

Module 8: Interpreting Context

A company manufactures soft drinks according to a secret formula and special mixing procedures. After mixing, the beverage is moved into a storage container for bottling. The rate at which the beverage flows into the storage container is modeled by the function R , where

$R(t) = 120 + 25 \cos\left(\frac{t}{2}\right) \cdot \ln(t+10)$ gallons per minute, t is measured in minutes, and $0 \leq t \leq 60$. Bottles are filled using the beverage in the storage container at a rate modeled by $B(t) = 20 \sqrt{100 - \frac{(t-30)^2}{10}}$ gallons per minute, for $0 \leq t \leq 60$. There are 2000 gallons of beverage in the storage container at time $t = 0$.

- Is the amount of beverage in the storage container increasing or decreasing at time $t = 10$ minutes? Give a reason for your answer.
- How many gallons of beverage flow into the storage container during the 30 minute time interval $0 \leq t \leq 30$?
- How many gallons of beverage are in the storage container at time $t = 40$ minutes?
- Find $B'(50)$ and, using correct units, explain the meaning of this value in the context of this problem.