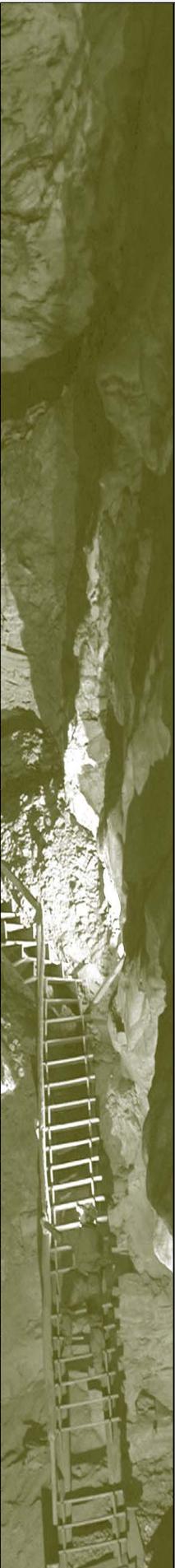


## The Rock Cycle

# Student Copy



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# THE ROCK CYCLE

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## The Rocks

There are three main rock types: **igneous**, **sedimentary**, and **metamorphic**:

1. **Igneous rocks** are formed when magma cools and solidifies to form a rock.
  2. **Sedimentary rocks** are formed when rock fragments are compacted and cemented together as a rock.
  3. **Metamorphic rocks** are formed when rocks change under extreme heat and pressure.
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## The Rock Cycle

Any one type of rock can become any other type through the processes of the **rock cycle**. One way we can look at the rock cycle is to begin with molten rock (magma), which, if cooled, forms **igneous rocks**. These rocks get uplifted and then begin to weather and erode. The eroded material is carried away by rivers, wind, and glaciers, and deposited elsewhere as sediments. These sediments are then buried and geological processes consolidate the loose sediments into **sedimentary rocks**. Sedimentary rocks can be buried, subjected to heat, pressure, and fluids, and become **metamorphic rocks**. Eventually, these metamorphic rocks may be heated to the point where they again melt into magma, and the cycle can start all over again.

It is important to note that the rock cycle doesn't have to work this way; sometimes igneous rocks metamorphose without ever eroding, and sometimes you uplift and erode sedimentary and metamorphic rocks, rather than melting them. It is also possible for rocks to remain un-eroded and unchanged in stable regions for long periods of time.

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## In Summary:

- ★ Igneous rocks can change into sedimentary rocks or into metamorphic rocks.
  - ★ Sedimentary rocks can change into metamorphic rocks or into igneous rocks.
  - ★ Metamorphic rocks can change into igneous rocks or into sedimentary rocks.
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## Devils Tower National Monument in the Black Hills of Wyoming

The sequence of geologic events that created Devils Tower is a great way to illustrate the powerful processes of the rock cycle.

### Stage 1: Deposition of Sedimentary Rocks

The layers of sedimentary rocks in the Black Hills area are nearly two miles (3.2 km) thick. Most of these layers were deposited in shallow seas beginning about 500 million years ago.

### Stage 2: Uplift of the Black Hills

Tectonic processes formed the Black Hills about 60 million years ago. The rocks were uplifted, fractured, and faulted.

### Stage 3: Intrusion of Magma

About 50 million years ago magma (molten rock) welled up into the older sedimentary rocks. One of these magma bodies would later become Devils Tower. However, the magma that formed the tower cooled underground, never reaching the surface. Thus, Devils Tower remained buried under more than a mile of sedimentary rock for many millions of years.

### Stage 4: Regional Uplift and Erosion



About 5 million years ago, the entire Rocky Mountain region (including Utah, Colorado, Wyoming, and Montana) was uplifted high above sea level. As a result, the rivers in the region began to flow aggressively, cutting rapidly downward into the soft sedimentary rocks. Rivers carried the eroded material away and deposited it into the Gulfs of Mexico and California. In the Devils Tower area, the Belle Fourche River and its tributaries removed many layers of softer sedimentary rocks covering the Tower. Hence, the harder igneous rock of Devils Tower was eventually exposed at the surface.

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### Want to learn more about Devil's Tower?

Visit the Devil's Tower Virtual Experience in the Views of the National Parks multimedia education program:

<http://www2.nature.nps.gov/views/#>

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## Questions

1.) From what source are sedimentary rocks formed?

2.) What is magma?

3.) What are 3 ways the eroded sediments of rocks can be carried away?

4.) What are the 4 geologic events that formed Devils Tower?

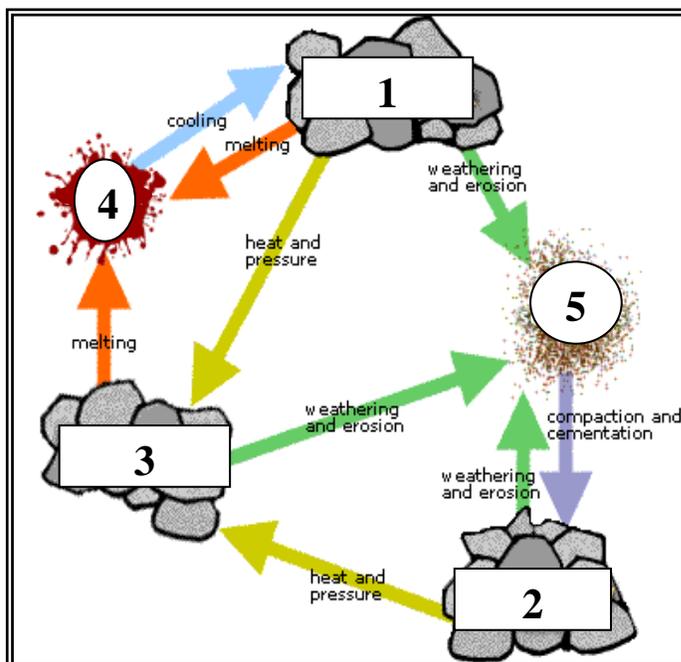
Stage 1:

Stage 2:

Stage 3:

Stage 4:

5.) Correctly label the rock cycle below:



1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_

5. \_\_\_\_\_

Illustration Source: <http://www.teacher-lab.org/ps101/bglasgold/rocks/lesson3rocksysle.htm>