Journal: Chapter 5:
Statics of Rigid Bodies and Assemblies

Answer the following in complete, grammatically correct sentences:

Sections 5-1 to 5-4:

1. Why can a rigid body moving along a straight path at a constant speed be modeled with the static version of Newton's Second Laws?

2. Why can a rigid body moving along a curved path at a constant speed not be modeled with the static version of Newton's Second Laws?

3. Do either of the above cases correspond to a so-called "quasi-static" problem? Which?

4. Briefly define the 3 ways we will use to express the direction of a vector in 3-D.

(a)

(b)

(c)

5. In defining a 3-D vector, how many angles measured from a rectangular coordinate system are required to completely define the vector's direction?

6. What graphical symbol do we use in this text to represent a moment or couple vector in 3-D?

7. Given a general position vector in 3-D from a specific point to a force vector in 3-D, how do we determine the magnitude and the direction of the moment vector of the force about the specific point?

Questions 8 – 11 will require you to use some deductive reasoning beyond facts stated in the reading. You will have a chance to discuss your reasoning with others in class.

8. Given several force vectors in 3-D that intersect at a point 1 on a body and given the position vector from a second point 2 to point 1, what would be two approaches to computing the total moment due to all the forces about point 2? Which approach is probably easier?

9. Given several force vectors in 3-D that act on the body but do not intersect anywhere in space and given the position vectors from a single given point 1 to different points on each of the forces vectors, how would you compute the total moment due to all the forces about the given point 1? How are your answers to 8 and 9 different?

10. In your MTHSC 206 class, you defined the dot product of two intersecting vectors with an included angle θ. Let the angle take any value between zero and 90 degrees. If one of the vectors is a force vector and the other is a unit vector, what is the physical interpretation of the dot product of the two vectors?

11. Now consider you have a moment vector and an intersecting unit vector similar to the above case. What is the physical interpretation of the dot product of the two vectors?

12. How can we find the single force and couple moment at a given point on a body that is "statically equivalent" to a set of several forces and several couples acting on the body?