How is gravity like nature's magnifying glass? To find out what the universe was like in the beginning, we need to study the most distant galaxies whose light has been traveling to us for billions of years. But the farther away a galaxy is, the fainter it appears. That makes distant galaxies very hard to see even for the most powerful telescopes, because they can only collect so much light.

Fortunately, nature can provide a helping hand. According to Einstein, the gravity of massive objects can be so intense that it can warp the fabric of space time. Light, which normally travels in a straight line through space, can show us where this distortion occurs. A very massive object will warp space and bend the path of the light.

In a sense, warped space acts like a magnifying glass. A magnifying glass collects and bends light, making a light bulb, for example, appear bigger and brighter. Warped space can do the same thing to light from a galaxy.

So what acts like the biggest magnifying glass in space? Galaxy clusters are the most massive things in the universe with the most gravity. When light from a very distant galaxy passes through a cluster, it is amplified and distorted, with the cluster acting like an imperfect magnifying glass.

Light that would have gone in other directions gets bent toward our telescope. That lets us see the very distant galaxy in more detail. This effect is called gravitational lensing. Without this natural boost from gravity, it would be impossible for our telescopes to see far away enough in space and time to study galaxies in the early universe.

The Hubble Space Telescope has made use of gravitational lensing to see many distant galaxies. And the larger James Webb Space Telescope will be able to find galaxies even fainter and farther than we've ever seen. With Webb, we will look for the very first galaxies to form and really learn about the early universe.