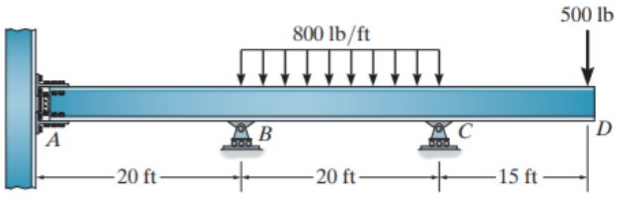

AHMEDMAHDY
MR
00201024041097
مدرس خصوصى
اونلاين
يحصل الطالب على ...
*مقاطع فيديوهات لشرح المقرربشكل وافي
*ملخص للمادة للمراجعة النهائية
*محاضرات مباشرة على برنامج Zoom
*تواصل مستمر مع معلم المادة للمناقشة
للتواصل
00201024041097
00201096019763
Mrahmedmahdy.com

***12–4.** Determine the reactions at the supports and then draw the moment diagram. Assume A is fixed. EI is constant.



$$\text{FEM}_{BC} = -\frac{wL^2}{12} = -26.67, \quad \text{FEM}_{CB} = \frac{wL^2}{12} = 26.67$$

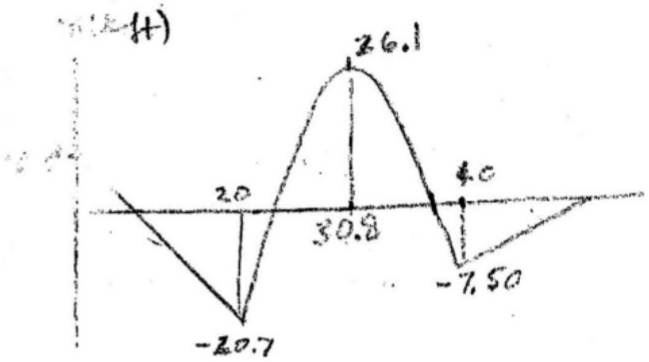
$$M_{CD} = 0.5(15) = 7.5\ \text{k}\cdot\text{ft}$$

$$K_{AB} = \frac{4EI}{20}, \quad K_{BC} = \frac{4EI}{20}$$

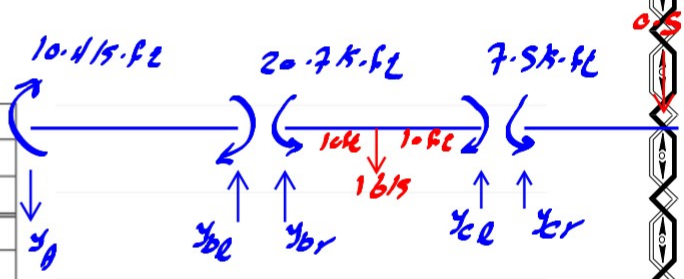
$$\text{DF}_{AB} = 0$$

$$\text{DF}_{BA} = \text{DF}_{BC} = \frac{\frac{4EI}{20}}{\frac{4EI}{20} + \frac{4EI}{20}} = 0.5$$

$$\text{DF}_{CB} = 1$$



Joint	A	B		C	
Member	AB	BA	BC	CB	CD
DF	0	0.5	0.5	1	0
FEM			–26.67	26.67	–7.5
		13.33	13.33	–19.167	
	6.667		–9.583	6.667	
		4.7917	4.7917	–6.667	
	2.396		–3.333	2.396	
		1.667	1.667	–2.396	
	0.8333		–1.1979	0.8333	
		0.5990	0.5990	–0.8333	
	0.2994		–0.4167	0.2994	
		0.2083	0.2083	–0.2994	
	0.1042		–0.1497	0.1042	
		0.07485	0.07485	–0.1042	
	10.4	20.7	–20.7	7.5	–7.5 k · ft



$$y_{bl} = \frac{10.4 + 20.7}{20} = 1.565\uparrow$$

$$y_A = 1.565\downarrow$$

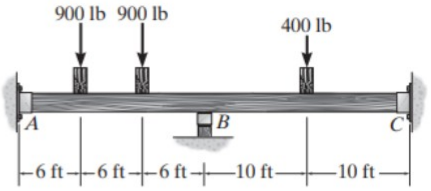
$$y_{cl} = \frac{16 + 10 + 7.5 - 20.7}{20} = 7.34\text{k}\uparrow$$

$$y_{br} = 16 - 7.34 = 8.66\text{k}\uparrow$$

$y_A = 1.56\text{k}\downarrow$, $y_b = 1.56 + 8.66 = 10.22\text{k}$, $y_c = 7.34 \quad 0.5 = 7.84\text{k}$

, $M_A = 10.4\ \text{k}\cdot\text{ft}$)

12–3. Determine the moments at A, B, and C, then draw the moment diagram. Assume the support at B is a roller and A and C are fixed. EI is constant.



$$(\mathrm{DF})_{AB} = 0 \quad (\mathrm{DF})_{BA} = \frac{I/18}{I/18 + I/20} = 0.5263$$

$$(DF)_{CB} = 0 \quad (DF)_{BC} = 0.4737$$

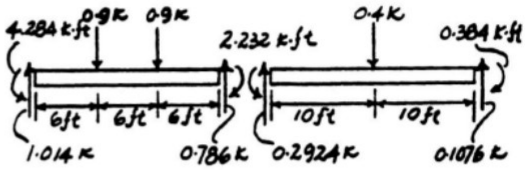
$$(\mathrm{FEM})_{AB} = \frac{-2(0.9)(18)}{9} = -3.60\ \mathrm{k \cdot ft}$$

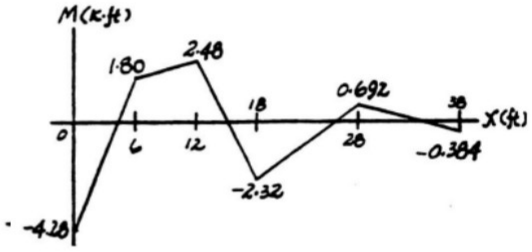
$$(\mathrm{FEM})_{BA} = 3.60\ \mathrm{k \cdot ft}$$

$$(\mathrm{FEM})_{BC} = \frac{-0.4(20)}{8} = -1.00\ \mathrm{k \cdot ft}$$

$$(\mathrm{FEM})_{CB} = 1.00\ \mathrm{k \cdot ft}$$

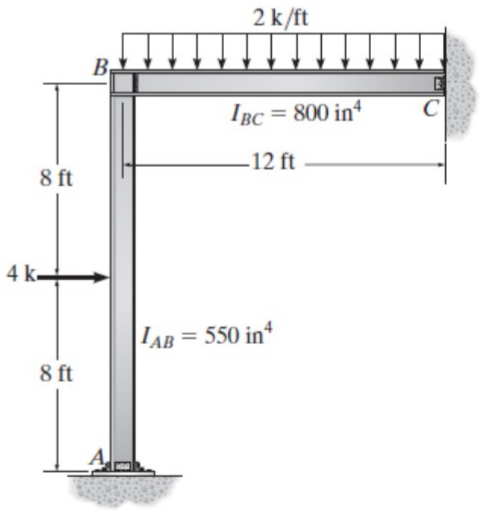
Joint	A	B		C
Mem.	AB	BA	BC	CB
DF	0	0.5263	0.4737	0
FEM	–3.60	3.60	–1.00	1.00
		–1.368	–1.232	
	–0.684			–0.616
$\sum M$	–4.28	2.23	–2.23	0.384 k · ft





Ans.

12–14. Determine the moments at the ends of each member of the frame. Assume the joint at B is fixed, C is pinned, and A is fixed. The moment of inertia of each member is listed in the figure. $E = 29(10^3)$ ksi.



$$(\mathrm{DF})_{AB} = 0$$

$$(\mathrm{DF})_{BA} = \frac{4(0.6875I_{BC})/16}{4(0.6875I_{BC})/16 + 3I_{BC}/12} = 0.4074$$

$$(\mathrm{DF})_{BC} = 0.5926 \qquad (\mathrm{DF})_{CB} = 1$$

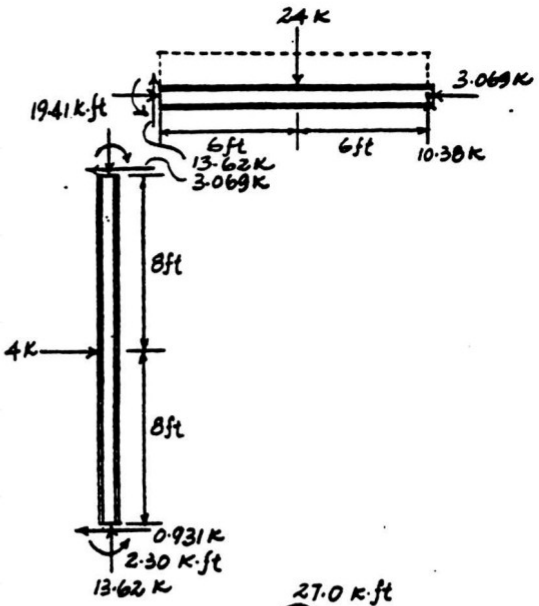
$$(\mathrm{FEM})_{AB} = \frac{-4(16)}{8} = -8\ \mathrm{k \cdot ft}$$

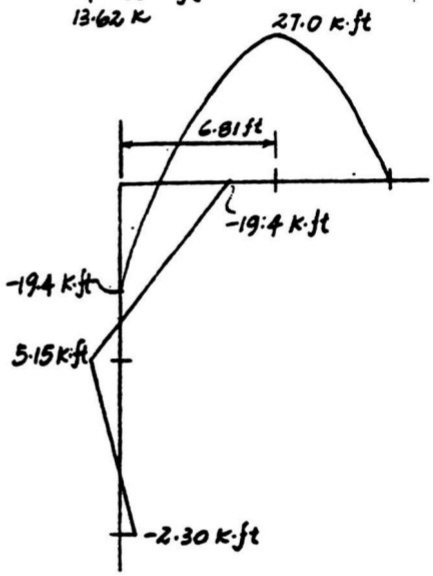
$$(\mathrm{FEM})_{BA} = 8\ \mathrm{k \cdot ft}$$

$$(\mathrm{FEM})_{BC} = \frac{-2(12^2)}{12} = -24\ \mathrm{k \cdot ft}$$

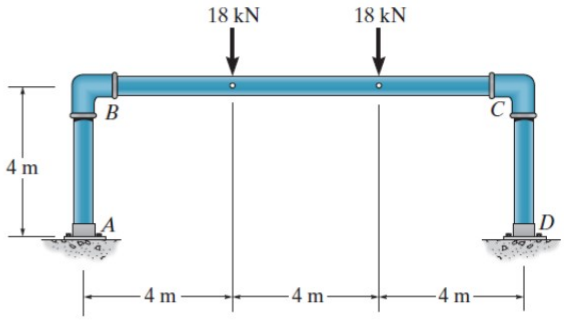
$$(\mathrm{FEM})_{CB} = 24\ \mathrm{k \cdot ft}$$

Joint	A	B		C
Mem.	AB	BA	BC	CB
DF	0	0.4047	0.5926	1
FEM	–8.0	8.0	–24.0	24.0
		6.518	9.482	–24.0
	3.259 ↙		–12.0	
		4.889	7.111	
	2.444 ↙			
$\sum M$	–2.30	19.4	–19.4	0





12–19. The frame is made from pipe that is fixed connected. If it supports the loading shown, determine the moments developed at each of the joints. *EI* is constant.



$$\text{FEM}_{BC} = -\frac{2PL}{9} = -48, \quad \text{FEM}_{CB} = \frac{2PL}{9} = 48$$

$$K_{AB} = K_{CD} = \frac{4EI}{4}, \quad K_{BC} = \frac{4EI}{12}$$

$$\text{DF}_{AB} = \text{DF}_{DC} = 0$$

$$\text{DF}_{BA} = \text{DF}_{CD} = \frac{\frac{4EI}{5}}{\frac{4EI}{4} + \frac{4EI}{12}} = 0.75$$

$$\text{DF}_{BC} = \text{DF}_{CB} = 1 - 0.75 = 0.25$$

Joint	*A*	*B*		*C*		*D*
Member	*AB*	*BA*	*BC*	*CB*	*CD*	*DC*
DF	0	0.75	0.25	0.25	0.75	0
FEM			−48	48		
		36	12	−12	−36	
	18		−6	6		−18
		4.5	1.5	−1.5	−4.5	
	2.25		−0.75	0.75		−2.25
		0.5625	0.1875	−0.1875	−0.5625	
	0.281		−0.0938	0.0938		−0.281
		0.0704	0.0234	−0.0234	−0.0704	
	20.6	41.1	−41.1	41.1	−41.1	−20.6