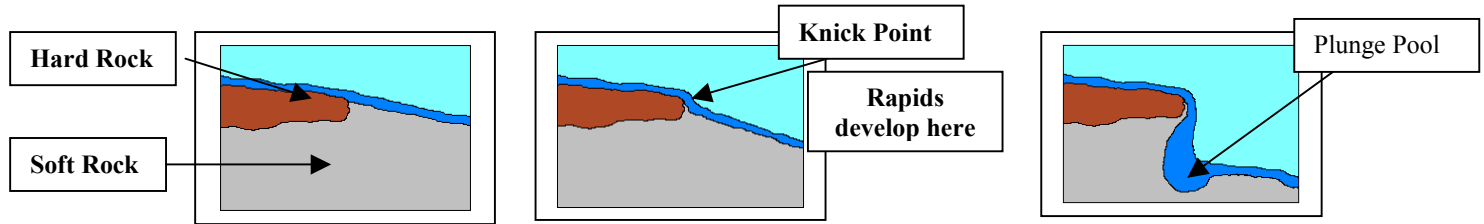


WATERFALLS



Waterfalls are sheer vertical falls in the channel of a river. Examples of well known waterfalls are the Niagara Falls in USA/Canada and Powerscourt Waterfall in Wicklow, Ireland. Waterfalls are found in the **upper course** of a river. They can occur further downstream during **rejuvenation** of a river system. Typically waterfalls occur where a river flows across a band of hard rock onto a band of softer rock. An example of hard rock is granite. The softer rock could be sandstone or limestone.

The waterfall is created because of **differential erosion**, that is, different rates of erosion. The softer rock is eroded more quickly than the harder rock. As the river flows downstream the softer rock is eroded more quickly as a result of the processes of **abrasion** and **hydraulic action**. The river carries a bed load of stones and pebbles. As the river flows, the bed load strikes the bed and banks of the river causing the channel to erode. This process is called abrasion. Hydraulic action is erosion caused by the sheer force of flowing water. Water rushes into cavities or small cracks in the river channel and forces soil and rock particles away from the river channel. In a waterfall, erosion is concentrated downwards into the bed of the channel. This aspect of the process is called **vertical erosion** and causes the river channel to deepen.

As the river passes the hard rock a **knick point** develops on the soft rock. Here the river water can become 'broken' by the development of rapids. This effect produces '**white water**' because the water is turbulent here. Over a long period of time the soft rock will erode producing a **vertical drop** in the river channel. This is the waterfall. The energy of the falling water will continue to erode the bed of the river so that eventually a **plunge pool** will develop at the base of the waterfall. The plunge pool develops initially because the force of the falling water creates a slightly deeper pool in the bed of the river. As the river's bed load falls into the pool it swirls about frantically and scours the base of the pool causing it to deepen.

Over a longer period of time, perhaps hundreds of years, the plunge pool will grow larger and assist the river in eroding backwards. This backward erosion is called **headward erosion**. Eventually the band of hard rock above the plunge pool will be undermined. Without the support of the rock below, the band of hard rock will collapse into the river. Over a still longer period of time, the river will erode back through its bed and produce a **gorge**. A gorge is a valley with high vertical walls at the bottom of which lies the river which eroded it.

Answer the questions on the page below and check your answers after you have completed them.

Waterfall questions (answers at the end of the page).

1. A water fall is:
 - a. A bend in a river
 - b. A large area of deposition in a river
 - c. A vertical drop in a river channel
 - d. Another name for a gravity fed shower
2. In what stage of a river are waterfalls found?
 - a. Middle course
 - b. Valley stage
 - c. Youthful stage
 - d. Old Stage
3. Erosion
 - a. Differential erosion is
 - i. Erosion in the gears of a car
 - ii. Erosion of the water in a river
 - iii. Different rates of erosion
 - iv. Different types of erosion
 - b. Vertical erosion
 - i. Erosion of the air above a river
 - ii. Erosion of the bed of a river
 - iii. Erosion of the bank of a river
 - iv. Erosion at the front of a river
 - c. Headward erosion
 - i. Erosion of heads caused by acid rain
 - ii. Erosion of the land behind the source of a river
 - iii. Erosion of the mature stage of a river
 - iv. Erosion of deposition caused by the river
 - d. Abrasion is erosion caused by
 - i. the force of flowing water
 - ii. by the acids in a river
 - iii. the bedload of a river
 - iv. trapped air in the pores in a river channel
 - e. Hydraulic Action

- i. the force of flowing water
 - ii. by the acids in a river
 - iii. the bedload of a river
 - iv. trapped air in the pores in a river channel
4. What is a gorge?
 - a. A good looking person
 - b. A type of river valley
 - c. A type of river erosion
 - d. A type of river deposition

Key words are marked in bold in the above paragraph. For the Leaving Certificate, you need to understand and be able to explain how river features are formed as a result of river processes. Therefore you need to be able to describe and explain how waterfalls are formed.