A simple procedure exists for calculating the maximum moment in a simply supported span due to a set of moving loads:

1) Calculate the centroid of the loads, $\bar{x}$
2) Position the loads so that midspan of the beam is halfway between the centroid and the nearest load to the centroid
3) Calculate the moment beneath the load nearest to the centroid

Example (Problem 8.39 in Text). Calculate the maximum moment in a 40-foot simply supported beam due to the following axle loads:

1) Centroid of loads
   The centroid can be found from the following formula: $\bar{x} \sum P_i = \Sigma x_i P_i$
   
   $\bar{x} = \frac{\sum[(0')(24k) + (16')(24k) + (28')(6k)]}{(24k + 24k + 6k)} = 10.22'$
   
   Set up a reference axis aligned with the rear wheel and positive to the left (as shown above).

2) Position the loads so that the midspan is halfway between the centroid and the load closest to the centroid.
3) Calculate the moment in the beam beneath the load closest to the centroid.

\[
(R_{Right})(40') = (6^k)(5.11') + (24^k)(17.11') + (24^k)(33.11'), \quad R_{Right} = 30.90^k
\]

\[
\text{max } M = (30.90^k)(20' + 2.89') - (24^k)(16'), \quad \text{max } M = 323^{k-ft}
\]