

Hazard Signal Sleuths

Read hazard data clues, then connect forecasts to protection.

MS-ESS3-2 "Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects. Clarification Statement: Emphasis is on how some natural hazards..."

NAME _____

DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline each type of data or warning sign that can help scientists forecast a hazard. Circle each technology or community action that can reduce harm.

Signals Before Disaster

- ① Scientists use hazard data to look for patterns and make decisions. Along the Gulf Coast, hurricane records show where storms traveled, how strong their winds were, and how often they occurred. Satellite images, ocean buoys, and weather stations measure cloud bands, sea-surface temperature, wind speed, and air pressure. When a hurricane forms, repeated measurements help forecasters track its path and estimate when dangerous wind, rain, and storm surge may reach communities. Forecasts improve as new data arrive.
- ② Earthquakes can strike suddenly, and scientists cannot yet reliably predict their exact time, place, and size before they begin. Maps of past earthquake locations and magnitudes still show which regions have repeated strong shaking. Engineers use that information to design safer buildings, flexible bridges, and automatic gas shutoff valves. An earthquake early-warning system can detect the first waves after a quake starts and send alerts before stronger shaking reaches some places. This warning is not a prediction.
- ③ Volcanoes sometimes give warning signs before an eruption. Small earthquakes beneath a volcano, swelling ground, and changing gas levels can show that magma is moving. Instruments such as seismometers, GPS stations, gas sensors, and satellites collect these data over time. Scientists compare new measurements with normal conditions and may raise alert levels when several signs increase. Communities can use the forecast to close danger zones, plan evacuation routes, and move people away from likely ash or lava hazards. The signs do not always reveal the exact eruption time or size.

2 ANSWER WITH EVIDENCE Use the passage

- 1 What measurements help forecasters track a hurricane and estimate when dangerous conditions may arrive?

- 2 Why can scientists use past earthquake data to reduce risk but not to predict an exact earthquake before it begins?

- 3 How is a volcano warning sign different from an earthquake early-warning alert?

- 4 Name one technology from the passage that can reduce hazard risk, and describe what it does.

3 YOUR TURN Your own words

A river town's records show that floods happened after more than 15 cm of rain fell in three days. Rain gauges now show 17 cm of rain in three days, and the river level is rising. Write exactly three sentences that name the evidence, make a forecast with uncertainty, and propose one technology or action to reduce harm.

PART 1 • READ AND MARK

Underline each type of data or warning sign that can help scientists forecast a hazard. Circle each technology or community action that can reduce harm. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What measurements help forecasters track a hurricane and estimate when dangerous conditions may arrive?	Satellite images, ocean buoys, and weather stations measure cloud bands, sea-surface temperature, wind speed, and air pressure. Repeated measurements help forecasters track the storm's path and estimate its arrival.
2	Why can scientists use past earthquake data to reduce risk but not to predict an exact earthquake before it begins?	Past locations and magnitudes show regions with repeated strong shaking, so engineers can design safer structures there. Earthquakes can strike suddenly, and scientists cannot reliably predict their exact time, place, and size beforehand.
3	How is a volcano warning sign different from an earthquake early-warning alert?	Volcanic signs, such as ground swelling or changing gas levels, can occur before an eruption. An earthquake early-warning system detects waves only after a quake has started.
4	Name one technology from the passage that can reduce hazard risk, and describe what it does.	An earthquake early-warning system detects the first waves after a quake begins and sends alerts before stronger shaking reaches some places.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Rain gauges measured 17 cm of rain in three days, and the river level is rising. Because past floods followed more than 15 cm of rain in three days, flooding is likely soon, although the exact water depth cannot be known yet. The town should use a flood-warning system to alert residents and close low roads before water rises.

Accept forecasts that use both the rainfall record and the rising river as evidence, while recognizing that the forecast is not certain. Accept practical mitigation choices such as warning systems, evacuation, closing roads, sandbags, or moving people and supplies to higher ground.