## Instantaneous Reaction Rate Homework

Consider the reaction $3 A+2 B \rightarrow C$, which proceeds via the mechanism:

$$
\begin{array}{lr}
2 A \rightarrow X & \text { (slow) } \\
X+2 B \rightarrow Y & \text { (fast) } \\
Y+A \rightarrow C & \text { (fast) }
\end{array}
$$

1) Sketch the energy diagram for this reaction, labeling all intermediates as well as the relative activation energies for each step.
2) When this reaction is performed in the laboratory, it is found that the reaction rate is second order in A and zeroth order in B. Using this information, determine the rate law for this reaction.
3) Experimental data show that when the concentration of $A$ is 0.25 M and the concentration of $B$ is 0.20 M , the rate of this chemical reaction is $0.00045 \mathrm{M} / \mathrm{sec}$. Using this information, determine the rate constant for this reaction (units are in $/ \mathrm{M} \cdot \mathrm{sec}$ ).
4) Using everything you've figured out from the problems above, determine the reaction rate when $[A]$ is 0.045 M and $[B]$ is 0.025 M .
