

Round 3

1. BIOLOGY

Writer: Olivia Gallager

Toss Up: Short Answer

What hormone regulates sleep cycles?

Bonus Answer: Melatonin

Bonus: Short Answer

What blood type is considered the universal donor?

Bonus Answer: O-, O-neg, O-negative

2. PHYSICS

Writer: William Xiang

Toss Up: Multiple Choice

Which of the following bodies has the largest kinetic energy?

W) Mass 3M and speed V

X) Mass 3M and speed 2V

Y) Mass 2M and speed 3V

Z) Mass M and speed 4V

Toss Up Answer: Y

Bonus: Multiple Choice

AN object is constrained by a cord to move in a circular path of radius 0.5m on a horizontal frictionless surface. The cord will break if its tension exceeds 16N. The maximum kinetic energy the object can have is:

W) 4J

X) 8J

Y) 17J

Z) 32J

Bonus Answer: W

3. BIOLOGY

Writer: Shanjeed Ali

Toss Up: Multiple Choice

Which of the following is not true about genetically modified food?

W) genetically modified organisms are generally safe for human consumption

X) over 80 % of corn grown in the US is genetically modified

Y) genetically modified crops require larger amounts of pesticides

Z) genetically modified crops can yield greater harvests for less cost

Toss Up Answer: Y

Bonus: Short Answer

Bt corn is genetically modified to produce a certain protein that is poisonous to certain insects. What is the genus of the source of the genetic material that produces this corn?

Bonus Answer: Bacillus

4. EARTH and SPACE

Writer: Nicholas Adit

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

5. PHYSICS

Writer: William Xiang

Toss Up: Short Answer

A ball with a weight of 3.5 Newtons is thrown at an angle of 30 degrees above the horizontal with an initial speed of 16 meters per second. Give the magnitude and direction of the net force on the ball at its highest point.

Bonus Answer: 3.5 Newtons, downward

Bonus: Short Answer

A car is traveling at 15 meters per second on a horizontal road. The brakes are applied and the car skids to a stop in 4 seconds. Assuming gravitational acceleration is 10 meters per second squared, find the coefficient of kinetic friction between the tires and road. Round your answer to the nearest tenth.

Bonus Answer: 0.38

6. MATHEMATICS

Writer: Aaron Gee

Toss Up: Short Answer

Subtract the following complex numbers, giving your answer in standard form: $(11 - 4i) - (-3 + 3i)$

Bonus Answer: 12 - 7i

Bonus: Short Answer

Solve the following inequality for x, giving your answer in fractional form, $\frac{1}{3}x + \frac{2}{3}$ is less than $\frac{5}{6}x - 2$.

Bonus Answer: x is greater than 16/3

7. BIOLOGY

Writer: Mohammed Jamil

Toss Up: Multiple Choice

Where does the electrical signal in the heart start

- W) sinoatrial node
- X) atrioventricular node

- Y) atrioventricular bundle
- Z) purkinje fibers

Toss Up Answer: W

Bonus: Multiple Choice

Which valve separates the right atrium from the right ventricle

- W) Mitral Valve
- X) Tricuspid valve
- Y) Bicuspid Valve
- Z) Semi-lunar valves

Bonus Answer: X

8. MATHEMATICS

Writer: Aaron Gee

Toss Up: Short Answer

What function is the inverse of $y = 3x + 4$?

Bonus Answer: $y = x - 4/3$

Bonus: Short Answer

Giving your answer as an ordered pair, find the solution of the system of the following 2 equations: $2x + 3y = 8$, and $3x - 2y = -1$

Bonus Answer: (1,2)

9. BIOLOGY

Writer: Ahmad Alnasser

Toss Up: Multiple Choice

Animals and fungi are both characterized as heterotrophic. The distinguishing factor of animal heterotrophy from fungal heterotrophy is that only animals derive their nutrition by

- W) consuming living, rather than dead, prey.
- X) preying on animals
- Y) ingesting it
- Z) using enzymes for digestion

Toss Up Answer: Y

Bonus: Multiple Choice

At which developmental stage should one be able to first distinguish a diploblastic embryo from a triploblastic embryo?

- W) fertilization
- X) gastrulation
- Y) coelom formation
- Z) cleavage

Bonus Answer: X

10. EARTH and SPACE

Writer: Jessica Titensky

Toss Up: Multiple Choice

What is the closest star to earth

- W) Sirius
- X) Betelgeuse
- Y) Alpha proxima
- Z) The sun

Toss Up Answer: Z

Bonus: Short Answer

What is the closest star to the sun

Bonus Answer: Proxima centauri

11. MATHEMATICS

Writer: Raafiul Hossain

Toss Up: Short Answer

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

Bonus Answer: 4

Bonus: Short Answer

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

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

12. CHEMISTRY

Writer: Nicholas Adit

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

13. PHYSICS

Writer: Prangon Ghose

Toss Up: Short Answer

A rock is thrown downward from the top of a tower with an initial speed of 12 m/s. If the rock hits the ground after 2 s, what is the speed of the rock as it hits the ground if air resistance is negligible to the nearest whole number?

Bonus Answer: 32 m/s

Bonus: Short Answer

Human reaction time is usually greater 0.10 s. If someone holds a ruler between your finger and thumb and releases it without warning, how far can you expect the ruler to fall before you catch in cm to the 10th place?

Bonus Answer: 4.9 cm (accept 5 cm)

14. EARTH and SPACE

Writer: Shamaul Dilmohamed

Toss Up: Short Answer

What are two general types of soils that have developed in the United States?

Bonus Answer: pedocals and pedalfers

Bonus: Short Answer

What are the two most prominent elements dissolved in seawater?

Bonus Answer: Chlorine and Sodium

15. MATHEMATICS

Writer: Hanna Yang

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

16. CHEMISTRY

Writer: Hanna Yang

Toss Up: Multiple Choice

Which of the following is a polar molecule?

- W) SO₂
- X) CH₄
- Y) SF₆
- Z) BF₄

Toss Up Answer: W

Bonus: Short Answer

Fill in the blanks in the following statement to make it true. Ionic compounds are ____ conductors in their solid state, but ____ conductors when dissolved in water.

Bonus Answer: poor; good (accept equivalent answers)

17. BIOLOGY

Writer: Jason Mohabir

Toss Up: Multiple Choice

Pine, fir, spruce, cedar, larch and cypress are the famous timber-yielding plants. All these belong to:

- W) angiosperms
- X) gymnosperms
- Y) monocotyledons
- Z) dicotyledons

Toss Up Answer: X

Bonus: Multiple Choice

The population of algae in soil is [blank] that of either bacteria or fungi.

- W) generally smaller than
- X) generally greater than
- Y) equal to
- Z) there are no algae in soil

Bonus Answer: W

18. EARTH and SPACE

Writer: Zoe Orlin

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

19. CHEMISTRY

Writer: Shihab Karim

Toss Up: Short Answer

By name or number, list the following atoms in order of increasing electronegativity:

1. Flourine
2. Chlorine
3. Bromine

Bonus Answer: Bromine, Chlorine, Flourine (accept 3,2,1)

Bonus: Short Answer

Which element has the highest electronegativity?

Bonus Answer: Flourine

20. BIOLOGY

Writer: Josh Tish

Toss Up: Multiple Choice

A female lizard washes ashore on an island after riding a floating log for hundreds of miles across the sea. She is the only member of her species to have ever made it to the island. After arriving, she lays 20 fertile eggs that hatch and form the basis of a lizard population on the island. Which of the following is NOT a likely result?

- W) The new island population will have less genetic diversity than the ancestral population.
- X) Mutation will add new alleles to the new population and thus increase its genetic diversity over time.
- Y) There will be little or no gene exchange between the new population and the ancestral population.
- Z) The new island population will have greater genetic diversity than the ancestral population.

Toss Up Answer: Z

Bonus: Multiple Choice

Loss of heterozygosity can be caused by all of the following EXCEPT:

- W) genetic drift.
- X) positive frequency-dependent selection.
- Y) heterozygote advantage.
- Z) inbreeding.

Bonus Answer: Y

21. CHEMISTRY

Writer: Nicholas Adit

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

22. PHYSICS

Writer: Nicholas Adit

Toss Up: Multiple Choice

A sphere of charge +Q is fixed in position. A smaller sphere of charge +q is placed near the larger sphere and released from rest. The small sphere will move away from the large sphere with

- W) decreasing velocity and acceleration
- X) decreasing velocity and increasing acceleration.
- Y) increasing velocity and decreasing acceleration.
- Z) increasing velocity and increasing acceleration.

Toss Up Answer: Y

Bonus: Short Answer

If the distance between two positive point charges is tripled, then the strength of the electrostatic repulsion between them will decrease by a factor of

Bonus Answer: 9

23. CHEMISTRY

Writer: Shihab Karim

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

24. 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) position

X) velocity

Y) acceleration

Z) jerk

Bonus Answer: X
