

## TEACHER NOTES

# Investigating Nature's Calendar: Key Stage 4 S4 – S5 in Scotland

### Objectives:

The objectives of this activity are:

- to introduce the idea that natural events are linked to climate
- to introduce Phenology as a scientific term
- to introduce the UK Phenology Network as one of the organisations that looks at these data to identify patterns
- to show that there is a change in the flowering times of snowdrops and the temperature profile during the start of the year
- to link these to a change in the onset of spring
- to try and relate this to global climate change

### Curriculum:

This activity is aimed at single and double award students at GCSE or equivalent level. Curriculum/guidelines mapping is shown below by country. In all cases the activity is aimed at the investigation aspects of science, but it does crossover into some content relating to climate change and the factors that influence plant behaviour.

#### England

Scientific Enquiry: Considering Evidence and Evaluating strands [SC1] (2j, 2k, 2m and 2o)

#### Northern Ireland

Experimental and Investigative Science: Presenting and Interpreting Results (a – f)

#### Scotland

Practical Abilities: Evaluation Skills (Ev1) and Recording and Reporting Skills (RR2) [(a) – (d)]

#### Wales

Scientific Enquiry: Investigative Skills (3).  
Analysing Information (14 – 17) and  
Evaluating Information (18, 21 and 22)

The Y axis on the graph [Days after 31st December] may provide problems for some less able students as they may not have come across something like this before. A possible extra activity that could be done as an introduction would be to give a few numbers and then ask students to work out what the date is.

*“If the number is 26, what is the date?”*

For more able students you could ask what a negative number would mean.

*“What data would be -7?”*

This could lead into a discussion about problems that may be created by leap years. The fact that it is easier to draw a graph with ‘real’ numbers is also relevant.

### Solutions (Where appropriate)

### Numerical Answers:

**Q3.** What is the date of the first flowering in 1980?  
[The value is 47 days]      **16th February 1980**

**Q4.** By how many days has the date of first flowering changed 1960 and 2000?  
[1960 = 53 days, 2000 = 25 days]      **28 days**

*This will vary slightly depending upon the student's best fit line although the variation should not be more than 3 or 4 days.*

### Text based Answers:

In questions 5 and 6 it is important that the students write about what the graphs are showing and not the graphs themselves. A statement about “... the line going down ...” for example is not of value. Their comments should relate to snowdrops and/or temperature and how they change with time.

**Q7.** Potentially contains a great deal of good ideas.  
The key ones that hopefully will come up are;

- both the snowdrop and temperature data show a pattern

- they are related, warmer temperatures mean earlier flowering
- this is related to global climate change – global warming. Depending upon the class it may be worth stressing that global warming can also create ‘colder’ and ‘wetter’ effects at different times and in different places on the Earth.

## Suggested Homework Tasks or further work:

The temperature graph shows an average for the first five months of the year. This could be used to lead into a discussion as to when spring actually starts. This may raise the differences between a calendar based spring and nature-based spring and how they are moving apart.

Students can research on the Woodland Trust websites or from other sources any other data and natural events that are recorded and collected as well as any patterns that have emerged.

This activity opens up many issues relating to climate change and as such can lead into a research-based task. The Woodland Trust family of websites contains a great deal of information about some of these issues [www.woodland-trust.org.uk](http://www.woodland-trust.org.uk) The links page of the Nature Detectives website [www.naturedetectives.org.uk](http://www.naturedetectives.org.uk) is probably the best place to start. There is a possibility that this could lead into managed classroom discussion on broader climate and ecological issues. This could also be tied into climate and climate change issues covered in geography.

## Investigating Nature's Calendar (KS4)

### Data Set

Below is the dataset that is used in the activity. This includes a second set of data from a different phenologist in Norwich. Although data is collected every year to simplify the graph drawing process, averages are calculated in five yearly blocks.

The second data set will allow comparison but also adds potential complications. The students need to understand what a negative number is and how to handle the lack of data for 1960 and 1965.

The trend lines are very similar with the lines running roughly parallel showing the Norwich snowdrops flowering earlier (lower line). This can be used to prompt a discussion about differences within the UK.

Year	Date of Flowering Days after 31st December (Newcastle data)	Date of Flowering Days after 31st December (Norwich data)
1960	56	
1965	53	
1970	37	22
1975	38	12
1980	47	21
1985	40	13
1990	31	-1
1995	19	10
2000	25	8

The temperature data is shown in the table below.

Although data is collected every year, to simplify the graph drawing process averages are calculated in five yearly blocks.

Year	Average temperature [Degrees Celsius] (Jan – May)
1955	6.53
1960	6.37
1965	6.49
1970	6.34
1975	6.66
1980	6.27
1985	6.52
1990	6.23
1995	7.44
2000	7.46