

Comprehension 6

GPS: How does it work?

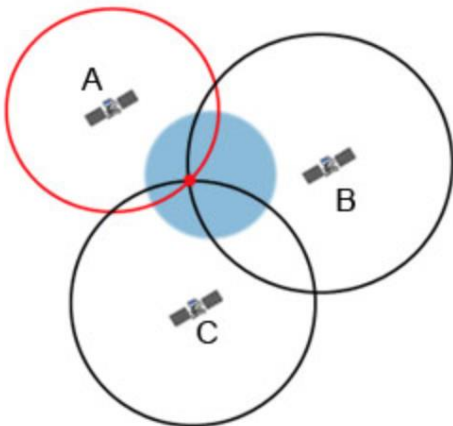
Did you know that at any time, there are at least four satellites moving through the sky above you? What are they doing there? Well, whenever you use a map app on your mobile phone, or switch on your SatNav, you are using the radio signals that are broadcast from these satellites, through a system called GPS.

Throughout history, humans have used the sky to help them navigate. For hundreds of years, people used star constellations to work out where they were. Today, we use satellites instead. 20,000km above your head, 30 satellites are orbiting the Earth.

Originally, these satellites were utilised for military navigation by the US government. Now, though, anyone with a GPS device can use the signals **they** emit.

So what exactly is GPS, and how does it work? GPS stands for Global Positioning System, which simply means that it is a system that can figure out where you are, wherever you are on the globe. GPS is made up of three parts: the satellites, ground stations, and receivers. We use the satellites in a similar way to how sailors used to use stars: we know where they are meant to be at any given time. The ground stations use radar to check that the satellites are where we expect them to be. The receiver, which could be your mobile phone, works out how far it is from three or more satellites. From this, it calculates exactly where you are.

But how exactly does the receiver do this? This is where it gets a little bit more **intricate**. The GPS receiver locates you using a process called trilateration.



Imagine that you are standing on the ground and there are three satellites above you. The receiver calculates your distance from satellite A, so it knows that you must be within the red circle. It then does the same for satellites B and C. It then finds out your location by working out where the three circles overlap. The more satellites there are above you, the more accurately the receiver can pinpoint your location.

Finding out your exact location is easier now than ever before. I wonder what the future holds for methods of navigation...

[Image credit: <http://www.physics.org/article-questions.asp?id=55>]

Answer the following questions in complete sentences.

1. How often are there four satellites above you?

2. What did Americans used to use the satellites for?

3. What does the word “they” in paragraph two refer to?

4. How are satellites similar to stars (paragraph 3)?

5. Find a phrase in paragraph 3 that means ‘in the world’.

6. What does the word “intricate” mean in paragraph 4?
 - a. dangerous
 - b. scientific
 - c. delicate
 - d. complicated

7. According to the text, which of the following is not used by the GPS receiver to locate you?
 - a. your distance from the satellites
 - b. your distance from the ground station
 - c. the locations of the satellites
 - d. the distances between satellites

8. How does the number of satellites (above three) affect how well your receiver can locate you?

