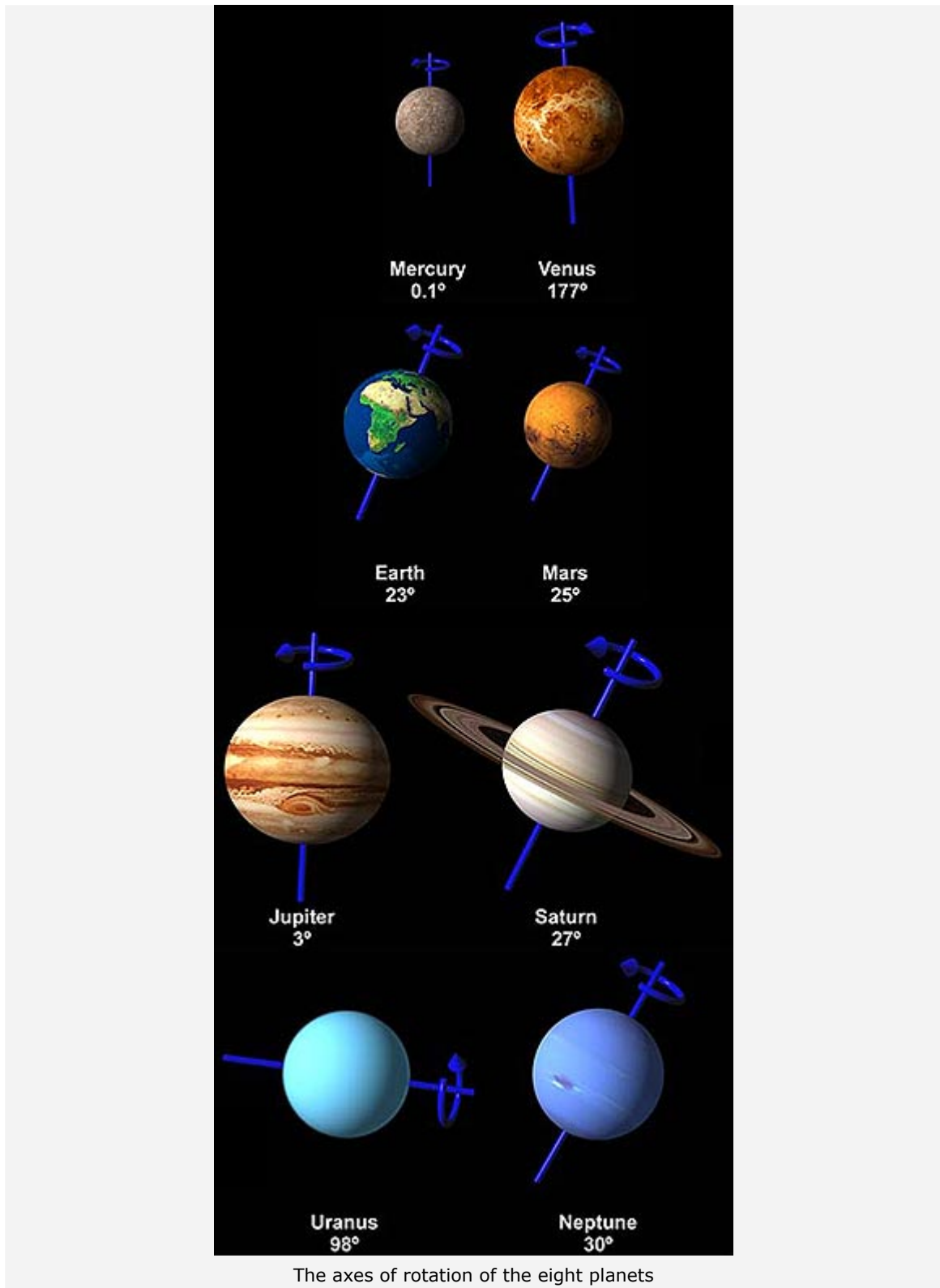




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Why do the planets break ranks?

Week 32



Our solar system is in motion – the planets orbit the Sun and at the same time rotate around their own axes. This cosmic dance goes back to the origins of the solar system about 4.6 billion years ago. At that time, a huge cloud of gas and dust (consisting of the remains of earlier stars and of interstellar matter) began to coalesce under the influence to its own gravity. In doing so, the cloud began to rotate and formed itself into a disc. Our Sun developed at the centre of this rotating disc and, further out, numerous small objects, known as planetesimals, began to form. From them, the planets, moons, asteroids and comets formed.

When the Sun, planetesimals and, later, planets developed, the angular momentum of the rotating disc was preserved – part of it in the rotation of the Sun and planetesimals around their own axes. The axes

of rotation of the Sun and planetesimals – that is, the line around which the bodies rotate – were probably perpendicular to the plane of the original disc.

The planetesimals of the inner solar system formed approximately a hundred protoplanets. They collided and created the planets as we know them today. These collisions probably tilted the axes of rotation of the planets away from being perpendicular to the plane of the original disc (and shifted the orbital planes of the planets around the Sun in relation to one another).

The axes of rotation of the planets – total disorder

The axis of rotation of Earth, which passes through the north and south poles, is not perpendicular to the plane of Earth's orbit around the Sun – it is tilted by about 23.4 degrees. This inclination gives rise to the seasons on Earth (see also the Astronomical Question from week 2: 'Why wasn't it nice and warm on 4 January?').

The axes of rotation of Venus and Uranus are particularly pronounced in their inclination. With Venus, the axis of rotation is tilted by 177 degrees, which means that the axis is almost perpendicular again – but upside down. Venus rotates in the opposite direction to the other planets and one Venusian day last slightly longer than one Venusian year. With Uranus, the tilt is 98 degrees – so the planet appears to 'roll' around the Sun and once a (Uranian) year the Sun is positioned above each of the planet's poles.

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