We suggest a novel visual approach to teaching topics in elementary algebra from a viewpoint that is characteristic of modern mathematics. It puts emphasis on families of mathematical objects that share a similar nature, rather than on the representative object from a given family. Thanks to rich computer-supported virtual mathematical environments (like "VisuMatica"), it becomes feasible to convey this advanced circle of ideas to students with a modest mathematical background. We will illustrate our approach with a few basic examples. They explore the world of quadratic polynomials and quadratic equations.