1. Determine the moment M that should be applied to the beam in order to create a compressive stress at point D of 10 ksi.
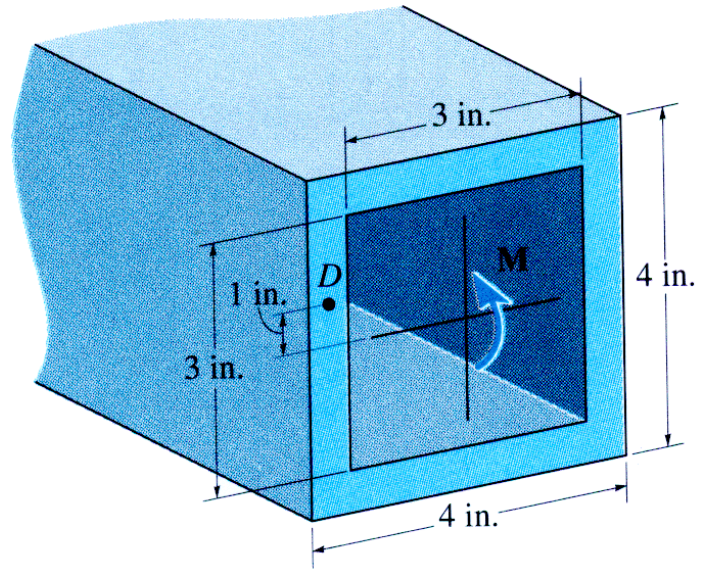
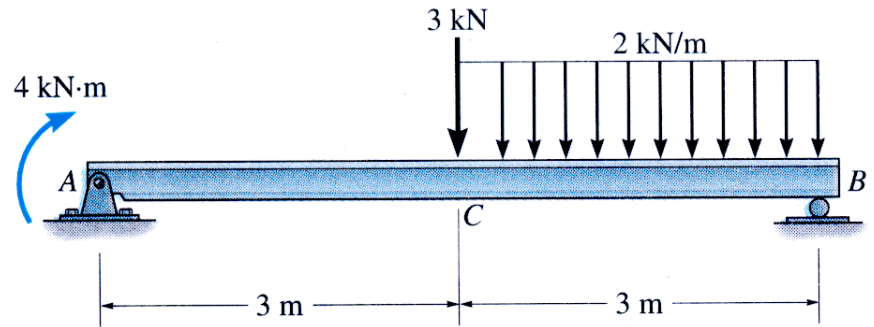2. Knowing that the allowable normal stress for the steel used is 12 MPa, select the most economical wide-flange beam from the attached beam table to support the loading shown.

3. Determine the maximum normal stress in the horizontal portion of the bracket. The bracket has a thickness of 1 in. and a height of 0.75 in.
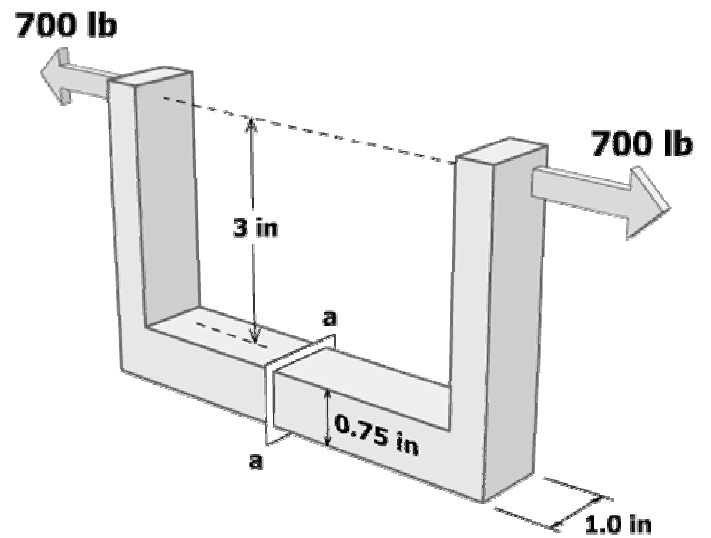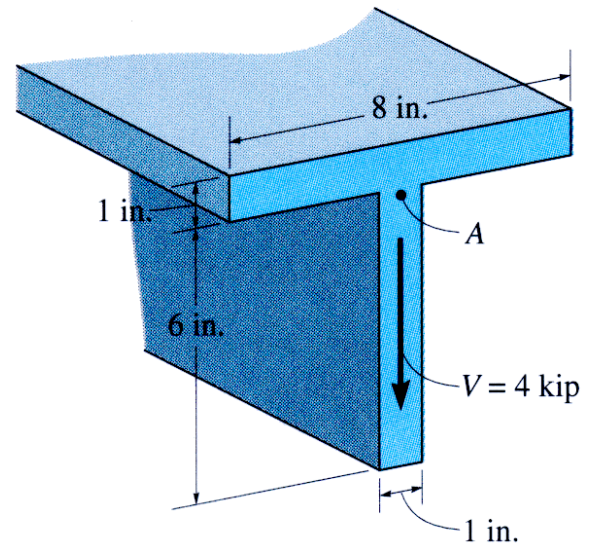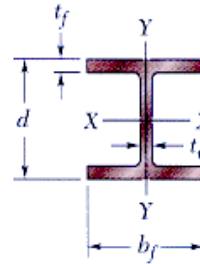
700 lb

700 lb

3 in

a

0.75 in

a

1.0 in

4. Determine the shear stress in the beam at point A, which is located at the top of the web.

Appendix C. Properties of Rolled-Steel Shapes
(SI Units)

W Shapes
(Wide-Flange Shapes)

Designation†	Area A, mm²	Depth d, mm	Flange Width b_f, mm	Flange Thickness t_f, mm	Web Thickness t_w, mm	Axis X-X I_x 10^6 mm⁴	Axis X-X S_x 10^3 mm³	Axis X-X r_x mm	Axis Y-Y I_y 10^6 mm⁴	Axis Y-Y S_y 10^3 mm³	Axis Y-Y r_y mm
W920 × 446	57000	933	423	42.70	24.0	8470	18200	385	540	2550	97.3
201	25600	903	304	20.10	15.2	3250	7200	356	94.4	621	60.7
W840 × 299	38100	855	400	29.20	18.2	4790	11200	355	312	1560	90.5
176	22400	835	292	18.80	14.0	2460	5890	331	78.2	536	59.1
W760 × 257	32600	773	381	27.10	16.6	3420	8850	324	250	1310	87.6
147	18700	753	265	17.00	13.2	1660	4410	298	52.9	399	53.2
W690 × 217	27700	695	355	24.80	15.4	2340	6730	291	185	1040	81.7
125	16000	678	253	16.30	11.7	1190	3510	273	44.1	349	52.5
W610 × 155	19700	611	324	19.00	12.7	1290	4220	256	108	667	74.0
101	13000	603	228	14.90	10.5	764	2530	242	29.5	259	47.6
W530 × 150	19200	543	312	20.30	12.7	1010	3720	229	103	660	73.2
92	11800	533	209	15.60	10.2	552	2070	216	23.8	228	44.9
66	8370	525	165	11.40	8.9	351	1340	205	8.57	104	32.0
W460 × 158	20100	476	284	23.90	15.0	796	3340	199	91.4	644	67.4
113	14400	463	280	17.30	10.8	556	2400	196	63.3	452	66.3
74	9450	457	190	14.50	9.0	333	1460	188	16.6	175	41.9
52	6630	450	152	10.80	7.6	212	942	179	6.34	83.4	30.9
W410 × 114	14600	420	261	19.30	11.6	462	2200	178	57.2	438	62.6
85	10800	417	181	18.20	10.9	315	1510	171	18.0	199	40.8
60	7580	407	178	12.80	7.7	216	1060	169	12.1	136	40.0
46.1	5890	403	140	11.20	7.0	156	774	163	5.14	73.4	29.5
38.8	4990	399	140	8.80	6.4	127	637	160	4.04	57.7	28.5
W360 × 551	70100	455	418	67.60	42.0	2260	9930	180	825	3950	108
216	27600	375	394	27.70	17.3	712	3800	161	283	1440	101
122	15500	363	257	21.70	13.0	365	2010	153	61.5	479	63.0
101	12900	357	255	18.30	10.5	302	1690	153	50.6	397	62.6
79	10100	354	205	16.80	9.4	227	1280	150	24.2	236	48.9
64	8140	347	203	13.50	7.7	178	1030	148	18.9	186	48.2
57.8	7220	358	172	13.10	7.9	161	899	149	11.1	129	39.2
44	5730	352	171	9.80	6.9	122	693	146	8.18	95.7	37.8
39	4980	353	128	10.70	6.5	102.0	578	143	3.75	58.6	27.4
32.9	4170	349	127	8.50	5.8	82.7	474	141	2.91	45.8	26.4

†A wide-flange shape is designated by the letter W followed by the nominal depth in millimeters and the mass in kilograms per meter.

Write legibly – box answers
Include proper units