

## ROUND 13

### TOSS-UP

- 1) **BIOLOGY** *Short Answer* What is the predominant immunoglobulin class found in human milk?

ANSWER: IgA (ACCEPT: IMMUNOGLOBULIN A)

### BONUS

- 1) **BIOLOGY** *Short Answer* Which 2 of the following 5 organisms are NOT protozoans? *Entamoeba* (Pron: *ent-am-e-ba*), *Toxoplasma* (Pron: *toxoplasma*), *Histoplasma* (Pron: *histo-plasma*), *Claviceps* (Pron: *klav-i-seps*), *Giardia* (Pron: *gee-ard-i-ah*)

ANSWER: HISTOPLASMA, CLAVICEPS

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### TOSS-UP

- 2) **CHEMISTRY** *Multiple Choice* Which of the following groups of compounds are saturated:

- W) alkenes
- X) alkynes
- Y) aromatic hydrocarbons
- Z) alkanes

ANSWER: Z) ALKANES

### BONUS

- 2) **CHEMISTRY** *Multiple Choice* Which of the following statements regarding the kinetic molecular theory of gases is false:

- W) the average kinetic energy of a collection of gas particles depends on the absolute temperature and nothing else
- X) there is no force of attraction between gas particles
- Y) collisions between gas particles are both elastic and inelastic
- Z) energy can be transferred from one gas particle to another during a collision

ANSWER: Y) COLLISIONS BETWEEN GAS PARTICLES ARE BOTH ELASTIC AND INELASTIC

**TOSS-UP**

- 3) **PHYSICS** *Short Answer* If friction is negligible, how much effort, in newtons, is needed to lift a 20 newton load if the lever has a mechanical advantage of 5?

ANSWER: 4

( Solution: Force = resistance / mechanical advantage )

**BONUS**

- 3) **PHYSICS** *Multiple Choice* If “p” is the momentum of a photon, “h” is Planck’s constant, and “c” is the speed of light, which of the following correctly relates wavelength to the photon’s momentum:

- W)  $p = h/\text{wavelength}$
- X)  $p = ch/\text{wavelength}$
- Y)  $p^2 = hc$
- Z)  $p = c^2h$

ANSWER: W)  $P = H/\text{WAVELENGTH}$

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**TOSS-UP**

- 4) **ASTRONOMY** *Short Answer* About how much of a first quarter moon will appear illuminated?

ANSWER: ONE-HALF

**BONUS**

- 4) **ASTRONOMY** *Short Answer* What are the 5 modern English names for the 5 celestial bodies recognized as planets by Greek astronomers of 200 BC?

ANSWER: MERCURY, VENUS, MARS, JUPITER, AND SATURN

**TOSS-UP**

5) MATH *Multiple Choice* A double point on a curve where the curve has 2 coincident tangents is called a:

- W) cusp
- X) chord
- Y) transversal
- Z) ray

ANSWER: W) CUSP

**BONUS**

5) MATH *Short Answer* Find the value of  $x$  from the following equation:

$$3x - (2x + 1) - 5 = 4x + (4 - 2x) - 3x$$

ANSWER: 5

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**TOSS-UP**

6) EARTH SCIENCE *Multiple Choice* Which of the following is NOT a sedimentary structure:

- W) stratification
- X) schistosity
- Y) cross bedding
- Z) graded bedding

ANSWER: X) SCHISTOSITY

**BONUS**

6) EARTH SCIENCE *Multiple Choice* If the air temperature is 80°F and the dew point is 60°F, what is the relative humidity?

- W) 100%
- X) 150%
- Y) 51%
- Z) 8%

ANSWER: Y) 51%

### TOSS-UP

- 7) GENERAL SCIENCE *Multiple Choice* Tiny red, green, and blue grains on the inside surface of a CRT monitor that are illuminated when an electron beam is directed toward them are called:
- W) dithors
  - X) illuminors
  - Y) phosphors
  - Z) chromofors

ANSWER: Y) PHOSPHORS

### BONUS

- 7) GENERAL SCIENCE *Multiple Choice* A person who has burned themselves to where blistering has occurred is said to have:
- W) 1<sup>st</sup> degree burns
  - X) 2<sup>nd</sup> degree burns
  - Y) 3<sup>rd</sup> degree burns
  - Z) 4<sup>th</sup> degree burns

ANSWER: X) 2<sup>ND</sup> DEGREE BURNS

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### TOSS-UP

- 8) COMPUTER SCIENCE *Multiple Choice* In Windows 98 and Windows 2000, what utility removes temporary internet files:
- W) Disk Cleanup
  - X) Disk Defragmenter
  - Y) Cache Cleanup
  - Z) Scan Disk

ANSWER: W) DISK CLEANUP

### BONUS

- 8) COMPUTER SCIENCE *Short Answer* Memory that is located on one or more microchips that are physically close to the microprocessor in a computer is often used as a shorter synonym for what general type of memory?

ANSWER: RANDOM ACCESS MEMORY (ACCEPT: RAM)

### TOSS-UP

- 9) BIOLOGY *Multiple Choice* Type 1 diabetes is to pancreatic islets as Parkinson's is to:
- W) pituitary
  - X) amigdyla (Pron: am-ig-dee-law)
  - Y) thalamus
  - Z) substantia nigra

ANSWER: Z) SUBSTANTIA NIGRA

### BONUS

- 9) BIOLOGY *Short Answer* Which germ layer in mammals is predominantly responsible for forming skin, hair, and nails?

ANSWER: ECTODERM

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### TOSS-UP

- 10) CHEMISTRY *Multiple Choice* A molecule that has a central atom surrounded by 3 single bonds and 1 lone pair will most likely have which of the following shapes:
- W) trigonal planar
  - X) trigonal pyramidal
  - Y) trigonal bipyramidal
  - Z) trigonal bipolar

ANSWER: X) TRIGONAL PYRAMIDAL

### BONUS

- 10) CHEMISTRY *Short Answer* What is the name of the plastic that was used in the original motion picture films:

ANSWER: CELLULOSE NITRATE (ACCEPT: CELLULOSE)

(Solution: film is now polyester)

**TOSS-UP**

11) PHYSICS *Multiple Choice* In 1934, Fermi was unknowingly experimenting with fission by bombarding uranium with:

- W) neutrons
- X) protons
- Y) gamma rays
- Z) alpha particles

ANSWER: W) NEUTRONS

**BONUS**

11) PHYSICS *Multiple Choice* Which of the following interactions of x-ray or gamma photons with matter will result in an increase in wavelength from the original incident ray when scattered by free electrons:

- W) photoelectric effect
- X) Compton effect
- Y) pair production
- Z) elastic scattering

ANSWER: X) COMPTON EFFECT

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**TOSS-UP**

12) ASTRONOMY *Short Answer* Consisting of two plano-convex lenses, what is the most common name for the first eyepieces ever designed for a telescope?

ANSWER: HUYGENS (PRON: HOI-GENS)

**BONUS**

12) ASTRONOMY *Short Answer* How many times more energy does a gas radiate if its temperature is raised from 10,000 Kelvin to 20,000 Kelvin?

ANSWER: 16

**TOSS-UP**

13) MATH *Short Answer* What is the only regular polyhedron that will completely fill space?

ANSWER: CUBE (ACCEPT: HEXAHEDRON)

**BONUS**

13) MATH *Short Answer* Of 1000 computer owners surveyed, it was found that 800 people owned a computer with a built-in CD drive, 230 owned one with a built-in DVD drive, and 100 owned a computer with both CD and DVD drives. How many people do not own a computer with a CD OR DVD-drive?

ANSWER: 70

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**TOSS-UP**

14) EARTH SCIENCE *Multiple Choice* What scale was developed in an effort to classify a tornado according to its rotational wind speed and from the damage it causes:

- W) Beaufort
- X) Saffir-Simpson
- Y) Fujita
- Z) Modified Mercalli

ANSWER: Y) FUJITA

**BONUS**

14) EARTH SCIENCE *Short Answer* Most of the ozone in the Earth's atmosphere is present in what layer?

ANSWER: STRATOSPHERE (ACCEPT: BETWEEN THE TROPOPAUSE AND STRATOPAUSE)

### TOSS-UP

15) GENERAL SCIENCE *Multiple Choice* Those products of chemical analysis of plants which are not true bases but share certain similarities with them and are generally insoluble in water are referred to as:

- W) alkaloids
- X) glycosides
- Y) amides
- Z) saponides

ANSWER: W) ALKALOIDS

### BONUS

15) GENERAL SCIENCE *Multiple choice* Which of the following equations represents the curve we know by the name of "the witch of Agnesi":

- W)  $xy^2 = a(a-x)$
- X)  $x^2y^2 = a^2(a^2-x^2)$
- Y)  $xy^2 = a^2(a-x)$
- Z)  $xy = a^2(a-x)^2$

ANSWER: Y)  $xy^2 = a^2(a-x)$

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### TOSS-UP

16) COMPUTER SCIENCE *Multiple Choice* What is the original name of the language now known as Java:

- W) Coffee
- X) C+++
- Y) Oak
- Z) Sun

ANSWER: Y) OAK

### BONUS

16) COMPUTER SCIENCE *Short Answer* In the COBAL programming language, what does the acronym COBOL stand for?

ANSWER: COMMON BUSINESS ORIENTED LANGUAGE



**TOSS-UP**

- 17) **BIOLOGY** *Short Answer* Of the primary, secondary, tertiary and quaternary levels of protein structure, to what level does the three-dimensional folding of a single peptide confer its structure?

ANSWER: TERTIARY

**BONUS**

- 17) **BIOLOGY** *Short Answer* FAD functions as a hydrogen acceptor in the oxidation of what molecule of the citric acid cycle?

ANSWER: SUCCINATE

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**TOSS-UP**

- 18) **CHEMISTRY** *Multiple Choice* Which of the following has a basic formula of  $(CH_2O)_n$ :

- W) amino acids
- X) carbohydrate
- Y) proteins
- Z) nucleic acids

ANSWER: X) CARBOHYDRATES

**BONUS**

- 18) **CHEMISTRY** *Multiple Choice* A combination of temperature and pressure where the properties of the vapor phase of a substance become indistinguishable from those of the liquid phase at the same pressure and temperature, so that the substance exists as a single phase, is called its:

- W) triple point
- X) critical point
- Y) saturation point
- Z) gas shift point

ANSWER: X) CRITICAL POINT

**TOSS-UP**

19) PHYSICS *Multiple Choice* What common form of ionizing radiation is made of relatively large particles with a double positive charge:

- W) alpha particle
- X) beta + particle
- Y) beta – particle
- Z) neutrino

ANSWER: W) ALPHA PARTICLE

**BONUS**

19) PHYSICS *Short Answer* Order the following 3 objects from the one with the smallest rotational velocity down an arbitrarily long 45 degree inclined plane to the one with the largest after 2 seconds: a cylindrical shell; a solid disc; a solid sphere

ANSWER: A CYLINDRICAL SHELL; A SOLID DISC; A SOLID SPHERE

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**TOSS-UP**

20) ASTRONOMY *Short Answer* What constellation that contains the M 42 nebula is generally regarded as the grandest and brightest of all the constellations?

ANSWER: ORION

**BONUS**

20) ASTRONOMY *Short Answer* The M 42 nebula marks the point where what object is imagined to hang from Orion's belt?

ANSWER: SWORD

**TOSS-UP**

- 21) MATH *Short Answer* If the universal set is represented by the numbers 1, 2, 3, 4, 5, 6, 7, and set A is represented by the numbers 1, 2, 3; set B by the numbers 3, 4, 5, 6; and set C by the numbers 2, 3, 4, then what set is represented by the intersection of sets B and C?

ANSWER: 3 AND 4

**BONUS**

- 21) MATH *Short Answer* Two basketball players are to be chosen from a roster of 10 players. What is the number of ways this can be achieved?

ANSWER: 45

(Solution:  $C(10,2) = 10! \div 2!(10-2)!; = 10! \div 2!(8)!; = 45$ )

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**TOSS-UP**

- 22) EARTH SCIENCE *Multiple Choice* Which of the following is a large, irregularly-shaped intrusive body of igneous rock, which can reach sizes of up to 1000 km in length and 250 km in width:

- W) stock
- X) batholith
- Y) laccolith
- Z) dike

ANSWER: X) BATHOLITH

**BONUS**

- 22) EARTH SCIENCE *Multiple Choice* Apatite is what number on the Moh's hardness scale:

- W) 1
- X) 3
- Y) 5
- Z) 7

ANSWER: Y) 5

### TOSS-UP

23) BIOLOGY *Multiple Choice* Which of the following DNA conformations is the native form:

- W) A-DNA
- X) B-DNA
- Y) L-DNA
- Z) Z-DNA

ANSWER: X) B-DNA

### BONUS

23) BIOLOGY *Multiple Choice* Chondroitin (Pron: kon-droyt-in) is most concentrated in which of the following human tissues:

- W) skin
- X) cornea
- Y) synovial fluid
- Z) finger nails

ANSWER: X) CORNEA

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### TOSS-UP

24) CHEMISTRY *Multiple Choice* Which of the following can you deduce if you know the formula for an alkane is  $C_5H_{10}$ :

- W) it is a straight-chain
- X) it is branched
- Y) it contains a ring
- Z) it contains one double bonded carbon atom

ANSWER: Y) IT CONTAINS A RING

### BONUS

24) CHEMISTRY *Short Answer* What French chemist in 1886 showed that the lowering of the vapor pressure of a solvent is proportional to the concentration of the substance dissolved, unless the solvent is an electrolyte:

ANSWER: FRANCOIS-MARIE RAOULT (ACCEPT: RAOULT)

(Solution: Raoult's Law)

### TOSS-UP

- 25) PHYSICS *Short Answer* According to the work of Coulomb, if the charges on each one of two tiny objects was doubled, by what multiple would the total force on the particles increase?

ANSWER: 4 TIMES

### BONUS

- 25) PHYSICS *Short Answer* In an argument over a shirt one brother pulls on one sleeve of the 0.25 kilogram shirt to the left of an observer with a force of 20 newtons, and the other brother pulls on the other sleeve to the right of an observer with a force of 40 newtons. What is the magnitude of the net force on the shirt?

ANSWER: 20 NEWTONS