

**Example 2**

The two-span, simply-supported beam shown is made up of a material having a Young's modulus of  $E$ , with the beam having a circular cross-section with a radius  $r$ , where  $a = 10r$ . A constant line load  $p_0$  acts along the length of the beam, and a concentrated couple  $M_0$  acts at the roller support C, where  $M_0 = 2p_0a^2$ .

- Using either integration techniques, Castigliano's theorem or superposition, determine the support reactions on the beam at B, C and H. If Castigliano's theorem is used, consider the contributions from shear to be negligible.
- Draw the shear force  $V(x)$  and bending moment  $M(x)$  diagrams in the plot axes provided.
- Determine the maximum flexural stress in the beam.

Leave your answers in terms of, at most:  $a$ ,  $E$  and  $p_0$ .



