

# Life cycle of a smartphone

## Brainstorm Activity



Do you remember how many stages the life cycle of a cell phone consists of?

That's right. It consists of 5 stages. Write down what comes to your mind for each stage. You can work in pairs or small groups.

### RESEARCH AND DEVELOPMENT

### RAW MATERIALS

### MANUFACTURING

### USAGE

### DISPOSAL/RESALE/RECYCLING



# UNBLACK THE BOX!

## WHAT ARE THE COMPONENTS IN YOUR PHONE?



Dare to crack the mobile phone open.  
Be creative.

Use the mobile phones provided in  
the workshop only.

Check if the battery is empty by trying  
to switch on the phone.



Do not start disassembling when the  
battery is charged.

Don't screw around with a private  
mobile phone.

Don't give up until you've tried different  
options.

### hair dryer

The hair dryer helps  
you with sticky areas.

### suction cup

The suction cup helps  
you to lift the screen.

### magnetic screw mat

You can use the magnetic  
mat to collect the small  
screws.



### lever tool

Use this to loosen and open  
stuck areas. If the glue does not  
come off, blow it out with a hair  
dryer.

### lever tool

This tool also helps you  
to prise open parts of  
the unit.

### screwdriver

Use a suitable 0.8 mm  
screwdriver to open the star-  
shaped screws.

### Did you know?

From the EU to the US, new  
laws are being developed  
to promote the "right to  
repair" and reduce waste.

Need your phone repaired?  
Check out [iFixit](#) for  
instructions on  
how to fix it.



The number of [repair cafés](#)  
continues to grow steadily.  
There are already  
more than 400  
around the world.



Collect old phones and  
donate them e.g. to  
the [Jane Goodall](#)  
Institute.



## HOW TO DISASSEMBLE A SMARTPHONE!



### 1. Get ready.

First read through the Do's and Don'ts. Prepare the tools you need. Make sure you have enough space and prepare a magnetic screwdriver mat on which you can collect the small parts. Choose a phone that you want to disassemble.

### 2. Examine the smartphone.

Remove all superficial things such as the phone cover or the protective film.

### 3. Use tools for disassembling the phone.

Try to find the SIM card and the battery. Use the tools shown to remove them. Try out which screwdrivers you need to open the phone.

### 4. Open the phone.

Attach the suction cup to the display or the back of the phone. Lift the suction cup firmly. In addition, use the lever tools by pushing them between the housing and the display of the phone.

### 5. Screws, screws, screws ...

Find the right screwdrivers to unscrew as many  
parts inside your phone as possible.

**GOOD LUCK!!!**





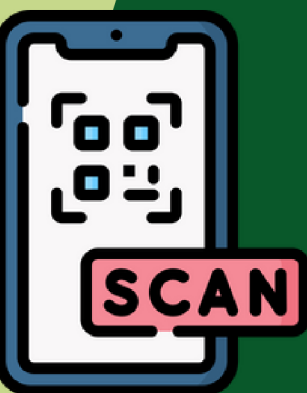
## WHAT ARE THE COMPONENTS IN YOUR PHONE?



# Disassembling a Fairphone



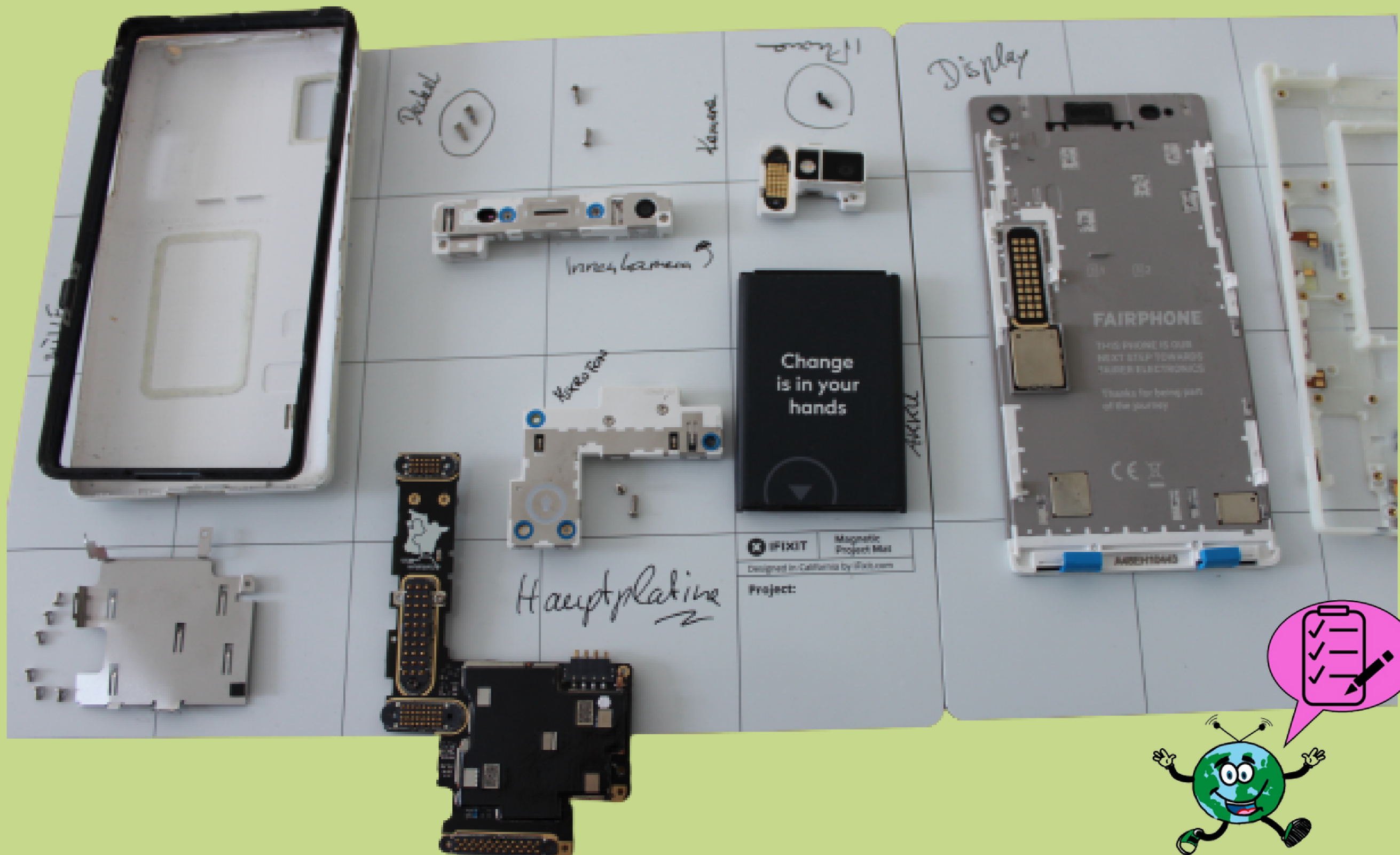
Fairphone  
Urban  
Mining



video



Look at the phone parts  
and try to name them.  
What parts of a phone  
can you identify?

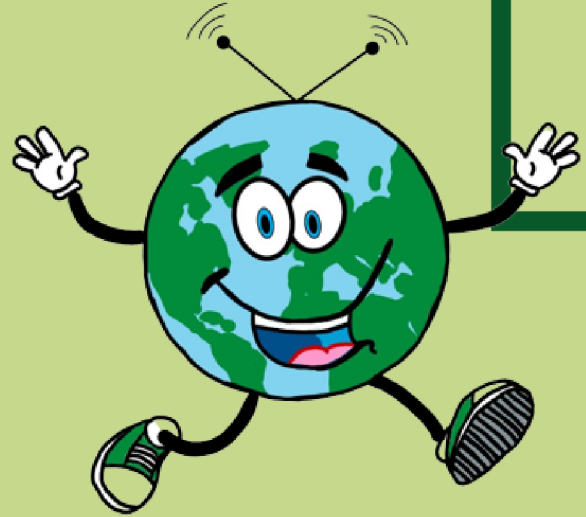




# WHAT'S INSIDE YOUR PHONE?

## WHAT RAW MATERIALS DOES A PHONE ACTUALLY CONSIST OF?

Mobile phones are our daily companions. But what raw materials go into them? Why are some of them really precious? And how much of which material can we find in a phone?



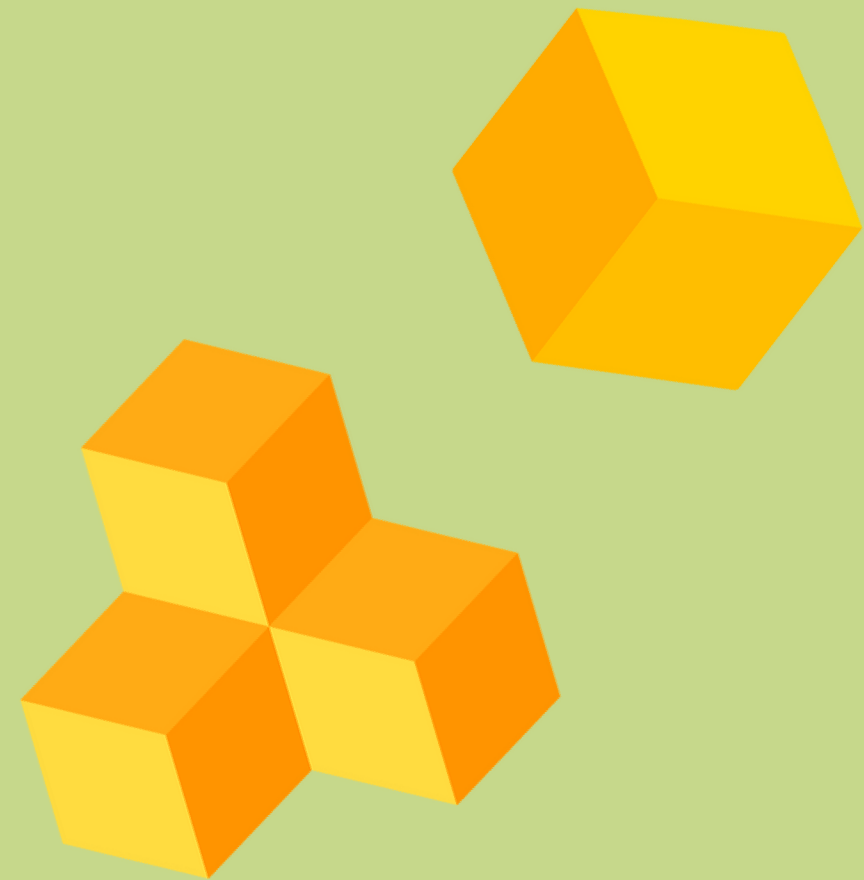
### What's inside your phone?

There are sets of 100 coloured cubes each in front of you.

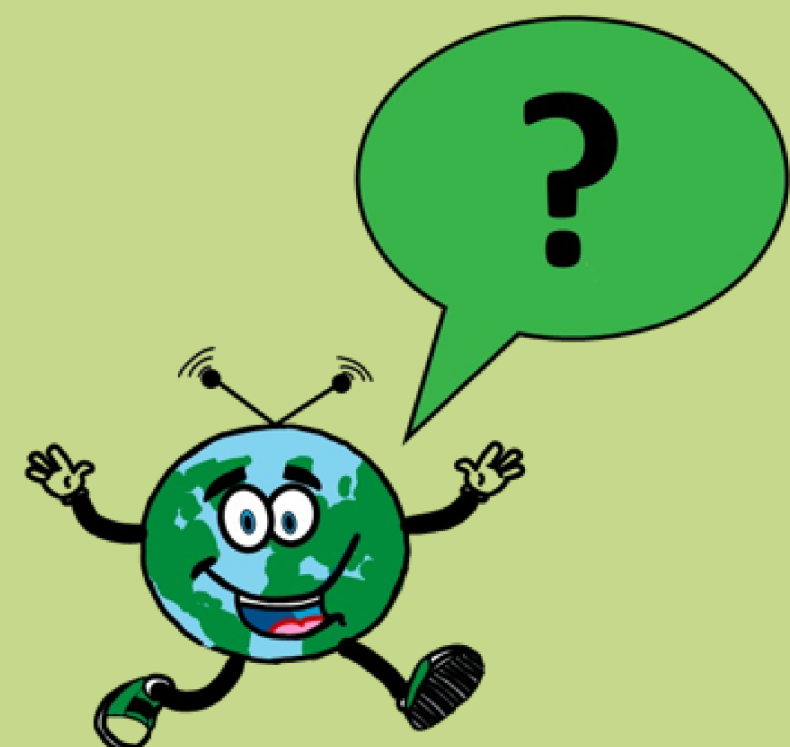
Explore the cubes. What are they all about?

Look at the provided diagrams. Group the cubes according to their colour. Then try to match them with the materials.

Compare with the key. Were you right? The diagrams are from the year 2015. Discuss – have the materials changed?



As a next step, discuss the following questions:  
What materials could be used to make a mobile phone more sustainable?  
For instance, could there be a mobile phone made entirely of wood?  
Why/why not?





# WHAT'S INSIDE YOUR PHONE?

Fill in the number and colour of cubes!  
100 cubes = raw materials in a phone  
1 cube corresponds to 1 %



number of cubes

colour

Plastics

Glass and Ceramics

3

Others

25

There are 25 metals. Among these are ...

Copper

Aluminum

Iron

Gold, Silver and others

Nickel

Tin

# WHAT'S INSIDE YOUR PHONE?

Match the phone parts with the raw materials!





# WHAT'S INSIDE YOUR PHONE?

Match the phone parts with the raw materials.  
Then compare with the key!

## Part of a Phone

phone case, cover

display

solder joints

SIM-card, contacts

shielding plate

speakers,  
microphones

flat cables, wires

main circuit board

## Raw Material

Silver

Aluminum

Iron

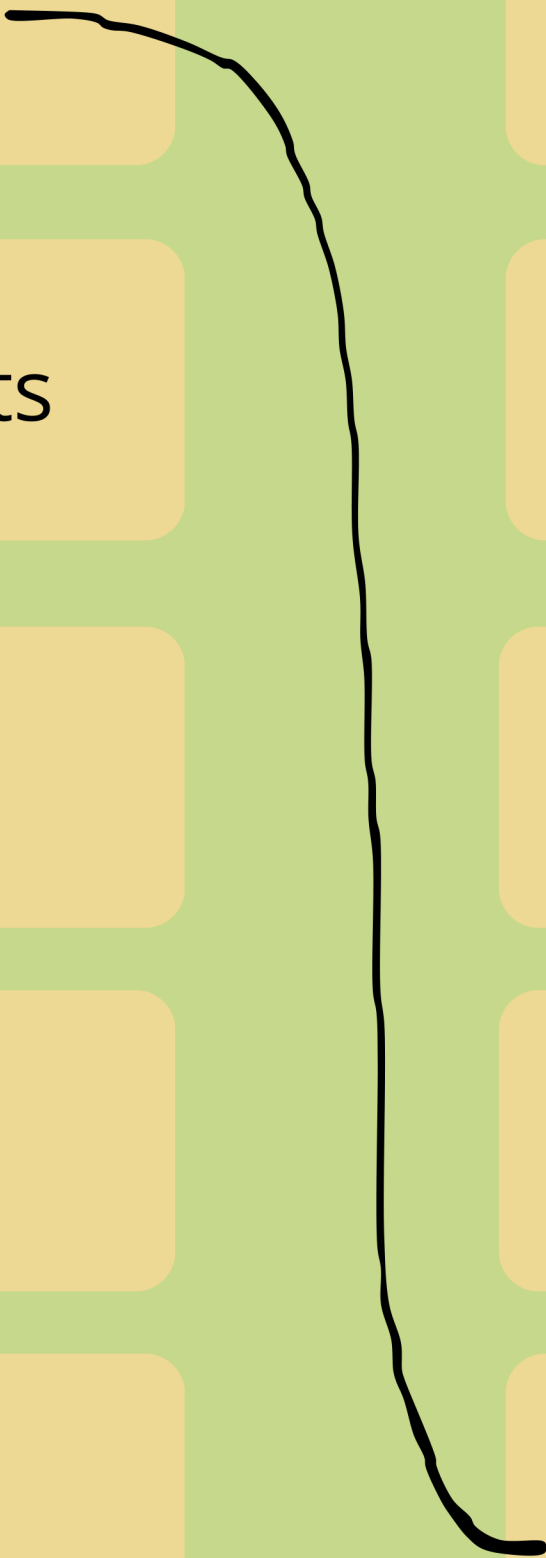
Glass and Ceramics

Copper

Plastics

Tin

Gold



# WHAT'S INSIDE YOUR PHONE?

## KEY

### Part of a Phone

### Raw Material



phone case, cover

Silver

display

Aluminum

solder joints

Iron

SIM-card, contacts

Glass and Ceramics

shielding plate

Copper

speakers,  
microphones

Plastics

flat cables, wires

Tin

main circuit board

Gold

Nickle is found in contacts and capacitors (capacitors store electrical charges). Nickle, Cobalt, Coltan and Lithium are found in phone batteries.



# WHAT'S INSIDE YOUR PHONE?

## KEY

### Part of a Phone

### Raw Material

phone case, cover



Plastics

display



Glass and Ceramics

solder joints



Tin

to connect individual components to the board

SIM-card, contacts



Gold (~ 0,3 gram)

shielding plate



Aluminum

to shield the electronics from electromagnetic radiation

speakers,  
microphones



Iron

flat cables, wires



Copper

to conduct electricity

main circuit board



Silver (~ 0,034 gram)

Nickle is found in contacts and capacitors (capacitors store electrical charges). Nickle, Cobalt, Coltan and Lithium are found in phone batteries.



# WHAT'S INSIDE YOUR PHONE?

## KEY





# WHAT'S INSIDE YOUR PHONE?

## KEY

number of cubes

colour

56	mint green	Plastics
16	blue	Glass and Ceramics
3	yellow	Others
25	There are 25 metals. Among these are ...	
15	brown	Copper
3	orange	Aluminum
3	black	Iron
1	gold/silver	Gold, Silver and others
2	white	Nickel
1	grey	Tin



# WHAT'S INSIDE YOUR PHONE?



## KEY

Diagram 1: Raw materials in a mobile phone

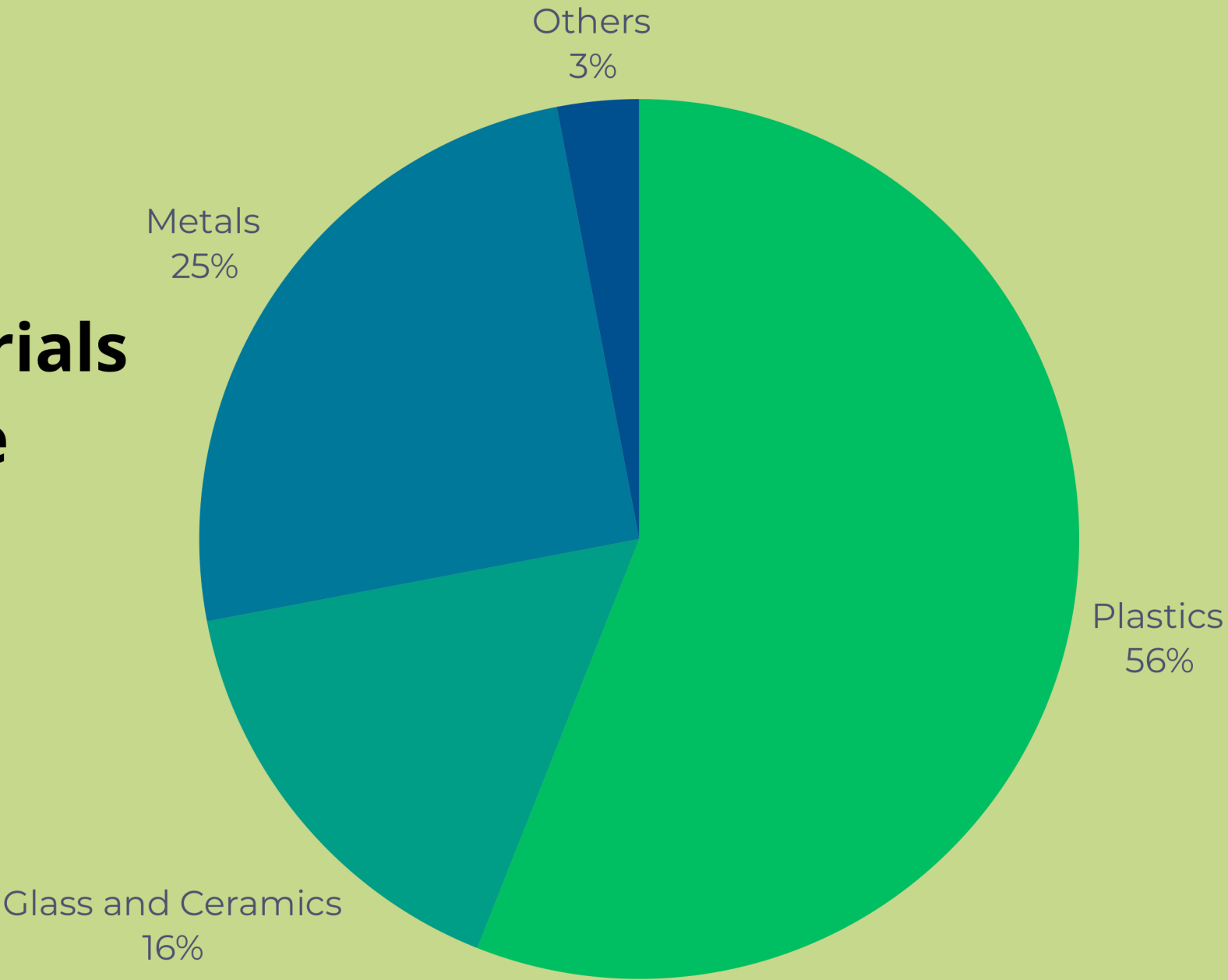
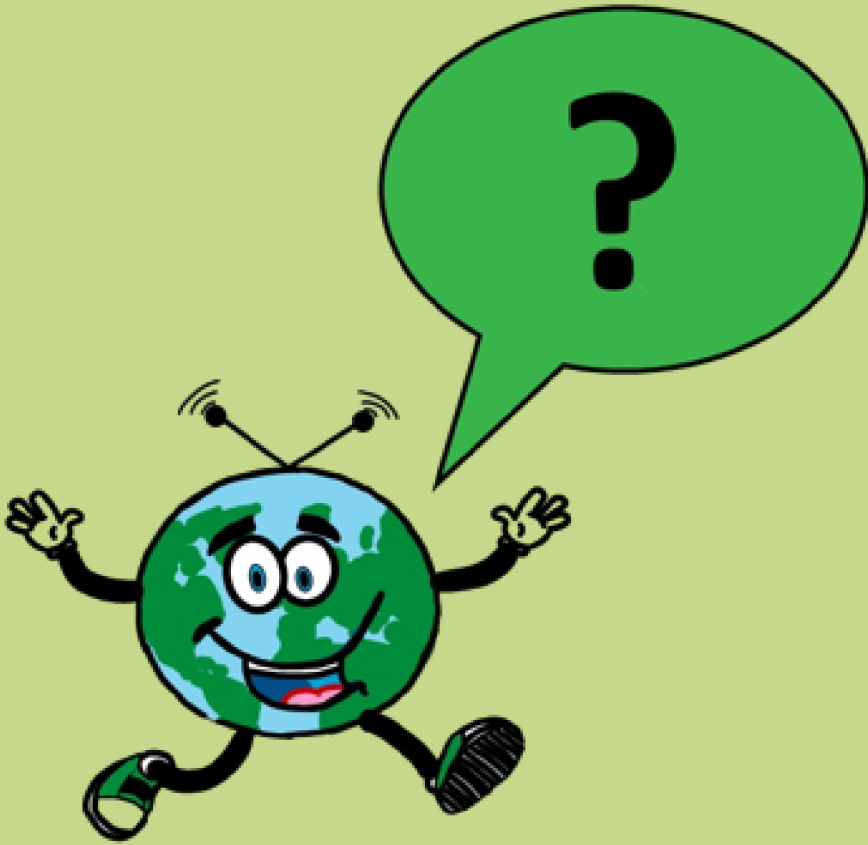
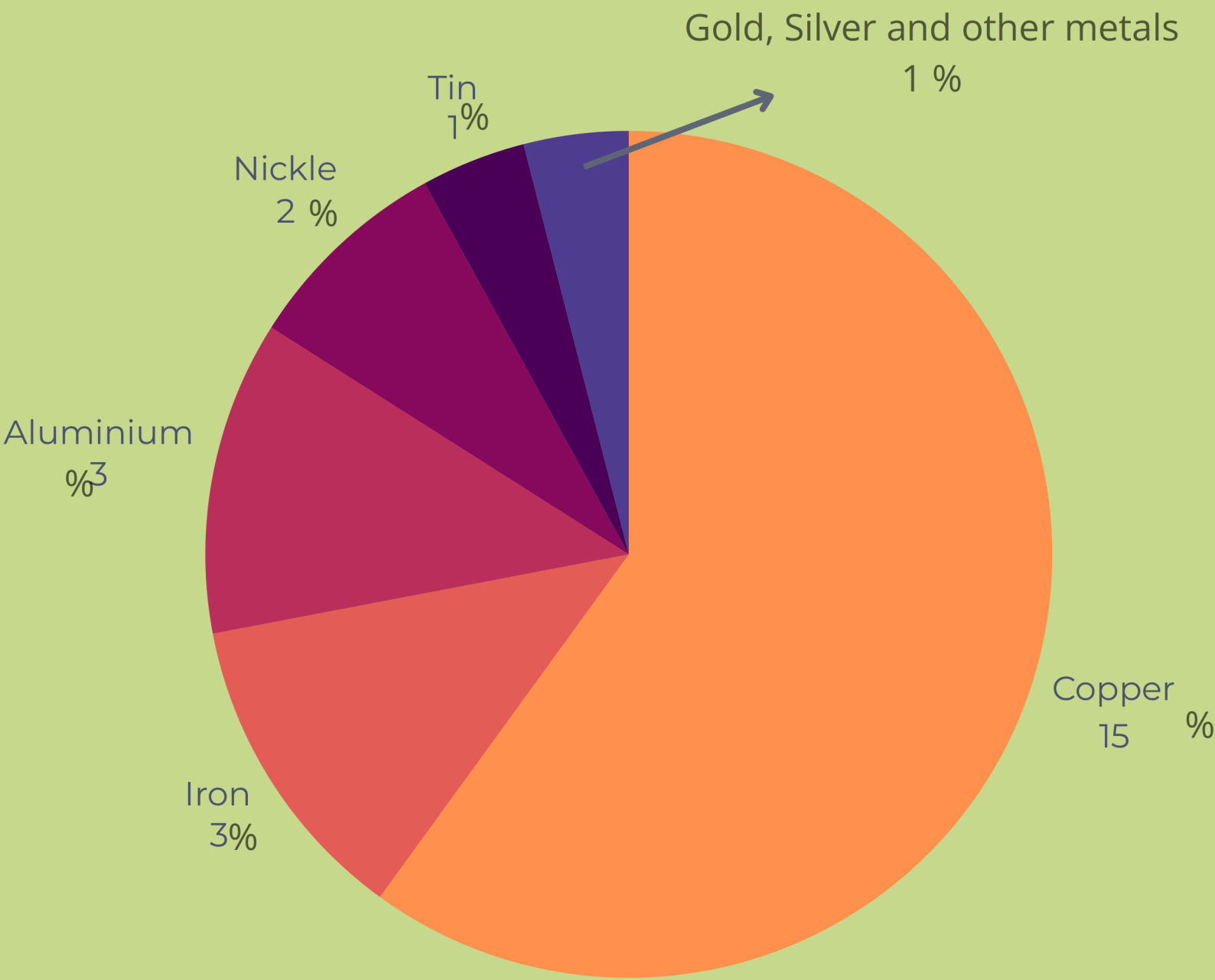


Diagram 2: Metals in a phone



1 % others = e.g.  
Gold, Silver, Platinum and Palladium  
Other rare metals, e.g.  
Cobalt, Gallium, Indium and Tungsten  
Rare earths e.g. Neodymium

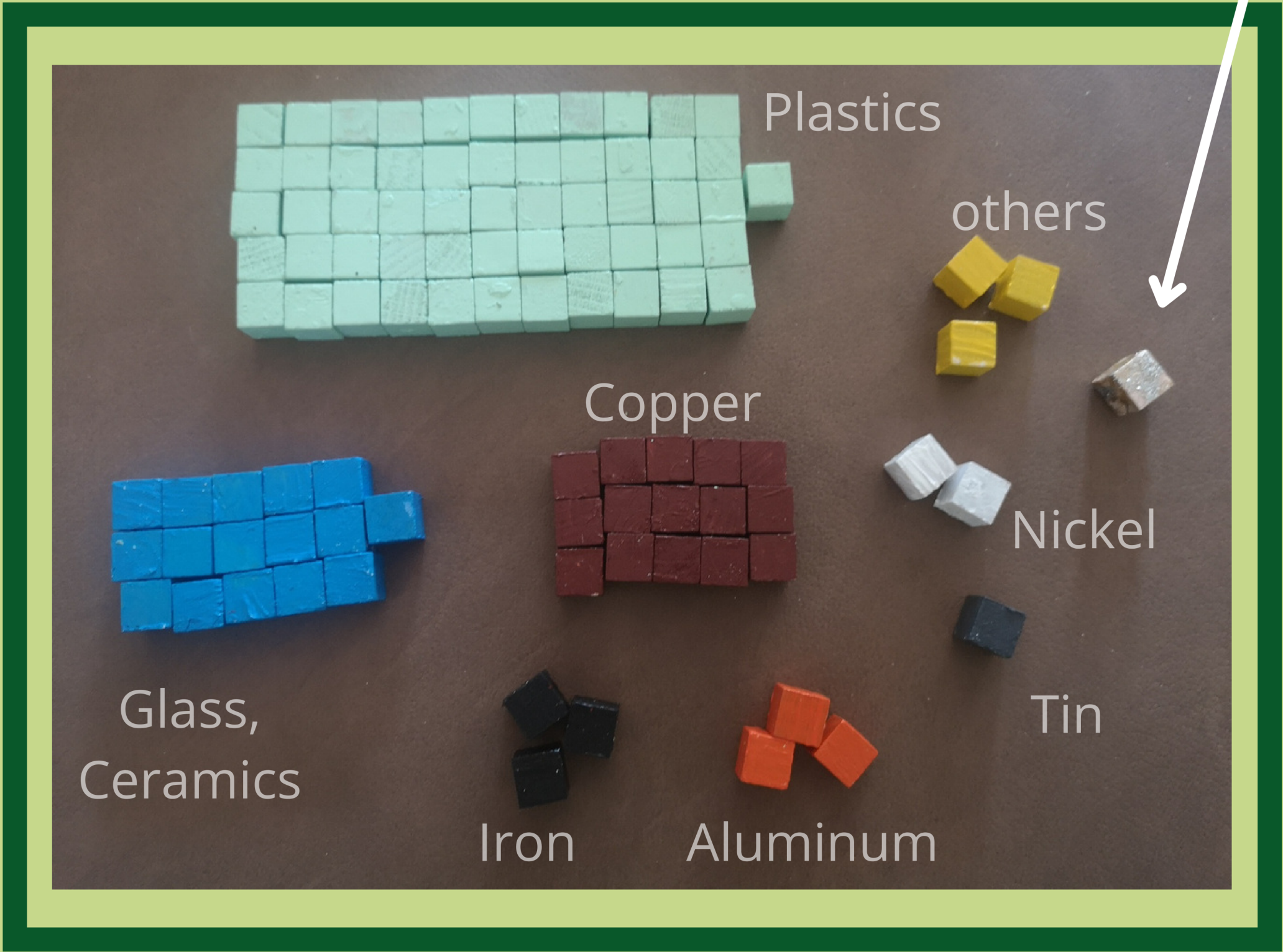


# WHAT'S INSIDE YOUR PHONE?

## KEY



Gold, Silver and  
other metals





# PIN THE PLANET!

## FIND THE COUNTRIES OF ORIGIN OF RAW MATERIALS



Making a mobile phone requires a wide range of metals and other raw materials from all around the world.

Many of these are mined under difficult and problematic conditions and are therefore known as "conflict minerals".

But where do they actually come from?

### Where do the raw materials come from?

Look at the world map and the pins with the resources. Cut the pins out.

Research where the raw materials come from.

Match the pins with the countries of origin.  
Note: There are several possible answers for most of the resources!

Discuss: Which continents and countries are particularly rich in raw materials? Where are they located?

?



## Match the countries of origin!





# PIN THE PLANET!

## FIND THE COUNTRIES OF ORIGIN OF RAW MATERIALS

You can find all these resources in a mobile phone! Cut them out and explore in which countries they can be found. Choose the country where most of this metal is mined!





# PIN THE PLANET!

## FIND THE COUNTRIES OF ORIGIN OF RAW MATERIALS



Now look at the countries. Which country is which? And – where is which mineral mined? Cut them out as well and match the pairs! Then pin the places on the world map!



The countries are:  
**Democratic Republic of Congo, China, China, Australia, Indonesia, Peru, Indonesia**



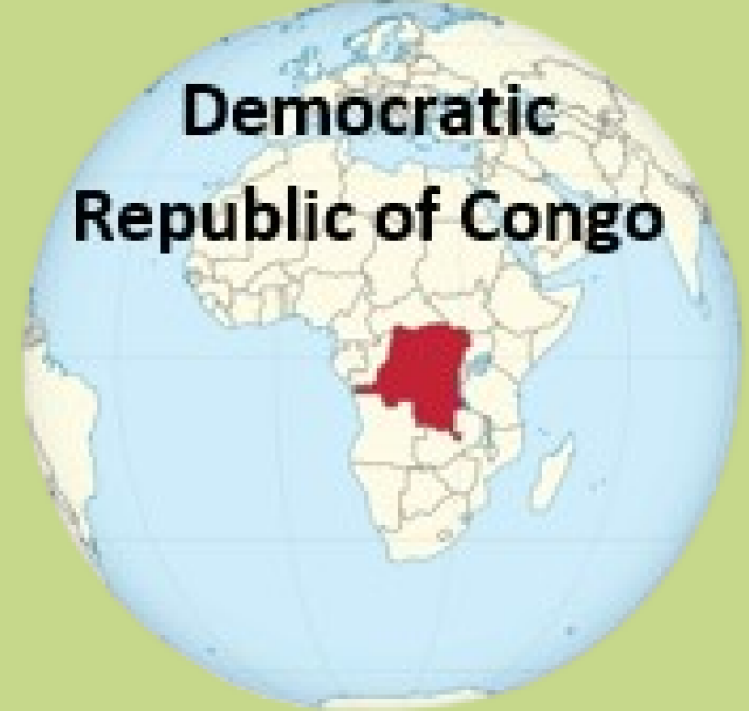


# PIN THE PLANET!

## FIND THE COUNTRIES OF ORIGIN OF RAW MATERIALS



Now look at the countries. What do you think:  
Where is which mineral mined? Cut them out as  
well and match the pairs!  
Then pin the places on the world map!



Can you find these countries on the map?  
**Democratic Republic of Congo, China,  
China, Australia, Indonesia, Peru, Indonesia**



# PIN THE PLANET!

## FIND THE COUNTRIES OF ORIGIN OF RAW MATERIALS



**Cobalt** comes mainly from the **Democratic Republic of Congo** and is used for **rechargeable batteries**.

Unfortunately, this raw material is becoming increasingly scarce. One battery contains approx. 6.3 grams of cobalt.

**Aluminum** is an important building material and is found in **Australia**. Aluminum is used in cell phones, for example, to **shield the electronics from electromagnetic radiation**.

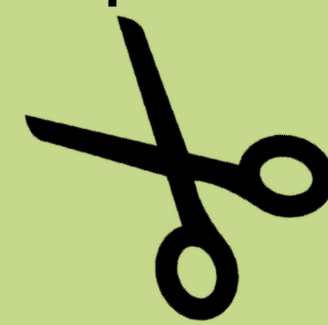
**Nickel** comes from **Indonesia**. It is used in a cell phone for **electrical connections** and **so-called capacitors**. These are components for storing electrical charges.

The most important country that mines **tin** is **China**. In electronic devices, tin is used for **soldering**, where it bonds individual components to the copper layer of the circuit board.

**Silver** comes from **Mexico** and is used for the **keyboard mat** and the **circuit board** of a cell phone. In one smartphone contains around 306 milligrams of silver.

Yes, really – there is real **gold** in a cell phone! It is mined in **South Africa**, for example, and used for the **contacts of the SIM card** and on the **battery**.

**Copper** comes from **Chile**, for example. It is a very important metal for **wires** and **printed circuit boards**.





# KEY – PIN THE PLANET!



Democratic Republic of Congo (DR Congo)



Australia, China, Guinea, Brasilia, India;



Indonesia, Philippines, Russia, New Caledonia, Canada, Australia, China;



China, Indonesia, Malaysia, Vietnam, Peru, Bolivia, Brazil, DR Congo, Niger, Rwanda, Nigeria and Australia.



Mexico, Peru, China;



China, Australien, Russia, USA, Canada;



Chile, Russia, China;



# SOURCES – PIN THE PLANET!

## FIND THE COUNTRIES OF ORIGIN OF RAW MATERIALS

### Sources of Pins (as of April 2022)

Cobalt mined e.g. in the Democratic Republic of Congo

<https://de.wikipedia.org/wiki/Cobalt#/media/Datei:Skutt%C3%A9rudite.jpg>

Aluminum mined e.g. in Australia

<https://de.wiktionary.org/wiki/Aluminium>

Nickel mined e.g. in Indonesia

[https://de.wikipedia.org/wiki/Nickel#/media/Datei:Nickel\\_kugeln.jpg](https://de.wikipedia.org/wiki/Nickel#/media/Datei:Nickel_kugeln.jpg)

Tin mined e.g. in China

[https://de.wikipedia.org/wiki/Zinn#/media/Datei:Zinn\\_Mory\\_Barren.jpg](https://de.wikipedia.org/wiki/Zinn#/media/Datei:Zinn_Mory_Barren.jpg)

Silver mined e.g. in Mexico

[https://upload.wikimedia.org/wikipedia/commons/1/16/Silver\\_Bar\\_01.jpg](https://upload.wikimedia.org/wikipedia/commons/1/16/Silver_Bar_01.jpg)

Gold mined e.g. in China

<https://pixabay.com/de/illustrations/gold-goldbarren-barren-feingold-1013618/>

Copper mined e.g. in Chile

<https://pixabay.com/de/photos/draht-kupfer-elektro-stop-closeup-2681887/>

### Sources of countries (as of April 2022)

Democratic Republic of Congo

[https://de.wikipedia.org/wiki/Demokratische\\_Republik\\_Kongo](https://de.wikipedia.org/wiki/Demokratische_Republik_Kongo)

Australia

<https://de.wikipedia.org/wiki/Australien>

Indonesia

<https://de.wikipedia.org/wiki/Indonesien>

China

[https://de.wikipedia.org/wiki/Volksrepublik\\_China](https://de.wikipedia.org/wiki/Volksrepublik_China)

Mexico

<https://de.wikipedia.org/wiki/Mexiko>

Chile

<https://de.wikipedia.org/wiki/Chile>





# FROM TRASH TO TREASURE!

## USE THINGS YOU FIND AND TURN THEM INTO CREATIVE TREASURES

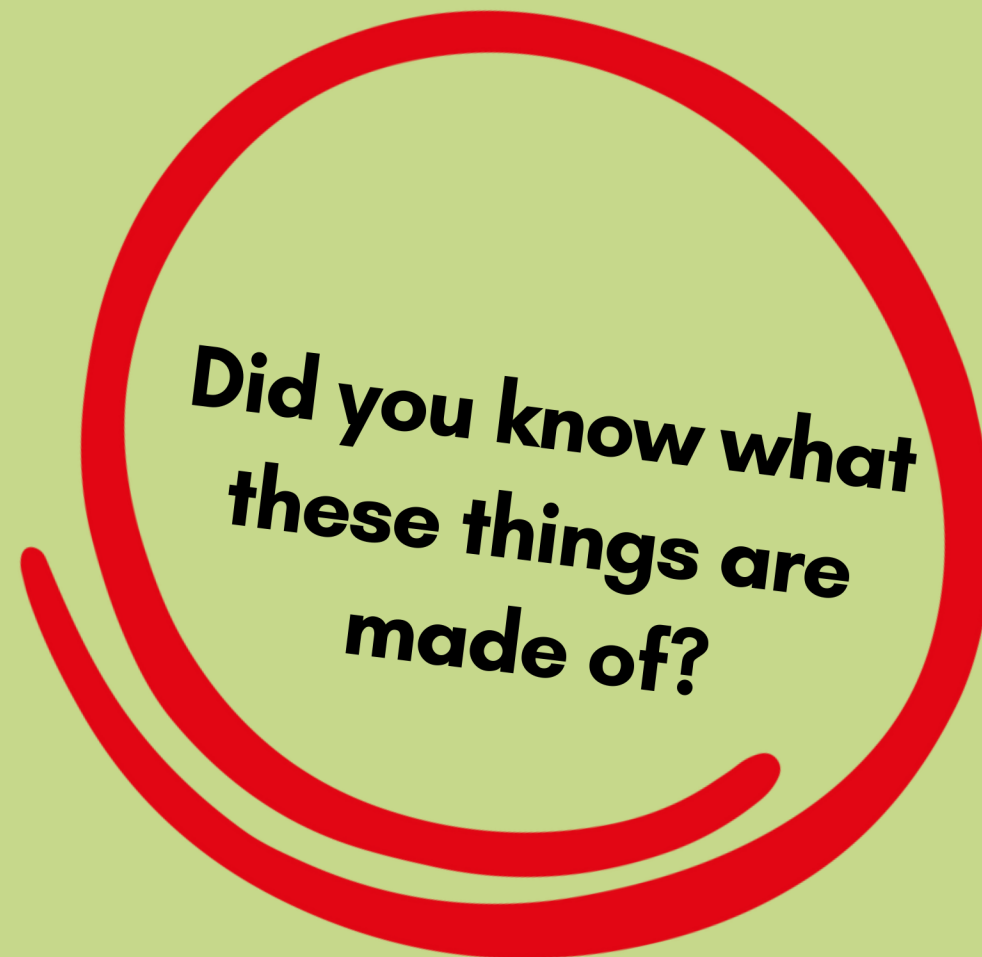
There are always creative ways to turn supposed trash into new treasures! You can make pictures, lamps, whatever you want actually! Trash Design is about re-making old stuff. It's about upcycling and re-using things, which have already been produced.



an old bicycle wheel



old flower pots



**Did you know what  
these things are  
made of?**



old jeans



the drum of a washing machine



**It's about  
seeing things with  
new eyes.**

### What does "Upcycling" mean?

Upcycling means reusing things (even trash) in a way as to create a product of higher quality or value than the original.

Look for things you no longer need. You can also use electronic parts from old electronic equipment, for example, the small parts you find inside an old phone.

Choose one of the picture frames and create your own unique picture. Draw things and make a treasure out of trash!



# MY SMARTPHONE AND ME

## STARTER DISCUSSION: REFLECT ON YOUR OWN USE OF DIGITAL DEVICES



Think about the questions below and answer them, first alone.  
Then compare them with a partner. What differences do you see?  
How many digital devices (mobile phones, tablets, computers, etc.) do you have at home? Who in your family uses which device(s) for what?

Device	Who owns it?	What is it used for?
smartphone	my mother	make calls, take photos, ...

Think about when and for how long you use your mobile phone/smartphone. How often and for how long do your parents or grandparents use their mobile phones during the day?

What happens in your family to digital devices that are no longer used (you have them at home, you donate them to charity, etc.)?

How many mobile phones have you had in your life?

How often do you ask for a new smartphone? Do you get it?

Why do you want a new smartphone (because it is broken, you saw an ad, your friends have a new model, etc.)?

Does your "old" phone still work when you get a new one?



# MY FUTURE PHONE

## DESIGN THE SMARTPHONE OF THE FUTURE

Do you have your own phone? Are you happy with it?  
Or – what model of phone would you like to have?  
TASK: Draw or write which model you have or would like to have.  
Include pictures of the apps you like to use most.



What does your  
dream phone look  
like? Describe it!



What should the phone of the future  
have/not have to help to protect the environment?