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1. Biology

Toss Up: Short Answer

Defects in the myelin sheath lead to what disease?

Toss Up Answer: Multiple Sclerosis

Bonus: Short Answer

From which parent do we inherit mitochondrial DNA?

Bonus Answer: Mothers, maternal

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2. Chemistry

Toss Up: Multiple Choice

Which of the following is a nonpolar molecule?

W) Carbon dioxide

X) Water

Y) Ammonia

Z) Hydrochloric acid

Toss Up Answer: W

Bonus: Short Answer

Which of the following forms of radioactive decay has (or have) no electrical charges? 1) Alpha Decay 2)

Beta Decay 3) Gamma Decay

Bonus Answer: 3 only

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3. Physics

Toss Up: Short Answer

As a pendulum is raised to higher altitudes, its period?

Toss Up Answer: Increases

Bonus: Short Answer

The SI unit of pressure is?

Bonus Answer: Pascal

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4. Mathematics

Toss Up: Short Answer

What is the volume of a sphere of radius "R"?

Toss Up Answer: $(4/3) \pi R^3$

Bonus: Short Answer

Using an x-y coordinate axis, a parabola is given by the equation $y = x^2$. Give the x-y coordinates of the focal point for this parabola.

Bonus Answer: (0, 1/4)

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5. Chemistry

Toss Up: Multiple Choice

The shape of a PCl_3 molecule is described as

- W) bent
- X) trigonal pyramidal
- Y) linear
- Z) trigonal planar

Toss Up Answer: X

Bonus: Short Answer

Twenty-five percent of element X exists as ^{210}X and 75 percent of it exists as ^{214}X . What is the atomic weight of element X?

Bonus Answer: 211

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6. Biology

Toss Up: Multiple Choice

When outside of the lymph vessel, the lymph is called

- W) Interstitial Fluid
- X) Hemocel
- Y) Plasma
- Z) Blood

Toss Up Answer: W

Bonus: Multiple Choice

Which of the following is not true about platelets

- W) They are involved in blood clotting
- X) They are present in blood
- Y) They are cells that broke away from megakaryocytes
- Z) They have cytoplasm

Bonus Answer: Y

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7. Physics

Toss Up: Multiple Choice

The work done by a friction force is

- W) always -
- X) always 0
- Y) either positive or negative depending upon the situation.
- Z) always +

Toss Up Answer: W

Bonus: Multiple Choice

: As defined in physics, work is:

- W) scalar quantity
- X) always a positive quantity

Y) a vector quantity

Z) always 0

Bonus Answer: W

8. Mathematics

Toss Up: Multiple Choice

If $f(x) = x^4 + 5x^8 + 7x^6 + 5$, which of the following is true about $f(x)$?

W) $f(x)$ is odd, only

X) $f(x)$ is even, only

Y) $f(x)$ is neither odd nor even

Z) $f(x)$ is both even and odd

Toss Up Answer: X

Bonus: Short Answer

Simplify: $\cos(\sin^{-1}(3/5))$

Bonus Answer: 4/5

Solution:

Draw a 3-4-5 right triangle and find the angle that $\sin^{-1}(3/5)$ is equal to. Then, take its cosine.

9. Biology

Toss Up: Short Answer

What is the main respiratory pigment of skeletal muscle cells?

Toss Up Answer: Myoglobin

Bonus: Multiple Choice

If a parent organism experiences a mutation, then all subsequent offspring of that individual will:

W) always carry the mutated gene, but only as a recessive.

X) Always carry the gene, but never express it phenotypically

Y) only carry the mutated gene if it is heritable

Z) never carry the gene as mutations can never be heritable

Bonus Answer: Y

10. Mathematics

Toss Up: Short Answer

The surface area of a sphere is how many times the area of a circle?

Toss Up Answer: 4

Bonus: Short Answer

What is the total surface area of a cone, given l as the slant height?

Bonus Answer: $(\pi)r^2 + \pi rl$

11. Biology

Toss Up: Multiple Choice

Which of these is not a viral disease?

W) Dutch elm disease

X) Yellow fever

Y) Mumps

Z) Rubella

Toss Up Answer: W

Bonus: Short Answer

In which viral reproductive cycle is the viral DNA incorporated into the host DNA?

Bonus Answer: Lysogenic

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12. Energy

Toss Up: Short Answer

What is the most common sulfur compound that occurs naturally in natural gas?

Toss Up Answer: HYDROGEN SULFIDE

Bonus: Short Answer

Earth's core is kept hot by the radioactive decay of several radioactive substances, including Uranium-235 and 238; name the other two heat-producing isotopes which are also significant contributors to the radioactive heat production of the Earth.

Bonus Answer: POTASSIUM-40 AND THORIUM-232 (Question is very hard?)

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13. Physics

Toss Up: Multiple Choice

Two particles interact by conservative forces. In addition, an external force acts on each particle. They complete round trips, ending at the points where they started. Which of the following must have the same values at the beginning and end of this trip?

W) the total kinetic energy of the two-particle system

X) the potential energy of the two-particle system

Y) the total linear momentum of the two-particle system

Z) the mechanical energy of the two-particle system

Toss Up Answer: X

Bonus: Multiple Choice

A force of 10 N holds an ideal spring with a 20 N/m spring constant in compression. The potential energy stored in the spring is:

W) 0.5J

X) 2.5J

Y) 5J

Z) 10J

Bonus Answer: X

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14. Earth and Space Science

Toss Up: Multiple Choice

What is the name given to planets that lie within a habitable zone of a star?

W) Extraneous Planets

- X) Exoplanets
- Y) Goldilocks Planet
- Z) Temperate Planets

Toss Up Answer: Y

Bonus: Short Answer

What is the name given to a cloud of dust and gas in outer space?

Bonus Answer: nebula

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15. Chemistry

Toss Up: Short Answer

What activates pepsinogen to change into pepsin?

Toss Up Answer: Hydrochloric acid

Bonus: Short Answer

What is the pH of gastric juice to the nearest tenth?

Bonus Answer: 1.5 to 2.5 (or any number in between)

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16. Earth and Space Science

Toss Up: Multiple Choice

Which of the following gases make up the majority of Earth's atmosphere?

- W) Oxygen
- X) Argon
- Y) Carbon dioxide
- Z) Nitrogen

Toss Up Answer: Z

Bonus: Short Answer

What is the name for the scientific theory that describes the movement of plates across the Earth's lithosphere?

Bonus Answer: Plate tectonics

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17. Physics

Toss Up: Multiple Choice

What is stated by Kirchhoff's First Law?

- W) The description of the force interacting between static electrically charged particles.
- X) The algebraic sum of currents in a network of conductors meeting at a point is zero.
- Y) The algebraic sum of the products of the resistances of the conductors and the currents in them in a closed loop is equal to the total emf available in that loop.
- Z) The net electric flux through any closed surface is equal to $1/\epsilon_0$ times the net electric charge within that closed surface.

Toss Up Answer: X

Bonus: Multiple Choice

If two 4-Farad capacitors and one 6-Farad are connected in parallel, what is the equivalent capacitance

three capacitors?

W) 14 Farads

X) 4.66 Farads

Y) 1.5 Farads

Z) 1 Farad

Bonus Answer: W

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18. Chemistry

Toss Up: Multiple Choice

Which of the following statements is NOT true for the element of sodium?

W) It has an oxidation state of +1

X) It forms a basic solution with water

Y) It gives off a bright red color when burned

Z) It reacts with a halogen to form a salt

Toss Up Answer: Y

Bonus: Short Answer

Which of the following are products made from the reaction $\text{H}_2\text{SO}_4(\text{aq}) + \text{Ba}(\text{OH})_2(\text{aq}) \rightarrow ?$ I) $\text{O}_2(\text{g})$ II)

$\text{H}_2\text{O}(\text{l})$ III) $\text{BaSO}_4(\text{s})$

Bonus Answer: II and III

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19. Mathematics

Toss Up: Multiple Choice

If the diameter of a circle is 6 inches, what is the area of the circle?

W) 36π

X) 9π

Y) 12π

Z) 6π

Toss Up Answer: X

Bonus: Short Answer

Find the equation of the line that passes through the point (3,4) and is perpendicular to the line $y = 3x - 2$?

Bonus Answer: $y = -(1/3)x + 5$

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20. Biology

Toss Up: Multiple Choice

Which of the following enzymes are not utilized by the human body to break down carbohydrates?

W) Amylase

X) Maltase

Y) Lactase

Z) Lipase

Toss Up Answer: Z

Bonus: Multiple Choice

Which of the following is a valid difference between animal and plant cells?

- W) Animal cells have a cell membrane whereas plant cells do not.
- X) Animal cells contain mitochondria whereas plant cells cannot.
- Y) Animal cells can contain multiple vacuoles whereas plant cells cannot.
- Z) Animal cells are larger than plant cells.

Bonus Answer: Y

21. Earth and Space Science

Toss Up: Short Answer

What volcano has erupted in the years 79 A.D., 1139, 1631, 1779, 1793, 1872, 1906, and 1944?

Toss Up Answer: Vesuvius

Bonus: Short Answer

What is the name of the very old mountain belt located in southern Missouri and Northern Arkansas?

Bonus Answer: the ozarks

22. Physics

Toss Up: Short Answer

The property of a moving object to continue moving is what Galileo called

Toss Up Answer: inertia

Bonus: Multiple Choice

If an object is moving, then the magnitude of its ____ cannot be zero

- W) position
- X) velocity
- Y) acceleration
- Z) jerk

Bonus Answer: X

23. Chemistry

Toss Up: Short Answer

What element has the largest atomic radius?

Toss Up Answer: Francium

Bonus: Multiple Choice

What is the most electronegative element?

- W) Francium
- X) Beryllium
- Y) Fluorine
- Z) Lithium

Bonus Answer: Y

24. Earth and Space Science

Toss Up: Short Answer

What is the closest star to the solar system, 4.25 light years away from the sun?

Toss Up Answer: Proxima Centauri

Bonus: Short Answer

On approximately which two days of the Gregorian calendar do full moons most commonly appear?

Bonus Answer: 15th and 16th of each month

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25. Mathematics

Toss Up: Multiple Choice

Find the points of intersection of the following curves:

$$y = \sqrt{x^2 - x + 29}$$

$$y = x + 2$$

W) (5,7)

X) $(\sqrt{2} - 1, \sqrt{2} + 1)$

Y) $(\sqrt{29} - 1, \sqrt{29} + 1)$

Z) (2,4)

Toss Up Answer: W

Bonus: Multiple Choice

Which of the following expressions is not divisible by 9

W) $5^3 + 7^3$

X) $4^5 + 2^5$

Y) $10^3 - 7^3$

Z) $9^7 - 6^7$

Bonus Answer: W

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