A bucket filled with 2 gallons of water leaks until it is empty as it is lifted 20 feet. What is the weight as a function of height? What is the work that is done in lifting the bucket?

\[
\text{Weight} = 16 - \frac{4}{5} h
\]

\[
\text{Work} = \int_{0}^{20} \left(16 - \frac{4}{5} h\right) dh
\]

\[
= \left[16h - \frac{2}{5} h^2\right]_{0}^{20}
\]

\[
= (20)(16) - \frac{2}{5} \cdot 400 - 0
\]

\[
= 160 \text{ ft} \cdot \text{lbs}
\]