

Tossup

- 1) *Biology – Short Answer:* Huntington's disease is characterized by repeats of what 3 nucleotide sequence?

ANSWER: CAG

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- 2) *Earth and Space – Multiple Choice:* Which of the following iron minerals is most resistant to chemical weathering?

- W) Magnetite
- X) Hematite
- Y) Goethite
- Z) Limonite

ANSWER: X) Hematite

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- 3) *Math – Short Answer:* An ellipse has 2 foci at $(-3,0)$ and $(3,0)$ and includes the point $(0,4)$. What is the area of this ellipse?

ANSWER: 20π

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- 4) *Physics – Multiple Choice:* A metal plate has a coefficient of linear expansion of 0.006 inverse Kelvins and an original area of 100 square meters. The temperature of the plate increases by 5 Kelvins. What is the new area of the plate to the nearest square meter?

- W) 101
- X) 103
- Y) 104
- Z) 106

ANSWER: Z

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- 5) *Chemistry – Short Answer:* Iodometry is most commonly used to determine the concentration of what types of compounds?

ANSWER: Oxidizing agents (Accept equivalent terms)

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- 6) *Biology – Short Answer:* What region of the inner ear is responsible for detecting horizontal acceleration?

ANSWER: Utricle

Tossup

- 7) *Earth and Space – Short Answer:* Tatooine orbits 3 AU away from a binary star system with masses of 1 solar mass and 3 solar masses. What is its orbital period to the nearest year?

ANSWER: 6

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- 8) *Chemistry – Short Answer:* How many radial and angular nodes respectively are contained in a 3d orbital?

ANSWER: 0 and 2

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- 9) *Physics – Short Answer:* A spaceship is in orbit with average mechanical energy of -78J. It fires its rockets and increases its average kinetic energy by 34 J. What is the average total mechanical energy in the orbit now?

ANSWER: -112 J

Tossup

- 10) *Math – Short Answer:* If $a^2 + b = 6$ [a squared plus b equals 6] and $a + b^2 = 7$ [a plus b squared equals 7], then what is the value of $a^2b^2 + a^3 + b^3 + ab$ [a squared times b squared plus a cubed plus b cubed plus a time b]?

ANSWER: 42