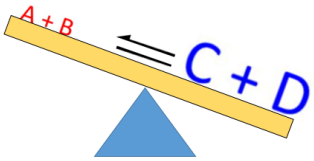
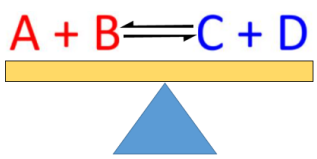
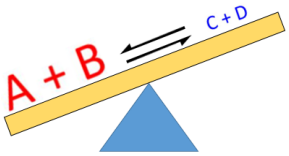
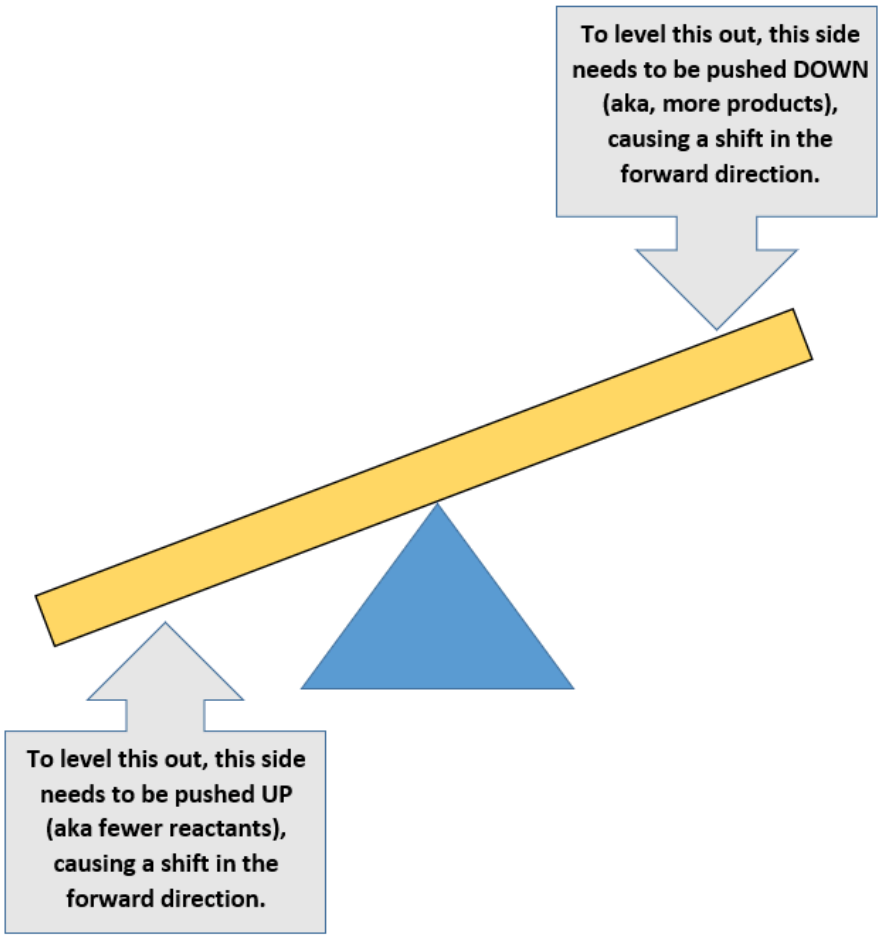
AP Chemistry Daily Videos

7.7 Calculating Equilibrium Concentrations

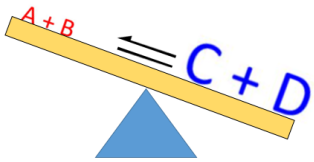
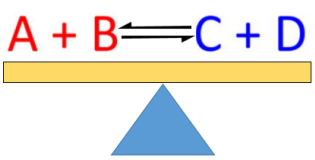
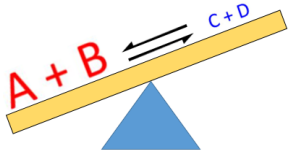
Video #1

1. Recall that K is only used when the system has reached equilibrium. Q is used to evaluate if a reaction is at equilibrium and what changes must occur to reach equilibrium. Complete the following table.

			
Is this system at equilibrium (Yes or No)?			
How are Q and K related (=, <, >)?			



2. **Reactions move towards equilibrium Recall that both Q and K are products/reactants.Complete the following table to indicate how the reaction would shift to reach equilibrium.**

			
Would products need to be increased or decreased			
Would reactants need to be increased or decreased?			
What direction would the reaction shift to reach equilibrium?			

3. Evaluate how you did and identify any errors you made.

1:30

Consider the reaction below:

$Br_2(g) + Cl_2(g) \leftrightarrow 2BrCl(g)$ $\quad K_p = 1.00 \times 10^{-5}$ at 420 K

Suppose we start with $P_{Br_2} = 1.00$ atm and $P_{Cl_2} = 1.00$ atm, and the system is allowed to come to equilibrium.

Without doing any math, what can we predict about the relative partial pressures of Br_2, Cl_2, and BrCl at equilibrium?

4. **Draw the ICE table and describe what information is placed in each area. What row represents the information associated with Q? For K?**

⏸ 5. Highlight the steps in your own words of how she solved the problem.

4:10

6. When can you assume plus or minus a value of x is so insignificant that you can ignore it?

[Video #2]

1. Evaluate how you did in examples 1 and 2 and identify any errors you made.

⏸ 2. Try sample 3 and evaluate any errors you may have made.

$C(s) + CO_2(g) \rightleftarrows 2CO(g)$

0.105 moles of solid carbon and some carbon dioxide gas are placed in a rigid 2.00 L container at 1,160 K, and the reaction represented above occurred. As the reaction proceeded, the total pressure in the container was monitored. When equilibrium was reached, there was still some C(*s*) remaining in the container. Results are recorded in the table below.

Time (hours)	Total Pressure of Gases in Container at 1,160 K (atm)
0.0	5.00
2.0	6.26
4.0	7.09
6.0	7.75
8.0	8.37
10.0	8.37

a) For the reaction mixture at equilibrium at 1,160 K, the partial pressure of the $CO_2(g)$ is 1.63 atm. Calculate the partial pressure of CO(*g*).

Suppose a second trial of the experiment was conducted under identical conditions (rigid 2.00 L container and 5.00 atm of CO_2 present at the beginning). The reaction mixture was heated to 1,160 K and allowed to reach equilibrium. When equilibrium was reached, some C(*s*) remained in the container. Sketch a curve on a graph showing how the total pressure would change over time as the reaction mixture was heated to 1,160 K and equilibrium was established **in Trial 2.**