

# The path of a pebble

# **Teachers notes**

**Indulge your natural sense of exploration** on the beach by collecting pebbles and recording sound effects. This activity uses the intuitive games that pupils and adults alike will want to play when exploring the beach for the first (or twentieth) time while helping to embed learning about abrasion, attrition, and other processes of coastal change.

Location:	Barton on Sea or any shingle or pebble beach
Timing:	30-45 minutes
Age:	Key stage 2

Curriculum links: Maths- 3D shapes, volume, estimation, Geography- coastal processes and change Science- rock types and properties, forces. English- poetry, onomatopoeia.

(\* check tides, weather conditions and safety of access near actively eroding cliffs prior to visit, take throw rope and appropriate emergency numbers, clearly demarcate and explain which areas pupils can explore safely)

#### Learning Outcomes:

- Estimate the volume of different beach materials and the energy need to move and lift them
- Discover that shingle is made from mixed materials (rock types, shells, man-made etc.) which have varying degrees of hardness.
- Understand that harder rocks erode softer rocks creating shingle and pebbles of varying sizes (attrition)

#### **Resources needed:**

- Blank postcard sized plain card
- Coloured pencils

Hampshire

County Council

• Aerial photo of your coastal site from e.g. google earth in two different time periods.



www.newforestcurriculum.org.uk

# The path of a pebble- *Teachers notes*



### Part 1- Does the coast stay the same?

From a high point, admire the view and point out landmarks (the Solent, Isle of Wight, Bournemouth). Ask pupils to imagine this landscape 10, 100 and 10,000 years ago and suggest reasons it may have changed.



Use aerial photographs in small groups to identify where you are stood. Look for:

- Patterns that are the same
- Patterns that are different
- Change of colours (n.b. aerial photos use real colour unlike like symbol on maps)
- Man made structures (more angular)

Nb. The year and the time of day (tide) may affect how accurate this photo is today.

Share ideas and identify man made structures e.g. rock groynes and armour that is a different colour and rock type to the local cliff. Why is it here? Clue= "armour".

# The path of a pebble- Teachers notes



### Part 2- How powerful is the sea?

At the edge of the rock armour. Ask pupils to find an d pick up one rock roughly the size of their closed fist and measure it using finger widths as an **estimate** for cm. **Calculate** width, height and depth if possible.

Ask pupils to **imagine** or dramatize trying to move your rock across a flat surface with adripping tap, b- watering can, c- tap on full blast, d- high pressure hose. Would it move? Would it lift? Which **forces** are it working against? (gravity, friction).

Some of these rocks were put up here deliberately by diggers etc, some were thrown further up the beach in the winter storms by the action and energy or wind and waves. This is how powerful the sea can be.

Nb. The rock armour is often made from portland limestone a dense sedimentary rock. Because it is made of intensely compacted particles the energy of the wave is dispersed when it hits the surface. The irregular gaps in the rock armour means the waves are hitting the limestone more times and dispersing the energy even more.



Lastly, in groups, try to estimate **how many times bigger** is one boulder of rock armour to the rock in your hand, **how many more times** energy would it take to move that?

### Part 3- Attrition and abrasion.

While walking along- Challenge pupils to **collect** as many different coloured and patterned pebbles as they can from the shingle. (Maximum size: ping pong ball. Warn about what we shouldn't pick up etc.)

Alone, in pairs/ small groups, ask pupils to **scratch test** their stone against each other. Work out which one is being scratched and which is being abraded. Does it leave a mark behind? Does it create a dent or flat spot? Is it **natural or man made**? (You may find brick, concrete, glass etc.)

**Order** their stones in their hand/ on a flat surface. from hardest to softest or roundest to most angular. E.g. Diamond (!) is sharpest, chalk is softest. **Explain** to a partner, using **evidence** the order you have chosen.

Revise or explain the **definitions** of attrition and abrasion and erosion. If you can find a hollow in a larger rock or a stone with a hole right through, this makes a great talking point.

**Coastal erosion** is the wearing away and breaking up of rock along the coast. **Destructive waves** erode the coastline in a number of ways:

**Hydraulic action**. Air may become trapped in joints and cracks on a cliff face. When a wave breaks, the trapped air is compressed which weakens the cliff and causes erosion.

Abrasion. Bits of rock and sand in waves grind down cliff surfaces like sandpaper.

Attrition. Waves smash rocks and pebbles on the shore into each other, and they break and become smoother.

Solution. Acids contained in sea water will dissolve some types of rock such as chalk or limestone.

http://www.bbc.co.uk/schools/gcsebitesize/geography/coasts/coastal\_processes\_rev3.shtml

### The path of a pebble- *Teachers notes*



#### Part 4- Sounds of the sea

Allow pupils to enjoy making noises or half **burying their feet** in the shingle. Remind them that with every step they take they are eroding the beach and attrition is changing the shingle sizes.

Explain that to do the next activity they will **sit alone in a quiet space**, and will need to wear a "magic hood of silence". Act out pulling an imaginary hood over your face and count down from ten until it covers your whole face and your voice "disappears". Then give a clapping signal and count up to 10 to remove the hoods and let the noise out! Practice as a group, then define where they can walk to and sit.

While they are sat alone ask pupils to **doodle** on a postcard different **symbols** for each sound they hear around them. They have total choice in whether to record as symbols, words or images, from left to right or in a 360 circle.

When they return ask pupils to share the secret symbols of their sound map with a partner, generating **real and made up words** that represent the sounds of the sea. These can be recited or repeated in a circle to create a group seascape **poem.** 

Nb. Each sound is made by the element wind/ sea/land/people interacting. The rise and fall of the water through the gravel is the sound of the beach being eroded. Imagine each sound is a different coastal process!



#### Extensions

- Make stone pictures (freeform or show processes)
- Compete to make the highest towers of stacked stones.
- On a flat safe area, create your own game and rules to represent the pattern of longshore drift.
- In the classroom. Take a small number of shingle samples back to the classroom. Estimate then measure their volume by displacing water from a measuring jug.