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The multivariable setting introduces extensions to many major themes of single variable calculus. The algebraic conditions necessary for these new theorems are often quite subtle but have beautiful geometric interpretations. We have developed physical surfaces, measurement tools, and activities which help students discover potential connections across the multivariable calculus curriculum. We will share how these materials help groups of students formulate and share their own conjectures with the class as well as test the conjectures of their peers before formal lecture. In this talk, we will demonstrate how these materials let students explore the relationship between the geometric features of contour plots and the value of various single, double, and triple integrals. Raising Calculus to the Surface is funded in part by the National Science Foundation DUE #1246094. (Received September 13, 2014)