Additional information and resources for video about planets and brown dwarfs

Both the Pennsylvania standards and the NGSS disciplinary core ideas include statements about the formation and evolution of the Solar System. These include:

PA 3.3.7.B1: Explain how gravity is the major force in the formation of the planets, stars, and the Solar System

PA 3.3.10.B1: Explain what caused the Sun, Earth, and most of the other planets to form between 4 and 5 billion years ago

PA 3.3.12.B1: Analyze the influence of gravity on the formation and life cycles of galaxies, including our own Milky Way Galaxy; stars; planetary systems; and residual material left over from the creation of the Solar System

NGSS Disciplinary Core Idea ESS1.B for grades 9 - 12: Observations from astronomy and space probes provide evidence for explanations of solar system formation

It may not be immediately apparent from these statements, but the underlying big idea in Solar System astronomy that relates most of the standards is our theory for Solar System formation. This is often called “Solar Nebula Theory” or the “Nebular Hypothesis”.

While standards documents like the PA standards and the NGSS focus on our own Solar System, our understanding of the process of the formation of planets has been heavily influenced by very recent discoveries of planetary systems orbiting distant stars as well as these “failed stars” known as brown dwarfs. For students to achieve expert understanding of planetary formation, they need to become broadly familiar with the latest discoveries of exoplanets and brown dwarfs and how those objects have forced us to revise our understanding of our own Solar System.

For further reading, here are a few suggestions:

- Origins: Fourteen Billion Years of Cosmic Evolution by Tyson & Goldsmith – this book accompanies the PBS Nova special, which is available on DVD
- A section in the free on-line astronomy textbook astronomynotes.com: http://www.astronomynotes.com/solfluf/s11.htm