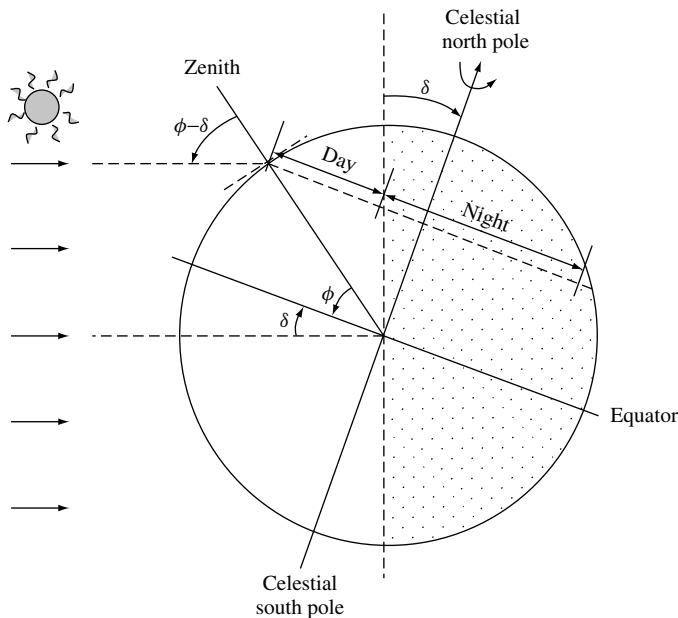


**Figure 20.2** The orbit of the Earth around the sun



**Figure 20.3** Relative Earth–Sun position at noon of a negative declination day (winter in the Northern Hemisphere, and summer in the Southern Hemisphere)

the sun is situated directly above the Tropic of Cancer, and sunrise and sunset are displaced towards the north-east and north-west, respectively. In the Northern Hemisphere, the summer solstice is when the longest day and shortest night of the whole year occur. In the Southern Hemisphere, it is the opposite. On the *winter solstice* (21st/22nd December)  $\delta = -23.45^\circ$ , the sun is directly above the Tropic of Capricorn, and sunrise and sunset are displaced towards the south-east and south-west, respectively. In the Northern Hemisphere, this is the shortest day and longest night of the whole year, and again, the opposite is true in the Southern Hemisphere.

A classic way of representing the sky is as a sphere centred on a fixed point of the Earth, as indicated in Figure 20.4. This is known as the *celestial sphere*. Each of its