

WHAT ARE THE 6 R'S?

This lesson introduces students to the 6 R words, their relationship to sustainability and how they should be considered when designing new sustainable products.

LESSON OBJECTIVES

Students will be able to:

- Recall the 6 R words
- Define each of the 6 R words and give examples of each
- Understand how to apply the 6 R words during the design of new products

SUMMARY OF TASKS

Before undertaking this lesson, students should have been introduced to the circular economy. This could be through the 'Introduction to the Circular Economy' lesson plan.

PART 1 – INTRODUCTION

- Watch the video '6Rs of Sustainability'¹ (3 mins).
- Ask students to complete the 'What are the 6R's?' matching activity. (This could also be converted to a digital activity through a platform such as kahoot or quizlet.)
- Once students have completed the activity split them into small groups (or work as a whole class), and ask students to discuss their answers to the activity, focusing on the ideas which they have had for new examples for each "R" word.

PART 2 – ACTIVITY AND DISCUSSION

- Ask students to complete the 'Designing with the 6R's' activity. If time allows students could complete more than one item.
- Come together as a whole class to discuss the responses from the activity. Base the conversation around:

How the answers differ for each of the different items, and why that may be?

Focus on how the answers depend on things such as how long the object is used for and how long it is intended to last.

Which R word was the easiest and which was the most difficult to come up with ideas for?

Which ideas do you think will be easiest to be implemented?

RESOURCES/ EQUIPMENT

- "What are the 6 R's?" Fact sheet
- "What are the 6 R's?" activity
- "Designing with the 6 R's" activity

HOMEWORK/ EXTRA ACTIVITIES

- Ask students to consider which of the R words is the most important, and present their response to the class

¹ <https://www.youtube.com/watch?v=luE5Aeqjf1Q>

FACTSHEET: WHAT ARE THE 6 R'S?

FACT SHEETS HAVE BEEN DESIGNED FOR TEACHER USE TO AID CREATING OF TEACHING RESOURCES, OR THEY ARE FREE TO BE REPURPOSED FOR STUDENT USE.

There are several processes which are involved in the transition of the circular economy, and one way in which they are often described through are “R” words. The idea of the 3Rs emerged in the 1990’s and were the basis for green manufacturing.² These words are:

- Reduce
- Reuse
- Recycle

The ideas link back to the waste hierarchy framework which is used by the EU. The waste hierarchy framework can be seen in Figure 1, and gives guidance on how waste should be managed to limit negative effects on the environment and health. The top levels are the most preferable and the bottom rungs less so – ensuring materials are maintained at each level for as long as possible.³

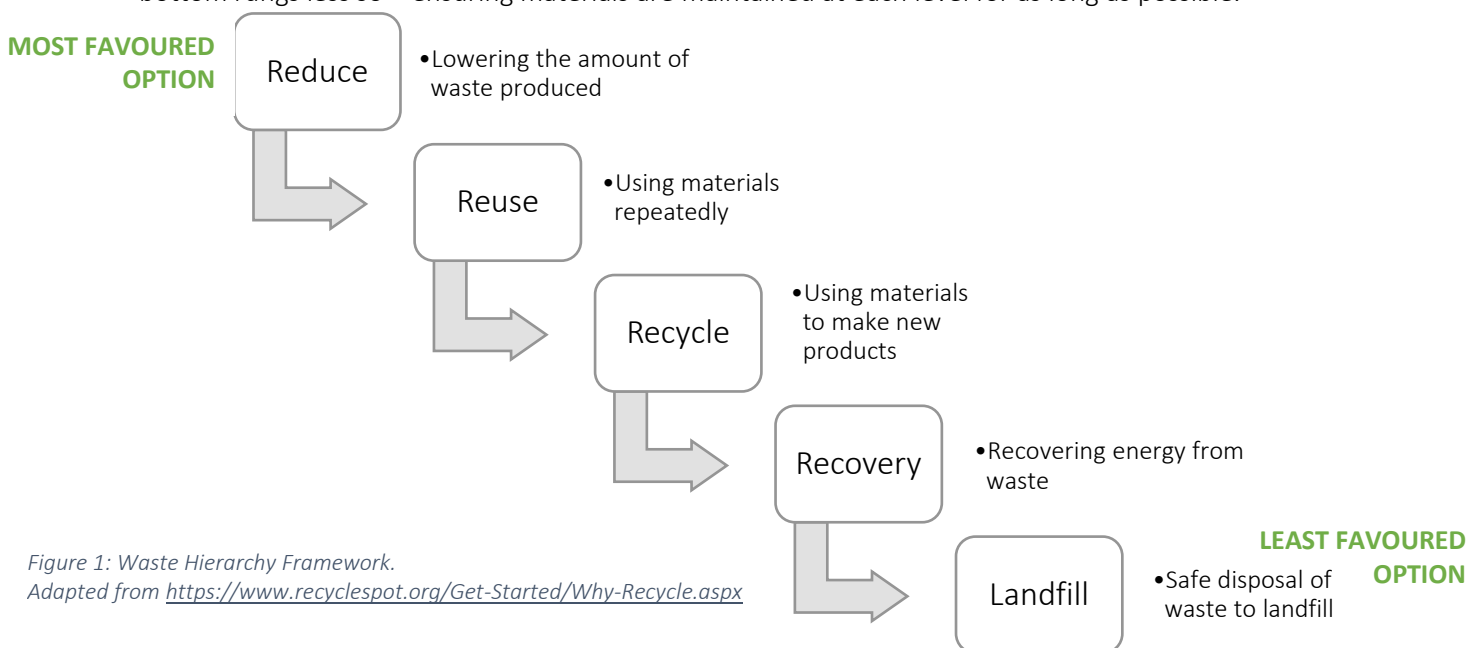


Figure 1: Waste Hierarchy Framework.
Adapted from <https://www.recyclespot.org/Get-Started/Why-Recycle.aspx>

Expansion to the 6 ‘R’s

However, one of the aims of the circular economy is to avoid the production of waste in any form, so this framework has been rethought, extending it to look more towards resource management and ensuring the value of resources is preserved. The number of processes has since been expanded to a wider number of resource management processes, up to 11 R’s from the original Reduce, Reuse, Recycle. 6 R’s is a common number of processes reported, and these can be seen in the list below.

² I. S. Jawahir and R. Bradley, *Procedia CIRP*, 2016, **40**, 103–108.

³ <https://ec.europa.eu/environment/waste/pdf/WASTE%20BROCHURE.pdf>

Circular Economy

Age Range: 13-16 years

(However, the set of words/terms used is not universally agreed on, and by searching on the internet and reading different sources one is likely to come across slightly different lists of words.)

Each of these processes should be considered when designing new products and processes. When things are being designed the designer should consider how the item will be used, can it be easily repaired if one part is faulty, and how can the materials which make up the product be recycled at the end of their life. They should also consider the energy usage at each stages of manufacture and use of the product.

Rethink

- Question and challenge the current norms
- Find new ways to design and manufacture products, promote new ways of using products and business models
- Design products so that they are more sustainable and aligned with the basis of the circular economy

Refuse

- Turn down products which are not needed, even more so if they are bad for the environment or wider society
- Promote that people have the right to reject current practices they disagree with

Reduce

- Cut down the amount of materials used to make up a product
- Decrease the amount of energy used through the whole life cycle of the product

Reuse

- When a product has reached the end of its life for its initial use, another use should be found for it with minimal reprocessing required

Repair

- Fix items which are broken to bring them back up to their initial conditions
- Avoid any decrease in value of the product
- Aim to extend the lifetime of a product being in use

Recycle

- This is the final stage which should be avoided for as long as possible
- Take items which can no longer be repaired or used, which would otherwise have been waste and turn them into new 'secondary' materials which can be used to make new products.
- Each material is recycled in a different way, and products should be designed with materials which can be efficiently recycled.

Further resources

- (1) <https://mauritskorse.nl/wp-content/uploads/delightful-downloads/2015/12/Resource-hierarchy.pdf> (Read more about the 11R's which have been mentioned and how the different processes can be applied to biological or technical materials, as well as how it may fit in with the make-take-dispose)

ACTIVITY: WHAT ARE THE 6 R'S?

Instructions

Please see the web page for more information about the 6R's of sustainability.

This activity introduces the 6 "R" words which are important for the circular economy and the way people think about using resources. The examples include both the definitions of the words, as well as everyday examples of the processes in action.

This activity can be used at an outreach event or adapted for use in the classroom to prompt discussions/debate, or at home as a stand-alone activity.

Task

Ask student to match up the "R" word card with the definition card. Ensure that students understand all these words, and the differences between them.

Then ask the students to match-up the example cards to the correct "R" word

If you are based in a classroom or at home:

Once the students have matched up the cards this can lead to a discussion about other examples of each "R" word and how this is important for the circular economy. Ask students to write down their ideas - including at least one new example per "R" word.

On an outreach stand or working as a large group:

Ask the students to write down another example of one of the ways they can contribute to the "R" on a post-it note and stick it on a large poster/board. This can be used to prompt discussion as there should now be lots of different examples which can be discussed during or after the event.

"R" word	Definition	Example	Example
Rethink	Ask questions about the way in which materials and products are used. Challenge the ways in which society can become more sustainable.	Coming up and discussing ideas with others at your school about how you could avoid the packaging waste for food	Ensuring that companies are coming up with new ways of working which may be different from the current norm
Refuse	Do not buy or take things which are not needed. Say no to things which you think may be bad for other people's livelihoods or the environment.	If you become aware that a company does not pay their staff the amount they should legally, decide to no longer buy anything from them	If you are offered a carrier bag at the shop, but you would be able to carry the shopping home without one, do not take it
Reduce	Cut down the number of products you are using and buying. This will result in a decrease in the amount of materials, resources and energy being used.	Take a reusable shopping bag with you when you go to the shops, rather than buying a new plastic one every time	Choosing to use a bar of soap without packaging rather than liquid soap which comes in a plastic bottle
Reuse	Use a product repeatedly, either in its original use or for another use to avoid the need to make another product.	Use an empty clean jam jar as a vase for flowers	Give away games which you no longer use to other children who will enjoy playing with them
Repair	When an item breaks so it cannot be used or does not work properly, try to fix it so it is as good as the original product was.	If the screen on your phone breaks take it to the shop to be mended or replaced rather, rather than buying a brand-new phone	Rather than throwing away an old pair of a trousers which have a hole in them, learn how to fix them
Recycle	Take an item which can no longer be used to create something new. Convert the product which would otherwise have been waste to materials to make new products.	Making sure you put unwanted paper/cardboard in the correct bin to make sure that it does not just go to a landfill site	Keep hold of old items which are not made to be reused, like old technology or batteries, and make sure you take them to a recycling centre to be disposed of correctly

ACTIVITY: DESIGNING WITH THE 6R'S

Instructions

Please see the web page for more information about the 6R's of sustainability.

This activity is intended to get students to think about how the 6 R words can be applied when designing new products.

This activity is intended to be used alongside the 'What are the 6 R's?' lesson plan.

Task

If you are based in a classroom:

Ask students to pick one of the following products, and imagine they are designing a new version of it and how they would consider each of the R words during the design process. This can include how the item may be manufactured, packaged, sold, and marketed. Students should note down their ideas in the grid below.

- A pair of designer trainers
- A bike
- Headphones
- Take-away fast food packaging

If you are doing this activity at home:

Ask the student to research online to find some examples of companies and products which have been designed in such way to be more sustainable. Students could add what these companies are doing to their grid of ideas. Some examples which could be used as prompts are listed below (although there are many other examples):

- <https://www.everlane.com/tread> - working towards zero impact trainers
- <https://www.vaastbikes.com/> - sustainable bicycle brand
- <https://gerrardstreet.nl/en/> - modular headphones
- <https://www.notpla.com/> - biodegradable take away food packaging

CHOSEN ITEM:

RETHINK

REFUSE

REDUCE

REUSE

REPAIR

RECYCLE