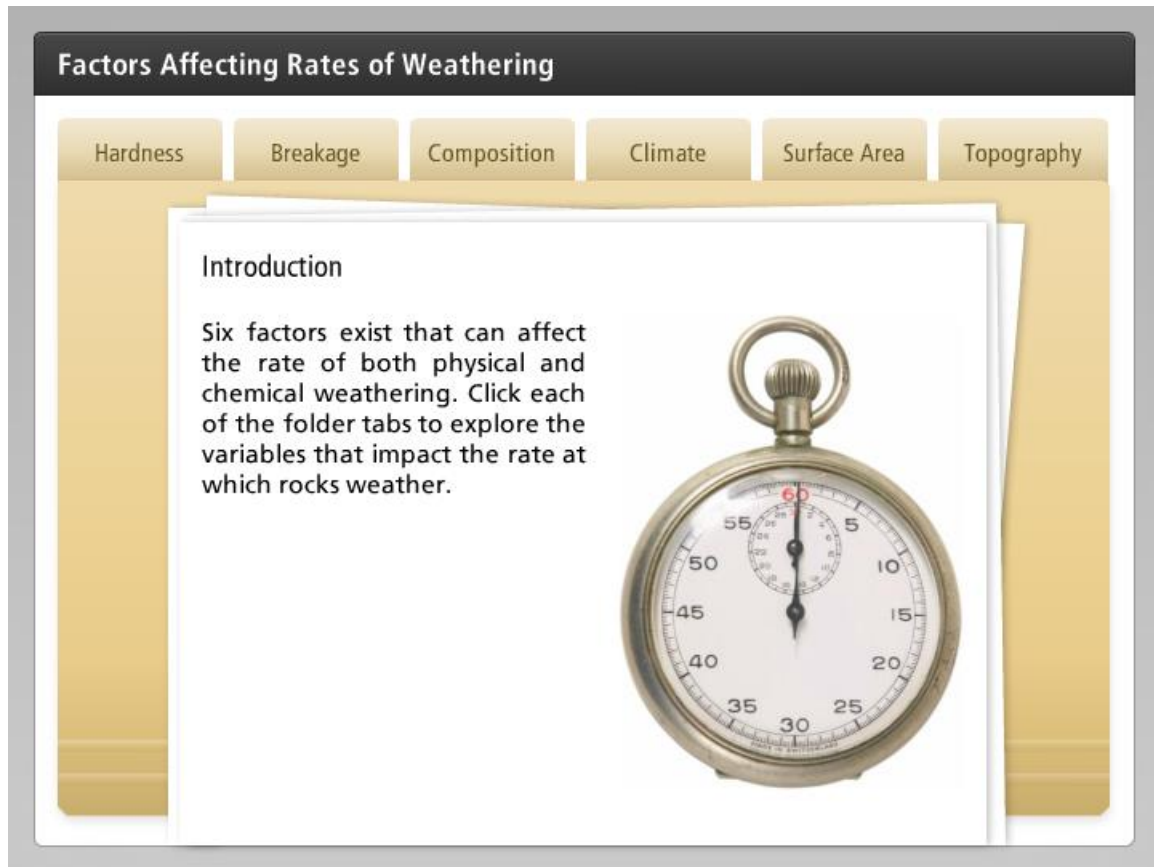


# Module 8: Weathering, Erosion, and Groundwater

## Topic 1 Content: Factors Affecting Rates of Weathering Notes

### Introduction



The screenshot shows a digital interface with a dark grey header containing the title "Factors Affecting Rates of Weathering". Below the header are six yellow folder tabs labeled "Hardness", "Breakage", "Composition", "Climate", "Surface Area", and "Topography". The "Introduction" tab is selected, displaying a white document with the following text:

**Introduction**

Six factors exist that can affect the rate of both physical and chemical weathering. Click each of the folder tabs to explore the variables that impact the rate at which rocks weather.

To the right of the text is a detailed image of a classic pocket watch with a white face and black numerals, showing the time as approximately 12:00.

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# Module 8: Weathering, Erosion, and Groundwater

## Topic 1 Content: Factors Affecting Rates of Weathering Notes

### Hardness

**Factors Affecting Rates of Weathering**

Hardness   Breakage   Composition   Climate   Surface Area   Topography

#### Hardness

All minerals are ranked on Mohs' Scale of Hardness which measures a mineral's resistance to being scratched. Minerals that rank low on the scale are soft and can be scratched easily. As a result, these minerals are highly susceptible to weathering. The opposite is true for hard minerals like quartz. Remember, minerals compose rocks. Any rock with softer minerals will weather at a faster rate.

Hardness	Mineral
1	Talc
2	Gypsum
3	Calcite
4	Fluorite
5	Apatite
6	Orthoclase
7	Quartz
8	Topaz
9	Corundum
10	Diamond

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## Module 8: Weathering, Erosion, and Groundwater


### Topic 1 Content: Factors Affecting Rates of Weathering Notes

#### Breakage

**Factors Affecting Rates of Weathering**

Hardness   Breakage   Composition   Climate   Surface Area   Topography

#### Breakage



Minerals either fracture or cleave. When minerals fracture; the mineral breaks in irregular shards or pieces. When a mineral cleaves; the breaks are linear and appear as if they were cut with a saw. Ultimately, the way a mineral breaks is determined by its crystal structure. Crystal structure is the way atoms are arranged. This pattern repeats over and over in three dimensions. If there is a weak bond present in the structure, then that weakness will be repeated throughout the structure. As a result, minerals with weaknesses present within the structure cleave. These weaknesses cause minerals with cleavage to weather easily or at higher rates. The mineral fluorite exhibits cleavage. As a result this mineral

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## Module 8: Weathering, Erosion, and Groundwater


### Topic 1 Content: Factors Affecting Rates of Weathering Notes

#### Composition

#### Factors Affecting Rates of Weathering

Hardness   Breakage   **Composition**   Climate   Surface Area   Topography

##### Composition



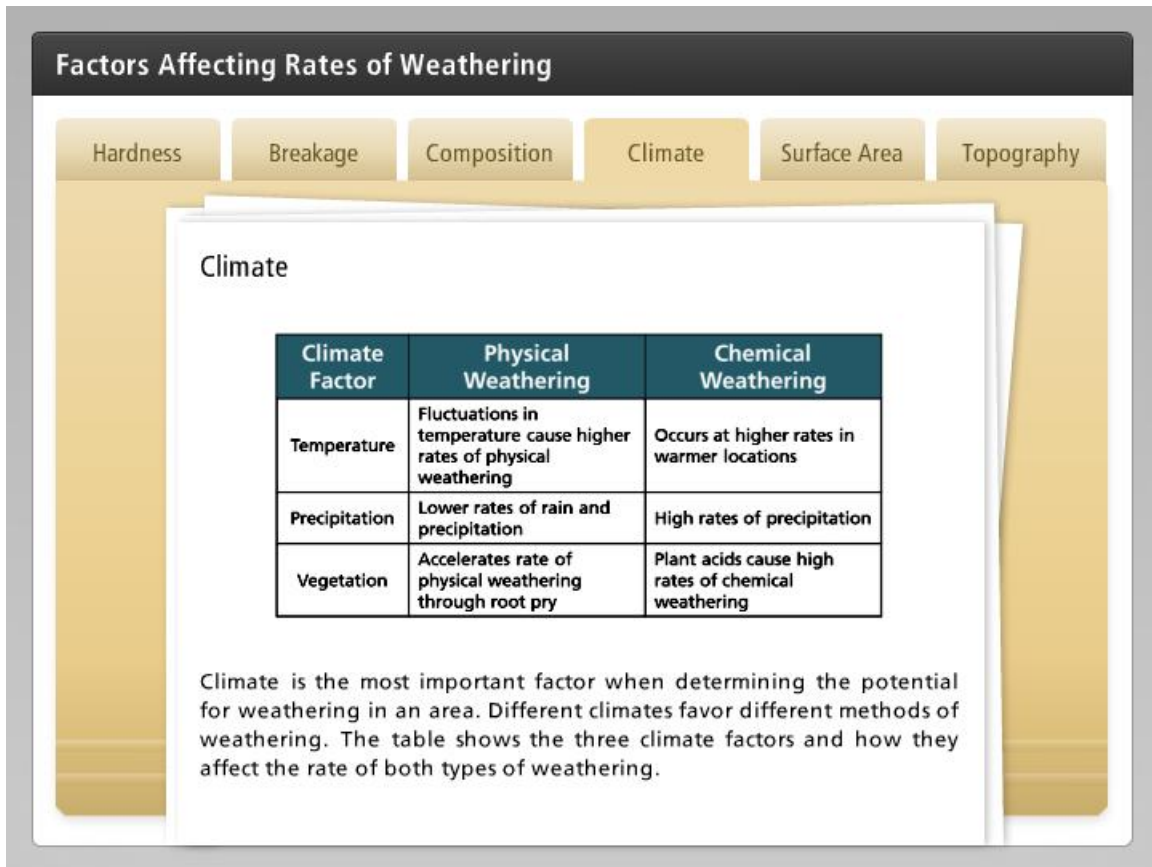
Each mineral has a unique mineral composition. Minerals that have highly reactive compositions will weather faster or more readily. The carbonate group easily reacts with acids. This makes them terribly vulnerable to any rain shower. Of the three rock types, sedimentary rocks weather the fastest due to the manner in which sedimentary rocks form. The image shows the White Cliffs of Dover in the United Kingdom. Here, the sedimentary rock chalk is weathering at a fast rate.

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# Module 8: Weathering, Erosion, and Groundwater

## Topic 1 Content: Factors Affecting Rates of Weathering Notes

### Climate



The slide is titled "Factors Affecting Rates of Weathering" and features a navigation bar with six tabs: Hardness, Breakage, Composition, Climate, Surface Area, and Topography. The "Climate" tab is selected. Below the navigation bar, the word "Climate" is written. A table with three columns and three rows is centered on the slide. The columns are labeled "Climate Factor", "Physical Weathering", and "Chemical Weathering". The rows are labeled "Temperature", "Precipitation", and "Vegetation". Below the table, a paragraph explains that climate is the most important factor in determining weathering potential and that different climates favor different methods of weathering.

Climate Factor	Physical Weathering	Chemical Weathering
Temperature	Fluctuations in temperature cause higher rates of physical weathering	Occurs at higher rates in warmer locations
Precipitation	Lower rates of rain and precipitation	High rates of precipitation
Vegetation	Accelerates rate of physical weathering through root pry	Plant acids cause high rates of chemical weathering

Climate is the most important factor when determining the potential for weathering in an area. Different climates favor different methods of weathering. The table shows the three climate factors and how they affect the rate of both types of weathering.

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# Module 8: Weathering, Erosion, and Groundwater


## Topic 1 Content: Factors Affecting Rates of Weathering Notes

### Surface Area

**Factors Affecting Rates of Weathering**

Hardness   Breakage   Composition   Climate   **Surface Area**   Topography

#### Surface Area



As a rock breaks, more of the rock is exposed at the surface of the rock. The total amount of rock exposed at the surface of a rock is called surface area. As surface area increases, the rate of weathering, both physical and chemical, increases. The exposed granite rocks at the Baths on the small island of Virgin Gorda in the Caribbean are exposed to weathering.

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# Module 8: Weathering, Erosion, and Groundwater


## Topic 1 Content: Factors Affecting Rates of Weathering Notes

### Topography

**Factors Affecting Rates of Weathering**

Hardness   Breakage   Composition   Climate   Surface Area   Topography

**Topography**



Areas with sloping topography are associated with high rates of physical weathering. This is because rocks are more likely to fall down the slope and break as a result of physical interactions with other rocks on the slope. You can observe the deposit of unconsolidated sediments at the bottom of the slope shown in the image.

Areas with sloping topography are associated with high rates of physical weathering. This is because rocks are more likely to fall down the slope and break as a result of physical interactions with other rocks on the slope. You can observe the deposit of unconsolidated sediments at the bottom of the slope shown in the image.