

Round 1

1. EARTH and SPACE

Writer: Jan Wojcik

Toss Up: Multiple Choice

sex

W) .

X) .

Y) .

Z) .

Toss Up Answer: Z

Bonus: Multiple Choice

penis

W) .

X) .

Y) .

Z) .

Bonus Answer: W

2. BIOLOGY

Writer: Matthew Lee

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

Bonus Answer: I, II, and IV

Accept: Systemic Lupus Erythematosus, Erythroblastosis fetalis, Glomerulonephritis

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

3. MATHEMATICS

Writer: Ivan Zhang

Toss Up: Short Answer

What number is a factor of $y^3 + 10y^2 + 123y + 5$?

Bonus Answer: 1, -1

Bonus: Short Answer

What is the area of an equilateral triangle inscribed in a circle with a radius of 6?

Bonus Answer: (27(radical 3))

=====

4. EARTH and SPACE

Writer: Zoe Orlin

Toss Up: Short Answer

what is a front?

Bonus Answer: boundary between two air masses

=====

Bonus: Short Answer

How does a cold front form?

Bonus Answer: w. drop in temperature

x. cold air moves in and replaces warm air

y.warm air moves in and replaces cold air

z. cold and warm air mix :)

=====

5. BIOLOGY

Writer: Matthew Lee

Toss Up: Multiple Choice

Which of the following is a bacteriostatic antibiotic that works by disrupting protein synthesis?

W) Erythromycin

X) Penicillin

Y) Trimethoprim

Z) Nalidixic acid

Toss Up Answer: W

=====

Bonus: Multiple Choice

In India, during a cholera epidemic of 1926, European men poured a treatment for cholera into village wells unbeknownst to the villagers. What was the treatment?

W) Alcohol

X) antibiotics

Y) Phages

Z) Iodine

Bonus Answer: Y

=====

6. EARTH and SPACE

Writer: Janine Goh

Toss Up: Short Answer

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

Bonus Answer: Proxima Centauri

=====

Bonus: Short Answer

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

Bonus Answer: 15th and 16th of each month

=====

7. BIOLOGY

Writer: Matthew Lee

Toss Up: Multiple Choice

One day you see the headline on a tabloid and it says: "BACTERIA ARE EATING MY FACE." The species of bacteria

that most commonly causes the condition (necrotizing fasciitis) sensationalized above is:

- W) Staphylococcus aureus
- X) Streptococcus agalactiae
- Y) Staphylococcus epidermis
- Z) Streptococcus pyogenes

Toss Up Answer: Z

Bonus: Short Answer

Staphylococcus aureus produces many enzymes that contribute to its virulence. It produces an enzyme that breaks down an acid crucial to the structural integrity of tissues. This acid is:

Bonus Answer: Hyaluronic acid (accept: Hyaluronic)

8. CHEMISTRY

Writer: Nicholas Adit

Toss Up: Multiple Choice

Which of these compounds is not a saturated compound?

- W) ethane
- X) propanol
- Y) butanal
- Z) acetylene

Toss Up Answer: Z

Bonus: Short Answer

What are the two compounds formed when ethanoic acid and ethanol react?

Bonus Answer: Ethyl ethanoate and water

9. MATHEMATICS

Writer: Aaron Gee

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 10 is closest to 255?

Bonus Answer: 10 to the 16

10. PHYSICS

Writer: Nicholas Adit

Toss Up: Multiple Choice

A light ray passes through a prism, causing a dispersion of light. Which color will have the greatest angle of deviation?

- W) Red
- X) Yellow
- Y) Green
- Z) Blue

Toss Up Answer: Z

Bonus: Short Answer

Put the following electromagnetic waves in order of increasing wavelength: Microwaves, Ultraviolet, Gamma Rays, Radio Waves, Visible Light, Infrared, X-rays.

Bonus Answer: Gamma Rays, X-rays, Ultraviolet, Visible Light, Infrared, Microwaves, Radio Waves

11. MATHEMATICS

Writer: Zoe Orlin

Toss Up: Short Answer

What is the derivative of x^2 ?

Bonus Answer: $2x$

Bonus: Short Answer

What is the derivative of $42x^2$

Bonus Answer: $84x$

12. BIOLOGY

Writer: Jason Mohabir

Toss Up: Multiple Choice

Stabilization of the unique coiled structure of an alpha helix in a protein is primarily attributed to:

- W) disulfide bridges between cysteine side chains
- X) carbohydrate moieties attached to polar amino acids
- Y) peptide linkages that covalently bond amino acids
- Z) an abundance of amino acids with electrically charged side chains

Toss Up Answer: Z

Bonus: Multiple Choice

Histidine is degraded to α -ketoglutarate and is described as a:

- W) gluco amino acid
- X) glucogenic amino acid
- Y) ketogenic amino acid
- Z) keto-gluco amino acid

Bonus Answer: X

13. PHYSICS

Writer: Shantanu Jha

Toss Up: Short Answer

A step-down transformer has a turns ratio less than

Bonus Answer: One

Bonus: Multiple Choice

By design, wires with the highest resistance are built into

- W) Clocks
- X) Toasters
- Y) Telephones
- Z) Stereo Speakers

Bonus Answer: X

14. BIOLOGY

Writer: Jason Mohabir

Toss Up: Multiple Choice

A person with phenylketonuria cannot convert:

- W) phenylalanine to tyrosine
- X) phenylalanine to isoleucine
- Y) phenol into ketones
- Z) phenylalanine to lysine

Toss Up Answer: W

Bonus: Short Answer

In the normal breakdown of phenylalanine, it is initially degraded to:

Bonus Answer: Tyrosine

15. PHYSICS

Writer: Shantanu Jha

Toss Up: Multiple Choice

The circuit breaker in a typical household light circuit is rated for how many amps?

- W) 2
- X) 20
- Y) 200
- Z) 2000

Toss Up Answer: X

Bonus: Short Answer

Most power lines carry high voltages. Before the electricity is fed into your home, it must be put through what device that lowers the voltage to 110 volts?

Bonus Answer: Transformer

16. CHEMISTRY

Writer: Nicholas Adit

Toss Up: Multiple Choice

What is the fourth most abundant element on Earth?

- W) Oxygen
- X) Carbon
- Y) Sulfur
- Z) Argon

Toss Up Answer: X

Bonus: Short Answer

What metal forms compounds that give a grayish-white color?

Bonus Answer: Lead

17. BIOLOGY

Writer: Jason Mohabir

Toss Up: Multiple Choice

The phospholipids present in cytoplasm membrane of the archaeo-bacteria is:

- W) phosphoglycerides

- X) polyisoprenoid
- Y) polyisoprenoid branched chain lipids
- Z) none of the above

Toss Up Answer: Y

Bonus: Multiple Choice

The phospholipids present in cytoplasm membrane of eubacteria is mainly:

- W) phosphoglycerides
- X) polyisoprenoid
- Y) phospholipoprotein
- Z) none of these

Bonus Answer: W

18. CHEMISTRY

Writer: Jason Mohabir

Toss Up: Multiple Choice

How many electrons occupy the bonding molecular orbitals of a CN triple bond?

- W) 2
- X) 4
- Y) 6
- Z) 8

Toss Up Answer: Y

Bonus: Multiple Choice

Which of the following compounds would have the highest boiling point?

- W) $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$
- X) CH_3NH_2
- Y) CH_2F_2
- Z) CH_3OH

Bonus Answer: Z

19. PHYSICS

Writer: Shantanu Jha

Toss Up: Multiple Choice

Who did not have a unit of electrical measurement named after him?

- W) Voltaire
- X) Georg Ohm
- Y) Andre Ampere
- Z) Charles Coulomb

Toss Up Answer: W

Bonus: Short Answer

It converts electrical energy into electromagnetic radiation and vice versa. Name this device designed to transmit and receive radio waves.

Bonus Answer: Antenna

20. CHEMISTRY

Writer: Jason Mohabir

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

21. PHYSICS

Writer: Raafiul Hossain

Toss Up: Short Answer

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

Bonus Answer: inertia

Bonus: Multiple Choice

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

W) speed

X) velocity

Y) acceleration

Z) W,X

Bonus Answer: Z

22. CHEMISTRY

Writer: Ivan Zhang

Toss Up: Multiple Choice

What does Pauli's Exclusion Principle state?

W) Electrons of an atom must have the same spin

X) No two electrons of an atom travel in the same orbital

Y) no two electrons in an atom can be at the same time in the same state or configuration

Z) Electrons can switch spin automatically

Toss Up Answer: Y

Bonus: Short Answer

What law states that electrons in the same orbitals reorganize themselves to maximize spin?

Bonus Answer: Hund's law

23. BIOLOGY

Writer: Jason Mohabir

Toss Up: Multiple Choice

Which were the investigators lived at the same time?

W) Koch and Pasteur

X) Darwin and Woese

Y) Van Leeuwenhoek and Ricketts

Z) Berg and Hooke

Toss Up Answer: W

Bonus: Short Answer

The third founder of microbiology, Ferdinand Cohn, classified bacteria by shape. This system is still used today. Name three shapes of bacteria.

Bonus Answer: Three of these: sphericals, short rods [rod], threads, and spirals

24. PHYSICS

Writer: Raafiul Hossain

Toss Up: Short Answer

The speedometer in your car tells you what

Bonus Answer: instantaneous speed

Bonus: Short Answer

Projectile 'A' is fired at an angle of 50° above the horizontal; projectile 'B' is fired with the same speed at an angle of 40° above the horizontal. Assuming level ground and negligible air resistance, what is true about range and height of both objects?

Bonus Answer: A' will reach a smaller height and have a greater range than 'B'.

25. BIOLOGY

Writer: Jason Mohabir

Toss Up: Short Answer

What is considered the most unifying concept in biology?

Bonus Answer: Evolution

Bonus: Multiple Choice

You capture a Pikachu and make it hold a Light Ball. You breed this Pikachu and the resulting Pokemon inherits the move Volt Tackle. This phenomenon of inheriting traits due to the actions of individuals reflects what theory:

W) Darwinian Natural Selection

X) Lamarckian Inheritance

Y) Oak-azaki Fragments

Z) Parental Mimicry

Bonus Answer: X
