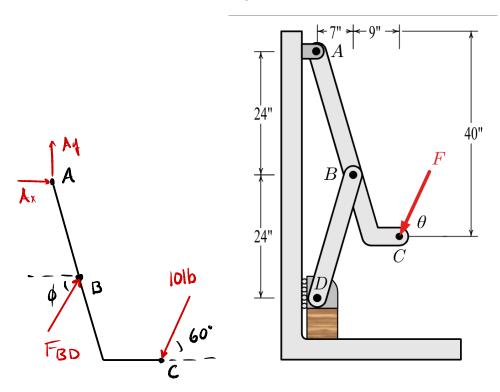A non-communicating calculator is allowed. Full credit will only be given if all steps used are clearly communicated (free body diagrams, algebra, etc).

A toggle clamp is shown below where a force F applied to C provides vertical clamping force at D. Given that angle $\theta = 60°$ and $F = 10.0$ lb, find the magnitude of the force exerted on member ABC at pin B.

$$\phi = \arctan\left(\frac{24}{7}\right) = 73.74°$$

$$\sum \overset{\curvearrowright}{M}_A = -10\left(16\sin 60° + 40\cos 60°\right) + F_{BD}\left(24\cos\phi + 7\sin\phi\right)$$

$$\longrightarrow F_{BD} = \frac{10\left(16\sin 60° + 40\cos 60°\right)}{24\cos\phi + 7\sin\phi}$$

$$= 25.2\,lb \quad \uparrow$$