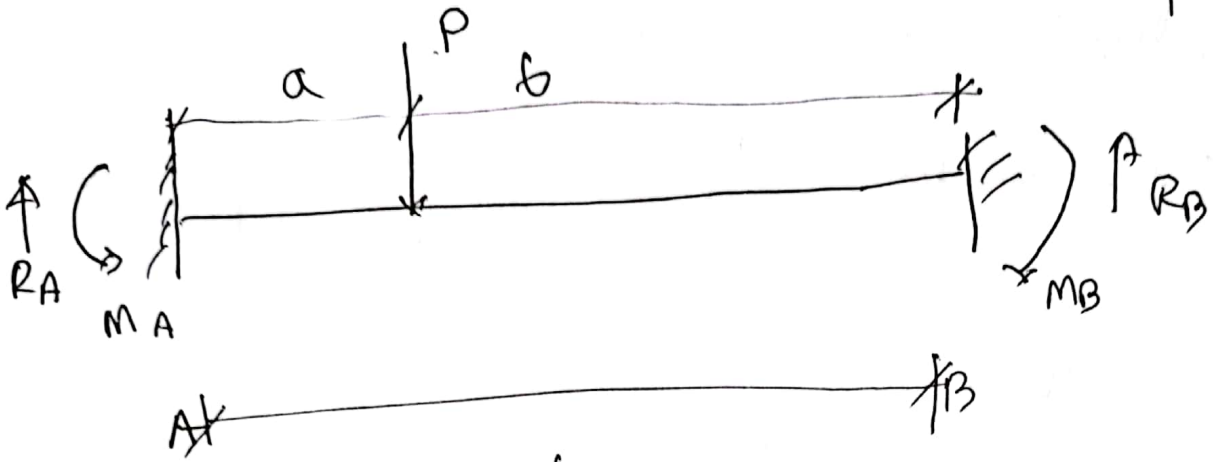
Fixed End Beams



$$M_A = -\frac{Pab}{L^2}$$

$$M_B =$$

F same as P concentrated load

$a+b = L$

$a = b = \frac{L}{2}$

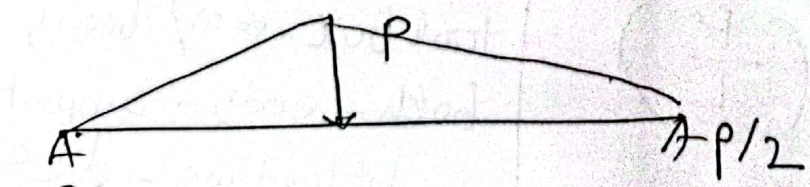
$$M_F = \frac{2Fa^2b^2}{L^3} \quad \left\{ = 2F \times a^2 \times (L-a) \right.$$

$$= \frac{2F \times \left(\frac{L}{2}\right)^2 \times \left(\frac{L}{2}\right)^2}{L^3}$$

$$= 2F \times \frac{L^2}{4} \times \frac{L^2}{4} \times \frac{1}{L^3} = 2F \times \frac{L}{16} \times \frac{1}{8}$$

$$= 2F \times \frac{L}{16} = \frac{FL}{8}$$

$\frac{FL}{8}$



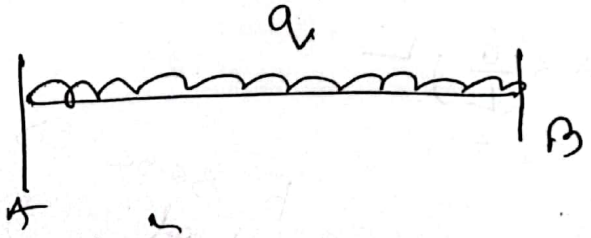
$$M_{max} = \frac{P}{2} \times \frac{L}{2} = \frac{PL}{4}$$

P-1

Maximum (+) moment is produced at Midspan

Its value = $\frac{PL}{8}$ = $\frac{1}{2}$ simple span moment

For UDL moment



$M_1 = \frac{qL^2}{24}$ maximum moment at center due to q (UDL)

equating two moments -

$\frac{PL}{8} = \frac{qL^2}{24}$

$\Rightarrow q = \frac{PL}{8} \times \frac{24}{L^2} = \boxed{3\left(\frac{P}{L}\right)}$

$q = 3\left(\frac{P}{L}\right)$

https://www.engineeringtoolbox.com/beams-fixed-both-ends-support-loads-deflection-d_809

P-2

HL-93

$P = 32$ Kip

$q = 3\left(\frac{32P}{L}\right)$

$= 3 \times \frac{32}{3}$

$= 32$ Kip/ft [whole regulation]

$= \frac{32}{(12)}$ (divide by AASHTO Lane width)

$= 2.67$ K/ft/ft