THE SUSTAINABLE SMARTPHONE

LESSON OBJECTIVE

In this lesson students explore the concept of conflict minerals and gain an understanding of the impact of resources used in the production and consumption of mobile phones. Students will research the Fairphone social enterprise and design a Smartphone based on a more sustainable model.

- Students will understand the role and impact of resource use;
- Students will understand the concept of conflict minerals; and
- Students will begin to take responsibility for sustainable consumption habits.

AUSTRALIAN CURRICULUM CONTENT DESCRIPTION

Year 9 & 10 Design and Technology

- Critically analyse factors, including social, ethical and sustainability considerations, that impact on designed solutions for global preferred futures and the complex design and production processes involved (ACTDEK040)
- Explain how products, services and environments evolve with consideration of preferred futures and the impact of emerging technologies on design decisions (ACTDEK041)

Year 9 Geography:

- The effects of the production and consumption of goods on places and environments throughout the world and including a country from North-East Asia(ACHGK068)
- Present findings, arguments and explanations in a range of appropriate communication forms, selected for their effectiveness and to suit audience and purpose; using relevant geographical terminology, and digital technologies as appropriate (ACHGS070)

Year 10 Geography:

- The environmental worldviews of people and their implications for environmental management (ACHGK071)
- Present findings, arguments and explanations in a range of appropriate communication forms selected for their effectiveness and to suit audience and purpose, using relevant geographical terminology and digital technologies as appropriate (ACHGS079)

LESSON OUTLINE

Time required: 180 minutes

Digital learning opportunities: Digital sharing capabilities, Interactive whiteboard (IWB), online video presentation tool.

1. There are a lot of elements that go into a smart phone. View the image Chemical Elements of a Smartphone and ask the students to work out how many elements go into manufacturing a Smartphone.

2. Explain to students about the production supply chain. That is, the process of bringing a raw mineral to the consumer market which involves the extraction, transport, handling, trading, processing, smelting, refining and alloying, manufacturing and sale of end product.

3. Ask students if they understand the difference between a mineral, metal and material. Refer to the terms below and provide some examples.
   Minerals: the raw stuff that comes from the ground (ore, as in the rock that contains minerals).
   Metals: what comes out of these minerals.
   Material: what is created from these metals and minerals; eg, how cassiterite (mineral) is taken to a smelter, where raw cassiterite ore is smelted and becomes tin (a metal).

4. Ask students if they ever heard of the word "conflict minerals"?
   Conflict minerals are tantalum ore (coltan), tungsten ore (wolframite), tin ore (cassiterite) and gold that originates from the Democratic Republic of Congo (DRC) or adjoining country, from areas controlled by armed groups or that helped to finance the conflict. The DRC, which is one of the poorest countries in the world, has been involved in a long-running bloody civil war in which rebel groups fight over access to minerals and profit from illicit trade.

5. Watch the following vides for more information on conflict minerals and the initiatives that have been established to find alternatives: Conflict-Free Tin initiatives (00:52 mins).

6. Introduce the students to the Fairphone social enterprise which is based in Europe and has designed and developed a smartphone with conflict-free minerals and minimal harm to people and the environment. Watch the Fairphone video on Vimeo http://vimeo.com/fairphone

7. Break your class into groups of at least six. Ask students to read the Fairphone roadmaps and complete the first task on the student worksheet.

8. Answer summary is below:

Mining Conflict-free or responsibly mined minerals Improve working conditions for miners Reduce mining degredation Address child labour Trace minerals to their source	**Design** Design for longevity Design for reparability Transparency on how the phone is designed
Manufacturing Better working and employee conditions Safe conditions Fair pay Allow employee feedback	**Reuse and Recycling** Extend the life of the phone Offer spare parts and repairs Offer responsible and safe recycling Don't send old phones overseas to countries that are not set up to recycle

9. Once complete, ask each group to develop ideas for their own sustainable smart phone that has been designed in a safe, ethical and responsible way. Allow 15 minutes for brainstorming.

10. Once groups have completed their brainstorming, it's time for them to create the concept of their sustainable phone. Students can create a presentation (e.g. Prezi or Powerpoint), blog or an infographic (e.g. Piktochart). The presentation should include:

    a. The name of the Smartphone
    b. An outline of what it does
    c. The main sustainable features
    d. How the product improves the mobile phone life cycle
    e. Supporting images

11. Ask students to make their presentations to the class.

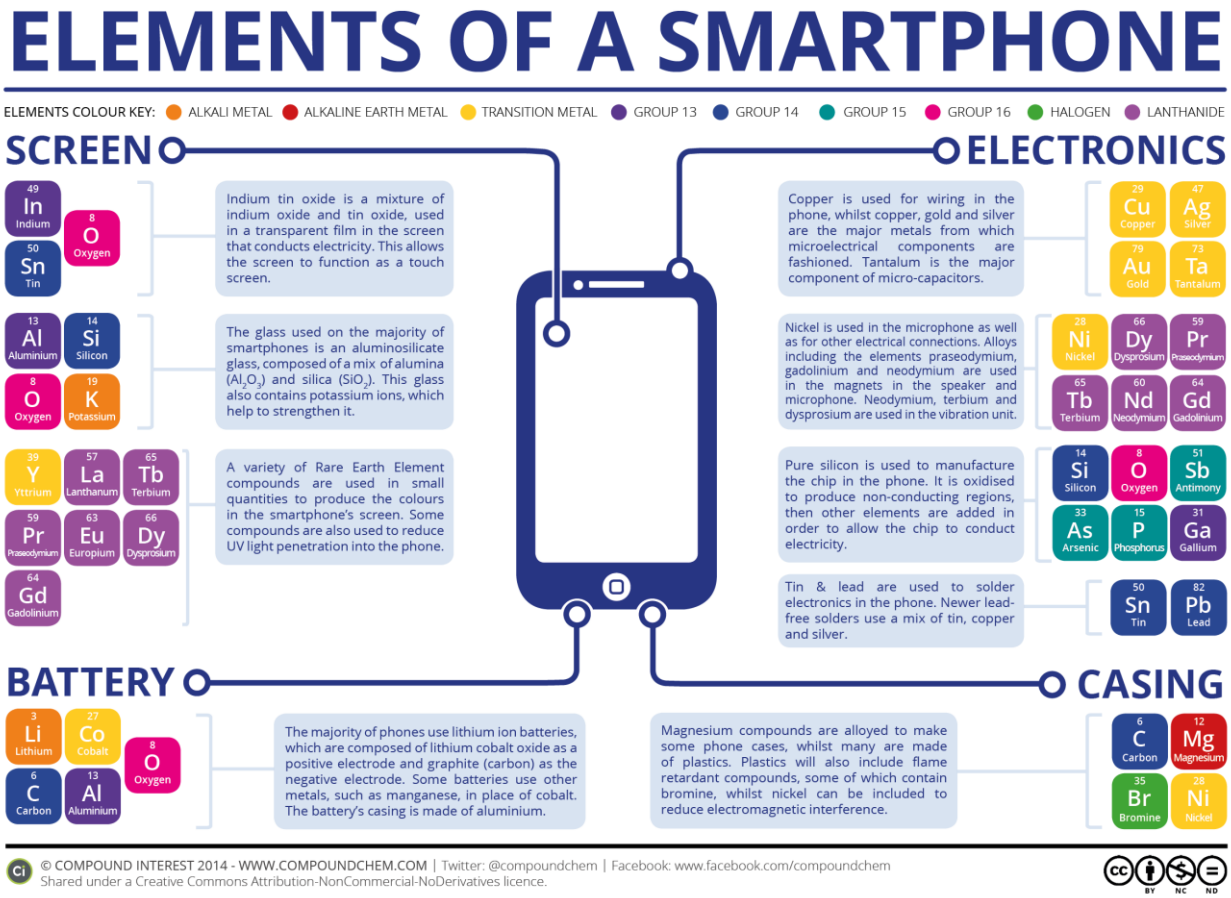
12. Assessment/Reflection: Ask students to use the Peer Assessment Rubric to assess group presentations.

EXTENSION ACTIVITIES:

Ask students to research a conflict-mineral (such as tin, tantalum, tungsten or gold), how is the mineral used in the production of a mobile phone and what is being done to use conflict-free minerals by the mobile phone manufacturers. Play the MobileMuster Resources Map game and see if you can work out what countries produce the minerals that go into making a mobile phone.

Student Worksheet: Fairphone Case study

Thought starter



Step 1: Read about the Fairphone roadmaps and complete the table below.
Mining Roadmap
Manufacturing Roadmap
Design Roadmap
Reuse and Recycling Roadmap

List how Fairphone are improving each stage of the mobile phone life-cycle.

Mining	Design

Manufacturing	Reuse and Recycling

Step 2. Begin brainstorming with your group about how you would promote the Fairphone and the principles it represents. Use either bubbl.us or mindmeister to record your brainstorming and other research resources listed below:
OECD Due Diligence Guidance: For Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas
Mobile Phone Industry Initiatives to Reduce the use of Coltan
Precious Materials 101
Conflict-Free Tin Initiative
Mobile Phone Life Cycles: Use, Take-back, Reuse and Recycle

Step 3. Once you've completed your brainstorming, it's time to design your own sustainable smart phone. You can create a presentation, blog or infographic to support your design. Your presentation should include:

- A name that reflects the values of the Smartphone
- An outline of what it does
- The strengths of the sustainable phone
- How the product relates to improving the mobile phone life cycle
- Supporting images and diagrams to highlight the product

You will also need to be prepared to present your ideas to the class, with each group member talking about their role in creating their Smartphone of the future and how their product contributes to a more sustainable world.