

### QUESTIONS

One Energy uses a drone to photograph its projects and perform wind turbine blade inspections. OE's drone can carry two cameras: a regular camera and a thermal camera. These cameras need to be balanced properly in order for the drone to be able to fly safely. We will balance a drone by using a "moment" equation. A moment is a measure of how much something wants to rotate. Moment is dependent on two variables: force and that force's distance from the pivot point. If you increase the force or distance from the pivot point, the moment will increase! You'll use the following equations for these problems:

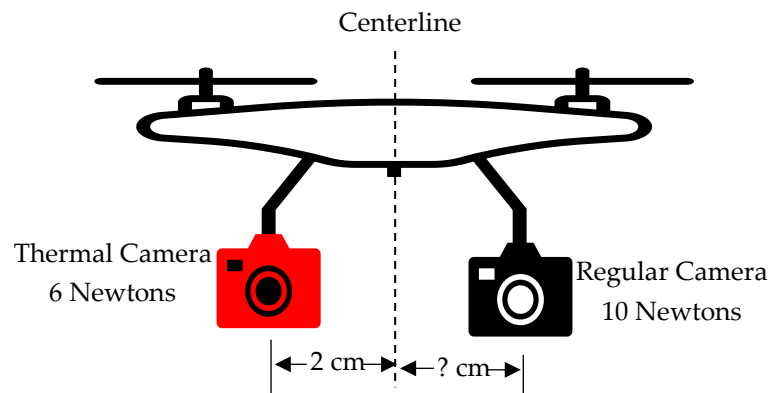
General Moment Equation:  $moment = force * distance$

Balancing Moments Equation:  $force_{left} * distance_{left} = force_{right} * distance_{right}$

In our examples, we'll use the force that accelerating masses exert on objects, which will be expressed in newtons (N).

**Level 1:** The centerline of the drone is the pivot point. If the 6 N thermal camera is 2 centimeters (cm) from the centerline, how far should the 10 N regular camera be from the centerline?

Note: while the masses are not moving, they still exert a force on the object due to the acceleration caused by gravity!



**Level 2:** In the diagram below, the drone is carrying a board which supports a 6 N left box and a 10 N right box. We want the moments on either side of the drone attachment point to be equal. Where should we put the drone lift point in order to balance the board holding left and right boxes? Assume the board does not affect the moment equation of the system.

