

Fixing Mateo's Field Trip Poster: Six Mistakes About Changing Landscapes

Learning target: I can find the errors in another student's statements about weathering, erosion, scales of change and uniformitarianism, explain the mistaken idea behind each one, and rewrite it correctly.

Error analysis

About 40 min

Individual

MS-ESS2-2 · practice

writing

independent practice

Name _____

Date _____

Period _____

Directions

Mateo made a poster after a class trip to a state park with hoodoos, a canyon and an old lava flow. He wrote eight statements. Six contain a mistake and two are correct. Your job is to be the teacher. In Part A, decide which statements are wrong and name the idea that went wrong. In Part B, explain each mistake and rewrite the statement correctly; where a number is involved, show the correct calculation. In Part C, step back and look for a pattern in Mateo's thinking.

You will need: This worksheet, Pencil, Calculator for q6

Mateo's poster (copied exactly) — **1.** The hoodoos look exactly the same as they do in a photo from 1990, so weathering has stopped here. **2.** Weathering carried the broken rock from the cliff down to the stream. **3.** A canyon this deep must have been cut by one giant flood, because big changes need big causes. **4.** Uniformitarianism means Earth's processes always run at exactly the same speed, so there were never sudden events in the past. **5.** Continents move about 2 cm per year, so in a million years a continent moves about 2 km. **6.** The eruption that made the lava flow happened in one afternoon, so nothing about it took a long time. **7.** Raindrops moving a few sand grains at a time can, over thousands of years, help wear down a whole hill. **8.** Dust from a large asteroid impact can cool the whole planet within days, so a global change can also be a fast one.

Part A: Diagnose

1. Complete the table. For each incorrect statement, name in a few words the idea Mateo got wrong. For the two correct statements, write 'correct.'

Correct or incorrect?	The idea that went wrong (a few words)
Statement 1	
Statement 2	
Statement 3	
Statement 4	
Statement 5	
Statement 6	
Statement 7	
Statement 8	

Part B: Explain and rewrite

For each incorrect statement, write two things: (a) **What went wrong**: the mistaken idea behind the statement, and (b) **Rewrite**: the statement corrected so that it is true. Keep Mateo's topic; change only what is wrong.

2. Statement 1 (the hoodoos have not changed). (a) What went wrong? (b) Rewrite it, and include what kind of evidence would show that the hoodoos are still changing.

3. Statement 2 (weathering carried the rock). (a) What went wrong? (b) Rewrite it so that weathering and erosion are each used correctly, and name the agent that moved the rock.

4. Statement 3 (a deep canyon needs one giant flood). (a) What went wrong? (b) Rewrite it. Your rewrite must explain how a small, slow process can produce a very large change, and must also admit that giant floods have really carved some landscapes.

5. Statement 4 (uniformitarianism means constant speed). (a) What went wrong? (b) Rewrite it so that it says what the principle actually claims and what it does not claim.

6. Statement 5 (2 cm per year gives 2 km in a million years). (a) What went wrong? (b) Rewrite it with the correct distance, showing the calculation step by step with units.

7. Statement 6 (the eruption took one afternoon, so nothing about it took long). (a) What went wrong? (b) Rewrite it so that it separates the time the event took from the time its conditions took to build up.

Part C: Step back

8. Statements 1, 3 and 6 share one habit of thinking: judging a process by what can be seen in a short time or by its size alone. Write one sentence Mateo could put at the top of his poster that would protect him from all three mistakes.

9. Statements 7 and 8 are correct. Pick one and explain why it is correct, as if Mateo had asked you to check it.

The 'so' test

Most of Mateo's mistakes happen at the word 'so' or 'must.' Underline that word in each statement and ask: does the first half really force the second half? For example, 'it looks the same, so it has stopped changing' assumes that every change is big enough to see in a photo. For the calculation in statement 5, write the units at every step: $\text{cm per year} \times \text{years} = \text{cm}$, then $\text{cm} \div 100 = \text{m}$, then $\text{m} \div 1,000 = \text{km}$.

Write the tricky ninth statement

Statement 4 hides a real history. For about a century after uniformitarianism became popular, many geologists did reject sudden events, and a geologist who proposed a giant ice-age flood in the 1920s was rejected for decades before the evidence proved him right. Write a ninth statement for Mateo's poster that is true, that mentions this history, and that explains the modern version of the principle in one or two sentences. Then write a tenth statement that is wrong in a subtle way and challenge a partner to find the error.