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TOSS-UP

- Matinta Mar ph ' 18 PR Muliture the the last of the l 1) CHEMISTRY Multiple Choice Which of the following is NOT considered a state function of a system in a reaction: Moritale Market 18 18 Mylitute ## # 18 18
 - W) work

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- X) enthalpy
- Y) temperature
- Z) volume

ANSWER: W) WORK

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BONUS

1) CHEMISTRY Short Answer What is the name of the law that states that the overall enthalpy change for a reaction is equal to the sum of the enthalpy changes for the individual steps in the reaction:

ANSWER: HESS'S LAW (ACCEPT: HESS)

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TOSS-UP

- 2) PHYSICS Multiple Choice A beam of white light is incident on one face of a prism. Which of the following colors will emerge on the other side at the lowest angle with respect to the primary beam:
- W) violet
- X) yellow
- Y) red
- Z) blue

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ANSWER: Y) RED

BONUS

fulcrum. A 6-gram mass is placed on the opposite side of the lever. How far, in centimeters, must the 6-gram mass be placed from the fulcrum. 2) PHYSICS Short Answer Consider a lever with a 4-gram mass located 12 centimeters from its the 6-gram mass be placed from the fulcrum to equally balance the 4-gram mass?

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ANSWER: 8 CENTIMETERS Milling 素素 養 一家 Implitute 素素 株 淺 序》 Ministration of the state of th

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3) BIOLOGY Short Answer What is the substrate for which catalase has the greatest affinity?

ANSWER: HYDROGEN PEROXIDE (ACCEPT: H₂O₂)

BONUS

- 3) BIOLOGY *Multiple Choice* Which of the following kinds of microscopy will most commonly employ freeze fracture preparation of tissue specimens:
 - W) bright field microscopy

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- X) scanning electron microscopy
- Z) transmission electron microscopy

ANSWER: X) SCANNING ELECTRON MICROSCOPY

- 4) ASTRONOMY Multiple Choice Cepheid variables are a large and important group of:
- W) yellow giants and super giants

- Y) blue giants
 Z) pulsation Z) pulsating quasars

ANSWER: W) YELLOW GIANTS AND SUPER GIANTS

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4) ASTRONOMY Short Answer What is the name of the simple astronomical instrument consisting of a vertical stick placed in a sunny spot to cast a shadow?

ANSWER: GNOMON Militale the the light Military War 14 13 18

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5) MATH Short Answer Find the derivative of the following function: $f(x) = \sin(\ln x)$ (read as: f of x equals the sine of the natural log of x)

 $\cos(\ln x)$ ANSWER:

BONUS

5) MATH Multiple Choice Using the Cartesian coordinate system, find the distance between the points (2, 3) and (-3, 1): Marithus Mark 18 180 Maritule Mark 18 18 Marithus Market 18 180 面对油油排料

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ANSWER: W) √29

TOSS-UP

6) EARTH SCIENCE Multiple Choice What percentage of the earth's total volcanic activity occurs under the ocean?

W) 30%

- X) 45%
- Y) 65%
- Z) 90%

ANSWER: Z) 90%

BONUS

- 6) EARTH SCIENCE *Multiple Choice* Which of the following is NOT true about the Earth's troposphere:
- W) within the layer, temperature decreases with altitude
- X) it is terminated by the tropopause
- Y) it contains the jet stream
- Z) within the layer, temperature increases with altitude

ANSWER: Z) WITHIN THE LAYER, TEMPERATURE INCREASES WITH ALTITUDE

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- 7) GENERAL SCIENCE Multiple Choice Galena is a primary ore of which of the following metals:
- W) zinc
- X) lead

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- Y) germaniumZ) tungsten

ANSWER: X) LEAD

BONUS

7) GENERAL SCIENCE *Short Answer* According to Aristotle, the portion of the Cosmos lower than the moon is made of what four elements?

ANSWER: EARTH, WATER, AIR, FIRE (accept in any order)

TOSS-UP

- 8) COMPUTER SCIENCE Multiple Choice The letter "T" in 10 Base-T wiring refers to:
- W) Teflon coated
- X) telephone wire
- Y) tetrahedral packing
 Z) twisted pair

ANSWER: Z) TWISTED PAIR

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- 8) COMPUTER SCIENCE Multiple Choice In Windows 98, what screen would you access to change device resources and troubleshoot resource conflicts:
- W) Device Performance Console
- X) Device Add/Remove
- Y) Device Changer
- Z) Device Manager

ANSWER: Z) DEVICE MANAGER

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- 9) CHEMISTRY Multiple Choice Which of the following is a manufactured fiber composed of regenerated cellulose or of regenerated cellulose in which substituents have replaced more than 15% of the hydrogens of the hydroxyl groups:
- W) polyester
- X) silk
- Y) rayon
- Z) nylon

ANSWER: Y) RAYON

BONUS 1/4

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9) CHEMISTRY Short Answer If the temperature of a 4L tank of gas changes from 200K to 500K, at constant pressure what is the new volume of gas, in liters:

ANSWER: 10

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(Solution: $V_1/T_1 = V_2/T_2$; $4L/200K = V_2/500K$; = 10L)

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TOSS-UP

tiny objects was doubled, by what multiple would the total force on the particles increase? 10) PHYSICS Short Answer According to the work of Coulomb, if the charge on either one of two

ANSWER: 2 TIMES

BONUS

- 10) PHYSICS Multiple Choice In the Bragg equation which is conventionally written as, $n\lambda = 2d$ sin **N**(Read as: n lambda equals two d sine phi), which of the following is the correct description of the angle phi:
- W) the complementary angle with respect to the normal to the crystal surface
- X) the angle between the incident ray and the normal to the crystal surface
- Y) the angle between the incident ray and the crystal surface
- Z) the internal angle of reflection of the crystal

ANSWER: Y) THE ANGLE BETWEEN THE INCIDENT RAY AND THE CRYSTAL **SURFACE** Mylitute At A S Stitute ## # '\$ PR

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Milling Mar H. 13 PR. 11) BIOLOGY Short Answer What scientist in 1936, building on the discoveries of Szent-Gyorgyi, (Pronounced: SENT- GEE-or-gee) postulated the basic reactions of the tricarboxylic (read as: tri-carbox-ill-ick) acid cycle?

ANSWER: KREBS

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BONUS

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- 11) BIOLOGY Multiple Choice At which of the following wavelengths will photosynthesis in a spinach plant be greatest:
- W) 475 nanometers
- X) 550 nanometers
 Y) 600 per
 - Z) 750 nanometers

ANSWER: W) 475 NANOMETERS

TOSS-UP

- 12) ASTRONOMY Multiple Choice Which of the following planets sees the Sun rising from the west and setting in the east during its Autumn and Spring equinoxes? Inditute 新光·後序
- W) Mars
 - X) Saturn
 - Y) Uranus
 - Z) Mercury

ANSWER: Y) URANUS

BONUS

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12) ASTRONOMY Short Answer Who is the author of the book titled "On the Revolution of the Heavenly Spheres" which rejected the Earth-centric universe? Militate At A 18 18 Militate A H 18 18 Millute Min the 's PR Drippy of the little of the li

ANSWER: COPERNICUS

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13) MATH Short Answer What percent of a normally distributed sample lies within 2 standard deviations of the mean?

ANSWER: 95%

BONUS

13) MATH Short Answer What is the smallest integer that satisfies the following inequality:

$$\frac{x}{2} + \frac{x}{3} > 5$$

Y.

Y.

Y.

Y.

Y.

Y.

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Y.

Y.

ANSWER: 7

TOSS-UP

- 14) EARTH SCIENCE Multiple Choice A wave base is defined as the depth below an ocean wave in deep water below which stirring due to wind is negligible, and is approximately equal to:
- W) 1/8th of its wavelength
- X) ¹/₄ of its wavelength
- Y) ½ of its wavelength
- Z) ³/₄ of its wavelength

ANSWER: Y) ½ OF ITS WAVELENGTH

BONUS

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- 14) EARTH SCIENCE Multiple Choice A clastic particle falling within the size range of 1/16th mm to 2 mm is called:
- W) silt
- X) sand
- Y) clay

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Z) pebble

ANSWER: X) SAND

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- 15) GENERAL SCIENCE Multiple Choice Which of the following woods is most desirable for fence posts in wet environments:
- W) locust
- X) oak

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- Y) alder
- Z) hickory

ANSWER: W) LOCUST

BONUS

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- 15) GENERAL SCIENCE *Multiple Choice* BenzoPyrenes are food toxins that can be found in low concentrations in:
 - W) charcoal-broiled meats
 - X) uncooked shellfish
- Z) wild mushrooms

ANSWER: W) CHARCOAL-BROILED MEATS

16) COMPUTER SCIENCE *Short Answer* The elapsed time between the initiation of a request for data and the receipt of the first bit or byte of that data is called:

ANSWER: ACCESS TIME (ACCEPT: DISK ACCESS TIME)

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BONUS

16) COMPUTER SCIENCE Multiple Choice Which of the following is a port that transmits data in a sort of wave, 8 bits across, in which each bit goes in the same direction at the same time:

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- W) LPT
- X) serial

Y) USB Z) FireWire

ANSWER: W) LPT Millinin 教教教學 Implitute 素素 ** 加加州縣

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- Milling 新光·漢序 17) CHEMISTRY Multiple Choice A substance with an acid dissociation constant, or K_a, of 1×10^{-9} would be considered a:
 - W) weak acid

Y.

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Y.

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- X) strong acid
- Z) strong base

ANSWER: W) WEAK ACID

BONUS

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17) CHEMISTRY *Short Answer* Which Law states that the rate of effusion of a gas is inversely proportional to the square root of its molar mass?

ANSWER: GRAHAMS' LAW

TOSS-UP

18) PHYSICS Short Answer According to quantum electrodynamics, what is exchanged that gives rise to the electromagnetic force between 2 charged particles?

ANSWER: PHOTONS

BONUS

18) PHYSICS Short Answer What are the spin quantities for a gauge boson, a lepton, and a kaon, respectively? Militate A H W Mistime Mark is 18 Militate Market 18 18

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ANSWER: 1; ½; 0

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19) BIOLOGY Short Answer A nucleosome is composed of what general class of proteins?

ANSWER: HISTONES

BONUS

- 19) BIOLOGY *Multiple Choice* In the cloning of plants such as orchids, the most desirable tissue to begin culturing in vitro is:
 - W) radial cambium
 - X) shoot meristematic tissue

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Z) stem internodes

ANSWER: X) SHOOT MERISTEMATIC TISSUE

20) ASTRONOMY Short Answer What is the Greek name meaning sparkling or scorching for the star, alpha Canis Majoris?

ANSWER: SIRIUS

BONUS

- 20) ASTRONOMY Multiple Choice One important difference between spiral and elliptical galaxies is that:
- W) spiral galaxies contain Population II stars
- X) spiral galaxies contain clouds of gas and are still forming stars
- Y) spiral galaxies contain a massive black hole

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Z) spiral galaxies are formed by a more rapid accumulation of mass

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ANSWER: X) SPIRAL GALAXIES CONTAIN CLOUDS OF GAS AND ARE STILL Marithus Mark 18 18 Myithin Make 18 18 Millute the He is the Arithte the 14 18 182 Militala 184 18 185 FORMING STARS Militale the At 18

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21) MATH *Short Answer* What parameter, usually signified by a lower case r, describes the direction and strength of a straight-line relationship between two quantifiable variables?

ANSWER: CORRELATION (ACCEPT: PEARSON'S CORRELATION or CORRELATION COEFFICIENT or PEARSON'S R, or THE PEARSON PRODUCT MOMENT CORRELATION)

BONUS

21) MATH *Short Answer* In terms of π , what is the area of a sector in a circle whose central angle is 40° bounded by two radii of 6?

ANSWER: 4π

(Solution: $A = n/360 \times \pi r^2$; $= 40/360 \times 36\pi = 4\pi$)

TOSS-UP

- 22) GENERAL SCIENCE *Multiple Choice* A flurry of recent reports in neurology and psychology points to protein translation in cerebral cortex dendrites leading to changes in synapses vital to what biological process:
 - W) voluntary motor control
 - X) stem cell repair
 - Y) myelination
 - Z) learning

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ANSWER: Z) LEARNING

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- 22) GENERAL SCIENCE *Multiple Choice* A common type of distortion in CRT monitors in which horizontal and vertical lines bend inwards towards the center of the display is called:
- W) spiral distortion
- X) barrel distortion
- Y) trapezoid distortion
- Z) pincushion distortion

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ANSWER: Z) PINCUSHION DISTORTION

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- 23) CHEMISTRY Multiple Choice A racemic mixture is a solution that contains:

 W) a 50:50 mixture
- W) a 50:50 mixture of (+) and (-) isomers
- X) greater than 50% of the (+) isomers
- Y) greater than 50% of the (-) isomers
- Z) only one species of isomer

ANSWER: W) A 50:50 MIXTURE OF (+) AND (-) ISOMERS

BONUS

- gradient is based on: 23) CHEMISTRY Multiple Choice Separation of proteins by centrifugation in a sucrose density
 - W) size and shape only
 - X) size only

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- Y) density only
- Z) size, shape, and density

ANSWER: Z) SIZE, SHAPE, AND DENSITY

TOSS-UP

24) PHYSICS Short Answer Which 2 of the following 4 parameters most directly yield the product used in the Lawson criterion for nuclear fusion, ion density. used in the Lawson criterion for nuclear fusion: ion density; fusion temperature; isotope half-life; energy confinement time

ANSWER: ION DENSITY AND ENERGY CONFINEMENT TIME (accept in any order)

24) PHYSICS Multiple Choice The toroidal magnetic field in the Tokamak fusion confinement is oriented in which of the following directions:

- W) uniformly throughout the toroid
- X) oblique to the toroid axis
- Y) perpendicular to the toroid axis
 - Z) parallel to the surface of the toroid

ANSWER: Z) PARALLEL TO THE SURFACE OF THE TOROID Mylithin Art At 18 18

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Matinta Mar At 13 1980 25) BIOLOGY Short Answer Which germ layer in mammals is predominantly responsible for the gut lining and digestive glands?

ANSWER: ENDODERM

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BONUS

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Marith Mar No. 18 18. Matitud Mar At ' & PR Mylithe Mark if the motitud # ** ** ANSWER: CHAGAS' DISEASE Milititle ## 14 13 Matitude Mar At 12 198 Matitud Mar ph ' 18 PR Matitude Market & PR Marithe Mar No. 18 18 Marith Mar H & PR Matitud Mar At ' & PR Militin Market 18 18 Matinta Mar ph '8 PR Mithitle Market & PR Milling 教教教學 Matitud Mar Har 18 18 Matinta 教育社·養學 Mytitute 精 社 该 序 Millinin 教教教·蒙然 Mytime ## # 18 18 Milling # # '& PR Mytitute 赫赫·赫·豫 Marithus Mar # 18 180 Mytitute 赫赫·接際 Mytime ## # 18 18 Mylithic Market & PR Marithus 教教教·蒙然 Matinta An At & PR Matitude # 14 18 Matinte Mark 18 18 Mythun 新科·養際 Maritule Mark is 180 Marithus Mar # 18 180