Chandra will Investigate:
Black Holes.

What is a black hole?
When a collapsed star has more than three times the mass of the Sun, Einstein’s general theory of relativity requires that it will collapse forever to form one of the weirdest objects in the universe: a black hole.

A black hole does not have a surface in the usual sense of the word. There is simply a region in space around a black hole beyond which we cannot see, because nothing—not even light—can escape from this region. The boundary between what we can see and what we can’t see is called the event horizon.

How can scientists observe black holes?
Scientists can’t observe black holes directly. They can observe light in the form of X-rays produced by matter as it swirls toward a black hole.

Why does matter falling toward a black hole produce X-rays?
As gas and dust particles swirl toward a black hole, they speed up and form a flattened disk. Collisions between the particles heat them to extreme temperatures. Just before particles pass beyond the event horizon, their temperature rises to many millions of degrees—hot enough to produce X-rays. An X-ray telescope is the only way to observe this process, and Chandra’s increased sensitivity will allow scientists to see details of this process as never before.

Do black holes grow when matter falls into them?
Yes, a black hole in the center of a galaxy where stars are crowded together may grow to a billion times the mass of the Sun.

The energy released from large clouds of gas as they fall into these supermassive black holes can be stupendous—greater than the output of an entire galaxy with a hundred billion stars!

The average speed of particles in a 100 million degree gas is over 2 million miles per hour. Why do you think the gas around a black hole gets so hot? (Hint: a black hole has extremely strong gravity.)