Signals to Location

Trace how a technical explanation builds from need to process to limits.

8.RI.1.B "Analyze how the author unfolds a perspective or series of ideas or events in historical, scientific, or technical texts, including the order in which the points are made, how they are introduced and developed..."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Number the passage's three main stages 1, 2, and 3. Then circle words or phrases that connect a later stage to an earlier idea.

How GPS Finds You

1 Before satellite navigation, sailors and pilots often used maps, radio signals, and careful observations to estimate location. Those methods could work, but clouds, storms, or unfamiliar land could make them difficult. In 1973, the United States began developing the Navstar Global Positioning System, usually called GPS. The project's first goal was to give military users a more reliable way to find their position. This earlier problem helps explain why a new system was needed.

2 GPS works by comparing time. Each GPS satellite carries atomic clocks and sends a radio signal that states the time and the satellite's position. A receiver, such as one in a phone, measures how long each signal took to arrive. Because radio waves travel at a known speed, the receiver changes travel time into distance. By calculating distances from at least four satellites, the receiver can determine its location and correct for a small timing error in its own clock.

3 However, a receiver's answer is not perfect. Signals can slow slightly as they pass through Earth's atmosphere, and tall buildings or mountains can block or reflect them. For this reason, modern GPS receivers combine satellite data with other information, such as maps, motion sensors, or signals from nearby cell towers. These added checks build on the time-and-distance method explained earlier. GPS can provide useful location results, but those results can sometimes be inaccurate.

2 ANSWER WITH EVIDENCE

Use the passage

1. Why does the author begin by describing navigation before GPS? Explain how this opening prepares the reader for the next idea.

2. How does paragraph 2 develop the explanation of how GPS works? Describe the order of the main steps.

3. Which details in paragraph 3 connect to paragraph 2, and what relationship do they show?

4. How does the order of the three paragraphs help the author explain GPS clearly?

3 YOUR TURN

Your own words

Choose a scientific or technical topic that is not GPS. Write exactly three sentences that explain how an author could order the ideas: a starting problem or question, a developed explanation, and a connected final point. Name a word or phrase that could link the final point to the earlier explanation.

ANSWER KEY

Signals to Location

GRADE 8 · 8.RI.1.B

PART 1 · READ AND MARK

Number the passage's three main stages 1, 2, and 3. Then circle words or phrases that connect a later stage to an earlier idea. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Why does the author begin by describing navigation before GPS? Explain how this opening prepares the reader for the next idea.	**It introduces the difficulty of finding a location with older methods, which explains why people needed a more reliable system such as GPS.**
2	How does paragraph 2 develop the explanation of how GPS works? Describe the order of the main steps.	**It starts with satellites sending time and position signals, then explains that a receiver measures travel time, changes time into distance, and uses distances from at least four satellites to find a location.**
3	Which details in paragraph 3 connect to paragraph 2, and what relationship do they show?	**The phrase "time-and-distance method explained earlier" connects paragraph 3 to paragraph 2. It shows that added information is used to improve the basic GPS method when signals are affected by the atmosphere or obstacles.**
4	How does the order of the three paragraphs help the author explain GPS clearly?	**The author moves from the problem that created a need for GPS, to the basic process GPS uses, to the limits of that process and ways receivers improve results.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

An explanation of a simple water filter could begin with muddy water to introduce the problem. Next, it could explain how sand and activated carbon remove some particles and impurities, developing the solution step by step. Finally, it could explain that the filter materials must be replaced as they collect material, and the word "therefore" could link this limit to the process.

Accept equivalent descriptions of the passage's progression from need, to process, to limitations and improvements. For Part 3, accept any accurate topic and logical sequence that includes a clear connection between the final point and an earlier idea.