



1. Which are quantized?

a. (yes/no) A click shifter on a ten speed bike	d. (yes/no) the mass of something made of atoms	g. (yes/no) The second hand on the clock in our classroom (Sweep)
b. (yes/no) Electron energy in hydrogen	e. (yes/no) The venetian blinds in our classroom	h. (yes/no) The rotation of a doorknob
c. (yes/no) Electron energy in gold atoms	f. (yes/no) The volume on an iPod "CLICK-CLICK-CLICK"	i. (yes/no) The altitude of the steps on a stairway

2. Are these four shapes associated more with Niels Bohr or the modern theory of e- from Schrodinger et al? SCHRODINGER

3. Compared to each of these shapes, where is an e- located? (circle one or more choices)

a. inside them **yes!**  
b. on the surface of them **yes!**  
c. outside them **yes!**

4. Answer in a sentence. What does the number 90% have to do with these drawings?

At any given instant the probability of finding an electron inside its orbital is 90%

5. Complete the chart.

p	n	e	symbol	atomic number	mass number	charge
5	7	5	<sup>12</sup> <sub>5</sub> B	5	12	0
17	18	18	<sup>35</sup> <sub>17</sub> Cl	17	35	-1
13	15	10	<sup>28</sup> <sub>13</sub> Al	13	28	+3
20	21	18	<sup>41</sup> <sub>20</sub> Ca	20	41	+2
16	16	18	<sup>32</sup> <sub>16</sub> S	16	32	-2

Which atoms contain the same number of neutrons?

- 1)  $^1_1\text{H}$  and  $^3_2\text{He}$
- 2)  $^2_1\text{H}$  and  $^4_2\text{He}$
- 3)  $^3_1\text{H}$  and  $^3_2\text{He}$
- 4)  $^1_1\text{H}$  and  $^4_2\text{He}$

Which of these phrases best describes an atom?

- 1) a positive nucleus surrounded by a hard negative shell
- 2) a positive nucleus surrounded by a cloud of negative charges
- 3) a hard sphere with positive particles uniformly embedded
- 4) a hard sphere with negative particles uniformly embedded

Which set of particles is arranged in order of increasing mass?

- 1)  $\text{H}_2$ ,  $\text{H}$ ,  $\text{H}^+$
- 2)  $\text{H}^+$ ,  $\text{H}_2$ ,  $\text{H}$
- 3)  $\text{H}_2$ ,  $\text{H}^+$ ,  $\text{H}$
- 4)  $\text{H}$ ,  $\text{H}^+$ ,  $\text{H}_2$

All atoms of a given element, *must* contain the same number of

- 1) protons
- 2) neutrons
- 3) electrons plus neutrons
- 4) protons plus neutrons

6. Which scientist is most associated with this style of drawing an atom?

- a. Niels Bohr
- b. Erwin Schrodinger

7. Is the drawing of this chlorine atom showing orbitals or orbits? (circle one)

8. If these circles were the only places an electron could be, how many different wavelengths of light could this atom emit?

- a. Thirty five wavelengths
- b. Seventeen wavelengths
- c. Seven wavelengths
- d. Three wavelengths



9.

10. According to the electromagnetic spectrum you memorized, which has a larger wavelength? (circle one)

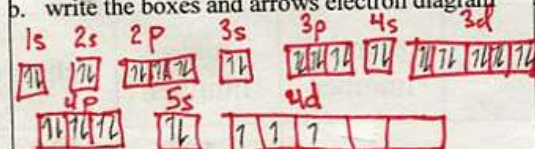
- green light or microwaves

11. For a neutral atom of Niobium (atomic # 41) [in the ground state],

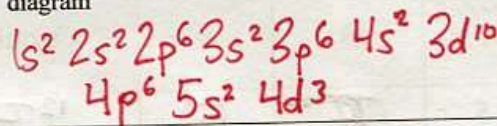
a. How many electrons should it have?

41e<sup>-</sup>

b. write the boxes and arrows electron diagram



c. write the shorthand abbreviation of the electron diagram



Don't worry about trying to draw a 41 e- atom as a Bohr Cartoon. I will never ask you to draw something with more than 28 electrons