Name_____Date_____Hour_____

Balancing Chemical Equations

Pre-Lab:

1. Aria wanted to design a new bouncy-chew toy for her new puppy.
She used this "equation" to build it. The arrow shows what she had "before" and "after" building her new toys.

a) Did Aria balance her equation? Yes No Not Sure

b) Not so fast...Explain your answer to number 1!

I chose _____ because _____

c) The **"before"** objects are called **reactants**. Go back to the picture of the equation and CIRCLE ALL THE REACTANTS. Put an (R) in the circles.

d) The **"after"** objects are called **products**. Go back to the picture of the equation and BOX ALL OF THE PRODUCTS.
Put a (P) in the box(es).

Making a prediction...

2. In the following chemical equation: $CO_2 + H_2O \rightarrow C_2H_6 + O_2$
   a) List the products: _____

   b) Is this chemical equation balanced?
      - Yes, because _____
      - No, because _____

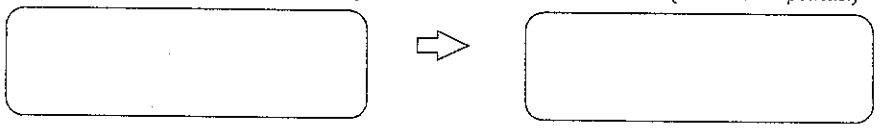
Part I: PhET Balancing Chemical Equations

- Go to http://ikechemistry.weebly.com
- Click on the "Chemistry" link at the top of the page
- Find the "Balancing Equations Simulation" under the Chapter 2 resources.
- Click on download file. Open the file.

1. Use the simulation to adjust the coefficients and balance the following equation. Select the balance scales and bar charts to help. Fill in the proper coefficients when you are successful (yellow smiley face).

a. ___ N_2 + ___ $H_2 \rightarrow$ ___ NH_3

2. Draw the particle view of the balanced equation as shown in the simulation. (Use colored pencils.)



3. Describe the purpose of the balance scales and bar charts in the simulation.

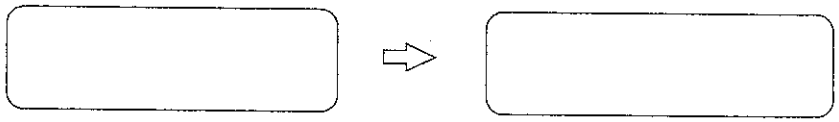
4. In order for a chemical equation to be properly balanced, what must be true?

5. Balance the other two examples.

Separate Water

_____ $H_2O \rightarrow$ _____ H_2 + _____ O_2

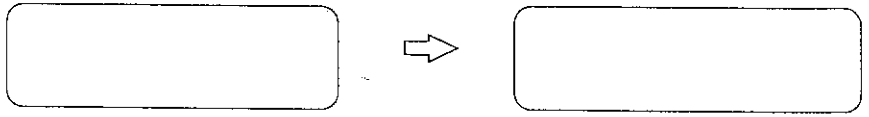
a. Draw the particle view of the balanced equation as shown in the simulation. (Use colored pencils.)



Combust Methane

___ CH_4 + ___ $O_2 \rightarrow$ ___ CO_2 + ___ H_2O

b. Draw the particle view of the balanced equation as shown in the simulation. (Use colored pencils.)



6. For each balanced reaction, indicate the total number of molecules in the table below. (If you don't understand what a molecule is ask!)

Reaction	Total Number of Molecules	
	Reactant Side (Left)	Product Side (Right)
Make Ammonia		
Separate Water		
Combust Methane		

7. Is the number of total molecules on the left side of a balanced equation always equal to the number of total molecules on the right side of the equation? Explain your answer.

8. For each balanced reaction, indicate the total number of atoms in the table below.

Reaction	Total Number of Atoms	
	Reactant Side (Left)	Product Side (Right)
Make Ammonia		
Separate Water		
Combust Methane		

9. Is the number of total atoms on the left side of a balanced equation always equal to the number of total atoms on the right side of the equation?

10. What is the same on the left and right side of a balanced equation? Explain your answer.

11. The number placed in front of a formula is called a coefficient. The small number within a chemical formula is called a subscript. Why do we adjust coefficients when balancing chemical equations and not subscripts?

12. Before beginning the game, if you had to explain to a friend how to balance a chemical equation, what would you say to them?

GAME: On the upper left hand corner of your screen is a tab that says "balancing game." Click on the tab and complete the games. These games are for YOU to test YOUR knowledge. These are great practice tools so try your hardest and be honest in your scores. These scores will determine if you should start attending help room or not! Have fun!

- **Each person should be in charge of balancing at least one equation**, asking for help from the group as needed.

13. As a group, play level 1 of the balancing equation game. Write down at least two strategies your group uses to balance chemical equations. Record your score.
Score: _____
Strategies:

14. Start level 2 of the balancing equation game. Take turns in your group to balance the equations in the sim, using your strategies from Level 1, and adding new strategies as needed. Record your score.
Score:_____
Strategies:

15. a. In the simulation, were you able to use noninteger numbers (like ½ or 0.43) for the coefficients in a balanced equation? Why do you think this is?

b. Which of the following are coefficients you could use in a balanced equation?
☐½ ☐¾ ☐1 ☐2 ☐6 ☐9

16. Both equation i and ii are balanced, but equation ii is the correct way to write the balanced equation. However, students often write it like equation i.
a. What do you have to do to the coefficients of equation i below to get them equal to the coefficients in equation ii?

i. $2\ SnO_2 + 4\ H_2 \rightarrow 2\ Sn + 4\ H_2O$
ii. $SnO_2 + 2\ H_2 \rightarrow Sn + 2\ H_2O$

b. Can you divide equation ii by another factor and still have it be correct? Why or why not?

c. In a complete sentence, write down a method you could use to determine if a balanced equation is written in the correct way.

17. Start level 3 of the balancing equation game. Take turns and write down along any new strategies you needed for balancing. Score: _____
Any new strategies?

CHALLENGE QUESTIONS: BALANCE THE EQUATIONS BELOW.

i. $__ NaNO_3 + __ PbO \rightarrow __ Pb(NO_3)_2 + __ Na_2O$

ii. $__ Ca_3P_2 + __ H_2O \rightarrow __ Ca(OH)_2 + __ PH_3$

iii. $__ NH_3 + __ O_2 \rightarrow __ NO_2 + __ H_2O$

iv. $__ FeS + __ O_2 \rightarrow __ Fe_2O_3 + __ SO_2$

v. $__ C_3H_6O_2 + __ O_2 \rightarrow __ CO_2 + __ H_2O$

Conclusion Statement: If there was *anything* that you would conclude from today's activity about balancing equations, what would it be? Write it in complete sentences and thoughts.