

Daylength

An investigation linked to Unit 5 of the QCA SoW for Geography and Unit 5E of the QCA SoW for Science

<p>Starter questions</p> <p>How long is a day? Yes, but how much of that is light/dark? Is that true all year? In midsummer? In midwinter? How can we find out? What time did it get light/dark yesterday? Where would we look for published information?</p>	<p>The important issue here is that this is ephemeral data not found in books.</p>
<p>Data collection</p> <p>Datalogging (if available) set to log overnight. Dark/light does not come instantly so children will need to set criteria for establishing a precise time for sunrise/sunset, e.g. half way point on the graph.</p> <p>Daily data in newspaper or internet.</p> <p>Explore the internet site before using with children – clicking on any part of the globe will re-centre and redraw the image. The index to the left gives data for each country.</p>	<p>www.worldtime.com</p> <p>Tip: if image breaks up click ‘refresh’ in the edit menu of your browser.</p>
<p>Calculation</p> <p>Calculating daylength from sunrise and sunset times is difficult for most children even in Y6 – and a calculator does not help. Scaffold the calculation by using the table provided (and a clock face for reference).</p>	<p>First count on whole hours and then the extra minutes. Pairs of children can work together checking each other’s calculations.</p>
<p>Analysis</p> <p>Get children to record the daylength daily in the table provided and to calculate the change from the previous day.</p>	
<p>The beginnings of an interpretation</p> <p>Do the same changes happen all over the world? Is day length the same all over the world?</p>	<p>Begin by comparing two UK places, e.g. London and Edinburgh.</p>
<p>Formulating a hypothesis</p> <p>On the basis of the UK data, how does daylength vary?</p>	<p>Possible hypotheses:</p> <ol style="list-style-type: none"> 1 The further south you go the longer/shorter the day (depending on season). 2 The closer to the equator you go the longer/shorter the day.

<p>Testing the hypothesis Use the website to look at other parts of the world.</p>	<p>Hypothesis 1 proves correct.</p>
<p>Explanation The explanation needs teaching and is unlikely to be elicited from children. Demonstrate the tilt of the earth using a globe and show how, as the tilted globe moves round the sun, the northern hemisphere is tilted towards the sun in summer and away from it in winter. Demonstrate the impact of this on daylength by looking especially at the poles, which will have 24 hour day or night.</p>	<p>e.g. at Hammerfest in Northern Norway (70N) the sun sets on November 21st and does not rise again until January 22nd. From 11am till 1pm there is twilight with a turquoise and violet sky. People sleep for 9–12 hours in the winter, some for only 3 hours in the summer.</p>
<p>Other useful information Longest Day (Summer Solstice) = 21 June Shortest day (Winter Solstice) = 22 December Spring Equinox = 20 March Autumn Equinox = 23 September Start/End of Daylight Saving Time(DST) (in UK called British Summer Time – BST) = at 1am on the last Sunday in March/October (Spring Forward, Fall Back is a useful aide memoire for the direction of the change.) Because sunrise and sunset times are calculated on the basis of an ideal circular orbit of the earth around the sun, the equinoxes do not mark the exact dates when the day/night split is exactly 12 hours of each. This will be two to three days away from the equinox, as children will discover if they keep a log around these dates. Another oddity which results from the elliptical orbit is that after the Winter Solstice the days <i>do</i> start to get longer but the sun continues to rise later for another few weeks. For this short period the day lengthening is due entirely to the sunset time getting later and not the balanced lengthening at both ends which is apparent throughout the rest of the year.</p>	<p>Another useful website is: http://aa.usno.navy.mil/AA/data/docs/RS_OneDay.html This gives sunrise and sunset times for any location (specified by latitude and longitude) and <i>for any date</i>. The site can thus be used to explore seasonal differences.</p>

A record of the changing daylength

Date	Sunrise	Sunset	Daylength	Change

To work out the daylength

Sunrise	Full hours before sunset	Takes us to	Minutes to sunset	Sunset	Daylength