Chapter 16 Problem 45 [†]

Given
$1\ gram\ fat = 9\ kcal$
$m = 78\ kg$
$x = 26.2\ mi$
$1\ mi = 125\ kcal$

Solution
Find the mass loss for running a marathon assuming 100% efficiency.

From the information provided this becomes a conversion problem. We will convert the original distance into kcal consumed and in turn convert kcal into grams of fat.

$$26.2\ mi\left(\frac{125\ kcal}{1\ mi}\right)\left(\frac{1\ gram\ fat}{9\ kcal}\right) = 364\ grams$$

364 grams of fat would be consumed. Converting this to ounces gives us

$$364\ g\left(\frac{1\ kg}{1000\ g}\right)\left(\frac{1\ lb}{0.454\ kg}\right)\left(\frac{16\ oz}{1\ lb}\right) = 12.8\ oz$$

[†]Problem from Essential University Physics, Wolfson