

Consider the loading on the beam shown below where the beam is supported by a pin joint at B and a roller support at C. Using integration techniques, determine the slope of the displacement at B and the displacement of end D of the beam. In your work, explicitly show the following steps:

- a) Draw FBD of beam and determine the reactions at B and C.
- b) Make a mathematical cut in beam between B and C (at a location “x”).
 - i. Draw an FBD of the beam between B and the cut at “x”.
 - ii. Determine the bending moment, $M(x)$, in the beam at “x”.
 - iii. Integrate $M(x)$ to find $\theta(x)$.
 - iv. Integrate $\theta(x)$ to find $v(x)$.
 - v. Evaluate $\theta(0)$.
- c) Make a mathematical cut in the beam between C and D. Repeat Steps i.-iv. above to find $\theta(x)$ and $v(x)$ for “x” between C and D.
- d) Evaluate $v(2a)$.

