Absolute Maximum Shear And Moment

- We need to develop a method for computing the maximum shear and moment on a beam that determines both the location of the point and position of the loading.
- If the beam is cantilevered or simply supported the problem is not so hard.

Absolute Maximum Shear And Moment

- **Shear** - For both a cantilevered and simply supported beam the maximum shear will occur at the support.
- The resulting value of the shear can be easily calculated with the method of sections.

Absolute Maximum Shear And Moment

- For a simply supported beam the maximum moment cannot be located by inspection.
- However, it can be proved that the absolute maximum moment in a simply-supported beam occurs under one of the concentrated loads.

Absolute Maximum Shear And Moment

- **Moment** - For a cantilevered beam the maximum moment will occur at the support when the loading is at the end of the cantilevered member.

Absolute Maximum Shear And Moment

- The location is determined such that this force is positioned on the beam so that it and the resultant force of the system are equidistance from the beam's center line.
- By applying this technique to each of the concentrated forces, the absolute maximum moment can be calculated.
Let's look at the moment under $F_2$.

$$\sum M_y = -F_2 x = -F_2 d_2 + F_2 d_1 = \frac{F_2}{R_y}$$

**Case 1** – Check at the position of the first force balanced about the centerline with the resultant force.

$$F_R = F_1 + F_2 + F_3$$

**Case 2** – Check at the position of the second force balanced about the centerline with the resultant force.

**Case 3** – Check at the position of the third force balanced about the centerline with the resultant force.
Live Loads for Bridges

Example: Determine the absolute maximum moment in beam below due to the wheel loads of a moving truck. The truck travels from right to left.

End of Influence Lines – Part 4

Any questions?