Where Water Reaches

Comparing flood, elevation, and transit maps

MWH.P.2.3.B "Compare and analyze complex maps and mapping technologies to analyze spatial patterns of human and physical environments, explaining relationships between the environment and events, past and present."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline two places where the passage compares map layers, circle one physical condition linked to a human effect, and write 1 beside a warning about map limits.

Mapping Sandy's Reach

1 In October 2012, Hurricane Sandy pushed seawater into New York City. To investigate where damage spread, a researcher compares a map of surveyed flood limits from 2012 with a current elevation map made using lidar, a laser-based measuring method. The maps show coastlines, but their colors mean different things: one marks where water reached, while the other marks ground height. Near the southern tip of Manhattan and the Rockaway Peninsula in Queens, the flood outline follows low coastal ground. Aligning street corners on both maps helps the researcher compare the same locations instead of mistaking a change in scale for a change in risk.

2 A third layer, a subway map, adds a human pattern. Some subway entrances and tunnels lay in places exposed to the 2012 surge, and saltwater flooded several tunnels during Sandy. Ground height alone cannot show how water could enter a station and travel through a connected system. A street above a tunnel might look dry on the flood map while the line below had to close. Comparing the flood outline with entrances and routes helps explain why travel was disrupted beyond the blocks covered by surface water. The maps connect a coastal event to a citywide effect without claiming that every closure had the same cause.

3 Now planners use newer elevation data and maps of protective projects to consider future storms. They may identify low ground near important subway entrances and consider barriers or redesigned openings there. Yet a map of 2012 flooding is a record of one storm, not a prediction of exactly where the next surge will go. Tide level, storm path, and rainfall can change the pattern. An older flood outline and a current elevation map also have different dates, so recent construction might alter what a street-level map shows. Comparing dates, map keys, and scale makes the relationship between land, transport, and flooding more trustworthy.

2 ANSWER WITH EVIDENCE

Use the passage

1. What pattern appears when the 2012 flood limits are compared with ground height? Name both places the passage uses as examples.

2. Why does adding the subway map explain travel disruption better than the elevation map alone?

3. How could planners use the flood and elevation maps together when considering protection for subway entrances?

4. A place is outside the 2012 flood outline but on low ground today. Why do the maps not prove it will stay dry in the next storm? Give two reasons from the passage.

3 YOUR TURN

Your own words

Imagine choosing a new emergency shelter site in a neighborhood along a tidal river. Describe two different maps or mapping layers you would compare, a spatial pattern that would make you reject a site, and one limit of your comparison. Do not use New York City or subway routes.

ANSWER KEY

Where Water Reaches

HIGH SCHOOL · MWH.P.2.3.B

PART 1 · READ AND MARK

Underline two places where the passage compares map layers, circle one physical condition linked to a human effect, and write 1 beside a warning about map limits. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	What pattern appears when the 2012 flood limits are compared with ground height? Name both places the passage uses as examples.	**The flood outline follows low coastal ground near the southern tip of Manhattan and the Rockaway Peninsula in Queens.**
2	Why does adding the subway map explain travel disruption better than the elevation map alone?	**It shows entrances and connected routes. Surge water could enter the system and disrupt a line beyond the streets covered by surface water.**
3	How could planners use the flood and elevation maps together when considering protection for subway entrances?	**They could locate important entrances on low ground near the 2012 flood area and consider barriers or redesigned openings.**
4	A place is outside the 2012 flood outline but on low ground today. Why do the maps not prove it will stay dry in the next storm? Give two reasons from the passage.	**The outline records only one storm. A different tide level, storm path, or amount of rainfall could change where flooding occurs.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

I would compare a map of a past river flood boundary with a current map showing elevation and roads. Where the old flood boundary overlaps low roads, I would reject a shelter site because residents could lose access even if the building stays dry. I would look for higher ground with more than one road out. The past flood was only one event, and newer construction may have changed drainage.

Accept other map-layer pairs if the response connects a specific spatial pattern to shelter access or safety and identifies a valid limit. For question 4, recent construction is also an acceptable reason.