Kinetics Problems

The following problems refer to the equations:

\[ A + B \rightarrow C + D \quad (1) \]
\[ A + C \rightarrow D + E \quad (2) \]

1. Which species is an intermediate?

2. If the rate of disappearance of A in reaction (1) is \( 3 \frac{\text{mol}}{\text{L} \cdot \text{s}} \) and the rate of disappearance of A in reaction (2) is \( 8 \frac{\text{mol}}{\text{L} \cdot \text{s}} \), what is the rate-limiting step in the reaction?

\[ 2A + B \rightarrow 2D + E \]

What is the rate of this reaction?

3. If the rate law for equation (1) is:

\[ \text{Rate} = k[A][B]^2 \]

what is the order of reaction (1)?
The following data were collected for the reaction \( A + B \rightarrow C \)

<table>
<thead>
<tr>
<th>Exp’t #</th>
<th>[A] (M)</th>
<th>[B] (M)</th>
<th>rate formation of C (M/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.20</td>
<td>0.10</td>
<td>(3 \times 10^{-2})</td>
</tr>
<tr>
<td>2</td>
<td>0.20</td>
<td>0.20</td>
<td>(6 \times 10^{-2})</td>
</tr>
<tr>
<td>3</td>
<td>0.40</td>
<td>0.20</td>
<td>(6 \times 10^{-2})</td>
</tr>
</tbody>
</table>

4. What is the rate law for the above experiment?

5. What is the value of \( k \) for the above rate law (in the correct units)?