

nano!

weww

nano wows

Introduction

This lesson is about the Potential of Nanoscience. It is about investigating the plausibility of a number of “NanoWOWs”. This lesson is activity based and includes an ideas sheet and worksheet. To begin the lesson the concepts of plausible and tentative are introduced in order to discuss the potential of the NanoWOWs.

Are these plausible?

- A space elevator
- A robot that could swim in your blood stream
- Growing a brain
- An invisible nano-cloak
- Jeans that clean the air as you walk
- Humans walking up walls
- A TV that rolls up
- Clothes that charge your phone

Curriculum links

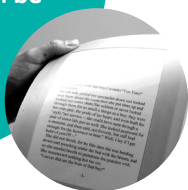
Science Strand:

Environmental awareness and care
Strand Units: Environmental awareness, Science and the environment

Maths Strand:

Data. Strand Units: Representing and interpreting data, Chance

The tentative nature of science is exciting and it allows us to imagine what our world will be like in the future



WALT

- **Understand the words ‘Plausible’ and ‘Tentative’**
- **Discuss the plausibility of a number of nanoscience ideas**
- **Use the language of the ‘Chance’ strand unit in maths to describe these ideas**
- **Make predictions based on what we know about our world and how it works**
- **Gather data and present it on bar charts/pie charts/line graphs**
- **Research on the Internet**

Background Information

This lesson can begin with a discussion on some vocabulary that can be used to describe and explore the NanoWOWs.

Science is a ‘tentative’ subject. In light of new evidence scientists can change their minds about how our world works. When people invent new technologies it can sometimes allow us to learn more about our world. New telescopes have given us more information about Space and new microscopes have taught us more about the nano world. The tentative nature of science is exciting and it allows us to imagine what our world will be like in the future.

- Discuss the word ‘Tentative’ with the children. If something is tentative it is not fixed, it is developmental and it is subject to change.
- Discuss the word ‘Plausible’ with the children. Is an idea plausible? Is the idea reasonable?

Synonyms for plausible:

probable – likely – credible – believable – possible

- Is it plausible that your county could win the Football All Ireland?
- Is it plausible that you could grow wings today?
- Is it plausible that you will be hungry in an hour?

Encourage the children to use the vocabulary of uncertainty and chance (linked with maths) e.g., possible, impossible, might, certain, uncertain and not sure.

Journal suggestions

- Draw a picture of your favourite NanoWOW
- Draw a picture of a person using a NanoWOW
- Write an advertisement for a NanoWOW of your choice (Give it a name, a price, explain how it might work, etc.)
- Record the opinions of your friends or family about the NanoWOWs on a bar chart
- Advanced: Use your imagination and create a NanoWOW of your own. Explain how nanoscience is used in your NanoWOW.



Useful resources

A space elevator

www.howstuffworks.com/space-elevator.htm

https://science.nasa.gov/science-news/science-at-nasa/2000/ast07sep_1

A robot that could swim in your blood stream

<http://ambercentre.ie/news/single/scientists-make-break-through-to-manage-immune-response-for-implanted-d>

<http://electronics.howstuffworks.com/nanorobot.htm>

www.microscopemaster.com/nanobots.html

Growing a brain

<http://ambercentre.ie/news/single/amber-researchers-develop-a-new-material-capable-of-regenerating-diseased-h>

www.youtube.com/watch?v=IKJvFnQYhKc

www.sciencedaily.com/releases/2013/02/130226101400.htm

An invisible nano-cloak

www.nanowerk.com/news2/newsid=30909.php

www.youtube.com/watch?v=Nfnbj9r1-2I

Jeans that clean the air as you walk

www.theguardian.com/science/2012/oct/21/bright-idea-jeans-clean-cities

www.bbc.co.uk/newsround/20078045

Humans walking up walls

www.bbc.co.uk/news/science-environment-19875247

<https://youtu.be/Dwcb1mFWnNY>

A TV that rolls up

<http://ambercentre.ie/news/single/amber-researchers-break-through-in-optimising-nanowire-networks-for-emerging>

www.oled-info.com/flexible-oled

<https://theconversation.com/samsungs-foldable-phone-could-soon-be-a-reality-103487>

Clothes that charge your phone:

<http://ambercentre.ie/news/single/new-material-could-increase-our-average-smartphone-battery-life-by-over-300>

<http://ambercentre.ie/news/single/amber-researcher-announced-as-first-irish-researcher-to-receive-6-erc-award>

www.bbc.co.uk/news/technology-18781878

www.wired.com/gadgetlab/2010/01/e-textile-charge

NanoWOW activity

The children can be introduced to the NanoWOWs as a list of ideas that the teacher has heard of, but is not sure if they are true or not.

Sample results

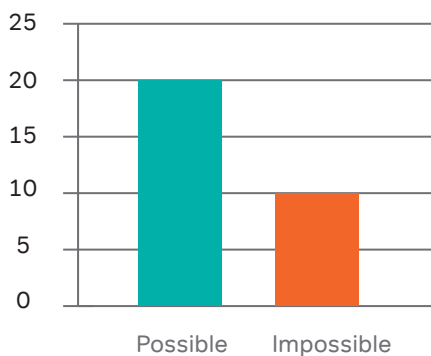
Invisible cloak

- Possible
- Impossible



Space Elevator

No. of students



Activity

To carry out the activity cut up and distribute the NanoWOWs ideas sheet to children. The children could be given a few minutes to discuss each NanoWOW, record their thoughts on the worksheet. Each child will have their own worksheet to record their own opinions about the NanoWOWs and they could also record the opinions of others. The opinions of the whole family or class can be recorded on a simple tally chart, see examples opposite.

Answers to NanoWOWs

Note: Scientists do not always get answers handed to them, they need to conduct extensive research and investigations and they may still not get the answers they are searching for.

The children will want to know if the NanoWOWs are possible or impossible, teachers or parents have the option of:

- Telling the children at the end of the lesson that scientists think that all of the NanoWOWs are plausible.
- Getting each group to research one NanoWOW in a computer lesson and present their findings to their family, or friends, as 'mini experts'.
- Asking the children to research a NanoWOW of their choice for homework (subject to Internet access at home).

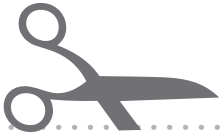


Teaching tips

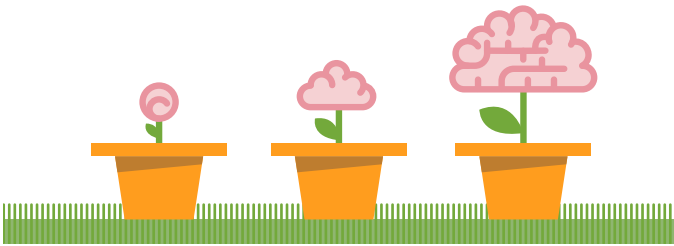
Use whole reflection to summarise what the children have learned in this lesson:

- What does tentative mean?
- Which NanoWOW might solve problems for the world?
- Which NanoWOW would you consider to be the most difficult to develop?
- Which would you consider the most important NanoWOW?
- If you had billions of euros what NanoWOW would you invest in? Why?

NanoWOW ideas sheet

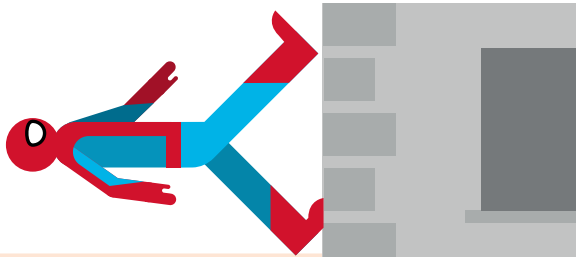


Growing a brain



How could humans use this?

Humans walking up walls



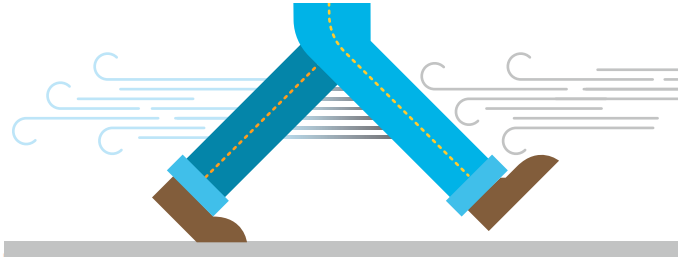
How would this change our world?

An invisible nano-cloak



How could humans use this?

Jeans that clean the air as you walk



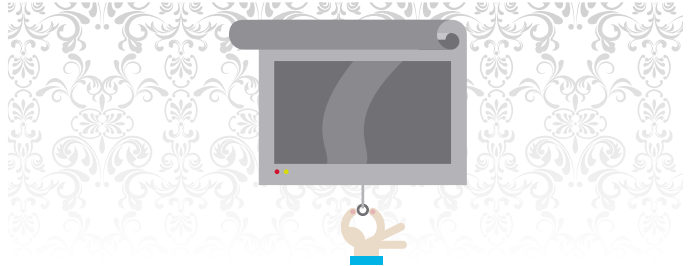
How would this benefit our environment?

Clothes that charge your phone



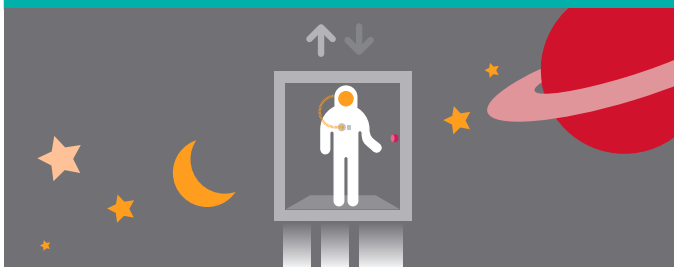
Would you wear a t-shirt that could charge a phone or laptop? Why?

A TV that rolls up



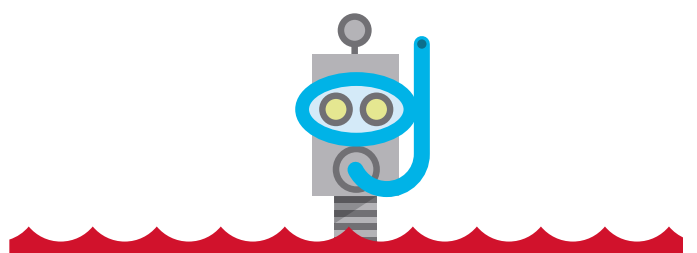
How would this change our world?

A space elevator



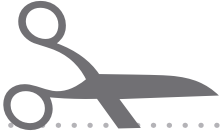
How would this change our world?

A robot that could swim in your blood stream



How could we benefit from this?

NanoWOW worksheet



NanoWOW:

Do you think this NanoWOW is possible?

Does your group think this NanoWOW is possible?

Notes:

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