3. Mind Map: Understanding Torque



 $F \perp = F \sin \phi$ τ=rFL

 $\mathbf{r} \perp = \mathbf{r} \sin \phi$ τ=r⊥ F

Equilibrium: For an object to be in rotational equilibrium, the net torque about any axis must be zero.

Choosing a Rotation Axis: You have the freedom to choose the axis of rotation. Smart choices can simplify calculations (e.g., choosing an axis where a force acts eliminates the torque from that force)

Work-Energy Theorem Analogy: Just as force is related to linear acceleration, torque is related to angular acceleration. Think about how the work-energy theorem has a rotational analog using torque and angular kinetic energy

Both methods are equivalent and yield the same magnitude of torque. Choose the method that simplifies the problem based on the given information

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- $\tau = rF \sin \phi$ $\tau = Fr \sin \phi$
- 1. Perpendicular Force Component Way $F_{\perp} = F \sin \phi$ T=rFL

- 2. Moment Arm Way
 - $r\perp = r \sin \phi$
 - T=rlF