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## Cosmic Candles Shine a Light on the Size of the Universe

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For a hundred years, astronomers have been trying to pin down the exact distance to one of our nearest neighbouring galaxies, the Large Magellanic Cloud. Measuring distances in the vast Universe is very tricky business: we can't travel with a measuring tape, and our rulers would have to be very long! However, astronomers have come up with some very clever tricks for measuring distances, using just light.

In the case of the Large Magellanic Cloud, its distance was determined by looking at pairs of stars that orbit each other. We call these 'binary systems'; you can see an artist's impression of one in this picture. From Earth, we see the stars regularly passing in front of each other. Each time this happens, the combined brightness of the stars drops. By tracking the changes in brightness very carefully, astronomers can work out all kinds of information: how big the stars are, how much material they have and even how far they are from Earth.

By using this technique, we now have a much more precise distance to our neighbour than ever before: it's 163 000 light years away! This means that if you managed to cheat physics and travel at the speed of light — the fastest moving thing we know — it would still take 163 000 years to reach it! Finding the accurate distance to the Large Magellanic Cloud is an important breakthrough, because the distance to stars in that galaxy can be used to find the distance to even more remote galaxies.

When measuring the scale of the Universe, astronomers use something called 'standard candles'. These are astronomical objects with a known brightness. If we know the distance to nearby standard candles — in the Large Magellanic Cloud, for example — we can work out the distance of those further away. This is because more distant objects appear fainter. But the chain is only as accurate as its weakest link, which used to be the Large Magellanic Cloud. Now

that we know the precise distance to it, we can determine the distance to the galaxies much further out in the Universe more precisely.

▲ **COOL FACT!**

Apart from Mercury and Venus, all the planets in our Solar System have natural satellites, better known as 'moons'. Interestingly, our galaxy — the Milky Way — also has some natural satellites orbiting it. These satellites are called 'dwarf galaxies' because they are much smaller than normal galaxies like ours. The Large Magellanic Cloud is one of these.