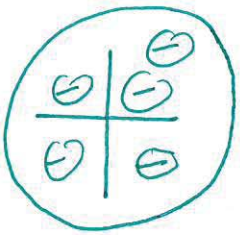
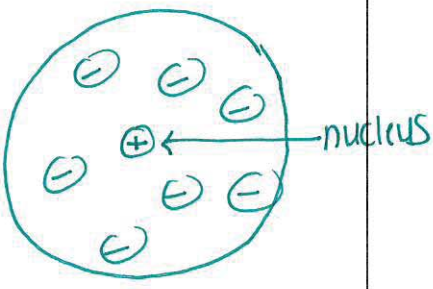
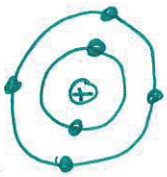
Unit 2 Test Review: The Atom ANSWER KEY

1. Complete the following table:

Scientist	Discovered/made what? How?	Related atomic picture
Dalton	**ATOMIC THEORY** (F) • All matter is made up of extremely small, solid, indivisible particles called atoms (F) • Atoms of same element are identical, different elements look different (T) • Atoms are neither created nor destroyed in chemical reactions, they can only be rearranged (T) • Compounds consist of atoms of elements combined in simple whole # ratio.	Which ones true/false? → protons, neutrons, electrons → isotopes
Thomson	• Atoms COULD be subdivided Experiment with cathode rays - atoms actually contained small negatively charged particles (called electrons)	plum pudding model 
Rutherford	• Gold foil experiment – 1) atoms consisted of a very small, positively charged region (called nucleus) 2) surrounded by the electrons, 3) atoms are mostly empty space • Nucleus contains protons (+) and neutrons (0) (All mass is in nucleus!)	
Bohr	• Electrons existed in specific orbits • Electrons have fixed energy in energy levels • Bohr model was developed with the study of the hydrogen emission spectrum	 planetary model

2. Complete the following table: $A = P = E$ $M = A + N$

Isotope name	mass #	atomic #	# of protons	# of neutrons
Nitrogen-14	14	7	7	7
Nitrogen-15	15	7	7	8
$^{12}_{6}C$	12	6	6	6
$^{13}_{6}C$	13	6	6	7
Potassium-39	39	19	19	20
Potassium-40	40	19	19	21
Potassium-41	41	19	19	22

isotopes (Nitrogen-14, Nitrogen-15)

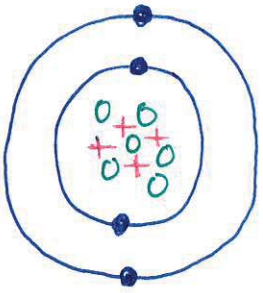
isotopes ($^{12}_{6}C$, $^{13}_{6}C$)

isotopes (Potassium-39, Potassium-40, Potassium-41)

3. Draw the Bohr model

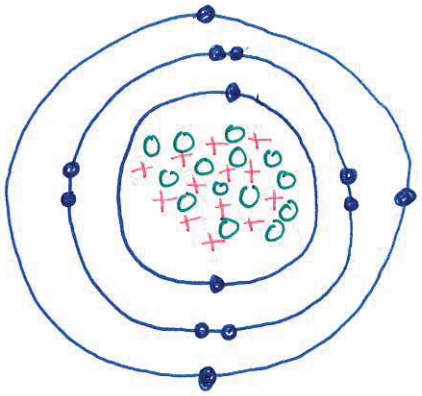
beryllium (mass of 10)

+ 4 p^+
0 6 n
• 4 e^-



aluminum (mass of 27)

+ 13 p^+
0 14 n
• 13 e^-



5. The most abundant isotopes of argon are argon-36, argon-38, and argon-40.
   a. Which of the three isotopes of argon is the most common (abundant) in nature? Ar-40
   b. How do you know?

on P.T. Argon's avg mass = 39.95 closest so must be most abundant

6. Compare and contrast isotopes of the same element:
   a. Compare: how are isotopes of the same element similar?

same # of p+

   b. Contrast: how are isotopes of the same element different?

different # of n°
different mass #

7. The following table lists relative abundances of a particular element on the periodic table with the mass of each isotope.

Relative Abundance of Naturally Occuring Isotopes	
Mass of isotope (amu)	Percent Abundance
49.946	4.345%
51.941	83.789%
52.941	9.501%
53.939	2.365%

What element would most likely have this isotopic composition? How do you know?

chromium (avg = 52.00)
closest to most abundant but slightly ↑

8. Silicon has three naturally occurring isotopes, as shown in the table below. What is the average atomic mass of silicon?

Isotope	Percent	Decimal	Mass	Product
Si-28	92.21%	0.9221	28	25.8188
Si-29	4.70%	0.047	29	1.363
Si-30	3.09%	0.0309	30	0.927
				+

Total: 28.1088 amu