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The far side of the moon

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We are used to the sun rising and setting every day. The moon, with its phases', from 'full' to 'new' and back to 'full', also rises and sets. But what is it like on the moon? Does the sun also rise and set? And the earth too?

Its because of rotation

The reason for this rising and setting, on the earth, of course, is that the earth turns on its axis once a day. But in the case of the moon, the moon turns around only once in a lunar month! And as it also goes around the earth once in that time, the earth never rises or sets, when seen from the moon! But in the time the moon goes once around the earth, the earth goes from 'full earth' to 'new earth' to 'full' again, once a lunar month, just like the moon on earth.

But, while the moon goes once round the earth, with the same face always turned towards the earth, it turns around once, with respect to the sun. A day on the moon is thus as long as a lunar month on the earth!

Because it is always the same side of the moon that faces the earth, we call the other face the 'dark side' of the moon. In fact, there is nothing dark about that far side, it gets the same sunlight as the 'bright' side. It is the 'earth light' that it does not get!

How did it get that way?

The reason that the moon keeps the same face pointing to the earth is the tidal action of the earth on the moon's landmass. The portion of the moon nearest the earth is attracted, due to gravity, more strongly than the far side. This attraction acts against rotation of the moon, a form of motion which would continuously draw this strongly attracted, closest part away. This effect must have been really strong in past ages, when the moon is known to have been closer to the earth than at present.

Under the strong gravity, rotation of the moon would have resulted in strong 'tidal waves', maybe not of water, but within the moon's land mass. This would have expended huge energy, gradually bringing the rotation to a halt.

Now that any natural rotation has been stopped, the moon is left with a 'prolate' or 'egg' shape, with the pointy end towards the earth.

The rotation, in fact, has not completely stopped, but is now an oscillation about the perfect alignment. If the tip of the egg does not point toward the Earth, then gravitational forces exert a torque that draws the tip point back toward the Earth. This makes the moon overshoot the correct alignment, and the torque now works the other way. The result, along with the motion around the earth and the earth's motion around the sun, is a complex, to and fro motion, called the 'lunar libration', in a form of mathematics that helps describe the motion of a top!

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