Date	Class Level Fifth and Sixth	Subject Science
Strand Environmental Awareness and Care	**Strand Unit** Caring for my locality / environment Environmental awareness Science and the environment	

Title
Biodegradation quiz and beach activities using the biodegradation information sheet

Objective(s)
Learn about the biodegradation of items typically found on the seashore.
This activity can be done in class or on the seashore.
See also the lesson plan on how to organise a seashore safari and beach clean.

Skills Required
Students will work scientifically learning about the biodegradation process using items typically found on their local seashore. Students will develop their investigation skills through: questioning, analysing, recording and communicating and evaluating how the different items can affect the environment.

Learning Objectives

The child will be enabled to:

- Identify and explain what a natural and manufactured or processed compound is.
- Identify and explain what biodegradation is.
- Identify and communicate how long compounds will take to biodegrade.

Learning Activities

KWL chart:
Begin the lesson using a KWL chart, where students can track information before and after the lesson. Ask students leading questions from the chart:

- What do you already 'know' about this topic?
- What things do you 'want' to learn about the topic?
- What did you 'learn' from doing your research?

Talk and Discussion:
Begin the lesson explaining the meanings of "compound" and "biodegradation".

Get the students to identify what natural compounds are (e.g. from the marine environment - salt water, plants, shells) v's manufactured or processed compounds (e.g. litter from the seashore – plastics, metals, paper etc).

Explain how all compounds and materials are subject to biodegradation.
However, the process can take minutes, hours, days, years and centuries for different types of

	compounds to breakdown. The different rates of biodegradation depend on the chemical compounds and the natural environment factors such as light, water, oxygen and temperature. Provide an anecdote about the effects of compounds, such as rubbish found on the beach, can have on the environment. For example, plastics can take centuries to biodegrade and the effects cause harm to our marine environment. If this activity is done in the classroom short movie clips can be shown to the children, showing the effects plastic biodegradation has on the marine. **Investigative approach:** Using the list of items typically found on the seashore get the children (in teams) to guess how long they think the items will take to biodegrade. Ask the students why they think some items biodegrade faster than other items. For example, why would an apple decay faster than a plastic bag? What type of compounds would typically be found in the items that take a long time to biodegrade - e.g. what is plastic made up of? Some manufactured or processed items don't biodegrade at all such as Styrofoam and tinfoil. **Activities:** Provide the correct answers and get the children to create a sand sculpture such as a time line graph in the sand to represent the results. Alternatively create a marine monster using a piece of litter found on the beach. Timeline graphs / collages can also completed in class. Using some of the "clean" items found on the beach draw a graph to represent the data. Each team should present their findings showing the approximate time for compounds to biodegrade in a marine environment. They should also explain the effects manufactured or processed compounds can have on the environment to the rest of the class.

	After the activities are completed (back in the class), the students should complete their KWL charts and highlight their experiences.
	Resources • KWL chart • Biodegradation information sheet (end of this lesson plan) • Biodegradation Power point Presentation • Samples of natural compounds v man-made compounds (e.g. rubbish found on the beach) • On the beach – use materials found / sand sculpture • Alternatively in class – drawing materials including paper, colouring pens, clue etc. • Short movie clips: http://www.upworthy.com/when-companies-add-tiny-plastic-beads-to-personal-care-products-they-go-surprising-places?g=2&c=ufb1&fb_ref=Default http://storyofstuff.org/movies/lets-ban-the-bead/

Differentiation
Higher and Lower order questioning. Differentiate group activities and roles to account of individual needs, by support, task. Mixed ability pairing.

Assessment
Students: KWL chart (What I know, What I want to know, What I learned)
Teacher observation and questioning: Mind Mapping
Examine learning outcomes before and after e.g. knowledge, understanding, skills.
Evaluation: Reflect on learning experiences that lead to the outcomes e.g. attitudes, enjoyment, as well as motivation to learn about the subject.

Linkage and Integration
Geography – Environmental awareness and care – see Organising a Beach Clean Survey lesson plan
Maths – Data – recognising and interpreting data, representing and interpreting data
Art – Construction – making constructions, looking and responding

BIODEGRADATION - INFORMATION SHEET

Biodegradation is when items (including natural items and manufactured or processed products) decompose or breakdown very slowly into very small parts by natural processes (bacteria, fungi, or other biological means). The following chart shows how long it takes for some items typically found on the seashore take to biodegrade.

Items typically found on the beach	**Approximate time for compounds to biodegrade in a marine environment**
Paper towels	2-4 weeks
Newspaper	6 weeks
Corrugated box	2 months
Apple	1-2 months
Banana peel	2-5 weeks
Cotton Cloth	5 months
Cigarette butt	1-5 years
Plywood (e.g. for building)	1-3 years
Waxed carton (e.g. milk cartons)	5 years
Plastic bags	10-20 years
Nylon fabric (e.g. clothing)	30-40 years
Leather	50 years
Rubber	50-80 years
Tin cans (e.g. tinned food)	50-100 years
Aluminium cans (e.g. drink cans)	150 -200 years
Soft plastic (e.g. drink bottles)	100 years
Hard plastic (e.g. bottle caps / lids)	400 years
Disposable nappy	450 years
Monofilament Fishing Line	600 years
Glass	Thousands of years
Styrofoam	While many things eventually break down after a number of years, Styrofoam is one of the few things that does not biodegrade.
Tinfoil	Tinfoil also does not biodegrade