

Big Screen Science series

The Law of Averages
Duration: 14 Minutes

The Law of Averages explores the issue of kidney transplantation in a short drama made and acted by a group of 14- and 15-year-old students.

With the help of professional filmmakers and scientists, the students based the film on an ordinary family whose lives are suddenly changed when the son is diagnosed with kidney disease and requires a transplant.

The group of students from Barrhead School near Glasgow, won the opportunity to make the film after winning the Scottish round of First Light's Big Screen Science competition.

Following the film, the students describe the process they went through, from coming up with the original idea with their science teacher, to working on the script and taking on the challenge of acting in the film.

The Perry Pigger Show
Duration: 14 Minutes

This animated film tackles the complex subject of xenotransplantation using the format of a popular chat show hosted by a pig named Perry Pigger.

Teaching a subject like xenotransplantation, can be testing, so using a cartoon character and a familiar, easy to understand format, helps make it fun.

The film was developed and made by ten Year 9 girls from Manchester's Abraham Moss School, aided by a professional animator and a scientist. The girls were one of six groups of students who won the opportunity to turn their idea into reality when they won the north west round of First Light's Big Screen Science competition.

The resulting film proves just how successful the collaboration between science and filmmaking can be.

The Stem Cell Controversy
Duration: 14 Minutes

Craig McMillan, a wheelchair user, investigates the moral and ethical dilemmas of stem cell therapy and questions whether it will ultimately affect his own disability.

Craig, who started using a wheelchair following a rugby accident at Ballycare High School, Belfast, is filmed by a group of ten 14- and 15-year-olds from his former school.

The students are the winners of the Northern Ireland round of the Big Screen Science competition which is run by young people's filmmaking initiative, First Light, and supported by the Wellcome Trust.

The students - who made the film with the help of a professional filmmaker and local scientist - had never met Craig but felt that his involvement in the film would give it greater impact and meaning.

Science

Cancer and The Genome

Cancer and The Genome
Duration: 14 Minutes

Sarah Walsh is a young woman living with melanoma, the third most common cancer in the 15 to 39 age group. Studies show that one of the biggest risk factors for melanoma, a type of skin cancer, is over-exposure to UV, either from the sun or tanning beds.

But what is cancer and why does it happen? Dr. Andy Futreal, co-founder of the Cancer Genome Project at the Wellcome Trust Sanger Institute, explains that cancer occurs when cells start to behave in inappropriate ways. The root cause of all cancers is mutations in DNA, causing changes in cell behaviour.

Researchers now know the underlying mechanism of melanoma in 70 per cent of cases and there is hope that a new drug will be able to stop the cancer in its tracks.

But any new treatment will probably come too late for Sarah. A recent hospital scan reveals the presence of secondary tumours and her outlook is not good.

Fighting HIV

Fighting HIV
Duration: 14 Minutes

Eight years ago, when Clint Walters was only 17, he found out he was HIV positive. The news shattered Clint and his family, but worse was to come: Clint's rapid progression to full-blown AIDS almost killed him.

Thankfully modern combination therapies have restored Clint to almost full health. In this program we meet Clint as he undergoes a charity walk to raise money for a clinic he is hoping to open, a weekend HIV testing centre for young people.

In preparation for setting up his centre Clint meets with various top scientists to find out about the science behind HIV and AIDS. Firstly he meets Dr Michael Brady, from Kings College London, who explains why controlling HIV is so difficult and talks about the difficulties of keeping to a drug regime that lasts for life.

Dr Anton Pozniak talks about vaccine trials, whilst Professor Jonathan Weber talks to us about the most recent developments in HIV prevention and the microbicide program, which is currently being tested in Africa and the UK.

Science

Life and Living Processes 3 series

01.
Habitat and Population
Duration: 19 Minutes

Life and Living Processes 3 is designed to help students develop their knowledge and understanding of life processes and living things. It explores a range of subjects such as habitat and population, diet and nutrition, energy for life, and microbes and health.

This episode examines the relationship between living organisms and their environment. Using the design of suitable habitats at Chester Zoo as a starting point we consider the important physical factors which need to be controlled if animals or plants are to thrive.

The program is divided into four main sections:

1. Creating a suitable habitat
2. Population growth in the absence of predators
3. Introduced predators and habitat destruction
4. Competition and disease

02.
Green Plants
Duration: 19 Minutes

This episode is concerned with the importance of plants as a source of useful products and the processes by which biomass is produced. The program uses the Eden Project, which comprises the world's largest environmentally controlled glasshouse, to illustrate the phenomenal variety of plant forms and the many uses to which species can be put.

The program is divided into five main sections:

1. The significance of plants
2. Photosynthesis and the leaf
3. A potted history of photosynthesis
4. Making starch and cellulose from sugar
5. Designing leaves for maximum photosynthesis

03.
Diet and Nutrition
Duration: 19 Minutes

This episode is concerned with the importance of a balanced, healthy diet. By drawing on the ideas of a group of young people and the knowledge of a variety of nutrition experts, it seeks to deal with a number of dietary issues in a straightforward and easily digested form!

The program is divided into 6 short sections:

1. Why we need a balanced diet
2. Diet for a purpose
3. Carbohydrates
4. Fats and proteins
5. Water, vitamins, minerals and fibre
6. How much of each food?

Science

<p>04. Energy for Life Duration: 19 Minutes</p>	<p>This program examines the process of respiration. We begin by investigating the energy content of different foods through the example of an Antarctic voyager. Oxygen is needed to release energy from food. We see food being burnt in liquid oxygen and a calorimeter is used to measure the energy in different foods.</p> <p>The program is divided into four main parts:</p> <ol style="list-style-type: none"> 1. Energy in different foods 2. Getting oxygen and glucose to your cells 3. Measuring the process of respiration 4. Balancing energy intake and output
<p>05. Microbes and Health Duration: 19 Minutes</p>	<p>In this episode the three most important groups of microbes are examined in detail. A fact file is created to compare the size, shape and lifestyle of bacteria, viruses and fungi.</p> <p>The program is divided into six sections:</p> <ol style="list-style-type: none"> a. How the immune system fights infectious diseases b. Microbe factfile c. Smallpox and the development of vaccination d. Microbes can survive in difficult environments e. Preventing the transmission of infectious disease f. Antibiotics
<p>Life Sciences 3 series</p>	
<p>01. Life Blood Duration: 19 Minutes</p>	<p>The heart, together with all the veins and arteries and the contained blood, is to be regarded as the beginning of all things that are in the body: the creator, fount, and spring, and the prime cause of life.</p> <p>This is a story of exploration and revelation. The English physician William Harvey lived in the 17th century and was perplexed by his observations of the heart and the movements of the blood around the body. What he saw didn't tally with what he'd always been taught: so he decided to investigate what was really going on.</p>
<p>02. Wired Duration: 19 Minutes</p>	<p>This program provides a detailed description and explanation of the biology and functioning of the human nervous system and the components of the nervous system: receptors and nerves.</p> <p>It also explains how someone can feel sensations from a missing limb as well as how blind people are able to 'see' with their hands.</p>
<p>Materials and Their Properties 1 series</p>	
<p>01. Rust Duration: 19 Minutes</p>	<p>This program explores the on-going battle between the human race and rust. Along the way the factors (iron, water and oxygen) are observed and investigated.</p>
<p>02. Fire Duration: 19 Minutes</p>	<p>The principle of the fire triangle is brought to life with spectacular demonstrations and firefighters at work; the fire that can burn underwater and the devastating front-room fire.</p>

Science

03. Rocks Duration: 19 Minutes	Exploring the rocks used in High Street buildings leads to an investigation of their properties and how rocks are formed, as well as the rock cycle.
04. Limestone Duration: 19 Minutes	A case study involving quarry owners, scientists, local residents and industrialists allows the audience to decide whether the environmental consequences of extracting limestone are outweighed by the commercial advantages.
Materials and Their Properties 2 series	
01. Changing State Duration: 19 Minutes	The properties of solids, liquids and gases and changes from one state to another, can all be explained by the theory that everything is made up of particles. Looking at familiar substances, along with a few surprises, the program investigates the differences between the three states of matter and how these can be put to good use.
02. Salty Water Duration: 19 Minutes	Using sea water as a context, the program explains the science of 'mixtures' and 'solutions' and demonstrates how basic scientific techniques are used to analyse the content of the oceans.
03. Gases Duration: 19 Minutes	Gases are notoriously difficult to study in the school laboratory. Television works to its strength in this program by showing a wide range of real-life applications through which the physical properties of gases can be investigated.
04. Elements Duration: 19 Minutes	A forensics case is used as an enticing introduction to the idea that everything is made up of 'building blocks' which we call elements. The program looks at the characteristics of elements and how they were discovered and the elemental recipe for life.

Science

Periodic Table: Ferocious Elements

Duration: 14 Minutes

There are more than 100 elements in our universe, 81 of which are metals.

In this program, we use the periodic table to explore some of these elements and discover why some are more reactive than others.

Science teacher Subathra Subramaniam visits Portobello Road market in London and learns why gold, silver and copper are ideal for making jewellery.

She also examines the highly reactive alkali metals, which are found in group one of the periodic table. She looks at their characteristic, reactions and uses.

Finally, Subathra explores halogens, a collection of non-metals found in group seven of the periodic table, that display their own qualities and trends.

Elsewhere, Professor Holloway of Leicester University, demonstrates how nasty and reactive the non-metal fluorine can be.

He shows how each of the halogens reacts with hydrogen and explains how there are a number of good uses for this type of element.

Physical Processes 2 series

01.

Solar System

Duration: 19 Minutes

3D graphics take us on a journey through space to study the relative position and movement of the nine planets that surround our Sun. But it takes a model the length of an airfield to capture a true sense of scale. This program traces the way our ideas of the solar system have changed through history, from the ground breaking work of Galileo to modern day exploration from home, using the Internet to control a robotic telescope.

02.

Air Forces

Duration: 19 Minutes

In this program a team of Britain's top cyclists in action at the world's fastest cycle track, and a terrifying plunge from the skies, introduce the idea of balanced and unbalanced forces.

03.

Electricity

Duration: 19 Minutes

At the beginning of this program every day appliances are used to look at the principles of electricity. Next the story of Swan and Edison's search for a suitable light bulb filament is used to illustrate both systematic enquiry and the possibility of converting electrical energy to heat and light energy. Animated charges then help to explain the flow of current through simple series and parallel circuits.

Science

<p>04. Static Electricity Duration: 19 Minutes</p>	<p>Lightning is a spectacular example of electricity in nature, but can we explain how it occurs? This program traces the way our ideas of how lightning is produced have changed through history, including the work of Benjamin Franklin. We also see young people finding out how static electricity is used to ensure an efficient paint-job on their bikes.</p>
Physical Processes 3 series	
<p>01. Temperature and Heat Duration: 19 Minutes</p>	<p>This program is concerned with the measurement of temperature and the nature of heat. Thermal imaging is used to give a new perspective on heat in everyday life. The history of the thermometer is outlined to show the importance of a standard scale for temperature measurement. How can we measure the temperature of red hot-iron, or liquid air? What is heat and how do things cool down? How can you make instant ice cream?</p> <p>The program is divided into four main sections:</p> <ol style="list-style-type: none">1. Imaging techniques using infra-red2. Sensing temperature3. How thermometers work4. Temperature, heat and the movement of particles
<p>02. Electricity for the Future Duration: 14 Minutes</p>	<p>This program is concerned with the use and production of electricity. It attempts to answer four main questions. How much electricity do we use? How is that electricity produced now? What are the drawbacks of our current methods of production? How is electricity likely to be produced in the future?</p> <p>The program is presenter-led and studies the issues surrounding the subject. It could be used to introduce the subject of alternative energy, stimulating students to further research, or it could be a useful revision and consolidation at the end of the topic.</p> <p>The program is divided into four main sections:</p> <ol style="list-style-type: none">1. Using and generating electricity2. Chicken waste – and other alternatives to fossil fuels3. Wind turbines4. Solar and water power

Science

<p>03. Light and Reflection Duration: 19 Minutes</p>	<p>This program is concerned with some basic properties of light. It uses the recent solar eclipse to introduce ideas about the transmission of light, shadow formation and how we see things.</p> <p>The use of mirrors in the theatre provides a starting point for an explanation of the law of reflection. This principle is used in optical fibres, and allows rapid and efficient communication over long distances.</p> <p>The program uses the shadow made during an eclipse to show that light travels in straight lines. The section on reflection illustrates how to draw ray diagrams; this could either precede or follow up pupils' practical work. The final section on communication and optical fibres could be used as a starting point for individual research work (see the Links section.)</p> <p>The program is divided into four main sections:</p> <ol style="list-style-type: none">1. How eclipses occur.2. Luminous objects and reflection – how we see things.3. Explaining reflection in a plane mirror.4. Communicating with light.
<p>04. Magnetism Duration: 19 Minutes</p>	<p>This program is concerned with magnetism and magnetic fields. It attempts to answer four questions. Which materials are magnetic? What is a magnetic field? How are magnets made? What are some of the uses of magnets?</p> <p>The program could be used either as background to support work in the classroom on magnets, or as revision and consolidation at the end of the topic.</p> <p>The program is divided into six main sections:</p> <ol style="list-style-type: none">1. Using a magnetometer to detect magnetic materials2. Which materials are attracted to magnets?3. Magnetic fields4. The history of magnetism5. Making magnets6. Some uses of magnets

Science

<p>05. Machines and Moments Duration: 19 Minutes</p>	<p>This program is about forces and their turning effect. It explores how a range of simple machines make the best use of forces, and goes on to examine one machine in detail: the lever. It introduces the concept of 'turning effect' and then goes on to look at 'balanced moments'.</p> <p>The program could be used as an introduction to work in the classroom on simple machines (ramps, pulleys, levers) and to revise or consolidate work on turning effects and balanced forces.</p> <p>The program is divided into four main sections:</p> <ol style="list-style-type: none"> 1. Erecting a big top 2. Investigating pulleys and ramps 3. The turning effect of levers 4. Balanced moments
<p>Real Science series</p>	
<p>01. Incriminating Evidence Duration: 24 Minutes</p>	<p>This program focuses on incriminating evidence and how science supports the police force.</p> <p>The Real Science series reveals the science at the core of many human activities. It is a stimulating and thought-provoking series offering insights into how science works in the real world.</p>
<p>02. Roller Coaster Duration: 24 Minutes</p>	<p>This program looks at roller coasters to help explain forces and structures.</p> <p>The Real Science series reveals the science at the core of many human activities. It is a stimulating and thought-provoking series offering insights into how science works in the real world.</p>
<p>03. Outbreak Duration: 24 Minutes</p>	<p>This program shows how science saved lives by tracking and stopping the SARS virus.</p> <p>The Real Science series reveals the science at the core of many human activities. It is a stimulating and thought-provoking series offering insights into how science works in the real world.</p>
<p>04. Pushing the Limits Duration: 24 Minutes</p>	<p>This program examines the effects of forces on bodies.</p> <p>The Real Science series reveals the science at the core of many human activities. It is a stimulating and thought-provoking series offering insights into how science works in the real world.</p>

Science

<p>05. That's My Baby Duration: 24 Minutes</p>	<p>This program examines the science of fertility treatment.</p> <p>Real Science is a stimulating and thought-provoking series offering insights into how science works in the real world. The series reveals the science at the core of many human activities.</p>
<p>06. Wannabe Biker Duration: 24 Minutes</p>	<p>This program examines the science and materials used in motorbikes.</p> <p>Real Science is a stimulating and thought-provoking series offering insights into how science works in the real world. The series reveals the science at the core of many human activities.</p>

The Issue

<p>Stem Cell Research Duration: 14 Minutes</p>	<p>Stephen Cuff is only 39, but he suffers from Parkinson's Disease and it has turned his life upside down. He can no longer look after his two children and basic day-to-day activities like shaving, takes him a long time. Conventional drugs have not been successful for Stephen, leaving him no option but to undergo brain surgery.</p> <p>Stephen's operation is successful, but it doesn't cure him. One potential future cure is embryonic stem (ES) cell therapy. This is being pioneered by the likes of Professor Ian Wilmut, who became famous when he cloned Dolly the sheep.</p> <p>Professor Wilmut introduces us to the concept of stem cells and the science behind them, whilst presenting his opinion of the technology.</p> <p>Alison Davies, the chair of No Less Human, is a wheelchair user who would refuse ES cell therapy if it were available. She offers a different ethical perspective as to why the use of ES cells should not be permitted.</p> <p>We also hear the differing opinions of leading cell biologists at a recent stem cell conference.</p>
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The Nature of Scientific Enquiry: Big Questions series

<p>01. Faraday's Famous Inventions Duration: 19 Minutes</p>	<p>These five programs focus on the lives, work and struggles of some of the world's greatest scientists – their discoveries; how they made their achievements; the problems they encountered and the legacy that they left.</p> <p>This program tells the story of how Michael Faraday, a self-educated, working-class boy became a world famous scientist. His discoveries laid the foundation for our modern age, which relies so much on electricity as a carrier of power and information.</p> <p>His early experiments with electricity led to the invention of the electric motor and generator. The program concludes dramatically with a demonstration of the 'Faraday suit' used by linesmen working for the National Grid. The suit is donned by the presenter and 400,000 volts are sent through him, proving that Faraday's suit works effectively.</p>
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Science

<p>02. Charles Darwin's Evolution Duration: 19 Minutes</p>	<p>This program tells the story of Darwin's theory of evolution. Charles Darwin put forward his theory of evolution in 1858, at a time when most people believed in the Creation.</p> <p>The idea that species can develop has been causing arguments for over 200 years. The evolution of the human race has set off the fiercest arguments of all. It was an English scientist called Charles Darwin who started the great debate on the origin of species. "Darwin's Evolution" takes us through his life, travels and work, and what led him to come up with such a revolutionary idea.</p>
<p>03. Mendel and the Gene Splicers Duration: 19 Minutes</p>	<p>This program focuses on the scientist Mendel, a brief history of his early life and his work with genes and how he worked it out with 10s of thousands of peas. The program illustrates Mendel's experiments with peas and how he arrived at his conclusions about passing on genes from one generation to another – genes and family characteristics, inherited illnesses - exploring cystic fibrosis and GM foods - with interviews for and demonstrations against GM vegetables and fish.</p>
<p>04. Mendeleev's Dream Duration: 19 Minutes</p>	<p>This program tells the story of how Dmitri Mendeleev devised the periodic table of the elements.</p> <p>Dmitri Mendeleev was born in Siberia, in the Tzarist empire, the last of 17 children. His family lived in abject poverty. Following her husband's death his mother sacrificed her life to make sure that her youngest son Dmitri had an education. She moved the entire family from Siberia to St Petersburg in order to do this. Dmitri Mendeleev knew everything that was to be known about the 63 elements already discovered. During a dream he invented the famous periodic table, which has been called 'a list of ingredients for the universe'. Mendeleev also left gaps in the table for elements and boldly predicted elements which weren't discovered until up to 15 years later.</p>
<p>05. Hubble's Expanding Universe Duration: 19 Minutes</p>	<p>This program tells the story of how the size of the Universe and the amazing fact that it is expanding, was discovered.</p> <p>The expansion of our universe was discovered by Edwin Hubble in 1929, by observing that the farther galaxies are from the Earth, the faster they recede. This trend is called Hubble's law. Some galaxies have speeds greater than hundreds of thousands of kilometres per second. Current thinking is that the universe may expand forever. This program examines the man himself, and his arrival at the discovery of 'Hubble's Law'.</p>
<p>The Virtual Body series</p>	
<p>01. Circulation, Respiration and Breathing Duration: 19 Minutes</p>	<p>This program uses live action filming and virtual graphics to follow the workings of the human body. It looks at the ways in which it can adapt its major functions of respiration and circulation to meet the differing demands placed upon it.</p>

Science

<p>02. The Immune System Duration: 19 Minutes</p>	<p>The immune system is a network of cells and organs that have evolved to defend the body against attack by a variety of 'invaders'. There are mechanisms for dealing with typical infectious organisms such as bacteria, fungi, parasites and viruses.</p> <p>The organs of the immune system are found throughout the body – in the tonsils and adenoids, the thymus, lymph nodes, the spleen, the appendix, and the bone marrow. They are concerned primarily with directing the growth, development or activity of the white blood cells – the leucocytes – which are the key to a healthy immune response.</p>
<p>03. Homeostasis Duration: 19 Minutes</p>	<p>This program uses live action filming and 'virtual' graphics to follow the workings of the human body. It looks at the ways in which the body is able to control its internal environment through a range of homeostatic mechanisms.</p>
<p>04. Sensory Systems Duration: 19 Minutes</p>	<p>Until relatively recently our knowledge of how the human brain works relied almost entirely on experiments using other animals and on dissecting dead brains. Now, thanks to the development of new techniques such as PET (positron emission tomography) and fMRI (functional magnetic resonance imaging), we can observe our brains at work in a living body. The new PET scanners for example, create an image on screen showing which areas of the brain are active when we hear sounds or taste foods or experience any number of other sensations. They work by picking up increases in blood flow that occur when a particular part of the brain is active. The blood must first be labelled with a mildly radioactive substance, then the patient's head is placed into the doughnut-shaped scanner. As the brain responds to a particular stimulus, blood flow to the active area will increase and along with it the level of radioactivity picked up by the scanner. These radioactive signals are then displayed as a visual picture of the brain at work.</p>
<p>05. Genetic Engineering Duration: 19 Minutes</p>	<p>Reproductive technology is a relatively new science that focuses on scientifically assisting successful reproduction. Although the first case of successful artificial insemination of a woman was recorded as long ago as the eighteenth century, it wasn't until the birth of the first test tube baby, Louise Brown, in 1978 that this technology really took hold of the public imagination.</p> <p>Since that time, scientists have moved from in-vitro (in laboratory glassware) fertilisation, using sperm and eggs, to producing viable animals from unfertilised eggs through cloning.</p>