: How many arrangements are there for five people around a table?

ANSWER: 24  
  
BONUS

MATH Short Answer: What is the sum of the sequence 2, 2/3, 4/9, etc. from the first to the fifth term? Give your answer as a fraction.

ANSWER: (422/ 81)  
  
TOSS-UP  
  
9) CHEMISTRY Short Answer: Which rule states that approximately the same increase in positional disorder occurs when any liquid is converted into vapor, so the change in entropy is the same in each case?   
ANSWER: Trouton’s rule  
  
BONUS   
  
CHEMISTRY Short Answer: Calculate the entropy change of the surroundings when 1 mol of liquid water vaporizes at 90 degrees Celsius and 1 bar. Assume the enthalpy of vaporization is 50 kJxmole^-1. Approximate to the tens digit.   
ANSWER: 140 JxK^-1  
  
TOSS-UP  
  
10) PHYSICS  Multiple Choice: Three resistors are connected in parallel, with resistances of 2, 3, and 6 ohms. The total potential of the circuit is 12 volts. What is the total current in Amperes?   
W) 10  
X) 12  
Y) 14  
Z) 16  
  
ANSWER: X  
  
BONUS  
  
PHYSICS Short Answer: There is a perfectly uniform asteroid rotating about its axis. The asteroid has a mass of 5000 kg and diameter of 40 meters? Give the answer with scientific notation and 2 significant digits.   
ANSWER: 3.2 x 10^6  
  
TOSS-UP   
  
11) EARTH/ ASTRO Multiple Choice: Which statement is true about the sun?   
W) It is a second generation star.   
X) Its mass is 1x10^30 kg.   
Y) The distance between the sun and Earth is approximately 100 million km.  
Z) The sun accounts for more than 99% of the mass of the solar system.  
  
ANSWER: z  
  
BONUS   
  
EARTH/ ASTRO Multiple Choice: Which mineral of the Bowen series would be most stable at the Earth’s surface?  
W) olivine  
X) plagioclase  
Y) quartz  
Z) biotite  
  
ANSWER: Y

TOSS-UP

12) ENERGY short answer: Regarding solar energy, what is the name of the towers that use rotating mirrors to track the sun and focuses sunlight into heat-receiving panels on the top?  
ANSWER: power towers  
  
BONUS   
  
ENERGY Short Answer: Using name or number, order the following 3 steps in a photovoltaic cell from the first occurring to those that occur last: 1) Phosphorus causes n-type silicon to form. 2) photons strike electrons in the p-n juncture 3) p-n juncture  
  
ANSWER: 3, 1, 2