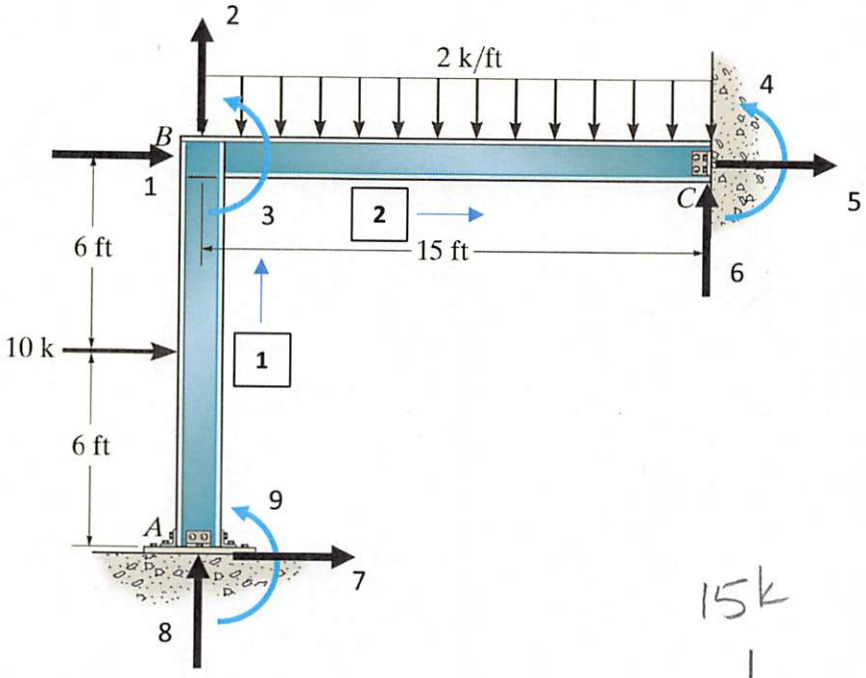
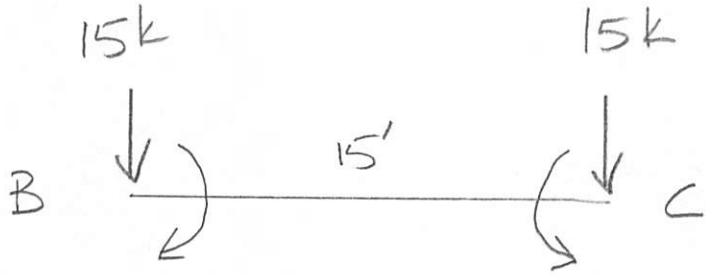
CIVL 4122 Quiz #10 F25 Name: _____

Determine the reactions in the frame. Assume A is fixed, and C is a pin. Assume $E = 29(10^3)$ ksi, $A_{AB} = 10$ in^2, $A_{BC} = 8$ in^2, $I_{AB} = 600$ in^4, and $I_{BC} = 800$ in^4.





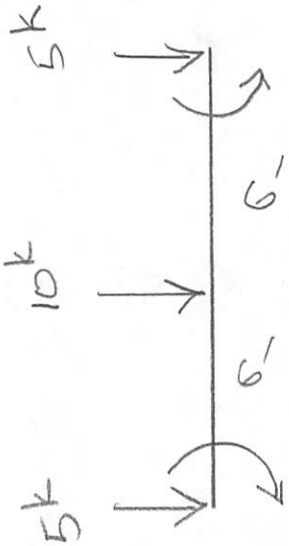
180k·in

450k·in

$\Rightarrow \underline{-270\,k\cdot in}$

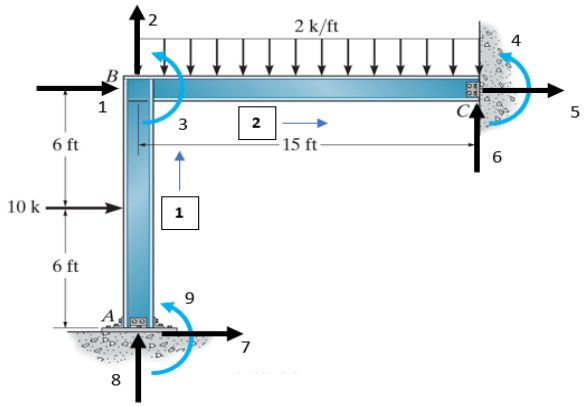
$$\frac{WL^2}{12} = \frac{(2k/ft)(15')^2}{12} = 37.5\,k\,ft$$

$$= \underline{450\,k\cdot in}$$



$$\frac{PL}{8} = \frac{10k(12ft)}{8} = 15k\,ft = \underline{180\,k\cdot in}$$

Quiz #10 F25



FEM_{BC}

450.00 k in

-15.00 k

FEM_{AB}

180.00 k in

5.00 k

Element 1

L =	144	in	E =	29,000	ksi
I =	600	in^4	θ_x =	90	°
A =	10	in^2	θ_y =	0	°

λ_x = 0.000

λ_y = 1.000

AE/L =	2,013.9	k/in
$12EI/L^3$ =	69.9	k/in
$6EI/L^2$ =	5,034.7	k
4EI/L =	483,333.3	k in
2EI/L =	241,666.7	k in

7	8	9	1	2	3	
69.93	0.00	-5,034.72	-69.93	0.00	-5,034.72	7
0.00	2,013.89	0.00	0.00	-2,013.89	0.00	8
-5,034.72	0.00	483,333.33	5,034.72	0.00	241,666.67	9
-69.93	0.00	5,034.72	69.93	0.00	5,034.72	1
0.00	-2,013.89	0.00	0.00	2,013.89	0.00	2
-5,034.72	0.00	241,666.67	5,034.72	0.00	483,333.33	3

Element 2

L =	180	in	E =	29,000	ksi
I =	800	in^4	θ_x =	0	°
A =	8	in^2	θ_y =	90	°

λ_x = 1.000

λ_y = 0.000

AE/L =	1,288.9	k/in
$12EI/L^3$ =	47.7	k/in
$6EI/L^2$ =	4,296.3	k
4EI/L =	515,555.6	k in
2EI/L =	257,777.8	k in

1	2	3	5	6	4	
1,288.89	0.00	0.00	-1,288.89	0.00	0.00	1
0.00	47.74	4,296.30	0.00	-47.74	4,296.30	2
0.00	4,296.30	515,555.56	0.00	-4,296.30	257,777.78	3
-1,288.89	0.00	0.00	1,288.89	0.00	0.00	5
0.00	-47.74	-4,296.30	0.00	47.74	-4,296.30	6
0.00	4,296.30	257,777.78	0.00	-4,296.30	515,555.56	4

k1

1	2	3	4	5	6	7	8	9	
69.93	0.00	5034.72				-69.93	0.00	5034.72	1
0.00	2013.89	0.00				0.00	-2013.89	0.00	2
5034.72	0.00	483333.33				-5034.72	0.00	241666.67	3
									4
									5
									6
-69.93	0.00	-5034.72				69.93	0.00	-5034.72	7
0.00	-2013.89	0.00				0.00	2013.89	0.00	8
5034.72	0.00	241666.67				-5034.72	0.00	483333.33	9

k2

1	2	3	4	5	6	7	8	9	
1288.89	0.00	0.00	0.00	-1288.89	0.00				1
0.00	47.74	4296.30	4296.30	0.00	-47.74				2
0.00	4296.30	515555.56	257777.78	0.00	-4296.30				3
0.00	4296.30	257777.78	515555.56	0.00	-4296.30				4
-1288.89	0.00	0.00	0.00	1288.89	0.00				5
0.00	-47.74	-4296.30	-4296.30	0.00	47.74				6
									7
									8
									9

K

1	2	3	4	5	6	7	8	9	
1,358.82	0.00	5,034.72	0.00	-1,288.89	0.00	-69.93	0.00	5,034.72	1
0.00	2,061.63	4,296.30	4,296.30	0.00	-47.74	0.00	-2,013.89	0.00	2
5,034.72	4,296.30	998,888.89	257,777.78	0.00	-4,296.30	-5,034.72	0.00	241,666.67	3
0.00	4,296.30	257,777.78	515,555.56	0.00	-4,296.30	0.00	0.00	0.00	4
-1,288.89	0.00	0.00	0.00	1,288.89	0.00	0.00	0.00	0.00	5
0.00	-47.74	-4,296.30	-4,296.30	0.00	47.74	0.00	0.00	0.00	6
-69.93	0.00	-5,034.72	0.00	0.00	0.00	69.93	0.00	-5,034.72	7
0.00	-2,013.89	0.00	0.00	0.00	0.00	0.00	2,013.89	0.00	8
5,034.72	0.00	241,666.67	0.00	0.00	0.00	-5,034.72	0.00	483,333.33	9

1	2	3	4	
1,358.82	0.00	5,034.72	-2.6318E-13	1
0.00	2,061.63	4,296.30	4296.296296	2
5,034.72	4,296.30	998,888.89	257777.7778	3
-2.6318E-13	4296.296296	257777.7778	515555.5556	4

Q
5
-15
-270
450

$D = K^{-1}Q$	
0.00583	in
-0.00864	in
-0.00058	rads
0.00124	rads

K

1	2	3	4	5	6	7	8	9	
1,358.82	0.00	5,034.72	0.00	-1,288.89	0.00	-69.93	0.00	5,034.72	1
0.00	2,061.63	4,296.30	4,296.30	0.00	-47.74	0.00	-2,013.89	0.00	2
5,034.72	4,296.30	998,888.89	257,777.78	0.00	-4,296.30	-5,034.72	0.00	241,666.67	3
0.00	4,296.30	257,777.78	515,555.56	0.00	-4,296.30	0.00	0.00	0.00	4
-1,288.89	0.00	0.00	0.00	1,288.89	0.00	0.00	0.00	0.00	5
0.00	-47.74	-4,296.30	-4,296.30	0.00	47.74	0.00	0.00	0.00	6
-69.93	0.00	-5,034.72	0.00	0.00	0.00	69.93	0.00	-5,034.72	7
0.00	-2,013.89	0.00	0.00	0.00	0.00	0.00	2,013.89	0.00	8
5,034.72	0.00	241,666.67	0.00	0.00	0.00	-5,034.72	0.00	483,333.33	9

D		KD		Q_0		Q	
0.00583	1	5.000		5	1	0.00	k
-0.00864	2	-15.000		-15	2	0.00	k
-0.00058	3	-270.000		-270	3	0.00	k-in
0.00124	4	450.000		450	4	0.00	k-in
0	5	-7.519	-	0	5 =	-7.52	k
0	6	-2.398		-15	6	12.60	k
0	7	2.519		5	7	-2.48	k
0	8	17.398		0	8	17.40	k
0	9	-111.132		-180	9	68.87	k-in