ENDS 231: Practice Quiz 9

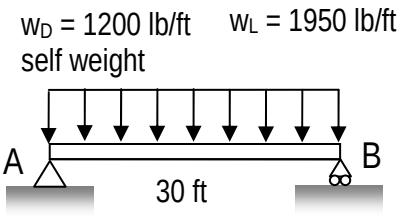
Clearly show your work and answer.

A simply supported steel beam is required to span 30 ft and support a roof having 1200 lb/ft of dead load (from materials), the self weight, and 1950 lb/ft of live load. The beam is fully braced. It will be A992 steel (F_y = 50 ksi and F_u= 65 ksi, E = 30 x 10^6 ksi). Use the chart provided.

a) Using Allowable Stress Design methodology, select the most economical section when F_b = 33.5 ksi.

b) If a W10x15 is used (A = 4.41 in^2, d = 9.99 in, t_w = 0.23 in, b_f = 4.0 in, t_f = 0.27 in), is it adequate for shear when F_v = 21 ksi (ignoring self weight)?

c) *[some short question from the text material]*



S_x In.^{3}	Shape	Depth d In.
176	**W 24× 76**	**23⅞**
175	W 16×100	17
173	W 14×109	14⅜
171	W 21× 83	21⅜
166	W 18× 86	18⅜
157	W 14× 99	14⅛
155	W 16× 89	16¾
154	**W 24× 68**	**23¾**
151	W 21× 73	21¼
146	W 18× 76	18¼
143	W 14× 90	14
140	**W 21× 68**	**21⅛**
134	W 16× 77	16½
131	**W 24× 62**	**23¾**
127	**W 21× 62**	**21**
127	W 18× 71	18½
123	W 14× 82	14¼
118	W 12× 87	12½
117	W 18× 65	18⅜
117	W 16× 67	16⅜
114	**W 24× 55**	**23⅝**
112	W 14× 74	14⅛
111	W 21× 57	21
108	W 18× 60	18¼
107	W 12× 79	12⅜
103	W 14× 68	14
98.3	**W 18× 55**	**18⅛**
97.4	W 12× 72	12¼
94.5	**W 21× 50**	**20⅞**
92.2	W 16× 57	16⅜
92.2	W 14× 61	13⅞
88.9	**W 18× 50**	**18**
87.9	W 12× 65	12⅛

Answers:

a) $S_{x\text{-req'd}}$* = 129.4 in^3, W24x62
b) $f_{v\text{-max}}$ = 20.6 ksi, OK

Disclaimer: Answers have NOT been painstakingly researched.