Multiscale transforms designed to process analog and discrete-time signals and images cannot be directly applied to analyze high-dimensional data residing on the vertices of a weighted graph, as they do not capture the intrinsic topology of the graph data domain. In this paper, we adapt the Laplacian pyramid transform for signals on Euclidean domains so that it can be used to analyze high-dimensional data residing on the vertices of a weighted graph. Our approach is to study existing methods and develop new methods for the four fundamental operations of graph downsampling, graph reduction, and filtering and interpolation of signals on graphs. Equipped with appropriate notions of these operations, we leverage the basic multiscale constructs and intuitions from classical signal processing to generate a transform that yields both a multiresolution of graphs and an associated multiresolution of a graph signal on the underlying sequence of graphs.