

# Just what is summertime?

David Malone

FOR thousands of years, people used sundials to tell the time – where the height of the sun and length of the shadows were important markers of the seasons and the days. Today, our time is based on amazingly accurate atomic clocks, but we still make an effort to keep in sync with the sun, using summer time, leap years and even leap seconds!

Atomic clocks work by trapping atoms – the tiny building blocks of the universe – and making them vibrate. When done in the right way, this can result in a clock that is good to one second in millions of years.

In Ireland, the Statutes (Definition of Time) Act in 1880 defined Dublin Mean Time as the legal time for the country, which was based around the local mean time at Dunsink Observatory outside Dublin, and was about 25 minutes 21 seconds behind Greenwich Mean Time (GMT). In 1916 the time difference between Ireland and Britain was considered inconvenient, and Ireland moved to the same time zone as Britain.

The concept of putting clocks forward (for the summer months) first took place during World War I in order to save energy and resources. It made better economic sense to wake and work during daylight hours,

The world clock in Berlin shows the Earth's rotation around the sun.



eliminating the need to use scarce fuel and power. The idea was first introduced by the Germans during the war and subsequently adopted by Britain in 1916, with the United States following in 1918. At the time Ireland was under British rule, so it was simply implemented here in parallel.

There have been some experiments along the way. Ireland fell out of synchronisation with Britain during World War II, with the introduction of 'Double Summer Time', when

the clocks were advanced by two hours across Britain to allow more work to take place during daylight hours. This resulted in droll letters to newspapers, pointing out that when Aer Lingus offered a Dublin-Belfast route, one could leave Belfast at 10, and arrive in Dublin at 9:30, apparently before

ever departing.

The energy crisis in the 1970s saw 'Daylight Saving Time' (DST) become

widespread across Europe and North America, and in 1980 the EU began the harmonisation of daylight saving across Europe, which runs from the last Sunday in March to the last Sunday in October. However, the US continues to introduce its DST three weeks earlier than in Europe.

Every few years the EU re-evaluates the rationale for

changing the hour. There are many arguments for and against, ranging from reducing energy and costs, maximising daylight hours during the warmer summer months, reducing traffic accidents and crime, impact on mental health, and that air quality in Mediterranean countries can be better in the evenings.

The arguments change as new scientific research emerges, but the EU is still positive about it, particularly because it gives more daylight in the evenings for our leisure activities.

WE all learn about leap years in school, where sometimes February has 29 days. We're not always told why: we have leap days in our calendar to keep the Spring Equinox (when day and night are of equal length) on March 21.

Though few people know about it, we have leap seconds too. This is because the earth is rotating slightly more slowly than the atomic clocks (see page opposite) are ticking. Consequently, we need an extra second, about every 18 months, to give the earth a chance to catch up on the atomic clocks.

These seconds are introduced at the end of either June or December,

and the last day of June 2015 will have a leap second.

There is a rule to tell us that we get a leap year basically every four years (though, there are special rules for 1800, 1900, 2000, 2100...). This is possible because the earth's rotation around the sun is very regular and predictable.

However, rotation around its own axis is more unpredictable, and is influenced by many things, including the moon, the atmosphere, the oceans and even the earth's core. This means there is no rule for leap seconds, and instead we must measure the rotation of the earth and predict when one is needed.

## Why will June 30 be a second longer this year?

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## What is the Summer Triangle?

Lorraine Hanlon



ONE of the celestial highlights of our short summer nights is the so-called 'Summer Triangle', made up of three bright stars called Vega, Deneb and Altair, in the constellations Lyra, Cygnus and Aquila, respectively.

Although they are associated with different constellations in the night sky, their brightness, even against the backdrop of the relatively bright summer night sky, makes this stellar arrangement, or 'asterism', an easy spot.

Looking to the east after sunset at this time of year, the first star to reveal itself is the dazzling Vega, the apex of the triangle. Altair is to the lower right, with Deneb to the left. Far away from light pollution, you might see the band of our galaxy, whose 'Via Lactea' (Milky Way) runs through the Summer Triangle.

Vega, at a distance of about 25 light years, is an important star for

astronomers, who use it as a reference point for the 'magnitude' brightness scale. An asteroid belt around Vega has recently been discovered and it may harbour a solar system with rocky planets.

Altair is a little closer to us than Vega, while Deneb has been estimated to be about 1,550 light years away. It is a blue super-giant and about 20 times the mass of our sun. If Deneb was in our solar system it would extend past the radius of Earth's orbit.

All three stars have a blue-white appearance, indicative of similar surface temperatures of between 7,200 and 9,200 °C. Of course, their nuclear cores are much, much hotter – unlike our Irish summer.

In the western sky at dusk watch out for the spectacular sight of Venus and Jupiter as they draw closer together through June, with their closest approach happening on June 30/ July 1.

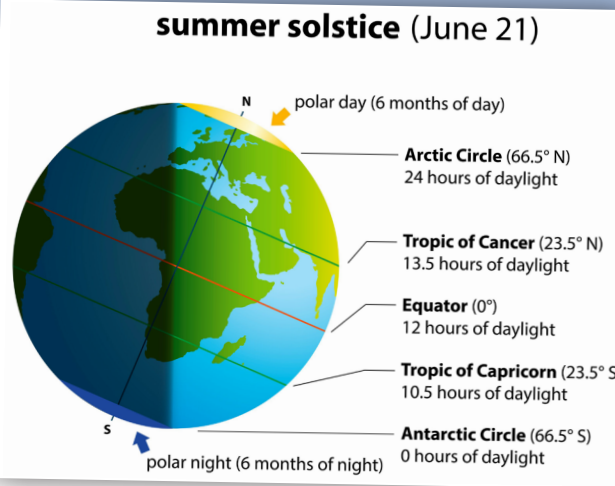
## Why is the longest day in the middle of June?

Lorraine Hanlon

MOST of us probably never think of ourselves as being passengers on-board a spinning planet that whips around on its axis of rotation once every 24 hours, or that travels 970 million kilometres on its 365-day journey around the sun.

If the earth's axis of rotation was perpendicular to the sun-earth line, we would have no solstices and no strong seasonal effects. However, the 23.5° tilt of the earth's axis gives rise to different orientations of earth relative to the sun during the year, giving us both.

At the summer solstice, the northern hemisphere is tipped most directly towards the sun, leading to more concentrated sunlight and shorter shadows at noon. We observe the sun



as reaching its maximum height in the sky and the day of the solstice has the greatest number of daylight hours in the year.

On the same day in the

southern hemisphere, which is tipped away from the sun, the sun's rays at noon are less concentrated and shadows are longer – it is their mid-winter. The situation in the two

hemispheres is reversed at the winter solstice.

The exact moment of the summer solstice, which occurs between June 20 and June 22, varies from year to year because of the influence of other planets on earth's orbit and the slight wobble of its axis. This year, the summer solstice is on June 21. In Dublin, sunrise is at 04:57 and sunset at 21:57, giving just over 17 hours of daylight.

Be glad we don't live on Venus, where the very small axial tilt of 3° provides no seasonal respite from the 462°C temperature caused by its proximity to the sun and its runaway greenhouse effect.

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