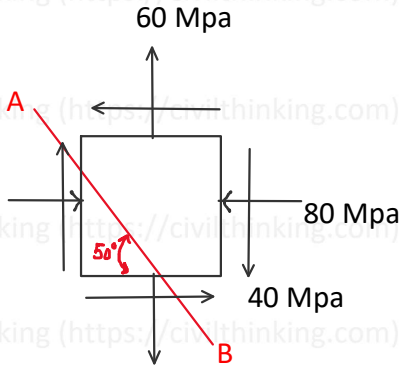
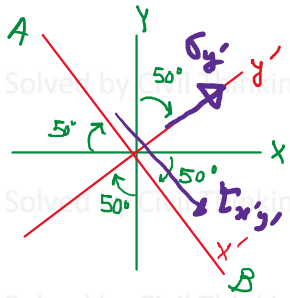
Plane Stress Transformation *question solution using*
STRESS TRANSFORMATION EQUATIONS

Determine the stress components acting on the inclined *plane AB* using ***Stress Transformation Equations***





$\theta = -50^\circ$ [∵ c.w.]

$\Rightarrow 90+\theta = 90-50$

$= 40^\circ$

$\sigma_x = -80 mpa$

$\sigma_y = 60 mpa$

$\tau_{xy} = -40 mpa$

$$\sigma_{y'} = \frac{\sigma_x+\sigma_y}{2} + \frac{\sigma_x-\sigma_y}{2}\cos 2(90+\theta) + \tau_{xy}\sin 2(90+\theta)$$

$$\Rightarrow \sigma_{y'} = -61.55 = 61.55 MPa \text{ [compressive]}$$

$$\tau_{x'y'} = \ominus \frac{\sigma_x-\sigma_y}{2}\sin 2\theta + \tau_{xy}\cos 2\theta = -62 = 62 MPa \ (\nwarrow)$$