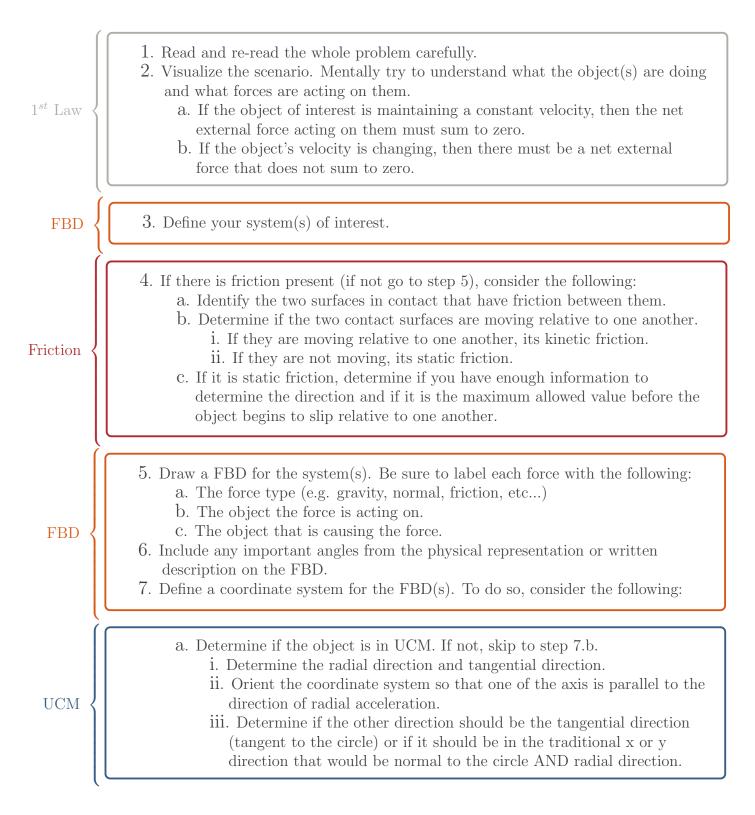
## \*This is a general algorithm for all of forces. See the shaded section for $3^{rd}$ Law.



INCLINED PLANES	<ul> <li>a. Determine, or define if not known, the direction of linear acceleration the object would have.</li> <li>i. If the object is not accelerating, orient the coordinate system such that you will have the least number of forces to decompose into components.</li> <li>ii. If the object is accelerating, orient the coordinate system such that one axis is parallel to the direction of acceleration. This will set the object's component of acceleration along the other axis to be zero.</li> </ul>
FBD ·	8. Double check that you have all of the external forces. The number of forces you should have should be equal to all of the visible forces that cross the boundary plus the number of objects that create friction with the system plus all of the non-contact forces.
<u>3</u> <sup>rd</sup> Law 〈	9. Look for any force pairs if multiple objects are present. a. Identify forces that are acting in opposite directions. b. Of the forces found in the step above, find which forces are the same type of force (e.g. normal, friction, etc) c. Of the forces that are the same type, find the forces that act on the same two bodies. In the notation used in class, they will have the same subscripts, but reversed order (e.g. $\left \vec{F}_{12}\right  = \left \vec{F}_{21}\right $ ) d. Either scale and mark the force pairs on the FBD, or write out the mathematical expression like the one in the step above.
COUPLED SYSTEMS	<ul> <li>10. Identify any connecting information if multiple objects are present.</li> <li>a. If there are objects that are coupled, then identify what it is that is coupling them.</li> <li>b. Determine how the motion of the two objects are affected by this coupling (e.g. if connected by a string are the magnitudes of the acceleration the same? Do the objects travel the same distance in the same amount of time? Are there pulleys that scale the distances traveled by each object in the same amount of time?).</li> </ul>

	11. Apply Newton's $2^{nd}$ Law in each direction of the coordinate system chosen. You will need to decompose the force vectors into their components on the chosen coordinate system, this process will return positive vales since all the
	angles we use to decompose vectors are smaller than 90 degrees. Thus, you must insert negative signs by hand based off of your choice of coordinate
	system.
	12. Simplify each Newton's $2^{nd}$ Law equation as best as possible, putting in
	definitions of things like, $\left \vec{F}^{G}\right $ , $\left \vec{F}^{F}\right $ if known, radial acceleration definition if
1	applicable, force pair equations, and any connecting information.
	13. Rearrange equations to solve for the required quantity. This can involve some
	ugly algebra, including solving simultaneous equations.
	4. Evaluate your answer, make sure units are correct and the results are within
	reason.

 $2^{nd}$  Law