



# BATTERIES

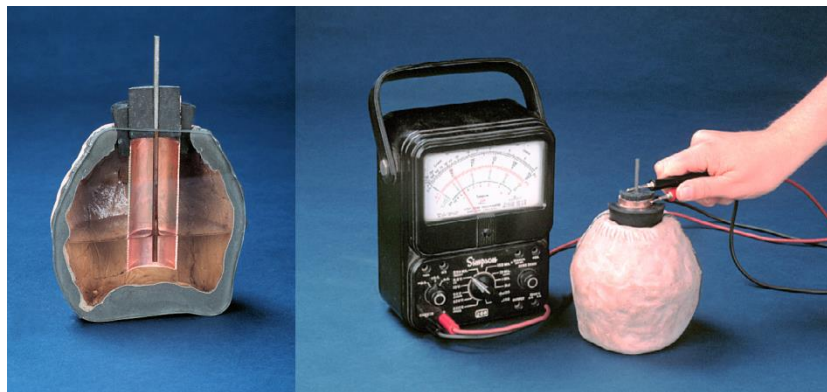
By Scott Cornish, based on the workshop investigation by Jonathon Schumack

## INTROUCTION:

You may have heard the term “Baghdad Battery” before. This refers to three separate artefacts, an iron rod, a copper cylinder and a ceramic jar. Individually these items could serve many purposes. However, since they were found together it has been suggested that when they are combined in a certain way they could be used to make a battery<sup>1</sup>.

Another piece is also required in order to make this battery to work, an electrolyte. Electrolytes are solutions that contain high concentrations of charged elements. This is necessary in order for electrical current to flow from one metal to another. It has been suggested that fruit juices could have been readily available and serve as an acidic electrolyte.

The Museum of Ancient Inventions has asked you to investigate, and find out if it is possible to create a battery in ancient times from materials of the day.



Photographs from The Virtual Museum of Ancient Inventions<sup>2</sup>

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<sup>1</sup> “Baghdad Battery”, Wikipedia <[https://en.wikipedia.org/wiki/Baghdad\\_Battery](https://en.wikipedia.org/wiki/Baghdad_Battery)> accessed on 7 October 2016.

<sup>2</sup> D. Downs and A. Meyerhoff, “Battery, Baghdad, 250 BCE”, The Virtual Museum of Ancient Inventions, Smith College, Northampton (MA) <[http://www.smith.edu/hsc/museum/ancient\\_inventions/battery2.html](http://www.smith.edu/hsc/museum/ancient_inventions/battery2.html)> accessed on 19 November 2015.

**AIM:** To construct a battery using the same materials found in the “Baghdad Battery”

**EQUIPMENT:**

Pieces of copper and iron

Pieces of other metals (optional)

Bench Mat

Various Fruits

Multimeter with Milliamp range at least, Microamp is better.

LED

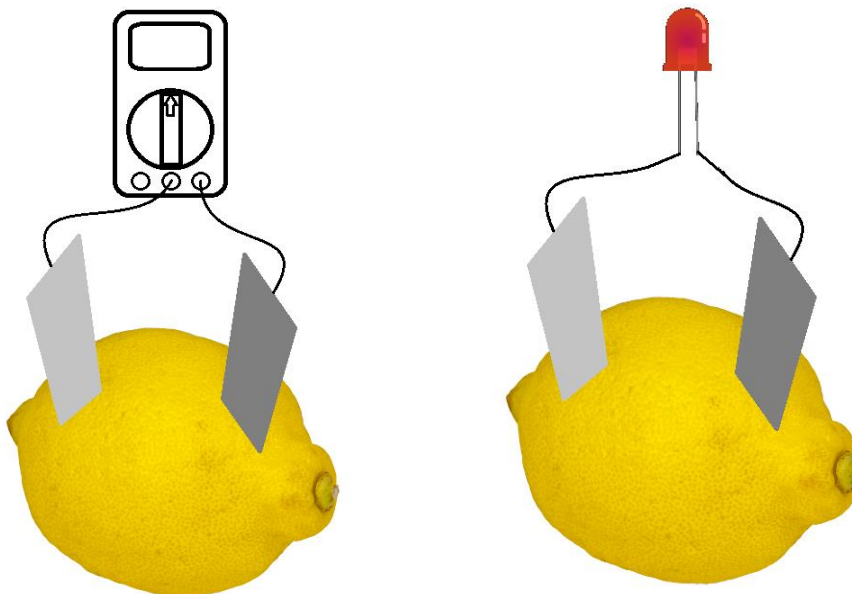
Incandescent light bulb

Knife

Leads with alligator clips

**METHOD:**

1. Select one of the fruits. Record this in the given table
2. Select two different metals, and record them in the given table.
3. Insert the metal piece into the fruit. If necessary make a small incision in the skin of the fruit. The metals should be around 3cm apart.
4. Create a circuit using the multimeter and the LED as shown in the diagram below.



5. Record voltage and current using the multimeter, and the brightness of the LED.
6. Repeat the process with different fruits and/or metals.

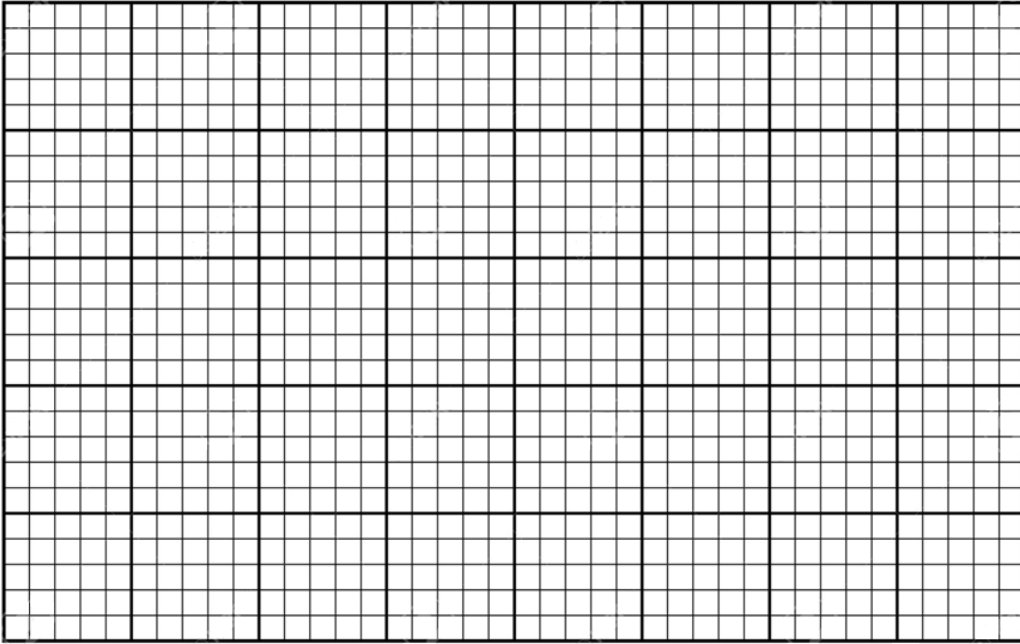
| Fruit | Metal 1 | Metal 2 | Voltage (V) | Current (mA) | LED Brightness |
|-------|---------|---------|-------------|--------------|----------------|
|       |         |         |             |              |                |
|       |         |         |             |              |                |
|       |         |         |             |              |                |
|       |         |         |             |              |                |
|       |         |         |             |              |                |
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|       |         |         |             |              |                |
|       |         |         |             |              |                |

**ANALYSIS:**

Make a bar graph of your results; Use a different graph for the different fruits used.

Fruit \_\_\_\_\_

Current ( )



Voltage ( )

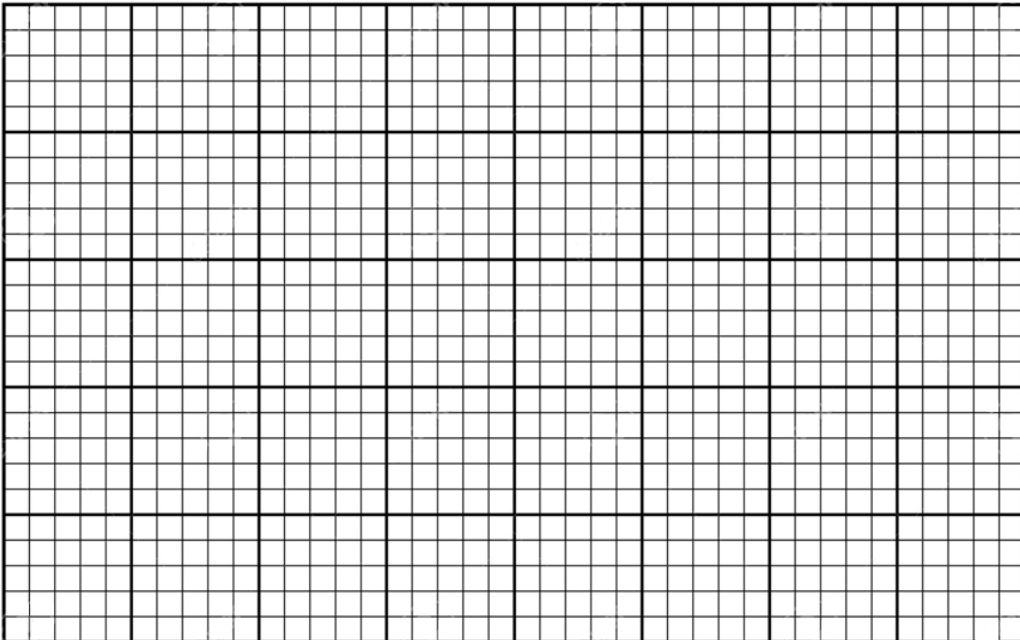
Metal No 1. \_\_\_\_\_

Metal No 2. \_\_\_\_\_

Metal Combinations

Fruit \_\_\_\_\_

Current ( )



Voltage ( )

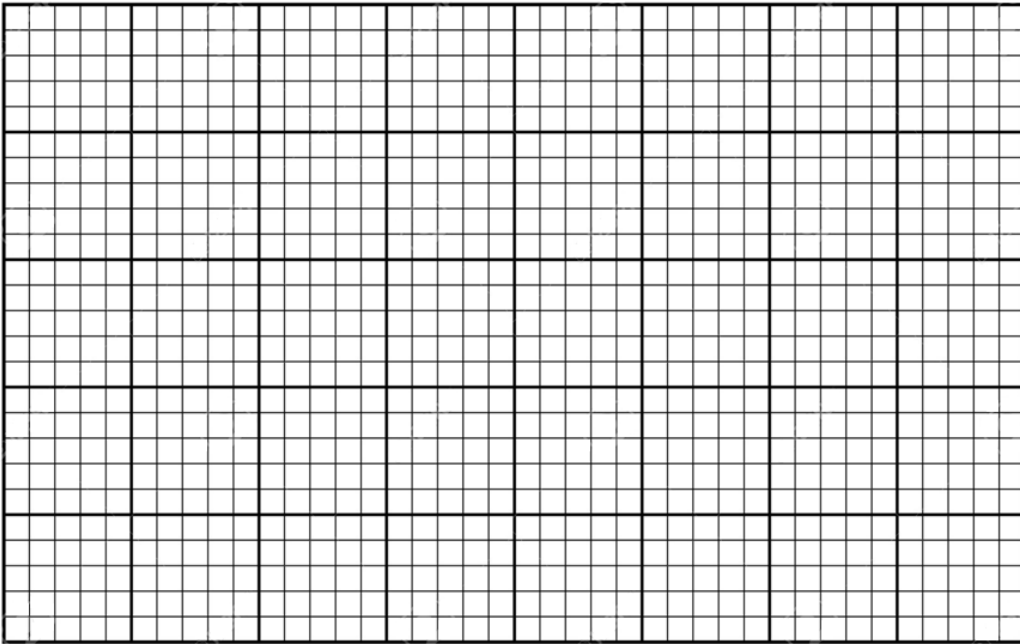
Metal No 1. \_\_\_\_\_

Metal No 2. \_\_\_\_\_

Metal Combinations

Fruit \_\_\_\_\_

Current ( )



Voltage ( )

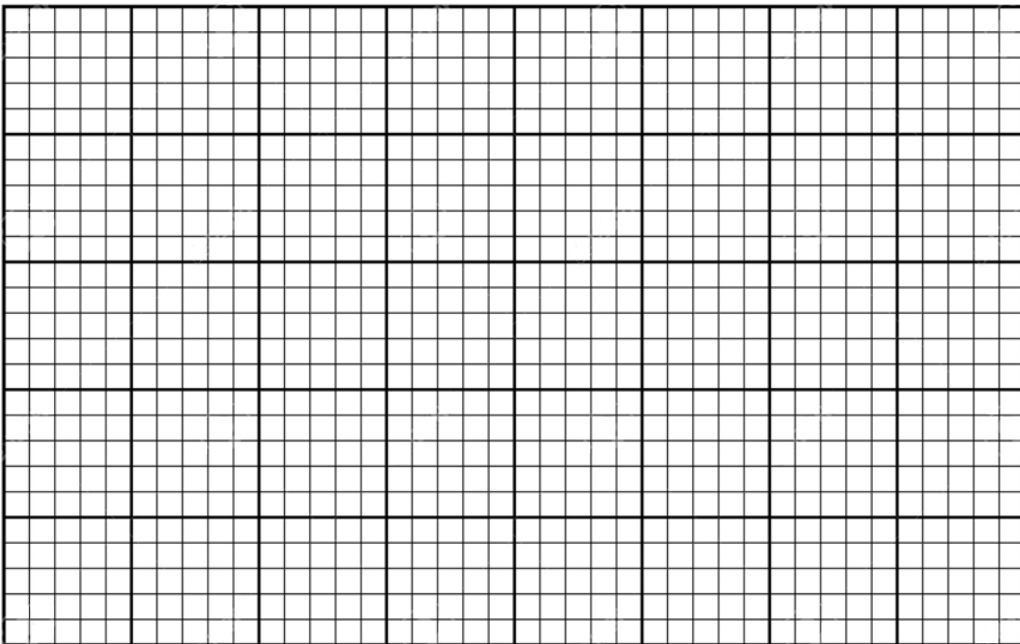
Metal No 1. \_\_\_\_\_

Metal No 2. \_\_\_\_\_

Metal Combinations

Fruit \_\_\_\_\_

Current ( )



Voltage ( )

Metal No 1. \_\_\_\_\_

Metal No 2. \_\_\_\_\_

Metal Combinations

## **DISCUSSION:**

What is the relationship between LED brightness and the Voltage/Current produced?

Do different metal combinations change the properties of the 'battery'? If so, in what way?

Do different fruits change the properties of the 'battery'? If so, in what way?

Can you speculate other ways that the "Baghdad battery" shown in Fig. 1. could have been used?

## CONCLUSION:

Here you need to answer your aim;

It was found that it was \_\_\_\_\_ to produce a \_\_\_\_\_ using only materials found in ancient times. However, this does not \_\_\_\_\_ that the three artefacts known as the “\_\_\_\_\_” were used as a \_\_\_\_\_. The fruit/\_\_\_\_\_ that produced the best battery was \_\_\_\_\_. The experiment could be \_\_\_\_\_, to more accurately depict the “Baghdad Battery”, by using fruit \_\_\_\_\_ rather than \_\_\_\_\_ fruit.