A time \( t \)

\[ x = 2t \]

so \[ \frac{x}{2} = t \]

Bucket weighs

\[ 4 + 40 - 0.2t \]

\[ = 4 + 40 - 0.1x \]
\[ w \sim \sum 44 - 1x \Delta x \]

\[
\text{work} = \int_{0}^{80} (44 - 1x) \, dx = 3200
\]
13a. rope weighs \(.5 \, \text{lb/ft}\)

\[
\text{Force } \cdot \text{ dist} \approx \sum .5x \Delta x
\]

\[
\text{Work } = \int_0^5 \frac{1}{2}x \, dx
\]
P. lift bucket + lift rope + lift water

Bucket: $9.8 \cdot 10 \cdot 12 = 9.8 \cdot 120 \text{ J}$

Rope: $9.8 \int_{0}^{12} 0.8x \, dx$

Water: x feet in air

bucket has $\frac{x}{12} = \frac{\text{water lost}}{36}$

so $3x = \text{water lost}$

so must lift $36 - 3x \text{ kg}$ water

get $9.8 \int_{0}^{12} (36 - 3x) \, dx$