

Round 6

1. PHYSICS

Writer: Shantanu Jha

Toss Up: Multiple Choice

What French physicist, living from 1623-1662, discovered the basic principles of pressures on fluids?

- W) Andre Marie Ampere
- X) Charles-Augustin de Coulomb
- Y) Joseph-Louis Lagrange
- Z) Blaise Pascal

Toss Up Answer: Z

Bonus: Multiple Choice

Supersymmetry is a proposed extension of space-time symmetry relating what 2 basic classes of elementary particles?

- W) Bosons and Fermions
- X) Hadrons and Leptons
- Y) Leptons and Mesons
- Z) Fermions and Mesons

Bonus Answer: W

2. MATHEMATICS

Writer: Larry Wong

Toss Up: Multiple Choice

If $\log_x (1/8) = -3/2$, then x is equal to

- W) -4
- X) 4
- Y) $1/4$
- Z) 10

Toss Up Answer: X

Bonus: Multiple Choice

f is a function such that $f(x) < 0$. The graph of the new function g defined by $g(x) = |f(x)|$ is a reflection of the graph of f

- W) on the y axis
- X) on the x axis
- Y) on the line $y = x$
- Z) on the line $y = -x$

Bonus Answer: X

3. PHYSICS

Writer: Shantanu Jha

Toss Up: Multiple Choice

What was the first object created by people that produces a sonic boom (albeit a very small one)?

- W) Bullet
- X) Bullwhip
- Y) Slingshot

Z) Jet Plane

Toss Up Answer: X

Bonus: Multiple Choice

What kind of semiconductors are essentially all pure semiconductor material?

W) p-type

X) n-type

Y) intrinsic

Z) extrinsic

Bonus Answer: Y

4. MATHEMATICS

Writer: Larry Wong

Toss Up: Short Answer

What is the distance in space between the points with coordinates (-3,6,7) and (2,-1,4)?

Bonus Answer: 9.11

Bonus: Multiple Choice

The diameter and height of a right circular cylinder are equal. If the volume of the cylinder is 2, what is the height of the cylinder?

W) 1.37

X) 1.08

Y) 0.86

Z) 0.8

Bonus Answer: W

5. PHYSICS

Writer: Mohammed Jamil

Toss Up: Short Answer

A 1-kilogram ball is thrown into the air with an initial velocity of 30 m/sec. How high in the air did it travel ?

Bonus Answer: 46 meters

Bonus: Short Answer

What is the velocity of an 500-kilogram elevator that has 4,000 joules of energy?

Bonus Answer: 4 m/sec

6. MATHEMATICS

Writer: Ivan Zhang

Toss Up: Multiple Choice

What is asymptote of the function: $f(x) = 1/x$?

W) $y = 0$

X) $x = 0$

Y) $x = 0, y = 1$

Z) $x = 0, y = 0$

Toss Up Answer: Z

Bonus: Short Answer

Plugging the divergent series, $1 + 2 + 3 + 4 + \dots$, into the Riemann Zeta Function results in which number?

Bonus Answer: $-1/12$

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7. PHYSICS

Writer: Mohammed Jamil

Toss Up: Short Answer

A conveyor-belt, horizontally, moves a 600Kg bag a distance of 100 meters through the airport. How much work was done?

Bonus Answer: No work was done

Bonus: Short Answer

A dryer has a power rating of 2500 watts. To dry a few towels this dryer uses 6,750,000 joules of energy. How long will it take to dry these towels, in minutes

Bonus Answer: 45 minutes

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8. MATHEMATICS

Writer: Ivan Zhang

Toss Up: Multiple Choice

What is the square root of 2 (to the nearest tenths)?

W) 1.7

X) 1.5

Y) 1.3

Z) 1.4

Toss Up Answer: Z

Bonus: Short Answer

What is the equation of a circle with circumference 6π that is positioned 3 points above the x axis and 4 points before the y axis?

Bonus Answer: $(x-4)^2 + (y+3)^2 = 9$

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9. PHYSICS

Writer: Mohammed Jamil

Toss Up: Short Answer

A bulldozer does 30,000 joules of work to push another boulder a distance of 20 meters. How much force is applied to push the boulder?

Bonus Answer: 1,500 N

Bonus: Short Answer

A 450-newton gymnast jumps upward a distance of 0.50 meters to reach the uneven parallel bars. How much work, in joules, did she do before she even began her routine ?

Bonus Answer: 225

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10. BIOLOGY

Writer: Shamaul Dilmohamed

Toss Up: Short Answer

What is the name given to the jellylike substance filling the chamber behind the lens of the human eye?

Bonus Answer: vitreous humor

Bonus: Short Answer

Name the clear watery liquid that surrounds the brain and spinal cord and fills the four cavities or ventricles of the brain.

Bonus Answer: Cerebrospinal Fluid

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11. CHEMISTRY

Writer: Prangon Ghose

Toss Up: Short Answer

What two chemical elements are found in sphalerite?

Bonus Answer: Zinc and Sulfur (accept: Zn and S)

Bonus: Short Answer

What two chemical elements are found in periclase?

Bonus Answer: Magnesium and Oxygen (accept: Mg and O)

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12. BIOLOGY

Writer: Shamaul Dilmohamed

Toss Up: Short Answer

The chromosomes responsible for characteristics other than sex are known by what name?

Bonus Answer: Autosomes

Bonus: Short Answer

What is the term given to enzymes whose action is modulated by binding of a molecule to a site other than the active site?

Bonus Answer: allosteric enzymes

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13. CHEMISTRY

Writer: Prangon Ghose

Toss Up: Short Answer

What is the empirical formula of glucose?

Bonus Answer: CH₂O

Bonus: Short Answer

What is the shape of an Acetylene (C₂H₂) molecule?

Bonus Answer: Linear

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14. BIOLOGY

Writer: Larry Wong

Toss Up: Short Answer

What branch of biology deals with the study of insects?

Bonus Answer: Entomology

Bonus: Multiple Choice

Which animal does not belong to phylum chordata?

W) Alligator

X) ostrich

Y) octopus

Z) shark

Bonus Answer: Y

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15. CHEMISTRY

Writer: Prangon Ghose

Toss Up: Short Answer

What is the correct formula for Aluminum Oxide?

Bonus Answer: Al_2O_3 (accept: Aluminum 2 Oxygen 3)

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Bonus: Short Answer

What is the formal charge of oxygen in H_3O^+ ?

Bonus Answer: +1 (do not accept 1)

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16. BIOLOGY

Writer: Ivan Zhang

Toss Up: Multiple Choice

What makes the fur of polar bears white?

W) White pigment

X) No pigment and transparency of fur

Y) White pigment and transparency of fur

Z) Transparency of fur

Toss Up Answer: X

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Bonus: Short Answer

The term superbugs is usually used to refer to what?

Bonus Answer: Antibiotic-resistant bacteria

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17. CHEMISTRY

Writer: Prangon Ghose

Toss Up: Short Answer

What is the element formed by the beta decay of Carbon-14?

Bonus Answer: Nitrogen-14

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Bonus: Short Answer

If the abundance of Lithium-6 (6.0 amu) is 7.500% and the abundance of Lithium-7 (7.0 amu) is 92.500%, what is the average atomic mass to the tenth place?

Bonus Answer: 6.9 amu

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18. BIOLOGY

Writer: Kerwin Chen

Toss Up: Short Answer

What is the medical term for lazy eye?

Bonus Answer: amblyopia

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Bonus: Short Answer

What is the medical term for the clouding of the lens of the eye?

Bonus Answer: cataracts

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19. CHEMISTRY

Writer: Prangon Ghose

Toss Up: Multiple Choice

What do the Neon, Fluorine(1-) and Magnesium(2+) have in common?

- W) They are isotopes of each other
- X) They are isomers of each other
- Y) They are isoelectronic with each other
- Z) They have nothing in common

Toss Up Answer: Y

Bonus: Multiple Choice

The half-life of francium-212 is 19 minutes. How many minutes will it take for 1 gram of this isotope to decay to 0.125 grams?

- W) 4.75 min
- X) 9.5 min
- Y) 38 min
- Z) 57 min

Bonus Answer: Z

20. BIOLOGY

Writer: Larry Wong

Toss Up: Multiple Choice

What is the scientific name for a perentie?

- W) Varnus giganteus
- X) Lupus canis
- Y) Faunus Lacerta
- Z) Varnus priscus

Toss Up Answer: W

Bonus: Short Answer

What does HIV stand for?

Bonus Answer: Human Immunodeficiency Virus

21. EARTH and SPACE

Writer: Banpreet Singh

Toss Up: Short Answer

What formed Kepler and Copernicus on the lunar surface?

Bonus Answer: meteorites

Bonus: Short Answer

What fundamental force is responsible for Earth's spherical shape?

Bonus Answer: gravity

22. BIOLOGY

Writer: Kerwin Chen

Toss Up: Short Answer

What is the liquid underneath the cornea called?

Bonus Answer: aqueous humor

Bonus: Short Answer

What is the jellylike tissue behind the lens called?

Bonus Answer: vitreous humor

23. EARTH and SPACE

Writer: Banpreet Singh

Toss Up: Short Answer

The Moon's umbra just fell onto the Earth. Name this phenomenon.

Bonus Answer: Solar eclipse

Bonus: Short Answer

What galaxy is Earth located in?

Bonus Answer: The milky way galaxy

24. BIOLOGY

Writer: Kerwin Chen

Toss Up: Short Answer

Which scientist is often considered the father of microbiology?

Bonus Answer: Leeuwenhoek

Bonus: Short Answer

Which English scientist coined the word "cell"?

Bonus Answer: Robert Hooke, Hooke

25. EARTH and SPACE

Writer: Banpreet Singh

Toss Up: Short Answer

What is the largest fault line in California?

Bonus Answer: the San Andreas fault line

Bonus: Short Answer

The Davis Strait provides a route between what two oceans?

Bonus Answer: The Atlantic and Arctic
