

## ENDS 231: Practice Quiz 9

*Note: A one page (one sided) crib sheet is allowed during the quiz,  
along with a silent, **non-programmable** calculator.*

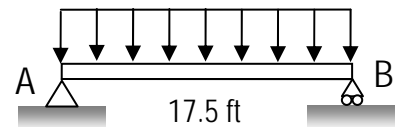
Clearly show your work and answer.

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A simply supported steel beam is required to span 17.5 ft and support a roof having 1325 lb/ft of dead load (from materials), the self weight, and 2100 lb/ft of live load. The beam is fully braced. It will be A992 steel ( $F_y = 50$  ksi and  $F_u = 65$  ksi,  $E = 30 \times 10^6$  ksi). Use the chart provided.

- Using Allowable Stress Design methodology, select the most economical section based on bending when  $F_b = 33.5$  ksi.
- If a W10x15 is used ( $A = 4.41$  in<sup>2</sup>,  $d = 9.99$  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)?
- [some short question from the text material]

$w_D = 1325$  lb/ft     $w_L = 2100$  lb/ft  
self weight



$S_x$	Shape	Depth $d$
in. <sup>3</sup>		in.
68.4	<b>W 18×40</b>	17 <sup>3</sup> / <sub>8</sub>
66.7	W 10×60	10 <sup>1</sup> / <sub>4</sub>
64.7	<b>W 16×40</b>	16
64.7	W 12×50	12 <sup>1</sup> / <sub>4</sub>
62.7	W 14×43	13 <sup>5</sup> / <sub>8</sub>
60.0	W 10×54	10 <sup>5</sup> / <sub>8</sub>
58.1	W 12×45	12
57.6	<b>W 18×35</b>	17 <sup>3</sup> / <sub>4</sub>
56.5	W 16×36	15 <sup>7</sup> / <sub>8</sub>
54.6	W 14×38	14 <sup>1</sup> / <sub>2</sub>
54.6	W 10×49	10
51.9	W 12×40	12
49.1	W 10×45	10 <sup>5</sup> / <sub>8</sub>
48.6	<b>W 14×34</b>	14
47.2	<b>W 16×31</b>	15 <sup>7</sup> / <sub>8</sub>
45.6	W 12×35	12 <sup>1</sup> / <sub>2</sub>
42.1	W 10×39	9 <sup>7</sup> / <sub>8</sub>
42.0	<b>W 14×30</b>	13 <sup>7</sup> / <sub>8</sub>
38.6	<b>W 12×30</b>	12 <sup>3</sup> / <sub>8</sub>
38.4	<b>W 16×26</b>	15 <sup>3</sup> / <sub>4</sub>
35.3	<b>W 14×26</b>	13 <sup>7</sup> / <sub>8</sub>
35.0	W 10×33	9 <sup>3</sup> / <sub>4</sub>
33.4	<b>W 12×26</b>	12 <sup>1</sup> / <sub>4</sub>
32.4	W 10×30	10 <sup>1</sup> / <sub>2</sub>
31.2	W 8×35	8 <sup>1</sup> / <sub>2</sub>
29.0	<b>W 14×22</b>	13 <sup>3</sup> / <sub>4</sub>
27.9	W 10×26	10 <sup>3</sup> / <sub>2</sub>
27.5	W 8×31	8

Answers:

- $S_{x\text{-req'd}}^* = 47.4$  in<sup>3</sup>, W14x34
- $f_{v\text{-max}} = 13.0$  ksi, OK

**Disclaimer: Answers have NOT  
been painstakingly researched.**