The tilt of the earth's axis away from the normal to the plane of the orbit is what causes the seasonal variation in the sun path. The angle that the sun makes to the earth normal to the equator is known as the angle of declination.

To be able to predict the sun's position in the sky it is first necessary to define a system of angular co-ordinates by which the sun's position may be described.
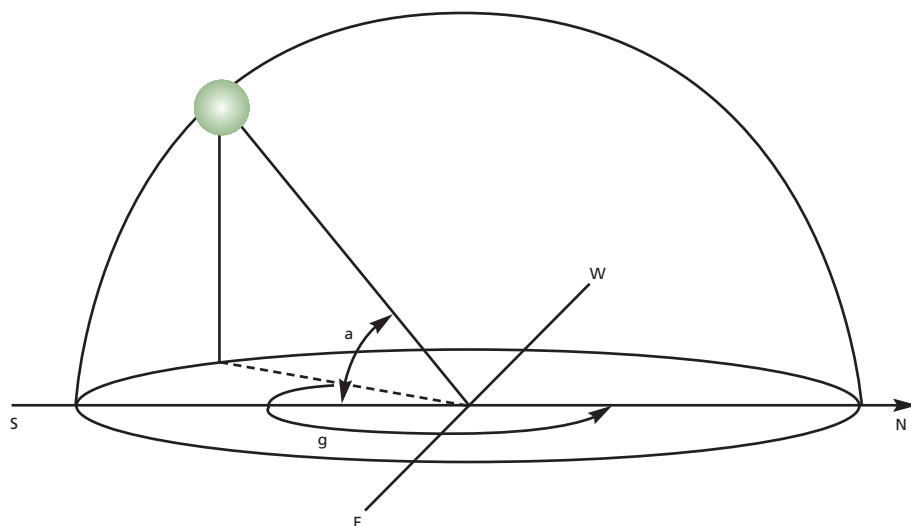

Figure 3.8   Angular co-ordinates used to describe the sun's position

There are formulae available to calculate the position of the sun at any time and any date, however care needs to be used in the calculations as they rely on inverse trigonometric functions and it is quite easy to confuse the results as most of the functions may take the same value for more than one angle.

3.2.2 Skylight
Whilst equations mentioned in the previous section can predict the position of the sun in the sky, they tell us very little about the distribution of light throughout the sky. This is because the light from the sun is scattered by the atmosphere, and the distribution and amount of light received at ground level is dependent on atmospheric conditions.

To calculate the distribution of luminance under various atmospheric conditions the standard BS EN 15469: 2004: *Spatial distribution of daylight — CIE standard general sky* may be used. This lists a series of 15 sky distributions and gives a formula that may be used for calculating the relative luminance distribution of the sky.