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1. Chemistry

Toss Up: Multiple Choice

How many moles of nitrogen are in 35 grams of nitrogen?

W) 3

X) 3.5

Y) 4

Z) 2.5

Toss Up Answer: Z

Bonus: Short Answer

What periodic group is Magnesium a part of?

Bonus Answer: Alkaline Earth Metals

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2. Physics

Toss Up: Short Answer

An educated guess or explanation for an observation or experimental result. Not yet fully accepted as fact is what?

Toss Up Answer: Hypothesis

Bonus: Short Answer

A systematic methodology for gathering, organizing and applying knowledge is?

Bonus Answer: A scientific method

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3. Biology

Toss Up: Multiple Choice

Which is not a part of the nucleus?

W) nuclear envelope

X) nucleolus

Y) chromatin

Z) plasmodesmata

Toss Up Answer: Z

Bonus: Multiple Choice

Which is not a part of the cytoskeleton?

W) microfilaments

X) intermediate filaments

Y) microtubules

Z) gap junctions

Bonus Answer: Z

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4. Physics

Toss Up: Short Answer

What is the resulting electrical potential, in volts, when a charge of 12

coulombs is applied to a 1 farad capacitor?

Toss Up Answer: 12 volts

Bonus: Short Answer

If 1000 pounds is applied to a spring with spring constant of 100 pounds per inch on top of a hydraulic piston, how many pounds of force is transferred to the piston?

Bonus Answer: 1,000

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5. Energy

Toss Up: Short Answer

Which of the following, by name or number, are not considered to be a greenhouse gas: Nitrous Oxide, Water Vapor, Methane, and Nitrogen gas.

Toss Up Answer: Nitrogen Gas, 4

Bonus: Short Answer

What are the two most used fuels for nuclear reactors?

Bonus Answer: Plutonium and Uranium

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6. Physics

Toss Up: Multiple Choice

For an object moving in uniform circular motion, the direction of the instantaneous acceleration vector is:

- W) tangent to the path of motion
- X) equal to zero
- Y) directed radially outward
- Z) directed radially inward

Toss Up Answer: Z

Bonus: Multiple Choice

A Newton is equal to which of the following?

- W) kilogram-meter per second
- X) meter per second squared
- Y) kilogram-meter per second
- Z)) kilogram per meter-second

Bonus Answer: Y

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7. Mathematics

Toss Up: Short Answer

Given $y = |x - 6|$, what is the derivative at $x = 6$?

Toss Up Answer: The derivative does not exist

Bonus: Short Answer

Find the derivative of x^3 / x^2

Bonus Answer: 1

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8. Earth and Space Science

Toss Up: Multiple Choice

What happens as air rises?

W) It gets warmer

X) It gets colder

Y) The temperature fluctuates

Z) Nothing

Toss Up Answer: X

Bonus: Short Answer

How are winds named?

Bonus Answer: By the direction they are coming in

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9. Physics

Toss Up: Multiple Choice

An object of mass 2 kg has a linear momentum of magnitude 6 kg · m/s. What is this object's kinetic energy?

W) 3 J

X) 6 J

Y) 9 J

Z) 12 J

Toss Up Answer: Y

Bonus: Short Answer

Two objects, one of mass 3 kg and moving with a speed of 2 m/s and the other of mass 5 kg and speed 2 m/s, move toward each other and collide head-on. If the collision is perfectly inelastic, find the speed of the objects after the collision.

Bonus Answer: 0.5 m/s

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10. Chemistry

Toss Up: Short Answer

What is the hybridization of CH₄?

Toss Up Answer: sp³

Bonus: Short Answer

What is the strongest intermolecular force in HF?

Bonus Answer: Hydrogen Bonding

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11. Physics

Toss Up: Multiple Choice

A Newton is equal to which of the following?

W) w) kilogram-meter per second

X) x) meter per second squared

Y) y) kilogram-meter per second squared

Z) z) kilogram per meter-second

Toss Up Answer: Y

Bonus: Short Answer

Work is what type of quantity?

Bonus Answer: Scalar quantity.

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12. Earth and Space Science

Toss Up: Multiple Choice

Which of these units is defined as "3.26 light-years"?

W) Astronomical Unit

X) Parsec

Y) Gigasphere

Z) Kilometer

Toss Up Answer: X

Bonus: Multiple Choice

What are the two neighboring galaxies of the Milky Way known as?

W) The Keplers

X) Magellanic Clouds

Y) Twin Cities

Z) Petronas Galaxies

Bonus Answer: X

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13. Mathematics

Toss Up: Multiple Choice

Which of the following types of symmetry does $x^2 + (y-1)^2 = 36$ have?

W) Y-axis symmetry, only

X) X-axis symmetry, only

Y) Both x and y axis symmetry

Z) Neither x nor y axis symmetry

Toss Up Answer: W

Bonus: Multiple Choice

Which of the following types of symmetry does $x^2 - y^2 = 36$ have?

W) Y-axis symmetry, only

X) X-axis symmetry, only

Y) Both x and y axis symmetry

Z) Neither x nor y axis symmetry

Bonus Answer: Y

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14. Chemistry

Toss Up: Short Answer

Which element is the more electronegative?

Toss Up Answer: Flourine

Bonus: Short Answer

Name all the atoms that are diatomic.

Bonus Answer: Hydrogen (H₂)

Nitrogen (N₂)

Oxygen (O₂)

Fluorine (F₂)

Chlorine (Cl₂)

Iodine (I₂)

Bromine (Br₂)

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15. Biology

Toss Up: Multiple Choice

Which of the following is a retrovirus?

W) HIV

X) Hepatitis B virus

Y) Poliovirus

Z) Influenza A virus

Toss Up Answer: W

Bonus: Short Answer

Where do DNA viruses usually replicate?

Bonus Answer: In the nucleus.

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16. Chemistry

Toss Up: Short Answer

What is the word that describes a substance that reacts with both strong acids and strong bases?

Toss Up Answer: Amphoteric

Bonus: Multiple Choice

The triple bond between the carbon atoms causes acetylene, C₂H₂, to have which of the following shapes?

W) Trigonal planar (pron: try-gon-al)

X) Linear

Y) Tetrahedral

Z) Trigonal bipyramidal

Bonus Answer: X

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17. 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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18. Chemistry

Toss Up: Multiple Choice

Which of the following is closest in mass to a proton?

- W) Alpha Particle
- X) Positron
- Y) Neutron
- Z) Hydrogen Molecule

Toss Up Answer: Y

Bonus: Short Answer

What is the amount of calories of heat transferred to the water is when the temperature of a 20-gram sample of water is increased from 10°C to 30°C?

Bonus Answer: 400
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19. Mathematics

Toss Up: Multiple Choice

Solve the following equation for x:

$$x^2 - 20x + 19 = 0$$

- W) 9, 10
- X) 10 and 9
- Y) 21 and 19
- Z) 19 and 1

Toss Up Answer: Z

Bonus: Short Answer

Convert log base 4 of 53 into a base 10 expression:

Bonus Answer: $\log 53 / \log 4$
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20. Earth and Space Science

Toss Up: Multiple Choice

What is the main source of energy for the Sun?

- W) Hydrogen fusion
- X) Internal combustion
- Y) Nuclear fission of metals
- Z) Burning of solar gases

Toss Up Answer: W

Bonus: Multiple Choice

The Long Valley Caldera in east-central California was formed by a massive volcanic eruption about

760,000 years ago. Since then, it has erupted several times. Of the following, which would be least likely to indicate that another eruption will soon occur?

- W) Recurring earthquakes in the vicinity
- X) decreases of precipitation in the area
- Y) changes of emissions from the caldera
- Z) uplifting of the floor of the caldera

Bonus Answer: X

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21. Mathematics

Toss Up: Multiple Choice

Donald Trump has $10x+5$ apples where $x=3$. How many apples does he have if he eats two of them?

- W) 35
- X) 39
- Y) 30
- Z) 33

Toss Up Answer: Z

Bonus: Short Answer

Donald Trump has a tower consisting of 0.00405×10^{45} grams of gold. How many kilograms of gold is in his tower? Express in scientific notation.

Bonus Answer: 4.05×10^{39} (kilograms of gold)

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22. Earth and Space Science

Toss Up: Multiple Choice

Which is not a type of rock?

- W) sedimentary
- X) metamorphic
- Y) igneous
- Z) elementary

Toss Up Answer: Z

Bonus: Short Answer

Which type of rock is formed from magma?

Bonus Answer: igneous rock

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23. Mathematics

Toss Up: Multiple Choice

Which of the following has the largest amplitude?

- W) $9\sin(x) - 2$
- X) $2\cos(6x) + 5$
- Y) $\cos(2x)$
- Z) $4\sin(10x)$

Toss Up Answer: W

Bonus: Short Answer

What power of 2 is closest to 255?

Bonus Answer: 8

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24. Biology

Toss Up: Short Answer

An ecologist recorded 12 white-tailed deer, *Odocoileus virginianus*, per square mile in one woodlot and 20 per square mile in another woodlot. What was the ecologist comparing?

Toss Up Answer: density

Bonus: Short Answer

Why do populations grow more slowly as they approach their carrying capacity?

Bonus Answer: Density-dependent factors lead to fewer births and increased mortality. (Accept Density-Dependent factors)

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25. Biology

Toss Up: Multiple Choice

Which of the following is not one of the basic tastes

- W) sweetness
- X) saltiness
- Y) umami
- Z) spiciness

Toss Up Answer: Z

Bonus: Multiple Choice

In classical conditioning, an unlearned, inborn reaction to an unconditioned stimulus is a(n)

- W) unconditioned stimulus
- X) conditioned stimulus
- Y) conditioned response
- Z) unconditioned response

Bonus Answer: Z

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