Calculating Tectonic Plate Movement
from GPS Time Series Data

October 24 Teachers workshop (Pilot)

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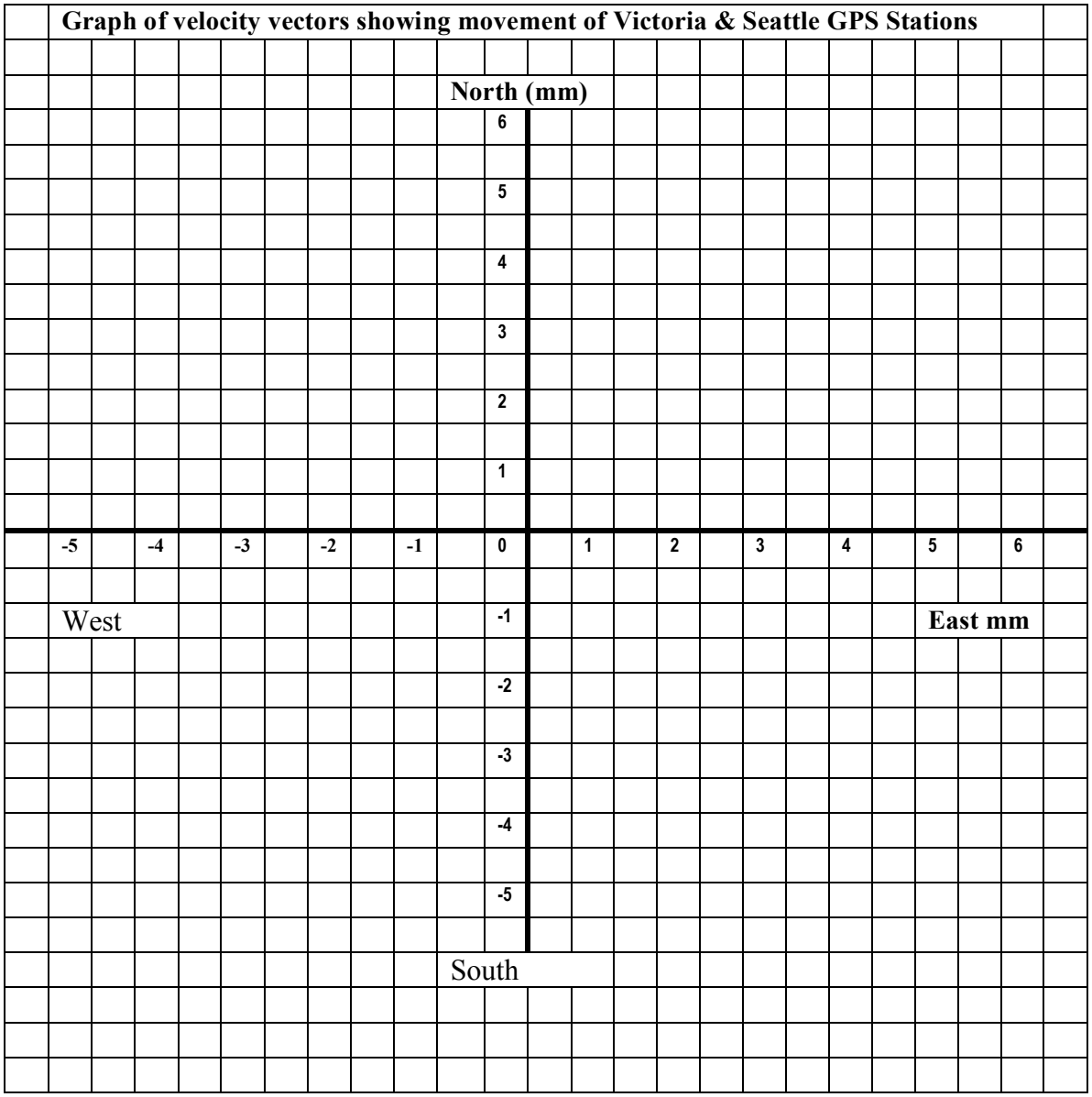
Objective: To compare movement (magnitude and direction) of the Earth's crust in Victoria and Seattle, by analyzing graphs of GPS station data; east/west and north/south over time.

- Remember from math that slope = rise /run, in this case in mm/day.
- The formulae for the slopes of the trend-lines are displayed on the graphs projected on the screen. As of September 2008, the formula for the east motion of the Victoria Station is y = **0.0148**x – 553.7
- In this formula, y represents east in millimeters. The slope in this example is **0.0148 mm east/day**.
- To find the average annual east/west (or north/south) motion of this station, multiply the **slope** by 365.25 days.

Using the slope of the trend-line from our time series plots, calculate the yearly north-south and east-west velocity of the GPS stations, state the direction. The first box is done for you.

GPS Station	**Victoria (Albert Head), BC**	**Seattle, Washington, US**
Calculate station velocity & direction	**Slope (in mm/day) x (number of days/year) = average yearly motion**	
East - west average velocity (mm/yr) Is it moving to the east or to the west?	0.0148 mm/day x 365.25 days/year = 5.406 mm per year East	mm/day x days/year = mm/year (slope) x 365.25 = _____
North-south average velocity (mm/yr) Is it moving north or south?	mm/day x days/year = mm/year (slope) x 365.25 = _____	mm/day x days/year = mm/year (slope) x 365.25 = _____

1) Using the graph paper on the back of this sheet, draw the axes of your graph with east-west on the x-axis and the north-south on the y-axis. The scale for the north and east axes are set to be the same.
2) Draw the north-south vector for Victoria on the graph paper (start at zero go up the y-axis) (Don't freak out, a vector is just a line between two points.)
3) Draw the east-west vector for Victoria on the graph paper (x-axis)
4) Add the vectors together to get the resultant vector for Victoria. (repeat for Seattle)
5) Label the vectors with an arrow-head pointing to direction and a GPS station location.



What do you notice about the vectors?

What is happening in both Seattle and Victoria?

How far and in what direction will Victoria move in one hundred years?

What are some sources of error?