Science Bowl Team Round

#1 Chemistry Multiple Choice In which phase of liquid crystals do the molecules lie together in straight and neat columns but staggered so they do not follow straight rows?

W) Nemactic Phase

X) Smectic Phase

Y) Cholesteric Phase

Z) Lyotropic Phase

Answer: W) Nemactic Phase

#1 Chemistry Short Answer What is the standard entropy of vaporization of ethanol if it boils at about 78.7 degrees Celcius and has a standard enthalpy of vaporization of 80 kJ/mol? Give your answer to the nearest tenth and in J /K mol.

Answer: 227.4 J/K mol

#2 Energy Short Answer Which of the following are true about ceramic pellets which are used in the Uranium Fuel cycle?

I) They cannot withstand very high temperatures

II) They are relatively small, the size of your fingertips

III) The can produce the same energy as 150 gallons of oil

IV) They are stored separately in cool refrigerators

Answer: II and III

#2 Energy Multiple Choice Power output for wind turbines dramatically increase between what two wind speeds?

W) 0 and 10

X) 5 and 10

Y) 10 and 25

Z) 25 and 30

Answer: Y) 10 and 25

#3 Earth and Space Multiple Choice Which of the following describes the thermocline of water in the arctic ocean if temperature is plotted on the x-axis and depth is on the y-axis?

W) It starts from the bottom left and ends on the top right

X) It starts at the top right and ends at the bottom left

Y) It is nonexistent

Z) It varies up and down through the graph

Answer: Y) It is nonexistent

#3 Earth and Space Short Answer What are the names of the only two trenches in the Atlantic ocean?

Answer: Puerto Rico Trench and South Sandwich trench

#4 Biology Short Answer What term is given to genes that have accumulated mutations and therefore have become nonfunctional?

Answer: Pseudogenes

#4 Biology Short Answer Which of the following is not true about Triiodothyronone?

1. it is abbreviated as T3
2. It is in the thyroid gland
3. It is a potent form of the thyroid hormone
4. It increases the basal metabolic rate and the sensitivity to catecholamines

Answer: II III and IV

#5 Physics Multiple Choice Electro magnetic force splits into which two forces? This phenomenon is described by the Higgs field.

Answer: Electric force and magnetic force

#5 Physics Short Answer What is the displacement of a polar that travels 60 kilometers south on the earth relative to the center of the galaxy? The polar bear is going 1 kilometers per second, the rotation of the earth is 900 miles per hour at the equator, the speed at which the solar system orbits the galactic center is 220 kilometers per second, and the speed of light is 3.00 X 10 5 km/s. Give your answer to the nearest 1000s place.

Answer: 13, 000 km

#6 Math Multiple Choice At Frank's Fruit Market, 3 bananas cost as much as 2 apples, and 6 apples cost as much as 4 oranges. How many oranges cost as much as 18 bananas?

W) 6

B) 8

C) 9

D) 12

Answer: B) 8

# 6 Math A test is scored with 6 points for each correct response, 0 points for each incorrect response, and 1.5 points for each unanswered question. Yash decides to do the first 22 questions of the test and leave 3 unanswered. How many of the first 22 questions must Yash get correct in order to receive a score of at least 100?

Answer: 16

#7 Chemistry Multiple Choice What is the name of the technique that determines molar mass of a solute by measuring the freezing point depression caused by dissolving it in a solvent?

W) Osmometry

X) Cryoscopy

Y) Spectroscopy

Z) distillation

Answer: X) Cryoscopy

#7 Chemistry Short Answer how many triple points does the phase diagram of sulfur have?

Answer: 3

#8 Energy Short Answer What type of solar home is described when the house does not use an mechanical equipment and relies solely on a solar collector?

Answer: passive solar home

#8 Energy Short Answer Which of the following are true about solar panels with photovoltaic cells?

1. The n-type silicon expresses negative charge at first
2. The n-type silicon has a negative charge when an electric field is introduced
3. Photons from the sun hit the p-n junction of the cell
4. Free electron move in a cycle from the cell to a load and back to the photovoltaic cell in the last step of electricity production in photovoltaic cells

#9 Earth and Space Short Answer What is the largest known object in the Kuiper belt?

Answer: Eris

#9 Earth and Space Short Answer The number of hospitable planets multiplied fy the fraction of habitable planets that actually have life multiplied by the fraction of life bearing planets upon which a civilization is capable of interstellar communication multiplied by the fraction of civilization planets that are capable of interstellar communication now models the probability of contacting another civilization is also known as what?

Answer: The Drake equation

#10 Biology Short Answer Which of the following is a correct order of events in Heterosporous spore production?

W) Mega sporangium to Mega spore to male gametophyte to sperm

X) Microsporangium to Microspore to Female gametophyte to eggs

Y) Micro sporangium to Microspore to male gametophyte to Sperm

Z) Sporangium to single type of spore to bisexual gametophyte to eggs and sperm

Answer: Y

#10 Biology Multiple Choice Which of the following hormones is an antioxidant and causes drowsiness?

W) Serotonin

X) Melatonin

Y) Thyroxine

Z) Histamine

Answer: X) melatonin

#11 Physics Short Answer A student has the choice of (Path A) going straight up a hill or (Path B) going in a zig zag up a hill. How does the work due to gravity compare with both path A and Path B?

W) They are equal

X) The work of Path A is greater

Y) The work of path B is Greater

Z) The work of Path B is greater sometimes and less at others

Answer: W

#11 Physics Short Answer What is the perceived length by an observer of an object that is 100m long is moving along at a speed of 0.6 c relative the stationary observer?

Answer: 80 meters

#12 Math Short Answer What is the sum of the 12th and 11th term of the Fibonacci sequence?

W) 89

X) 144

Y) 233

Z) 377

Answer: X) 144

#12 Math Multiple Choice Two different prime numbers between 4 and 18 are chosen when their sum is subtracted from their product, which of the following numbers could be obtained?

W) 21

X) 60

C) 119

D) 180

Answer: C

#12 Math Short Answer