A uniform beam extending at right angles from a wall is used to display an advertising sign for an eatery. The beam is 2.50 m long and weighs 80.0 N. The sign, whose dimensions are 1.00 m by 0.800 m, is uniform, and weighs 200. N, hangs from the beam as shown in the drawing. A cable, attached to the wall of the eatery at a point on the beam where the inside end of the sign is attached to the beam and making an angle of 60.0° with the beam, supports this advertising structure.

A. \( \left[ 20 \text{ pts.} \right] \) What is the magnitude of the tension in the cable supporting the beam?

\[
\begin{align*}
\Sigma F_i &= 0 \\
\Sigma F_x &= 0 \\
\Sigma F_y &= 0 \\
T \cos 60° &= \frac{W_b l_b + W_s l_s}{l_T} \\
T &= \frac{(80 \text{ N})(1.25 \text{ m}) + (200 \text{ N})(2.00 \text{ m})}{1.20 \text{ m}} \\
T &= 385 \text{ N}
\end{align*}
\]

B. \( \left[ 10 \text{ pts.} \right] \) What are the magnitudes of the horizontal and vertical forces the wall exerts on the left end of the beam?

\[
\begin{align*}
\Sigma F_x &= 0 = F_h - T \cos 60° \\
F_h &= (385 \text{ N})(.5) = 192 \text{ N} \\
F_h &= 192 \text{ N}
\end{align*}
\]

\[
\begin{align*}
\Sigma F_y &= 0 = T \sin 60° - F_v - W_b - W_s \\
F_v &= -(80 \text{ N} + 200 \text{ N}) + (385 \text{ N})(\sin 60°) \\
F_v &= 53.4 \text{ N}
\end{align*}
\]