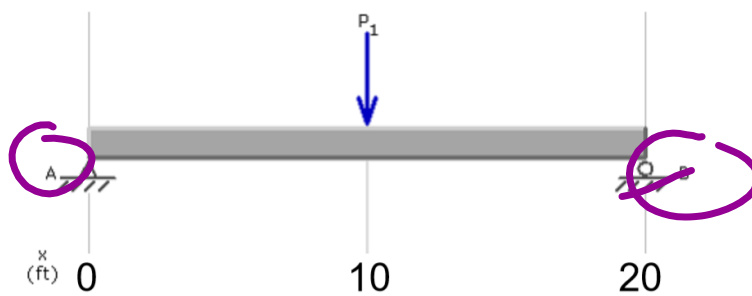


All beams are simply supported and are 20 **feet long**. All uniform loads are **w = 160 lb/ft**. All concentrated loads are **P = 400 lb**. Find reaction forces and moment.



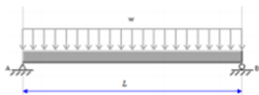
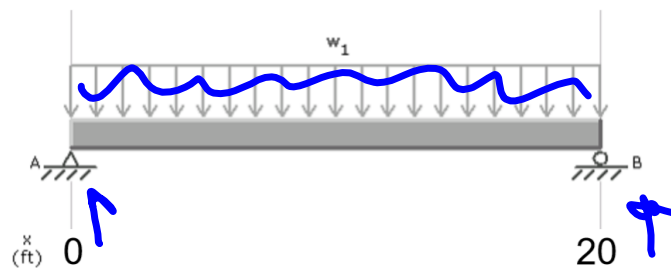
Reaction	$R_A = R_B = \frac{P}{2}$	(12.1)
Moment	$M_{max} = \frac{PL}{4}$ (at point of load)	(12.2)
Deflection	$\Delta_{max} = \frac{PL^3}{48EI}$ (at point of load)	(12.3)

$$R_A = R_B = \frac{400}{2}$$

$$200 \text{ lb}$$

$$M = \frac{(400)(20)}{4} = 2000 \text{ lbs}$$

All beams are simply supported and are 20 feet long. All uniform loads are $w = 160 \text{ lb/ft}$. All concentrated loads are $P = 400 \text{ lb}$. Find reaction forces and moment.

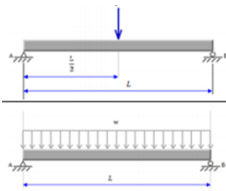
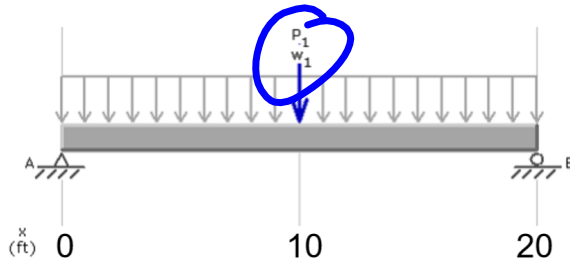


Reaction	$R_A = R_B = \frac{wL}{2}$	(12.4)
Moment	$M_{\max} = \frac{wL^2}{8}$	(at center) (12.5)
Deflection	$\Delta = \frac{5wL^4}{384EI}$	(at center) (12.6)

$$R_A = R_B = \frac{(160)(20)}{2}$$

$$M = \frac{160(20)^2}{8} = 8000 \text{ lb} = 1600 \text{ lb}$$

All beams are simply supported and are 20 **feet long**. All uniform loads are **w = 160 lb/ft**. All concentrated loads are **P = 400 lb**. Find reaction forces and moment.



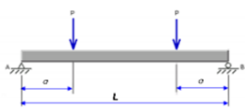
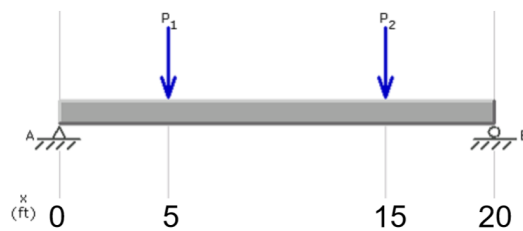
Reaction	$R_A = R_B = \frac{P}{2}$ (12.1)
Moment	$M_{max} = \frac{PL}{4}$ (at point of load) (12.2)
Deflection	$\Delta_{max} = \frac{PL^3}{48EI}$ (at point of load) (12.3)

Reaction	$R_A = R_B = \frac{wL}{2}$ (12.4)
Moment	$M_{max} = \frac{wL^2}{8}$ (at center) (12.5)
Deflection	$\Delta_{max} = \frac{5wL^4}{384EI}$ (at center) (12.6)

$$R_A = R_B = \frac{P}{2} + \frac{wL}{2} = \frac{400}{2} + \frac{160(20)}{2} = 1800 \text{ lb}$$

$$M = \frac{PL}{4} + \frac{wL^2}{8} = \frac{400(20)}{4} + \frac{160(20)^2}{8} = 10,000 \text{ lb}$$

All beams are simply supported and are 20 **feet long**. All uniform loads are **w = 160 lb/ft**. All concentrated loads are **P = 400 lb**. Find reaction forces and moment.

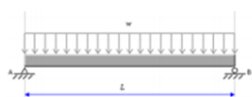
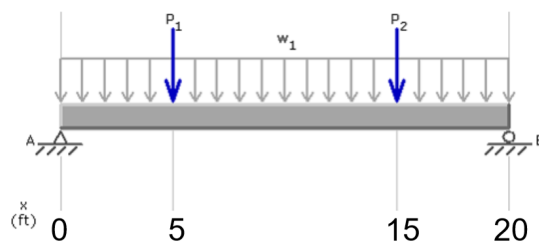


Reaction	$R_A = R_B = P$	(12.7)
Moment	$M_{max} = Pa$	(12.8)
Deflection	$\Delta_{max} = \frac{Pa^2}{24EI} (3L^2 - 4a^2)$ (at center)	(12.9)

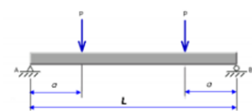
$$R_A = R_B = 400 \text{ lb}$$

$$m = (400)(5) = 2000 \text{ lbs}$$

All beams are simply supported and are 20 **feet long**. All uniform loads are **w = 160 lb/ft**. All concentrated loads are **P = 400 lb**. Find reaction forces and moment.



Reaction	$R_A = R_B = \frac{wL}{2}$	(12.4)
Moment	$M_{\max} = \frac{wL^2}{8}$ (at center)	(12.5)
Deflection	$\Delta_{\max} = \frac{5wL^4}{384EI}$ (at center)	(12.6)



Reaction	$R_A = R_B = P$	(12.7)
Moment	$M_{\max} = Pa$	(12.8)
Deflection	$\Delta_{\max} = \frac{Pa}{24EI} (3L^2 - 4a^2)$ (at center)	(12.9)

$$R_A = R_B = \frac{wL}{2} + P = \frac{160(20)}{2} + 400 = 2000 \text{ lbs.}$$

$$M = \frac{wL^2}{8} + Pa$$

$$\frac{160(20)^2}{8} + 400(5) = 10,000 \text{ lb}$$

All beams are simply supported and are 20 feet long. All uniform loads are $w = 160 \text{ lb/ft}$. All concentrated loads are $P = 400 \text{ lb}$. Find reaction forces and moment.

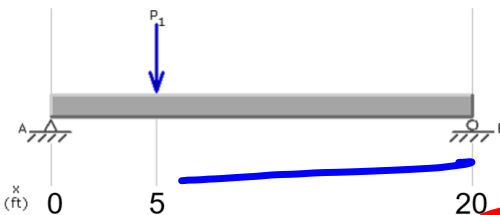


Diagram of a simply supported beam AB of length $L = 20 \text{ ft}$. A concentrated load $P_1 = 400 \text{ lb}$ is applied at $x = 5 \text{ ft}$ from support A. The beam is supported by a pin at A and a roller at B. The coordinate system x (ft) is shown below the beam.

Handwritten calculations for reaction forces and moment:

$$R_A = \frac{(400)(15)}{20} = 300 \text{ lb}$$

$$R_B = \frac{400(5)}{20} = 100 \text{ lbs}$$

$$M = \frac{400(5)(15)}{20} = 1500 \text{ lb}$$

Formulas for Reaction, Moment, and Deflection are provided in the background:

Reaction: $R_A = \frac{Pb}{L}$ and $R_B = \frac{Pa}{L}$ (12.10)

Moment: $M_{\max} = \frac{Pab}{L}$ (at Point of Load) (12.11)

Deflection: $\Delta_{\max} = \frac{Pab(a+2b)\sqrt{3a(a+2b)}}{27EI}$ (12.12)

(at $x = \sqrt{\frac{a(a+2b)}{3}}$ when $a > b$)

