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*All About Black Holes*

A black hole is a region of space that has a gravitational field so intense that no matter or radiation can escape. Light cannot even escape. It is where matter has been squeezed into a tiny space. The idea of black holes was first predicted by Albert Einstein through his theory of relativity (e = mc2) in 1916, but the term was not coined until John Wheeler, an American Astronomer, did so in 1967. It was in 1971 that the first black hole was discovered.

At a distance, Newton’s Universal Law of Gravitational Force applies to black holes. Objects will feel the black hole’s attraction, and can even orbit around them. The more massive an object or shorter distance from the black hole makes this force stronger. But, as an object comes too close to a black hole, relativistic effects come into play, and Newton’s law breaks down. The object will be traveling fast enough that time dilation will occur. Because of this, gravitational tidal facts occur and time itself begins to slow down.

Black holes obey the laws of gravity. It is gravity itself that that cause a black hole’s remarkable properties. Objects are attracted to black holes and at times orbit them, displaying that the holes do obey the laws of gravity. They follow Einstein’s explanation of gravity as well, for his theory of relativity displays how massive objects distort the four-dimensional space-time continuum, and gravity is that distortion. The very strong gravitational fields near black hold allow Einstein’s theory to predict numerous different phenomena.

There are three types of black holes. They are stellar, supermassive, and miniature black holes. Black holes are measured in “solar masses”. One solar mass is equivalent to 1.99 x 1030 kilograms. Stellar-mass black holes fall in the range of 10-100 solar masses, while supermassive black holes can be millions or billions of solar masses. Miniature black holes are the smallest of the three.

Black holes create many peculiar phenomena. If a clock was dropped in a black hole, it would appear to run slower and become redder as it falls. It will remain frozen in both space and time, never crossing the event horizon. Objects can in fact safely orbit a black hole. If you were to replace the sun with a black hole, we would continue orbiting it just the same. How close you can get, though, depends on your speed. As you get closer, an object would need to move faster in faster in order to avoid being sucked in. The speed of the orbit can decrease as distance from the hole increases. The distance and speed have an inverse relationship.

Nothing can escape a black hole. As black holes near each other, they can eventually collide. This collision is one of the most energetic explosions in the known universe, but when it occurs, it is completely dark and silent, because no sound, light, radiation, or particles can escape. If you mash two together, you end up with a more massive black hole.

In total, along with the 100 billion stars, our galaxy contains roughly 100 million black holes. Each other galaxy probably contains millions and millions other black holes. There are so many in the universe that it is impossible to count how many black holes there are.

If light rays pass too close to a black hole, they become caught and cannot escape. This causes a dark disk region around black holes. But, if the light passes outside of this range, the light is bent by the black hole’s gravity. This distorts the star field like a funhouse mirror.

As far as what lies inside of a black hole, scientists are uncertain. The edge of a black hole is called the event horizon, and we are unable to look past it without being sucked in. Whatever is inside, though, is unable to escape. If a human falls into a black hole, they may first expect to be crushed or torn to pieces. The reality is stranger than that. The moment you enter a black hole, reality would split in two. In one, you would be instantly incinerated. In the other, you would plunge utterly unharmed. The laws of physics break down when a black hole is involved.

 Black holes do not live forever. Over time, they evaporate and release their energy back into the universe. This process, however, is not short. It would take a black hole as large as the sun approximately 1067 years to completely evaporate. Nevertheless, they do in fact eventually die. This and all other characteristics of black holes make them one of the most interesting subjects literally in the universe, one that challenges physics in its entirety.