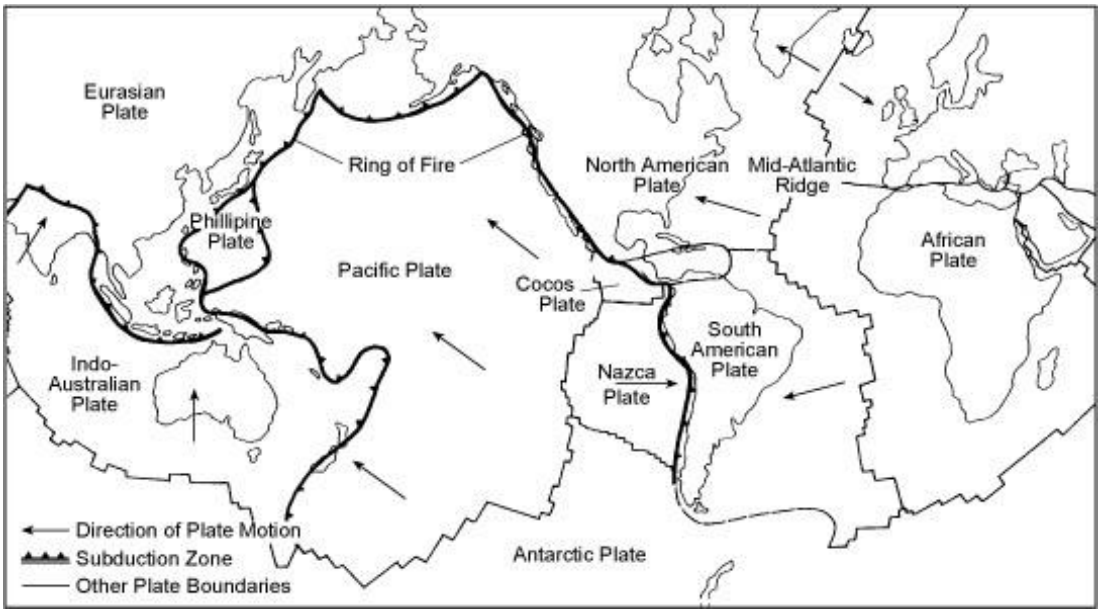
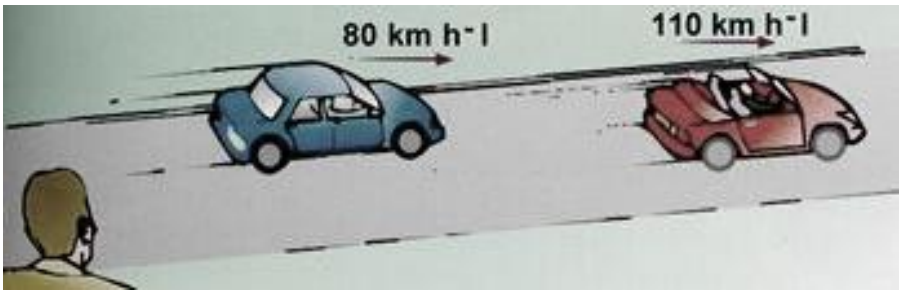
Section 2: Earth's Moving Lithospheric Plates

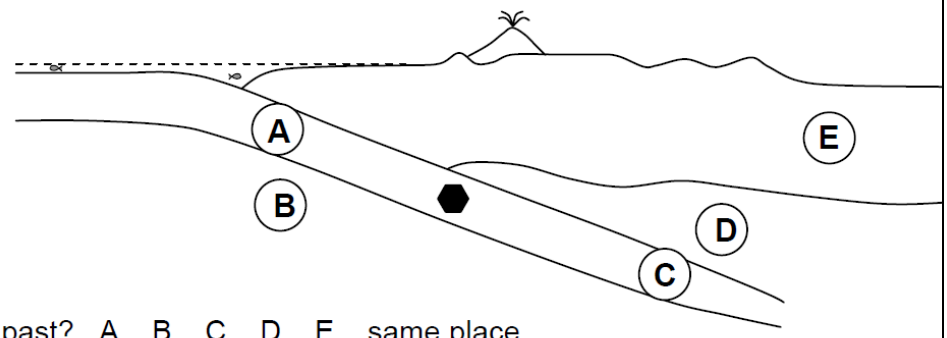




Section 2 Question: How can we describe how Earth's surface moves?

What Do You See?
(cartoon)

What Do You Think?



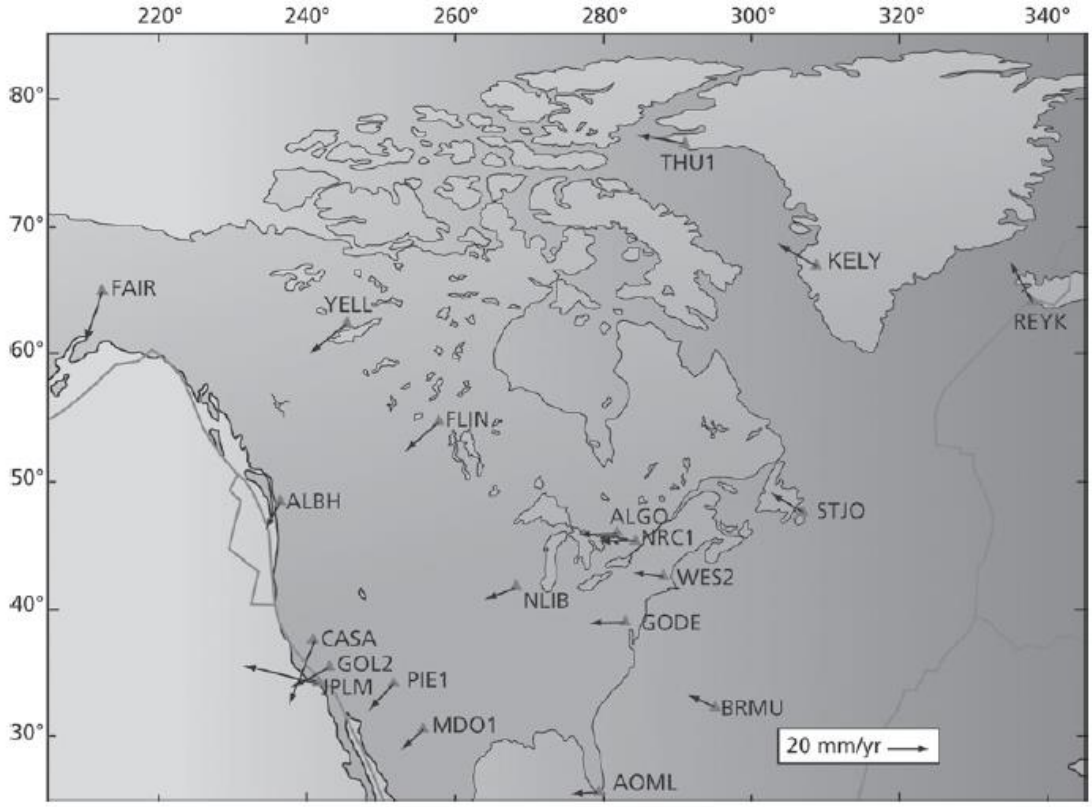
Where was ⬣ in the past? A B C D E same place

Where will ⬣ be in the future? A B C D E same place

What Do You Think Now?

Focus Question A: How can GPS data be used to discover how lithospheric plates move?

Observations:



What Do You See?

What Do You Think?

Extend:

Plate Motion Data from a Computer Model

1. Computer models that use geo-spatial data can be used to show changes in the location of your community. To use such a model, you will need to know the latitude and longitude of your school (or another familiar place). Latitude and longitude are used to identify a position on the Earth's surface. Latitude is a measure of location in degrees, minutes, and seconds north or south of the equator. Longitude is a measure of location in degrees, minutes, and seconds east or west of the Prime Meridian, which passes through Greenwich, England. You can use World Atlas to find the latitude and longitude of your school (or another familiar place). After you open your web browser, search for "World Atlas Latitude and Longitude Finder". Enter the location in the input box and click on the "Submit" button. World Atlas will zoom into your location and provide you with a latitude and longitude at the top of the map.
    a. Record the latitude and longitude of the position you chose in degrees, minutes, and seconds. (These "minutes" and "seconds" are not the same as the familiar minutes and seconds of time! They describe positions on a circular arc.)
    b. Convert the latitude and longitude values to a decimal format. Use the following example to help you.

Example:

42° (degrees) 40' (minutes) 30" (seconds) north latitude

1. Convert seconds to minutes
    a. Each minute has 60" (seconds)
    b. 30" divided by 60" equals 0.5'
    c. This gives a latitude of 42° 40.5' north
2. Convert minutes to degrees
    a. Each degree has 60' (minutes)
    b. 40.5' divided by 60' equals 0.675°
3. The latitude in decimal format is 42.675° north
4. Longitude is converted the same way.
5. If the longitude value is West of the Prime Meridian, add a (-) sign in front of the final value.

2. Examine the plate tectonic n page 4 of the ESRT showing lithospheric plates. Arrows show the relative motions of the plates relative to the African Plate, which happens to be moving slowest relative to the Earth's axis of rotation.
    a. Identify the location of your community.
    b. In your notebook, record the name of the plate your community lies within. Record the name of a plate next to your community.
3. Visit the Relative Plate Motion (RPM) Calculator web site at: **http://sps.unavco.org/crustal_motion/dxdt/nnrcalc/** The RPM calculator determines how fast your plate is moving relative to another plate that is assumed to be "fixed" (non-moving). At the web site, enter the following information:
    a. The latitude and longitude of your community (decimal format)
    b. The name of the plate on which your community is located under "Tectonic Plate of Attributed Motion"
    c. The name of the "Reference" plate adjacent to your plate. Use the African Plate as the reference plate.

Note: Most of the information will be left blank

4. Once you have entered the data, run the model. Record the following information in your notebook:
    a. The rate of movement of the plate on which your community is located (in centimeters per year).
    b. Its direction of motion. (Note that direction is given in degrees, starting from 0°, clockwise from north. For example, 90° is directly east, 180° is directly south and 270° is directly west.)

Record your answers here

1. Latitude and Longitude of Odessa, NY in degrees, minutes, and seconds.

2. Latitude and Longitude of Odessa, NY in decimal format.

3. Name of our community and the name of the tectonic plate we are located on.

4. Data from computer model:
    - Rate of Movement (cm/yr)
    - Direction of movement

5. In your own words, describe the motion of your plate over time.

Choose another location in another country and repeat steps 1 through 4.
Record you answers here

1. What is the name of the location you picked?

2. Latitude and Longitude of your location in degrees, minutes, and seconds.

3. Latitude and Longitude of your location in decimal format.

4. Name of our community and the name of the tectonic plate we are located on.

5. Data from computer model:
    - Rate of Movement (cm/yr)
    - Direction of movement

6. In your own words, describe the motion of your plate over time.

7. What information can GPS provide us with that the plate motion calculator does not?

RETURN TO WDYTN

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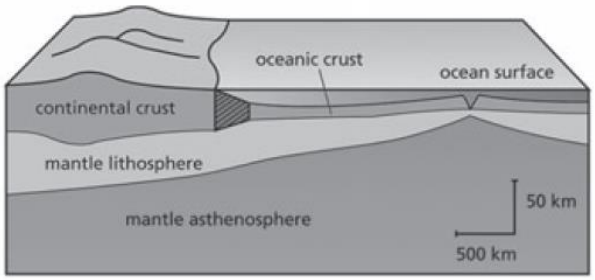
DIGGING DEEPER

Earth's Moving Lithospheric plates

- Earth's crust is divided into two categories; the first is continental crust and the second is oceanic crust.
- The lithosphere consists of the Earth's crust and the upper most part of the mantle.
- Continental crust is thickest in locations that contain mountains.

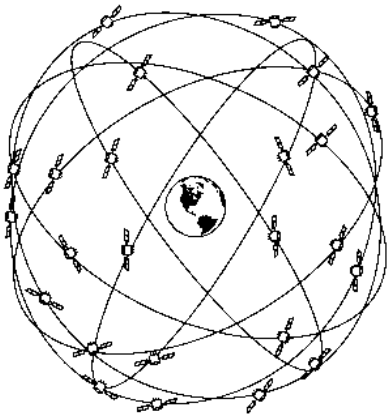
Complete the table of characteristics of Earth's crust below.

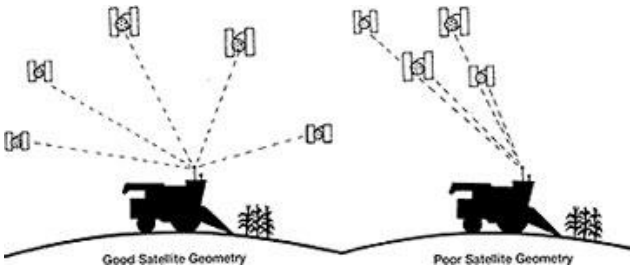


Global Positioning System

- G.P.S. consists of 24 satellites that orbit the Earth at an elevation of 20,200 km.
- G.P.S. can be used to determine an objects location or elevation anywhere on Earth.
- A minimum of three satellites is required using the process of triangulation.
- G.P.S. system provides geologists with a fixed position for which to measure the movement of lithospheric plates.
- G.P.S. has been tracking the movement of Earth Lithospheric plates since 1993.

List some ways that G.P.S. has influenced you directly.





Chapter 2, Section 2 E.B.C. Name:_____
Earth's Moving Lithospheric Plates Period:_____

Question (2)		
Claim 1 (2)		
A. Supporting Evidence (3)	B. Supporting Evidence (3)	
Claim 2 (2)		
A. Supporting Evidence (3)	B. Supporting Evidence (3)	
Analysis (6)		

	Claim *A statement or conclusion that answers the original question/problem.*	**Evidence** *Scientific data that supports the claim. The data needs to be appropriate and sufficient to support the claim.*	**Analysis** *A justification that connects the evidence to the claims. It shows why the data counts as evidence by using appropriate and sufficient scientific principles and vocabulary*.
0	Does not make a claim, or makes an inaccurate claim.	Does not provide evidence, or only provides inaccurate or vague evidence.	Does not provide an analysis, or only provides an irrelevant analysis.
1	Makes an accurate but vague or incomplete claim.	Provides vague evidence and does not include specific data.	Repeats evidence and links it to claim, but does not include specific scientific principles.
2	Makes accurate and complete claim.	Provides correct evidence but does not include specific data.	Connects all evidence to the claims using scientific principles or vocabulary but not both.
3		Provides correct evidence and includes specific data.	Connects all evidence to both claims using scientific principles and vocabulary.

CHECKING UP PAGE 152, 1 through 3 (2 Points each)

____
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1.

2.

3.

Describe the direction and rate of motion for movement of the plate on which you live. (5 points)