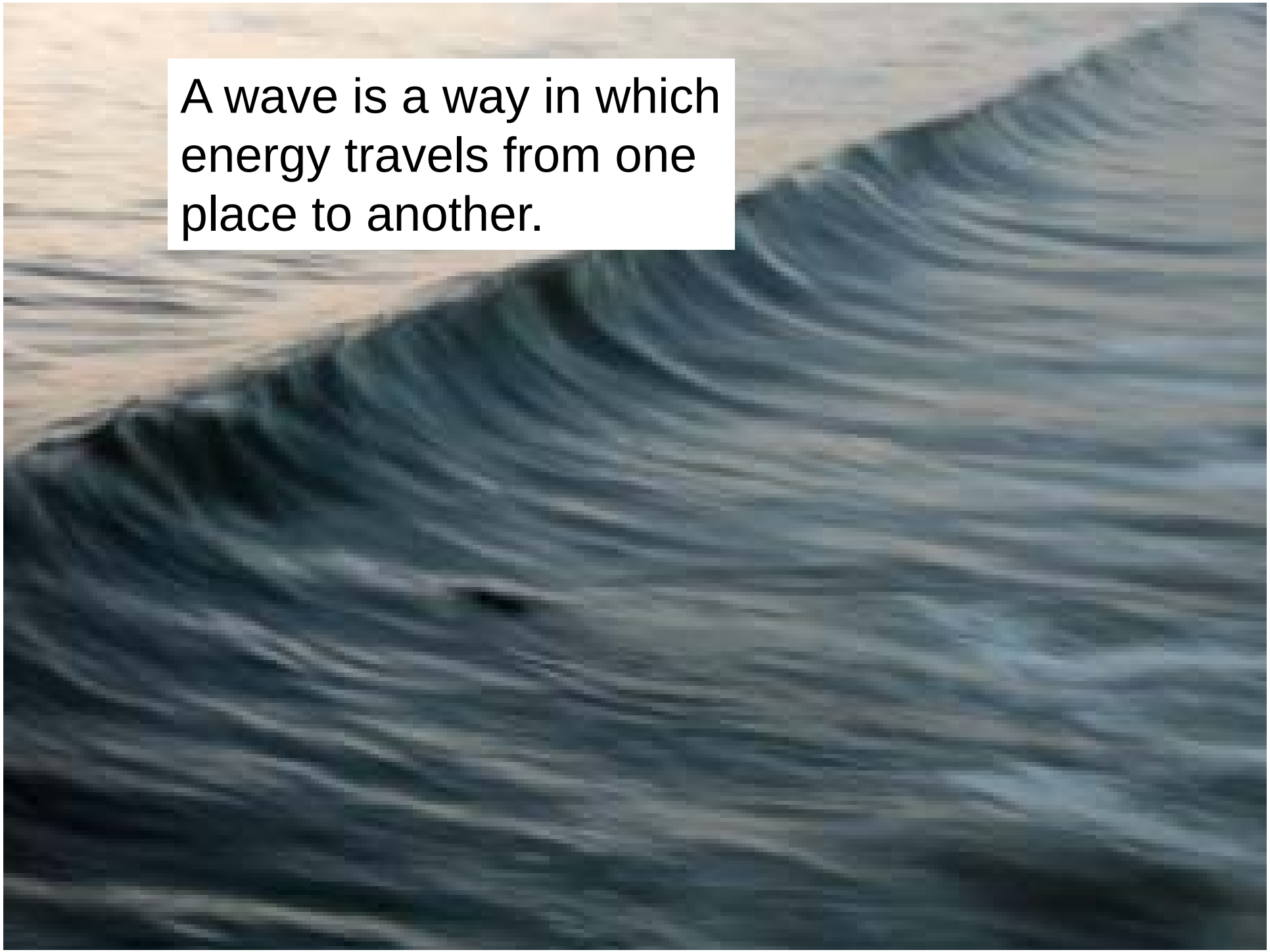

Waves


A wave is a way in which energy travels from one place to another.

# How waves form

The sun’s radiation warms the sea surface.

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Surface winds blow toward low pressure areas.

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Air and surface of sea interact – waves form as wind blows over the surface

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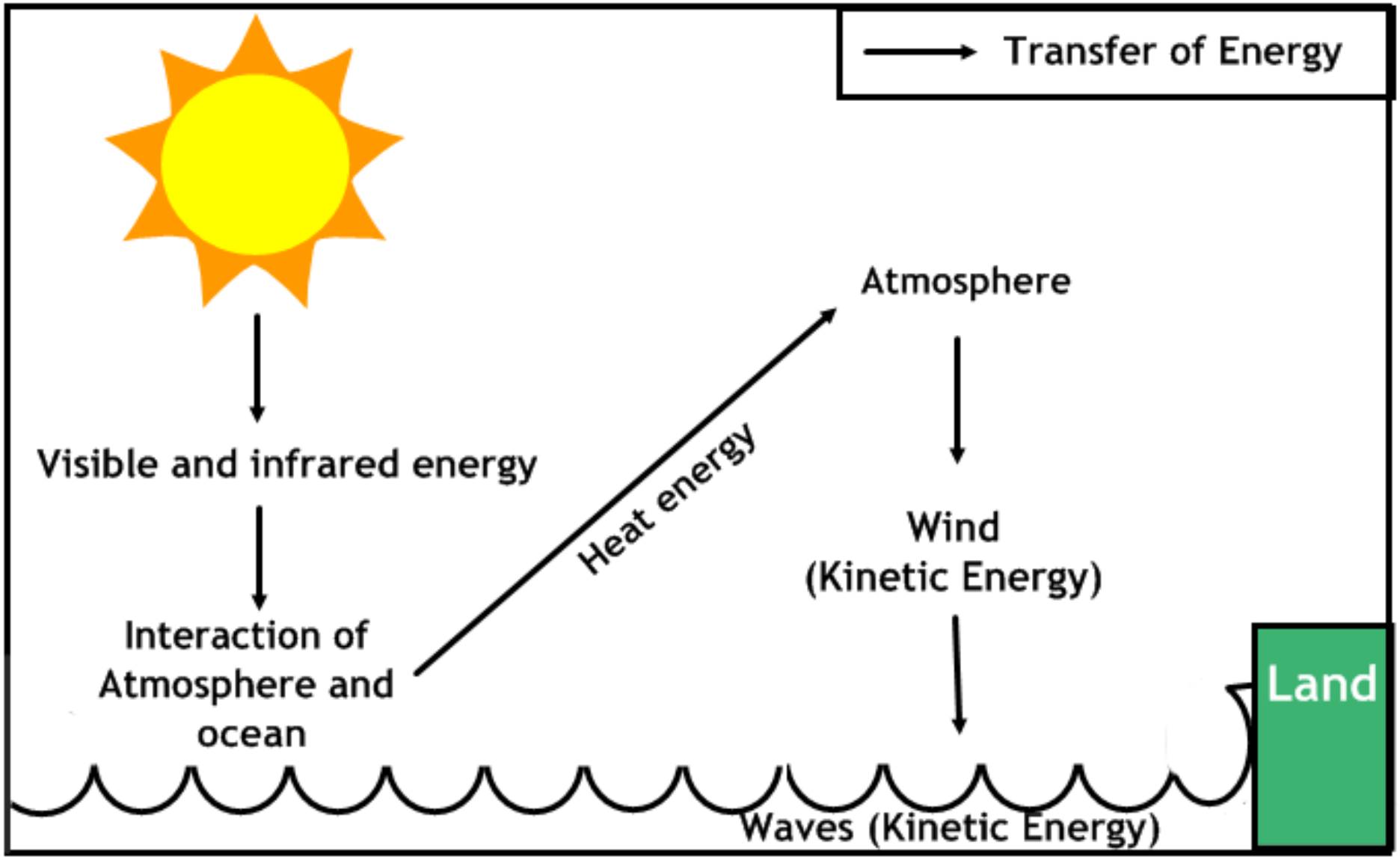
Wind waves formed and become larger with fetch (size of ocean) and duration.



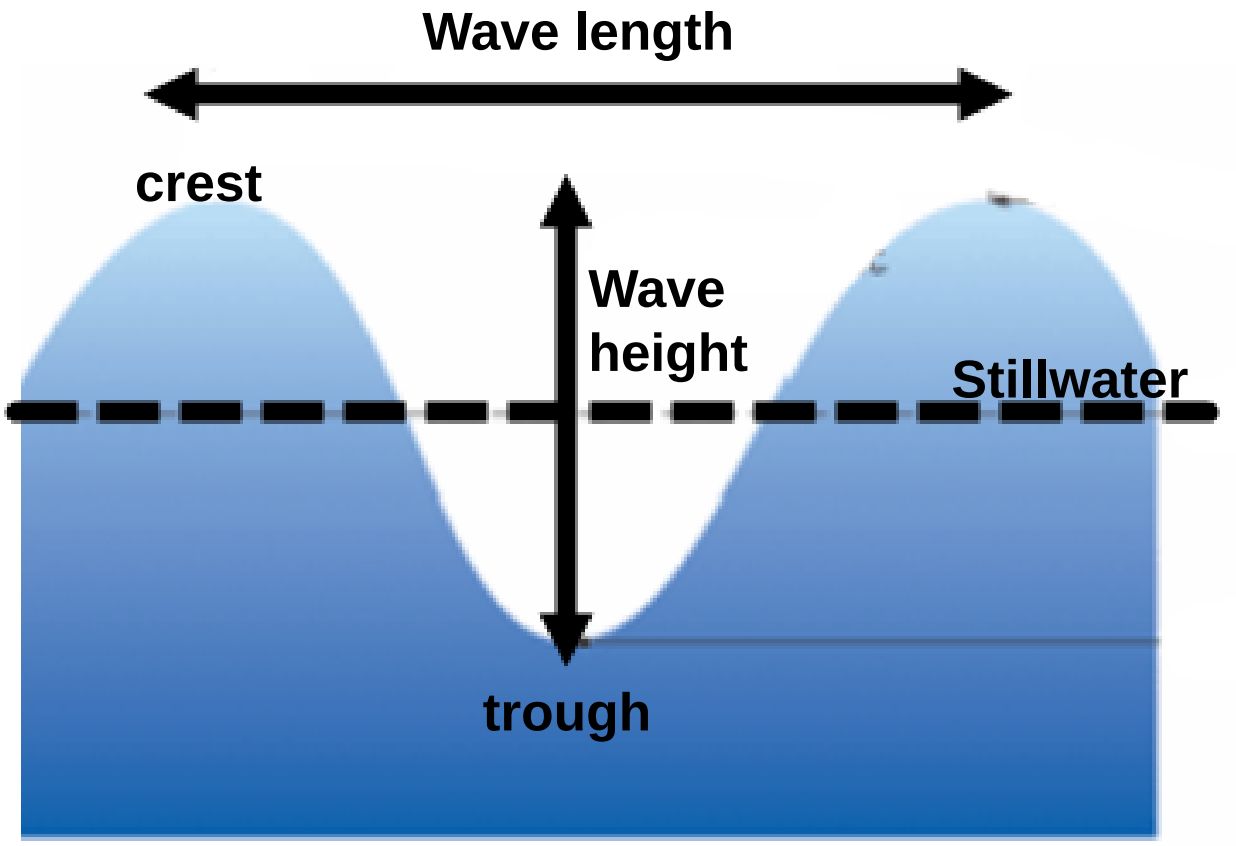

**Kinetic Energy (energy through motion)**

Each wave has a crest and a trough.

The time it takes for wave crests or troughs to pass a fixed point is called the wave period.

The distance between the wave crests is called the wave length.

The distance from the bottom of the trough to the top of the crest is called the wave height.

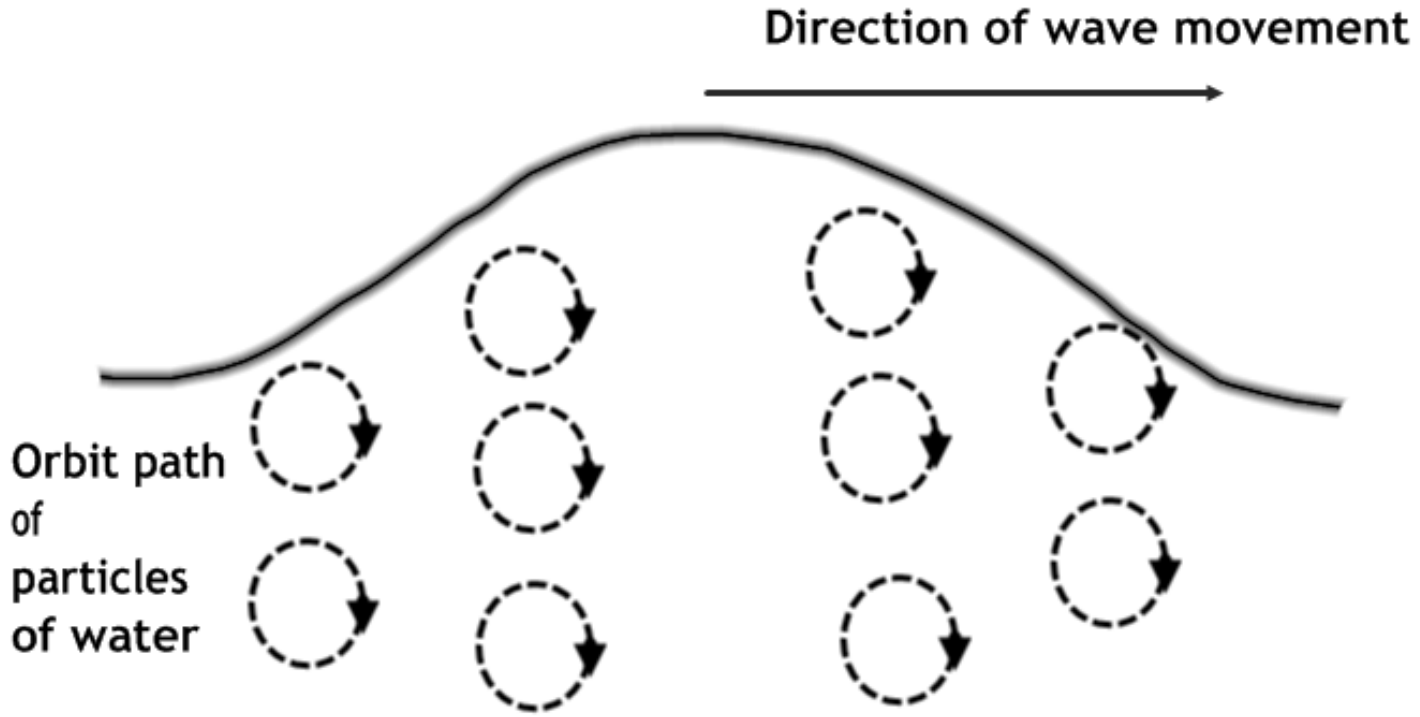


Waves are not moving masses of water (until they reach shore).

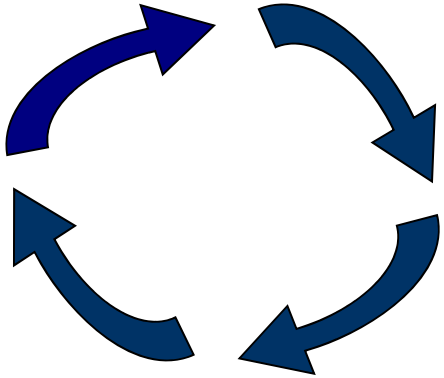
A wave represents energy being transferred.

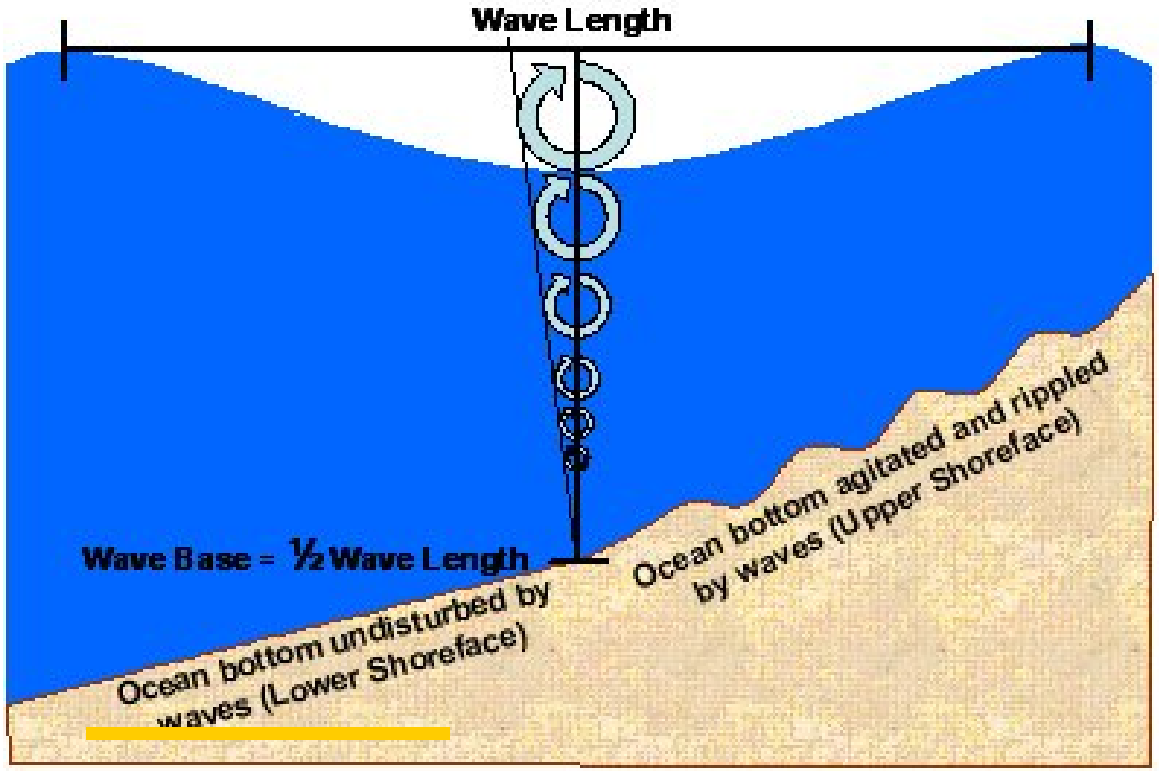
Energy moves forward but the water particles, moving in circular motion, return to the position held prior to the wave's arrival.

View wave animation



As the water molecules move in a circular motion, the waves are called <u>oscillatory waves</u>.





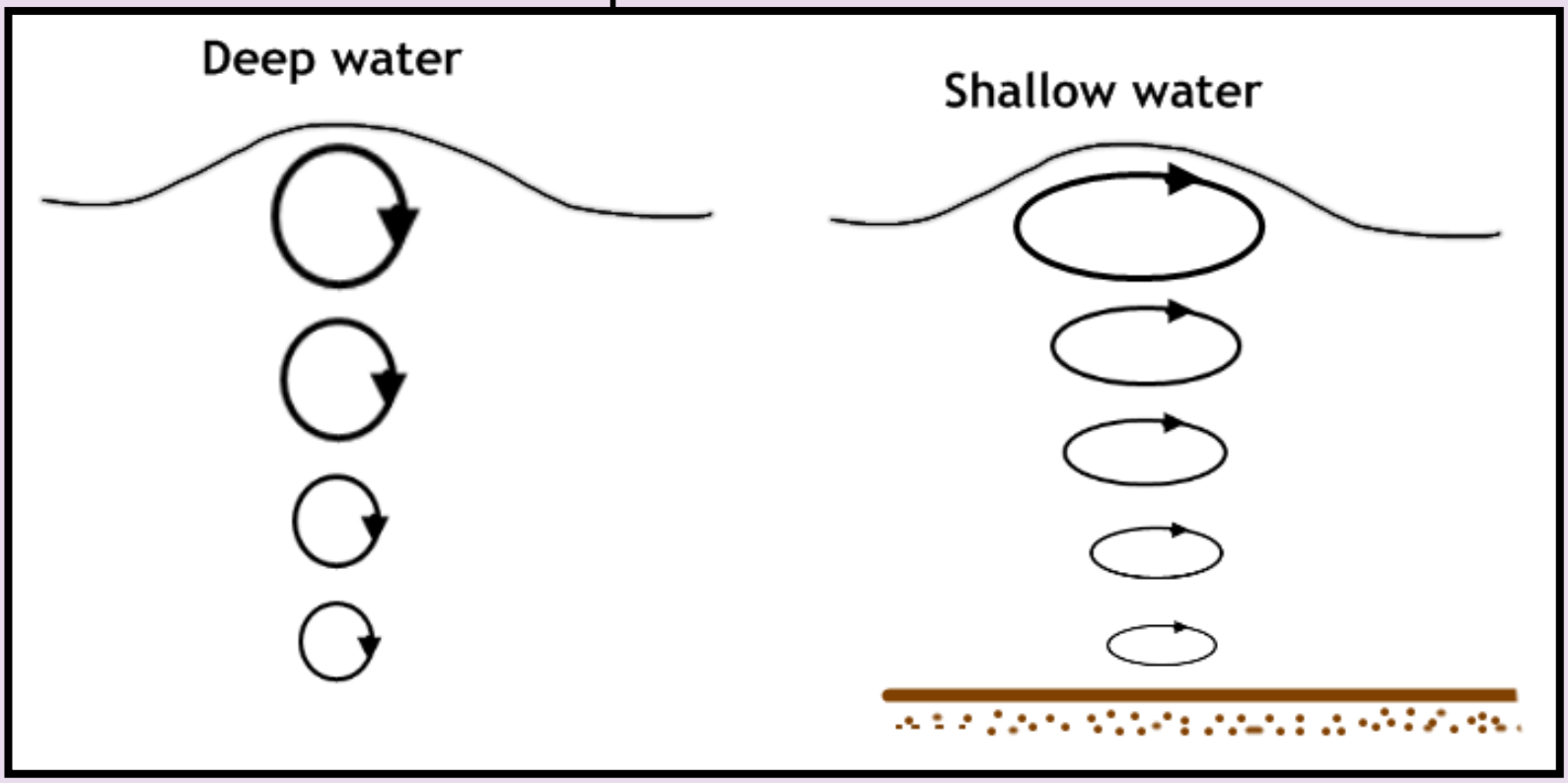

Since waves are usually generated by wind energy there is a certain depth below which surface waves do not affect the water below. This is called the <u>wave base</u>.

Wave base is important because wave erosion, transportation and deposition occur close to and above the wave base.

Oscillatory waves that move through water above their wave base are called deep water waves.

**See animation of shallow water waves.**

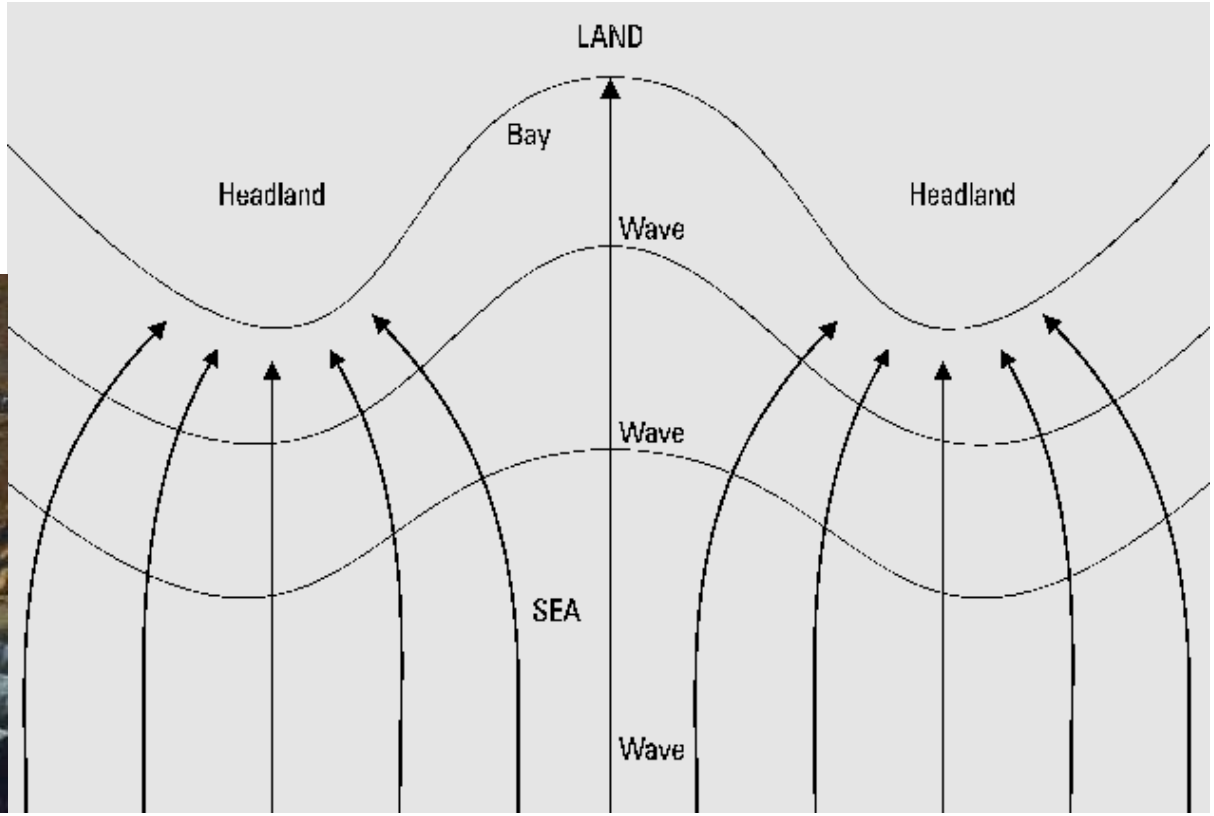
Translatory (Shallow water waves) are waves moving through water that is less deep than their wave base.



# Wave Refraction

**Animation of Wave Refraction**

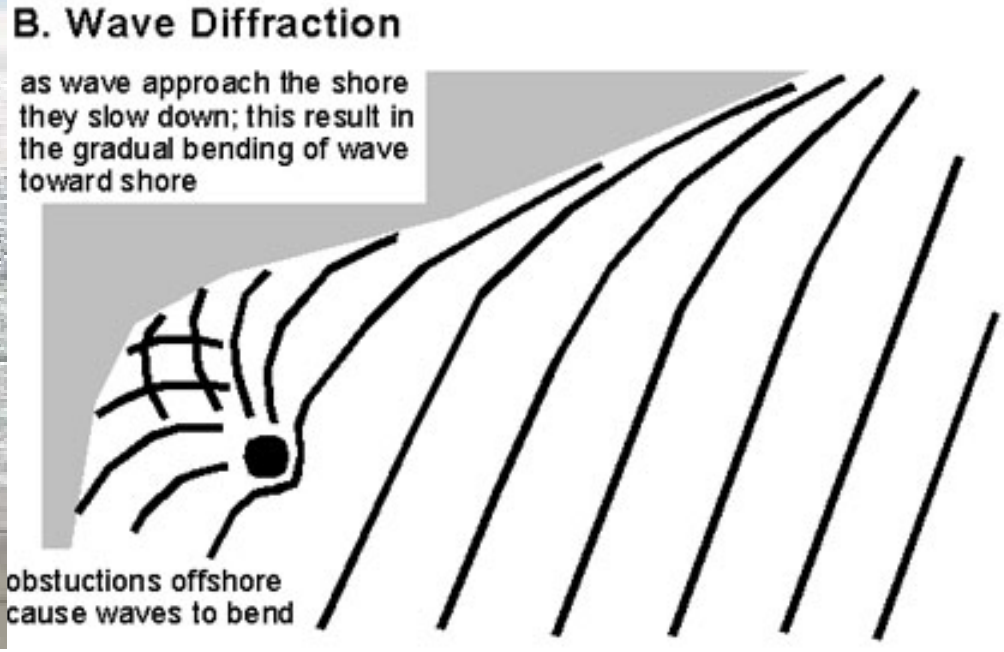
Process by which waves are bent; wave approaching a beach will be turned toward the beach as the part that reaches the shallow water slows and the part of the wave in deeper water maintains its previous speed.



# Wave Diffraction

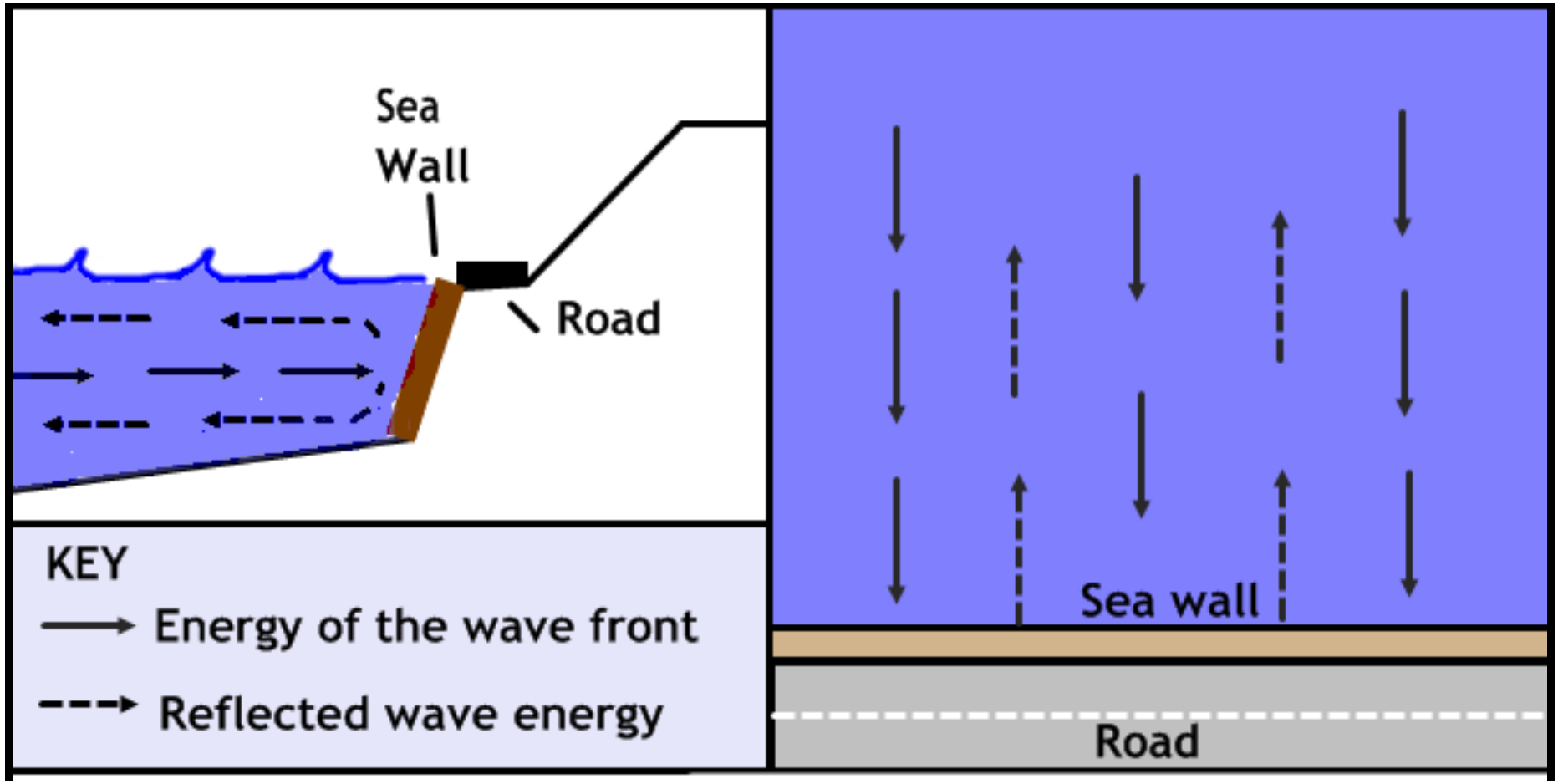
Occurs when waves bend (diffract) around each end of an obstacle or when waves enter a bay through a narrow inlet. The wave front is slowed but water escapes sideways into shadowed area.

**Animation of wave diffraction**



# Wave Reflection

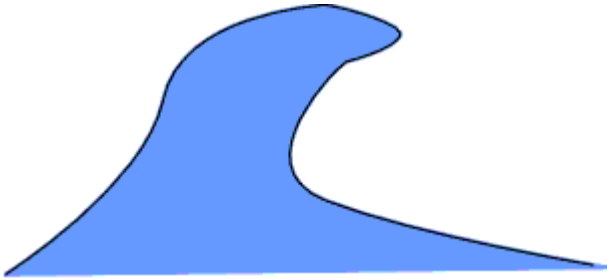
This is created by wave energy reflected back off an obstacle. E.g. when waves approaching the shore meet reflected waves.



# How waves break

There are three main ways that waves break, depending on:
a. how steep the wave is
b. how steep the shore is
c. how deep the water is

## Spilling waves

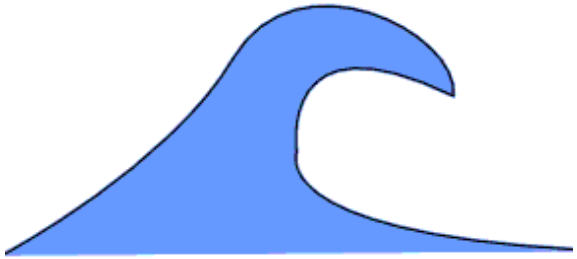


These waves are common on beaches on a low angle. They tend to lose their energy (dissipation) in an area of the beach called the dissipative domain (area where wave loses energy).

## Plunging waves

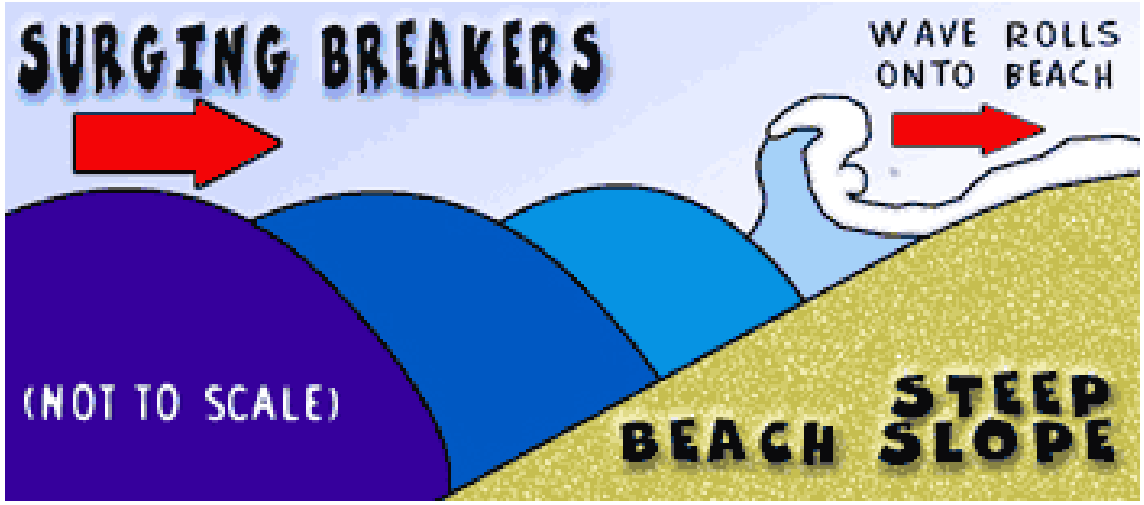
Shores that have steeply angled slopes have steep-fronted breakers that curl over and crash loudly. These are plunging waves.

Because of the steepness of the shore, a lot of the wave energy is reflected back to sea.



## Surging waves

These are waves that do not break fully and therefore have very little foam.  They are low waves in which the crest collapses instead of curling over.



The way a wave breaks determines whether it has a destructive (eroding) or constructive (depositing) effect on the beach.

A plunging wave is a destructive wave.
A spilling wave is a constructive wave.

Swash is the movement of a turbulent layer of water up the slope of a beach, as the result of a breaking wave

Backwash is the movement of water down a beach under gravitational forces after the breaking of a wave.