Kits
Burglar Alarm
(clothes-peg switch, trip-wire, electricity, multimeters, series and parallel circuits) 1 hour

Table Tennis Ball Launcher (motors, correct wiring) ½ hour

Paper Roman Catapults
(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.)

Why Lag Your House ½ - 1 hour

Free to borrow locally *Contact* enquiries@schoolsliaisoncommunity.net

Arithmetic Bricks 1 hour

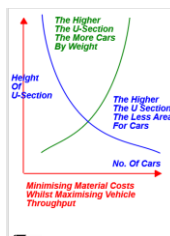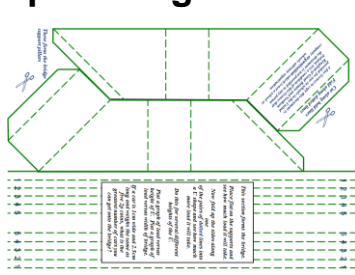### also used for Indices and Pi 1 hour

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.

http://www.dwiller.com/Challenges/DC-Current-Kit.pptx
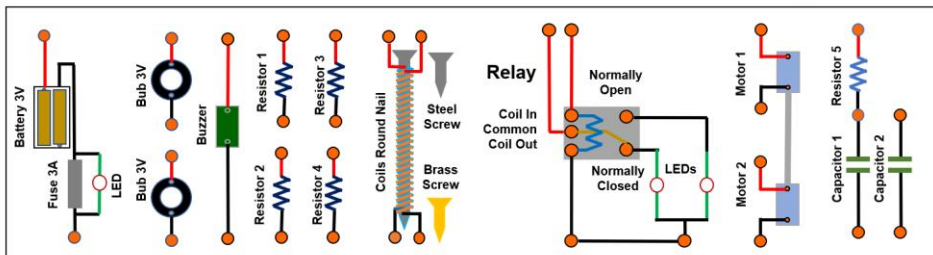
Lets Be Specific About Gravity
1 hour +

Sir "Irate" Newton

http://www.dwiller.com/Challenges/Lets%20Be%20Specific%20About%20Gravity%20Mass-Volume-Density.pptx

Free to borrow locally *Contact* enquiries@schoolsliaisoncommunity.net

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

http://www.dwiller.com/Challenges/Secondary%20Challenges/TuringTumble.pptx

Levers Alone – Don't Pulley My Leg

Magic Cards

Card tricks which use algebra to solve

Shuffle a deck of 52 cards. Cards have face value, Ace=1 but picture cards count 10.
Look at the first card, say a 6

Lay the 6 face down, count cards on top until you get to 12 ......
7.8.9,10,11,12

There will be 7 cards in the pile.

Do this until you cannot do it again, i.e. there are too few cards to count up to 12.

Card Piles

Cards Left Over

If there are six piles of cards

And 3 left over

The sum of the face cards will be

29!

Sums.
The're Math Magic

Derrick Willer MBE

Card tricks which use algebra to solve
http://www.dwiller.com/Challenges/Card%20Trick.pptx
http://www.dwiller.com/book/

Robots

Construct a "working" robot using KNex, elastic bands and string
(School to provide the KNex, etc.)
http://www.dwiller.com/Challenges/RobotChallenge.pptx

Free to borrow locally *Contact* enquiries@schoolsliaisoncommunity.net

VEX Robots

From ASE   **Contact dw@dwiller.com**

Electricity Is Fun

http://www.dwiller.com/Challenges/Electricity%20For%20Fun.pptx

Lingo

An Arduino based programming kit with untrasonic sensor, buzzer and LEDs
Contact dw@dwiller.com

Dancing Clown, Robot, Santa

http://www.dwiller.com/Challenges/Clown.pptx

Free to borrow locally *Contact* enquiries@schoolsliaisoncommunity.net

Balloon Car

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

http://www.dwiller.com/Challenges/Baloon%20Car.pptx

Egg Drop

Using recycled Materials

Gravity Egg Drop

Will Your Egg Survive The Drop?

Plastic Sheet

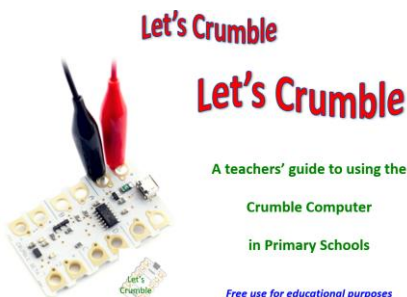**School to provide recycled materials and eggs**

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

Let's Crumble

Let's Crumble

A teachers' guide to using the

Crumble Computer

in Primary Schools

Free use for educational purposes

Materials:
•Cumble Computer Kit
•Recycled Materials
•Sticky Tape and Glue

Free to borrow locally *Contact* enquiries@schoolsliaisoncommunity.net

A4 Paper Aeroplanes
(just print the A4 plans) ½ hour
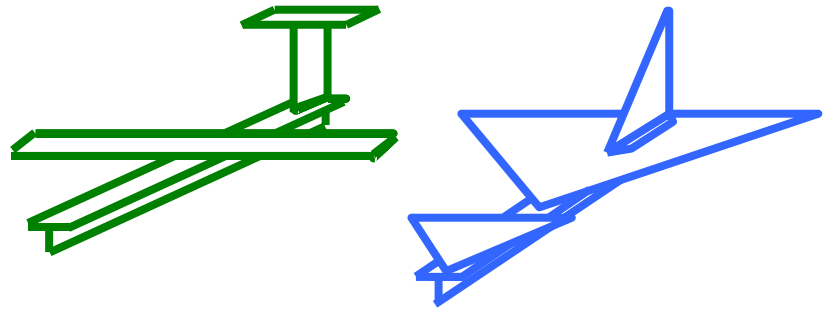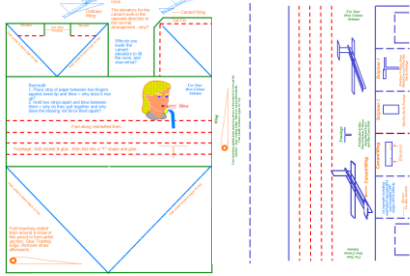
Just photocopy the relevant slides
http://www.dwiller.com/Challenges/Flight.pptx

Van Der Graaf Generator
Are you a Bright Spark
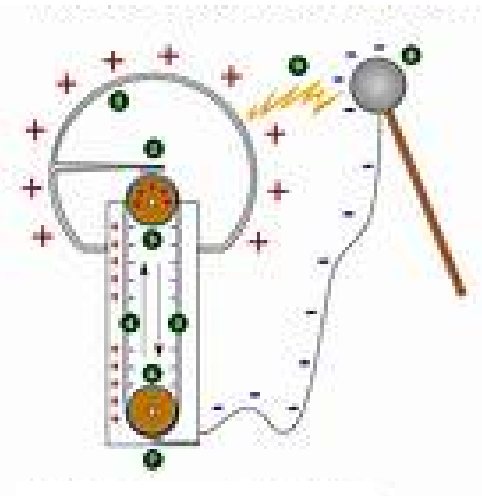
Danger to Medical Electronics

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

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

Free to borrow locally *Contact* enquiries@schoolsliaisoncommunity.net

IMechE Coventry and Warwickshire School Liaison Network

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
```

Run the programme by clicking ▶

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

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

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

Square Root

```
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
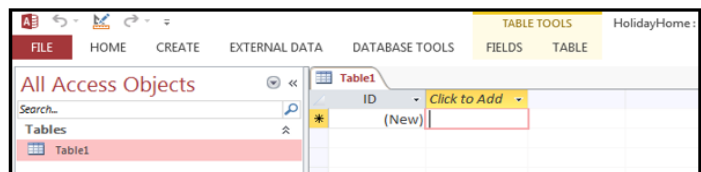**An Excel Spreadsheet exercise with mail-merge to Word**

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