Unit 2: AP Free Response Practice #2 [2003 Form B #2, modified, 5 points]

2. In a reaction vessel, 0.600 mol of $Ba(NO_3)_2(s)$ and 0.300 mol of $H_3PO_4(aq)$ are combined with deionized water to a final volume of 2.00 L. The reaction represented below occurs.

$$\underline{3}\ Ba(NO_3)_2(aq) + \underline{2}\ H_3PO_4(aq) \rightarrow \underline{1}\ Ba_3(PO_4)_2(s) + \underline{6}\ HNO_3(aq)$$

a. Balance the equation above by writing the correct coefficients in the blanks provided. [1 point]

b. Calculate the mass of $Ba_3(PO_4)_2(s)$ formed. [2 points]

$\frac{0.600\ mol\ Ba(NO_3)_2}{3} = 0.2$ limiting!

$\frac{0.300\ mol\ H_3PO_4}{2} = 0.15$ smaller!

$3\ Ba(NO_3)_2 + 2\ H_3PO_4 \rightarrow Ba_3(PO_4)_2 + 6\ HNO_3$

0.600	0.300	∅	∅
−0.450	−0.300	+0.150	+0.900
0.150	∅	0.150	0.900

$0.150\ mol\ Ba_3(PO_4)_2 \times \frac{601.93\ g}{1\ mol} =$ **90.3 g $Ba_3(PO_4)_2$**

c. Calculate the moles of nitric acid (HNO_3) formed. [1 point]

0.900 mol HNO_3

(see BCA table)

d. How many moles of excess reactant are left over once the reaction stops? [1 point]

0.150 mol $Ba(NO_3)_2$ left over

(see BCA table)