Andy Bumstead

Anthony Raymond

Plasmolysis Computer Model – State Educational Standards

The key concepts our computer model deals with are osmosis and diffusion. Both of these are phenomena that seek to establish an equilibrium. Equilibrium is in a broad sense addresses both state educational standards dealing with algebra and functions.

When solving an equation or finding the solution to a function, the student is effect determining when a state of equilibrium is achieved for that set of variables.

- **Osmosis is the movement of water molecules from an area of high water concentration to an area of low water concentration. This process continues until an equilibrium is reached.**

- **Diffusion is the spontaneous movement of molecules from an area of high concentration to an area of low concentration. This process continues until an equilibrium is reached.**

From NYS Common Core Learning Standards:

Equations and inequalities

An equation is a statement of equality between two expressions, often viewed as a question asking for which values of the variables the expressions on either side are in fact equal. These values are the solutions to the equation

Connections to Functions and Modeling

Expressions can define functions, and equivalent expressions define the same function. Asking when two functions have the same value for the same input leads to an equation; graphing the two functions allows for finding approximate solutions of the equation. Converting a verbal description to an equation, inequality, or system of these is an essential skill in modeling.

The two principles of osmosis and diffusion, in conjunction with our plasmolysis computer model, reinforce mathematics concepts involving algebra and functions as a whole. The rate at which osmosis and diffusion occur can be thought of as functions. For example, osmosis can be thought of as one function of water leaving the cell, and a second function of solute molecules entering the cell. When these two functions equal one another, equilibrium is achieved.   Using our computer model, it is easy to see when there is an inequality, this is observed as the cell membrane shrinks in response to the addition of solute (salt) molecules.