Watch mr leckie 7.1 integrals as net change watch from 12:00-27
http://www.chaoticgolf.com/tutorials_calc_ch7_aahs.html

7.1 Integral as Net Change — Calculus

Consumption over Time

Velocity is not the only rate in which you can integrate to get a total. In fact if you were given a function that gave the number of tickets per hour that the police wrote each day, and you wanted to find the total number of tickets in a 24-hour period, you could integrate.

Example 3: The tide removes sand from Sandy Point Beach at a rate modeled by the function R given by

$$R(t) = 2 + 5\sin\left(\frac{4\pi t}{25}\right).$$

A pumping station adds sand to the beach at a rate modeled by the function S, given by

$$S(t) = \frac{15t}{1+3t}.$$

Both $R(t)$ and $S(t)$ have units of cubic yards per hour and t is measured in hours for $0 \le t \le 6$. At time $t = 0$, the beach contains 2500 cubic yards of sand.

a) How much sand will the tide remove from the beach during this 6-hour period? Indicate units of measure.

b) Write an expression for $Y(t)$, the total number of cubic yards of sand on the beach at time t.

c) Find the rate at which the total amount of sand on the beach is changing at time $t = 4$.

d) For $0 \le t \le 6$, at what time t is the amount of sand on the beach a minimum? What is the minimum value? Justify your answers.