Name: Class:	
The Early Experiments To Characterize the Atom	
Learn about who, how, and when performed experiments that determined a model of the that we use today.	atom
 Go to the websites noted below and read about the experiments and the people who performed them. Also, use our class website to download additional information Answer the questions regarding these experiments ENJOY 	
The Cathode Ray Tube Experiment:	
http://www.wwnorton.com/college/chemistry/gilbert2/tutorials/interface.asp?chapter=chapter_02&folder= e_ray	<u>cathod</u>
The Gold Foil Experiment:	
http://www.wwnorton.com/college/chemistry/gilbert2/tutorials/interface.asp?chapter=chapter_02&folder=ord_experiment	<u>rutherf</u>
The Oil Drop Experiment	
http://www.wwnorton.com/college/chemistry/gilbert2/tutorials/interface.asp?chapter=chapter_02&folder=	<u>millikan</u>
The Cathode Ray Tube Experiment 1. Who conducted investigations into "the nature of matter" in the late 19 th century and what instrument use? 2. In everyday life, where could your parents use this instrument?	t did he
3. What does this instrument consist of? Draw a labeled diagram showing all the important parts	

5.	What happens to the cathode ray when the magnets are moved closer to it? Which pole of the magnet repels the cathode ray? What did this discovery suggested?
6.	What else, beside the magnetic field, affected the cathode ray path? What did Thomson concluded based on this phenomenon?
7.	Combining the phenomena of bending the cathode ray by the magnetic field and the electric current, what did Thomson do and what did he determine?
8.	What is a formula for mass-to-charge ratio? What was the mass-to-charge ratio relative to the hydrogen ion?
9.	What did this suggest to Thomson?
10.	Answer QUESTION 1:
	Answer QUESTION 2:
12.	What did this experiment demonstrated and established?

14. How did scientists demonstrate that electrons are found in ALL elements?
Download a PowerPoint presentation from the class website and learn about the "plum pudding" model of an atom. You will need this for the next part of this worksheet. The Gold Foil Experiment
1. Who suggested the "plum pudding" model of an atom? Draw and describe it.
2. Who and when tested the plum pudding model of an atom? What is the nickname of this experiment?
3. What is the charge of alpha particles?
4. What was the set-up of the experiment and what was the expected result?
5. Draw the experimental set up for this experiment, labelling all important parts of it.

13. Why do you think the cathode ray is under vacuum?

6.	What happened to the alpha particles shot at the gold foil? Draw it using your answer to question #5.
7.	Did the experimental results agreed with the "plum pudding" model of the atom? Why yes or why not?
8.	How did Rutherford himself describe these results?
9.	What was the Rutherford conclusion? What did he propose?
10.	. Based on his discovery, Rutherford also proposed/calculated two additional important information. What were they?
11.	. If you were to change the gold foil for a foil made out of Americium and performed the same experiment, what results would you expect? Would there be any change?

The Oil Drop Experiment

1.	Hov	v did	Thon	nson	contri	ibute	into	what	Milliko	an pl	anned	l to	deter	rmine.	Wei	re any	of ·	the o	quantit	ies k	nown?	
2.	Des	scribe	the	арра	ratus	used	by I	Milliko	an. Dro	aw it	and,	in y	our o	own wo	ords,	expla	in ho	w it	operat	tes.		
3.			•		<u>were</u> rate		_		of the	oil c	Irople	ts (d	of the	e same	size)?						
	ь)	Wha	t hap	pene	d to	the r	ate (of the	falling	g of	the o	oil di	oplet	rs as t	he dr	oplet	s wei	re ch	narged	by >	(– Ray	s?
	c)	Wha	t for	ces v	vere (acting	on ·	the d	roplets	and	l whic	h di	rectio	on the	y wer	e act	ing o	n the	e dropl	let?	Draw a	
		free	body	/ diag	gram '	for t	he oi	il drop	olet. W	/hat	was 1	the (overa	ll move	ement	of t	he di	rople	† ?			
										٠	•		_									
	d)	How	can	you c	alcula	ite th	ne ve	locity	of the	e dro	oplet?	Giv	e a f	ormulo	a and	desci	ribe (all th	ne quar	ntitie	s in it	

4.	<u>If the two plates were NOT charged</u> , what was the rate of the falling of the oil droplets of the same size and different charge?
5.	If the two plates were charged, a) What was the rate of the falling of the oil droplets of the same size and different charge?
	b) What forces are acting on the droplets? Draw a free body diagram for the oil droplet. What was the overall movement of the droplet?
6.	How can you calculate the velocity of the droplet? Give a formula and describe all the quantities in it
7.	Upon analysis, what did Millikan find out with regards to the differences between velocities of the drops of the same masses? How was the velocity related to charge?
8.	So, if the velocities of the droplets are multiples of a discrete amount, then
9.	Answer QUESTION 1:
10	. Answer QUESTION 2:
11.	. What is the Millikan's contribution to the characterization of the current model of the atom? What is the percentage error between his experimental value (for the charge) and the "current" value?