**Sample astronomy activity**

**Overview:**

Students identify differences between images of astronomical objects and Earth taken in near-infrared and visible light. They construct hypotheses for what causes the differences by comparing what they observe in these images to their own photographs, and evaluate their hypotheses using information from the NASA and other web sites.

**Materials:**

* Student sheet “Visible Light and Near-Infrared Images of Astronomical Objects”
* Computers with Internet access or printouts of the web pages listed on the last page of the handout.

**Activity:**

Start by discussing a few examples of objects that look different in the students’ near-infrared and visible light photographs. Probe students’ understanding of what causes these differences. For example, they should be able to explain that

* Objects look bright if they reflect and dark if they absorb most of the light that illuminates them. Some objects absorb most visible light and reflect most near-infrared (e.g., leafs, dark-skinned fruits and vegetables, dark cotton fabrics), some objects absorb both types of light (artificial turf, black leather), and some objects reflect (or scatter) both types of light (e.g., light skinned fruits and vegetables, clouds).
* Substances are transparent if light can pass through them without being absorbed. They are opaque if light is absorbed and cannot pass through them. Some substances are opaque in visible light and transparent in near-infrared (e.g., wet-erase overhead markers ink, cola, sunglasses), some objects are opaque in both types of light (e.g., sharpie ink, coffee), and some substances are transparent in both types of light (e.g., water, window glass).

When students are able to explain what they see in their own photographs, give them the “Visible Light and Near-Infrared Images of Astronomical Objects” handout and ask them to complete the following tasks:

1. Categorize each of the six objects. (planet, moon, …)
2. Write one-paragraph descriptions of what you see in the near-infrared and visible light images of each object. Pay particular attention to details that are only visible in the near-infrared images but not in the visible light images and vice versa.
3. Based on what you learned about near-infrared and visible light from your own photographs, write down a hypothesis for each pair of images about what causes the differences between them.

After completing these tasks, ask a few volunteers to read one of their hypotheses out loud. The other students should either suggest changes or explain why they agree with the hypotheses. Finally, ask students to compare their hypotheses with the information about each object provided on the web sites listed on the last page of the handout (or printouts of these web pages). Students should write short reflections about whether or not this information supports their hypotheses and what questions they still have about the objects.