

Chapter 16 Problem 43 [†]

Given

$$1 \text{ gram fat} = 9 \text{ kcal}$$

$$m = 78 \text{ kg}$$

$$x = 26.2 \text{ mi}$$

$$1 \text{ mi} = 125 \text{ kcal}$$

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.

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

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

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

[†]Problem from Essential University Physics, Wolfson