To do ...

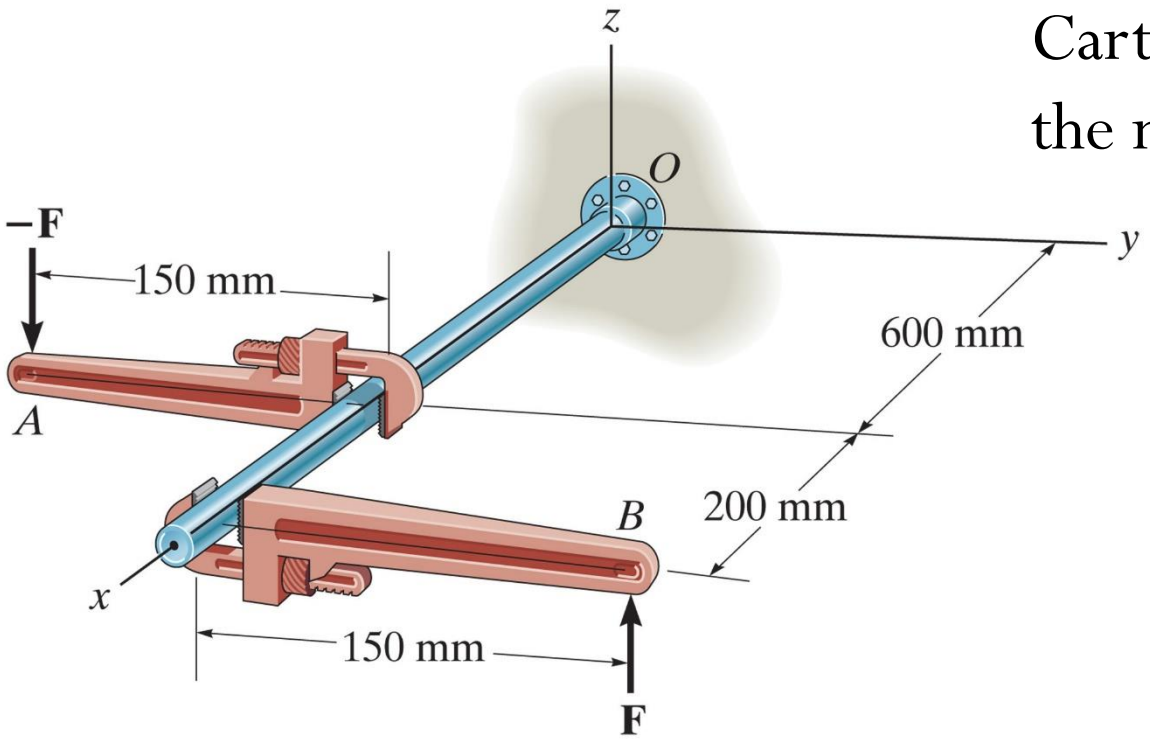
- Quiz 2 this week (**ends Fri**)
- HW 7 due **Thurs**
- WA 1 due **Fri**
- HW 8 due **Tues**

Chapter 4: Force System Resultants

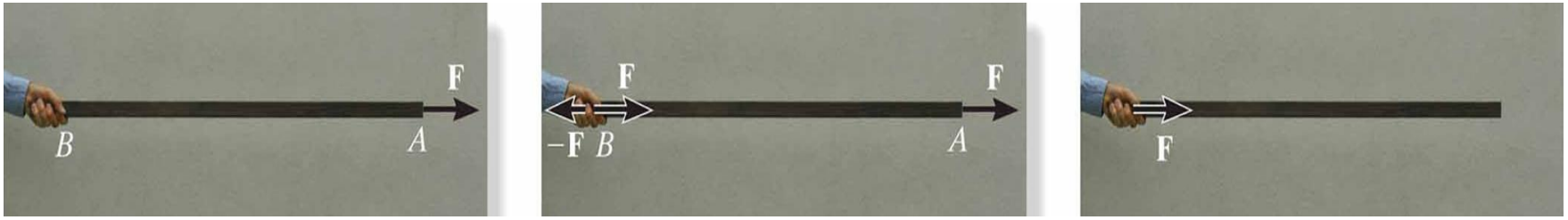
Main goals and learning objectives

- Discuss the concept of the moment of a force and show how to calculate it in two and three dimensions
- Provide a method for finding the moment of a force about a specified axis
- Define the moment of a couple
- Method to simplify a force and couple system to an equivalent system
- Indicate how to reduce a simple distributed loading to a resultant force having a specified location

Express the moment in Cartesian vector form. What is the magnitude?



Moving a force on its line of action

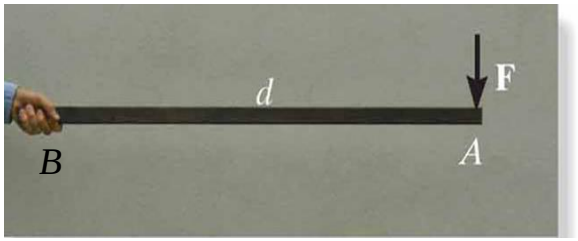


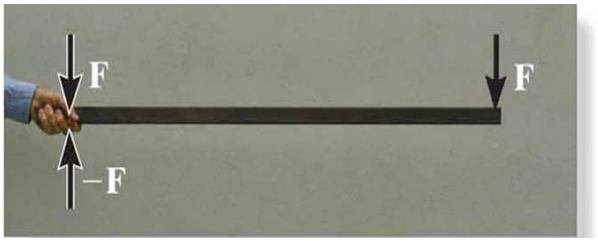
Moving a force from A to B, when both points are on the vector's line of action, does not change the **external effect**.

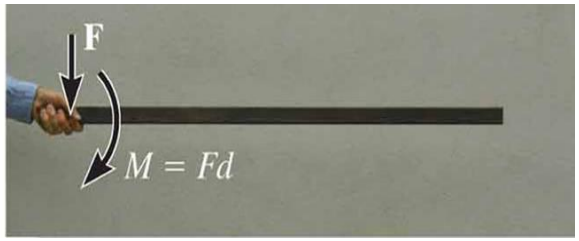
Hence, a force vector is called a **sliding vector**.

However, the **internal effect** of the force on the body does depend on where the force is applied.

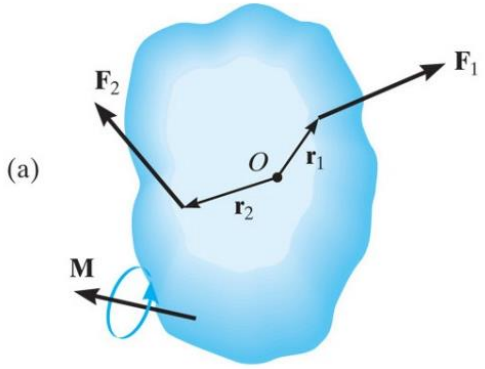
Moving a force off of its line of action







Equipollent (or equivalent) force systems

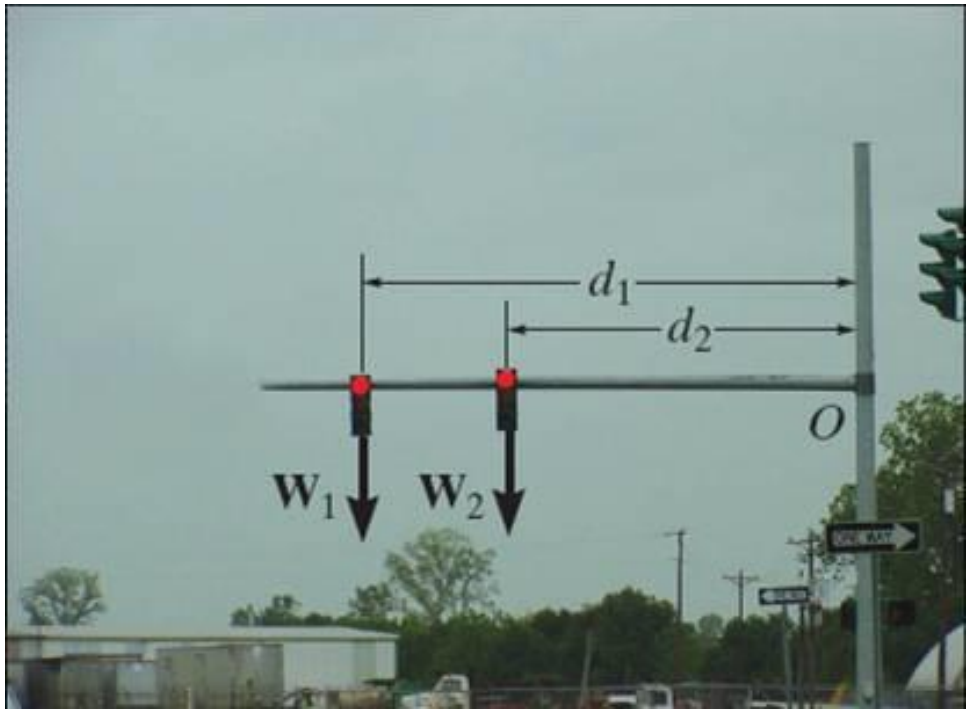


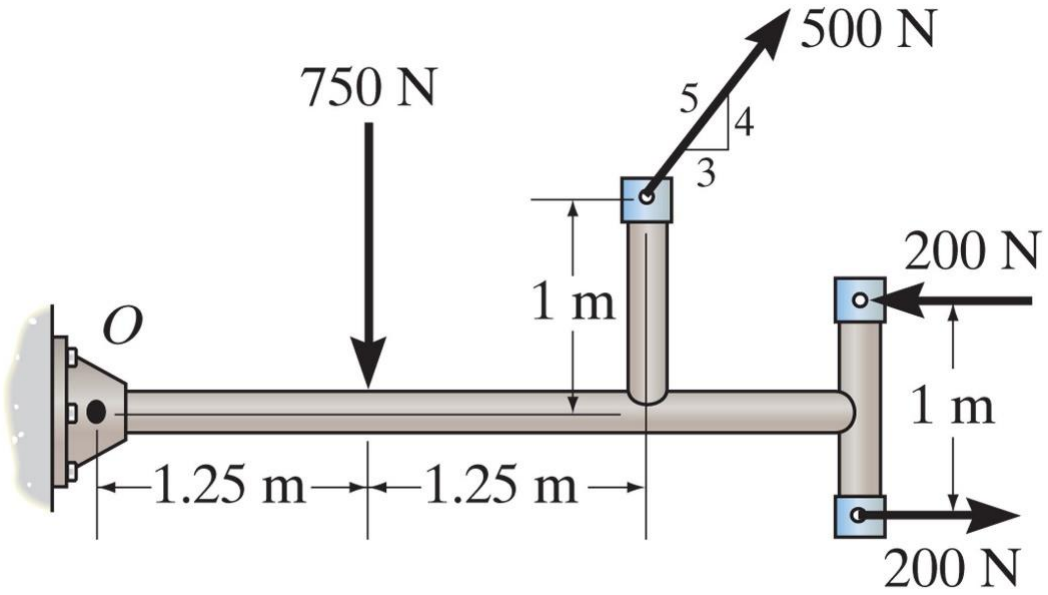
A force **system** is a collection of **forces** and **couples** applied to a body.

Two force systems are said to be **equipollent** (or equivalent) if they have the **same resultant force** AND the **same resultant moment** with respect to any point P.

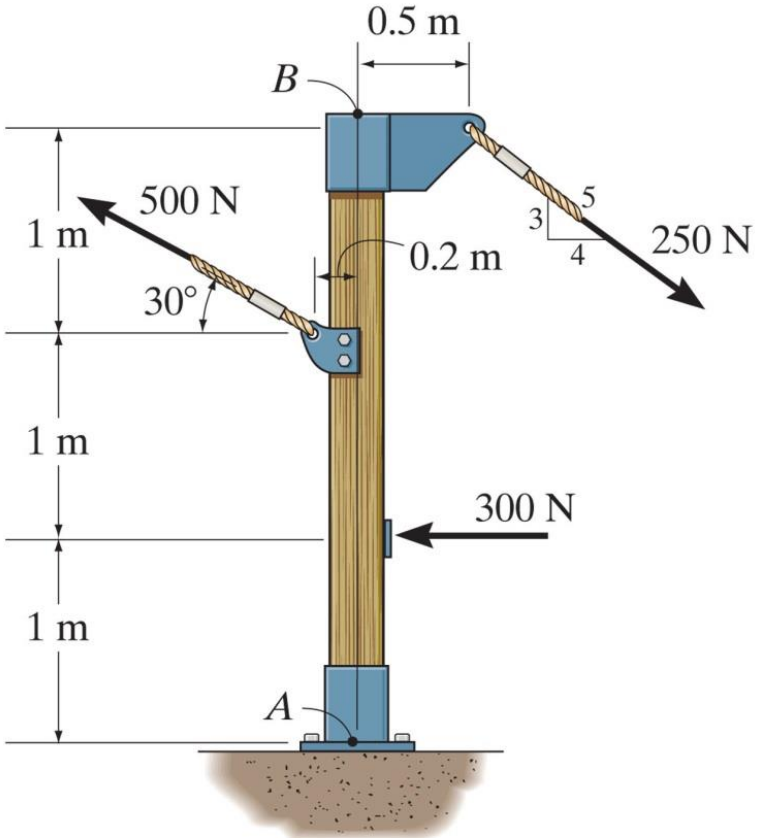
Reducing a force system to a single resultant force $\boldsymbol{F}_R$ and a single resultant couple moment $(\boldsymbol{M}_R)_O$:

What is the equivalent system?





Replace the force and couple system acting on the member by an equivalent force and couple moment acting at point O.



Replace the force system acting on the post by a resultant force and resultant moment about point A, and specify where its line of action intersects the post AB measured from point A.

Reduction of a simple distributed load