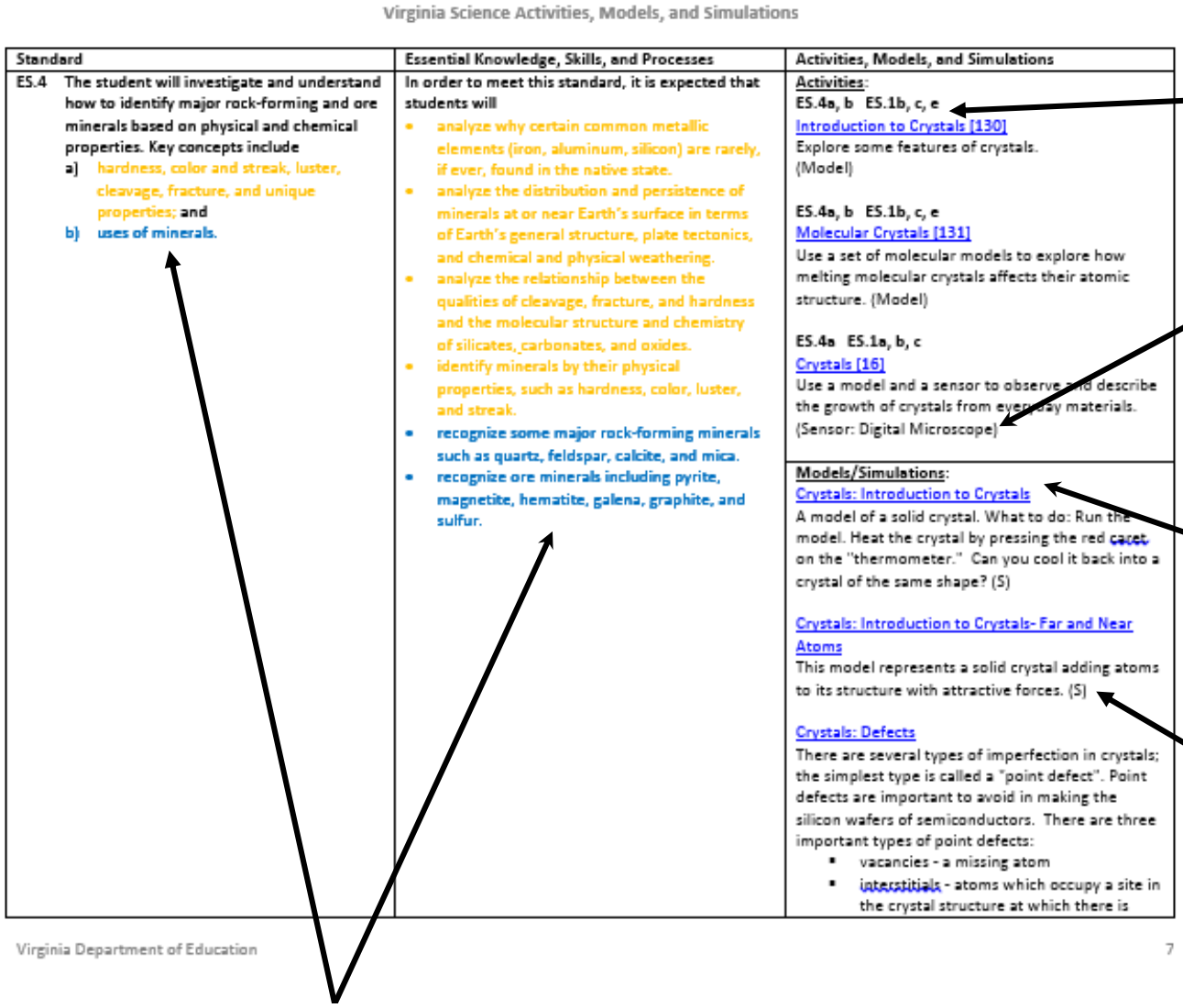
Virginia Science, Models, and Simulations Diagram



Virginia Science Activities, Models, and Simulations

Standard	Essential Knowledge, Skills, and Processes	Activities, Models, and Simulations
ES.4 The student will investigate and understand how to identify major rock-forming and ore minerals based on physical and chemical properties. Key concepts include a) hardness, color and streak, luster, cleavage, fracture, and unique properties; and b) uses of minerals.	In order to meet this standard, it is expected that students will • analyze why certain common metallic elements (iron, aluminum, silicon) are rarely, if ever, found in the native state. • analyze the distribution and persistence of minerals at or near Earth's surface in terms of Earth's general structure, plate tectonics, and chemical and physical weathering. • analyze the relationship between the qualities of cleavage, fracture, and hardness and the molecular structure and chemistry of silicates, carbonates, and oxides. • identify minerals by their physical properties, such as hardness, color, luster, and streak. • recognize some major rock-forming minerals such as quartz, feldspar, calcite, and mica. • recognize ore minerals including pyrite, magnetite, hematite, galena, graphite, and sulfur.	Activities: ES.4a, b ES.1b, c, e Introduction to Crystals [130] Explore some features of crystals. (Model) ES.4a, b ES.1b, c, e Molecular Crystals [131] Use a set of molecular models to explore how melting molecular crystals affects their atomic structure. (Model) ES.4a ES.1a, b, c Crystals [16] Use a model and a sensor to observe and describe the growth of crystals from everyday materials. (Sensor: Digital Microscope) Models/Simulations: Crystals: Introduction to Crystals A model of a solid crystal. What to do: Run the model. Heat the crystal by pressing the red caret on the "thermometer." Can you cool it back into a crystal of the same shape? (S) Crystals: Introduction to Crystals- Far and Near Atoms This model represents a solid crystal adding atoms to its structure with attractive forces. (S) Crystals: Defects There are several types of imperfection in crystals; the simplest type is called a "point defect". Point defects are important to avoid in making the silicon wafers of semiconductors. There are three important types of point defects: ▪ vacancies - a missing atom ▪ interstitials - atoms which occupy a site in the crystal structure at which there is

Virginia Department of Education 7

Activities include a correlation to science standard(s), a brief description, and the interactive component (model or sensor).

Each activity indicates the components incorporated in the activity. For this lesson, both a model and a sensor (probeware) are used by students in the activity.

Models/Simulations include a short description of each model or simulation along with a brief description. These may be used as stand-alone tools.

Each model/simulation has a suggestion for student **(S)** use or teacher **(T)** use.

The key concepts of the standards and the student expectations of the Essential Knowledge, Skills, and Processes are linked by color.