

Wave Observations

Level

7-8+

Key question

How can wave action be measured?

Key outcome

Describe and monitor waves.

What you need

Pencil, paper or field sheets

Clipboard

Stopwatch

Ruler/tape measure

Float (apple rather than foam is suggested)

What you do

Assemble in small groups and do the experiments. One student should record data accurately for use by the group later.

Wave Period

Record the time in seconds for eleven wave “crests” to pass a stationary point. Eleven “crests” must include ten complete waves (crests and troughs). Crest one is zero time, crest eleven is end of time period.

Wave Height

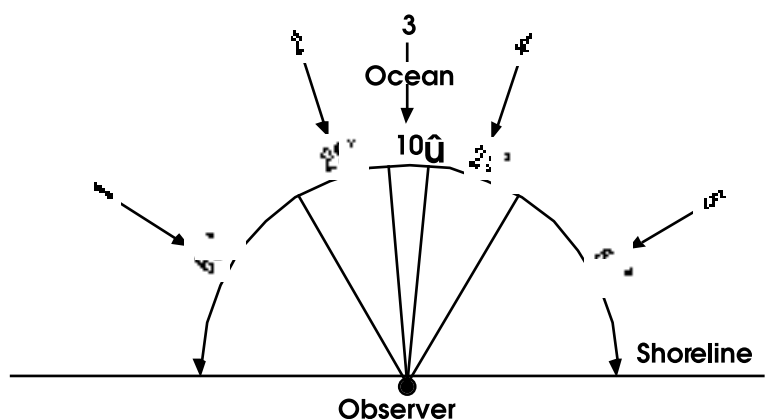
This observation relies solely on your judgement. Record the breaking wave height to the nearest one-fifth of a metre (i.e. 20 cm). If the wave height is less than 20 cm, then record “0”. If no waves exist, record “0” for both wave period and wave height.

Wave Angle at Breaker

Record the code (1 to 5) which best describes the direction of the approaching waves according to Figure 1 below. If no waves exist record “0”.

Adapted from field notes prepared by Rochedale High School, and St. Aidan’s School in Brisbane.

Figure 1. Wave direction code



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Surf Zone Width

Estimate the distance, to the nearest whole metre, from the water line, at the time of observation, to the line of the most seaward row of breakers.

To determine if the waves are constructive or destructive build a sand castle where the waves are washing up the beach. If the wash is stronger than the backwash, the waves are constructive. Write up your findings.

How will the speed of the backwash vary between a steep beach face and a flat beach face?

To determine if beach drifting is occurring, place a plank or heavy branch at right angles to the wash of the waves. Notice the effect of this mini-breakwall on deposition. What do you notice? What would be the effect of these breakwalls on a coastline?

The slope of the ocean bed affects the shape of the waves (wave profile). Look at the wave profile and indicate the probable sea floor at this beach.

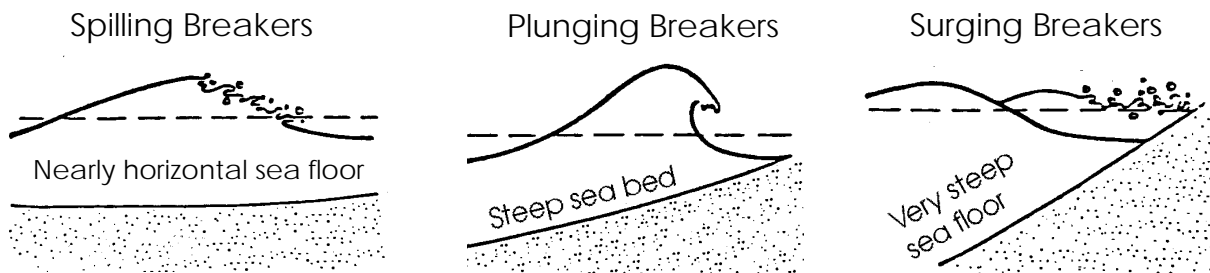


Figure 2.
Three types of breakers

Wave Type

Record the code (0-4) which best describes the type of breaking wave.

- 0 Calm: No waves exist.
- 1 Spilling: Spilling occurs when the wave crest becomes unstable at the top and the crest flows down the front face of the wave producing an irregular foamy white surface. This wave is sometimes referred to as a 'roller'.
- 2 Plunging: Plunging occurs when the wave crest curls over the front face of the wave and falls into the base of the wave, producing a high splash and much foam. This wave is sometimes referred to as a 'dumper'.

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- 3 Surging: Surging occurs when the wave crest remains unbroken while the base of the front of the wave advances up the beach.
- 4 Plunging/Spilling: This is a combination of spilling and plunging waves.

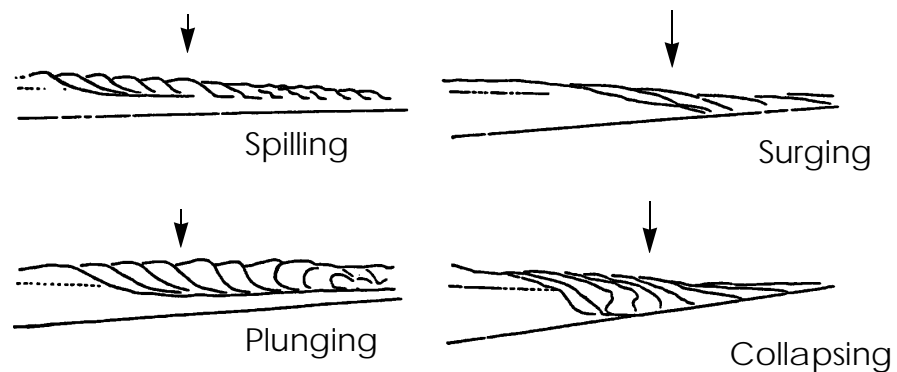


Figure 3. Wave types

Offshore Bar

- 1 = yes, if there is a distinct gutter between the initial breakpoint and the beach allowing the wave to re-form.
- 2 = no, if the wave continues in a broken state from the initial breakpoint to the beach.

Longshore Drift

Drop a piece of buoyant material (e.g. foam) at the water's edge and time how long it takes to move a measured distance. Note that the foam must be recovered, which may be difficult. An apple may be used as an alternative. Summarise your conclusions below.

To show the ways different shaped loads are transported by water, place small flat and uneven stones where the waves can move them. Comment on the ways or ease with which they move.

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Field sheet for beach measurements

Carry out the following measurements and/or observations.

Phenomena	Site
1. Sand composition at mid tidal zone: <ul style="list-style-type: none">• clear particles – mica or quartz• black rutile – mica or quartz• blue-black – basalt• red-brown – sandstone• grey – pumice• old coral, shells, sponge	
2. Sand texture at LWM to base of dune: <ul style="list-style-type: none">• coarse, rough, smooth, angular, size	
3. Distance: <ul style="list-style-type: none">• LWM to HWM• HWM to Berm• Berm to Dune Base	
4. Dune Height	
5. Berm Height	
6. Beach Angle: <ul style="list-style-type: none">• LWM to HWM• HWM to Berm Base• Top of Berm to Dune Base	
7. Evidence of efforts to protect/stabilise sand dunes	
8. Rough cross section and vegetation transect	