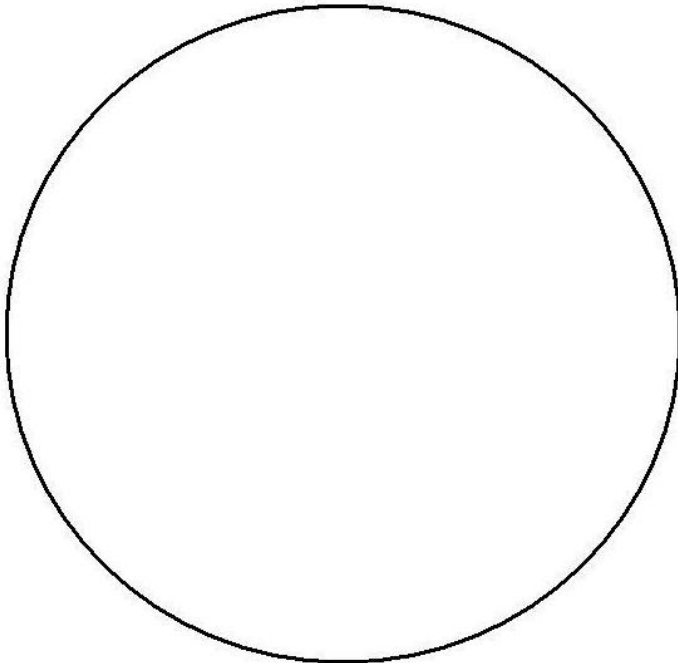


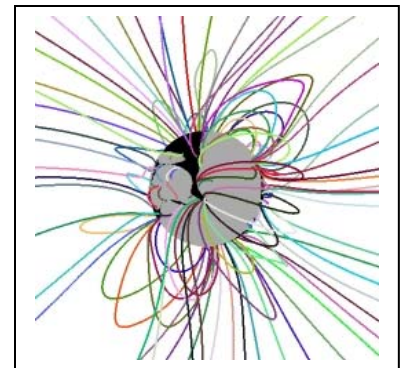
This image was taken by the X-Ray Telescope (XRT) on the Hinode solar observatory in December, 2006. It shows the complex magnetic structure over a large sunspot called Active Region AR930. You can also see large numbers of bright 'freckles' - each representing a small micro-flare.

The large black 'holes' are places in the corona of the sun where high-temperature gas is free to escape from the sun, and so there is little gas to illuminate these regions of the solar corona. This is because in these 'coronal holes' magnetic field lines open out to interplanetary space. Closed field lines near the surface act like magnetic bottles and keep the heated plasma close to the sun, creating the bright areas (red and yellow colors).

Using a black pen or pencil, try your hand at predicting what the magnetic field lines look like using the clues from Hinode picture!



Below is an example of a field line model calculated from an image by the SOHO satellite.



Answer Key:

Students may come up with several different versions. The main thing to look for is that in the regions where the Hinode picture shows orange or yellow, students should draw loops of magnetism...like a bar magnet field....that are close-in to the solar surface. In the black regions (north pole) of sun and the large spot to the left of the sunspot (yellow), they should draw magnetic lines that start in the dark region but end outside the picture because they are continuing on into interplanetary space. Below is a possible drawing! Students may notice that the gases are brightest in the lower-right quadrant so there are more closed magnetic field 'loops' there. There are also more dark areas in the top half of the image so there are probably a mixture of open and closed field lines, and not as many closed ones as in the lower-right quadrant. They should definitely realize that the two large dark areas at the top 'north' pole and to the left of the bright yellow sunspot region contain open field lines. The bright yellow active region should have a number of large loops and a higher density of them than elsewhere.

