

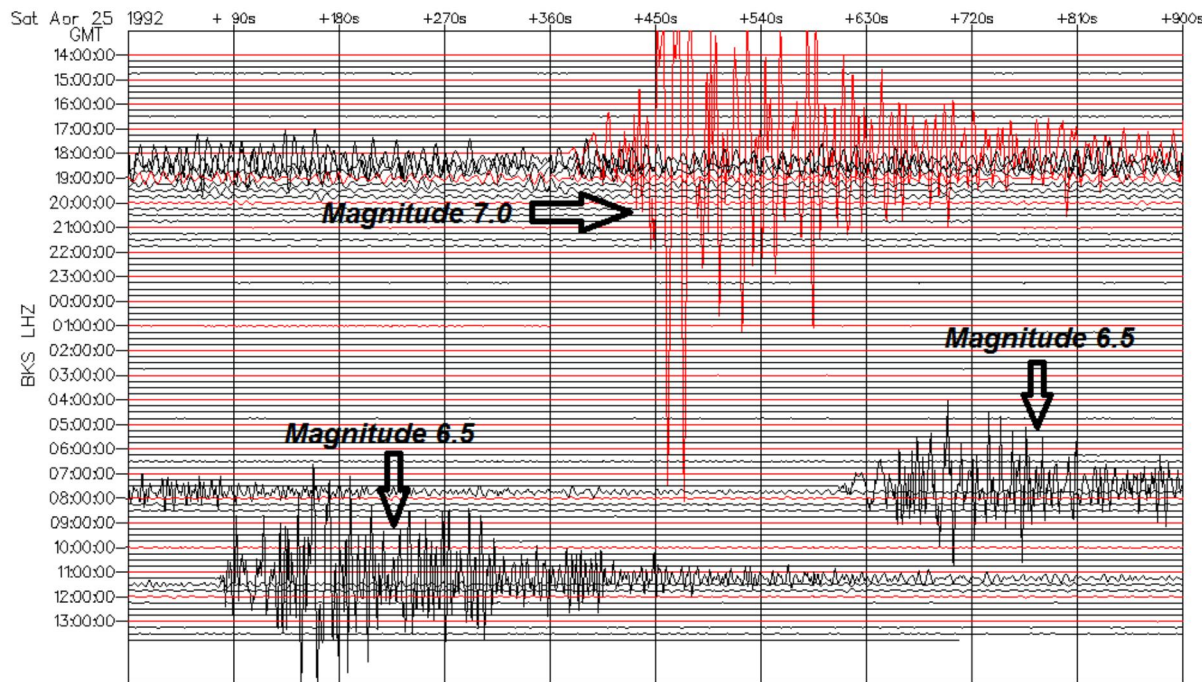
Course Project

Earthquakes Shiny App - Sept 2014

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Earthquake Seismograph: Cape Mendocino, California, April 25-26, 1992

[The Seismograph](#) shows one Magnitude 7.0 quake, and two Magnitude 6.5 quakes. How does Magnitude 7.0 compare to Magnitude 6.5?



Compare Sizes

When comparing sizes of two quakes, use the relationship between wave Amplitude (A) and Magnitude (M):

$\log_{10}(A)$ is proportional to M

Compare sizes of the Magnitude 7.0 and 6.5 quakes:

```
10^7.0 / 10^6.5
```

```
## [1] 3.162
```

The Magnitude 7.0 quake is 3.2 times larger than a Magnitude 6.5 quake, in terms of the seismograph wave amplitudes.

Compare Strengths

When comparing strengths of two quakes, use the relationship between Energy (E) and Magnitude (M) of an earthquake:

$\log_{10}(E)$ is proportional to $1.5 \cdot M$

Compare strengths of the Magnitude 7.0 and 6.5 quakes:

```
10^(1.5*7.0) / 10^(1.5*6.5)
```

```
## [1] 5.623
```

The Magnitude 7.0 quake is 5.6 times stronger than a Magnitude 6.5 quake, in terms of destructive energy.

Let's make an app that compares the Sizes and Strengths of two earthquakes from their Magnitudes.

Shiny App: Earthquake Comparisons

1. Use the slider bars to select the two Magnitudes
2. Click "Submit"
3. The summary of the two Quakes is displayed on the right side

Earthquake Calculator

Select Earthquake #1 Magnitude

0.1 6.5 9

Select Earthquake #2 Magnitude

0.1 7 9

Submit

Earthquake Summary

Quake #1 Magnitude = 6.5
Quake #2 Magnitude = 7

Compare Sizes

Quake #2 is 3.2 times larger than Quake #1.
In other words, when comparing the two earthquakes on a Seismograph, the Amplitudes of the waves for Quake #2 are 3.2 times larger than Quake #1.

Compare Strengths

Quake #2 is 5.6 times stronger than Quake #1.
In other words, Quake #2 has 5.6 times more shaking energy than Quake #1.
It would take 5.6 earthquakes of Magnitude 6.5 to equal the energy released from one earthquake of Magnitude 7.

Based on information from USGS:
http://earthquake.usgs.gov/learn/topics/how_much_bigger.php