**PARCC/MISA Item Set ES - PARCC/MISA - Earthquakes**

**EARTHQUAKE INFORMATION:** Earthquakes occur in the earth's crust, the topmost layer of the earth, which is typically 7 to 30 km (4 to 18 mi) thick. The crust is the coldest and most brittle part of the earth, and has many fault systems on which earthquakes occur. These earthquakes are caused by the buildup of tectonic stress, and result in the release of energy in the forms of seismic waves. This energy can be measured to determine an earthquake’s magnitude.

Earthquakes also occur in the parts of the tectonic plates that are being pushed down into the earth, called *subducting slabs* or subduction zones. These slabs are known to penetrate down to depths of 700 km (400 mi) or so. At these depths, the higher temperatures make rock softer.

Scientists have studied how seismic waves move through different material and noticed that the transfer of energy in the form of waves is easier when the waves pass through solid material as compared to liquid/molten material.



***Crustal Earthquakes 2004 and 2016***

***Deep Crustal Earthquakes 2011 and 2014***

***Subduction zone earthquake 2016 and 2017***

**EARTHQUAKE DATA:** Scientists have collected data from the earthquakes that have occurred in the Cascadia Earthquake Sources diagram found in STIMULUS ONE to try and determine what factor(s), if any have a correlation with the earthquake’s magnitude. Below you will find the data that the scientists collected.

**CRUSTAL EARTHQUAKES**

|  |  |  |
| --- | --- | --- |
| **Year** | **Depth of Focus** | **Magnitude** |
| **2004** | 13km | 8.9 |
| **2016** | 10km | 9.0 |

**SUBDUCTION ZONE EARTHQUAKES**

|  |  |  |
| --- | --- | --- |
| **Year** | **Depth of Focus** | **Magnitude** |
| **2016** | 608km | 4.5 |
| **2017** | 564km | 3.8 |

**DEEP CRUSTAL EARTHQUAKES**

|  |  |  |
| --- | --- | --- |
| **Year** | **Depth of Focus** | **Magnitude** |
| **2011** | 480km | 4.8 |
| **2014** | 392km | 5.1 |

**CONSTRUCTED RESPONSE:** Cite evidence from the information and data presented to determine what factor(s), if any have a correlation with the magnitude of an earthquake. 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