

## Topic: Reuse and Recycling of Waste Electrical and Electronic Equipment

**Topic:** Technological developments in society.

**Topic Overview:** Reuse of electrical and electronic equipment will extend product lifespan and protect scarce resources.

**Activity Overview:** To “repair” Lego phones so they can be re-used and by doing this, to understand the value of re-selling equipment and why it is good to re-use.

### Core Experiences & Outcomes

**TCH 0-02a** – Within and beyond my place of learning, I can reduce, re-use and recycle resources I use, to help care for the environment.

**TCH 1-02a** – Throughout all my learning, I take appropriate action to ensure conservation of materials and resources, considering the impact of my actions on the environment.

#### Learning Intention

I will understand that re-using is more eco-friendly than recycling.

#### Success Criteria:

- I can explain that valuable materials are used to make electrical & electronic equipment.
- I can explain that some of these materials will run out one day so it is important to use equipment for as long as possible.

#### Science Skills

Observing, Experimenting, Recording,

#### Key Vocabulary:

**WEEE Waste Electrical and Electronic Equipment.** (Electrical & electronic items have a plug or a battery.)

**Waste hierarchy** – Reduce, Reuse, Recycle

**Reduce** – using less materials or energy to make something e.g. buy things with less packaging

**Reuse** – Use things again (& again). E.g. Swap toys with a friend, or buy from a charity shop

**Recycle** – To take something and make it into something else. E.g. waste paper is changed into cardboard.

**Circular economy** – instead of “make things, use things, throw away things” we should design things to be easily repaired, instead of being thrown away.

**Teacher Information** – this gives starting points for lessons. Use as appropriate.

## Resources:

All resources contained within WEEE reuse pack. Request pack from David Keith, Recycling Officer, Tel: 01224 489352, Email [Dkeith@aberdeencity.gov.uk](mailto:Dkeith@aberdeencity.gov.uk)

#### Concept Introduction:

- 1 x Tablet within display showing component parts within resource pack.
- What’s inside my mobile phone poster (x2)

#### Main Activity:

- Lego Phones with spare Lego bricks (within resource pack).
- Resale value pupil worksheet (x 3).

For information on the waste hierarchy (Eco-schools):

<http://www.keepsotlandbeautiful.org/sustainable-development-education/eco-schools/ten-topics/waste-minimisation/>

Video clip describing Circular Economy produced by Ellen MacArthur Foundation (suitable for children):

<https://youtu.be/zCRKvDyyHml>

Video clip about electronics recycling produced by recycle now (suitable for children):

<https://vimeo.com/12730094>

Video clip from BGS describing critical raw materials, their uses and issues concerning their supply. Clip recommended for pupils aged 10 plus, however very informative for teachers wishing to gain background information very quickly.

<http://www.bgs.ac.uk/mineralsuk/statistics/criticalRawMaterials.html>

BGS weblink with several short animations suitable for children of all ages and mixed abilities showing how many minerals are used by an average person.

<http://www.bgs.ac.uk/mineralsuk/mineralsYou/howUse.html>

## Topic Plan

This topic has been broken down into 30 minute – 1 hour sessions. Option to cover all topics or to pick and choose sessions based on the interests of pupils. Workshops and a resource pack to support learning can be arranged through the Aberdeen City Council's Recycling Team.

### Establishing Prior Knowledge

- Discuss pupils' understanding of what Reduce, Reuse, Recycle means and what items they recycle at school and home.
- Discuss pupils' understanding of what electrical and electronic equipment is (anything with a plug or battery).

### Concept Introduction

#### "Hands-up" survey

- How many mobile phones in your home?
- How many computers/ laptops in your home?
- How many printers in your home?

Children could suggest additional electrical items that they have in their homes.

#### Fun Facts to support discussion:

- By 2017, there will be the same number of phones as people in the UK. (65 million)
- There are 300,000 unused smartphones in homes/offices in the UK – that's same as one in every primary school!

- On average, each person in the UK buys three new electrical items each year. (Around 170 million nationally.)

### **Introductory Activity ( 1hr):**

#### **Examination of mobile phone and the different materials that make up a mobile phone.**

Split pupils into groups and ask them to draw and count the different materials within a phone (see poster for details of the types of chemicals that go into a mobile phone) and [worksheet 1: Drawing a mobile phone](#).

If your school has requested the resource box, it will contain a tablet that has been broken down into parts to enable pupils to see the different components.

Ask the pupils to think about the different parts of the phone and the time and effort that is needed to make a phone.

**Useful fact: Mobile phones contain over 40 different chemicals and hundreds of parts.**

### **Main Activity (1 hour):**

1. Show pupils the “Lego phones” and explain that some have missing parts but could be fixed. Discuss with pupils what could happen to the “Lego phones” e.g. phones that can be fixed could be reused, phones that could not be fixed could be recycled.
2. Inform the class that phones that could be reused could be sold for £10, and phones that can be recycled could be sold for £5. The aim of the activity is to reuse as many phones as possible.
3. Discuss with pupils the roles and responsibilities required to reuse and recycle the Lego phones and split the class into groups based on different roles.
4. Pupils “fix” mobile phones by re-attaching Lego buttons, screens, etc.
5. Count the number of Lego phones” that can be reused and recycled.
6. Choose the level of worksheet appropriate for the age and stage of the class.

Worksheet 1: Counting phones.

Worksheet 2: Counting phones and basic monetary values.

Worksheet 3: Calculating “resale values” of the mobile phones that could be reused/ recycled. Or use the worksheets in small groups/ as a class to determine the re-sale value.

### **Follow-on Activity: Components of Electrical/ Electronic Equipment**

Discuss that some metals are very important, but that there can be issues with their supply. These are called critical raw materials. These elements are often used in electronic equipment and without them, it would be difficult to manufacture electronic/ electrical goods.

Pupils to suggest electrical/ electronic equipment that they use and how they would feel/ what they would do if they could not use it. E.g. Mobile phones used to call/ text friends and family. Pupils may feel more isolated because they cannot speak to people they care about.

### Discussion:

- What happens to electronic/ electrical equipment when it is no longer needed? Suggested responses may include: Passed on to friends/ family, hoarded, recycled, landfilled/ binned, sold, donated to charity shops.
- Discuss the merits/ disadvantages of what happens to equipment when it is no longer needed.
- Briefly introduce the waste hierarchy (reduce, reuse, recycle).

### Plenary:

- Discuss what happens to unwanted equipment within school and at home.
- Explain the difference between reduce, reuse and recycle

### Extension ideas:

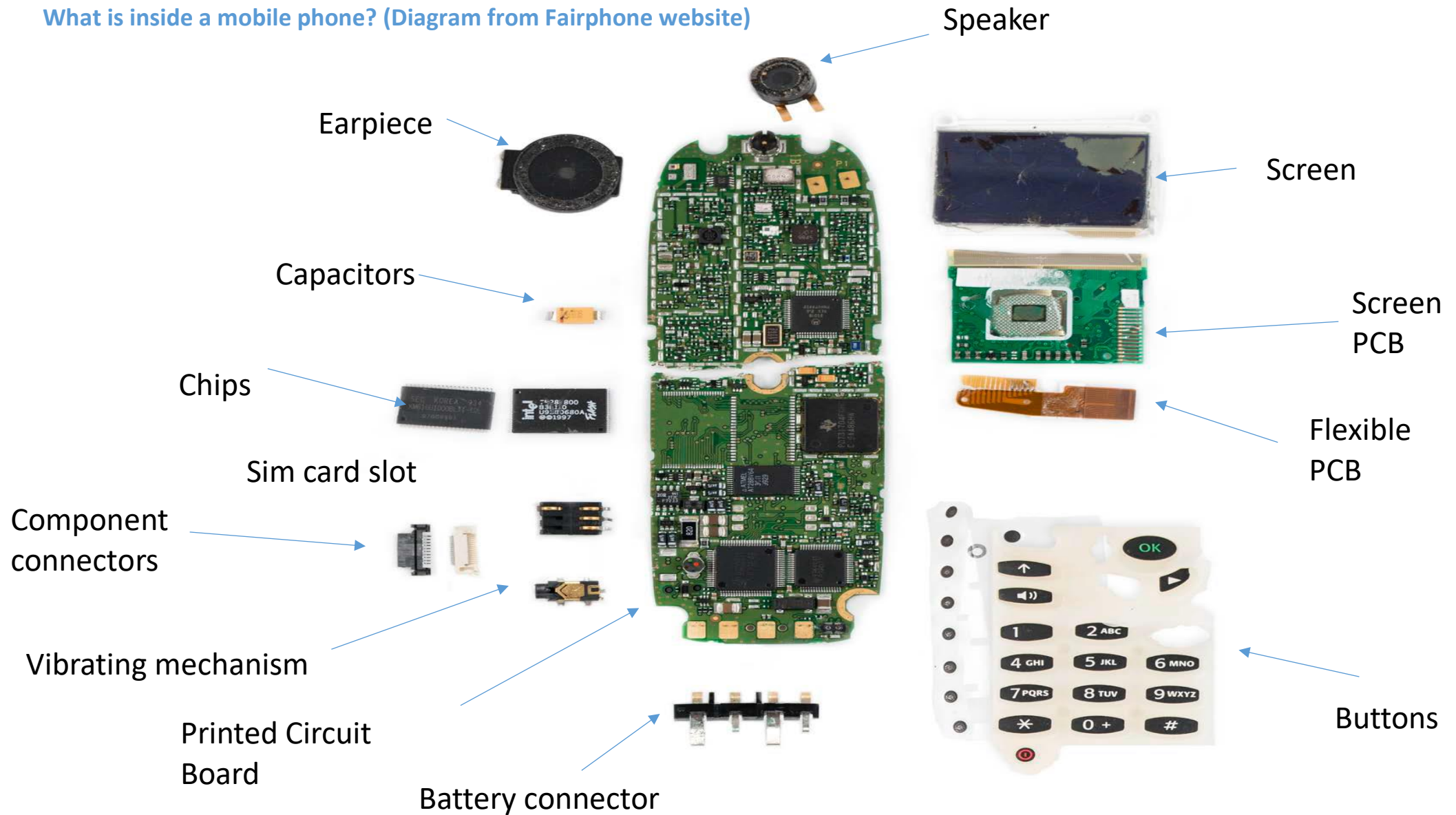
- Pupils design posters/ leaflets to raise awareness of the importance of reusing equipment.
- Pupils produce a bar chart of different types of equipment owned by families/ the school.

### Home Link Opportunity:

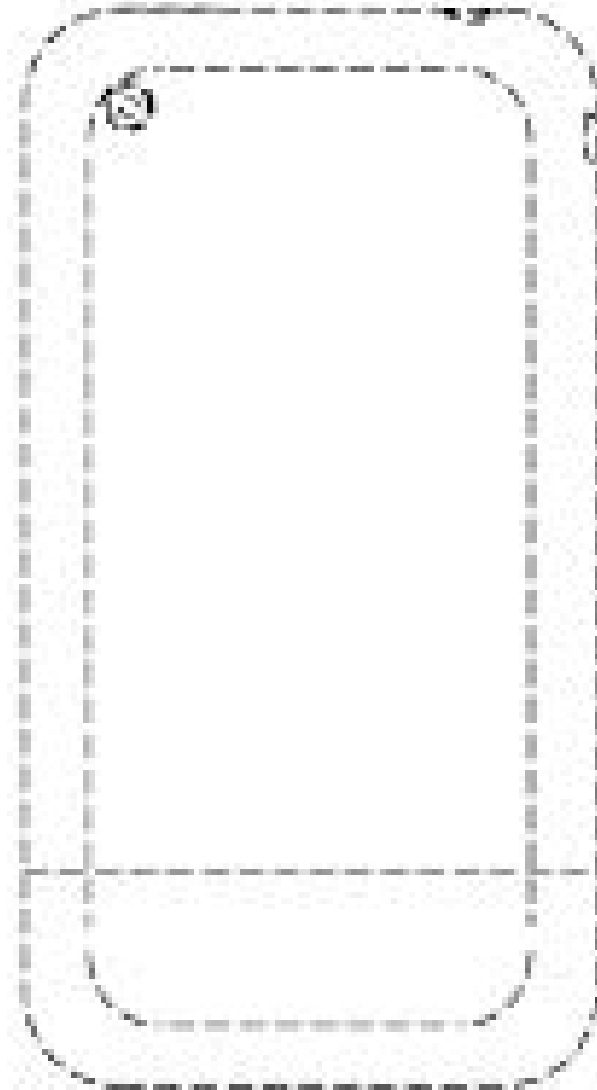
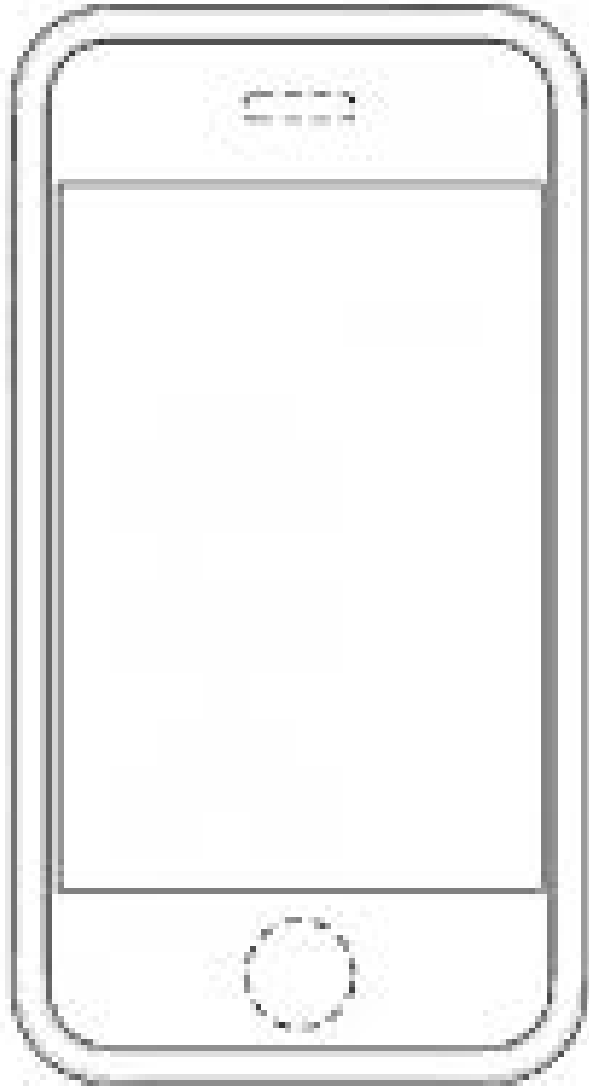
- Pupils link with Aberdeen City Council's Waste Team to organise a WEEE reuse collection day (full resources available).

# Teachers' Resources

What is inside a mobile phone? (Diagram from Fairphone website)



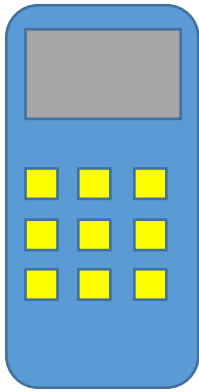
# Pupil Activity Sheets



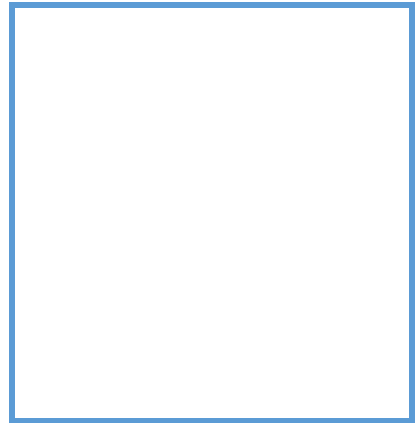
Draw and colour in the different parts of a mobile phone



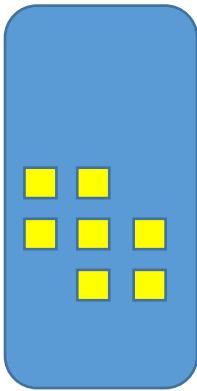
Count the phones for **REUSE**



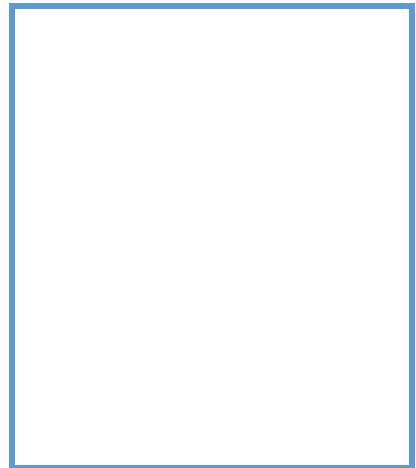
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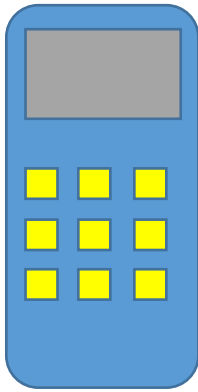
Count the phones for **RECYCLING**



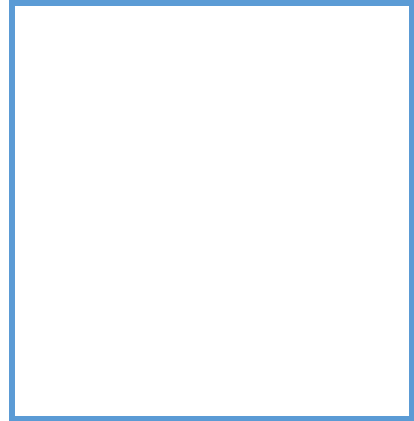
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Count the number of phones that can be **REUSED**.

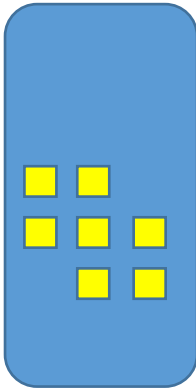


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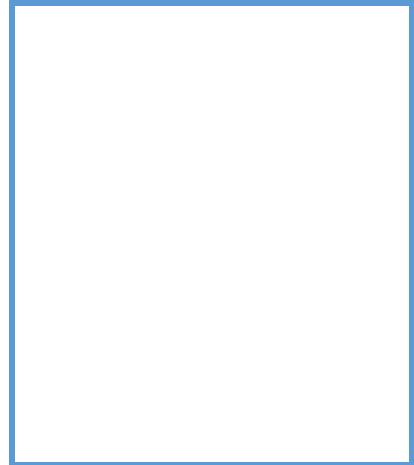


Each phone that can be **REUSED** is worth **£10**

1. Count the number of phones that can be **RECYCLED**.

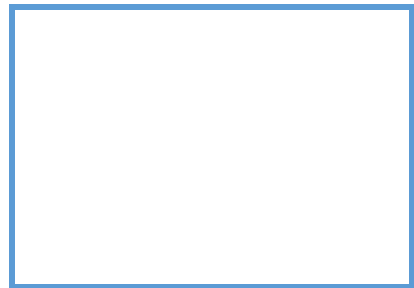


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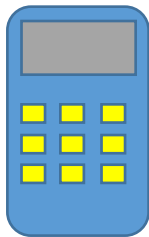


Each phone that can be **RECYCLED** is worth **£5**

2. Which number is **higher** £5 or £10?



1. Count the number of phones that can be **REUSED**.



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Each phone that can be **REUSED** is worth **£10**

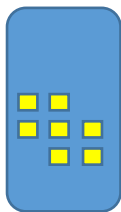
**Multiply** the number of phones by £10 to see how much money could be made by reusing phones.

x

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Number of phones

Count the number of phones that can be **RECYCLED**.



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Each phone that can be **RECYCLED** is worth **£5**

**Multiply** the number of phones that can be **recycled** by **£5** to see how much money could be made by **recycling** phones.

x

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Number of phones