

Magnetic Stripes - Teacher Notes

Part of the magnetic history of Earth is recorded in the basalts poured out on either side of mid-ocean ridges. We can observe basalt flowing out from trenches at the centre of mid-ocean ridges. At the time when the flow solidifies the magnetic minerals within align with the North Pole (See activity on Earth's Magnetosphere). Scientists have noticed that some rocks demonstrate reversed polarity. When the magnetic orientation of these basalts was measured across a mid-ocean ridge they were seen to be mirror images. When the ages of these bands were estimated they also were mirror images

Materials per student or group

- Two books
- Two sheets of lined paper
- Pen/pencil
- A coin

Mark one central line on the paper to represent the present.

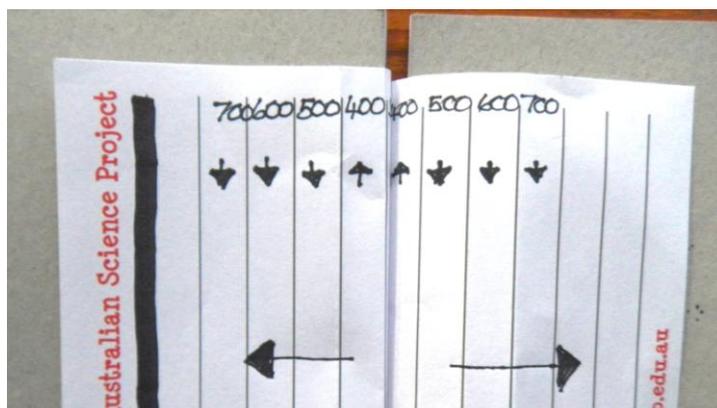
Each line on either side represents 100 years of seafloor spreading basalt flows.

700 600 500 400 300 200 100 0 100 200 300 400 500 600 700

Toss a coin to decide whether the magnetic orientation of each of the seven one hundred year sections will be north or south.

Indicate with arrows which direction north lies on the paper. For each of the 7 sets of 100 years

Cut the paper in half along the "present" column.

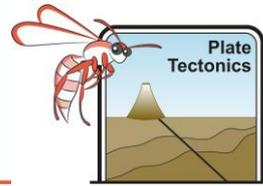


Tuck the sheets under the books so that only a little protrudes at the centre. The books represent continental plates being pushed apart and the paper the lava flows coming out of the mid-ocean ridge. Draw out the paper from between the books and see how the magnetic striping can be modelled.

Does this activity prove the theory of seafloor spreading? **This does not support the theory, only models the possible process. Science requires data to support theories.**

Every so often convection currents in our outer magnetic core change causing our poles to "flip". North becomes south. When the polarity of minerals is oriented to the North Magnetic pole we call it "NORMAL POLARITY". Normal polarity is usually represented by the colour white. When

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Minerals' north poles are oriented towards the present South Magnetic Pole we call it "REVERSE POLARITY". Black usually represents reverse polarity.

The strip below represents polarity across a theoretical mid-oceanic ridge. Each block represents 100 years.



What is the polarity at present? [Reverse Polarity](#)

How many years does the data cover? [350 years](#)

If every block represents 100 years how many changes of polarity have happened in the last 350 years? [Two, reverse to normal and then back again.](#)

Use the following data to create a similar strip for a mid-oceanic ridge. Data is sourced from "Scripps Classroom Connections 2010. Activity - Solid Earth and Plate Tectonics by Leah Zeigler and Dave van Dusen. Normal polarity rocks have positive VPG latitude.

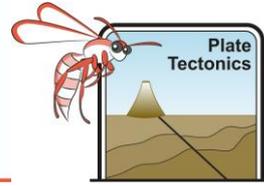
HINT Every time the VPG latitude crosses zero it is the result of a change in polarity.

Materials per student

- Paper
- Ruler
- Pencil/pen

Distance from ridge (km east)	VPG Latitude (deg.)
-156	82.9
-133	-88.5
-125	-80.5
-109	71.1
-85	-82.9
-76	12.7
-52	38.8
-39	86.9
-19	82.2
-8	60.4
Distance from ridge (km west)	VPG Latitude (deg)
10	58.4
21	84.0
38	87.4
60	40.2
76	9.6
87	-83.2
111	69.7
128	-78.8
136	-87.8
159	81.3

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What is obvious about the stripes you have plotted? **They are mirrored on either side of the central point. They are symmetrical.**

Does this magnetic stripe data support the theory of seafloor spreading? **Yes.**

Extension Teacher may ask students to graph the VPG Latitude (degrees) against Distance from Oceanic Ridge (km). There is no regular pattern of period length for normal or reversed polarity. They vary for 0.1 and 1 million years. The last major period was 780,000 years ago when humans were present. There was however a brief reversal during the most recent glacial period about 41,000 years ago. There does not appear to be a direct relationship between polar reversals, global extinctions or warming/cooling periods. Our modern world depends on our magnetosphere for communications and navigation. Studies of rocks 200 million years and older has suggested that reversals are more common recently.