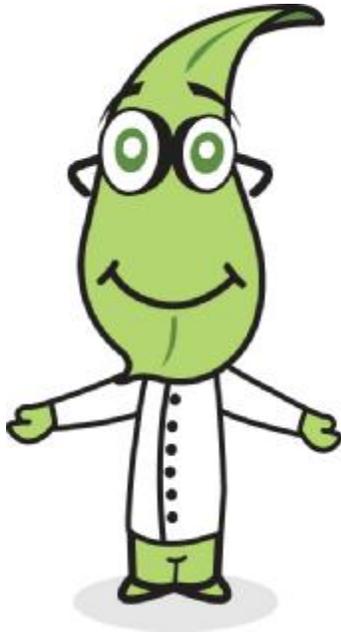


Professor Plant's investigation ideas.

Investigation 1: Will a crocus open early in a warm room?



Just before your crocus flowers are ready to open and look like this → bring just one or two into a warm classroom. Discuss what you expect to happen & why. Wait with a timer and digital camera and make a record of any changes. Note down the time of the changes if you like. Next, place the flower outside, perhaps on the windowsill and watch what happens from the inside. Again, take notes, photographs and record the timings.

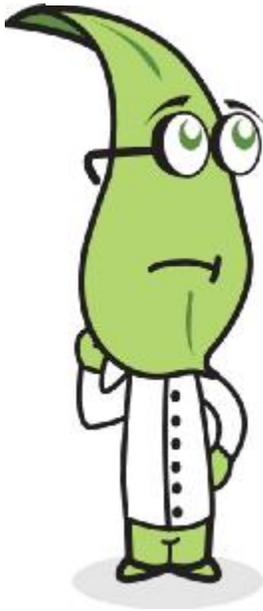


What to expect: The flower should open very quickly once brought inside – especially if your room is very warm. It should spring open as you watch it. The class can make recordings and perhaps discuss why they think this happened. The warm air has tricked the flower into thinking it is a warm day. Discuss with your pupils why it is important not to do this with all your crocus - as it will make false results for the main spring bulb investigation.

How does the crocus move? Heat makes the inner surfaces of a flower's petals grow. So when the temperature goes down, the outer surfaces grow faster than the inner ones, thus making the flower close.



Investigation 2: Does your crocus close in the evening?



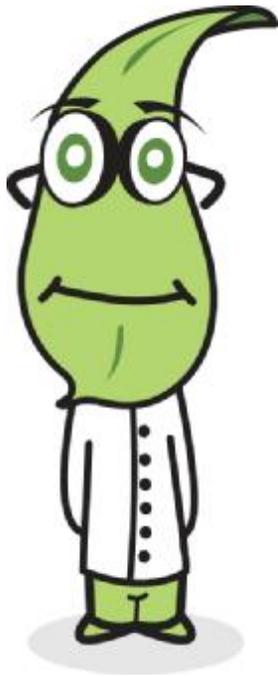
Once your crocus is open visit it at different times of the day to see when it opens, perhaps just before lunch and just before the end of the school day. Draw and note down any differences and explanations you may have.

What to expect: Unless your crocus petals are damaged by heavy rain or wind it should open as the temperature increases during the day and close as the day gets cooler in the late afternoon.

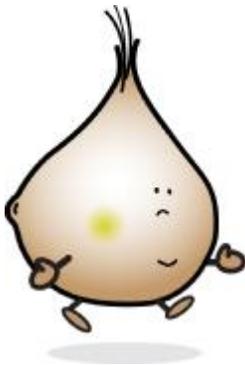


Why do they close at night? When flowers close temporarily for the night they are effectively in standby mode, protecting their delicate reproductive parts and pollen while they are not in use. The pollen is separated from the dew that forms during the night, keeping it dry so that it can be dusted onto a passing insect the following day. Some flowers remain closed until some time after dawn, and only reopen when the day is warm enough for the dew to have evaporated.

Investigation 3: Do daffodil flowers always face the sun?



Look at your daffodils. Are they all facing the same direction? Discuss which direction you expect them to face and why? Find out which way they are facing by using a map or compass and a piece of chalk to note South, East, West and North on the school yard. Alternatively, use a piece of large paper, reference points (e.g. buildings) or the template provided to record the direction. Ask each pupil to note the direction of their flower. Discuss your expectations and compare them with the results.

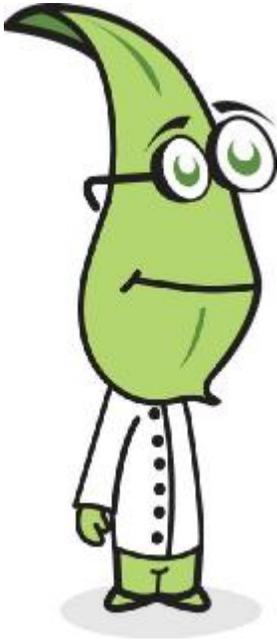


What to expect?

Daffodils should face the South rather than the north to maximise the sunlight they receive. However, if they are unable to face the South because of a wall or building in the way - they will face the sunniest direction. To expand this investigation you could look at what happens if you turn your flower away from the sun? Will it grow towards the sun? Investigate with some daffodils throughout a week. Over a few days it will grow back towards the sunlight. Plants that grow towards the light are called **Phototropic**.



Investigation 4: Do daffodils tilt or move their heads throughout the day?

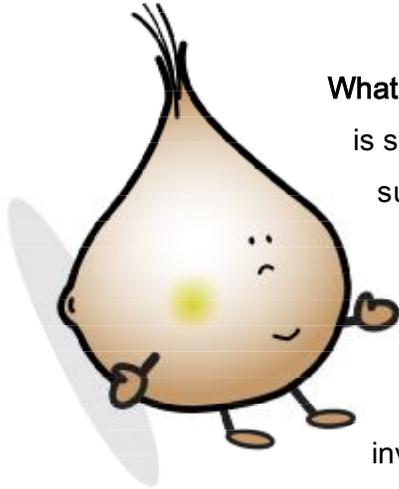


This experiment is best done on a calm and sunny day – because the wind will really affect the results. The sun moves throughout the day from East to West. Do your daffodils move their heads with the sun throughout the day? Discuss your expectations & how you will record where the sun is & what direction your flower is facing. You may wish to draw reference points on the floor with chalk or use the template provided.

On the template you can mark out with a ruler the direction of the sun and the direction your daffodil is facing at certain times throughout the day. Perhaps record 1st thing in the morning, just before lunch and at the end of the school day. You could use a digital camera to record any movements. You may also wish to set up a control for your experiment, by placing one daffodil in a dark room – to see if it behaves differently from those outside. You may also wish to compare temperatures throughout the day.



Things to discuss: Does the position of the sun change throughout the day? Does the direction your flower change throughout the day? You may also wish to discuss how the sun can be used to help us find the direction if we are lost.



What to expect: Providing there is no wind and the sun is shining the flower heads should tilt towards the sun throughout the day. Although there are scientific studies that refer to daffodils tracking the sun throughout the day – there is also some disagreement amongst gardeners – so this is something that truly needs more investigation. Please let Professor Plant know your conclusions. How you set up this experiment is very important – you need to give your pupils space to work around their pots without moving them or you may wish to secure a few pots in place with bricks or blue tack. Or discuss how the sun can be used to help us find the direction if we are lost.

Plants that track the sun throughout the day with their leaves or flowers are called **Heliotropic**; a sunflower is typical example of a heliotropic plant. Heliotropism was first described by Leonardo da Vinci.



ESD&GC link: Discuss setting up a solar panel – which direction would it need to face etc. Some solar panels track the sun by using motors and electronic control systems, but some scientists believe that we can mimic the plants that track the sun by using materials that expand in the heat. This could be very useful in developing countries, where motor-based sun-tracking panels are not affordable.

Literature link:

Discuss William Wordsworth's poem the Daffodil then write your own poems about daffodils or the spring. (p.t.o).

Daffodils (1804)

I wander'd lonely as a cloud

That floats on high o'er vales and hills,
When all at once I saw a crowd,
A host, of golden daffodils;
Beside the lake, beneath the trees,
Fluttering and dancing in the breeze.

Continuous as the stars that shine

And twinkle on the Milky Way,
They stretch'd in never-ending line
Along the margin of a bay:
Ten thousand saw I at a glance,
Tossing their heads in sprightly dance.

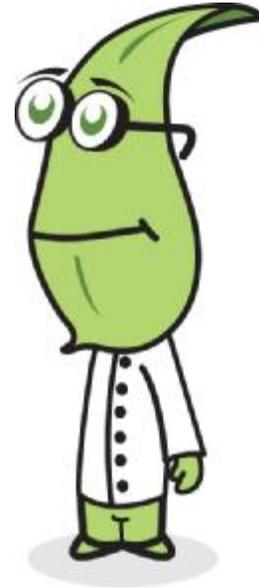
The waves beside them danced; but they

Out-did the sparkling waves in glee:
A poet could not but be gay,
In such a jocund company:
I gazed -- and gazed -- but little thought
What wealth the show to me had brought:

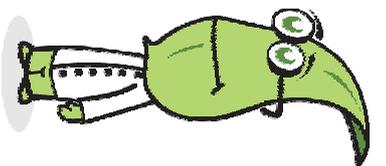
For oft, when on my couch I lie

In vacant or in pensive mood,
They flash upon that inward eye
Which is the bliss of solitude;
And then my heart with pleasure fills,
And dances with the daffodils.

By William Wordsworth (1770-1850).



Teitl / title: _____



Dwyrain / East

Haul y Bore / Morning sun
 Haul canol dydd / Midday sun
 Haul y prynhawn / afternoon sun

De / South

Gorllewin / West

Carefully use a ruler to mark the direction of the sun & your daffodil on this chart.

Rhowch eich pot yma. Place your pot here.

Enw / Name: _____