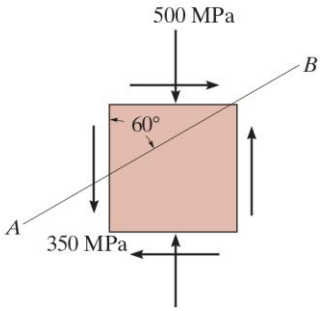
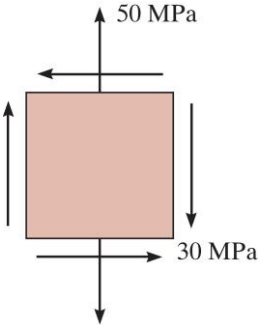
1. The state of plane stress at a point is represented by the element shown. Determine the stress components acting on the inclined plane *AB*. [15%] Ans:-678, 41.5 MPa



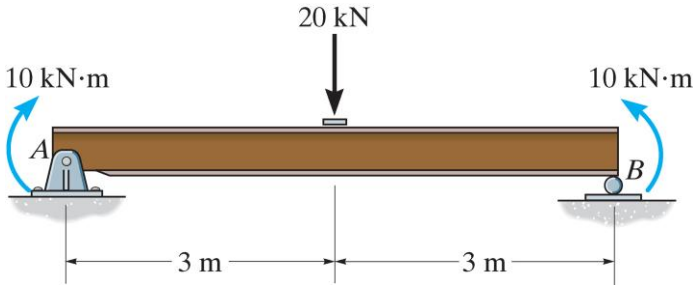
2. The state of stress at a point is shown on the element. (a) Determine the principal stresses and the corresponding orientation of the element. (b) Determine the maximum in-plane shear stress and average normal stress at the point, and specify the orientation of the element. You must use Mohr's circle to solve this problem. [20%] Ans: (a) 64.1, -14.1 MPa, 25.1^0 (b) 39.1, 25.0 MPa, -19.9^0



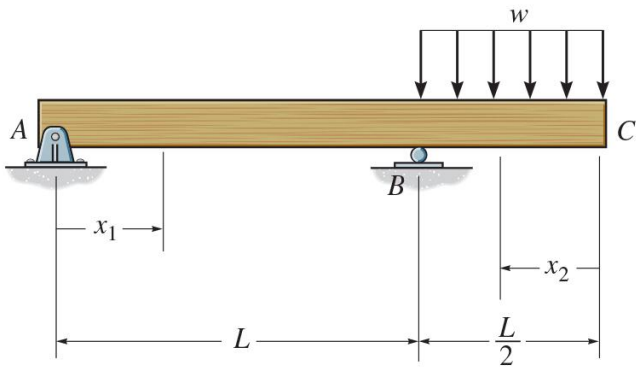
3. The state of plane strain at a point has components $\varepsilon_x = 350(10^{-6})$, $\varepsilon_y = 400(10^{-6})$, $\gamma_{xy} = -675(10^{-6})$. (a) Determine the in-plane principal strains. (b) Determine the maximum in-plane shear strain and average normal strain. You must use Mohr's circle to solve this problem. [15%] Ans: (a)713,36.6 (10^{-6}) (b) 677, 375 (10^{-6})

4. The state of plane strain at a point is represented on an element having components $\varepsilon_x = -400(10^{-6})$, $\varepsilon_y = 0$, and $\gamma_{xy} = 150(10^{-6})$. Determine the state of strain on an element oriented 30^0 clockwise (順時針) from the reported position. [15%] Ans: -365, -35, -271 (10^{-6})

5. Determine the slope of the simply supported beam at *A*. The Young's modulus *E*=200 GPa and *I*=39.9(10^{-6}) m^4. [15%] Ans:-9.40(10^{-3}) rad



6. Determine the equations of the elastic curve using the x_1 and x_2 coordinates, and the deflection of end *C* of the overhang beam. *EI* is constant. [20%]



$$EIv_1 = -\frac{wL}{48}x_1^3 + C_1x_1 + C_2 \qquad (2)$$

$$C_2 = 0$$

$$C_1 = \frac{wL^3}{48}$$

$$v_2 = \frac{w}{384EI}\left(-16x_2^4 + 24L^3x_2 - 11L^4\right)$$

At C, $x_2 = 0$. Thus,

$$v_C = v_2\big|_{x_2=0} = -\frac{11wL^4}{384EI} = \frac{11wL^4}{384EI}\downarrow$$