

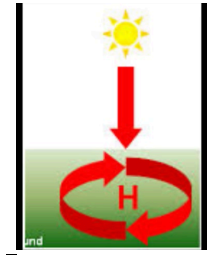
What Causes Ocean Currents?

Experiments will be shown/done demonstrating these phenomena on the next few pages.

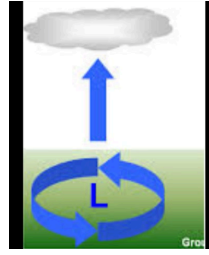
1. Highs and low pressures meeting
2. Heat capacities of water (and land)
3. Winds blowing across the ocean
4. Convection Currents
5. Earth's rotation
6. Prevailing winds
7. Amount of salt in the ocean
8. Contour of the ocean floor

What Causes Ocean Currents to Maneuver Experiments

1. High and Low Pressures



Cold Air



Hot Air

Hot air Rises and Cold Air Sinks

1. Put a balloon over a 12 oz plastic soda bottle. Put it into a pan of hot water.

a. What happened?

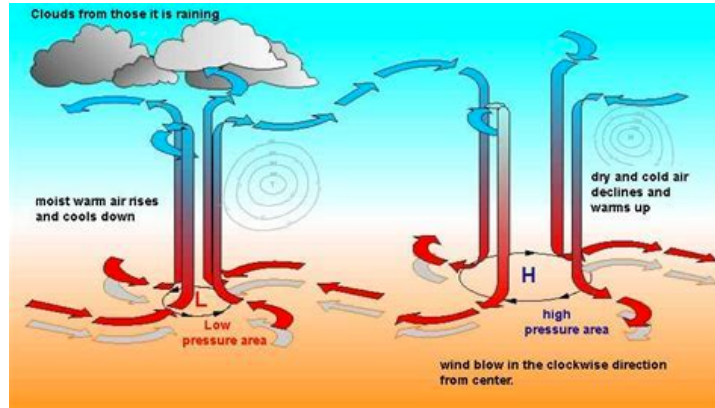
b. Why did the balloon fill with air?

2. With the air in the balloon, but the plastic bottle into a pan of cold water.

a. What happened?

b. Why did the balloon lose its air?

c. What does this have to do with ocean currents?



Air pressure can change causing high air pressure to flow into a low air pressure area experiments.

Experiment A--Message in A Bottle

1. Get a hardboiled egg and a bottle with an opening that a shelled-egg could barely fit through.
2. Lubricate the egg with light cooking oil or water.
3. Put a lit match into the glass bottle.
4. Quickly place the tapered end of the egg in the mouth of the bottle.
5. Explain what happened? (The phenomenon)

6. Explain why this happened.

Experiment B--Popping the Lid

1. Get a pint-sized canning jar with a lid.
2. Put some birthday candles in some clay and place the clay at the bottom of the jar.
3. Light the candles and quickly screw the lid on the jar. Watch and listen to what happens.
4. Explain what you heard and saw. (The phenomenon)

5. Explain why this happened.

Experiment C--Rising to the Occasion

1. Get a flat low-rimmed container like a cake pan. Put some water in it about an inch deep. Put some food coloring in the water. (This is so you can see the water.)
 2. Put some clay in the middle of the pan.
 3. Put some birthday candles in the clay making sure the water is not higher than the candles.
 4. Light the candles.
 5. Put a wide-mouthed bottle over the candles into the water.
 6. What is happening in the jar? (The phenomenon)
-
-

7. Explain why this happened.
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Experiment D--The Bottle Crush

1. Get a two-liter bottle with a lid.
 2. Put a cup of hot water in the bottle.
 3. Pour the water out.
 4. Put the lid on it.
 5. Explain what happened to the bottle. (The phenomenon)
-
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6. Explain why you think this happened to the bottle.
-
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2. Heat Capacity of Water and **3. Winds Blowing Across the Ocean Experiment**

Wind Blowing Across Water Experiment

1. Get a bowl of water.
2. Get a straw.
3. Blow air with the straw across the water.
4. What do you see happening?

5. Why is this happening?

6. What causes waves the waves on the ocean?

7. What actually causes the winds to blow in different directions on the ocean?

Draw illustrations of where the high and low pressures are on the two ocean pictures.



4. Convection Currents

Investigating The Density of Water When it is Hot and Cold Experiments

Convection is the transfer of heat by movement of currents within fluids, such as a liquid or gas, causing the fluid matter to move. When heat is transferred by convection, slow-moving molecules in the fluid begin to move faster, and they also move farther apart. As a result, the heated fluid becomes less dense and floats to the top. The more dense fluid then sinks to the bottom. Convection produces global winds that form Earth's weather when air is heated by the 'sun. It also produces the ocean currents when warm water meets the cold.

1. Experiment A—Hot Water, Warm Water, and Cold Water Density

I. Experiment One

1. Put the hot water color at the top of one of the room temperature water cups.
Write down what you see happening.

2. Put the cold-water color at the bottom of one of the room temperature water cups.
Write down what you see happening.

II. Experiment Two

1. Put the cold-water color at the bottom of one of the room temperature water cups.
2. Put the hot water color at the top of the same room temperature water cup.
3. Write down what you see happening.

4. Write your conclusion of what you discovered after doing experiments 1 and 2.

III. Experiment Three

1. Put the hot water color at the bottom of the cup in the room temperature water.
Write down what you see happening.

2. Put the cold-water color at the top of one of the room temperature water cups.
Write down what you see happening.

IV. Experiment Four

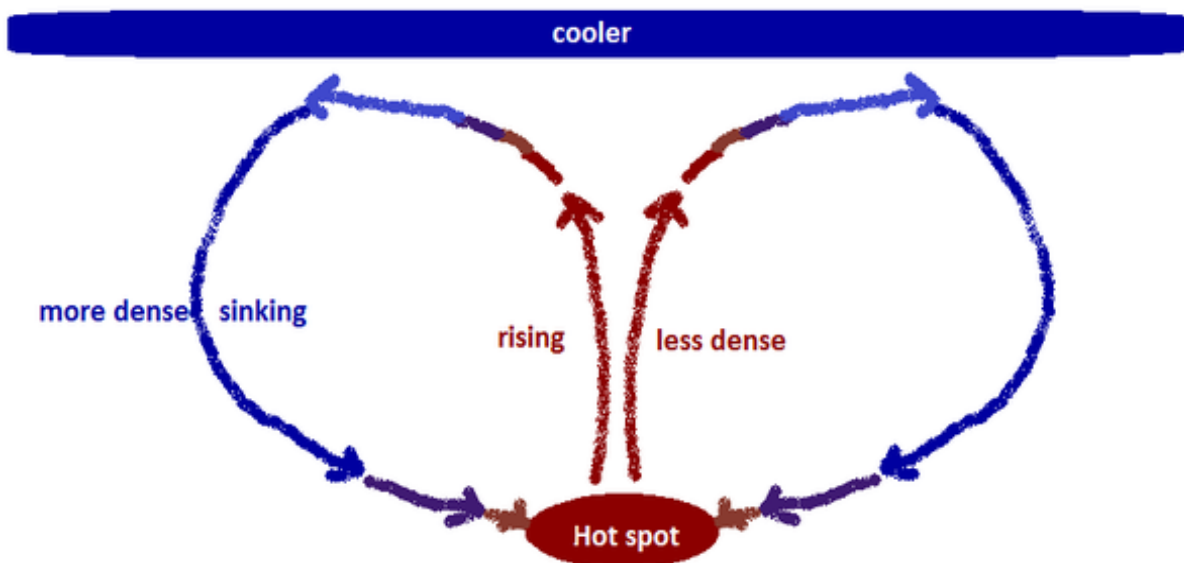
1. Put the hot water color at the bottom of one of the room temperature water cups.
2. Put the cold-water color at the top of the same room temperature water cup.
3. Write down what you see happening.

4. Write your conclusion of what you discovered after doing experiments 1 and 2.

V. Teacher Experiment Five—Hot and Cold Water in Cups

1. Watch the experiment. Why does the hot and cold colored water react the way it does?

2. How does this experiment show how ocean currents work?



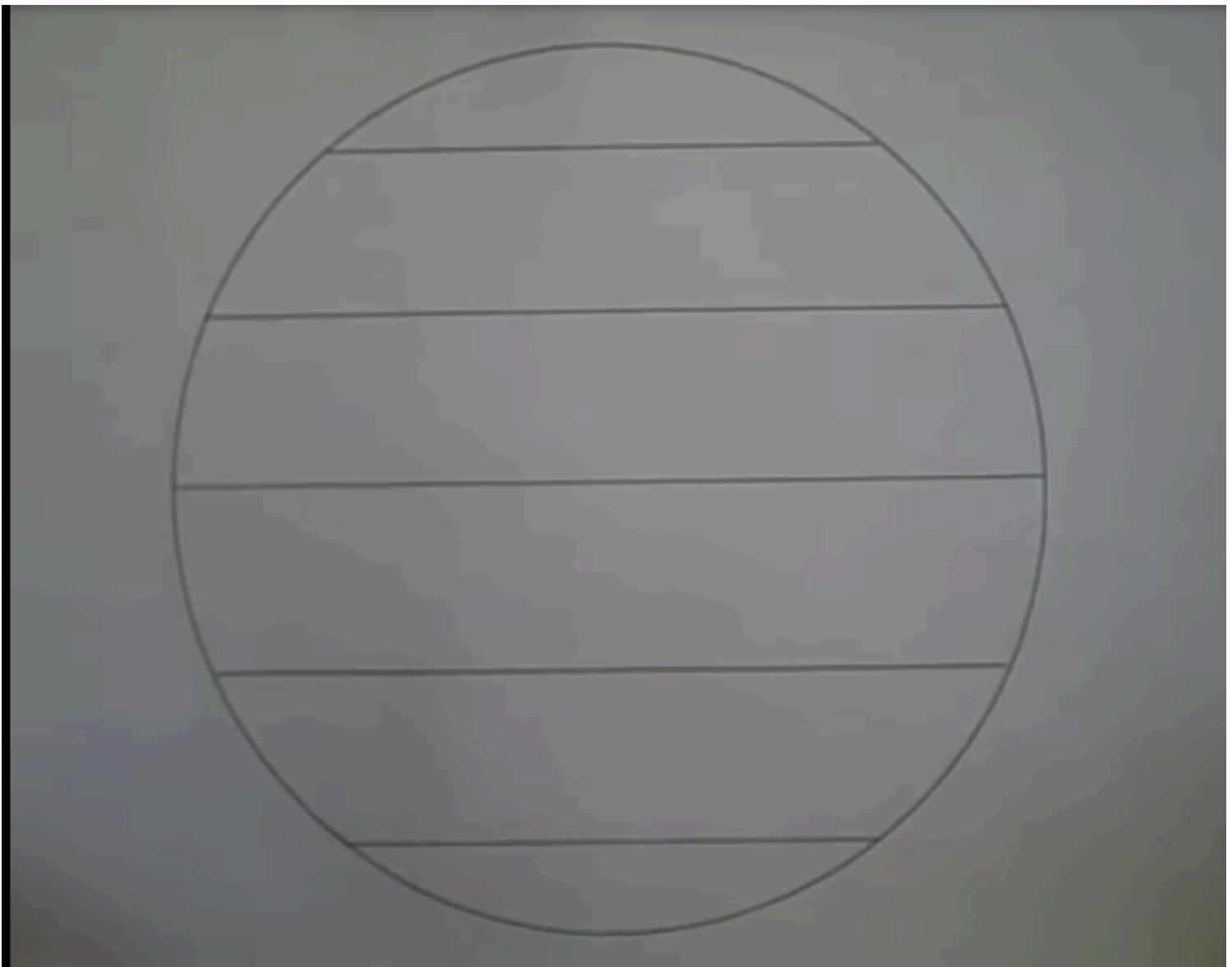
The Coriolis Effect

1. High Pressure and Low Pressure Creating
4. Convection Currents
and
5. Earth's Rotation Creating
6. Prevailing Winds

Watch the Video about the Coriolis Effect

<https://www.bing.com/videos/search?q=global+trade+winds+map&&view=detail&mid=EB43D59EC02A31AEBCC1&&FORM=VDRVRV>

1. Draw on your paper what the teacher is drawing:



2. Watch the Videos on why the prevailing winds blow in different directions on the Earth.
Coriolis Effect on a Twirler Experiments

<https://www.youtube.com/watch?v=mPsLanVS1Q8>

https://www.youtube.com/watch?v=IMKa_ubu8UM

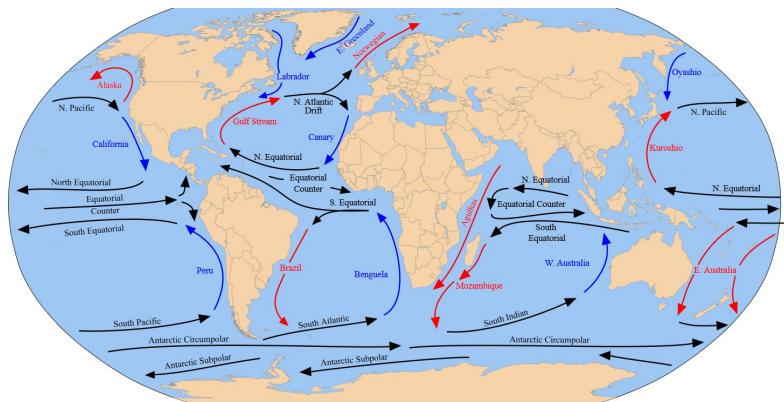
<https://www.youtube.com/watch?v=6L5UD240mCQ&t=7s>

3. Why did the ball thrown on a twirler go to the person to the right when it was thrown to the person straight across?

4. Why do the prevailing winds go to the left on the globe instead of straight?

5. Why are the prevailing winds so important?

6. Draw what the prevailing winds look like as hot air rises (low pressure) and cold air sinks (high pressure) while the Earth is rotating. (Look at the map with the ocean currents of the Earth and draw them on the black and white map of the Earth.)



7. The Amount of Salt in the Ocean

Watch the Bill Nye Experiment about high and low density of salt in water.

https://www.youtube.com/watch?v=w_8mw-1HYFg

Answer these questions:

3. High Density of Salt Water and Low Density of Salt Water

- a. What did the high density of salt water do when poured into the water and why?

- b. What did the low density of salt water do when poured into the water and why?

- c. What does the high and low density of salt have to do with ocean currents?

