7

1. Biology

Toss Up: Multiple Choice

Which of the following processes in cellular respiration produce the most ATP

W) Glycolysis

X) Link Reaction

Y) Krebs Cycle

Z) Oxidative Phosphorylation

Toss Up Answer: Z

Bonus: Multiple Choice

Which of the following is not used in cellular respiration

W) Glucose

X) NADH

Y) FADH2

Z) NADPH

Bonus Answer: Z

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2. Earth and Space Science

Toss Up: Multiple Choice

The ozone is in what layer

W) Stratosphere

X) Troposphere

Y) Hydrosphere

Z) Mesosphere

Toss Up Answer: W

Bonus: Multiple Choice

Atmospheric convection is driven by

W) Ocean currents

X) Evaporation of oceans

Y) Unequal heating by the sun

Z) Fluctuations of the Earth's magnetic field

Bonus Answer: Y

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3. Biology

Toss Up: Short Answer

Ruminants have the ability to digest what commonly ingested substance that humans cannot digest due to microorganisms in the stomach?

Toss Up Answer: Cellulose

Bonus: Short Answer

What is the main site of methane production in ruminants?

Bonus Answer: Rumen, accept first chamber/stomach

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4. Mathematics

Toss Up: Short Answer

What is tan(arcsin(9/41))

Toss Up Answer: 9/40

Bonus: Short Answer

What is sin(arccot(tan(arccos(3/5))))

Bonus Answer: 3/5

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5. Physics

Toss Up: Short Answer

The frequency of a wave is 50 Hertz and its wavelength is 25 meters. What is the velocity of this wave?

Toss Up Answer: 1250 meters/second

Bonus: Short Answer

The focal length of a concave spherical mirror is equal to 1 meter. What is the radius of curvature of this mirror?

Bonus Answer: 2 meters

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6. Earth and Space Science

Toss Up: Multiple Choice

In the Northern Hemisphere, the Coriolis force deflects in which direction?

W) Up

X) Down

Y) Right

Z) Left

Toss Up Answer: Y

Bonus: Short Answer

What is the altitude of Polaris equal to?

Bonus Answer: Your latitude

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7. Physics

Toss Up: Short Answer

A sports car dealer claims that his product will accelerate at a constant rate from rest to a speed of 90 km/hr in 8s. What is the acceleration of the car in m/s^2 to the nearest whole number?

Toss Up Answer: 3 m/s^2

Bonus: Short Answer

A rock released at rest from the top of a tower hits the ground after falling for 2 s. What is the height of the tower if air resistance is negligible to the nearest whole number?

Bonus Answer: 20 m

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8. Chemistry

Toss Up: Multiple Choice

What is the correct term(s) used to determine if a system has come to equilibrium?

W) Ka and Q

X) Ksp

Y) Q

Z) Kc

Toss Up Answer: Y

Bonus: Multiple Choice

Chemical equilibrium may be used to describe

W) gas phase chemical reactions

X) acid and based ionization

Y) Solubility

Z) All of the Above

Bonus Answer: Z

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9. Earth and Space Science

Toss Up: Multiple Choice

What element accounts for the second-most percentage of volume of the Earth's crust?

W) Oxygen

X) Calcium

Y) Potassium

Z) Silicon

Toss Up Answer: Z

Bonus: Short Answer

Give four pieces of information that would be present on a typical weather map.

Bonus Answer: Any four of the following: Temperature, visibility, weather or weather conditions, dew point, wind speed, wind direction, pressure or barometric pressure, precipitation, and cloud cover

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10. 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 = x2. Give the x-y coordinates of the focal point for this parabola.

Bonus Answer: (0, 1/4)

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11. Earth and Space Science

Toss Up: Short Answer

What determines a mineral's properties?

Toss Up Answer: The internal arrangement of its atoms.

Bonus: Short Answer

What type of currents cause plates to move in the mantle?

Bonus Answer: Convection currents

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12. Mathematics

Toss Up: Short Answer

Describe the experession 2 log3 x + log3 5 as a single logarithmic expression

Toss Up Answer: log3 (5x^2)

Bonus: Short Answer

Solve the equation 2|3x - 2| - 3 = 7

Bonus Answer: x = (7/3) , -1

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13. 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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14. Biology

Toss Up: Short Answer

Which of the following are classified as Type III hypersensitivity? (Note more than one answer may apply.)
I. Systemic Lupus Erythematosus
II. Farmer's lung
III. Erythroblastosis fetalis
IV. Glomerulonephritis

Toss Up Answer: I, II, and IV

Accept: Systemic Lupus Erythematosus, Erythroblastosis fetalis, Glomerulonephritis

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Bonus: Multiple Choice

Erythroblastosis fetalis can kill the baby in any pregnancy of the mother but the first. This fatal condition occurs when
W) The mother is Rh(-) and the fetus from her first pregnancy is Rh(-)
X) The mother is Rh(-) and the fetus from her first pregnancy is Rh(+)

Y) The mother is Rh(+) and the fetus from her first pregnancy is Rh(-)
Z) The mother is Rh(+) and the fetus from her first pregnancy is Rh(+)

Bonus Answer: X
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15. Earth and Space Science

Toss Up: Multiple Choice
What was the magnitude of the largest earthquake ever?
W) 9
X) 9.1
Y) 9.3
Z) 9.6

Toss Up Answer: Z

Bonus: Multiple Choice
How much north does the Earth's magnetic north pole move per year?
W) 30 miles
X) 35 miles
Y) 40 miles
Z) 50 miles

Bonus Answer: Z
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16. Mathematics

Toss Up: Short Answer
What is the volume of a sphere if the radius is 7 inches? (use 22 / 7 for pi) You may either use fractions or decimals rounded to the nearest hundredth as your answer.
Toss Up Answer: V = 4312 / 3 cubic inches
or V = 1437. 33 cubic inches
(they must include the correct units)

Bonus: Short Answer
Find the surface area of a rectangular prism if the length is 2 inches, the width is 3 inches, and the height is 2 inches.
Bonus Answer: V = 32 square inches
(they must include the correct units)
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17. Biology

Toss Up: Multiple Choice
Barr bodies exist as what structure in the nucleus?
W) euchromatin
X) acetylated histones
Y) heterochromatin
Z) circular DNA
Toss Up Answer: Y

Bonus: Short Answer
In histone acetylation, acetyl groups attach to which amino acid of the histone tails?
Bonus Answer: lysine
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18. Earth and Space Science

Toss Up: Multiple Choice
What is the penultimate spectral type of a star?
W) F
X) G
Y) K
Z) M
Toss Up Answer: Y

Bonus: Short Answer
What spectral type is the Sun?
Bonus Answer: G
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19. Chemistry

Toss Up: Multiple Choice
The H–C–O bond angle in H2C=O (formaldehyde) is approximately:
W) 90
X) 109
Y) 120
Z) 180
Toss Up Answer: Y

Bonus: Short Answer
In which compound does carbon have the highest oxidation state?
1. CH4
2. HCN
3. H2CO
4. CH2Cl2
Bonus Answer: 2. HCN
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20. Physics

Toss Up: Multiple Choice
What did Ernest Orlando Lawrence develop in 1932?
W) Nuclear Reactor
X) The Microwave
Y) Cyclotron
Z) X-Ray Machine
Toss Up Answer: Y

Bonus: Short Answer
What theory first appeared in a 1905 paper called "On the Electrodynamics of Moving Bodies"?
Bonus Answer: Special Theory of Relativity
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21. Biology

Toss Up: Multiple Choice

Which of the following most closely approximates the number of protein-coding genes in the human genome?

W) 10,000
X) 20,000
Y) 50,000
Z) 100,000

Toss Up Answer: X

Bonus: Short Answer

Arrange the following to depict the conduction pathway in the vertebrate heart: 1) atrioventricular node, 2) right and left bundle branches, 3) sinoatrial node, 4) Bundle of His, 5) Purkinje fibers.

Bonus Answer: 3) SINOATRIAL NODE
1) ATRIOVENTRICULAR NODE
4) BUNDLE OF HIS
2)RIGHT AND LEFT BUNDLE BRANCHES
5) PURKINJE FIBERS

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22. Physics

Toss Up: Multiple Choice

Diffraction plays an important role in which of the following phenomena?

W) The sun appearing as a disk to the naked eye
X) Light being bent through a glass prism
Y) Shouting through a megaphone
Z) A thin soap film displaying colors when light is incident on it

Toss Up Answer: Y

Bonus: Multiple Choice

A beam of light passes though one polarizing filter and through another filter rotated at 45 degrees compared to the first one. If the original intensity of the light was 100 W, what is the new intensity of the polarized light?

W) 50
X) 75
Y) 100
Z) 150

Bonus Answer: W

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23. Biology

Toss Up: Multiple Choice

Acetone has a distinct smell, which many people associate with the smell of nail polish remover. What might the smell of acetone in the urine or on the breath of a patient indicate?

W) The patient might be degrading too many amino acids from muscle proteolysis.
X) The patient's body might be oxidizing too many fatty acids.
Y) The patient might have enteritis and is absorbing endproducts of fermentation.

Z) The patient might have fructose toxicity.

Toss Up Answer: X

Bonus: Multiple Choice

Which description best describes what would happen to the carbon cycle if all detritivores suddenly went on “strike” and stopped working?

W) Carbon would increase in inorganic mass, while the atmospheric reservoir of carbon would continue to increase and plants would not be jeopardized.

X) Carbon would accumulate in organic mass, the atmospheric reservoir of carbon would decline, and plants would eventually be starved for CO_2 .

Y) Carbon would increase in organic mass, while the atmospheric reservoir of carbon would increase and plant-life would be starved for CO_2.

Z) Carbon would decrease in organic mass, while the atmospheric reservoir of carbon would increase with the result that plant-life would be starved for CO_2.

Bonus Answer: X

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