BE THE WAVE
AR FRIG Y DON

Circular Economy

Lesson Plan

cadwch keep gymru'n wales daclus tidy

MARINE CONSERVATION SOCIETY

UNDEB EWROPEAIDD EUROPEAN UNION

Llywodraeth Cymru Welsh Government

Cronfeydd Strwythurol a Buddosoddi Ewropeaidd

European Structural and Investment Funds

Ariennir gan Lywodraeth Cymru

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Aims
• Understand the principle of a circular economy and how transition to this way of utilising resources benefits the environment and society. • Raise awareness of issues concerning marine litter and to encourage students to act constructively to make a real difference.
Objectives
• Discover the meaning of the term 'Circular Economy' and how this differs from the current 'linear economy' lifestyle most of society is part of. • Discuss ways of supporting the transition to a Circular Economy and how the choices we make can lead to better environmental outcomes. • Apply knowledge of circular economy to everyday life through #BeTheWave actions and the Eco-School programme

Eco-Schools Topic	Global goals
• Litter • Waste Minimisation	• 12 - Responsible Consumption • 14 - Life Below Water

Links to the Curriculum For Wales	
Purpose	
Ethical and informed citizens who: • Show their commitment to the sustainability of the planet Healthy and confident individuals who: • Have secure values and establishing ethical beliefs	
What matters	**Progression step: Four**
Humanities • Have an understanding of own and others' environmental, economic and social responsibilities in creating a sustainable future. • Discuss and challenge the view points of decision makers and elected representatives un my community and at a national level. Science and Technology • Describe the impacts of science and technology, past and present, on society • Evaluate responsible working which consider environmental and societal impacts	
LNF	**Progression step: Four**
• Share, talk and write about my thoughts, feelings and opinions showing empathy and respect.	

Activity one	Resources and Equipment
What does 'A Circular Economy' mean? Watch the video produced by the Ellen MacArthur Foundation (3:50). In groups or whole class, discuss the life cycle of a natural product found in the ocean e.g. a fish, and draw the various stages in a diagram to show how it is circular. Discuss the lifecycle of something man-made that you might take with you to the beach e.g. a drinks bottle, beach towel, bucket and spade etc. Think about how it was made, what materials is it made from, what happens after it has been used? Draw the life cycle of this item. Is the life cycle 'circular' or 'linear'? For support use the card sorts to give key points of each.	Activity One Worksheet Card sort life cycle of a fish, and bucket and spade

Activity Two	Resources and Equipment
'autopsy' of a discarded item. In groups conduct an 'autopsy' to determine what components have gone into manufacturing the item. Discuss what are the options for disposing of the item. Discuss if the product can be easily repaired, repurposed or recycled when it reaches the end of its life. Consider are there any alternatives that you can think of that would prolong its life.	Activity Two Worksheet Various used items e.g. • Juice carton • Felt pen • glue stick • Reusable coffee cup • An old t shirt • Cotton bud • Old mobile phone Access to ICT

Activity Three	Resources and Equipment
How can we all help to make a difference? Work in pairs to make a list of things you've bought/been given this month. It could be food, beauty products, entertainment, clothing/fashion items or anything else! Discuss what are they made from, how long will they last, what will you do with the item when it's finished/you no longer have use for it? Can you think of alternatives that will create less waste? Think about Repairing, Reuse and Refill alternatives. Feedback your ideas to everyone and compile a class list of ideas.	

Alternative Activities	Resources and Equipment
1. Discuss the pros and cons of the Deposit Return Scheme, where you pay more money for a drink in a bottle or can. This extra money or 'deposit' is returned when you take the drinks container back. Do you think this would help encourage people to recycle their used bottle or can? How much value do you think needs to be added to the container to make it worthwhile? Do you think this would work for other items such as takeaway containers? How does this compare to the 5p plastic bag charge, do you think that this has made a difference? 2. Watch this video (6 minutes 35 seconds) that explains about an idea for big brands to provide reusable packaging. Do you think it would work? 3. Research into businesses/organisations that contribute to the Circular Economy. Some ideas for starters: http://www.plastecowood.com/ https://hiutdenim.co.uk/ https://www.facebook.com/RePurposedRopeMats/	

#BeTheWave

Apply the knowledge gathered in the lesson into action as ethical and informed citizens. It is an important aspect to ensure students know they have the power to enact and make changes within their own lives and within the school. It is also a positive step which helps to balance some of the negative impacts explored within the lesson.

Decide on an action/actions to take forward either as individuals or as a class, these are some suggestions, or the class could generate their own.

School:

- Does your school canteen use disposable/single use items? Work with the relevant staff to come up with alternatives that will reduce the amount of resources coming into the kitchen and crucially, reducing the amount that leaves as waste.
- Conduct a beach clean and record how many items you discover. How many of the items would not be found if there was a completely circular economy.

Individual:

- Research your local Repair Café and arrange to take along an item if it needs repairing.
- Look to extend the lifespan of electronic devices as much as possible. The European Environmental Bureau (EEB) says extending the life of smartphones and other electronics by just one year would be the equivalent of taking two million cars off the road, in terms of CO_2 emissions.
- Switch from single use items to reusable alternatives and remember to actually reuse them! Look at the Refill Wales website and challenge yourself to not buy bottled water for the rest of the year!

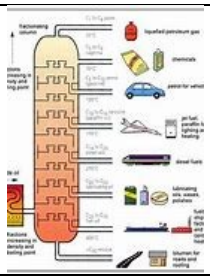
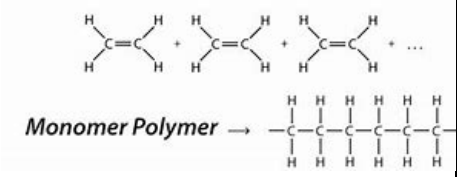
Activity 1 Worksheet

Natural item found in or near the sea:	
Draw its life cycle	
Man made item found in or near the sea:	
What materials is it made from?	
Is this a single use item or will it be used again?	
What happens after it has been used?	
Draw its life cycle	
Is the life cycle ‘circular’ or ‘linear’?	

Life Cycle of a Fish – Card Sort

Egg		Fertilised after sperm has been deposited. Contain the developing embryo.
Larvae		Have hatched and still have the yolk sac attached to provide nutrients for approximately 4 days while the eyes and mouth develop.
Fry		Very small and no longer dependent on the yolk sac as they can feed independently. Still undergoing development and growth.
Juvenile		Adult like in characteristics however not sexually mature.
Adult		Fully grown and sexually mature.
Spawning		Eggs and sperm are deposited, and some eggs become fertilised.

Life Cycle of a Bucket and Spade – Card Sort

Extraction		Crude Oil and natural gas are extracted from the ground
Refinement		The oil and gas are sent for refinement to get ethane and propane, the building blocks of plastics
Cracking		Broken down into smaller molecules; ethylene and propylene
Polymerisation		Produce plastic resins; polyethylene and polypropylene
Pre -Production		Melted cooled down and chopped up into pre-production pieces called nurdles

Adding Colour	 	Dye is added to the nurdles in the pre- production stage. The chemicals are transported to the factory and waste chemicals can end up in waterways if there is not effective regulation
Transportation		Nurdles are transported to the factories to make plastic products
Injection Moulding		Plastic nurdles are heated up to produce a plastic liquid this is then forced under high pressure into moulds to make the bucket and spade shapes. These are then cooled and sent to another section of the factory for packing.
Packing	 	The bucket and spades are packaged within a plastic mesh to keep the items together and multiple buckets and spades are placed into large boxes ready for transportation.
Transportation		The boxes are transported from the factories to the shops ready to be sold.

Retail		Bucket and spades are placed on shelves/in warehouses ready to be sold to customers.
Use		The bucket and spades are used for a fantastic day/week/years on the beach by families.
Disposal		Buckets and spades are no longer required and are disposed of either left at the beach or sent to landfill.
Landfill		The bucket and spade take approximately 450 years to degrade completely into microplastics.

Item	What is it made from?	How would you dispose of this item?	Could it be repaired, repurposed or infinitely recycled?	Do you think this item is 'circular' or 'linear'? i.e. can it be used over and over again or will it eventually end up in landfill/burned as fuel.	How could it become 'more circular', or is there a 'circular' alternative?
Drink can	*Aluminium*	*Recycling bin*	*Recycled infinitely – as long as it is always placed in correct bin*	*Circular - potentially*	*Add a value to the can to incentivise recycling*
Pair of Trainers	*Plastic, rubber, metal, textiles*	*General waste or trainer recycling*	*Difficult to repair once worn out*	*Linear*	*Wear until worn out, or pass on if grown out*

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