

"The Sun" redirects here. For other uses, see [Sun \(disambiguation\)](#) and [The Sun \(disambiguation\)](#).

The Sun is the [star](#) at the centre of the [Solar System](#). It is a massive, nearly perfect sphere of hot [plasma](#), heated to [incandescence](#) by [nuclear fusion](#) reactions in its core, radiating the energy from its [surface](#) mainly as [visible light](#) and [infrared radiation](#) with 10% at [ultraviolet](#) energies. It is the main source of energy for [life](#) on [Earth](#). The Sun has been an [object of veneration](#) in many cultures and a central subject for astronomical research since [antiquity](#).

The Sun orbits the [Galactic Center](#) at a distance of 24,000 to 28,000 [light-years](#). Its [mean](#) distance from Earth is about  $1.496 \times 10^8$  kilometres or about 8 [light-minutes](#). The distance between the Sun and the Earth was used to define a unit of length called the [astronomical unit](#) (au), now defined to be  $149.5978707 \times 10^6$  kilometres. Its [diameter](#) is about 1,391,400 km (864,600 mi), 109 times that of Earth. The Sun's [mass](#) is about 330,000 times that of Earth, making up about 99.86% of the total mass of the Solar System. The mass of the Sun's surface layer, its [photosphere](#), consists mostly of [hydrogen](#) (~73%) and [helium](#) (~25%), with much smaller quantities of heavier elements, including [oxygen](#), [carbon](#), [neon](#), and [iron](#).

The Sun formed approximately 4.6 billion<sup>[a]</sup> years ago from the [gravitational collapse](#) of matter within a region of a large [molecular cloud](#). Most of this matter gathered in the centre; the rest flattened into an orbiting disk that became the [Solar System](#). The central mass became so hot and dense that it eventually initiated nuclear fusion in its [core](#). It is now classified as a [G-type main-sequence star](#) (G2V). Every second, the Sun's core fuses about 600 billion [kilograms](#) (kg) of hydrogen into helium and converts 4 billion kilograms of [matter](#) into [energy](#).

About 4 to 7 billion years from now, when [hydrogen fusion](#) in the Sun's core diminishes to the point where the Sun is no longer in [hydrostatic equilibrium](#), its core will undergo a marked increase in density and temperature which will cause its outer layers to expand, eventually transforming the Sun into a [red giant](#). After the red giant phase, models suggest the Sun will shed its outer layers and become a dense type of cooling star (a [white dwarf](#)), and no longer produce energy by fusion, but will still glow and give off heat from its previous fusion for perhaps trillions of years. After that, it is theorised to become an extremely dense [black dwarf](#), giving off negligible energy.

## Etymology

The English word *sun* developed from Old English *sunne*. Cognates appear in other Germanic languages, including West Frisian *sinne*, Dutch *zon*, Low German *Sünn*, Standard German *Sonne*, Bavarian *Sunna*, Old Norse *sunna*, and Gothic *sunnō*. All these words stem from Proto-Germanic \**sunnōn*.<sup>[18][19]</sup> This is ultimately related to the word for sun in other branches of the Indo-European language family, though in most cases a nominative stem with an /i/ is found, rather than the genitive stem in *n*, as for example in Latin *sōl*, ancient Greek ἥλιος (*hēlios*), Welsh *haul* and Czech *slunce*, as well as (with \**l* > *r*) Sanskrit स्वर् (*svár*) and Persian خور (xvar). Indeed, the /i/-stem survived in Proto-Germanic as well, as \**sōwelan*, which gave rise to Gothic *sauil* (alongside *sunno*) and Old Norse prosaic *sól* (alongside poetic *sunna*), and through it the words for sun in the modern Scandinavian languages: Swedish and Danish *sol*, Icelandic *sól*, etc.<sup>[19]</sup>

The principal adjectives for the Sun in English are *sunny* for sunlight and, in technical contexts, *solar* (/ˈsoułər/),<sup>[3]</sup> from Latin *sol*.<sup>[20]</sup> From the Greek *helios* comes the rare adjective *heliac* (/hiːliæk/).<sup>[21]</sup> In English, the Greek and Latin words occur in poetry as personifications of the Sun, *Helios* (/hiːliəs/) and *Sol* (/sol/),<sup>[2][1]</sup> while in science fiction *Sol* may be used to distinguish the Sun from other stars. The term *sol* with a lowercase *s* is used by planetary astronomers for the duration of a *solar day* on another planet such as Mars.<sup>[22]</sup>

The astronomical symbol for the Sun is a circle with a central dot: ☺.<sup>[23]</sup> It is used for such units as  $M_{\odot}$  (Solar mass),  $R_{\odot}$  (Solar radius) and  $L_{\odot}$  (Solar luminosity).<sup>[24][25]</sup> The scientific study of the Sun is called *heliology*.<sup>[26]</sup>