

Round 14

1. BIOLOGY

Toss Up: Multiple Choice

Which is not associated with the proteasomal degradation pathway?

- W) Response to oxidative stress
- X) Regulation of gene expression
- Y) Kinetochore attachment
- Z) The Cell cycle

Toss Up Answer: Y

Bonus: Short Answer

If a reaction with a Delta G of +3.4 kcal/mol is coupled with ATP hydrolysis, what is the net Delta G?

Bonus Answer: -3.9 kcal/mol

2. EARTH and SPACE

Toss Up: Short Answer

Which type of star will live for the longest period of time?

Bonus Answer: Red Dwarfs (they can live for 1 trillion years or so)

Bonus: Multiple Choice

What resonance does Pluto have with Neptune which ensures that the celestial objects will never impact each other?

- W) 2:1
- X) 3:2
- Y) 5:2
- Z) 5:4

Bonus Answer: X

3. BIOLOGY

Toss Up: Multiple Choice

Where might a proteasome be found?

- W) Nucleus
- X) Plasma membrane
- Y) Extracellular Matrix
- Z) Lysosome

Toss Up Answer: W

Bonus: Short Answer

Which small protein tags other proteins for degradation?

Bonus Answer: Ubiquitin

4. EARTH and SPACE

Toss Up: Multiple Choice

Which of the following rocks is responsible for the formation of black sand?

- W) Quartzite
- X) Schist
- Y) Basalt
- Z) Slate

Toss Up Answer: X

Bonus: Short Answer

What is the scale used to measure the hardness of minerals?

Bonus Answer: Moh Accept: Moh Scale

5. MATHEMATICS**Toss Up: Multiple Choice**

If the test scores of Mr. Coco's Calculus test are assumed to have a normal distribution, and if the mean test score was 91, what can be said about the median test score of that test?

- W) The median was lower than 91
- X) The median was higher than 91
- Y) The median was 91
- Z) The median cannot be determined

Toss Up Answer: Y

Bonus: Multiple Choice

The z-score for Shantanu's physics test grade was found to be 0.375. If he scored a 94 on the test, and the standard deviation was 8, what was the mean test score on the physics test?

- W) 91
- X) 95
- Y) 92
- Z) 98

Bonus Answer: W

6. EARTH and SPACE**Toss Up: Multiple Choice**

Which of the following is closest to the magnitude of a parsec?

- W) 10^{18} meters
- X) 10^{16} meters
- Y) 10^{14} meters
- Z) 10^{12} meters

Toss Up Answer: X

Bonus: Short Answer

What is the name of the space probe that first orbited Saturn?

Bonus Answer: Cassini-Huygens (Accept Cassini)

7. CHEMISTRY**Toss Up: Short Answer**

What is $K_{\text{sub W}}$?

Bonus Answer: 1.0×10^{-14}

Bonus: Multiple Choice

Which of the following acids is not diprotic?

- W) Sulfuric Acid
- X) Oxalic Acid
- Y) Carbonic Acid
- Z) Citric Acid

Bonus Answer: Z

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8. CHEMISTRY

Toss Up: Multiple Choice

- w
- W) f
- X) a
- Y) a
- Z) a

Toss Up Answer: X

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Bonus: Multiple Choice

- a
- W) w
- X) w
- Y) w
- Z) w

Bonus Answer: X

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9. CHEMISTRY

Toss Up: Short Answer

How many different structures can Formic Acid (HCO_2H) form?

Bonus Answer: Two (2)

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Bonus: Short Answer

What is the pH of a $\text{Ca}(\text{OH})_2$ solution with Calcium(2+) concentration of 5.0×10^{-6} ?

Bonus Answer: 9.00 (Accept: Nine)

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10. CHEMISTRY

Toss Up: Short Answer

Which elements are in the liquid state at room temperature?

Bonus Answer: Bromine and Mercury (Accept: Br and Hg)

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Bonus: Multiple Choice

In a gaseous, exothermic reaction, which of the following changes makes no difference to the position of equilibrium?

- W) Change of Temperature
- X) Adding more reactants
- Y) Adding a catalyst
- Z) Removing products

Bonus Answer: Y

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11. CHEMISTRY

Toss Up: Short Answer

What feature of a chemical species allows it to act as a ligand in a complex ion?

Bonus Answer: It has a lone pair of electrons that can act as a Lewis base. (Accepts: Has electrons that act as a Lewis Base, Acts as a Lewis base)

Bonus: Multiple Choice

Which of the following ionic solutions is colorless?

W) Cu(2+)

X) Ni(2+)

Y) Mn(7+)

Z) Zn(2+)

Bonus Answer: Z

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12. BIOLOGY**Toss Up: Multiple Choice**

Which of the following refers to the fact that when we have experienced a conditioned stimulus by itself many times, it can be difficult to later condition to another stimulus?

W) Blocking

X) Dormant Inhibition

Y) Extinction

Z) Latent Inhibition

Toss Up Answer: Z

Bonus: Short Answer

What is the corepressor molecule in the trp operon?

Bonus Answer: tryptophan

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13. CHEMISTRY**Toss Up: Short Answer**

What is the chemical formula of Thiocyanate?

Bonus Answer: SCN⁻ (Read as: SCN minus)

Bonus: Multiple Choice

Which of the following is the name of an isotope of Hydrogen?

W) Protium

X) Hydronium

Y) Kydronium

Z) Zirconium

Bonus Answer: W

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14. PHYSICS**Toss Up: Multiple Choice**

A magnetic field CANNOT:

W) exert a force on a charged particle

X) change the trajectory of a charged particle

Y) change the kinetic energy of a charged particle

Z) do no work on a charged particle

Toss Up Answer: Y

Bonus: Multiple Choice

If a magnet and a conducting loop are placed next to each other at rest. If the magnet with the north pole facing left is

put through the loop and is moved left in which direction will the induced current within the loop move with reference to the magnet?

- W) The loop will move with the magnet.
- X) Counter-clockwise
- Y) clockwise
- Z) There is no current.

Bonus Answer: X

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15. CHEMISTRY

Toss Up: Short Answer

What is the name of the elements in Group 16?

Bonus Answer: Chalcogens (Accept: Chalcogen)

Bonus: Short Answer

When Carbonic acid is created, it always decomposes into:

Bonus Answer: Dihydrogen Monoxide and Carbon Dioxide (Accept: H₂O and CO₂, Water and CO₂)

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16. PHYSICS

Toss Up: Short Answer

When charging or discharging a capacitor, what the quantity RC (read as resistance times capacitance) known as?

Bonus Answer: Time constant

Bonus: Multiple Choice

At point 'A' on a circuit the wire is grounded. At point 'B' on the same circuit there is a emf of 30 volts. If there are two identical resistors with resistance of 10 ohms in parallel, between point 'A' and point 'B', what is the current in ampere flowing through either resistor?

- W) 15
- X) 3
- Y) 9
- Z) 6

Bonus Answer: X

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17. BIOLOGY

Toss Up: Multiple Choice

Which process is in play when we respond less strongly to repeated stimuli over time?

- W) Sensory Adaptation
- X) Habituation
- Y) Accomodation
- Z) Maturation

Toss Up Answer: X

Bonus: Multiple Choice

The learning phase during which a conditioned response is established is called:

- W) Learning
- X) Possession
- Y) Acquisition
- Z) Incubation

Bonus Answer: Y

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18. BIOLOGY

Toss Up: Short Answer

Which amino acid would constitute a disulfide bridge?

Bonus Answer: Cysteine

Bonus: Short Answer

What is the name of the cellular machinery that removes introns?

Bonus Answer: Spliceosome

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19. CHEMISTRY

Toss Up: Multiple Choice

Which of the following is the ionic charge of the Dimercury ion?

W) 1+

X) 0

Y) 2+

Z) 1-

Toss Up Answer: Y

Bonus: Short Answer

What is the electron configuration of Iron(III)?

Bonus Answer: 1s² 2s² 2p⁶ 3s² 3p⁶ 3d⁵

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20. CHEMISTRY

Toss Up: Multiple Choice

What form of hybridization is found in Sulfur Hexafluoride?

W) sp³

X) sp³d²

Y) sp³d³

Z) sp⁴d³

Toss Up Answer: Y

Bonus: Multiple Choice

Which of the following amino acids is aromatic?

W) Tryptophan

X) Glutamic Acid

Y) Methionine

Z) Lysene

Bonus Answer: W

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21. PHYSICS

Toss Up: Multiple Choice

Which of the following is NOT true about magnetism?

W) Electric field lines go from the North pole to the South pole

X) Electric field lines can cross each other

Y) Cutting a magnet in half will not create two magnetic monopoles

Z) They are all true

Toss Up Answer: X

Bonus: Short Answer

By name or number, list all of the following elements that are ferromagnetic: Cobalt, Manganese, Cobalt, Cadmium, Silver

Bonus Answer: Cobalt. Accept: Co, 1

22. BIOLOGY

Toss Up: Multiple Choice

Which of these is not a stop codon?

W) UAA

X) UGG

Y) UGA

Z) UAG

Toss Up Answer: X

Bonus: Short Answer

What was the first codon-amino acid pair to be identified? (Give both the codon and the amino acid)

Bonus Answer: UUU and phenylalanine

23. PHYSICS

Toss Up: Short Answer

What is the equivalent capacitance in Farads of two capacitors connected in series, one with a capacitance of 4 microFarads and the other with a capacitance of 2 microFarads?

Bonus Answer: 4/3 microFarads

Bonus: Short Answer

Give your answer in scientific notation, in Farads, rounded to the nearest tenth. What is the approximate capacitance between two parallel plates of surface area 10cm squared, separated by a distance of 1 meter?

Bonus Answer: 8.9×10^{-14} Farads

24. BIOLOGY

Toss Up: Multiple Choice

Modern research has shown that silent mutations can be harmful in all of the following ways except:

W) Causing a short pause during codon-anticodon pairing in translation

X) Reducing the stability of the mRNA's 3D structure

Y) Causing improper splicing of the primary transcript

Z) Slowing the rate of transport of mRNA across the nuclear membrane

Toss Up Answer: Z

Bonus: Short Answer

Which type of RNA is most common in the cell?

Bonus Answer: rRNA

25. PHYSICS

Toss Up: Multiple Choice

In the capacitor discharge formula $q = q_0 e^{(-t/RC)}$ (read as q naught times e raised to the power of negative t over R times C) the symbol t represents:

W) the time constant

- X) the time it takes for C to lose the fraction $1/e$ of its initial charge
- Y) the time it takes for C to lose the fraction $(1 - 1/e)$ of its initial charge
- Z) none of the above

Toss Up Answer: Z

Bonus: Short Answer

Resistor 1 has twice the resistance of resistor 2. They are connected in parallel to a battery. The ratio of the thermal energy generation rate in 1 to that in 2 is:

Bonus Answer: 1:2
