Chapter 6 Problem 45 [†]

Given
$W = 7.9 \times 10^{11}\ J$
$m = 3.4 \times 10^{6}\ kg$
$\Delta x = 180\ km = 1.8 \times 10^{5}\ m$

Solution
Find the average force as the locomotive pulls the train.

From the definition of work.

$$W = F\Delta x$$

Solving for the average force gives

$$F = \frac{W}{\Delta x} = \frac{7.9 \times 10^{11}\ J}{1.8 \times 10^{5}\ m} = 4.39 \times 10^{6}\ N$$

$$F = 4.39\ MN$$

[†]Problem from Essential University Physics, Wolfson