Balancing Equations Race

1) ___ C_3H_8 + ___ O_2 → ___ CO_2 + ___ H_2O

2) ___ Al + ___ Fe_3N_2 → ___ AlN + ___ Fe

3) ___ Na + ___ Cl_2 → ___ NaCl

4) ___ H_2O_2 → ___ H_2O + ___ O_2

5) ___ $C_6H_{12}O_6$ + ___ O_2 → ___ H_2O + ___ CO_2

6) ___ H_2O + ___ CO_2 → ___ C_7H_8 + ___ O_2

7) ___ $NaClO_3$ → ___ NaCl + ___ O_2

8) ___ $(NH_4)_3PO_4$ + ___ $Pb(NO_3)_4$ → ___$Pb_3(PO_4)_4$ + ___ NH_4NO_3

9) ___ BF_3 + ___ Li_2SO_3 → ___ $B_2(SO_3)_3$ + ___ LiF

10) ___ C_7H_{17} + ___ O_2 → ___ CO_2 + ___ H_2O

11) ___ $CaCO_3$ + ___ H_3PO_4 → ___ $Ca_3(PO_4)_2$ + ___ H_2CO_3

12) ___ Ag_2S → ___ Ag + ___ S_8

13) ___ KBr + ___ $Fe(OH)_3$ → ___ KOH + ___ $FeBr_3$

14) ___ KNO_3 + ___ H_2CO_3 → ___ K_2CO_3 + ___ HNO_3

15) ___ $Pb(OH)_4$ + ___ Cu_2O → ___ PbO_2 + ___ CuOH

16) ___ $Cr(NO_2)_2$ + ___ $(NH_4)_2SO_4$ → ___ $CrSO_4$ + ___ NH_4NO_2

17) ___ KOH + ___ $Co_3(PO_4)_2$ → ___ K_3PO_4 + ___ $Co(OH)_2$

18) ___ $Sn(NO_2)_4$ + ___ Pt_3N_4 → ___ Sn_3N_4 + ___ $Pt(NO_2)_4$

19) ___ B_2Br_6 + ___ HNO_3 → ___ $B(NO_3)_3$ + ___ HBr

20) ___ ZnS + ___ AlP → ___ Zn_3P_2 + ___ Al_2S_3

Balancing Equations Race - Solutions

1) **1** C_3H_8 + **5** O_2 → **3** CO_2 + **4** H_2O

2) **2** Al + **1** Fe_3N_2 → **2** AlN + **3** Fe

3) **2** Na + **1** Cl_2 → **2** NaCl

4) **2** H_2O_2 → **2** H_2O + **1** O_2

5) **1** $C_6H_{12}O_6$ + **6** O_2 → **6** H_2O + **6** CO_2

6) **4** H_2O + **7** CO_2 → **1** C_7H_8 + **9** O_2

7) **2** $NaClO_3$ → **2** NaCl + **3** O_2

8) **4** $(NH_4)_3PO_4$ + **3** $Pb(NO_3)_4$ → **1** $Pb_3(PO_4)_4$ + **12** NH_4NO_3

9) **2** BF_3 + **3** Li_2SO_3 → **1** $B_2(SO_3)_3$ + **6** LiF

10) **4** C_7H_{17} + **45** O_2 → **28** CO_2 + **34** H_2O

11) **3** $CaCO_3$ + **2** H_3PO_4 → **1** $Ca_3(PO_4)_2$ + **3** H_2CO_3

12) **8** Ag_2S → **16** Ag + **1** S_8

13) **3** KBr + **1** $Fe(OH)_3$ → **3** KOH + **1** $FeBr_3$

14) **2** KNO_3 + **1** H_2CO_3 → **1** K_2CO_3 + **2** HNO_3

15) **1** $Pb(OH)_4$ + **2** Cu_2O → **1** PbO_2 + **4** CuOH

16) **1** $Cr(NO_2)_2$ + **1** $(NH_4)_2SO_4$ → **1** $CrSO_4$ + **2** NH_4NO_2

17) **6** KOH + **1** $Co_3(PO_4)_2$ → **2** K_3PO_4 + **3** $Co(OH)_2$

18) **3** $Sn(NO_2)_4$ + **1** Pt_3N_4 → **1** Sn_3N_4 + **3** $Pt(NO_2)_4$

19) **1** B_2Br_6 + **6** HNO_3 → **2** $B(NO_3)_3$ + **6** HBr

20) **3** ZnS + **2** AlP → **1** Zn_3P_2 + **1** Al_2S_3

Teacher Guide for the Balancing Equations Race:

<u>The problem with balancing equations:</u>

There's a problem with education that never gets any press. No politician has come out against it and no teacher union has ever made a stand to end it. We all know it exists, but we brush it under the rug and pretend it isn't there.

The problem: Chemistry worksheets are boring.

Your students say worksheets are boring and, quite frankly, they're right. I didn't like answering the same questions over and over again when I was in school, and neither do they. Unfortunately, there's no way around it, because to get good at doing chemistry problems you need to do hundreds upon hundreds of them.

There's a book out by a competitor of mine that has a bunch of worksheets in it. To get around this problem, they add clip art that makes the worksheets a little more visually stimulating. My students like to give the scientists and students in these pictures little mustaches and horns. Although the clip art does succeed in breaking up the boredom, I have a feeling that this isn't what they had in mind.

The solution: Make the activities vastly different from one another! Instead of having a big worksheet where your students answer the same boring questions, have a race where each team competes against the rest of the class! Instead of boring worksheets, this is competition – survival of the fittest – a bloodthirsty quest for dominance in the classroom!

OK. It's still just a worksheet. The difference here isn't that the worksheets are different, it's that your students have a different perception of the activity. This difference is what sells the worksheet and gives your kids a little more practice balancing equations.

<u>Doing the balancing equations race:</u>

Divide the students into teams of two. (For honors classes, have each student work on his or her own.) The kids should be sitting side-by-side so they can work together more efficiently. Pass out one worksheet face down for every student. At the count of three, have the students start working.

There are many different ways you can run this activity. The first way involves having students come up to the front of the room with their answers when they've finished the worksheet. If all of the answers are correct, they win. If they aren't, send the kids back to their seats without telling them which problem is wrong. They'll grumble a little bit, but ultimately this is practice for having them check their work during a quiz. When they've made an adjustment to their answer, recheck, and so on until a group wins the race.

There should be some prize for winning the race. It's been my experience that having the kids compete for the love of the chase doesn't work. Like most people, students want something in return. In my class, I use mole dollars (they're a sort of pass which can be used for trips to the drinking fountain or bathroom, or as extra credit at the end of the term). Whatever reward system you use, use it here.

A variation of the competition is to have each team come up every time they finish five problems. When they correctly finish five, send them back to work on the next five. Although effective, the result of running the race this way is to have a huge line of students at your desk demanding you to tell them if they've done it correctly. To save you this headache, I suggest you only do this for a class of slower learners.

Problems you might encounter:

1)   **The students simply can't get the answers right:** What happens if the kids have been coming up to your desk for the last 45 minutes and nobody is even close to winning? If this happens, announce that at some predetermined time you'll have everybody turn in his or her papers and whoever has more correct answers will be declared the winner.

2)   **One group finishes well before any of the others:** I had a class last year where one of the students always finished every activity before anybody else. Predictably, when he was working on the race, his team won before anybody else got through number ten. My recommendation if this happens is that you have a reward for your second and third place teams. This provides incentive for the other students even if they know they're not likely to be the winner.