Earth in Motion

Model features across distance and time.

HS-ESS2-1 "Develop a model to illustrate how Earth's internal and surface processes operate at different spatial and temporal scales to form continental and ocean-floor features..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline each constructive or destructive process, circle the feature it changes, and write L, R, or G beside it for local, regional, or global scale evidence. Number the phrases that state a time scale.

Forces That Shape the Surface

(1) Earth's surface is a moving record of forces that act over different distances and times. Along a continental collision zone, compression can thicken crust and lift a broad mountain belt over millions of years. This is a regional change, extending hundreds of kilometers. On one slope, water enters cracks, freezes, and breaks rock into smaller pieces. Gravity then moves loosened rock downhill in landslides. These surface processes can reshape a single hillside during a storm or over centuries. A model of this area needs arrows for crustal compression, uplift, rock movement, and the changing slope.

(2) Far from the shore, ocean-floor features also form at several scales. Where two oceanic plates move apart, magma rises and cools, making new crust along a mid-ocean ridge. The ridge can stretch for thousands of kilometers and grow over millions of years. Elsewhere, one oceanic plate bends and sinks beneath another plate, forming a deep trench. Volcanoes may build seamounts above the seafloor as magma erupts repeatedly. Currents and gravity can later move sediment across the seafloor, covering parts of these features. A useful model shows plate directions, magma movement, and sediment transport rather than treating the seafloor as flat and unchanging.

(3) Internal and surface processes often work together, not as separate events. Tectonic uplift can raise a wide, nearly level area into a plateau. Over a much shorter time, rivers cut channels into the raised rock, while weathering weakens canyon walls and mass wasting drops material into the valley. At a coast, waves remove sediment from a cliff, but rivers may deliver new sediment to a nearby beach. The coastline can therefore retreat in one place while material builds up in another. A complete model links constructive and destructive changes, identifies the feature affected, and includes time and distance scales.

2 ANSWER WITH EVIDENCE

Use the passage

1. Use paragraph 1 to compare the mountain belt and the hillside. What processes shape each, and how do their spatial or temporal scales differ?

2. How should a model explain the formation of both a mid-ocean ridge and a trench? Include the plate movement and the resulting feature.

3. What three kinds of movement should a useful seafloor model show, according to paragraph 2?

4. Trace the sequence that can change an uplifted plateau into a valley landscape. Identify the constructive process and the destructive processes.

3 YOUR TURN

Your own words

Sketch or write a labeled cross-section of a continental rift basin beside a lake. Your model must show plate-motion and material-movement arrows, one constructive internal process, one destructive surface process, a local and regional scale label, and two different time labels, then write 3 sentences explaining how the processes form and change the basin.

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PART 1 · READ AND MARK

Underline each constructive or destructive process, circle the feature it changes, and write L, R, or G beside it for local, regional, or global scale evidence. Number the phrases that state a time scale. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Use paragraph 1 to compare the mountain belt and the hillside. What processes shape each, and how do their spatial or temporal scales differ?	**Compression and uplift build a broad mountain belt over millions of years across hundreds of kilometers. Freezing water and landslides reshape a local hillside during a storm or over centuries.**
2	How should a model explain the formation of both a mid-ocean ridge and a trench? Include the plate movement and the resulting feature.	**Arrows should show oceanic plates moving apart as magma rises and creates new crust at a ridge. They should show one oceanic plate bending and sinking beneath another to form a trench.**
3	What three kinds of movement should a useful seafloor model show, according to paragraph 2?	**Plate directions, magma movement, and sediment transport.**
4	Trace the sequence that can change an uplifted plateau into a valley landscape. Identify the constructive process and the destructive processes.	**Tectonic uplift constructively raises the plateau. Rivers cut channels, weathering weakens canyon walls, and mass wasting moves material into valleys.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Cross-section labels: regional, 300-km rift, plates pull apart ← →, magma rises ↑, and faults drop a basin; local, 2-km lake shore, rain weathers the fault scarp and a landslide moves sediment → into the lake. Over 1 million years, extension and volcanism create the long, low basin. During a single storm and over thousands of years, weathering and landslides break down its walls and deposit sediment in the lake.

Accept models that accurately connect internal constructive processes and surface destructive processes to a changing land or seafloor feature. The model should include clear movement arrows and valid contrasts in spatial and temporal scale.