**Toss-Up**

1. BIOLOGY: Place the following terms in the correct order from least specificity to most specificity: Kingdom, Domain, Class, Genus, Order

ANSWER: Genus, Order, Class, Kingdom, Domain

**Bonus**

BIOLOGY: Which two domains of life consist entirely of prokaryotes?

ANSWER: Domain Bacteria and Domain Archaea (accept Bacteria and Archaea)

**Toss-Up**

1. CHEMISTRY: Which element has the highest melting point?

ANSWER: Tungsten

**Bonus**

CHEMISTRY: What process describes the movement of water down a potential gradient?

ANSWER: Osmosis

**Toss-Up**

1. PHYSICS: What law of motion states that an object at rest will remain at rest unless compelled to do so by an outside force?

ANSWER: Newton’s Second Law of Motion (accept second law of motion, second law)

**Bonus**

PHYSICS: What type of collision occurs when there is no net conversion of kinetic energy into other forms?

ANSWER: Elastic collision

**Toss-Up**

1. MATH: Find the second derivative of the following function with respect to x:

F(x) = 3x3 – 27x + 9

ANSWER: F’’(x) = 54x

**Bonus**

MATH: Which of the following side lengths of a triangle is impossible?

W) 3, 4, 5

X) 4, 5, 6

Y) 1, 5, 10

Z) 18, 20, 21

ANSWER: Y) 1, 5, 10

**Toss-Up**

1. ESS: Which of the following values is closest to the estimated age of the Earth?

W) 2.5 billion years

X) 3.5 billion years

Y) 4.5 billion years

Z) 5.5 billion years

ANSWER: Y) 4.5 billion years

**Bonus**

ESS: Place the following atmospheric gases in order from the highest percentage composition of the Earth’s dry atmosphere to the lowest:

Argon, Carbon Dioxide, Oxygen, Nitrogen, Ozone

ANSWER: Nitrogen, Oxygen, Argon, Carbon Dioxide, Ozone

**Toss-Up**

1. ENERGY: What is the most widely used form of renewable energy today?

W) Hydroelectric

X) Geothermal

Y) Wind

Z) Solar

ANSWER: W) Hydroelectric

**Bonus**

ENERGY: Place the following countries in order from the highest hydroelectric production to the lowest:

Canada, United States, China, Japan, Russia

ANSWER: China, Canada, United States, Russia, Japan

**Toss-Up**

1. BIOLOGY: What is the mechanism that slows the process that creates a product when an excess of that product is present?

ANSWER: Negative feedback

**Bonus**

BIOLOGY: What term describes the structural change in a macromolecule caused by extreme conditions?

ANSWER: Denaturation

**Toss-Up**

1. CHEMISTRY: Four atoms covalently bonded to a central atom have what type of structure?

ANSWER: tetrahedral

**Bonus**

CHEMISTRY: What element is produced in alpha decay?

ANSWER: helium

**Toss-Up**

1. PHYSICS: What term describes the tendency of a force to rotate an object about an axis, fulcrum, or pivot?

ANSWER: torque

**Bonus**

PHYSICS: Which of the following does NOT affect the magnitude of torque?

W) Applied force

X) Length of lever arm

Y) Angle between force vector and lever arm

Z) Velocity

ANSWER: Z) Velocity

**Toss-Up**

1. MATH: All numbers divisible by 17 are also divisible by which of the following values?

W) 31

X) 34

Y) 37

Z) 39

ANSWER: X) 34

**Bonus**

MATH: What is the value of the eccentricity of a circle?

ANSWER: Zero

**Toss-Up**

1. ESCC: In astronomy, the metallicity of an object describes the proportion of its matter composed of chemical elements other than what two elements?

ANSWER: Hydrogen and Helium

**Bonus**

ESCC: Order the following stellar populations from greatest metallicity to lowest:

Population III, Population I, Population II

ANSWER: Population I, Population II, Population III

**Toss-Up**

1. ENERGY: Methane produced by the anaerobic digestion of organic matter by anaerobes that is used as fuel is known as what?

ANSWER: biogas

**Bonus**

ENERGY: What country in Europe is currently the world’s greatest producer of biogas?

ANSWER: Germany

**Toss-Up**

1. BIOLOGY: What is the process by which a signal on a cell’s surface is converted to a specific cellular response in a series of steps?

ANSWER: signal transduction pathway

**Bonus**

BIOLOGY: What is a physical or chemical agent that induces mutations in a living organism?

ANSWER: mutagen

**Toss-Up**

1. CHEMISTRY: What is a term that describes the weakly charged regions of positive and negative charge that can occur when atoms and molecules are in close relation to each other?

ANSWER: Van der Waals interactions

**Bonus**

CHEMISTRY: What term describes the phenomenon where hydrogen bonds hold water molecules together?

ANSWER: cohesion

**Toss-Up**

1. PHYSICS: Which of the following nuclear weapon designs involves the firing of one piece of fissile uranium towards another piece of fissile uranium to achieve critical mass?

W) Gun Assembly

X) Tellar-Uram

Y) Implosion

Z) Fusion-boosted fission

ANSWER: W) Gun Assembly

**Bonus**

PHYSICS: Pure fusion nuclear weapons, should they ever be developed, would likely have which of the following effects?

W) Elimination of radioactive fallout and elimination of neutron emission

X) Greater radioactive fallout and elimination of neutron emission

Y) Elimination of nuclear fallout and greater neutron emission

Z) Greater radioactive fallout and greater neutron emission

ANSWER: Y) Elimination of nuclear fallout and greater neutron emission

**Toss-Up**

1. ESCC: Surface acoustic waves that travel on solids and are produced on the Earth’s surface during Earthquakes are called what?

ANSWER: Rayleigh Waves

**Bonus**

ESCC: Which of the following seismic waves is likely to be the most destructive?

W) P Waves

X) S Waves

Y) Rayleigh Waves

Z) Surface Waves

ANSWER: Z) Surface Waves

**Toss-Up**

1. ENERGY: What condition is marked by more than two sets of homologous chromosomes?

ANSWER: polyploidy

**Bonus**

BIOLOGY: What genetic disease is marked by trisomy of chromosome 21?

ANSWER: Down Syndrome

**Toss-Up**

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**Bonus**

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**Toss-Up**

1. BIOLOGY: What law states that each pair of alleles segregates into gametes independently of the pair of alleles for any other gene/

ANSWER: Law of Independent Assortment

**Bonus**

BIOLOGY: In what type of dominance are both phenotypes expressed for a specific gene?

ANSWER: codominance

**Toss-Up**

1. BIOLOGY: What principle states that the frequencies of alleles and genotypes in a population will remain constant from generation to generation, provided that only Mendelian segregation and recombination of alleles are at work?

ANSWER: Hardy-Weinberg principle

**Bonus**

BIOLOGY: Which form of light microscopy involves tagging the specimen with fluorescent dyes or antibodies?

ANSWER: Fluorescent microscopy

**Toss-Up**

**Bonus**