Exercise 52

Suppose the world's oil reserves in 2014 are 1,820 billion barrels. If, on average, the total reserves are decreasing by 25 billion barrels of oil each year:

(a) Give a linear equation for the remaining oil reserves, R, in terms of t, the number of years since now.

(b) Seven years from now, what will the oil reserves be?

(c) If the rate at which the reserves are decreasing is constant, when will the world's oil reserves be depleted?

Solution

Because the rate at which the reserve is being depleted each year is constant, a linear function can be used to model the amount left. Let t be the number of years after 2014, and let R be the amount of oil left in the reserve. The amount present at $t = 0$ is 1,820 billion barrels, or 1.82×10^{12} barrels. The rate that it increases each year is -25×10^9 cubic feet per year.

$$R(t) = (-25 \times 10^9)t + (1.82 \times 10^{12})$$

Plug in $t = 7$ to determine the amount of helium in reserve in 2021, seven years after 2014.

$$R(7) = (-25 \times 10^9)(7) + (1.82 \times 10^{12}) = 1.645 \times 10^{12} \text{ barrels} \quad \text{(1,645 billion barrels)}$$

Set $R = 0$ and solve the equation for t to determine when the reserve will be depleted.

$$0 = (-25 \times 10^9)t + (1.82 \times 10^{12})$$

$$25 \times 10^9 t = 1.82 \times 10^{12}$$

$$t = \frac{1.82 \times 10^{12}}{25 \times 10^9} = 72.8$$

Therefore, in 72.8 years, or a little before the end of 2087, the reserve will be depleted.