Follow the Current

Name _____

Date _____

Period _____

An extension to the Currents and Climate Lab · mrsajdak.com/currents/follow · © Ryan Sajdak · CC BY-NC-SA 4.0

Ride along with one bucket of seawater on its trip around the North Atlantic. Open the page, press **Next stop**, and copy each row from **Your log**.

☐ I can trace how ocean water moves north at the surface, sinks, and returns south in the deep ocean.

☐ I can use temperature and salt to explain why one water mass sinks below another.

Part 1. Follow your water

SEP 4 Analyzing and Interpreting Data · CCC Energy and Matter

Stop	Depth (m)	Temperature (°C)	Salt (g/kg)	Density (kg/m³)	Heading
1. Florida Straits					
2. Cape Hatteras					
3. Middle of the North Atlantic					
4. Cape Farewell					
5. Labrador Sea (no meltwater)					
6. Off the Grand Banks					
7. Below Cape Hatteras					
8. Below the equator					

1. From stop 1 to stop 3 the water cooled from _____°C to _____°C. Where did that heat go, and which city across the ocean gets it?

2. As your water cooled from stop 1 to stop 4, did its density go up or down? By how much?

Part 2. The sink test (stop 5)

SEP 3 Planning and Carrying Out Investigations · CCC Cause and Effect

Water below you at 1,000 m: 3.4°C, 34.86 g/kg, density 1027.74 kg/m³.

3. No meltwater. Your water first sank at _____°C. Its density then was _____ kg/m³, compared with _____ for the water below.

4. Lots of meltwater. Could your water sink, even at −1.8°C, the coldest seawater gets? Use the word **denser** to explain.

5. Some meltwater. It sank at _____°C. The more fresh water mixes in, the _____ the water has to get before it sinks.

Part 3. Two layers, two directions SEP 6 Constructing Explanations · CCC Structure and Function

6. At stop 6 the **Labrador Current** at the surface is –1°C, colder than your water (3.3°C). But it floats on top. Use the salt and density numbers to explain why.

7. At stop 7 the surface water flows _____, and your water at 2,500 m flows _____. The Gulf Stream is the saltiest water on your trip. Why does it not sink?

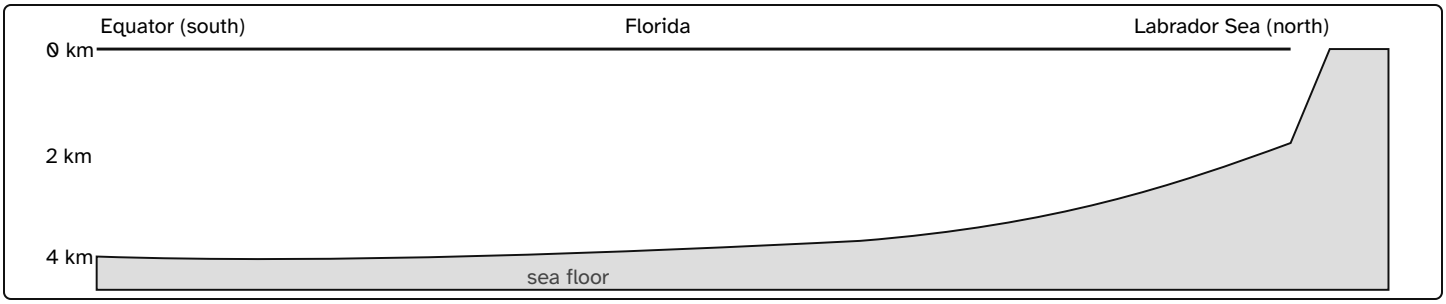
8. Math. The Gulf Stream moves about 1.5 m/s. Deep water moves about 0.1 m/s.

a. The Gulf Stream is _____ times faster. b. Florida to Cape Hatteras is about 1,100 km. At 1.5 m/s that takes about _____ days. (1,100,000 m ÷ 1.5 m/s = seconds; ÷ 86,400 s in a day)

READ FIRST. Finish stop 8. Then read the green Learn It box below the map, and watch the video if your teacher shows it.

Part 4. Put it together SEP 2 Developing and Using Models · CCC Systems and System Models

9. Draw the loop on this side view. Add arrows, and label where the water **flows north** , **cools** , **sinks** , and **flows south** .



10. Greenland's ice is melting faster. Predict what that does to the loop, and to winters in London. Use your answer to Q4 as evidence.

11. Model check. How is this loop like the ice and hot water box in Tab 1? Name one thing the real ocean has that the box did not.

NYSSLS: building toward HS-ESS2-5 and HS-ESS2-7, with DCI ESS2.D Weather and Climate and ESS2.C The Roles of Water in Earth's Surface Processes. Environmental Science, Lesson 6.1 extension. Values are typical winter values, rounded, from the NOAA World Ocean Atlas; density from the UNESCO seawater equation. Sea floor: ETOPO 2022 (NOAA NCEI).