

1-18*

From a free-body diagram of the upper handle, moment equilibrium gives

$$\rightarrow \Sigma F_x = 0: \quad F_A \cos \theta + B_x = 0$$

$$\uparrow \Sigma F_y = 0: \quad F_A \sin \theta - 100 + B_y = 0$$

$$\circlearrowleft \Sigma M_B = 0: \quad 93(100) - 28(F_A \sin \theta) + 5(F_A \cos \theta) = 0$$

$$\theta = \tan^{-1} \frac{30}{50} = 30.964^\circ$$

$$F_A = 919.116 \text{ N}$$

$$B_x = -788.136 \text{ N} \quad B_y = -372.881 \text{ N}$$

Then a free body diagram of the upper jaw gives

$$\circlearrowleft \Sigma M_C = 0: \quad Fd + 12B_y + 35B_x = 0$$

$$d = \sqrt{35^2 + 15^2} = 38.0789 \text{ mm}$$

Therefore

$$F = 842 \text{ N} \nearrow 66.8^\circ \text{ on the jaw}$$

$$\mathbf{F} = 842 \text{ N} \nearrow 66.8^\circ \text{ on the block} \dots \dots \dots \mathbf{Ans.}$$

