Model 1 Critical thinking questions

1. Decreases
2. It is being converted to B.
3. Decreases
4. As the concentration of A falls, the arte of conversion to B also decreases.
5. $1 \text{M/20 minutes} = 0.05 \text{ M/min}$
6. $0.7 \text{ M/5 minutes} = 0.14 \text{ M/min}$
7. $0.2 \text{ M/5 minutes} = 0.04 \text{ M/min}$
8. Yes, identified that rate as decreasing with time.
9. Use a tangent line or take a derivative.

Graphs:
Questions related to above graphs:
2. The rate is independent of concentration
4. The rate increases linearly with concentration
6. The rate increases exponentially with concentration.
7. As the rate constant doubles, all rates double.

Model 2

Critical Thinking questions
1. The shape is hyperbolic
2. The reaction follows first order kinetics up to about 0.031 M ethanol.
3. Zero order kinetics are observed between 0.2 and 0.4 M ethanol.
4. $V_{\text{max}}$ is 0.29 mM/min.
5. The enzyme becomes rate limiting; all active sites are filled.
1. Yes, the Michaelis Menton model produces the expected hyperbolic curve.
2. The asymptote is 0.3, \( V_{\text{max}} \).
3. The velocity slows, \( V_{\text{max}} \) is unchanged, but is not reached over this substrate interval.

![Graph showing the Michaelis-Menten curve with labeled axes and data points.]

1. \( V_{\text{max}}/0.5 \ V_{\text{max}} = 2 \), \( K_m = [S] \ at \ ½ \ V_{\text{max}} \), so it has units of concentration typically M or mM.

2. 0.5 \( V_{\text{max}} \) is 0.15 when \( V_{\text{max}} \) is 0.3.

3. The perpendiculars will give values of \( K_m \) as 0.2 or 4.

4. \( V_{\text{max}} \) is approximately 2.3. 0.5 \( V_{\text{max}} \) is then 1.15. Dropping a perpendicular to the x axis here gives a \( K_m \) of 0.8 – 0.9.

5. The enzyme that takes less substrate to reach half maximal velocity is more efficient. Hence, the enzyme that has a \( K_m \) of 0.2 is more efficient than an enzyme with a \( K_m \) of 4.0.