Chemical Weathering: Limestone

Student Pack

Name:_____

Date:_____

Learning Objectives

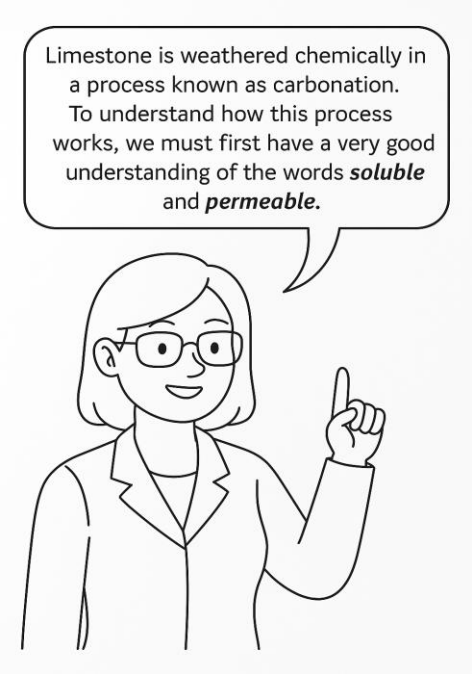
Today We Will:

- Learn how limestone is affected by chemical weathering
- Understand key words like permeable, soluble, and carbonation
- Explore how weak carbonic acid forms and affects limestone
- Identify and label features like joints, bedding planes, clints, and grikes
- Compare limestone before and after weathering using diagrams.

keywords
Weathering Soluble Permeable Insoluble Impermeable Chemical weathering Precipitation Rain Carbon dioxide Weak carbonic acid Joints Bedding plane Strata Grikes Clints Limestone pavement

L.O 1.3 Analyse the processes and effects of weathering on our landscape

Limestone: How is it weathered?



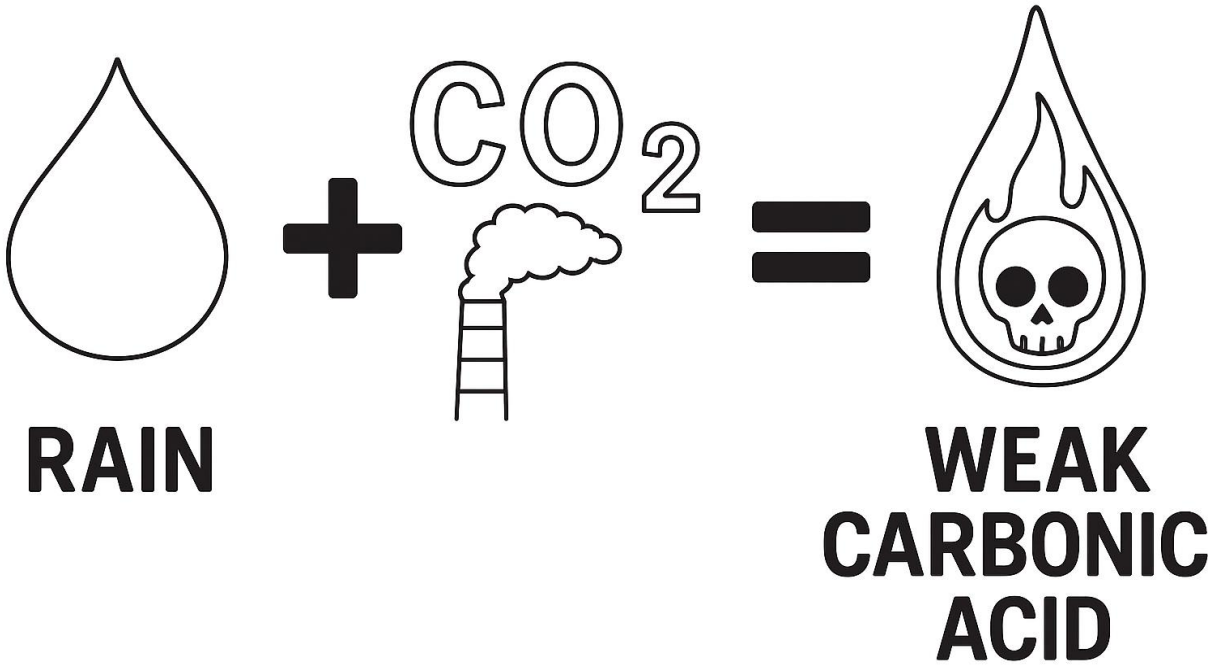
Firstly, let's look at the word *soluble*!
If something is soluble, it means it can **dissolve** in a liquid. Be careful to use the word **dissolve**, not **disappear**.
Why is that difference important?

Limestone is soluble — so does that mean it can dissolve in water?
Not exactly. It dissolves in a weak carbonic acid.
Let's explore what weak carbonic acid is.

- As rain falls through the sky, it passes through air that contains carbon dioxide.
- When the rain and carbon dioxide mix, they form a weak acid called carbonic acid.
- This acid isn't strong or dangerous, but it's strong enough to slowly dissolve limestone, which is a soluble rock.

Draw a labelled diagram to explain how weak carbonic acid is formed (made)

Colour the diagram below



Colour in the letters SOLUBLE in the word below

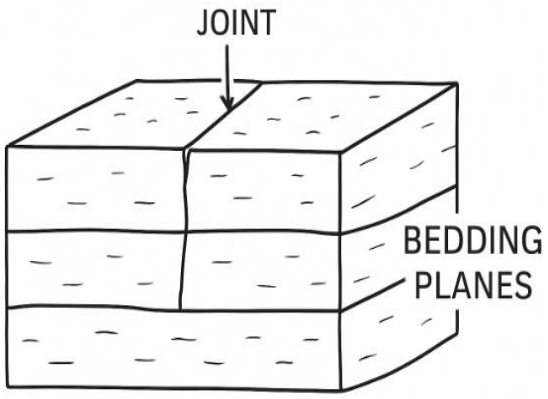
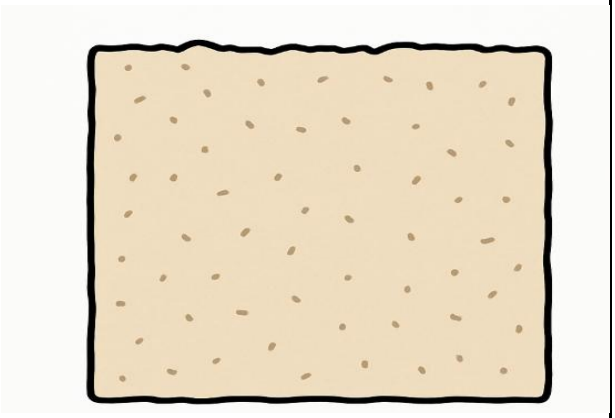
INSOLUBLE

What do you think the word *insoluble* means?
Take an educated guess.

Write a summary about limestone being soluble

Now let's look at the word *permeable*.
Permeable means that **water can pass through a material**.

Take a look at a profile of **limestone** and **granite**.
Why do you think **limestone is permeable**?

Limestone	**Granite**
	

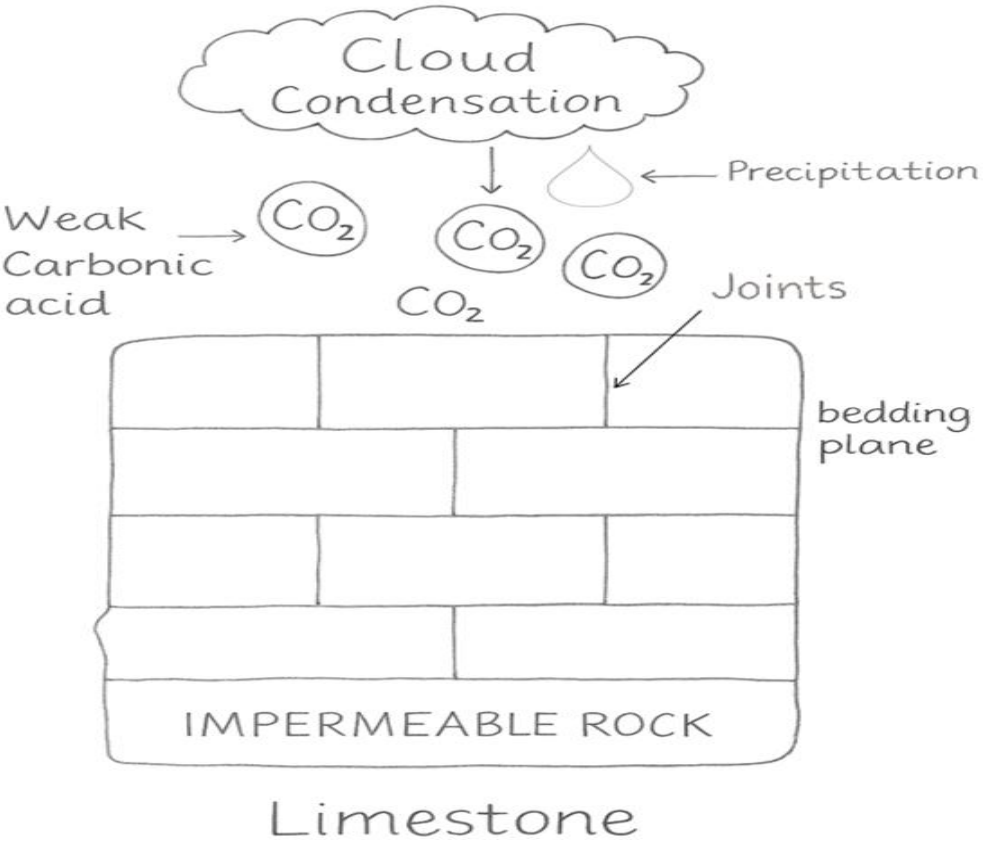
Why do you think limestone is permeable?

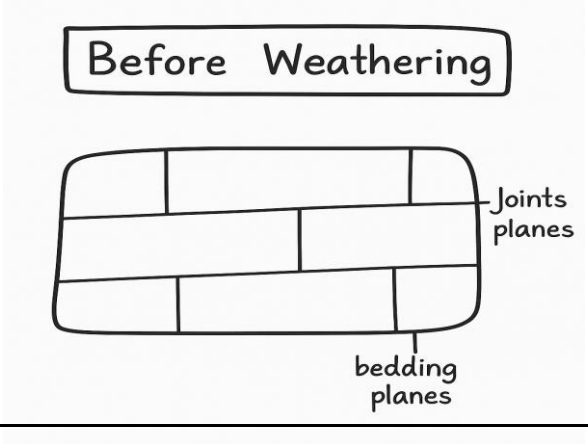
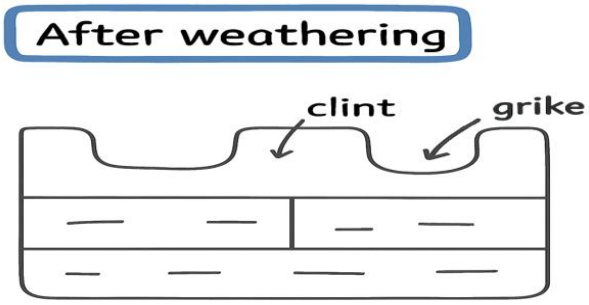
Colour in the letters PERMEABLE in the word below

IMPERMEABLE

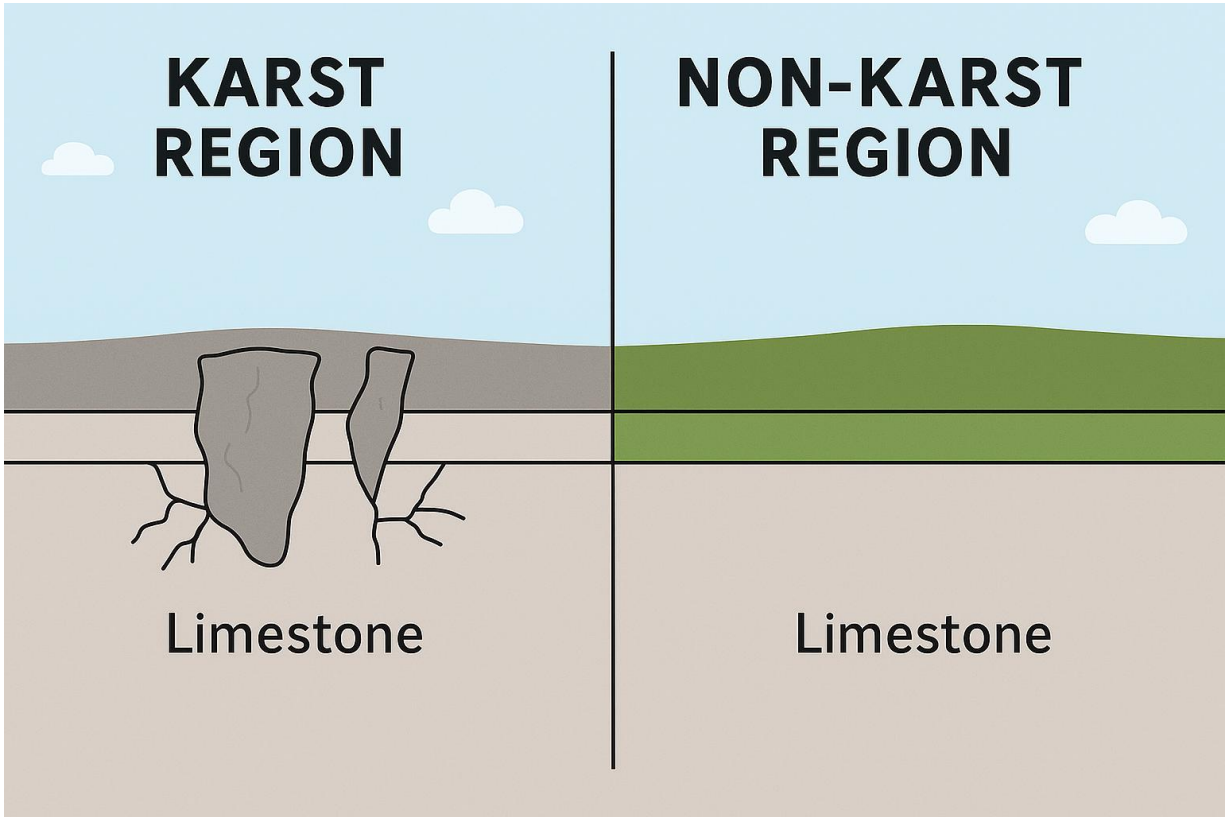
What do you think the word impermeable means?
Take an educated guess

Using any colour, mark the route that the weak carbonic acid takes when it reaches the limestone.



Carbonation	*Describe what carbonation is in relation to limestone in your own words*
They form mainly because of weathering, especially chemical weathering. 1. Limestone is made of calcium carbonate, which reacts with rainwater. 2. Rainwater is slightly acidic because it mixes with carbon dioxide in the air, forming a weak acid. 3. This acidic rainwater seeps into tiny cracks in the limestone and slowly dissolves the rock. 4. Over time, the cracks (called joints) get wider and deeper. 5. The limestone breaks into blocks with gaps in between. The blocks are called clints, and the gaps are called grikes.	
	
	

What is the difference between karst and non karst?



Write the differences:

Colour all the words associated with limestone

LIMESTONE	
IMPERMEABLE	SOLUBLE
PERMEABLE	INSOLUBLE

Student Self Reflection

Tick the box

I Can...

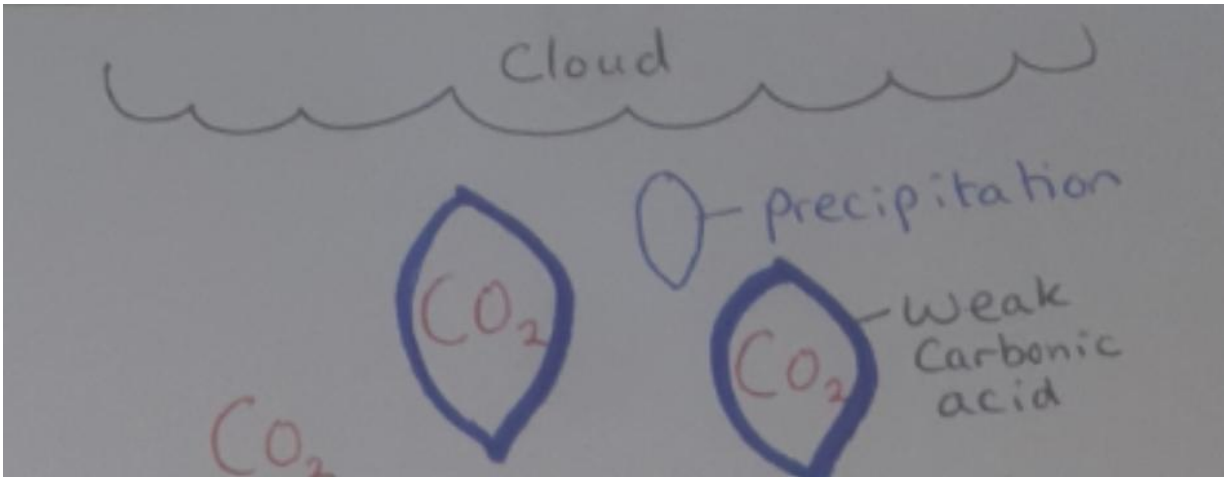
☐ Explain how limestone is weathered by weak carbonic acid
☐ Understand what soluble and permeable mean
☐ Describe how carbonation works
☐ Label diagrams showing joints, bedding planes, clints, and grikes
☐ Compare limestone before and after weathering using correct terms

What I found easy:

What I still need help with:

Teacher Guidelines

Dissolve versus Disappear
When something **dissolves**, it **spreads out evenly in a liquid** and forms a solution. It might look like it's gone, but it's **still there**, just **mixed in** so well that you can't see it anymore. For example, when salt dissolves in water, it's still in the water—you can taste it! But if you say it **"disappeared"**, it sounds like it's **completely gone**, like it vanished or stopped existing—which isn't true when something dissolves. So, scientists use the word **"dissolve"** to be accurate: the substance is still there, just mixed into the liquid.

Draw a labelled diagram to explain how weak carbonic acid is formed(made)
 Any version is acceptable, aim is to engage with concepts

What do you think the word *insoluble* means?
Take an educated guess.

Insoluble means **something cannot dissolve** in a liquid.

So if a substance is **insoluble in water**, it means that no matter how much you stir or wait, it **won't mix in** or **disappear into the water**. It will just stay as it is—like sand in water. The sand sinks to the bottom but doesn't dissolve.

It's the opposite of **soluble**, which means it **can** dissolve.

Why do you think limestone is permeable?

Limestone is considered **permeable** because **water can pass through it**. This happens for two main reasons:

1. **It has natural cracks and joints** – Limestone forms in layers, and over time, it develops tiny cracks. Rainwater can easily seep through these spaces.

2. **It dissolves in rainwater** – Rain is slightly acidic, and it can slowly dissolve limestone. This makes the cracks wider, creating **bigger gaps** where water can flow through even more easily.

What do you think the word impermeable means?
Take an educated guess

Impermeable means liquid or water cannot pass through something.

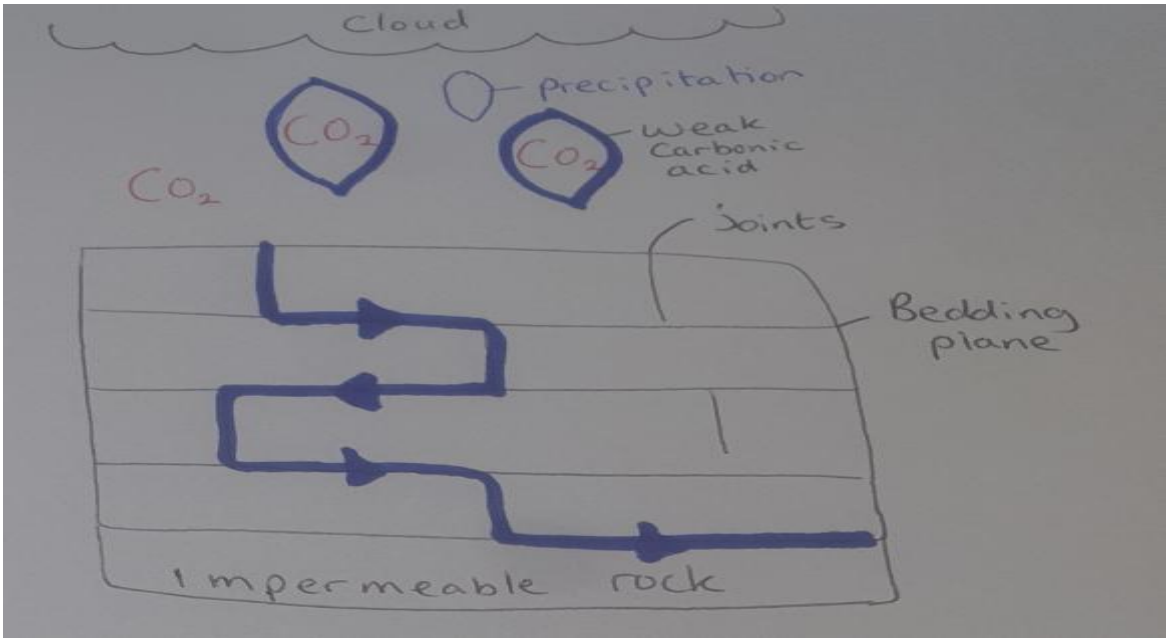
If a rock or material is impermeable, it blocks water from soaking in or getting through. Instead, the water just sits on top or runs off.

For example:

- Clay is impermeable—it doesn't let water through easily.
- A plastic raincoat is impermeable—it keeps you dry by stopping water from getting in.

So, if something is impermeable, it acts like a barrier to water!

Using any colour, mark the route that the weak carbonic acid takes when it reaches the limestone.



Why is one side karst and the other non-karst?

Both sides are made of **limestone**, but the **karst side** has been **affected by weathering** more than the non-karst side.

- On the **karst side**, **rainwater (which is slightly acidic)** has soaked into the limestone.
- This water **dissolves the rock** along cracks and joints over thousands of years.
- This forms features like **grikes, clints, sinkholes**, and underground caves.
- Because of this, the landscape becomes **rocky, uneven, and full of gaps**—this is called a **karst landscape**.

On the **non-karst side**, the limestone **hasn't been weathered as much** yet.

- The surface is still mostly **flat, smooth, and covered in soil or grass**.
- There hasn't been enough time, water, or acidity to create the same changes.