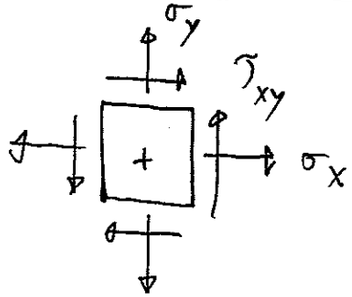
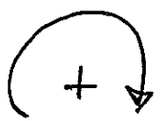
SIGN. CONV FOR σ/τ



MOHR'S CIRCLE CONV. FOR SHEAR



*CW ROTATION

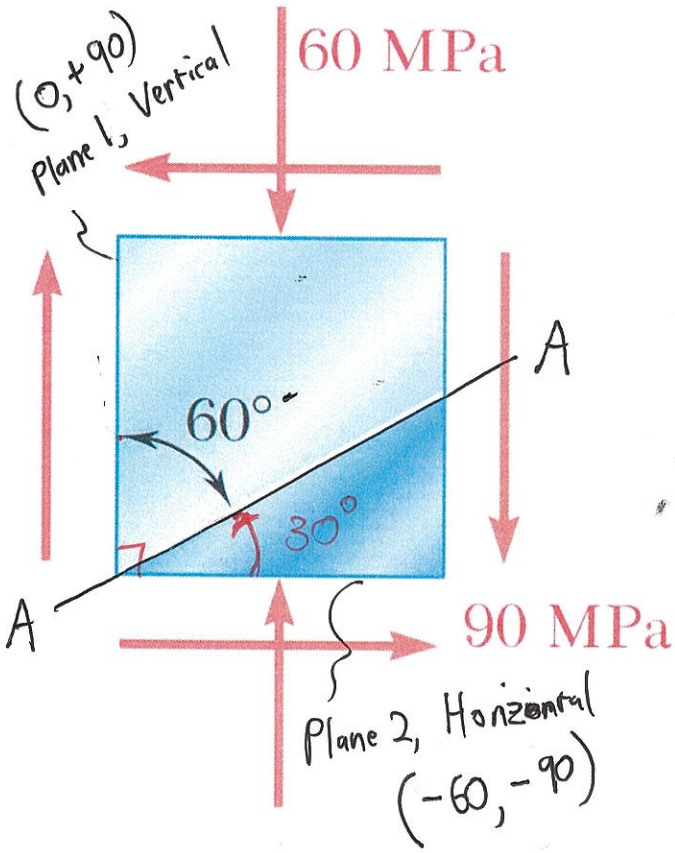
$$\sigma_{AVG} = \sigma_{CENTER} = \left(\frac{\sigma_x + \sigma_y}{2}\right)$$

$$RAD. = \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + \tau_{xy}^2}$$

Use the Mohr's circle approach as discussed in class to determine the normal and shearing stresses on the indicated plane for the state of stress shown. Enter the magnitudes of your calculated stresses in the blocks provided being sure to indicate the proper sign.

3-29-2020

2/6



$\sigma_x = 0$ MPa

$\sigma_y = -60$ MPa

$\tau_{xy} = -90$ MPa

$\theta = 60°$ CW from Vertical

$2\theta = 120°$

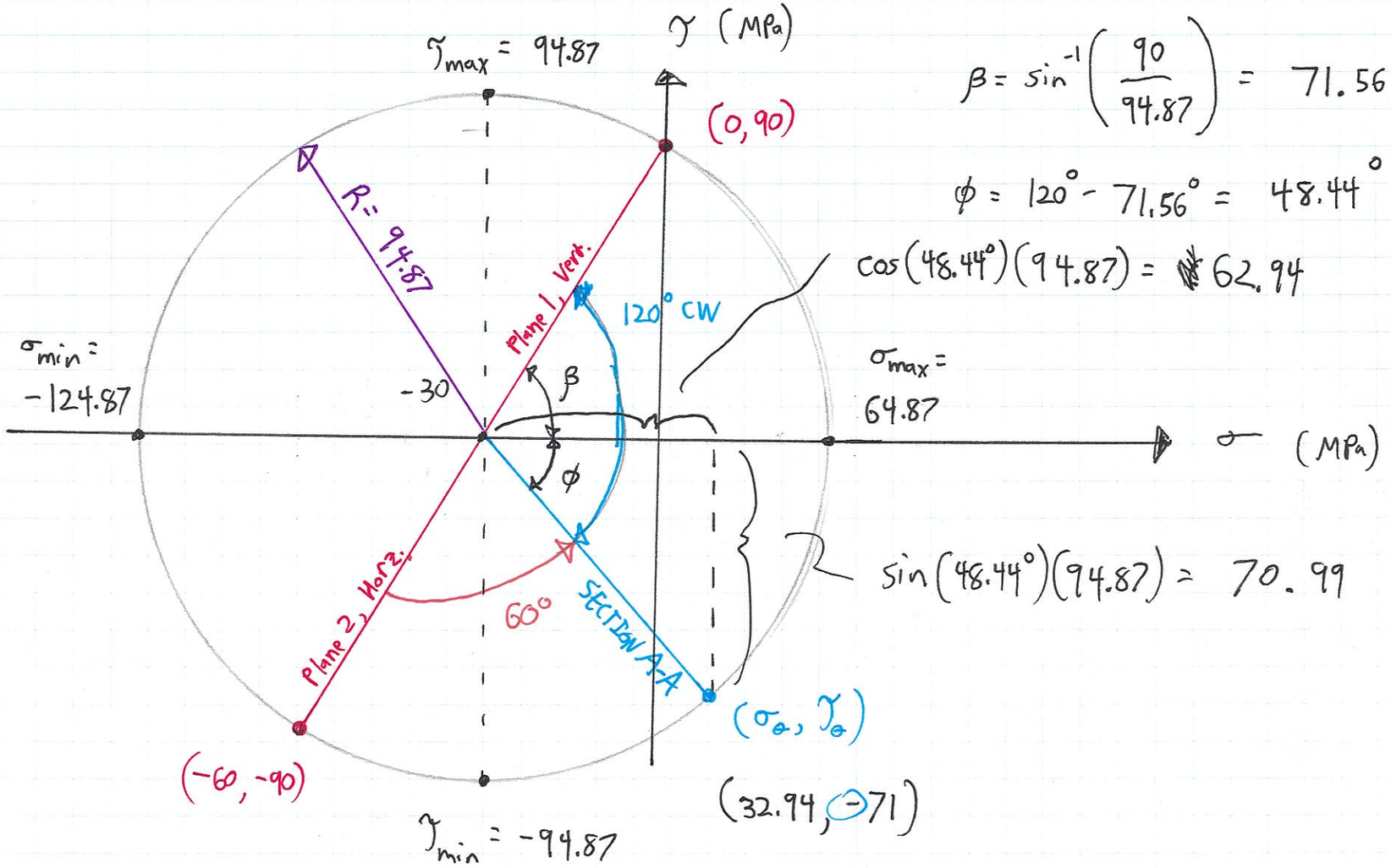
$$\sigma_{AVG} = \left(\frac{\sigma_x + \sigma_y}{2}\right) = \left(\frac{0\ \text{MPa} + -60\ \text{MPa}}{2}\right) = -30\ \text{MPa}$$

$\sigma_\theta =$ [ ] MPa

$\tau_\theta =$ [ ] MPa

$$RAD = \sqrt{\left(\frac{\sigma_x - \sigma_y}{2}\right)^2 + \tau_{xy}^2} = \sqrt{\left(\frac{0 - -60}{2}\right)^2 + (-90\ \text{MPa})^2}$$

$$= 94.87\ \text{MPa}$$



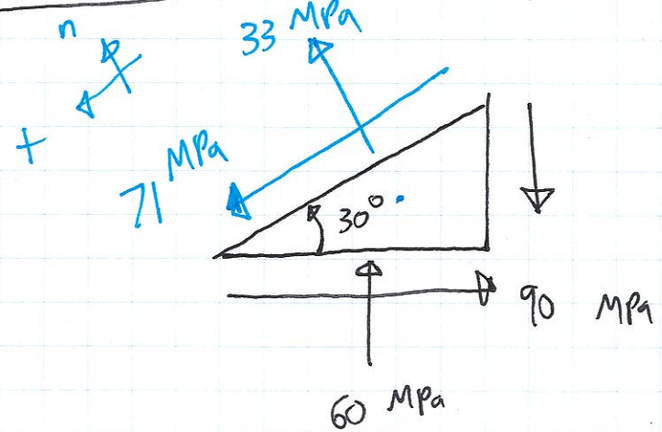
$$\beta = \sin^{-1}\left(\frac{90}{94.87}\right) = 71.56^\circ$$

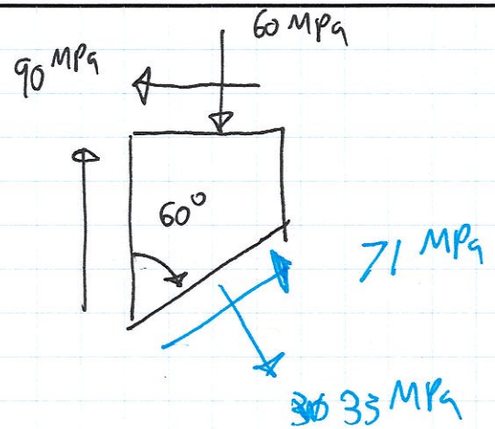
$$\phi = 120^\circ - 71.56^\circ = 48.44^\circ$$

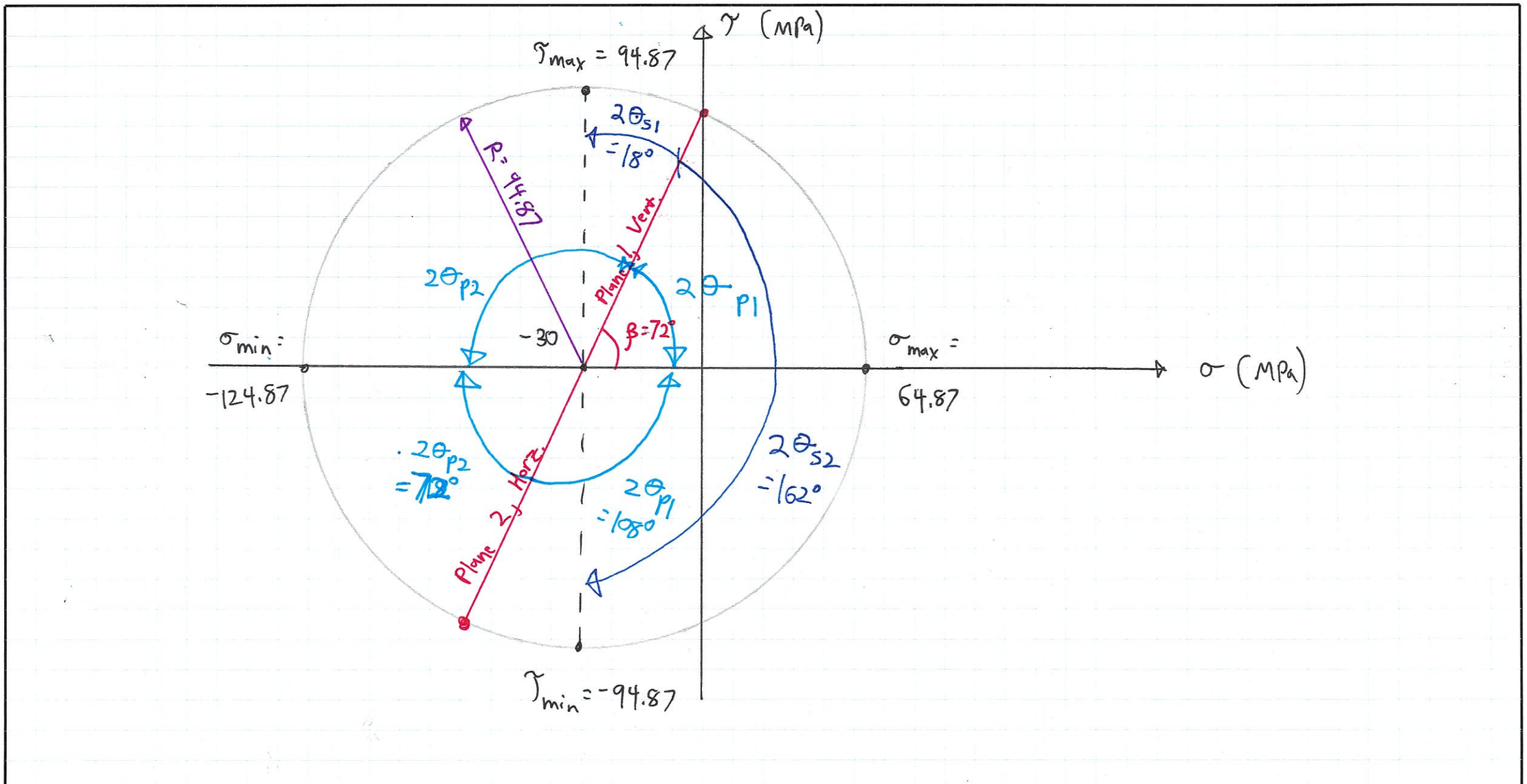
$$\cos(48.44^\circ)(94.87) = 62.94$$

$$\sin(48.44^\circ)(94.87) = 70.99$$

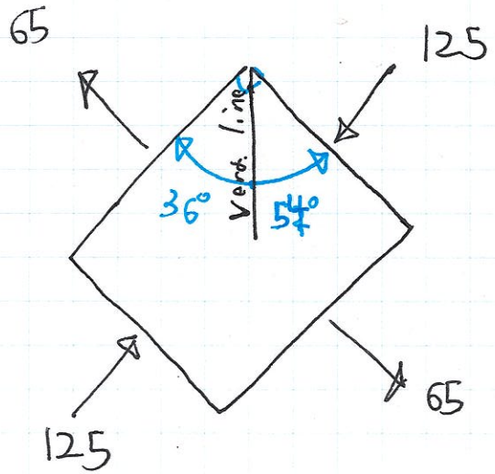
PROP. ORIENT. SKETCH

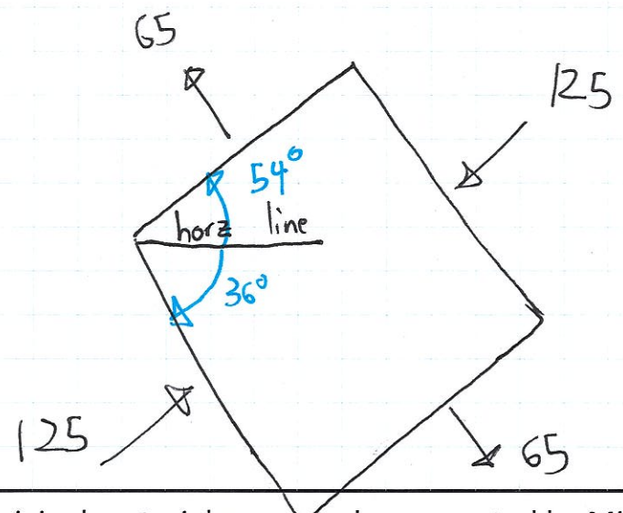




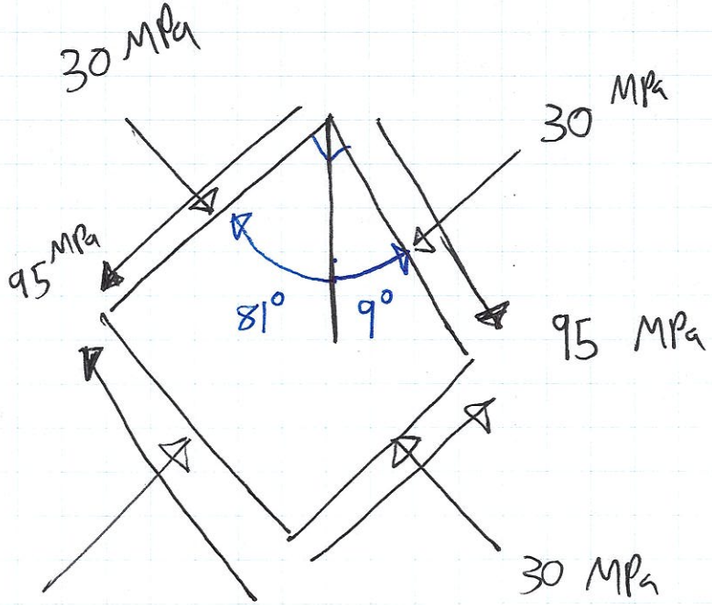


PRINC. STRESS / PROP. ORIENT. SKETCH





PROP. ORIENT SKETCH: MIN/MAX SHEAR



30 MPa