

WS 1.1: UNBLACK THE BOX!

WHAT ARE THE COMPONENTS IN YOUR PHONE?



😊	😞
Dare to crack the mobile phone open. Be creative.	Do not start disassembling when the battery is charged.
Use the mobile phones provided in the workshop only.	Don't screw around with a private mobile phone.
Check if the battery is empty by trying to switch on the 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!!!



WS 1.2: UNBLACK THE BOX!

WHAT ARE THE COMPONENTS IN YOUR PHONE?



Disassembling a Fairphone

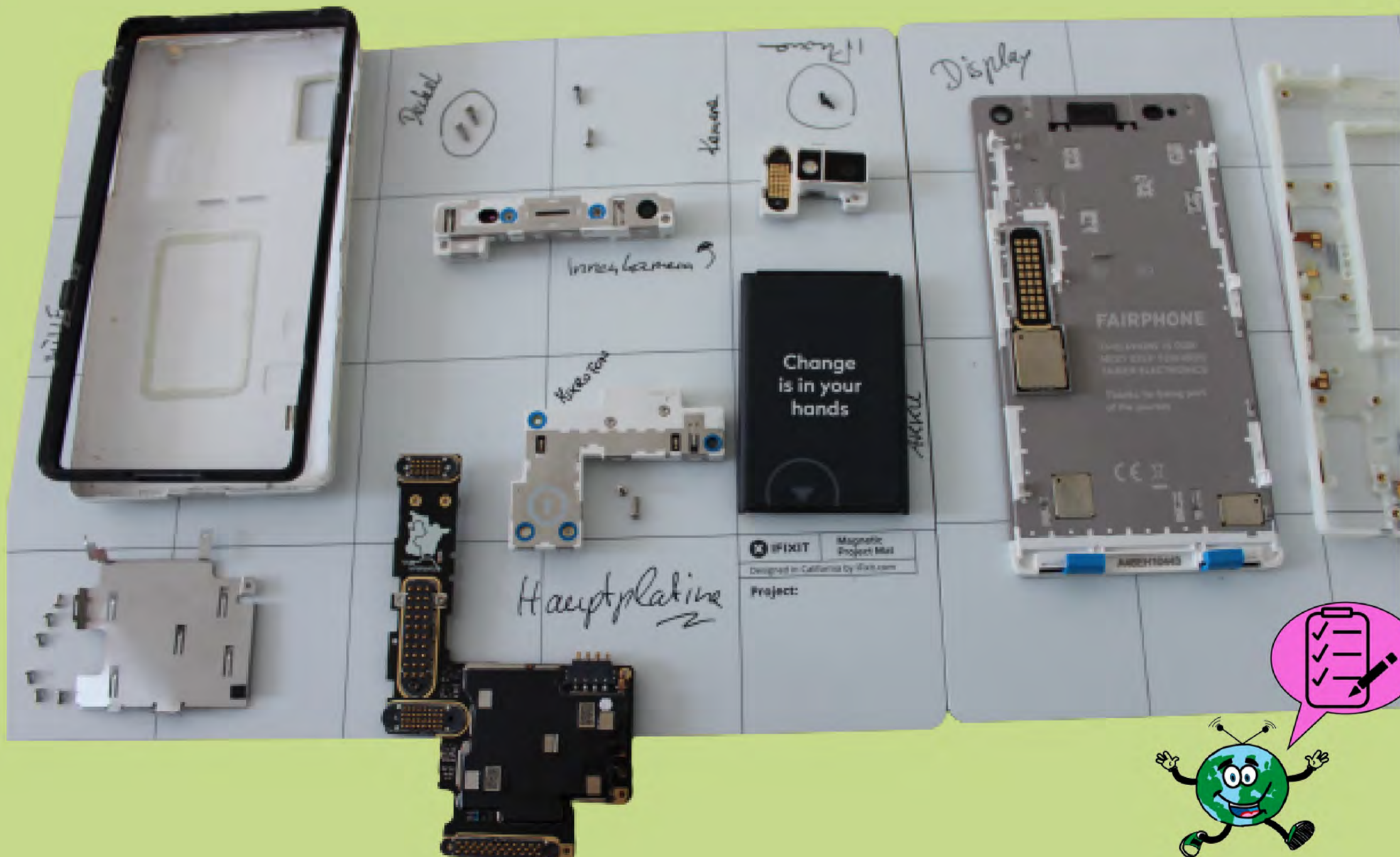


Fairphone
Urban
Mining

video



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



WS 2.1: 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?



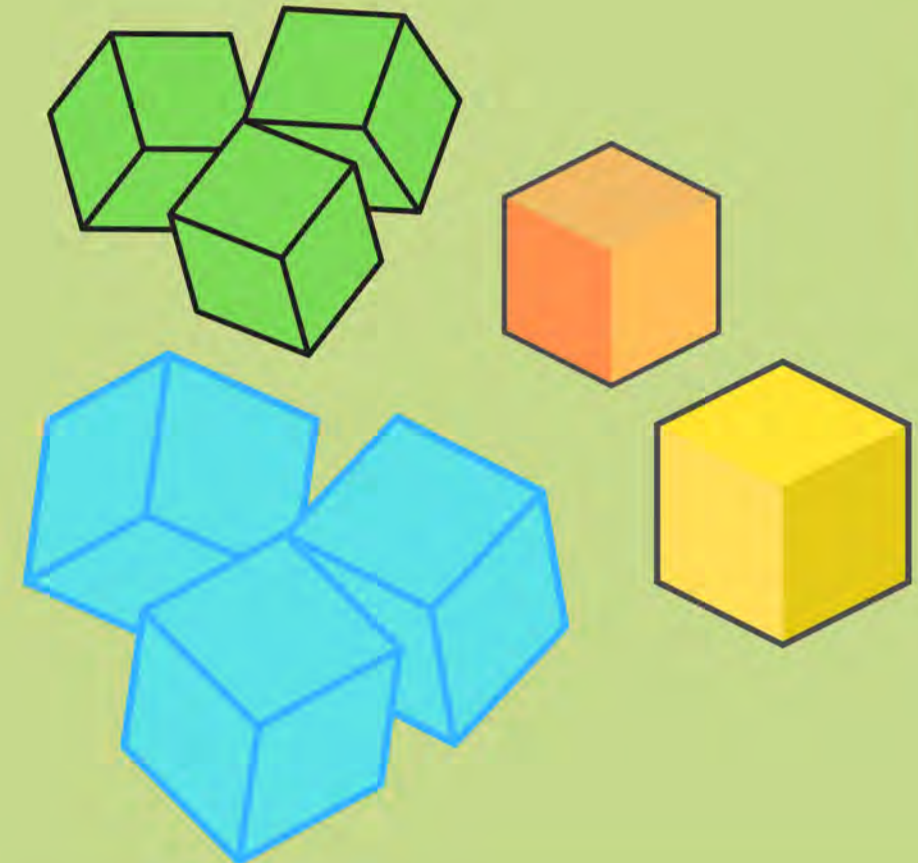
What's inside your phone?

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

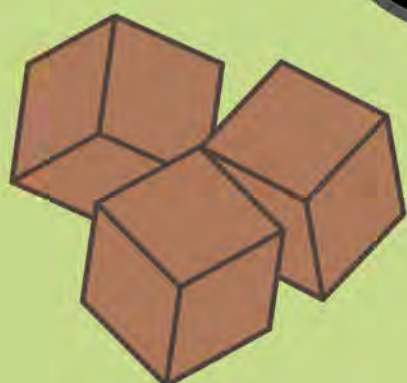
Explore the cubes. What are they all about?

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?



WS 2.2: 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

Others

25

There are 25 metals. Among these are ...

Copper

Aluminum

Iron

Gold, Silver and others

Nickel

Tin

WS 2.3: WHAT'S INSIDE YOUR PHONE?

Match the phone parts with the raw materials!

The diagram illustrates the following matches between phone parts and raw materials:

- Gold** is used for SIM cards.
- Gallium** is used for USB drives.
- Plastics, Ceramics** are used for the phone's outer casing.
- Platinum, Palladium, Copper, Silver, Gold, Tantalum, etc.** are used for the internal circuit board.
- Indium** is used for the LCD screen.
- Tin** is used for the battery.
- Tantalum (from coltan)** is used for capacitors.
- Aluminum** is used for the metal back cover.
- Rare earths, Gallium, Tungsten** are used for the camera lens.
- Iron** is used for screws.
- Gold** is used for the charging port.
- Cobalt, Coltan, Lithium** are used for the battery.
- Copper** is used for the earpiece.

A cartoon Earth character with arms and legs is shown running on the right side of the diagram.

WS 2.4: WHAT'S INSIDE YOUR PHONE?

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

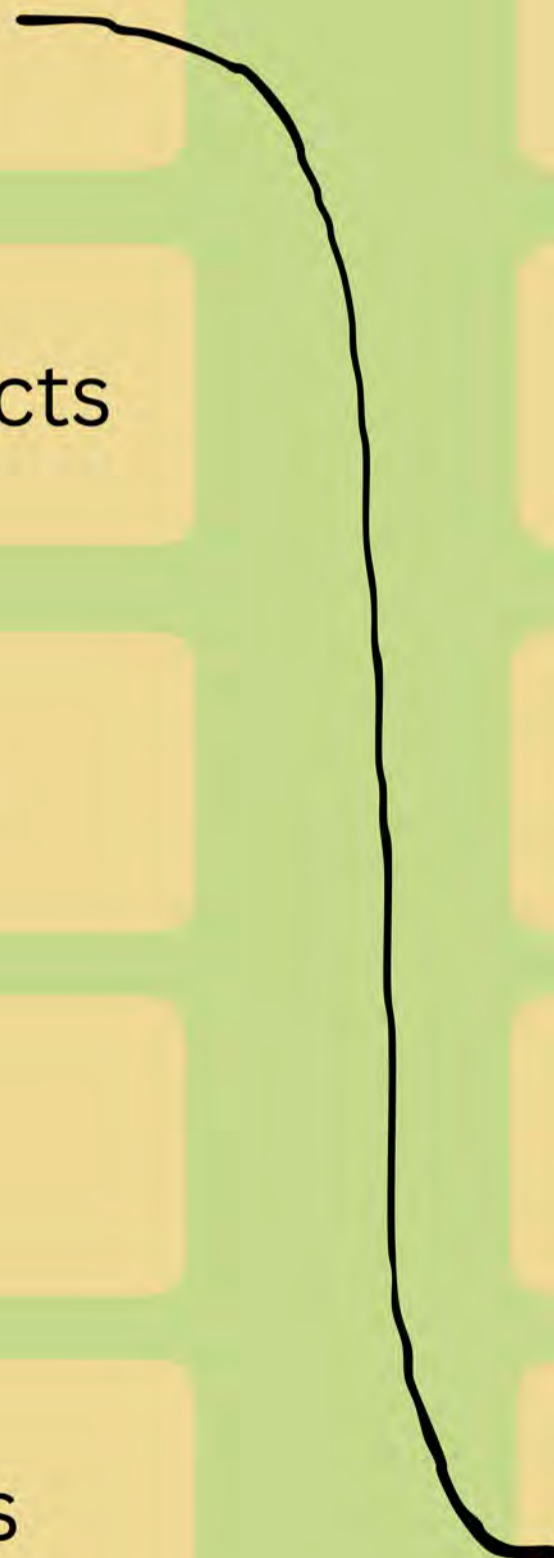
Plastics

flat cables, wires

Tin

main circuit board

Gold



WS 2.4: 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.

WS 2.4: 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.

WS 2.3: WHAT'S INSIDE YOUR PHONE?

KEY



WS 2.2: 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



WS 2.2: WHAT'S INSIDE YOUR PHONE?



KEY

Diagram 1: Raw materials in a mobile phone

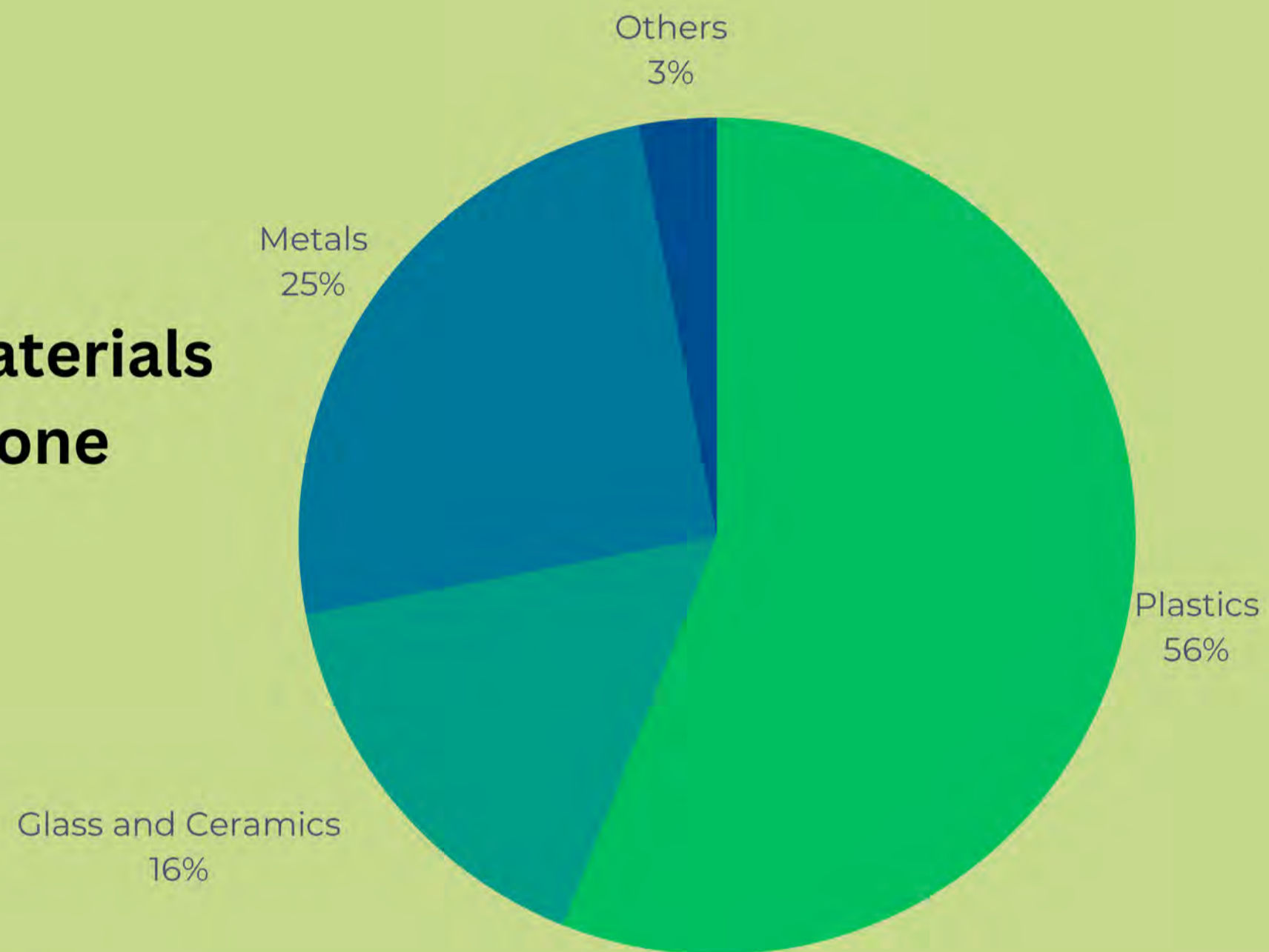
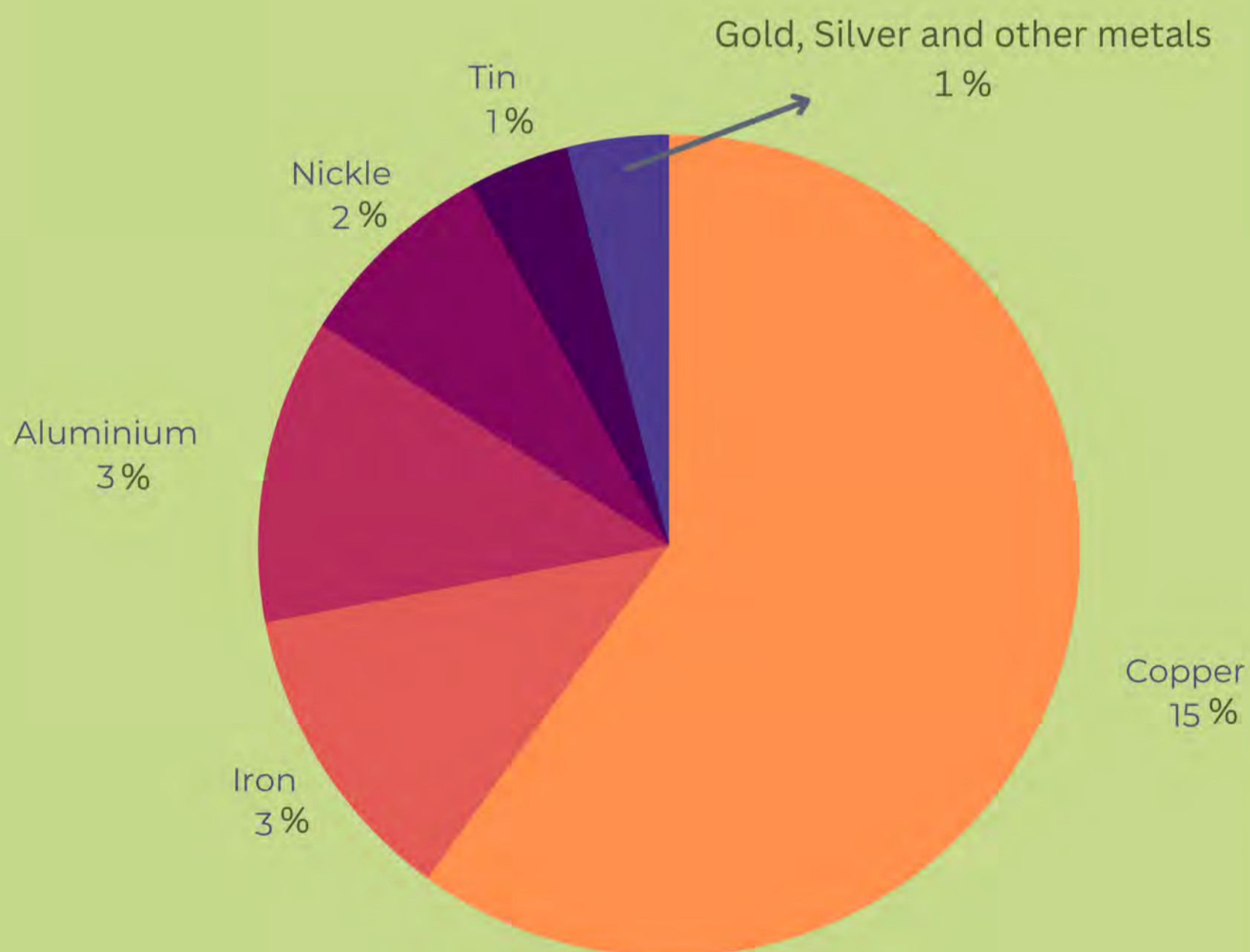


Diagram 2: Metals in a phone



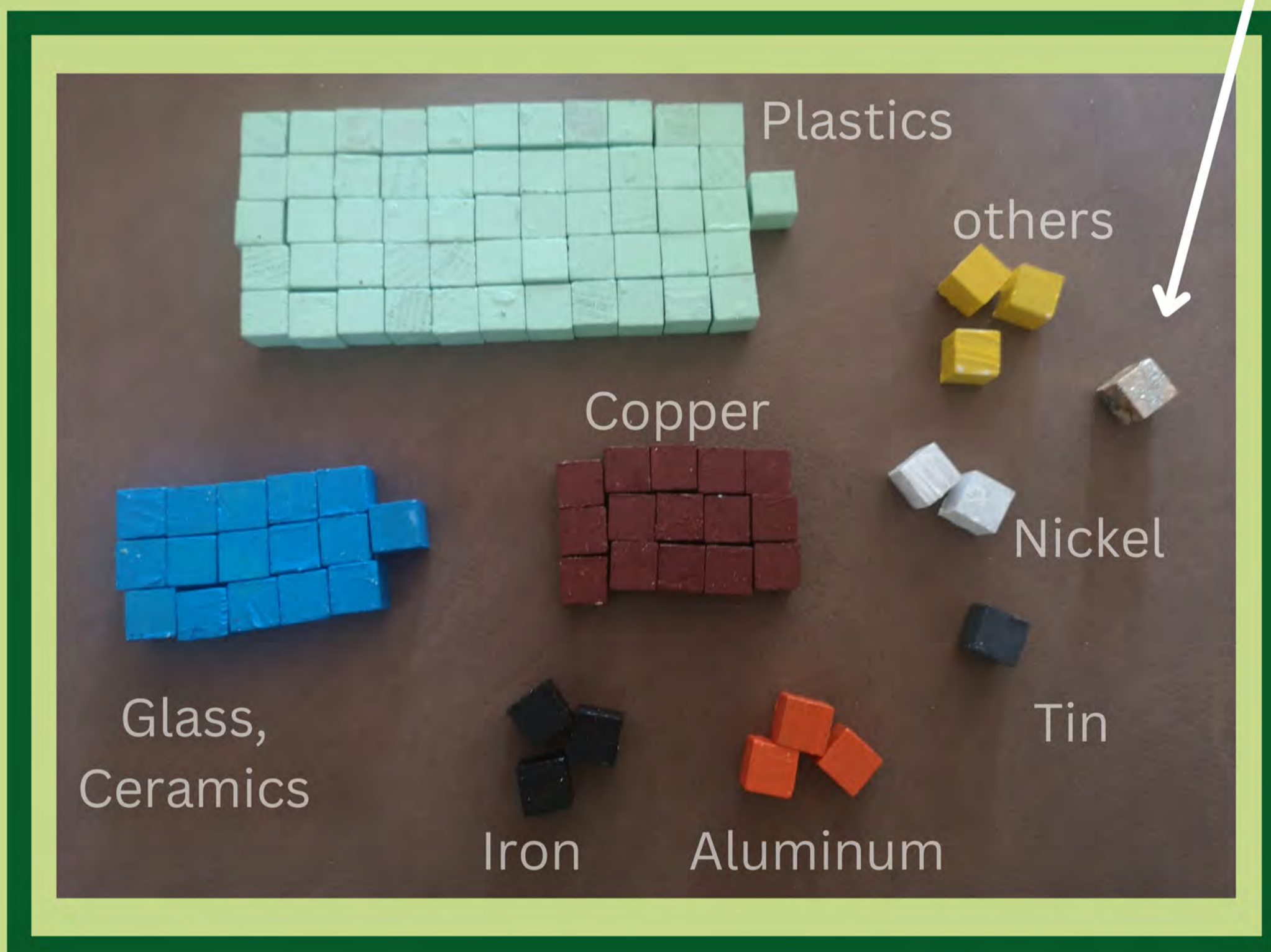
1 % others = e.g.
Gold, Silver, Platinum and Palladium
Other rare metals, e.g.
Cobalt, Gallium, Indium and Tungsten
Rare earths e.g. Neodymium

WS 2.1: WHAT'S INSIDE YOUR PHONE?

KEY



Gold, Silver and other metals



WS 3.1: 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!



WS 3.2: 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!



WS 3.3: 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

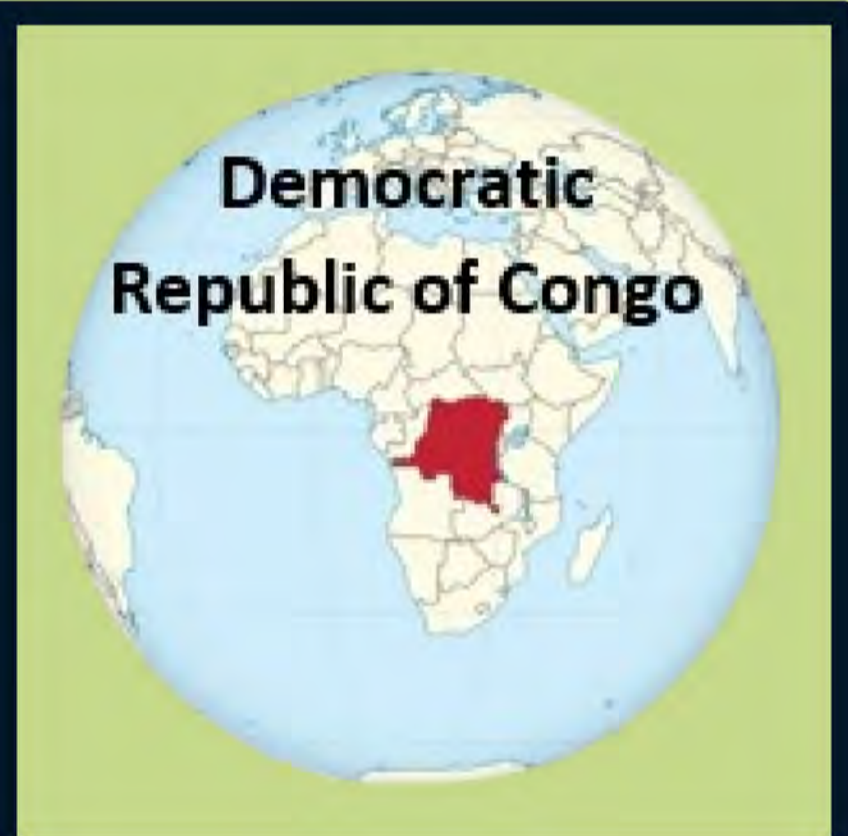


WS 3.3: PIN THE PLANET!

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**



WS 3.4: 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 – WS 3.2: 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 – WS 3.2: 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

Tin mined e.g. in China

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

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

Australia

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

Indonesia

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

China

https://de.wikipedia.org/wiki/Volksrepublik_China

Mexico

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

Chile

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



WS 4.1: 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



old jeans



the drum of a washing machine

Did you know what these things are made of?



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!

WS 4.2: FROM TRASH TO TREASURE!

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?



WS 4.3: FROM TRASH TO TREASURE!

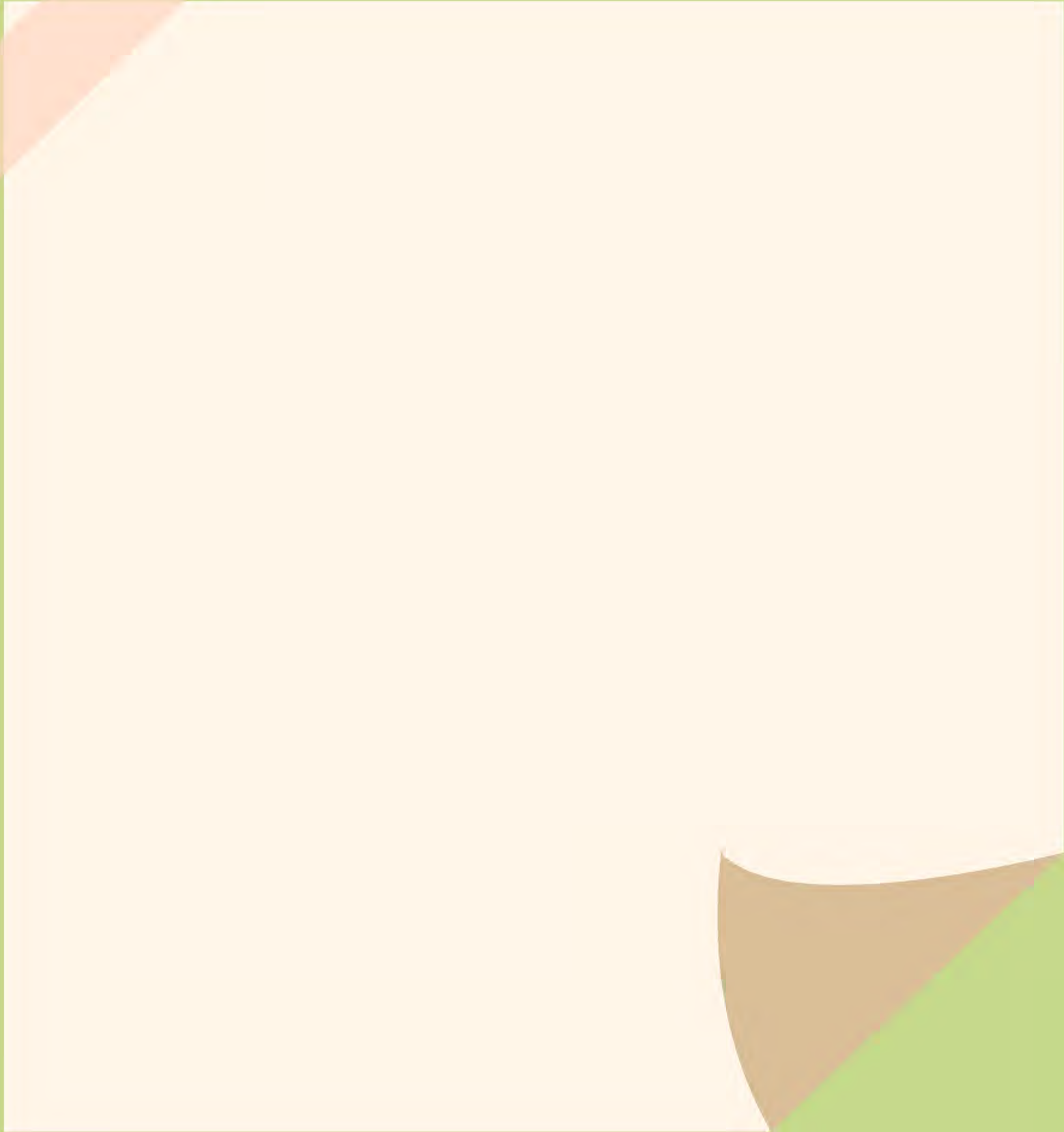
DESIGN THE SMARTPHONE OF THE FUTURE

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?

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

