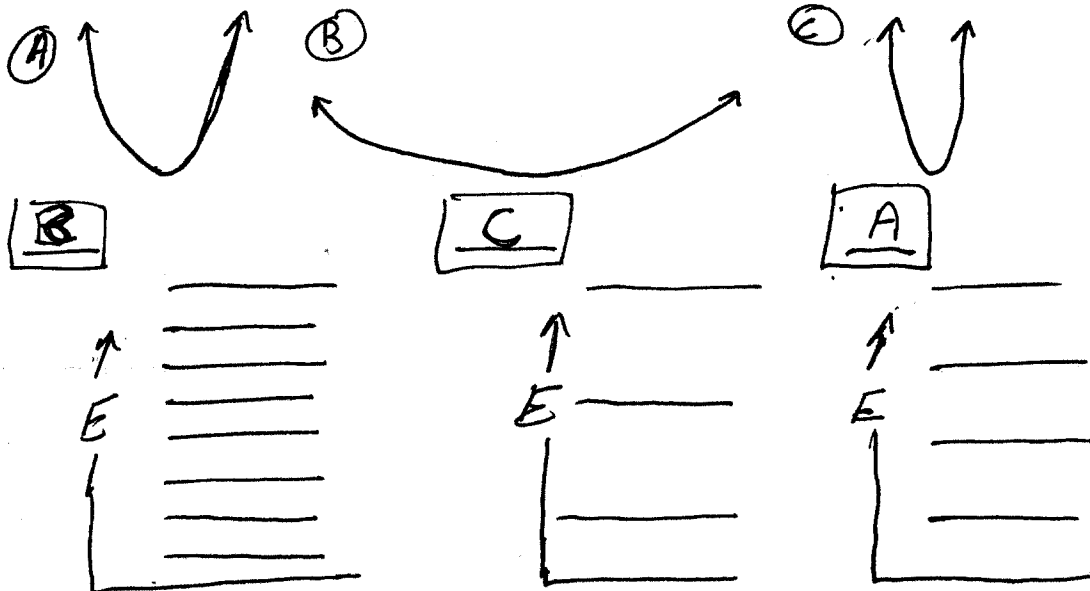


# Harmonic Oscillator

- ① Match the Harmonic oscillator potential with the energy level diagram. Also indicate which has the largest force constant. (Assume the same mass for all).



- ② Qualitatively sketch the vibrational spectrum for a mixture of regular hydrogen and its isotope Deuterium.

The mixture: 50%  $H_2$     25%  $HD$     25%  $D_2$



- ③ The spectrum below is for a mixture of diatomic gases.



- ⑤ a) Which diatomic requires the most energy to ~~pull~~ <sup>move the atoms</sup> apart?  
 ① b) Which diatomic has the lowest vibrational constant?  
 ③ c) Which diatomic has the most zero point energy?