Balancing Act

Overhead Key

Atoms are not **CREATED** or **DESTROYED** during a chemical reaction. Scientists know that there must be the **SAME** number of atoms on each **SIDE** of the **EQUATION**. To balance the chemical equation, you must add **COEFFICIENTS** in front of the chemical formulas in the equation. You cannot **ADD** or **CHANGE** subscripts!

Step 1: Determine number of atoms for each element.

Step 2: Pick an element that is not equal on both sides of the equation.

Step 3: Add a coefficient in front of the formula with that element and adjust your counts.

Step 4: Continue adding coefficients to get the same number of atoms of each element on each side.

$\square$ Mg + $\square$ O_2 ➔ $\square$ MgO

Mg =	Mg =
O =	O =

Try these:

$\square$ Ca + $\square$ O_2 ➔ $\square$ CaO

Ca =	Ca =
O =	O =

$\square$ N_2 + $\square$ H_2 ➔ $\square$ NH_3

N =	N =
H =	H =

$\square$ Cu_2O + $\square$ C ➔ $\square$ Cu + $\square$ CO_2

Cu =	Cu =
O =	O =
C =	C =

$\square$ H_2O_2 ➔ $\square$ H_2O + $\square$ O_2

H =	H =
O =	O =

Balancing Act
Teacher Notes

Step-by-Step Example Problem:

Step 1: Determine number of atoms for each element.

$Mg + O_2 \rightarrow MgO$

Mg = 1	Mg = 1
O = 2	O = 1

Step 2: Pick an element that is not equal on both sides of the equation.

$Mg + O_2 \rightarrow MgO$

Mg = 1	Mg = 1
O = 2	O = 1

Since the O atoms are not equal, we'll target those first!

Step 3: Add a coefficient in front of the formula with that element and adjust your counts.

$Mg + O_2 \rightarrow 2\ MgO$

Mg = 1	Mg = ~~1~~ 2
O = 2	O = ~~1~~ 2

Adding a 2 in front of MgO will change the number of atoms on the product side of the equation.

Step 4: Continue adding coefficients to get the same number of atoms of each element on each side.

$2\ Mg + O_2 \rightarrow 2\ MgO$

Mg = ~~1~~ 2	Mg = ~~1~~ 2
O = 2	O = ~~1~~ 2

Now we need to increase the number of Mg atoms we have on the reactant side. Adding a 2 in front of Mg will give us 2 atoms of Mg and balance the equation.

Balancing Act Answer Key:

Page 1 Problems

$2\ Ca + O_2 \rightarrow 2\ CaO$

$N_2 + 3\ H_2 \rightarrow 2\ NH_3$

$2\ Cu_2O + C \rightarrow 4\ Cu + CO_2$

$2\ H_2O_2 \rightarrow 2\ H_2O + O_2$ Hint: Add the O atoms on the product side together when doing the counts.

Page 2 Practice Problems

1. $2\ Na + MgF_2 \rightarrow 2\ NaF + Mg$
2. $Mg + 2\ HCl \rightarrow MgCl_2 + H_2$
3. $Cl_2 + 2\ KI \rightarrow 2\ KCl + I_2$
4. $2\ NaCl \rightarrow 2\ Na + Cl_2$
5. $4\ Na + O_2 \rightarrow 2\ Na_2O$
6. $2\ Na + 2\ HCl \rightarrow H_2 + 2\ NaCl$
7. $2\ K + Cl_2 \rightarrow 2\ KCl$

Challenge: This one is tough!

$2\ C_2H_6 + 7\ O_2 \rightarrow 4\ CO_2 + 6\ H_2O$