Mechanics Map Formatting Guidelines

Terminology:

- Engineering Mechanics – Collectively, the study of the interaction of forces, bodies, and motion
- Statics – The study of rigid bodies in equilibrium
- Dynamics – The study of rigid bodies in motion
- Strength of Materials – The study of deformable bodies

- Particles – A body where we assume all mass is concentrated at a single point.
    - Alternatively we will talk about concurrent force systems, which we will approximate as particles
- Rigid Bodies – A body that is assumed to not deform under loading and that has a distributed mass

Website Format:

- Webpage
  - Each html page should have a title “Mechanics Map - *Subject Title*”
  - Use the <h1> tags for a visible title on the top of the page
  - Use the <h2> tag for section headings within the page
  - Use the tags to bold important terms used for the first time.
- Images
  - Use public domain images or self-generated images if possible.
  - Images under a CC-BY-SA or CC-BY can also be used, with the source being attributed in the image caption.
  - Always include an image caption.
  - Images in the main content area should be no more than 600px in width (standard should be 500px)
  - Worked problem images should be no more than 500px in width
- Equations
  - For accessibility reasons, all equations should be written in LaTEX using the MathJax pluggin
    - Use an equation table to organize and center the equation
    - The equation itself in the mathjax tags
      - \[*put LaTEX equation here* \]

Symbols:

- Body Physical Properties and points
  - m – mass
  - C – Centroid point for a 2D area
  - $\bar{x}\ and\ \bar{y}$ for the x and y coordinates of the centroid
  - G – center of mass point
  - O– a fixed ground point, particularly for fixed axis rotation
  - Other points should generally be labeled A, B, C, etc

- Vectors
  - Vectors use an rightward arrow over the variable (the \vec{} tag in LaTEX

- Forces
  - F – a force
  - F_A – a force at point A
  - F_{AX} – The x component of the force at A

  - F_g – The gravity force
  - F_N – A normal force
  - T – A tension force
  - F_k – Force from a spring
  - F_c – Force from a damper

- Moments
  - M – a moment
  - M_A – the moment about point A
  - M_{AX} – the moment about point A about the x axis

- Moments of Inertia
  - I_G – Mass moment of inertia for 2D problems, always use subscript to denote point the moment of inertia is about.
  - I_{xx} I_{yy} and I_{zz} for mass moments of inertia in 3D about the center of mass
  - $I_{xx\,O}$ $I_{yy\,O}$ and $I_{zz\,O}$ Add to the subscript if using a point other than the center of mass
  - K is used for the radius of gyration.

- Motion in one dimension
  - x – position in one dimension
  - $\dot{x}$ or v – velocity in one dimension
  - $\ddot{x}$ or a – acceleration in one dimension
- Motion in x – y coordinates
  - x and y position
  - $\dot{x}$ or v_x and $\dot{y}$ or v_y velocities
  - $\ddot{x}$ or a_x and $\ddot{y}$ or a_y accelerations

- Motion in n – t coordinates
  - v_t velocity
  - a_t or $\dot{v}$ and a_N accelerations
- Motion in polar coordinates
  - r and θ for position
  - v_r and v_θ for velocities
  - a_r and a_θ for acceleration

- Relative Motion
  -
  - $\vec{r}_{A/B}$ *(position of A with respect to B)*
  - $\vec{r}_{A/O}$ *(position of A wrt origin)*
  - $\vec{v}_{A/B}$ *(velocity of A with respect to B)*
  - $\vec{v}_{A/O}$ *(velocity of A wrt origin)*
  - $\vec{a}_{A/B}$ *(acceleration of A with respect to B)*
  - $\vec{a}_{A/O}$*(acceleration of A wrt origin)*

- Coordinate systems for relative motion analysis
  - x and y coordinates reserved for the fixed ground frame of reference
  - Use r_1 and θ_1 coordinate directions for first coordinate system that rotates with the body (mirroring polar kinematics), up the subscript number for each additional rotating coordinate system that is required

- Work and Energy
  - W – Work
  - KE – kinetic energy
  - PE – potential energy
  - P – Power
  - η – efficiency

- Impulse Momentum
  - $\vec{J}$ – Impulse (Use vector in for vector form, use subscripts (J_x) when discussing components
  - $m\vec{v}$ – Momentum (Use vector when in vector form, use subscripts for initial and final and for direction when breaking it down into components
  - mv_{Afx} – For 2D collisions, use subscripts (in this order) to describe the body, initial vs. final, and the direction.
  - $\vec{K}$ – Impulse (Use vector in for vector form, use subscripts (J_x) when discussing components
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- Vibrations
  - *k – spring constant*

- k_{eq} *– equivalent spring constant*
- *c – damping constant*
- ω_0 *= forced frequency*
- ω_n *= natural frequency*
- ω_d *= damped natural frequency*

Graphics:

- Free body diagrams
  - Free body diagrams should show only the body (no background), with the body itself in black
  - Coordinate systems should be drawn as appropriate in black
  - The coordinate system should be drawn on the diagram, also in black.
  - Forces should be shown as red vectors
  - Moments in planar problems should be shown as purple curving vectors
  - If velocities or accelerations are shown, use a dashed blue vector
  - Key dimensions should be shown in blue

Commented [GU1]: Coordinate system definitions?

Commented [GU2R1]: What should they look like?

Video Formatting:

- Videos
  - Videos should be uploaded to the group YouTube account
  - Each video lecture should be titled "*Section Number* *Subject Name* - Video Lecture - *Your initials*
  - Each worked problem video should be titled "*Section Number* *Subject Name* - WP### - *Your Initials*
  - Please have the problem itself shown at the beginning of the video and give a brief verbal recap of the problem
  - Don't refer to the problem number in the video itself (just say "In this problem"). This makes it easier if we add problems and change the numbers.