Housekeeping

- Thursday
  - ME 17

- Sunday
  - WA 9

- Next Week
  - Q 5 + the usual
  - Oct 28: last day TAM 210 (review?)
  - Weekend Oct 28: TAM 210 office hours

- Week after: TAM 210 FINAL

*Updated L24 online 😊*
Internal loadings developed in structural members

Concentrated vs. distributed loads....

V & M will vary depending on where/how load is applied....

Would be nice to see what this looks like...
Draw the shear and moment diagrams for the simply supported beam.

1. Determine external loads (incl. reactions)
2. Start from 1, section beam
3. FBD of section + Solve w/ equations of equil.

Pro-tip: When ext loads A, V = M
Draw the shear and moment diagrams for the simply supported beam.
**Slide 5**

1. **External/reaction loads**

\[ \sum F_x : A_x = 0 \]

\[ \sum M_A : (B_y)(L) - (P)(b) - (w)(a)(\frac{a}{2}) = 0 \]

\( (B_y)(L) = \frac{1}{2}aw + Pb \)

\( B_y = \frac{1}{L}(\frac{1}{2}aw + Pb) \)

\[ \sum F_y : A_y + B_y - P = 0 \]

\( A = P - B_y \)
From 0 to a (just to end of w)

\[ \sum F_x: N = 0 \]
\[ \sum F_y: A_y - w(x) - V = 0 \]
\[ V = A_y - w(x) \]
\[ \therefore \quad a + x = 0, \quad V = A_y \]
\[ a + x = a \]
\[ V = A_y - wa \]

\[ \sum M(x_1): M - A_y(x) + w(x)(\frac{1}{2}x) = 0 \]

\[ M = -\frac{1}{2}wx^2 + Ayx \] \text{ quadratic!}

@ \( x = 0 \) \quad M = 0

@ \( x = a \) \quad M = -\frac{1}{2}wa^2 + Ay a
From $a \to b$ (just before $P$)

\[ \begin{align*}
\Sigma F_x : & \quad N = 0 \\
\Sigma F_y : & \quad A_y - wa - V = 0 \\
\end{align*} \]

\[ V = A_y - wa \quad \text{constant!} \]

From $a \to b$ only!

From $a \to b$:

\[ M(x) = A_y x + (w)(a)(x - \frac{1}{2}a) = 0 \]

\[ M(x) = A_y x - wa(x - \frac{1}{2}a) \]

\[ M = A_y x - wa x + \frac{1}{2}wa^2 \]

\[ \text{at} \quad N \quad \text{end} \]

\[ M = (A_y - wa) x + \frac{1}{2}wa^2 \]

Linear!
\[ \text{From } 0 \text{ to } L \Rightarrow \text{ just after } P \]

\[ \Sigma F_x = N = 0 \]
\[ \Sigma F_y: A_y - wa - P - V = 0 \]
\[ V(x) = A_y - wa - P \text{ constant again!} \]

\[ \Sigma M: M + P(x-b) + wa(x - \frac{1}{2}a) - A_y x = 0 \text{ (linear!)} \]
\[ M_{BL} = A_y x - P(x-b) - wa(x - \frac{1}{2}a) \]
\[ M_{BL} = A_y x - P_x + Pb - wa x + \frac{1}{2} wa^2 \]
\[ = (A_y - P - wa)x + (Pb + \frac{1}{2} wa^2) \]