

**Circuit 1**

Battery

Switch

Buzzer

Lamp

**Circuit 2**

Battery

Switch

Buzzer

Lamp

**Circuit 3**

Battery

Switch

Buzzer

Lamp

Circuit 1 has the lamp in **SERIES** with the buzzer.

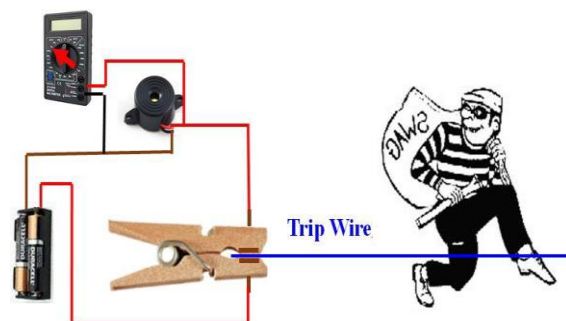
Circuit 2 has the lamp in **PARALLEL** with the buzzer.

Circuit 3 has the lamp in **PARALLEL** with the buzzer.

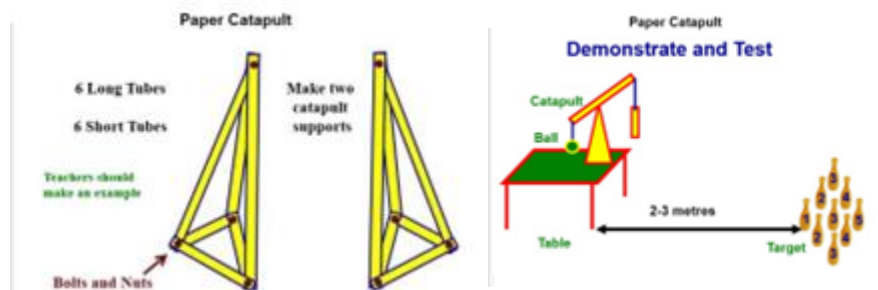
Measure the Voltages.

Measure the Voltages.

Measure the Voltages.



(requires recycled A4, nuts and bolts etc. provided – secondary pupils have to do a design and budget and are marked on these and also their score) (Primary 1½ hrs. Secondary 2½ hrs.)



**The Circuit**

Wire the Circuit Like This

Diagram illustrating a simple series circuit. The circuit components are connected in a loop: Batteries, Switch, Buzzer, Light Bulb, and Motor. The circuit is connected to a power source (Batteries) and a switch. The circuit is labeled with components: Batteries, Switch, Buzzer, Light Bulb, Motor, Wires, and Terminal Blocks. A yellow box at the bottom left contains the text: "DO NOT Touch the Cords or the Batteries. Use Circuit Tape Correctly." A red box at the bottom right contains the text: "Design From Understanding Principles of Circuit Construction".



## Arithmetic Bricks

1 hour



also used for Indices and Pi

1 hour

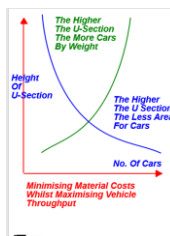
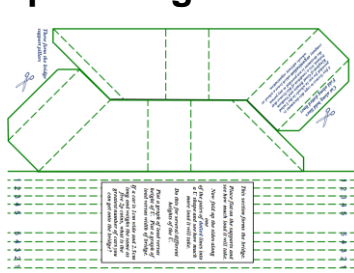
## Calculate Pi by weighing water

(area and volume – specific gravity of water is 1) 1 hour



School to provide ug, 20cm diam. pot, string, bucket and ball

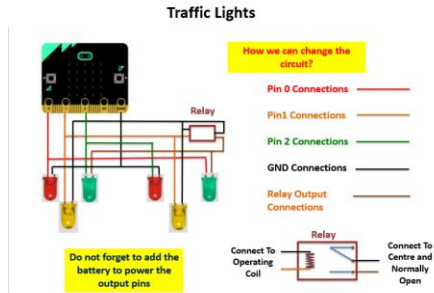
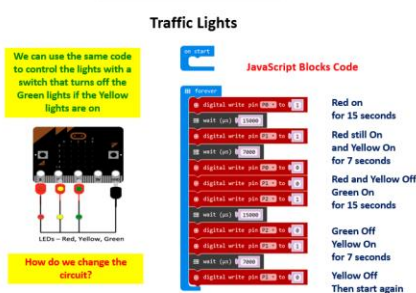
## Paper Bridges



(just print the A4 plans, ask children to bring toy cars) ½ - 1 Hour

## BBC Micro:bit Traffic Lights

up to 2 hours



## Recycled Paper Towers and Bridges

(A4, nuts and bolts etc. provided, pupils bring in toy cars as for the bridges above) 1 hour

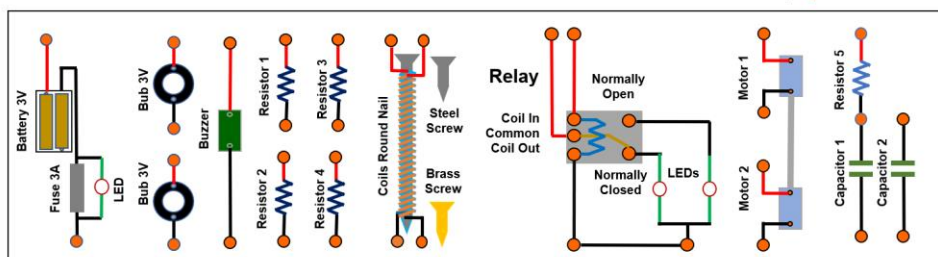


<http://www.dwiller.com/Challenges/Paper%20Towers%20and%20Bridges%20-%20Primary%20Version.pptx>

<http://www.dwiller.com/Challenges/Paper%20Towers%20and%20Bridges%20-%20Secondary.pptx>

## DC Current Tutorial

This is a schematic of the circuit board which you will use.



## Lets Be Specific About Gravity

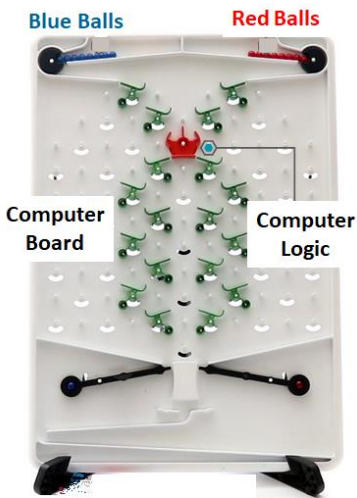
1 hour +



## Sir "Irate" Newton

## Turing Tumble Computer

**NEW**



We have four kits available to lend.

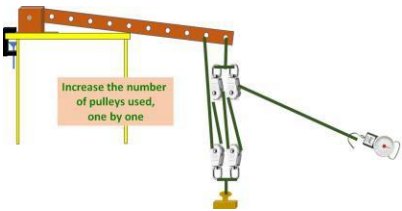
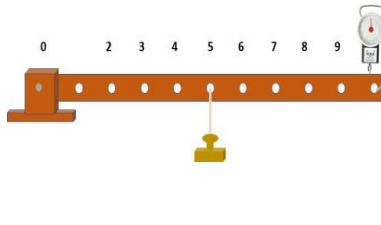
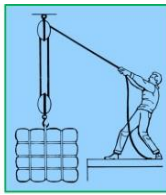
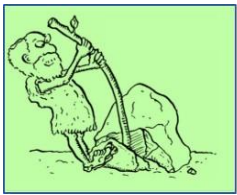
They demonstrate computer logic as balls fall from top to bottom.

There is a book of examples.

PPT has two activities.

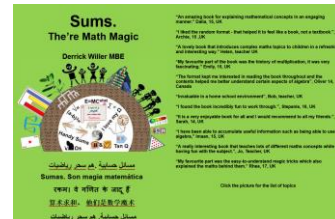
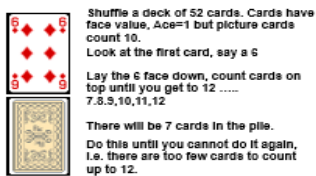
- Dropping balls alternately.
- Binary addition

## Levers Alone – Don't Pulley My Leg



## Magic Cards

### Card tricks which use algebra to solve



## Card tricks which use algebra to solve

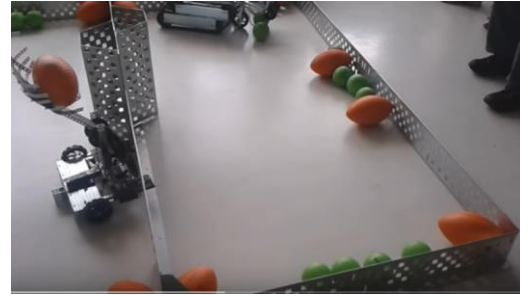
## Robots



Construct a “working” robot using K'Nex, elastic bands and string  
(School to provide the K'Nex, etc.)



## VEX Robots



From ASE Contact [dwilleruk@yahoo.com](mailto:dwilleruk@yahoo.com)

## Electricity Is Fun



## Lingo



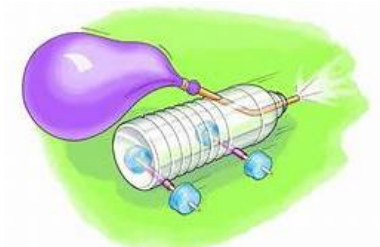
An Arduino based programming kit with ultrasonic sensor, buzzer and LEDs  
Contact [dwilleruk@yahoo.com](mailto:dwilleruk@yahoo.com)

## Dancing Clown, Robot, Santa



## Balloon Car

**Made from recycled materials, the school supplies the recycles materials, balloons and tools**



## Egg Drop



## Using recycled Materials

### School to provide recycled materials and eggs

# Rockets

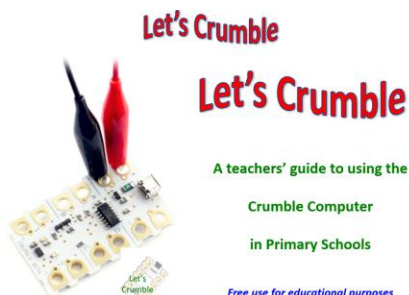


### Materials:

- Sheets Of Paper
- Straws
- Recycled materials
- Tape or Glue
- Measuring Tape or Ruler
- Stopwatch (use a Smart 'Phone)

### School to provide materials, use mobile phone as stopwatch

# Lets Crumble

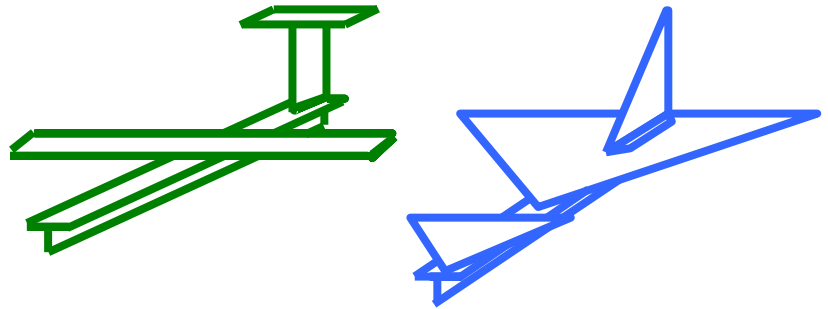
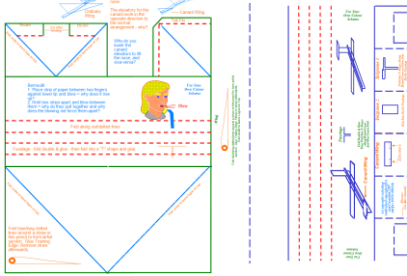


### Materials:

- Cumble Computer Kit
- Recycled Materials
- Sticky Tape and Glue

## A4 Paper Aeroplanes

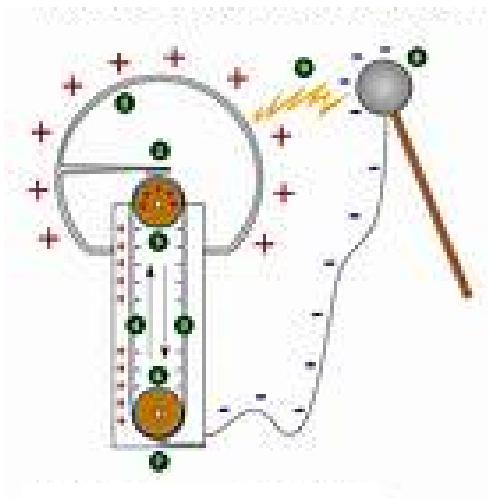
(just print the A4 plans) ½ hour



Just photocopy the relevant slides

## Van Der Graaf Generator

Are you a Bright Spark

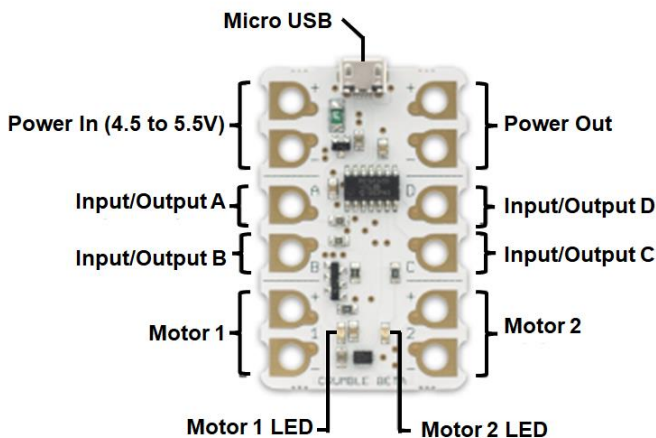


### Danger to Medical Electronics

Keep 2metres away if you have hearing aids, pacemakers, brain implants, etc.

Also keep mobile phones, I Pads, and computers away.

## Lets Crumble



This activity is for pupils to write computer programmes and then use the kit to make a mock-up of a fun product also using recycled materials.

The following programming, Basic, Excel and Access exercises are suitable for pupils to challenge themselves as the instruction slides are complete.

## Introduction to Programming

```
rem "my first program"
rem "add two numbers together"
input "type in the first number > "; a
input "type in the second number > "; b
answer = a + b
print a, "+", b, "=", answer
end
```

Using Basic programming language. Input, add, subtract, multiply, divide, display result, etc.

School to load Just Basic to the computers to be used.

Run the programme by clicking ►

## Code and Decode – Send Coded Messages to Friends

### Encoding by a given number

```
rem This program ask for a string and then
rem displays a list of ASCII codes for each
rem character in the entered string
input "Please enter a string >"; entry$
input "Please enter a number up to 100 > "; a
for index = 1 to len(entry$)
result$ = str$(asc(mid$(entry$,index,1))) + " has ASCII code of "
+ str$(asc(mid$(entry$,index,1))+a)
result2$ = result2$+chr$(asc(mid$(entry$,index,1))+a)
print result$
next index
```

Type in the message, line by line, code the line, display. Then the reverse to decode.

School to load Just Basic to the computers to be used.

### Prime Numbers

```
rem this program inputs a number
rem then calculates if it is a prime number
input "Input a Number > "; x
print x
rem Now find the square root of x
a = sqr(x)
print a
rem Now rationalise this to a whole number ( use
int ) but add 1 to be sure of trying all numbers
up to the square root
a = int(a)+1
print a
```

Coding using Just Basic, as above, to find prime numbers

School to load Just Basic to the computers to be used.



## Pythagorean Triangles

```
rem is a b c a right-angled triangle where a b and c are integers (whole numbers).
rem input the maximum length for one side as x
input "maximum length for one side > ":"x
rem use for a = 1 to x for one side
answer$ = "The following are Right-Angled Traingles" + chr$(13)
for a = 1 to x
  rem use for b = 1 to x for another side
  for b = 1 to x
    c = sqr(a*a + b*b)
    print a,b,c
    if int(c)=c then
      rem we have a right angled triangle sides a, b, c
      rem use str$(x) to print x inside a string called answer$
answer$ = answer$ + str$(a) + " " + str$(b) + " " + str$(c) + chr$(13)
    end if
  next b
next a
print answer$
end
```

Coding using Just Basic, as above, to find Pythagorean whole number triangles) e.g. 3,4,5 or 5,12,13  
School to load Just Basic to the computers to be used.

## The Vault

An Excel Spreadsheet exercise with mail-merge to Word

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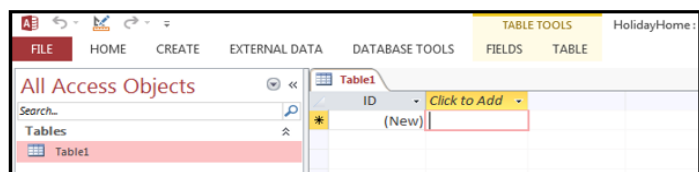
*picturesque Cavendish House in the heart of Brighton*

Complex If statements.  
Based on a real life project

## Microsoft Access Tutorial My Holiday Home

Requires the computers to have Microsoft Access

### My Holiday Home



#### Conventions:

We need to conform to a convention throughout this exercise so that others can see what we have done and can conform.

#### I use:

- T Tablename
- Q Queryname
- F Formname
- P Printoutname

# IMechE Warwickshire School Liaison























## STEAM Presentations

**Presentations are about 40-60 minutes,  
preferably to more than 50 pupils.**

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**[dwilleruk@yahoo.com](mailto:dwilleruk@yahoo.com)**



|   |  |   |   |  |  |
|---|--|---|---|--|--|
|     | <b>Electric Vehicles and the Rocky Road to Green Transportation</b><br><b>Peter James, Lyra Electronics Ltd.</b><br>Hybrid or all electric? What advantages? What are the problems? And what do we need to do to achieve "all electric" by 2040? Are there other power systems available?  |    |    | <b>Godiva Awakes, Cyclopeda and Humming Bird Project</b><br><b>Roger Medwell MBE, Godiva Awakes working party</b><br>Roger will describe this project to create this giant puppet and demonstrate the "cyclopeda" and the new Humming Bird.  |   |
|     | <b>Construction on Soft Soils - From Hills to the Sea</b><br><b>Dr Shervin Motamedi</b><br>A talk about climate change and its effect on coastal areas and how it impacted tropical mangroves. How civil engineers can build with nature.<br>Dr. Motamedi is an Assistant Professor at Coventry University School of Energy, Construction and Environment  |    |    | <b>We're Hear For You</b><br><b>Joseph Squire</b><br><b>Founder of We're Hear For You</b><br>Creating a passion for learning. This workshop captures children's and young people's imaginations and reshapes their idea of learning through discussion-led PSHE workshops. (Personal, social, health and economic education)<br><a href="http://www.werehearforyou.org.uk">www.werehearforyou.org.uk</a>                     | <br><b>We're Hear For You</b><br>Building Resilience For Life |
|     | <b>A history of Robots</b><br><b>Derrick Willer MBE</b><br>When were robots first thought about, what is necessary to make a robot work, through yester-year's examples to today's applications.   |    |    | <b>What We Need To Do To Solve The Energy Crisis</b><br><b>Amanda May, National Grid</b><br>Firstly we must take action to stop global warming<br>But we must also provide for changing to electric vehicles, cars, lorries, trains, aeroplanes and ships  |   |
|    | <b>A History Of The Land Speed Record</b><br><b>Willy Goldsmidt</b><br>Willy will outline the attempts to gain the world land speed record for cars.   |   |   | <b>Energy storage and the problem of electric cars</b><br><b>Graham Prebble</b><br>Currently there are major problems with battery life but these may soon be solved. As the number of electric cars increases how will the National infrastructure cope with the demand for electricity? Finally, how will we pay for this?   |   |
|  | <b>Harrier Jump Jet and Formula Student</b><br><b>Visit to Coventry University Engineering</b><br>This visit enables pupils to climb into the Harrier cockpit and also see the students' work for Formula Student and other automotive projects.   |  |  | <b>A career In Engineering and Recycling</b><br><b>Marcell Batson-Warner</b><br>An engineer having worked in cars, cans, cheese and cars again. Now at the University of Warwick researching Sustainable Manufacturing. Marcell is an engaging and amusing speaker who will enthral both girls and boys. She explains how engineering can be a rewarding, fun career.  |   |
|  | <b>Ethical Issues for Connected &amp; Autonomous Vehicles</b><br><b>Dr. Paula Palade, Jaguar Land Rover</b><br>Dr. Palade worked on a report commissioned by the European Commission for autonomous and connected driving looking at the ethical, societal, data security and privacy aspects that she hopes will influence EU legislation.<br>Her presentations will outline the problems faced by AV systems and the possible consequences of the decisions made.  |  |  | <b>USA, Arctic and Indonesian Eclipses</b><br><b>Mike Frost, Amateur Astronomer.</b><br>Mike will intrigue pupils with descriptions of his recent travels to see eclipses of the sun in the far north, on the equator and USA.<br>Mike has other presentations, <a href="http://www.mikefrost.info">www.mikefrost.info</a>   |   |
|  | <b>Saving the Bees with Maths</b><br><b>Dr. Martine Barons, University of Warwick</b><br>There is much concern about declining insect populations and what this might mean for human food and survival. The pollinator system is part of an interconnected ecosystem, which we don't know completely. How is it possible to make good decisions with so much uncertainty? And how on earth can mathematics help? Dr Barons will demonstrate how we can combine data and information from different experts to ensure our insects survive and thrive. |  |  | <b>Graphic Design</b><br><b>Michelle Abrahall, Graphic Designer, Illustrator &amp; Copywriter</b><br>Michelle will describe her career working with businesses of all areas, from accountants to self-published authors, showing examples of her work  |   |
|   | <b>A career In Distribution of Electricity across the UK</b><br><b>Amanda May, National Grid</b><br>Amanda is an engineer in Group Policy Making and as Programme Manager having graduated in Electrical Engineering at Durham University  |  |  | <b>Blending behavioural science, computer science, data analytics, engineering, and business model innovation.</b><br><b>Ganna Pogrebna, Professor of Behavioural Science at University of Birmingham</b><br>Ganna will outline her work to help cities, businesses, charities, and individuals to better understand why they make decisions they make and how they can optimize their behaviour to achieve improved results |  |

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# IMechE Warwickshire School Liaison



## STEAM Presentations

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|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  | <b>Model Engineering at its Best - Visit to Echills Wood Model Railway</b><br><b>Wednesdays in June/July</b><br>2 hours our including a tour of the 2Km track, the engine sheds, workshops, etc. and a ride on one of the trains. Maximum 16 per school party. Kingsbury Water Park 10:45am. and 12:45pm. Please note that the school is responsible for transport and the car parking charge.   |  |  | <b>CERN and the Large Hadron Collider</b><br><b>Prof. David Evans, CERN and University of Birmingham</b><br>Collide two protons together at almost the speed of light and what do you get. Sparks, Quarks, Whatever?   |  |
|  | <b>Track Safe</b><br><b>Derrick Willer MBE</b><br>Derrick leads the pupils to put together a bid for funding this implementation in Atlanta, Georgia USA. He also outlines the salaries that engineers and technicians can earn.<br>Derrick has a presentation on his career that has taken him across the world.  |  |  | <b>Effective Communication</b><br><b>Yichan Cai, Management Consultant, FunKeyB</b><br>Good communications are essential in almost all walks of life. But many are usually full of jargon that is unintelligible outside the particular work sector, nationality, religion or age. Yichan will try to debunk jargon. |  |
|  | <b>How We Won Fastest Car at F1 In Schools</b><br><b>Abi Hiron and Eddie Hodieme</b><br>Abi and Eddie were part of the team from WIMG Academy For Young Engineers who won the UK Final and went on to win fastest car at the International Finals in Kuala Lumpur. The team engineered their car using CAD/CAM and CAFD which reached 70mph in less than 1 second.   |  |  | <b>A History of Transport</b><br><b>Derrick Willer MBE</b><br>From Shanks's Pony to the modern transport – sea, land, air, space, the future?  |  |
|  | <b>A History OF Robots</b><br><b>Marcell Batson-Warner</b><br>When were robots first thought about, what is necessary to make a robot work, through yesterday's examples to today's applications.  |  |  | <b>Your future career is in your hands. But how to get there?</b><br><b>Kevin Leien, Graduated in Law and taught in a University but has now chosen to progress in a career of photography.</b><br>Kevin can advise on the education and career paths to follow for a successful career outcome.                     |  |
|  | <b>Exo-Planets and the Search for Alien Life</b><br><b>Thomas Killestine (End of Summer Term Only)</b><br>Thomas will outline current methods of searching for life in our solar system and in others for earth like planets. Thomas, age 21, won the Sir Patrick Moore  |  |  | <b>Tomorrow's Engineers Competition</b><br><b>Girls from Coundon Court School</b><br>The team that entered the finals of this competition at the Big Bang Fair 2018 after winning the local finals in Coventry. They are happy to present their achievements to other local schools.                                 |  |
|  | <b>Being a Woman in a Man's World' – A Career in Engineering</b><br><b>Lisa Cobble, ABB Global Product Development Process Manager</b><br>In 1995, there were not many girls leaving school to go into Engineering. Lisa was one of 2 in her company to start as an apprentice. Currently around 12% of all engineers are female in the UK. Discover what a career in Engineering can open up and take the opportunity to learn about how being 'different' can be advantageous! |  |  | <b>Frederick Lanchester – the unknown pioneer of UK aerospace.</b><br><b>Dr. Caroline Lambert, Coventry University</b><br>In 1892 Frederick Lanchester, whilst crossing the Atlantic, noticed the way herring gulls used up-currents of air to rise up without flapping their wings. He then began to study aviation |  |
|  | <b>Art Design In The Transport Sector</b><br><b>Dr. Aysar Ghassan</b><br>Dr. Ghassan heads Coventry University's Automotive and Transport sector and his presentation brings Art-Design into the Engineering Sector. He describes his work and invites pupils to create their own designs.   |  |  |  |  |
|  | <b>Women Engineering The Railway</b><br><b>Vanessa Stanley, Siemens</b><br>Vanessa outlines her route into engineering and describes her role with Siemens designing and delivering Protection & Control solutions to UK Rail systems and her roles as an IET Young Professional.<br>Zoom or Teams presentation only because Vanessa lives in Yorkshire.   |  |  |  |  |

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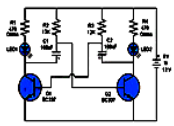










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|  |   |   |   |   |   |
|--|---|---|---|---|---|
|    | <b>Sums, They're Math Magic.</b><br><b>Derrick Willer MBE</b><br>A fun lecture to inspire pupils about maths involving pupils and teachers. Including how aliens might count, card tricks, measuring square roots and "handy multiplication".   |    |    | <b>Flux-Dance</b><br><b>Charlotte Hale-Smith,<br/>Stephanie Townsend</b><br>Combining dance with science and robots.<br>They have to make a small charge  |    |
|    | <b>Believe in yourself - Why we shouldn't feel imposter syndrome</b><br><b>Dr Shervin Motamedi</b><br>My journey from an underprivileged child living in poverty to a CEng and having my dreams come true - to teach at a university.<br>Dr. Motamedi is an Assistant Professor at Coventry University School of Energy, Construction and Environment |    |    | <b>Dark Matter. Is it Dark? Does It Matter</b><br><b>Mike Frost, Amateur Astronomer.</b><br>Mike will intrigue pupils with his description of Dark Matter. Can we see it? Can we detect it? How does it affect us?<br>Mike has other presentations, <a href="http://www.mikefrost.info">www.mikefrost.info</a>  |    |
|    | <b>Electronics Made Easy for Young Engineers</b><br><b>Naim Kapadia, Grinsty Rail</b><br>Electronic Made Easy for Young Engineers (EMEYE) is a new program to help young engineers (12 years+) to understand electronics and help schools and community in the Midlands area.   |    |    | <b>Saving The Environment</b><br><b>Tony McNally</b><br>An outline on how the pupils and schools can contribute to reducing climate change and harmful emissions<br>Tony is the MD of Climate [change] Solutions  |    |
|   | <b>Loudmouth Education and Training</b><br>Innovative theatre in education company. The company has been delivering Relationships, Sex and Health Education (RSHE) since 1994<br>Fees may be payable  |   |   | <b>Improving The Performance and Life of Batteries for Vehicles, etc</b><br><b>Muhammad Ans</b><br><b>WMG University OF Warwick</b><br>The current performance of batteries needs improving and their life extending to make electric vehicle's whole-life carbon footprint compete with diesel cars, etc.<br>Muhammad outlines the work that scientists and engineers are doing to help improve batteries.   |   |
|  | <b>Improving outcomes for young people</b><br><b>Diane Vernon MBE</b><br><b>CEO EmployabilityUK</b><br>The mission of EmployabilityUK is to facilitate employer engagement to enhance the aspirations, opportunities and career prospects of enthusiastic and committed young people.   |  |  | <b>Is there a pot of gold at the end of the rainbow?</b><br><b>Mike Frost, Astronomer</b><br>A fresh look at a familiar sight, which generations have sought to interpret according to their own beliefs. Will the world end if the rainbow does not appear? Is there a pot of gold at the end of the rainbow? And what strange fate will befall you should you pass beneath the rainbow? Leading to the modern day theory of the bow, from Descartes, Halley and Newton to quantum physics, lasers and infra-red rainbows. |  |