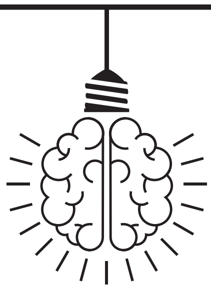
Teachers' notes

- bringing Catalyst to life in the classroom



Discover ideas and resources to build on the issues covered in edition 35 of Catalyst.

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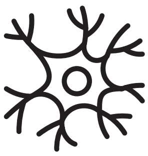
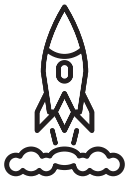
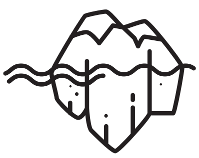






Testing for antioxidants using DCPIP

1

By Mary Howell, Professional Development Lead, STEM Learning

Matching article:
Improving natural antioxidants for the treatment of neurodegenerative disease.

Useful resource:
www.stem.org.uk/resources/elibrary/resource/448062/investigating-anti-cancer-properties-plants

Students can test fresh fruit juice or other plant material for vitamin C, an antioxidant, by using the indicator DCPIP (2,6-Dichlorophenolindophenol). DCPIP changes from blue to colourless when it reacts with vitamin C and will stop changing colour when all the vitamin C in the sample has reacted. By counting the drops of DCPIP added until it keeps its colour the amount of vitamin C can be estimated.

Students could measure vitamin C concentrations in different parts of a vegetable by grinding the parts in water, which will dissolve the vitamin C, or investigate the effect of heating the extract on the concentration of vitamin C. The latter will give a hands on example of how some types of processing might affect the desired product, as discussed in the article.

Aspects of the experiment that cause problems, such as the colour of fruit making it difficult to see the colour change of the DCPIP can be used to develop students' understanding of experimental design, for example using a colour reference. If a solution of known concentration of vitamin C (ascorbic acid) is provided students can test this with DCPIP and then calculate the amount of vitamin C.

The companion resource in the link gives more detail of how to measure vitamin C concentration, plus additional materials on development of medicines.

There is a launch page with more resources about developing medicines: **https://www.stem.org.uk/resources/community/collection/155999/discovery-and-development-new-medicines**

Landing on Mars

2

By Tom Lyons, STEM Enrichment Lead, STEM Learning

Matching article:
PanCam - the science 'eyes' of the Rosalind Franklin rover

Useful resources:
www.stem.org.uk/resources/elibrary/resource/453516/deciding-destinations-ks4

The ExoMars mission is a collaboration between ESA and the Russian State Space Corporation, Roscosmos. By working together, the ExoMars mission has already put a spacecraft in orbit around Mars – the Trace Gas Orbiter. The second part of the mission, due in 2021, is sending a high-tech rover to land on Mars. The rover, Rosalind Franklin will be searching for the building blocks of life on Mars. It is the first robot of its kind that can both roam around Mars, and also drill down to study samples two metres below the surface.

The premise of this activity is that the school is sending a rover to Mars. Its mission is to search for evidence that life has ever existed there.

It is the job of the class to decide where the rover should land on Mars. They will do this by working in groups and investigating six potential landing sites and weighing up the pros and cons of each.

The landing site selection requires systematic and careful observations, interrogate data based on success criteria, record findings and rank most to least appropriate. They must work with negative values, use basic equations to solve problems. They will use satellite images and contour maps to identify spatial patterns, measure distances and consider scale.

Climate change in Polar Regions

By Tom Lyons, STEM Enrichment Lead, STEM Learning

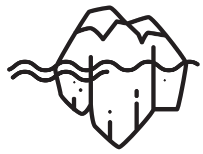
Matching article:
Watching Antarctica from space

Useful resource:
www.stem.org.uk/resources/elibrary/resource/419363/climate-change-polar-regions

This resources is taken from the Polar Explorer Programme, and use the context of the design, construction, and subsequent research activities of the RRS Sir David Attenborough, and its auto long range submersible, Boaty McBoatface.

Children will work with hypothetical data to help them understand how mathematics can model real life situations. This will enable them to reflect on how mathematics might be used to help scientists make predictions about the possible impact of climate change in the Polar regions.

This question is an excerpt from the collection.



Sea Ice Extent

The Artic Sea Extent is the area of the Artic that is covered by at least 15% of sea ice, including areas of the Artic ocean completely covered by ice, and those that are only partly covered. In the table below you can see the data on the sea ice extent from 1979 until 1996.

1. Plot the data points from table 1 on a graph. What do you think your graph is telling you, if anything? Can you see a trend in the data?
2. Now draw a straight line on your graph which you think best approximates the data. This is called a line fo best fit.
3. Using two points on your line, work out its equation. What does this line predict for the sea ice extent in the years 2000, 2005 and 2010?

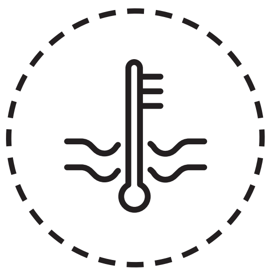
Table 1

Year	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Years from start	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Sea ice extent million km^2	7.2	7.85	7.25	7.45	7.52	7.17	6.93	7.54	7.48	7.49	7.04	6.25	6.55	7.55	6.5	7.18	6.13	7.88

4. Now add the remaining data from table 2 for 1997 to 2006 to your graph. How accurate were your predictions for 2000 and 2005? Are you likely to want to change your prediction for 2010?

Table 2

Year	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
Years from start	18	19	20	21	22	23	24	25	26	27
Sea ice extent million km^2	6.74	6.56	6.24	6.32	6.75	5.96	6.15	6.05	5.57	5.92



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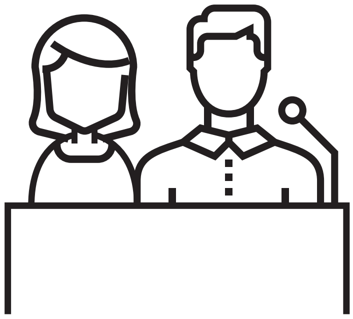
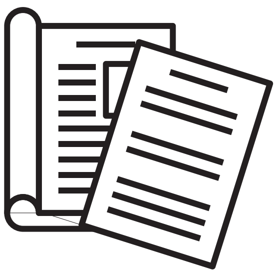
www.stem.org.uk/stem-ambassadors





Thank you

We hope you enjoyed Catalyst, and matching teachers’ notes. If you have any feedback, or ideas for topics you’d like to see covered in future editions, please email:

catalyst@stem.org.uk

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