### ROUND 4

Military of the state of the st

### TOSS-UP

Matinta Mar ph ' 18 PR 1) PHYSICS Short Answer What is the angular velocity of a wheel with a radius of 15 meters and a surface velocity of 120 meters/sec: Inhihih 教教教·蒙豫 Millinin 教育 养 · 溪 序

ANSWER: 8 RAD/SEC

Military of the state of the st

Milital At 3

1

Y.

Y.

1

10

1

1

Y.

(Solution:  $\mathbf{T} = v/r = 120/15 = 8$ )

### **BONUS**

if it has an initial velocity of 5 meters per second, if the average braking force is 20 Newtons, and if the object's mass is 20 kilograms? 1) PHYSICS Short Answer Assuming friction is negligible, how long will it take an object to stop

**ANSWER: 5 SECONDS** 

(Solution: v = at, f = ma = > t = v/a = v m / f = 20 x 5 / 20 = 5 seconds)

### **TOSS-UP**

- 2) CHEMISTRY *Multiple Choice* For individuals who are "Lactose Intolerant," the reason for Millimin # # # 18 PM Mylithe # \*\* their gastric distress is the production of:
- W) methane
- X) acetic acid and nitrogen
- Y) lactic acid and carbon dioxide
- Z) acetic acid and methane

ANSWER: Y) LACTIC ACID AND CARBON DIOXIDE

### **BONUS**

2) CHEMISTRY Multiple Choice Which acid connects the 2-deoxyribose units within every DNA Militate At 18 18 Maritude Mar NA 18 1980 Militate Mark to 180 **加州州 蒸水水 溪 烧** strand:

slitute 新林·蒙豫

- W) acetic acid
- X) phosphoric acid
- Y) citric acid

ANSWER: X) PHOSPHORIC ACID

加加州縣

Myithin Mark 18 18

Marithus Mar # 18 180

Military of the state of the st

Molitule At A 18 18

Moritalia All All Section of the Sec

al-	** ***	THE WALL	AL AL M	TOSS-UP	A STAN	13 W
Mystitute 38	3) BIOLOGY Arachnida:	Multiple Choice	Which of t	he following organis	sms does NOT b	elong to the Class

- W) scorpions
- X) lobsters
- Z) ticks Y) mites

Milital All State Co.

Y.

Y.

Y.

Y.

Y.

Y.

1

Y.

Y.

本本本

ANSWER: X) LOBSTERS

### **BONUS**

Imhiling 教養養養際

Militale At 18 18

面的加州

Asitute the the light

3) BIOLOGY *Short Answer* What anatomical structure is responsible for the various colors of eyes in humans?

ANSWER: IRIS

### **TOSS-UP**

- 4) ASTRONOMY Multiple Choice Which of the following planets is NOT known to have any orbiting satellites:
- y Uranus Z) Satur
- X) Mars

ANSWER: W) VENUS

# BONUS

Mobility of the State of the St

Milling 新菜菜家

Mylitute # # 18 18

Matinta 新春 华 溪 序 4) ASTRONOMY Short Answer Cassini's division is associated with what planet?

Mylitute ## # 18 PR

Molitule # # 18 18

Myithin 教教教·蒙豫

ANSWER: SATURN Mytitute ## # 18 PK Milling 素素 ·養 /家

Militin 教教教·蒙豫

4. 数米洛尔

Military of the Committee of the Committ

Matinte Mark is 198

Maritanto 教育 养 · 溪 · 溪

Minimin An At is 182

Maritule of the state of the st

Militate ## # 18 18

Mylithe star of

Matitude Market & PR

Matitude Mar At ' 18 180

Matinta Mar At 13 1980 5) MATH Short Answer Convert 135° into radians:

ANSWER:  $\frac{3\pi}{4}$ 

Mylithe star of

Milital And Service

1

Y.

Y.

Y.

Y.

Y.

1

Y.

Y.

Marithus Mar # 18 180

## **BONUS**

Mylithe Mar har 's PR 5) MATH Short Answer Solve the following inequality: 3 - 6x > 15

Molitule # # 18 18

Matitude Market 18 18

ANSWER: x < -2

### **TOSS-UP**

Milling 素素。養學

- 6) EARTH SCIENCE Multiple Choice Hawaiian volcanoes such as Kilauea and Mauna Loa are examples of which of the following types of volcanoes:
- y vasaltic X) rhyolitic Y) and
- y) andesitie

  Z) andes: Z) andesitic and rhyolitic

ANSWER: W) BASALTIC

# BONUS

Matinte Mark 18 180 6) EARTH SCIENCE Short Answer In reference to glacial ice, the process by which ice below the snow line is lost by evaporation and melting is called what?

Myithin Market 18 18

Milling 新春春·養學

Milital Mar Art '8 PR

Mytime ## # 18 18 ANSWER: ABLATION Implitude with the state of the

Militing 素素 養 一家

Militin 教教教·蒙豫

\*\*\*\*\*\*\*

7) GENERAL SCIENCE Short Answer What is a quantity that has only a magnitude most commonly called?

ANSWER: SCALAR

Y.

Y.

Y.

Y.

1

10

1

Y.

Y.

Marithus Market & PR

### **BONUS**

7) GENERAL SCIENCE *Multiple Choice* What pioneer bacteriologist in 1873 located a particular bacterium that caused anthroving the choice. bacterium that caused anthrax in the spleen of infected cattle and, after transferring it serially to mice, recovered the same bacterium in the end:

Milling 教教 · 養 · 豫

Maritally Mar # 13 180

Ministate And At 18 18

例加州縣

- W) Louis Pasteur
- X) Robert Koch (pronounced: Coke)
  Y) Rudolf Virchow

  - Z) Peter Vogt

ANSWER: X) ROBERT KOCH

### TOSS-UP

8) COMPUTER SCIENCE Short Answer In most computer systems, a byte is a unit of data that is how many binary digits long?

ANSWER: 8

### **BONUS**

Mylithin the the 18 180

Milling the 13 last

8) COMPUTER SCIENCE Short Answer What is the term for half a byte, or four bits? Molitule At 18 18 Matitude ## # 18 18

Drithte Make 18 182

Molitule ## # '\$ 18

ANSWER: NIBBLE (ACCEPT: NYBBLE)

Mylitute At A S PR

Milling 素素 養 一家

Militation the At 13 180

Istitute the the ist of

9) PHYSICS *Short Answer* In a standing wave of a vibrating wire cord, what are the points of constructive interference most commonly called where the cord oscillates with maximum amplitude?

ANSWER: ANTINODES

Y.

Y.

Y.

1

1

Y.

Y.

Mylitute At A Se Pic

### **BONUS**

9) PHYSICS *Short Answer* For a radioactive element with a half-life of 5000 years, if a sample of the radioactive element is left to decay for 15,000 years, what fraction of the original radioactive atoms in the sample will be left?

ANSWER: 1/8 (ACCEPT: 12.5%)

### TOSS-UP

- 10) CHEMISTRY *Multiple Choice* Which of the following elements is found in Period 3 and main Group 5A:
- W) phosphorous
- X) silicon
- Y) nitrogen
- Z) arsenic

ANSWER: W) PHOSPHOROUS

Militale Art & R.

Milling 素素 養 一家

### BONUS

10) CHEMISTRY *Short Answer* From the lowest to the highest atomic number, give the full names of any 4 alkaline earth metals:

Militate the the is the

Mobilithe Am At '8 PR

ANSWER: BERYLLIUM; MAGNESIUM; CALCIUM; STRONTIUM; BARIUM; RADIUM

Milling the 14 18 180

Stitute to the State of the Sta

Myitute Make 18 18

Milling the 13 PR

Mylithin the the continue of t

Millite the 14 18 18

Mylithe star is

Molitule At 18 18

Millute Mark 18 1982

Milling Mark 18 180 11) BIOLOGY Short Answer Which is the more common specific name for the polymorphonuclear (read as: poly-morph-oh-nuclear) leukocyte?

ANSWER: NEUTROPHIL (ACCEPT: PMN)

## BONUS

11) BIOLOGY Short Answer Tobacco, jimsonweed, belladonna, and tomatoes all belong to what family of plants?

ANSWER: NIGHTSHADE (ACCEPT: SOLANACEAE)

### **TOSS-UP**

12) ASTRONOMY Short Answer How many degrees above the horizon will the north celestial pole be for someone standing at latitude 53° North? Mininte 教教教·後序

ANSWER: 53

Implitute 素素 \*\*

Milling 新春 · 養 · 豫

Milital Market & PR

\*\*\*\*\*

Mylithe star of

Y.

Y.

Y.

Y.

1

1

Ph.

Y.

Mylitute At A Se Pic

Mylitute At A Se Pic

· 安米·洛州

### **BONUS**

Milital State Stat

Militate Market 18 18

Militale And At '8 18

Asitute the the light

12) ASTRONOMY Short Answer What kind of celestial bodies have cores that consist primarily than about 1.4 times the Chandrasekhar limit? of neutral particles in a superfluid state and are thought to have evolved from stars with masses more

inditute the the light of the

Molitule At At is PR

Maritule 教 林·婆 然

ANSWER: NEUTRON STARS (DO NOT ACCEPT: PULSAR)

Militale At A 18 18

Mylitute Art 18 18

Moritale Market 18 18

Militale All At 3

Maritule Mark 18 180

Ministate And At 18 18

13) MATH *Short Answer* What is the formula for the volume of a sphere?

ANSWER:  $\frac{4}{3}\pi r^3$  (read as: four third pi radius cubed)

# BONUS

BONUS

13) MATH Short Answer Subtract the following 2 polynomials:
$$(-4x^3y + 2x^3y^2 + 2x^2y^3 + 2y) - (4x^3y - 7x^3y^2 + x^2y^3 - y)$$

ANSWER:  $-8x^3y + 9x^3y^2 + x^2y^3 + 3y$ 

- 14) EARTH SCIENCE Multiple Choice A measure of how easily water flows through rock is Marith A 14 18 Militate # # 18 18 Militate # # 18 18 called its:

Milital At 3

Y.

1

W.

1%

Y.

Ph.

1

Ph.

Y.

Milling 素素 養 一家

- W) porosity X) aquifer system
  - Y) permeability
  - Z) zone of aeration

ANSWER: Y) PERMEABILITY

Militate At 18 18

Milling 素素 養 一家

水水水水

### **BONUS**

14) EARTH SCIENCE *Short Answer* In coastal engineering terms, the area from the shoreline to just beyond the breaker zone is called what? Militing ## # 18 18

Printy to the training the state of the stat

Maritule of the state of the st

ANSWER: LITTORAL ZONE (ACCEPT: INTERTIDAL ZONE)

Millate Mark 18 1982

Myithin 教教教·蒙豫

Mylitute the state of the state

加加州縣

Matinta And Act of

Imhilitin 教育社·後序

Militale Market 18 182

Militate Mr. # 18 PR

Milling 新菜酱厂 15) GENERAL SCIENCE Short Answer What ardent behaviorist and author of "Walden Two" believed that human behavior is strongly influenced by what he referred to as operant reinforcement?

ANSWER: B.F. SKINNER (ACCEPT: SKINNER)

## BONUS 13

- 15) GENERAL SCIENCE *Multiple choice* The total amount of sediment a stream can carry past a point in a given amount of time, is known as its:
- W) competence

Y.

Y.

Y.

Y.

Y.

10

Y.

Ph.

Y.

- Y) abrasion
  Z) disc Z) dissolved load

ANSWER: X) CAPACITY

### **TOSS-UP**

16) COMPUTER SCIENCE Short Answer In word processing, a collection of letters and associated characters in the same typeface, style and point size is called:

Maritato Mark 18 18

Myithin 教教教·蒙豫

ANSWER: FONT

### **BONUS**

16) COMPUTER SCIENCE Multiple choice A logic chip that is just 20 nanometers wide would be about how many times wider than a single silicon atom? Militale At A 18 18 Tilling Market & Pic 面的抽象教养等风 Mininte 新科·婆 序

Maritule # # 18 18

Maritule of the state of the st

10年11年18日

- W) 5
- X) 50
- Y) 200
- Z) 500

ANSWER: Y) 200

Implitute 素素 \*\*

Molitule ## # '\$ PR

Militate Market 18 182

- 17) PHYSICS *Multiple Choice* Which physical phenomenon explains the flotation of boats and air balloons:
- W) Bernoulli's principle
- X) Archimedes principle

Ph.

P.

1

1

1

1

- Y) Newton's second law of motion
- Z) Galileo's law of displacement

ANSWER: X) ARCHIMEDES PRINCIPLE

### **BONUS**

17) PHYSICS *Short Answer* A runner, with her feet braced against her starting blocks, accelerates with a horizontal magnitude of 5 meters per second squared. How much horizontal force, in Newtons, must she exert on the blocks to produce this acceleration if the she has a mass of 70 kilograms?

ANSWER: 350 NEWTONS (ACCEPT: 350)

(Solution: F=MA; F=70x5; F=350)

### **TOSS-UP**

18) CHEMISTRY Short Answer How many electrons would fill the 4d energy subshell?

ANSWER: 10

### **BONUS**

- 18) CHEMISTRY *Multiple Choice* In which element is the first crossing in the orbital-filling order encountered, whereby the next 2 electrons go into the 4s subshell rather than filling the 3d orbitals?
- W) argon

Mylitute At A Se PR

- X) scandium
- Y) rubidium
- Z) potassium

ANSWER: Z) POTASSIUM

Mittel the the is the

glitule 素 株 溪 序

slithte ## # '\$ PR

Millite Mar H '3 PR

Millite Mar H '3 PR

19) BIOLOGY Short Answer What section of the brain is sometimes referred to as the body's thermostat?

ANSWER: HYPOTHALAMUS

### **BONUS**

- 19) BIOLOGY *Multiple Choice* Removal of a predatory starfish results in an overabundance of mollusks dramatically altering the community population. The starfish would be considered:
- W) a keystone species

Y.

Y.

Y.

Y.

Y.

Y.

1

Y.

Y.

Mylithin Art Art & PR

Milling 素素 養 一家

- Y) secondary producer
  Z) an endance Z) an endangered species

ANSWER: W) A KEYSTONE SPECIES

### **TOSS-UP**

20) MATH Short Answer In statistics, what is the square root of the variance most commonly known as?

ANSWER: STANDARD DEVIATION

### **BONUS**

20) MATH Short Answer To the nearest cubic inch, find the volume of a sphere whose diameter is 4 inches: Militinio Am At 18 18 Mistitute Mark 13 1982

Printy to the training the state of the stat

Militale Art & R.

Milling 素素 ·養 /家

ANSWER: 33 (ACCEPT: 32 – 34) (Solution:  $V = 4/3 \pi r^3$ ; = 4/3 (3.14)(8); = 33.49)

Millitte Mar 14 13 1982

Militate was by 18 182

Mistitute Mark 13 1982

Maritanto 新春 株 淺 序

Militale St. # '3 PR

制油化糖素

- 21) EARTH SCIENCE Multiple Choice On a topographical map, what are the lines drawn that connect points of the same elevation above or below mean sea level called:
- W) isobars
- X) ridges
- Z) contours

ANSWER: Z) CONTOURS

### **BONUS**

Milling 新春 紫 塚

Mininte 新春 株 淺 序

Militate Market 18 18

Militally Mark of 1880

Militation # # 18 18

shitute 素質 株 · 沒 「彩

- 21) EARTH SCIENCE *Multiple Choice* The abyssal plain of the Atlantic ocean lies directly adjacent to the:
  - W) continental slope
  - X) continental rise

Y.

1

1

1

Ph.

Ph.

- Y) continental shelf
- Z) continental crust

ANSWER: X) CONTINENTAL RISE

- 22) GENERAL SCIENCE *Multiple Choice* In 1905, on the basis of apparent irregularities in the orbital motion of Neptune that later proved to be incorrect, who predicted the existence of a ninth planet with an orbit beyond Neptune:
- W) Percival Lowell
- X) Charles Dillon Perrine
- Y) George Ellery Hale
- Z) Johannes Franz Hartman

ANSWER: W) PERCIVAL LOWELL

## BONUS

**即**时和4 紫 茶 溪 溪

Millitute Mit # 13 192 22) GENERAL SCIENCE Short Answer What native tree, prized for its wood, which looked like oak, and valued also for its fruit, is now almost extinct in the wild in the US?

ANSWER: AMERICAN CHESTNUT (DO NOT ACCEPT CHESTNUT)

23) PHYSICS Short Answer The speed of light in a vacuum divided by the speed of light in a specific material is a way to compute what common optical value:

ANSWER: INDEX OF REFRACTION

### BONUS 1/3

23) PHYSICS Short Answer What is the potential difference, in volts, if 35 joules of work is needed to move 5 coulombs of charge in a uniform electric field?

ANSWER: 7

(Solution: v = 35/5 = 7 volts)

### **TOSS-UP**

- 24) CHEMISTRY Multiple Choice All elements in a given period of the periodic table have similar:
  - W) valence-shell electron configuration
  - X) maximum principal quantum number

Militale Art & R.

Milling 素素 ·養 /家

Y) atomic radii

Y.

1

1

1

1

Mylitute At A Se Pic

Milling 素素 養 一家

\*\*\*\*\*

Z) atomic number

ANSWER: X) MAXIMUM PRINCIPAL QUANTUM NUMBER

### **BONUS**

Millute Mark 13 198

Stitute And At '8 PR

IRON(II) CARBONATE (read as: iron 2 carbonate)
(DO NOT ACCEPT: FERROUS CARBONATE OR IRON CARBONATE)

Millite the 14 18 18

Militate was by 18 182

制油槽鄉港灣際

Mylithin the # 13 PR

Mylithin the 14 18 180

Drithin the 14 18 182

- 25) BIOLOGY *Multiple Choice* Which of the following is a feeding structure in arachnids:
- W) dentipalps
- X) radula

Y.

Y.

Y.

Y.

Y.

1

1

Y.

1

- Y) proboscis
- Z) chelicerae (read as: chill-iss-err-ave)

ANSWER: Z) CHELICERAE

### **BONUS**

Marithus Mar St. 18 180

Militin Art of 18

Maritule Mark 18 18

Militate Art & R.

Maritule of the state of the st

25) BIOLOGY Multiple Choice Which of the following is NOT a cranial bone:

Millinin 教教教·蒙然

Maritule Mark 18 18

Maritule Mark 18 18

Maritule Mark 18 18

- W) parietal
- X) occipital
- Y) sphenoid
- Z) lacrimal

Matinta Ar Ar & PR

Mytitute 精 社 该 序

Marithus Mar # 18 180

Matinta An At & PR

本本本

ANSWER: Z) LACRIMAL

(Solution: Lacrimal is a facial bone)

Marithus 教教教·婆 然

Mylitute At A 18 18

Marithur 教育 林· 接 然

\*\*\*\*\*\*

stitute 素 并"等序》

Milling 新春 · 養 · 豫

Marithus Market 18 180

Maritule Market 18 182

Militinin Am At '8 PR

Milling 素素 ·養 感

Maritule of the state of the st

Mikituto 横林塔原