

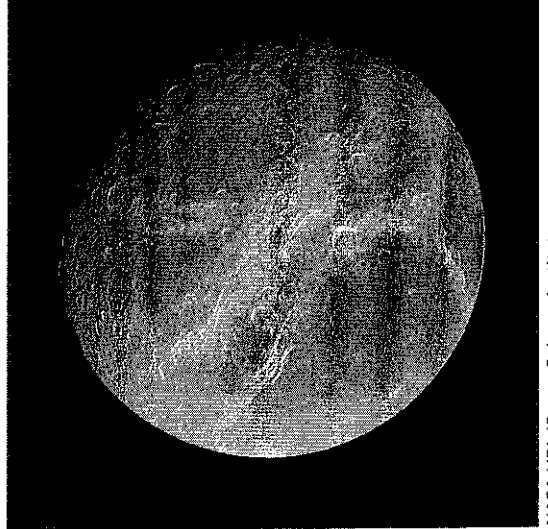
## THE SHAPE OF A MOON'S ORBIT

When is a circle not a circle? Many objects in the Solar System move in orbits that are very circular. For instance, Dione is a moon that moves around the planet Saturn in an orbit that is almost a perfect circle. It seems perfectly logical to say that the trajectory of Dione is circular. But is it really?

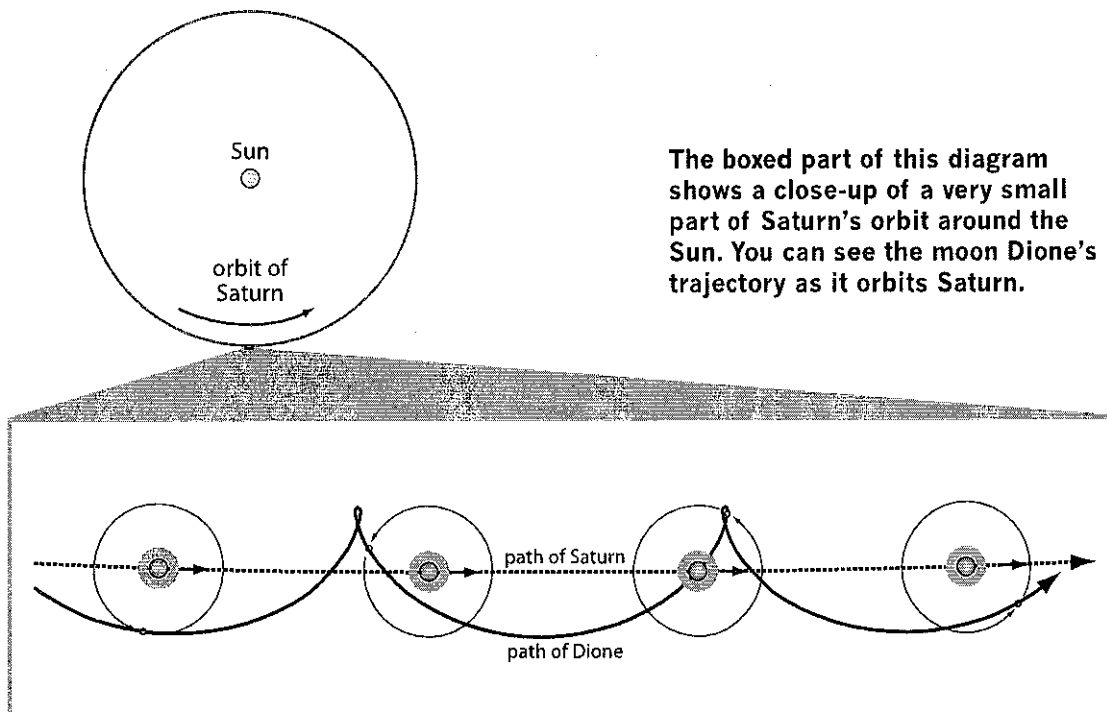
While Dione is circling around Saturn, Saturn is not sitting still. Saturn is moving around the Sun. The gravitational pull of the Sun affects Saturn and all its moons, so they all move around the Sun together. Saturn moves in an orbit that is almost a perfect circle, but what kind of trajectory does a moon such as Dione follow?

The path of a moon around the Sun can be quite complicated. It depends on how fast the planet is moving, how fast the moon is orbiting, and how far away the moon is from the planet. Dione moves around the Sun in a wavy path that makes a little loop every time it orbits around Saturn. Every time Saturn orbits the Sun once, Dione orbits Saturn about 3,931 times, so the trajectory that Dione follows is an intricate path with thousands of waves and loops.

Dione, a moon of Saturn

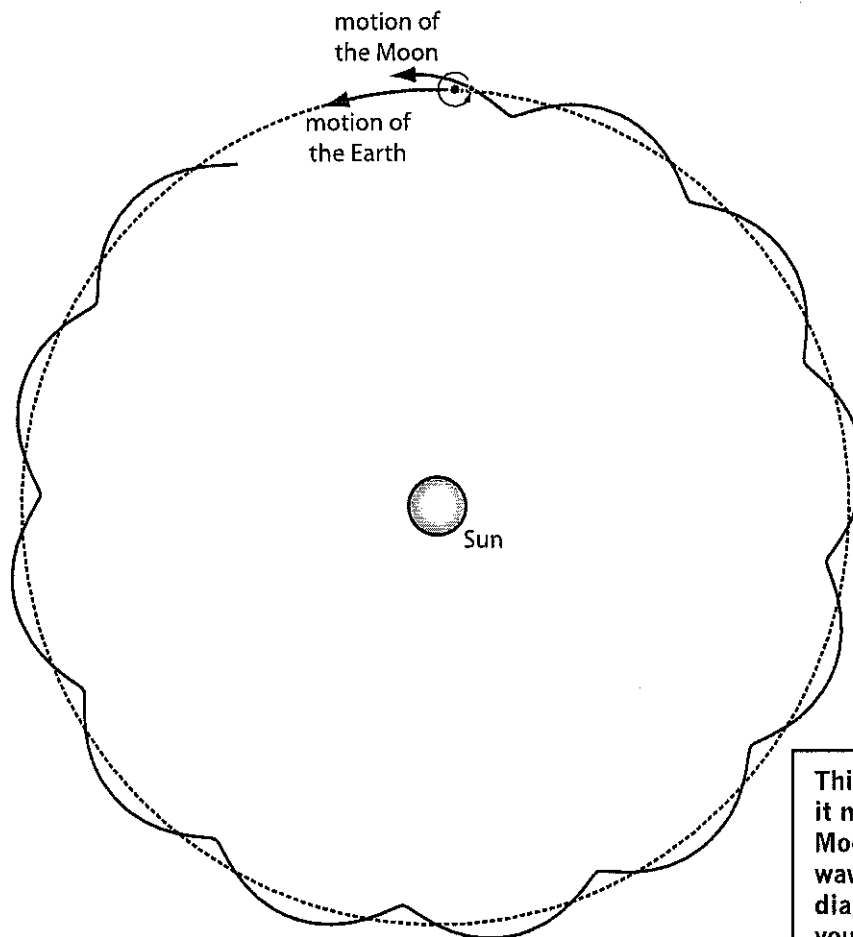
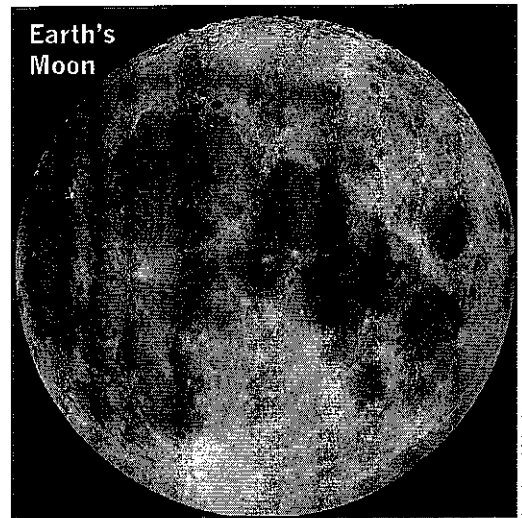


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Earth's Moon is like Dione in some ways and different in some ways. Our Moon orbits Earth in very much the same way that Dione orbits Saturn. The orbits are even about the same size. What is different are the speeds. Earth orbits the Sun much more quickly than Saturn does, and the Moon orbits Earth much more slowly than Dione orbits Saturn. While Dione orbits Saturn thousands of times on each orbit around the Sun, the Moon orbits Earth only about a dozen times. The Moon does follow a slightly wavy path around the Sun, but the waves are very stretched out, and they do not have loops in them.



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**This diagram is exaggerated: it makes the path of the Moon around the Sun look wavier than it really is. If the diagram were more accurate, you wouldn't be able to tell that the Moon's path around the Sun is wavy at all!**