Sky Surveys Answers

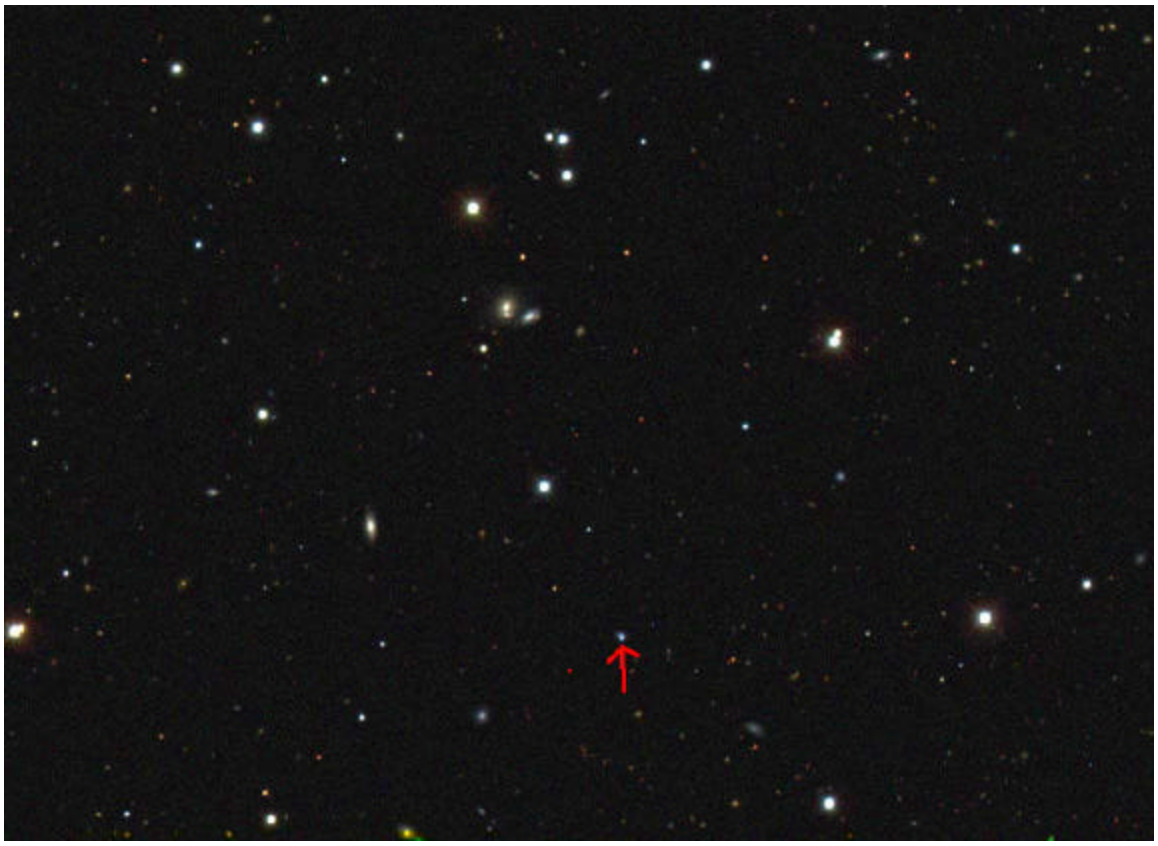
Question 1. The SDSS photos should show more detail (SDSS has a resolution of 0.4 arcseconds per pixel, and POSS I has a resolution of 1.7 arcseconds per pixel. POSS II has 1.0 arcsecond per pixel resolution, so SDSS still shows more detail). Image processing of the digitized POSS images makes many faint objects visible, so the number of objects visible in both images is comparable. However, SDSS can show many fine details about each object that POSS can not. In addition, POSS images are taken through a single filter only, so they are not color images.

The pictures are rotated and flipped with respect to one another. To align the two pictures, take the SDSS image, rotate it 90 degrees counterclockwise, and then flip it over the vertical axis.

Question 2. The SDSS is in color, and it shows more detail. These will probably be the most common answers, although students may see other differences depending on the fields they choose.

Question 3. Students may see the supernova marked on the next page.

Exercise 1. The supernovae are marked with arrows in the pictures below.



Question 4. The biggest difference is that the dust lanes, which are NGC 4753's most distinctive feature in the SDSS image, are not visible in the 2MASS image. Dust is transparent to infrared light. The core of the galaxy looks similar in each image.

Question 5. Infrared light is not absorbed by dust, so you can see objects hidden behind dust clouds.

Exercise 2. Answers will vary. Generally, dust lanes will not be visible in 2MASS images. Students may also see some details in infrared 2MASS images that are not visible in the visible-light SDSS images.

Question 6. Many different objects give off x-rays. Most likely, students will have picked a galaxy. If SDSS returns the object type as a star, the object is probably really a quasar. The error in classification occurs because a program called Photo classified objects in SDSS data, and objects that appear as point sources are classified as stars. Quasars are so far away that most of them appear as point sources – so Photo usually classifies them as stars.

Question 7. Looking at x-ray sources tells you which objects have temperatures high enough to give off x-rays. Objects that appear as ordinary stars or galaxies reveal their true nature.

Exercise 4. Most objects that give off x-rays are galaxies. Some will be classified as stars; as students find these, explain that the objects are actually quasars.