Divergence of a Vector Field.

The divergence of $\mathbf{F} \ = \ div \ \mathbf{F} \ = \ \nabla \bullet \mathbf{F}$.

Thus in 2-dimensions where $\mathbf{F} \ = \ < P, \ Q >$ and $\nabla \ = \ < \frac{\partial}{\partial x}, \ \frac{\partial}{\partial y} >$,

$$div \ \mathbf{F} \ = \ \nabla \cdot \mathbf{F} \ = \ < \frac{\partial}{\partial x}, \ \frac{\partial}{\partial y} > \cdot < P, \ Q > \ = \ \frac{\partial P}{\partial x} + \frac{\partial Q}{\partial y}.$$

Thus in 3-dimensions where $\mathbf{F} =< P, \ Q, \ R >$ and $\nabla =< \frac{\partial}{\partial x}, \ \frac{\partial}{\partial y}, \ \frac{\partial}{\partial z} >$,

$$div \ \mathbf{F} \ = \ \nabla \cdot \mathbf{F} \ = \ < \frac{\partial}{\partial x}, \ \frac{\partial}{\partial y}, \ \frac{\partial}{\partial z} > \cdot < P, \ Q, \ R > \ = \ \frac{\partial P}{\partial x} + \frac{\partial Q}{\partial y} + \frac{\partial R}{\partial z}.$$

Suppose a $\mathbf{F} < P(x,y), P(x,y) >$ represents the velocity vector of water flowing on a flat surface.

I.e., the water at the location (x,y) is flowing in the directions $< P(x,y), Q(x,y) >$ with speed $|| < P(x,y), Q(x,y) > || meters per second$