

Journey to a Black Hole!

So you and a friend want to take a trip to a black hole? You better know what you're in for!

A black hole is born when an enormous star—at least 10 or 20 times more massive than the Sun—dies in an explosion and the star collapses down to a point. A small object with such incredible mass causes a deep warp in space-time. Nothing—not even light—can escape from the strong gravitational field created by such a deep dent.

We still can't see them, but we know that black holes exist, thanks to the groundwork of Einstein's General Theory of Relativity.

Still sound like a place you want to visit? Let's say your friend forgot to tie his shoes, tripped, and fell into a black hole. The wild events that would follow include some of these ...

BLACK HOLE MIND MELTERS

You'd never actually see your friend disappear into the black hole—you'd just watch his ever-slowing "descent." As he got closer to the event horizon, where gravity is so strong that not even light can get free, he would appear to move in slow motion.

If your friend pointed a flashlight at you and turned it on and off every other second, the blinking of the flashlight would appear to slow down as he approached the event horizon. Your friend wouldn't feel time slowing down.

The extreme gravitational pull would also change the color of the light—it would start to appear red and get redder until it faded away from human eyesight. The light would still be there, but in longer wavelengths than our eyes can detect.

Your friend would experience what some scientists call the "spaghettification" effect. With his legs in deeper than his head, the black hole's gravity would pull at his feet and stretch his legs out like long pieces of spaghetti. Yikes! No wonder these places aren't listed on any travel brochures!

THE HOLE WORLD

If the mass of the Earth were compressed to the size of a ping-pong ball, it would become a black hole.

LIGHT TRAVELER

Q: If light has no mass and therefore no weight, why can't it escape the gravity of a black hole?

A: See below



Illustration by:
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As if it had the mass represented by $E=mc^2$
A: Light is made of photons. Photons have no mass, but have kinetic energy. Black holes pull on this energy