

Fixing Marisol's Hazard Report: Ten Claims, Eight Errors

Learning target: I can find and correct errors about where hazards happen, how magnitude works, and the difference between forecasting and predicting, and explain why each correction matters.

Error analysis

About 40 min

Individual

MS-ESS3-2 · practice

MS-ESS2-3 · supports

writing

independent practice

Name _____

Date _____

Period _____

Directions

Marisol is a fictional seventh grader who wrote a report on natural hazards in California. Two of her ten claims are correct and eight contain a science error. First decide which are which. Then fix the errors: explain what is wrong, and rewrite the idea so that it is accurate. Your rewrites should be sentences Marisol could put straight into her report.

You will need: This worksheet, Pencil, Calculator

Rule for magnitude (you will need it) — Each step of one whole number on the magnitude scale means about 32 times more energy released and about 10 times larger ground motion on a seismogram. Two steps means about $32 \times 32 = 1,024$, or about 1,000 times the energy.

Marisol's report: Natural hazards in California

1. Earthquakes and volcanoes are scattered randomly across the planet, so any place is as likely to have one as any other.
2. Under the crust, the mantle is an ocean of melted rock, which is why magma can come up almost anywhere.
3. Mount Shasta and Lassen Peak formed because an ocean plate is sinking beneath North America.
4. The 1906 San Francisco earthquake was magnitude 7.9 and the 1989 Loma Prieta earthquake was magnitude 6.9. Since 7.9 is only about 15 percent bigger than 6.9, the 1906 quake released only about 15 percent more energy.
5. The epicenter is the point deep underground where the rock first breaks.
6. Small earthquakes are good news. Each one lets out some pressure, so lots of small quakes keep a big one from happening.
7. Large earthquakes on one fault have come about 150 years apart on average. The last one was in 1880, so the next one will happen in 2030.
8. Lava flows are the deadliest thing a volcano does, because lava races downhill faster than a car.
9. Earthquake early warning on phones means scientists can now predict earthquakes before they start.

10. The 1989 Loma Prieta earthquake struck without any warning sign that scientists could recognize ahead of time.

Marisol's conclusion — Because nobody can predict earthquakes, hazard maps are just guesses, and there is nothing California can do about earthquakes except wait.

Part A: Sort the claims

1. Decide whether each claim is correct or incorrect. For each incorrect claim, name the word or idea that causes the error. 5 pts

Correct or incorrect?	If incorrect, the word or idea that is wrong
Claim 1	
Claim 2	
Claim 3	
Claim 4	
Claim 5	
Claim 6	
Claim 7	
Claim 8	
Claim 9	
Claim 10	

Part B: Fix the errors

2. Claims 1 and 2: Explain what is wrong with each. Then rewrite them as one or two accurate sentences about where volcanoes and earthquakes happen and why. Include one exception to the pattern. 3 pts

3. Claim 4: How many times more energy did the 1906 earthquake release than Loma Prieta? Show how you know, and explain why Marisol's 15 percent is wrong. 3 pts

4. Claims 5 and 9: Each uses a term incorrectly. Rewrite both so that *epicenter*, *focus* and *early warning* are used accurately. 2 pts

5. Claim 6: (a) About how many magnitude 4 quakes would it take to release as much energy as one magnitude 6? (b) If a fault averages 2 magnitude 4 quakes per year, how many years of them would it take to match one magnitude 6? Use your answers to explain why claim 6 is wrong. 3 pts

6. Claim 7: What is wrong with Marisol's reasoning? Rewrite the claim as an accurate forecast-style statement. 3 pts

7. Claim 8: Correct the claim. Name the volcanic hazard that really is fast and deadly, and say what kind of harm lava flows usually cause instead. 2 pts

Part C: Rewrite the conclusion

8. Rewrite Marisol's conclusion so that it is accurate. Explain what hazard maps are based on, what a forecast can tell people, and give two specific ways California reduces earthquake harm. 4 pts

9. Which of Marisol's errors would be most harmful if a whole town believed it? Explain your choice in two or three sentences. 2 pts

Hunting for errors

For each claim ask: Is a key word used correctly (focus, epicenter, predict, forecast, magnitude)? Does the claim treat an average as a schedule? Does it ignore the 32-times rule for magnitude? Does it say something is everywhere or always when it is really in some places or sometimes? Claims 3 and 10 are the ones to check twice: they are about real places and events, and they are accurate.

Where do these ideas come from?

Choose two of Marisol's errors and find a movie, cartoon, news headline or social-media post that spreads the same idea (for example, a film where a fault 'swallows' a city, or a headline that says scientists 'predicted' a quake). Write a short paragraph for each explaining how the source gives the wrong impression and what an accurate version would show.