

Measuring Earthquakes

The recent earthquake that hit northeastern Japan was measured at 9.0 on the Moment Magnitude Scale (MMS). Scientists known as **seismologists** use the MMS to determine the **magnitude** (strength) of an earthquake.

The MMS measures the total energy of an earthquake, called the **seismic moment**. The seismic moment of an earthquake is determined based on three factors. The first factor is the distance that rock slides along a fault surface after it breaks, called the **fault slip**. The second factor is the area of the fault surface that is actually broken by the earthquake. And the third factor is the measurement of how **rigid** the rocks are near the broken fault. A strong rock, such as granite, cannot be broken easily. That makes it a highly rigid rock.

When an earthquake happens, stations with advanced seismology tools all take readings of the fault slip, the fault area, and the rigidity. Those readings are sent to central locations. Seismologists multiply the fault slip, fault area, and rigidity together to determine the actual seismic moment.

The most powerful seismic moment ever measured registered a **9.5** on the MMS—it happened when an earthquake struck just off the coast of Chile on May 22, 1960.

The MMS is similar to an older, well-known earthquake measurement scale called the **Richter scale**. Most scientists now

prefer the MMS to the Richter scale. The Richter scale is not as exact as the MMS in how it calculates an earthquake's strength.

Here is an approximate and basic description of what happens when earthquakes of different strengths strike. You'll notice that the higher the number gets, the worse the damage becomes.

- 1.0 — Earthquakes this small happen below ground. You can't feel them.
 - 2.0 — Trees sway. Small ponds ripple. Doors swing slowly. But you can't tell that an earthquake is to blame.
 - 3.0 — You may notice this quake if you are sitting still, or upstairs in a house. A hanging object, like a model airplane, may swing.
 - 4.0 — Buildings shake a little. It feels like a truck is passing by your house.
 - 5.0 — If you are in a car, it may rock. Glasses and dishes may rattle. Windows may break.
 - 6.0 — Pictures can fall off walls. Furniture moves. In some buildings, walls may crack.
 - 7.0 — It is hard to keep your balance. The ground cracks. Roads shake. Weak buildings fall down. Other buildings are badly damaged.
 - 8.0 — Very few buildings stay up. Bridges fall down. Underground pipes burst. Railroad rails bend. Large rocks move. Smaller objects are tossed into the air. Some objects are swallowed up by the earth.
 - 9.0 and above — Causes complete devastation and large-scale loss of life.
- Credit: *Scholastic News*

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