2011 Tsunami Propagation Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Use the following data to draw the approximate location of the 2011 tsunami wave front after 5, 10, and 15 hours on the provided map.

|  |  |  |
| --- | --- | --- |
| Station | Arrival Time | Elapsed Time |
| 21413 | 0700 | 1 hour |
| 21414 | 0915 | 3.25 |
| 21415 | 0845 | 2.75 |
| 21416 | 0800 | 2.00 |
| 21418 | 0630 | 0.50 |
| 21419 | 0700 | 1.00 |
| 32411 | 2230 | 16.50 |
| 32412 | 0030 | 18.50 |
| 43412 | 1900 | 13.00 |
| 43413 | 2030 | 14.50 |
| 46402 | 1045 | 4.75 |
| 46403 | 1130 | 5.50 |
| 46404 | 1430 | 8.50 |

|  |  |  |
| --- | --- | --- |
| Station | Arrival Time | Elapsed Time |
| 46407 | 1430 | 8.50 |
| 46408 | 1015 | 4.25 |
| 46409 | 1215 | 6.25 |
| 46410 | 1300 | 7.00 |
| 46411 | 1500 | 9.00 |
| 51406 | 1900 | 13.00 |
| 51425 | 1230 | 6.50 |
| 52402 | 0930 | 3.50 |
| 52403 | 1030 | 4.50 |
| 52405 | 0930 | 3.50 |
| 52406 | 1200 | 6.00 |
| 54401 | 1700 | 11.00 |



Arrival times extracted from raw DART data: <http://www.ngdc.noaa.gov/hazard/dart/2011honshu_dart.html>

1. Use your map to estimate when the tsunami arrived at:

Osaka, Japan \_\_\_\_\_\_\_\_\_\_\_

 Hawaii (station 51407) \_\_\_\_\_\_\_\_\_\_\_

Los Angeles \_\_\_\_\_\_\_\_\_\_\_

2. How far (in miles) did the tsunami travel from its source near Japan to Los Angeles.

3. How long (in hours) did it take for the tsunami to travel from Japan to Los Angeles?

4. Given the total distance and total travel time from the two above questions, estimate the speed of the tsunami in miles per hour? (please show your work)

5. Does this method of calculating the average speed of the tsunami provide a good approximation of the actual speed of the wave at any given point? Why or why not?

6. Debris from the 2011 Tsunami did not begin to wash ashore on North American beaches until late 2012. Why did it take so much longer for the debris to arrive than the wave?