

2-96

The given values for use in drawing Mohr's circle are

$\sigma_x = 20 \text{ MPa}$

$\sigma_y = 120 \text{ MPa}$

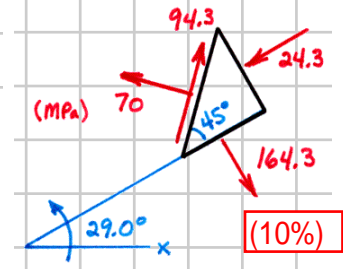
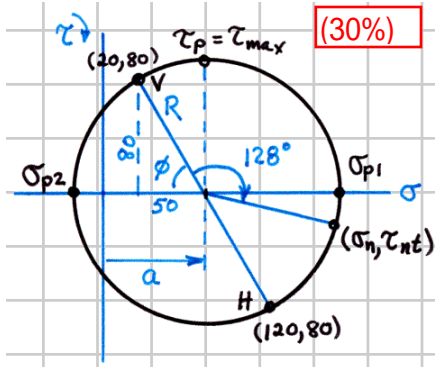
$\tau_{xy} = -80 \text{ MPa}$

$\sigma_z = \sigma_{p3} = 0 \text{ MPa}$

$a = \frac{20+120}{2} = 70.00 \text{ MPa}$

$R = \sqrt{50^2 + 80^2} = 94.340 \text{ MPa}$

$\theta_{p1} = \frac{\phi}{2} = \frac{1}{2} \tan^{-1} \frac{80}{50} = 28.997^\circ \text{ (CCW)}$



- (a) $\sigma_{p1} = 70.00 + 94.3 = 164.3 \text{ MPa (T)} \quad \searrow 61.00^\circ \dots \text{Ans. } 10\%$
- $\sigma_{p2} = 70.00 - 94.3 = -24.3 \text{ MPa} = 24.3 \text{ MPa (C)} \quad \nearrow 29.00^\circ \dots \text{Ans. } 10\%$
- $\tau_{\max} = \tau_p = R = 94.3 \text{ MPa} \dots \text{Ans. } 10\%$

- (b) 10% $\sigma_{ab} = 70 + 94.340 \cos 5.995^\circ = 163.82 \text{ MPa (T)} \dots \text{Ans.}$
- 10% $\tau_{ab} = 94.340 \sin 5.995^\circ = 9.85 \text{ MPa (CCW)} = 9.85 \text{ MPa} \dots \text{Ans.}$

