

Rubber Ducks, Nikes and the Pacific

Name: _____ Date: _____

It was a dark and stormy night. Huge waves crashed over the deck of the freighter “Hasana Carrier”, a container ship carrying, among other cargo, 80,000 pairs of Nikes (shoes) in six 40-foot containers on deck bound for Tacoma, Washington from South Korea. So huge were some of the waves that they knocked all of the Nike containers overboard. Five of the six containers opened as they gurgled their way down to the bottom of the Pacific Ocean, allowing 60,000 Nikes to begin a journey of thousands of miles floating across the Pacific Ocean. Months and even years later some of these shoes were found by beachcombers along the western coast of North America. The shoes were still wearable and weekend swap meets were organized. These Nikes were also found in Hawaii and are eventually expected to be found in Asia and Japan.

A similar incident occurred just two years later when another container vessel bound from Hong Kong to Tacoma plowed through another storm in almost the same spot, causing the contents to spill into the Pacific Ocean as their containers broke open; in all losing 12 containers of 29,000 bathtub toys such as yellow rubber ducks. Months later hundreds of toys began to show up along the coast of Alaska; In all about 2% of all Nikes and bathtub toys were recovered.

The information below was gathered by researchers as these washed-up objects were found after their long voyages. Your job will be to plot these locations and determine the speeds and directions of ocean currents which caused these unusual beach deposits.

NIKE SHOES

Days elapsed since spill	Location Found	
	Latitude	Longitude
0 (spill day)	48° N	161° W
190	48° N	125° W
249	52° N	128° W
300	54° N	133° W
310	45° N	124° W
340	43° N	125° W
730	20° N	157° W

RUBBER DUCKS

Days elapsed since spill	Location Found	
	Latitude	Longitude
0 (spill day)	45° N	178° W
300	57° N	135° W
330	59° N	140° W
360	61° N	146° W
540	53° N	162° W
720	59° N	162° W

Procedure: Using the data above, plot the locations of the Nikes and ducks on the accompanying map. At each location write a small “x” and number of days elapsed for the shoes, and a small “o” and number of days elapsed for the ducks.

Analysis and Conclusions:

1. Circular ocean currents are called *gyres*. On the map, **use arrows to DRAW the gyre(s)** which the shoes and ducks might have followed.

2. How **far**, in **km**, did the shoes and ducks drift from the site of their original spill until they arrived at the coast? **(scale: 1 cm = 575 km)**

Shoes: _____ cm = _____ km

Ducks: _____ cm = _____ km

3. How many **days** did it take the shoes and ducks to first arrive along the coast?

Shoes: _____ days

Ducks: _____ days

4. What was the daily **rate** of drift for *each*? → **Equation:** Rate = Distance Traveled (km) / Time (days)

Example: If you travel 100 km in 2 days: Rate = 100 km/2 days → 50 km/day.

SHOW YOUR WORK FOR BOTH BELOW:

Shoes: _____ km/day

Ducks: _____ km/day

5. The shoes traveled faster than the ducks. Propose a **hypothesis** to explain the faster shoes (Ex: Does it have to do with their shape, their weight, where they were dropped?) Use the “**if....then....**” state to propose your hypothesis.

6. The shoes floated low in the water while the ducks floated high in the water. **Explain** how this simple fact could have changed the course and speed of each. (Hint: Neither one is affected by density currents)

7. **Explain** why some Nikes drifted northward along the coast, while others drifted south.

8. **Predict** where the shoes and ducks might be found in six (6) months after their last known plotted position. On the accompanying map, **place** an “**S**” for your predicted **shoe** position, and a “**D**” for your predicted **duck** position. **Explain** how you decided where to place your 6-month predicted positions?

9. The path of the ducks became 600km wide after 6 months at sea. What could have made the toys spread so far apart?

10. Computer models and historical records predict that some of the rubber ducks would eventually arrive in Greenland, while some shoes would arrive in Japan. With arrows, **DRAW** currents on the map that might take them to these places.