ROUND 11

TOSS-UP

Matitude Mar At 12 198 1) PHYSICS Short Answer In their studies of trans-uranium elements and crystallization studies of barium, Hahn and Meitner discovered what process?

ANSWER: FISSION (ACCEPT: NUCLEAR FISSION)

BONUS

1) PHYSICS Short Answer Assuming g = -32 feet/sec² and friction is negligible, if a coffee bean is thrown upward from the top of a building with a vertical velocity of +32 ft/sec, what will its velocity be in ft/sec after 3 seconds?

ANSWER: -64 (ACCEPT: -64 or 64 DOWN)

TOSS-UP

2) BIOLOGY *Short Answer* Afferent neuron is to sensory neuron as efferent neuron is to:

ANSWER: MOTOR NEURON

Militate At 18 18

Milling 素素 ·養 ·養

1

Y.

1

Y/L

Y.

1

Ph.

1

Millato Mark 13 1982

Milling 素素 養 一家

本学家外

BONUS

- 2) BIOLOGY *Multiple Choice* Which of the following is most accurate about the pasteurization of milk:
 - W) it heats milk to the boiling point for about 1 minute
 - X) it kills all bacteria by passing steam through the milk
 - Y) it kills most of the germs in the milk by moderate heating

Millate Mar 14 18 198

Asitute the the is the

Z) it kills all the bacteria but not the viruses in the milk

ANSWER: Y) IT KILLS MOST OF THE GERMS IN THE MILK BY MODERATE HEATING

Millute Mark 13 198

Stitute And At '8 PR

Stitute 新春 养 溪 序

Mylitute the state of the state

Drippy of the state of the stat

shinte 新春等學

3) CHEMISTRY *Short Answer* Hydrocarbons that contain a carbon-carbon double bond are generally know as what:

ANSWER: ALKENES (ACCEPT: OLEFINS)

BONUS 18

3) CHEMISTRY *Short Answer* If you have 1 milliliter of a 75% ethanol stock solution, how much water, in milliliters, must be added to the 1 milliliter stock solution to obtain a 25% ethanol solution?

ANSWER: 2

Y.

1

1

1

Milling 新菜 · 養 序

(Solution: 75%/25% = 3df; 1 part stock + 2 parts water = 3df)

TOSS-UP

4) ASTRONOMY *Short Answer* The total amount of energy of a star's surface radiated into space each second is most commonly referred to as what?

ANSWER: ABSOLUTE LUMINOSITY (ACCEPT: LUMINOSITY, INTRINSIC BRIGHTNESS, OR ABSOLUTE BRIGHTNESS)

BONUS

4) ASTRONOMY *Multiple Choice* If you could shrink the Earth to a quarter its present diameter while maintaining its mass, by what factor would the escape velocity change?

giitule star the 's

W) the escape velocity would be doubled

Maritute Market & PR

- X) the escape velocity would be four times larger
- Y) the escape velocity would remain unchanged
- Z) the escape velocity would be reduced by half

ANSWER: W) THE ESCAPE VELOCITY WOULD BE DOUBLED

Williage We by 18 180

(Solution: escape velocity \sim (M/R)1/2; $V_e = \sqrt{2}GM/r$)

gitute the the light

Melitula 教養 株·漢 序》

Maithin the the 18 180

Millittle 新春 接 %

Stitute 新春 茶·養 學

5) MATH Short Answer What is the term for the part of the secant contained between the points of intersection on a curve?

ANSWER: CHORD

Y.

Y.

W.

Y.

Y.

Y.

1

1

Y.

BONUS

5) MATH Short Answer Find the solution set of the following inequality: x

ANSWER: $-1 \le x \le 2$

TOSS-UP

- 6) EARTH SCIENCE *Multiple Choice* The Hawaiian Islands originated from magma:
- W) intruding along the boundary between two lithospheric plates
- Y) injected along a mid-ocean fracture zone
 Z) coming from a hotspot within

ANSWER: Z) COMING FROM A HOTSPOT WITHIN THE MANTLE

Millate Mark 18 1982

Militate A H H W William

6) EARTH SCIENCE *Multiple Choice* Which of the following is classified as a silicate mineral:

Misting # # 13 PK

Militale the the light of the l

Stitute 新 林 · 邃 學

- W) gypsum
- X) malachite
- Y) halite
- Z) quartz

Mylitute Art 18 18

Milling 素素 養 一家

· 安米·茨州

ANSWER: Z) QUARTZ

Militale And At '8 PR

Milling 素素 ·養 /家

githte 素 养 。

Myithin Man At 13 18

Maritally 教育 养 淺 序

Militation # # 18 18

Militation that the 18 18.

stitute 素 并接序

- 7) GENERAL SCIENCE *Multiple Choice* A severe and chronic deficiency in what vitamin causes the disease known as pellagra:
- W) vitamin C
- X) vitamin D
- Y) niacin
- Z) thiamine

ANSWER: Y) NIACIN

BONUS

- heart-shaped leaves and a light-colored wood which is prized by wood carvers 7) GENERAL SCIENCE Multiple Choice What tree in the North-Central to Northeast US has
 - W) pin oak
 - X) cottonwood
 - Y) American sycamore

Y.

1

1

1

ANSWER: Z) BASSWOOD

TOSS-UP

- the years before the World Wide Web: 8) COMPUTER SCIENCE Multiple Choice This distributed information system was prevalent in
 - W) Gopher
 - X) SSL
 - Y) LINUX
 - Z) Fox

· 安米·茨州

ANSWER: W) GOPHER

BONUS

- Milititute Militarity 1882 8) COMPUTER SCIENCE Multiple Choice Dynamic RAM is called such because:
- W) the value it holds can be dynamically changed at any time
 - X) the address space the RAM refers to can be dynamically changed
 - Y) the value it holds must be dynamically refreshed every few milliseconds
 - Z) the value it holds must be dynamically refreshed once a session

ANSWER: Y) THE VALUE IT HOLDS MUST BE DYNAMICALLY REFRESHED EVERY FEW MILLISECONDS

Millitule 新春養療

myitute ## # 15 1980

- 9) PHYSICS Multiple Choice Which of the following exhibits the least resistivity at 20°C:
- W) gold
- X) tungsten
- Y) iron
- Z) copper

ANSWER: Z) COPPER

BONUS

Millian A H S Committee of the committee

tension, in Newtons, must be on the string to give a wave velocity of 14.14 meters per second? 9) PHYSICS Short Answer If a violin string is 0.5 meters long and has a mass of 3.0 grams, what

ANSWER: 1.2

Ph.

Y.

1

1

Y.

Millinin 教教教學

· 安米·茨州

(Solution:
$$V = \sqrt{\frac{T}{m/l}}$$
; = m/l × v² = T; (0.003/0.5)(200) = 1.2 newtons)

TOSS-UP

Maritule Mark 18 180 10) BIOLOGY Short Answer The coronal suture is found between what two bones?

ANSWER: PARIETAL AND FRONTAL (accept in any order)

BONUS

slitute 新春等學

- 10) BIOLOGY Multiple Choice Which of the following infectious agents is NOT properly matched with its disease:
- W) Trichophyton (read as:TRI-co-fie-ton) and ringworm
- X) Hepatitis A and serum hepatitis
- Y) Rubella and German measles

Militate At 18 18

Z) Epstein Barr and infectious mononucleosis

ANSWER: X) HEPATITIS A AND SERUM HEPATITIS

Stitute ## # '\$ PE

(Solution: Hepatitis A causes infectious hepatitis)

stitute the the state of the

slithle the the little of the

Millite Mar H '3 PR

- 11) CHEMISTRY Multiple Choice Polystyrene is produced by which of the following reactions:
- W) free radical vinyl polymerization from the monomer styrene
- X) metalocene catalysis polymerization
- Y) graft copolymerization
- Z) butadiene polymerization

ANSWER: W) FREE RADICAL VINYL POLYMERIZATION FROM THE MONOMER STYRENE

BONUS

- 11) CHEMISTRY *Multiple Choice* Which of the following molecular shapes would you expect from O₃: from O₃:
 - W) bent

1

Y.

1

1

1

- X) trigonal planar
- Z) see-saw

ANSWER: W) BENT

12) ASTRONOMY Short Answer When a one solar mass star becomes a red giant for the first time, its energy comes mainly from the fusion of helium forming into what final element?

ANSWER: CARBON

BONUS

- 12) ASTRONOMY Multiple Choice Which of the following distance-measuring techniques measures the farthest:
- W) radar ranging
- X) stellar parallax
- Y) variable stars
 - Z) standard candle/Tully-Fisher relation

ANSWER: Z) STANDARD CANDLE/TULLY-FISHER RELATION Mylithin Art At 18 18

Millute the by 18 180

Mylitute the state of the state

別補明教養養際

- 13) MATH *Multiple Choice* In a normal distribution, a mean of a sample population, plus or minus 1 standard deviation, includes what percentage of the sample:
- W) 16%

Y.

Y.

Y.

1

1

1

Y.

- X) 32%
- Y) 68%
- Z) 95%

ANSWER: Y) 68%

BONUS

Milital Art of the Committee of the Comm

Milliante 新春 华 · 溪 中彩

Militing ## # 18 18

Marithus 教育教·養學

13) MATH *Short Answer* What is the 13th term in the following arithmetic progression: 2, 7, 12...

ANSWER: 62

(Solution: $a_n = 2 + (13 - 1)5$)

TOSS-UP

- 14) EARTH SCIENCE Multiple Choice When two halves of a crystal aggregate are mirror images of each other and joined together in some definite, shared crystallographic orientation, such crystals are referred to as being:
- W) polymorphs
- X) symmetrical
- Y) twinned
- Z) anhedral

ANSWER: Y) TWINNED

BONUS

- 14) EARTH SCIENCE *Multiple Choice* Which of the following is FALSE about the Coriolis Milling 新春 · 沒 (第) Effect:
- W) it is an apparent force due to the precession of the Earth
 - X) it is an apparent force due to the rotation of the Earth
 - Y) it causes winds in the Northern Hemisphere to be deflected to the right
 - Z) it causes winds in the Southern Hemisphere to be deflected to the left

ANSWER: W) IT IS AN APPARENT FORCE DUE TO THE PRECESSION OF THE EARTH

- 15) GENERAL SCIENCE Multiple Choice A wave with a wavelength of 40 meters and a height of 2 meters, will NOT be refracted in water with a depth of more than:
- W) 1 meter
- X) 2 meters
- Z) 20 meters

ANSWER: Z) 20 METERS

BONUS

Imhiling 教教養學

Imhiling 新光·接際

Matitude Mar # 13 Pic

Militate Market 18 182

- 15) GENERAL SCIENCE Multiple Choice The mass of a new 2002 USA quarter is about how many grams:
 - W) 3.0
 - X) 4.5
 - Y) 5.5
 - Z) 7.0

Y.

1

1

1

1

1

ANSWER: Y) 5.5

TOSS-UP

- melted onto the surface of the paper: 16) COMPUTER SCIENCE Multiple Choice Which printer uses bits of plastic that effectively are
 - W) thermal
 - X) ink jet
 - Y) laser

· 安米·茨州

Z) dot matrix

ANSWER: Y) LASER

BONUS

- 16) COMPUTER SCIENCE Multiple Choice Which of the following is true for a binary tree but not for a regular tree:
- W) it stores only zeros and ones
- X) each parent node has no more than two children
- Y) its branches are ordered
- Z) nodes without children are called leaves

ANSWER: X) EACH PARENT NODE HAS NO MORE THAN TWO CHILDREN

Ministante Am At 13 18

Marithe Mar 34 3

Millinin 教教教·婆 然

Militale All At 3

Marith Mar H. 13 PR

Molitule At 18 18

Militate At 18 18

制油化糖素

- 17) PHYSICS Multiple Choice Red light has a wavelength of:
- W) 300-350 nanometers

Mylithe star & 3

Y.

1

Y.

Y.

Y.

1

1

1

Y.

Moritally And At 18 18

Myithin 教教教·蒙豫

- X) 450-500 nanometers
- Y) 550-600 nanometers
- Z) 650-700 nanometers

ANSWER: Z) 650-700 NANOMETERS

BONUS

from what specific part of the periodic table: 17) PHYSICS Short Answer Bose-Einstein condensates were initially created by using elements

ANSWER: GROUP 1 (ACCEPT: ALKALI METALS)

18) BIOLOGY Short Answer From what vitamin is NAD derived?

Maritale Market 18 18

Myithin 教教教·蒙豫

ANSWER: NIACIN

18) BIOLOGY Short Answer Penicillium notatum is to penicillin as Bacillus subtilis (pronounced: SUT-ill-iss) is to:

Mainth the state of the state o

Mailing # # 13 PR

Stitute And At 's PR

ANSWER: BACITRACIN Milling 素素 素 % Maritule # # 18 18

Militale And At '8 PR

Millinto 新春·養 然

withth ## # 18

Ministate # # 18 18

Maithin ** ** **

- 19) CHEMISTRY Multiple Choice Which of the following radioactive isotopes emits alpha particles:
- W) hydrogen-3
- X) cobalt-60

Y.

Y.

Y.

Y.

Y.

Y.

1

1

Y.

Milling 素素 養 一家

- Z) radium-226

ANSWER: Z) RADIUM-226

BONUS

Maritule Mark 18 180

Militally Mark of 1880

Militate At 18 18

Millite Mar H '3 PR

19) CHEMISTRY *Short Answer* What is the molecular formula for the conjugate acid of the following Brønsted-Lowry base: HCO₃⁻

ANSWER: H₂CO₃

13 19 **TOSS-UP**

Matinta Mar of 18 18 20) ASTRONOMY Short Answer In North America, what is typically the most spectacular meteor shower in the month of August?

ANSWER: PERSEIDS

BONUS

Delitate the the light

Delitate the the light of the

- 20) ASTRONOMY *Multiple Choice* A bolometer (pronounced: bowl-O-meter) is used to:
- W) measure the energy output of the Sun
- X) measure the length of a bowling alley
- Y) measure the size of celestial bodies
- Z) standardize the azimuth of a sextant

Milling 素素 ·養 /家

ANSWER: W) MEASURE THE ENERGY OUTPUT OF THE SUN Militing 素素 * · 養 / 於

Milling the 18 180

Militate A H H W William

Stitute 新春 养 溪 序

Maithin Mark is 180

- 21) EARTH SCIENCE Multiple Choice As the intensity of metamorphism increases, which of the following transformations occurs:
- W) granite to slate
- X) schist to slate

Y.

1

Y.

Y.

1

1

1

Y.

- Z) limestone to marble

ANSWER: Z) LIMESTONE TO MARBLE

BONUS

Molitule Mark if the

Myithin Mark 18 18

Maritally 教育 养土溪 序》

Maithin Mark 18 18

stitute 素 并接序

- 21) EARTH SCIENCE *Multiple Choice* In which of the following latitudes would you expect belts of high pressure to typically develop:
 - W) 30° North
 - X) 0°
- North Z) 60° South

ANSWER: W) 30° NORTH

TOSS-UP

22) GENERAL SCIENCE Multiple Choice Which of the following is classified as a waterinsoluble fiber:

Militate the the light of the l

Assitute the the light

- W) algal polysaccharides
- X) pectin Y) lignin
 7) -

 - Z) gums

ANSWER: Y) LIGNIN

BONUS

British the state of the state

22) GENERAL SCIENCE Short Answer Methods that cause hair to have curls usually rely on manipulating disulfide bonds in what amino acid?

ANSWER: CYSTINE Milling 素 基 · 養 序 Implitute 紫春 林 溪 序》

- 23) PHYSICS Multiple Choice The line spectra of low density gases is usually produced by the emission or absorption of light by:
- W) molecules
- X) crystals

Y.

Y.

Y.

Y.

Y.

Y.

1

Y.

Y.

Milling 素素 ·養 /家

Milita Market & PR

- Z) individual atoms

ANSWER: Z) INDIVIDUAL ATOMS

BONUS

Milling 新春 * · 養 序》

Militally Mark of 1880

23) PHYSICS *Short Answer* What was the last name of the father and son team that developed the theory and technique of X-ray diffraction by crystals?

ANSWER: BRAGG

TOSS-UP

24) BIOLOGY Short Answer Avery and Macleod attributed the transforming principle to what substance?

ANSWER: DNA

BONUS

24) BIOLOGY Short Answer What other vitamin acts like an antagonist and has the most similar structure to vitamin K? Myithin Mark 13 18 Militale Market 18 18 Marithus Market 18 180

Marithin the #4 13 182

Maritally 教育 养 · 沒 「然

Agitude the the September 18

Militate At 18 182

ANSWER: VITAMIN E (Solution: both are isoprenoids)

Implitute 素素 **

制油糖糖养养资源

Ministate Market 18 18

Militate At 18 18

Millute Mark 18 1982

Mysitute star of co

Millinin 教教教·婆 然

Milling 新菜 · 養 · 豫

Military of the state of the st

Imhiling 新光·接際

Inditude 素素 ·養 · 養 · 學

- Matinta Mar At 13 198 25) CHEMISTRY Multiple Choice Reaction with a copper compound is a qualitative test for which functional group:
 - W) alcohol

Milital And St. Co.

1

Y.

Y.

1

Y.

Y.

1

Y.

1

- X) aldehyde

Matitude Mar At 12 198

Matinta Ar Ar & PR

Mytitute 精 社 该 序

Marithus Mar # 18 180

Matinta An At & PR

Z) carboxylic acid

ANSWER: X) ALDEHYDE

Marith Mar ph ' 18 PR

Milital Market & PR

Millinin 教教教·蒙然

Maritante Art 18 18

Militin 教教教·蒙豫

1. 数米洛尔

BONUS

Mytitute # 14 18 198

25) CHEMISTRY *Short Answer* Name the two elements that have atomic numbers less than that of lead that have no stable isotopes:

Milling 素素 ·養 ·養

ANSWER: TECHNETIUM AND PROMETHIUM (ACCEPT: Tc and Pm)

Mylithe # ** **

Mytitute ## # 18 PR

Marithte Mar 18 3
