Logarithmic Earthquake Project

NCTM San Antonio 2017

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Timeline 2016-2017

6	7	8	9	10
Earthquake Project Intro	Ch. 7 Test		Earthquake Project Workday	

Assign Groups & Earthquakes

Watch Video after test HW: create Gallery Walk Slides

85 minutes in class and students finish for homework

13	14	15	16	17
Earthquake Project Presentations		8.1 Inverse Variation		

8 presentations during an 85 minute block

Project Guidelines Handout

Refer to 3. Earthquake Project Guidelines

ALGEBRA 2 HONORS EARTHQUAKE PROJECT 2015-2016

Khan Academy Video

PROJECT OVERVIEW

In groups of 3 to 4, you will create a 5 - 10 minute group presentation (possible formats include Google Slides, Prezi, Video, etc) that does the following:

1. Research and document how scientists use mathematics in measuring various earthquakes.
2. Research and document the physical impact of earthquakes in various locations. (Stewardship)
3. Research and document the social impact of earthquakes in various locations. (foundation to do advocacy)
4. Mathematically compare the magnitude, energy released and intensity of multiple earthquakes.
5. Reflect upon personal responsibility of stewardship, solidarity, and advocacy.

Refer to 4. Exit Ticket

Refer to 2. Earthquake Gallery Walk Sample

Algebra 2 Honors Block 7 (sample)

1. Add a slide to this presentation for each earthquake that you are studying.
2. Add an image that captures the damage, rescue or humanitarian efforts to provide relief for each earthquake (your image should cover the majority of the slide)
3. Add a textbox that contains the place and date of the earthquake (day, month and year)
4. Add a QR Code to your presentation.

Gallery Walk

Step 1 Research

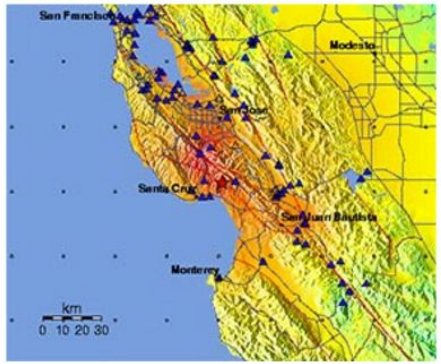
Refer to
5. (a) Group F3 -Student Work

5. (b) Group F5 - student work

The Two Quakes - quick facts

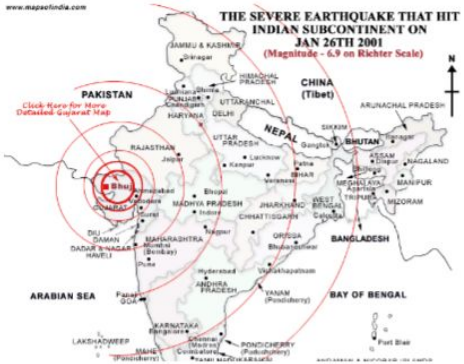
Loma Prieta

- October 17, 1989
- In the San Francisco/Santa Cruz area
- 6.9 on the Richter scale
- Death Toll: 63



Gujarat

- January 26, 2001
- In Gujarat(east India)
- 7.9 on the Richter scale
- Death Toll: 21,357



Step 1 Research

Refer to
5. (a) Group F3 -Student Work

5. (b) Group F5 - student work

Life Before The Quakes Q4

Loma Prieta, CA:

- Embarcadero freeway & San Francisco-Oakland Bay Bridge for transportation.
  - Embarcadero freeway consisted of double decker roads.
- Buildings were built on soft soil and had unreinforced frames, floor systems, and brick walls
- After the 68 time period of no earthquakes, there were 3 major earthquakes; Morgan Hill before Loma Prieta
- July 1989 - 725,889; July 1990 - 723,496

Gujarat, India:

- Home water supply: 30%
- People knowing cautionary procedure during earthquakes: 0% (after: 80%)
- Population: 50, 671, 017
- ⅗ of population live in rural areas
- Highest elevation: 3,665 feet
- Land is wet and fertile

Step 2 Calculations

$R = 0.67\log(.37E) + 1.46$

R is richter magnitude

E is energy in kilowatt hours

$\log(I_1/I_2) = M_1 - M_2$

I = intensity of earthquake

M = magnitude (Richter) of earthquake

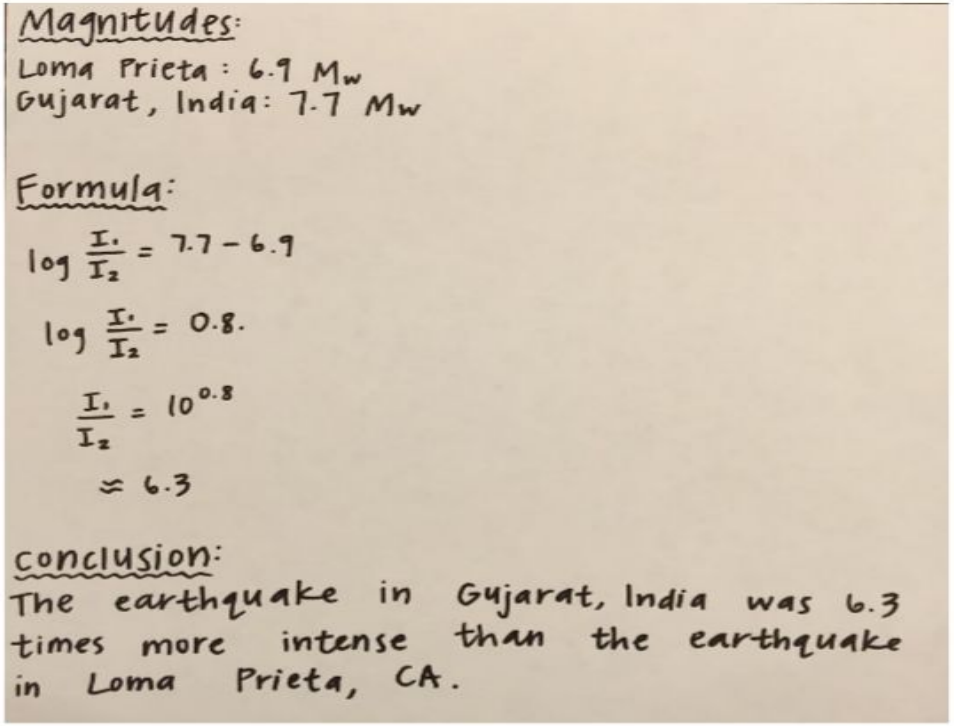
Step 2 Calculations

Refer to
5. (a) Group F3 -Student Work

5. (b) Group F5 - student work

Calculations - Intensity

After identifying the two magnitudes of the earthquakes, we used the formula (shown on the right) to identify the intensity of one earthquake over the other.



Magnitudes:
Loma Prieta : 6.9 M_w
Gujarat, India: 7.7 M_w

Formula:

$$\log \frac{I_1}{I_2} = 7.7 - 6.9$$

$$\log \frac{I_1}{I_2} = 0.8.$$

$$\frac{I_1}{I_2} = 10^{0.8}$$

$$\approx 6.3$$

conclusion:
The earthquake in Gujarat, India was 6.3 times more intense than the earthquake in Loma Prieta, CA.

Step 3 Reflections

Refer to
5. (a) Group F3 -Student Work

5. (b) Group F5 - student work

How can we be good stewards through service?

We can be good stewards through acts of service by volunteering to to help those affected by natural disasters such as earthquakes, hurricanes, typhoons, tsunamis, and more. We must help those who are hurt to recover, because for one thing, it is our moral duty and responsibility, and for another, the whole world is connected, and something that happens on the other side of the world can affect us in ways we cannot predict. Service is something that should be performed by everyone.

Rubric Handout

Refer to
6. Earthquake Project Grading Rubric

7. Earthquake Project Template

Introduction quick facts	1 of 5 requirements satisfied	2 of 5 requirements satisfied	3 of 5 requirements satisfied	4 of 5 requirements satisfied	1. Title slide complete - title, full names, date, block 2. map pinpointing earthquake #1 is clear 3. map pinpointing earthquake #2 is clear 4. Date of two earthqakes given 5. Magnitude of two quakes given
Research life before quake	1 of 5 requirements satisfied	2 of 5 requirements satisfied	3 of 5 requirements satisfied	4 of 5 requirements satisfied	1. Discussed life before earthquake #1 2. Discussed life before earthquake #2 3. Explained similarities of life before the quakes amongst the two locations 4. Explained differences of the life before the quakes amongst the two locations 5. Explanations were clear and articulate
Research life during quake	1 of 5 requirements satisfied	2 of 5 requirements satisfied	3 of 5 requirements satisfied	4 of 5 requirements satisfied	1. Discussed life during earthquake #1 2. Discussed life during earthquake #2 3. Explained similarities of life during the quakes amongst the two locations 4. Explained differences of the life during the quakes amongst the two locations 5. Explanations were clear and articulate
updated **Calculations** magnitude	1 of 5 requirements satisfied	2 of 5 requirements satisfied	3 of 5 requirements satisfied	4 of 5 requirements satisfied	1. Stated the magnitude of earthquake #1 2. Stated the magnitude of earthquake #2 3. Clearly stated info about the epicenter of earthquake#1 4. Clearly stated info about the epicenter of earthquake#2 5. Discussed difference and similariies of the magnitudes
Calculations energy released	1 of 5 requirements satisfied	2 of 5 requirements satisfied	3 of 5 requirements satisfied	4 of 5 requirements satisfied	1. Explanation shows clear and concise steps for calculating the energy released of earthquake #1 2. Explanation shows clear and concise steps for calculating the energy released of earthquake #2 3. Discussed similarities in the results for each calculation 4. Discussed differences in the results for each calculation 5. Explanation shows complete understanding of the mathematical concepts used to solve the problem

Questions?