Question 1

For the f states of the hydrogen atom, $l = 3$.

Which of the following is the number of f energy states?

1. 3
2. 5
3. 7
4. 10
5. 14

Question 2

Consider the $n = 3$ level of the hydrogen atom.

For how many states in this level is the quantum number $m = +1$?

1. None
2. Exactly 1
3. Exactly 2
4. Exactly 3
5. Exactly 4

Question 3

A hydrogen atom is initially in its ground state ($n = 1$). A free electron is fired toward the hydrogen atom and collides with the atom. The lowest energy levels for hydrogen are as illustrated.

$-0.85\,\text{eV}$ —— $n = 4$

$-1.51\,\text{eV}$ —— $n = 3$

$-3.40\,\text{eV}$ —— $n = 2$

$-13.6\,\text{eV}$ —— $n = 1$

What is the minimum energy that the electron must have in order for it to stop after the collision (and all the energy be absorbed by the atom)?

1. $0.85\,\text{eV}$
2. $1.0\,\text{eV}$
3. $10.2\,\text{eV}$
4. $12.8\,\text{eV}$
5. $13.6\,\text{eV}$