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TOSS-UP

- Matinta Mar ph ' 18 PR Unitate the 14 th 18 th 1) CHEMISTRY Multiple Choice The so-called d-block elements of the periodic table constitute the: Milling 素 基 · 该 序 Myithin 新科·接際 Imhiling 新光·接際
 - W) lanthanide and actinide series

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X) transition metals
Y) group 2.4 Y) group 3A to 8A elements

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Z) group 1A and 2A elements

ANSWER: X) TRANSITION METALS

BONUS

1) CHEMISTRY Short Answer In any order, give the full names of any 4 metalloids:

ANSWER: BORON; SILICON; GERMANIUM; ARSENIC; ANTIMONY; TELLURIUM; **ASTATINE**

TOSS-UP

2) PHYSICS Short Answer What is the most common term used to describe the velocity equal to Militing 新来等學 the average velocity in the limit that the measurement time period approaches zero?

ANSWER: INSTANTANEOUS VELOCITY

BONUS

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2) PHYSICS Short Answer How long will it take a squirrel to run straight down a tree trunk 18 meters long if it accelerates from a stop at 4 meters/sec²?

ANSWER: 3 SECONDS

(Solution: $t = \sqrt{2\Delta x/a} = \sqrt{9} = 3$) Milling 素素 ·養 /家 Mikituto 横林·接风

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3) BIOLOGY Short Answer What gland in humans is the primary producer of melatonin?

ANSWER: PINEAL GLAND

Y.

Y.

Y.

Y.

Y/L

1

1

1

Y.

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BONUS

- 3) BIOLOGY *Multiple Choice* An example of negative feedback control is when:
 - W) thyroid hormone interrupts the stimulation of the thyroid by TSH
 - X) the initial enzyme of a metabolic pathway inhibits a later reaction
 - Y) FSH inhibits progesterone production by the corpus luteum
 - Z) the initial product of a metabolic pathway inhibits the next reaction

ANSWER: W) THYROID HORMONE INTERRUPTS THE STIMULATION OF THE THYROID BY TSH

TOSS-UP

4) ASTRONOMY *Short Answer* According to Kepler's second Law of planetary motion, in which season in North America does the Earth currently move the fastest in its orbit about the Sun?

ANSWER: WINTER

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4) ASTRONOMY Short Answer What is the brightest star in the Northern sky?

ANSWER: ARCTURUS (ACCEPT: ALDILLE TO AL

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5) MATH Short Answer What is the most common name for the theorem proved by Gauss which states that "every polynomial of degree $n \ge 1$ with real or complex coefficients has n real or complex roots"?

ANSWER: THE FUNDAMENTAL THEOREM OF ALGEBRA

BONUS

5) MATH Short Answer Simplify the following fractional radicand to an expression that has the lowest whole number radicand:

Y.

Y.

Y.

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Y.

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6) EARTH SCIENCE Short Answer Which body wave can travel at the greatest velocity of all the seismic waves?

ANSWER: P-WAVES (ACCEPT: PRIMARY WAVE OR COMPRESSION/EXPANSION WAVES)

BONUS

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- 6) EARTH SCIENCE *Multiple Choice* The earth's outer core is interpreted to be liquid because:
- W) S-waves don't travel through liquid
- X) S-waves are faster than P-waves

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- Y) S-waves don't travel through gases
 Z) P-waves don't travel through gases Z) P-waves don't travel through liquids

ANSWER: W) S-WAVES DON'T TRAVEL THROUGH LIQUID

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- 7) GENERAL SCIENCE *Multiple Choice* If you need to measure 100 milliliters in an Erlenmeyer flask that has a stated volume of 100 ml but has no calibration lines, typically the stated volume will approximately fill to:
- W) the top rim of the flask
- X) where the neck attaches to the flask
- Y) 1 centimeter below the where the neck attaches to the flask
 - Z) there is no safe way to approximate 100 ml in such a flask

ANSWER: X) WHERE THE NECK ATTACHES TO THE FLASK

7) GENERAL SCIENCE Short Answer The ratio of total leaf surface area to the total ground surface area covered by the leaves is know as what?

ANSWER: LEAF AREA INDEX (ACCEPT: LAI)

TOSS-UP

- 8) COMPUTER SCIENCE Multiple Choice Which of the following best describes a router:
- W) segments an existing network
- X) provides the network address for the PC
- Y) manages traffic on the network by filtering data
- Z) controls the flow of data between 2 or more separate networks

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ANSWER: Z) CONTROLS THE FLOW OF DATA BETWEEN 2 OR MORE SEPARATE 面对加州 赫 赫 溪 豫 **NETWORKS**

(Solution: W & Y = bridge; X = NIC)

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BONUS

8) COMPUTER SCIENCE Short Answer A network technology based on transferring data in cells or packets, what does the acronym ATM stand for?

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ANSWER: ASYNCHRONOUS TRANSFER MODE (DO NOT ACCEPT: AUTOMATED TELLER MACHINE)

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9) CHEMISTRY Multiple Choice One standard atmosphere of pressure is equal to how many Pascals:

W) 760

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Y.

Y.

1

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X) 1,325

Y) 10,325

z) 101,325 Z) 101,325

ANSWER: Z) 101,325

BONUS

9) CHEMISTRY *Short Answer* In order of increasing energy, number and designate all the subshells in the 4th electron shell:

ANSWER: 4s, 4p, 4d, 4f (ACCEPT: s, p, d, f)

TOSS-UP

- 10) PHYSICS Multiple Choice Rutherford discovered that x-rays were produced by:
- W) uranium when bombarded with slow neutrons
- X) certain binary stars
- Y) particles emitted by a cathode, which then struck an anode
- Z) the sun

ANSWER: Y) PARTICLES EMITTED BY A CATHODE, WHICH THEN STRUCK AN ANODE

10) PHYSICS *Short Answer* Which 3 of the following 4 are vector quantities: velocity, acceleration, speed, magnetic field

Millute Min H 's Pic ANSWER: VELOCITY, ACCELERATION, MAGNETIC FIELD

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(Solution: speed has no directional component)

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- 11) BIOLOGY Multiple Choice Which of the following is NOT a Rickettsial disease:
- W) Q fever

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- X) Scrub Typhus
- Y) Rocky Mountain Spotted Fever
- Z) Relapsing fever

ANSWER: Z) RELAPSING FEVER

BONUS

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- 11) BIOLOGY *Multiple Choice* Which of the following vegetations is NOT properly matched with its location:
 - W) boreal coniferous forest and Midwestern Canada
 - X) rain forest and the Olympic National Forest
 - Y) Saguaro desert and the Southwestern US
 - Z) Taiga and the Northeastern US

ANSWER: Z) TAIGA AND THE NORTHEASTERN US

TOSS-UP

12) ASTRONOMY *Short Answer* Which planet is 14.5 times the Earth's mass, has a rotational rate of 17.2 hours, and a year length of 84 Earth years?

ANSWER: URANUS

BONUS

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12) ASTRONOMY *Short Answer* What are generally considered the most common and most primitive type of meteorites?

ANSWER: CHONDRITES

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Matitude Mar At 12 198 13) MATH *Short Answer* Simplify the ratio of the following factorial: $\frac{4!}{6!}$ (read as: 4 factorial divided by 6 factorial)

ANSWER: 1/30 (ACCEPT: 0.033)

BONUS

13) MATH Short Answer A recipe calls for flour, sugar and butter to be mixed in a ratio of 7 to 5 to 2, respectively. Assuming there is enough sugar and butter to use all the flour and 20 pounds of flour is available, how many pounds of the mixture can be made?

ANSWER: 40

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Y.

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1

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Y.

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TOSS-UP

- deposition of sediment by a glacial stream: 14) EARTH SCIENCE Multiple Choice Which one of the following was NOT formed by the
 - W) outwash plain
 - X) kame
 - Y) moraine

ANSWER: Y) MORAINE

BONUS

indicate which of the following weather-related events: 14) EARTH SCIENCE Multiple Choice Closely spaced isobars on a weather map most directly

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- W) calm conditions
- X) windy conditions
- Y) a gentle pressure gradient

Z) torrential rainfall

ANSWER: X) WINDY CONDITIONS

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- 15) GENERAL SCIENCE Multiple Choice Most plants absorb nitrogen from the soil through their roots in which of the following forms:
 - W) dinitrogen
 - X) ammonia
- Z) nitrate Y) ammonium

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Y.

1

1

1

Y.

ANSWER: Z) NITRATE

BONUS

- 15) GENERAL SCIENCE *Multiple Choice* Which of the following is NOT a fat-soluble vitamin:
 - W) vitamin K
 - X) vitamin A
 - Y) vitamin D
 - Z) biotin

ANSWER: Z) BIOTIN

TOSS-UP

16) COMPUTER SCIENCE *Short Answer* If a computer has a 64-bit bus, how many bytes of information can travel across it at the same time?

ANSWER: 8

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16) COMPUTER SCIENCE Multiple Choice What type of chip is commonly used to store the BIOS in a PC:

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- W) ROM
- X) DAT
- Y) DOS エテ DOS Z) FAT

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ANSWER: W) ROM

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- Milital Market & PR 17) CHEMISTRY Multiple Choice An amine is a class of compounds that contains a:

 W) sulfur and bydrogon
 - W) sulfur and hydrogen group
 - X) nitrogen and oxygen group
 - Y) nitrogen and hydrogen group
 - Z) carbon and sulfur group

Y.

Y.

Y.

Y.

Y.

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Y.

ANSWER: Y) NITROGEN AND HYDROGEN GROUP

BONUS

what Period and main Group number on the Periodic Chart? 17) CHEMISTRY Short Answer An element with an electron configuration of 2-8-8-2 is found in

ANSWER: PERIOD 4 AND GROUP 2 (ACCEPT: PERIOD 4 AND GROUP 2A)

TOSS-UP

18) PHYSICS Short Answer In 1885, Johann Balmer derived the formula for the 4 spectral line of what element?

ANSWER: HYDROGEN

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BONUS

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18) PHYSICS Short Answer Which lower case letter is most typically used to denote Planck's constant?

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- Maritule Mark & PR 19) BIOLOGY Multiple Choice Which of the following is a member of the Hirudinea: (pronounced: high-rue-DIN-E-A)
 - W) earthworm
 - X) centipede

Y.

Y.

Y.

Y.

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Z) chelicerae (read as: chell-IS-err-aye)

ANSWER: Y) LEECH

BONUS

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19) BIOLOGY *Short Answer* When successive beats of the heart result in an increased end-diastolic volume leading to optimal sarcomere length for strongth of commonly referred to by the name of what law:

ANSWER: THE FRANK-STARLING LAW

TOSS-UP

- 20) ASTRONOMY Multiple Choice Which of the following was NOT known to be a planet until 1781 AD: Marithus Market of Police Militate 教 养婆家
- W) Saturn
- X) Venus
- Y) Mercury
- Z) Uranus

ANSWER: Z) URANUS

BONUS

20) ASTRONOMY Short Answer What law states that the total amount of energy radiated per unit time from the surface of a body is related to the fourth power of its temperature? Millite Mit H. is file

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ANSWER: STEFAN-BOLTZMANN LAW (ACCEPT: STEFAN'S LAW)

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21) MATH Short Answer A statistician who computes the standard deviation of a set of sample means is computing what statistical quantity?

ANSWER: STANDARD ERROR OF THE MEAN (ACCEPT: STANDARD ERROR)

21) MATH Short Answer Name 2 consecutive ODD integers where 5 times the second number minus 6 times the first number equals –55:

ANSWER: -65 AND -67 (must be in order)

(Solution: 5(n+2) - 6n = -55; 5n + 10 - 6n = -55; -n = -65; n = 65; but the ans. must be negative)

TOSS-UP

- a person suffering from recurrent kidney stones: 22) GENERAL SCIENCE Multiple Choice Recent evidence shows which to be the best advice for
 - W) decrease their intake of calcium-rich foods
 - X) increase their intake of calcium-rich foods
 - Y) increase their intake of oxalate-rich foods
 - Z) decrease their intake of magnesium-rich foods

ANSWER: X) INCREASE THEIR INTAKE OF CALCIUM-RICH FOODS

(Solution: the Ca is thought to bind with oxalates in the intestine, keeping it from entering the bloodstream)

BONUS

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- Time the state of 22) GENERAL SCIENCE *Multiple Choice* A lens defect resulting from its inability to bring all wavelengths of light into the same plant of wavelengths of light into the same plane of focus is called:
 - W) barrel distortion
 - X) astigmatism

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Y) chromatic aberration

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Z) spherical aberration

ANSWER: Y) CHROMATIC ABERRATION Mylithin Art At 18 PR

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- 23) CHEMISTRY Multiple Choice Which metal acts at the anode in mercury batteries that are commonly found in cameras and watches:
- W) mercury
- X) mercury (II) oxide
- Y) zinc

Y.

Y.

1

1

Y.

Z) lithium

ANSWER: Y) ZINC

BONUS

23) CHEMISTRY *Short Answer* In the periodic table, what are elements 58 through 71 classified as? as?

ANSWER: LANTHANIDES (ACCEPT: LANTHANIDE SERIES OR INNER TRANSITION METALS OR RARE EARTH ELEMENTS)

TOSS-UP

24) PHYSICS Short Answer How far, in kilometers, will the runner travel in five hours on a straight path if her average speed is 9 kilometers per hour? Militate Market 18 182 Maining Mark is 182

ANSWER: 45 KM

(Solution: (9 km/h) (5 h) = 45 km)

BONUS

24) PHYSICS Multiple Choice Which of the following forms of radioactive decay does NOT alter the atomic number of an element:

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- W) alpha
- X) beta minus
- Y) beta plus
- Z) gamma

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ANSWER: Z) GAMMA

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- Marith Mar No. 18 18. 25) BIOLOGY Multiple Choice Which of the following genera of plants contains a species that traps and digests insects:
 - W) Ulmus

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Y.

Y.

Y.

Y.

Y.

Y.

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- X) Nepenthes (pronounced: neh-PEN-thes)
- Z) Psilotum (pronounced: sill-O-tum) Y) Lupinus (pronounced: lew-PIE-nus)

ANSWER: X) NEPENTHES

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BONUS

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- 25) BIOLOGY *Multiple Choice* Thallassemia (pronounced: thal-ah-SEE-me-ah) and Marfan Syndrome are both which of the following types of diseases:
 - W) virus-related diseases
 - X) bacteria-related diseases
- Z) inherited disorders Y) toxic-exposure diseases

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ANSWER: Z) INHERITED DISORDERS

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