



# MAGNETIC FIELDS



## ONE MORE DEFINITION

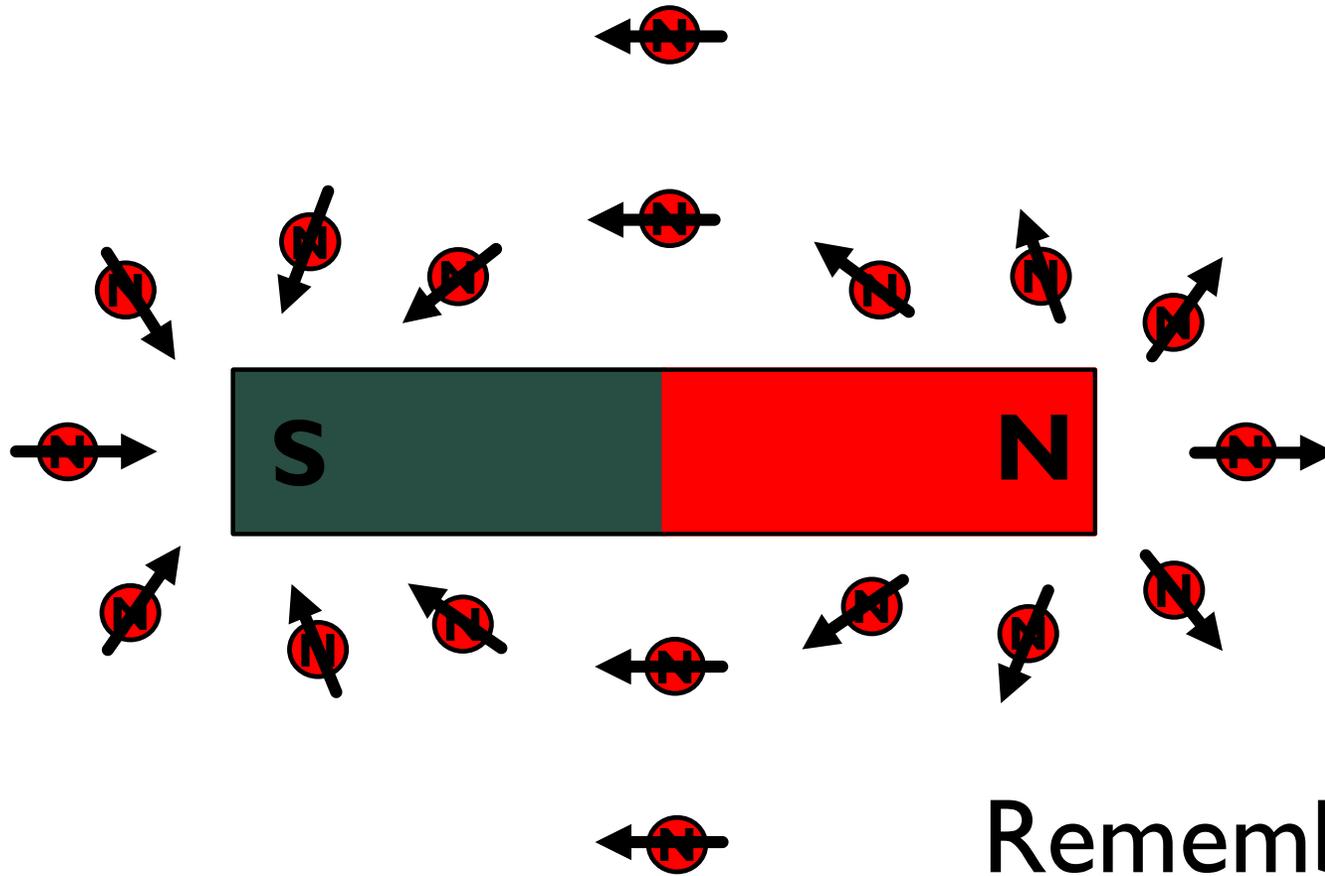
- **Magnetic field:**
  - **The area around a magnet (or electric current) in which other magnetic objects will be affected**

How can we “see” this?

# MAGNETIC FIELD LINES

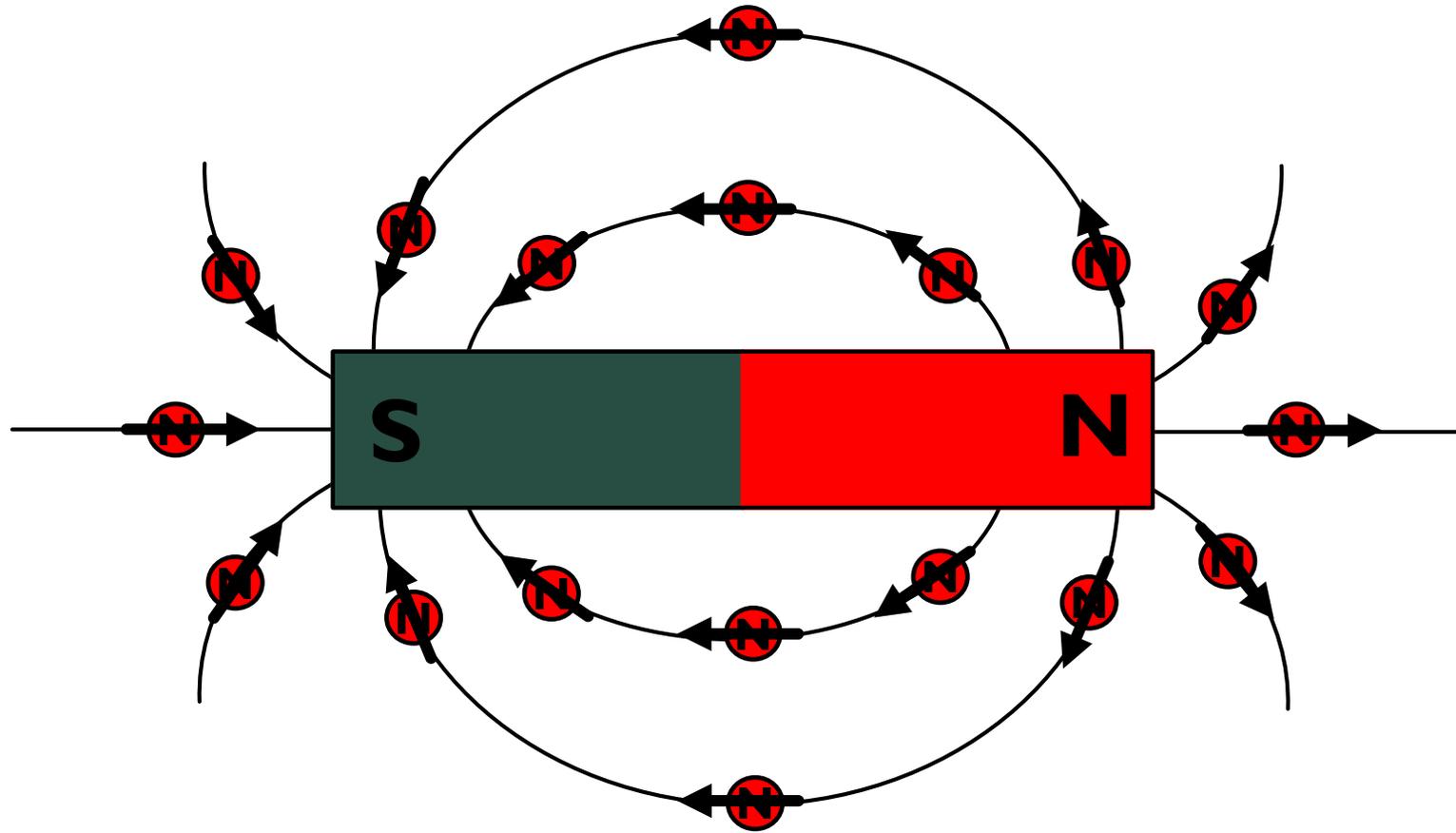
- **Visualizing magnetic field lines**
  - If we were to place a series of **compasses (tiny magnets)** around another large magnet we would see how all the arrows start to **align in a particular pattern**

In what direction would a North pole be pushed/pulled if it were near the following bar magnet?

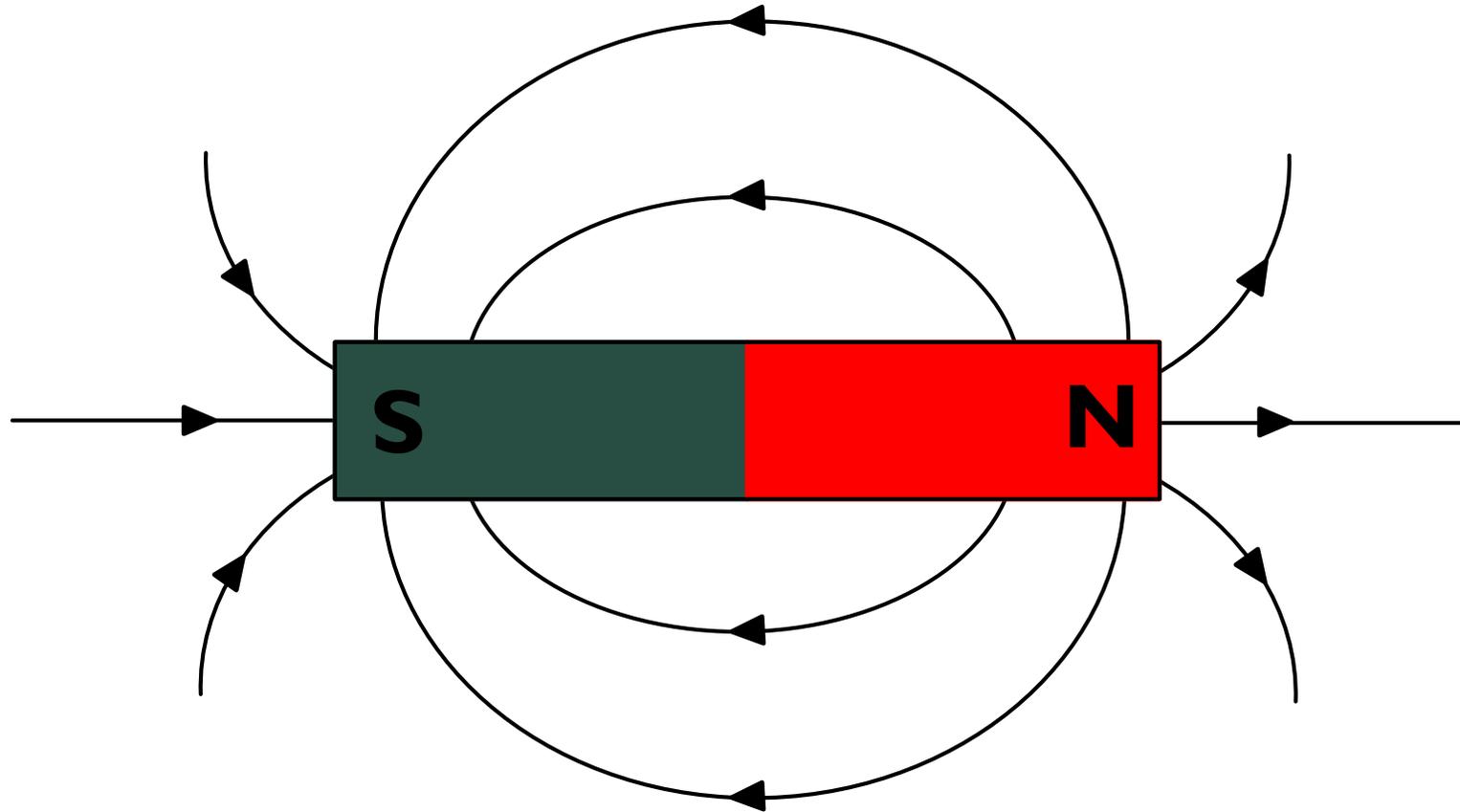


Remember: North is attracted to South

The magnetic field is illustrated with a few lines that show the pattern,



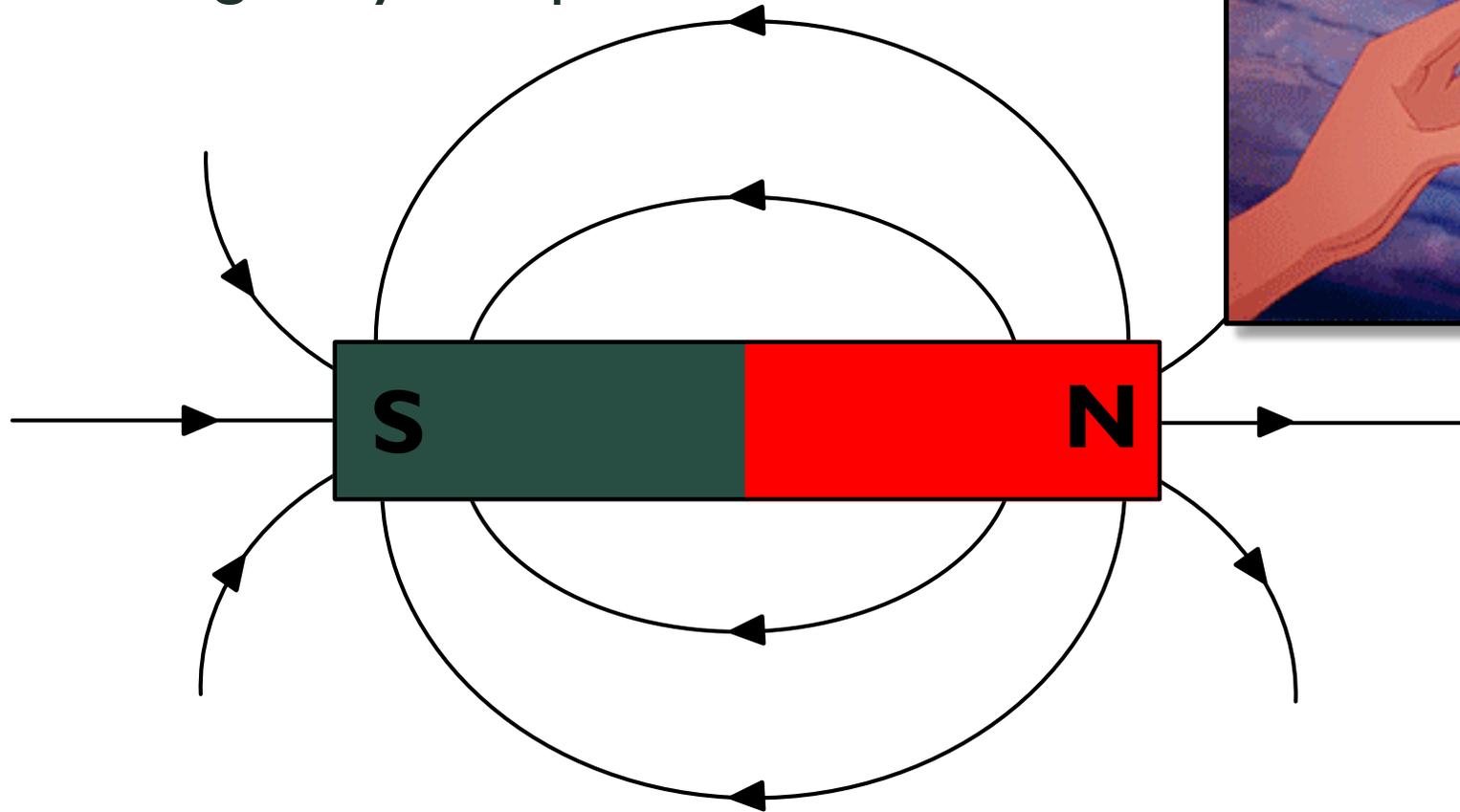
The magnetic field is illustrated with a few lines that show the pattern, with arrowheads to show the direction of the magnetic push.



**Note:** the arrows **always** point towards the **south!**

# How can we see this pattern in the lab?

We don't have enough tiny compasses....



....so we'll use iron filings!

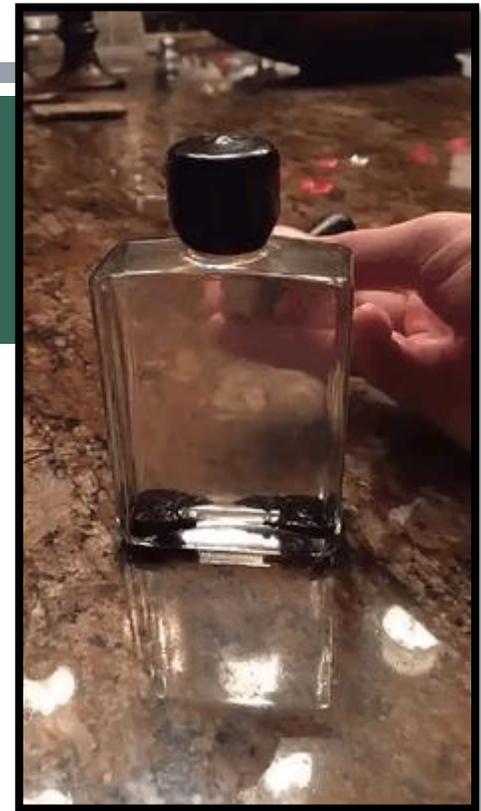
# RECALL DOMAINS

- **Ferromagnetic substances and magnetic domains**
  - **Ferromagnetic:**
    - Something that contains **iron, cobalt or nickel**
    - **Readily attracted to a magnet**

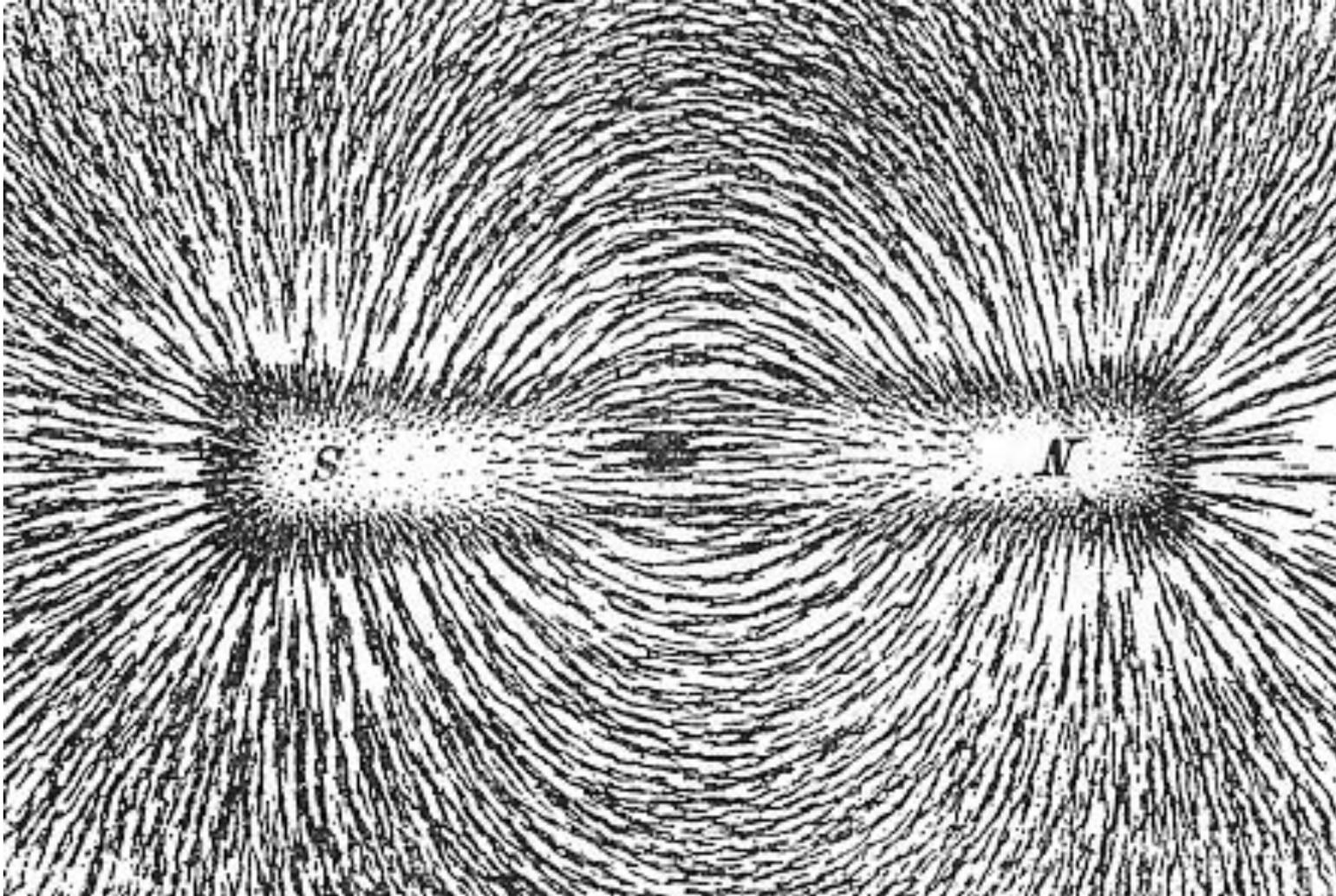


# RECALL DOMAINS

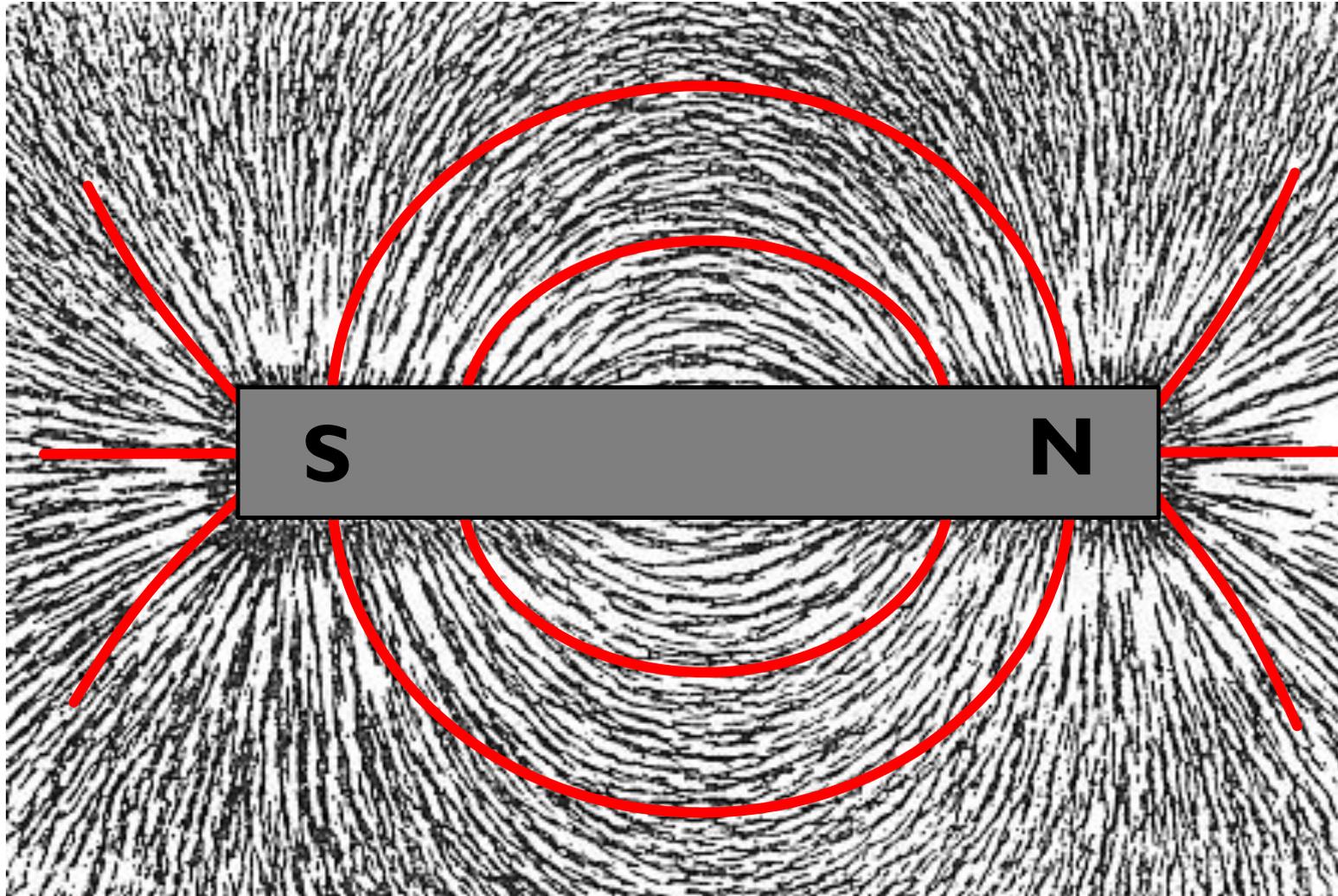
- **Ferromagnetic substances and magnetic domains**
  - **Ferromagnetic:**
  - Ferromagnetic substances consist of **tiny magnetic regions** (called '**domains**') that act like many **small magnets** within the material.
  - So iron filings will become **magnetized** and then act like tiny compasses and **line up** to show the **magnetic field lines!**



- Actually... it'll look a little something like this

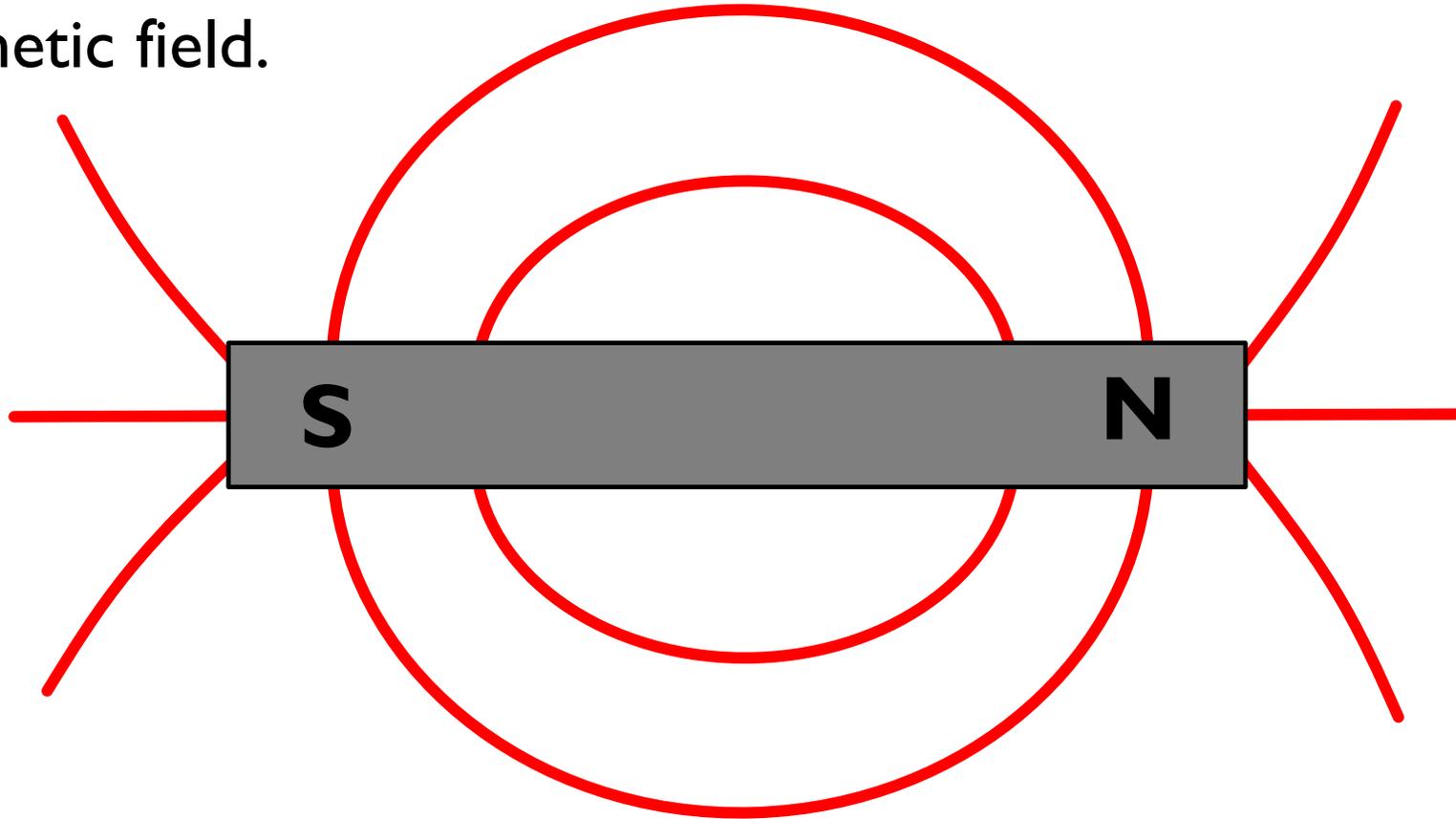


Look at the pattern, then draw a few lines (6 – 12) to show the basic shape



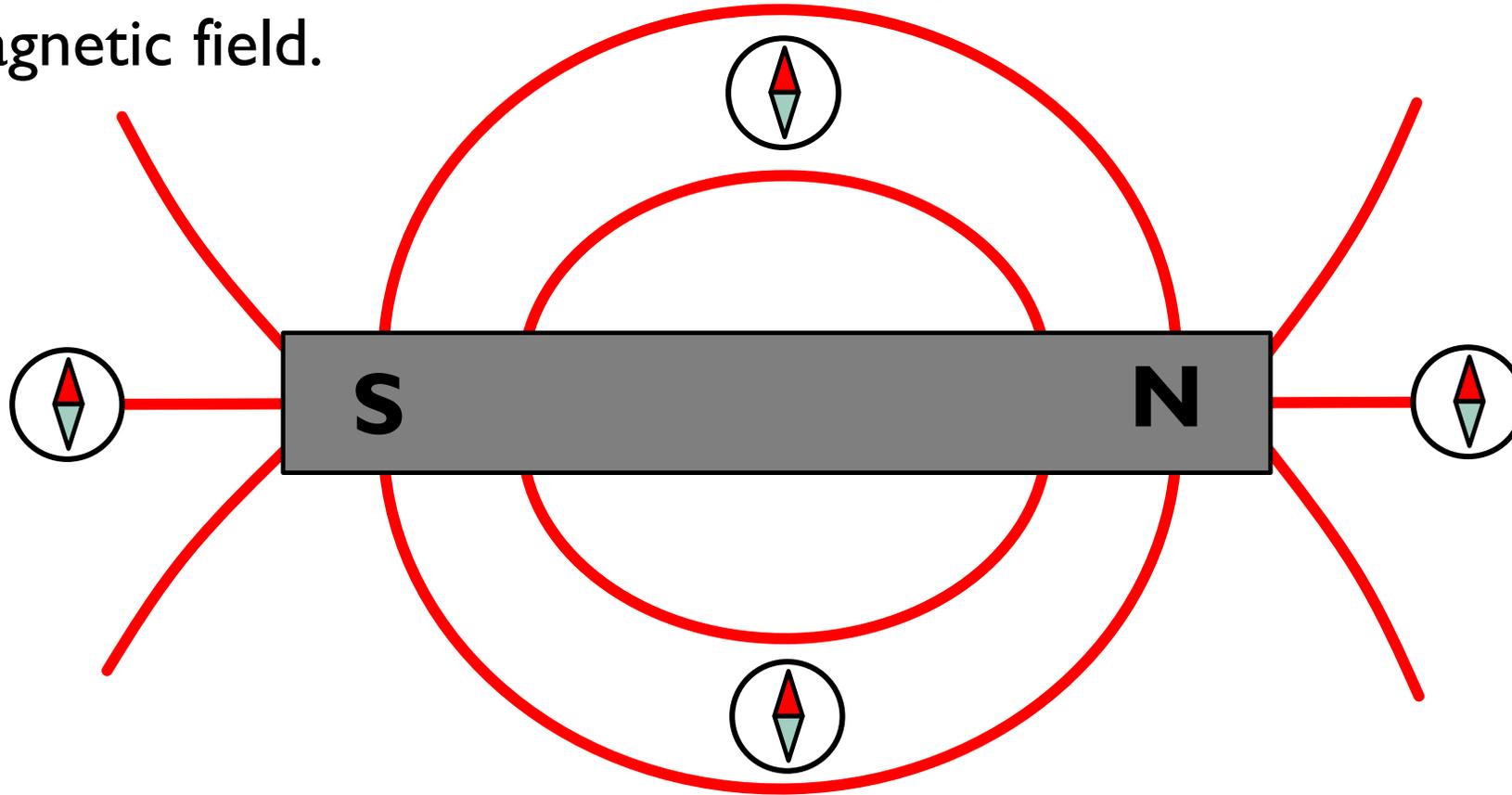
Complete the drawing by giving each line a direction.

The direction can be determined by placing a compass in the magnetic field.



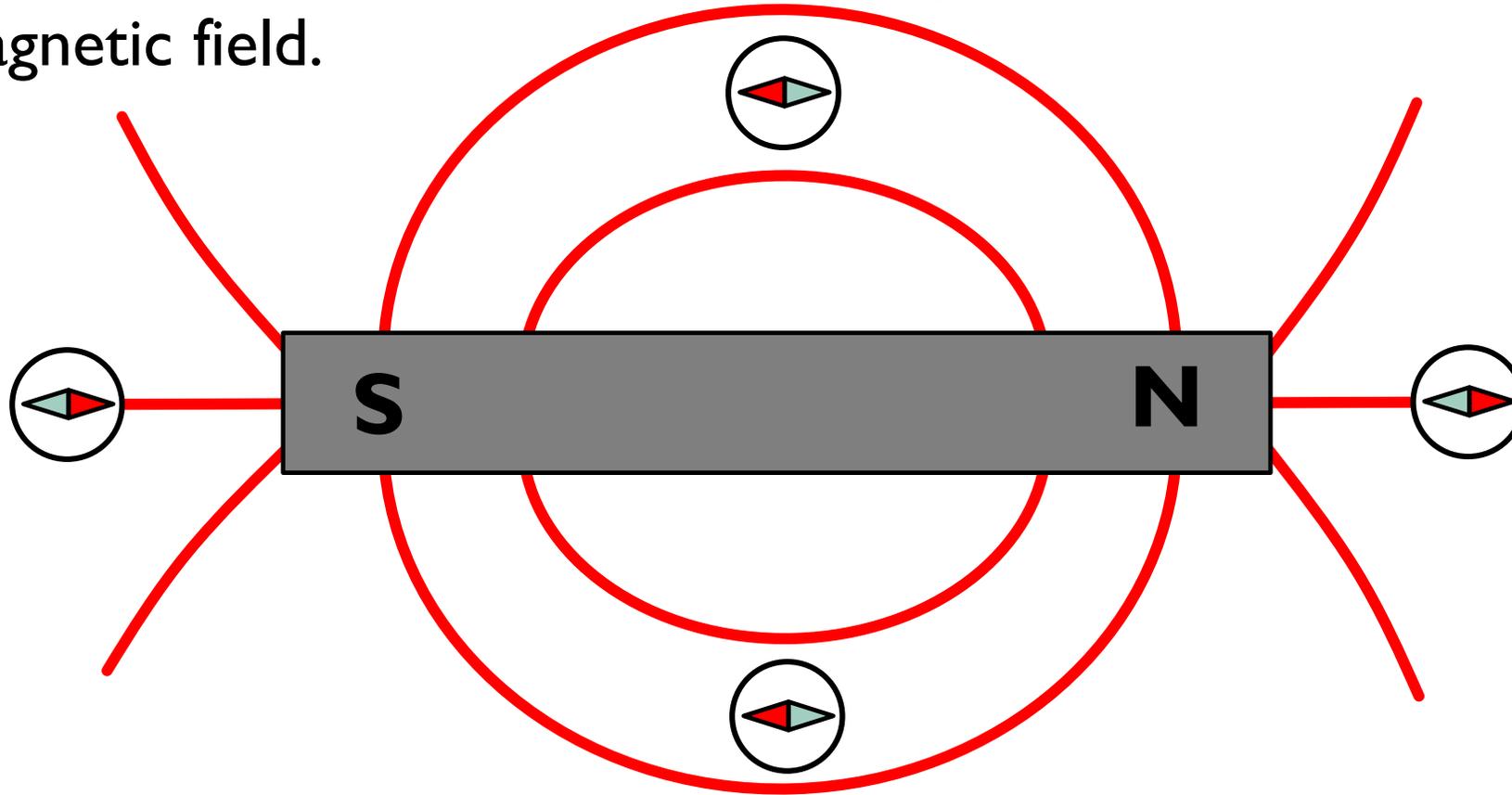
Complete the drawing by giving each line a direction.

The direction can be determined by placing a compass in the magnetic field.



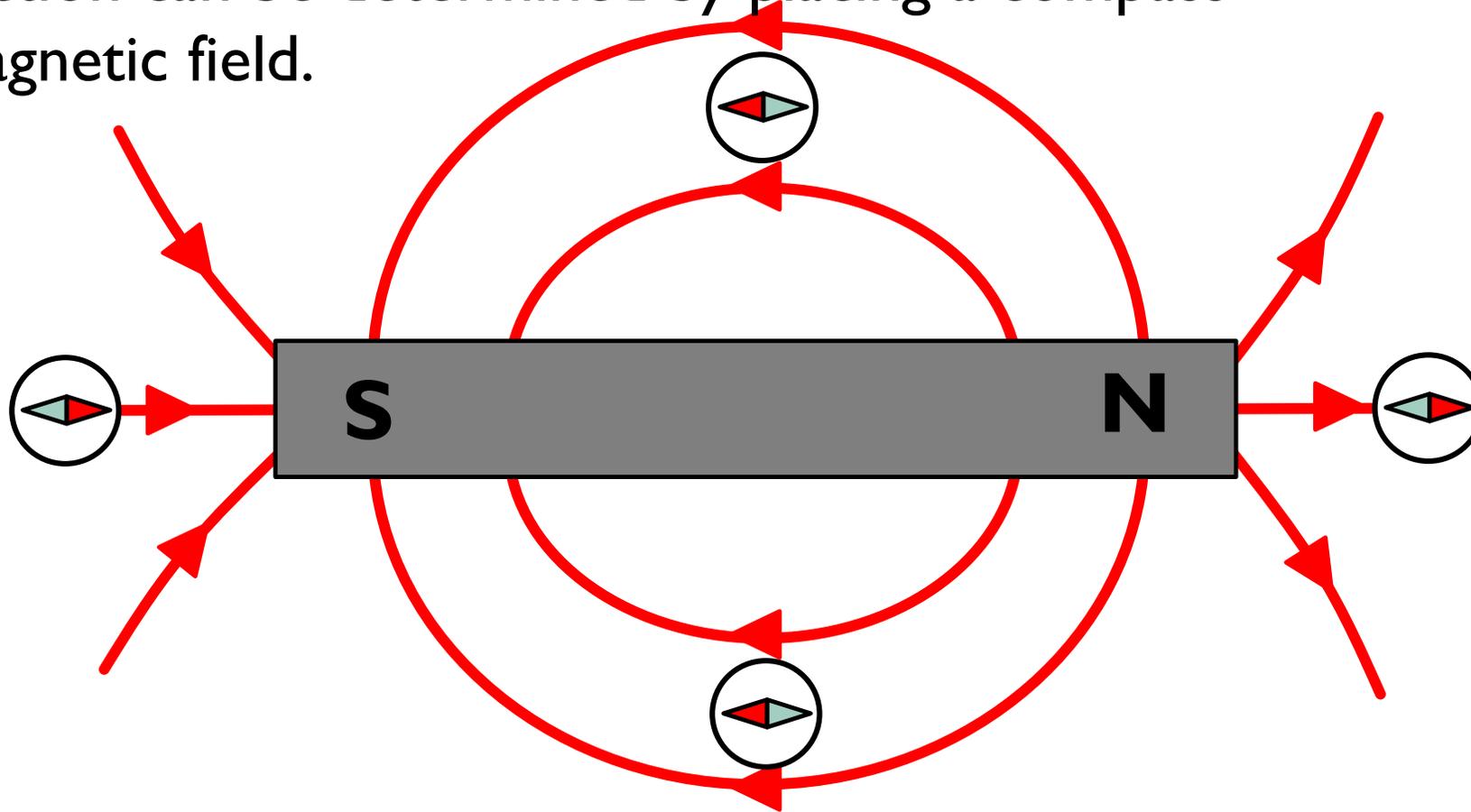
Complete the drawing by giving each line a direction.

The direction can be determined by placing a compass in the magnetic field.



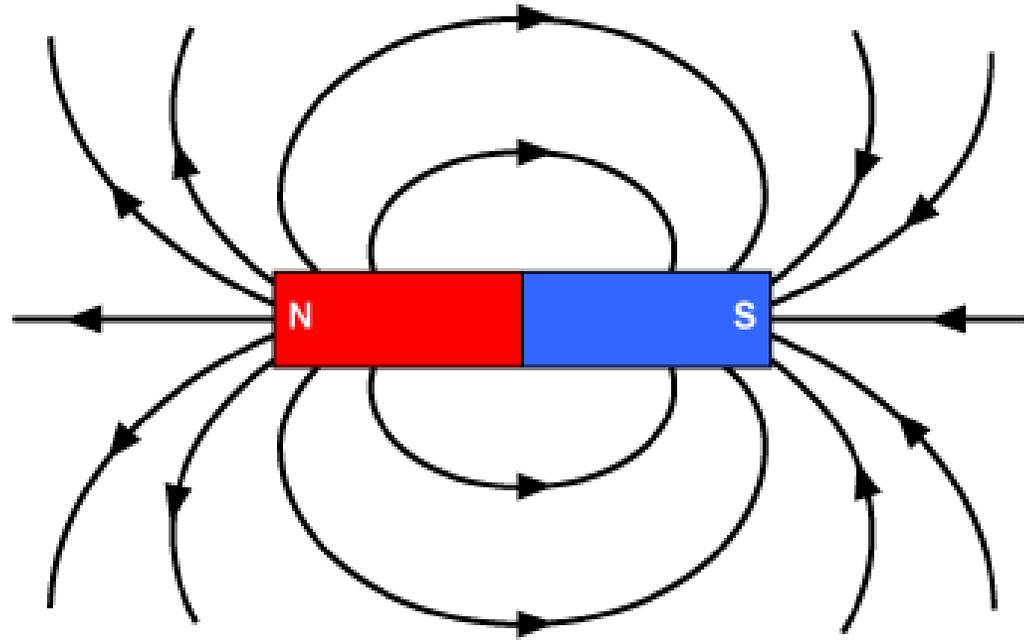
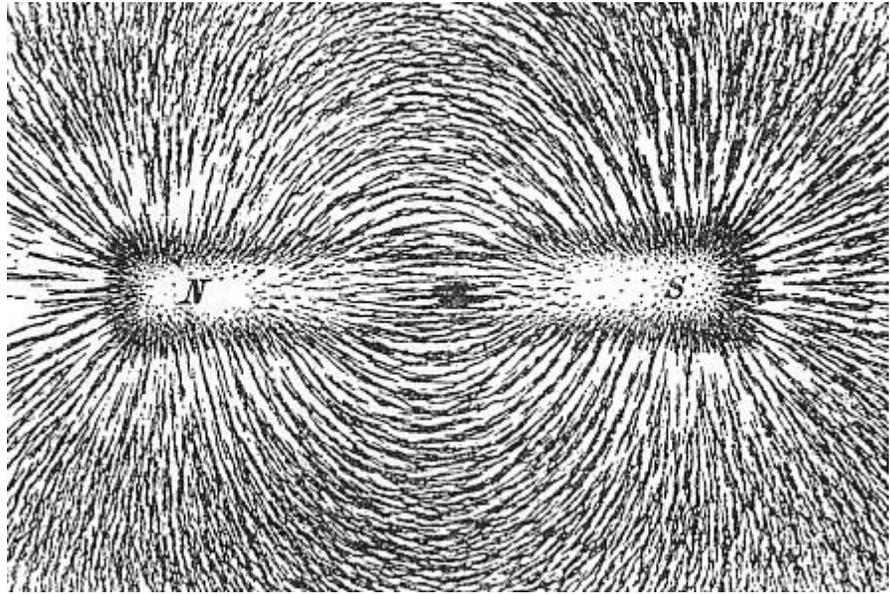
Complete the drawing by giving each line a direction.

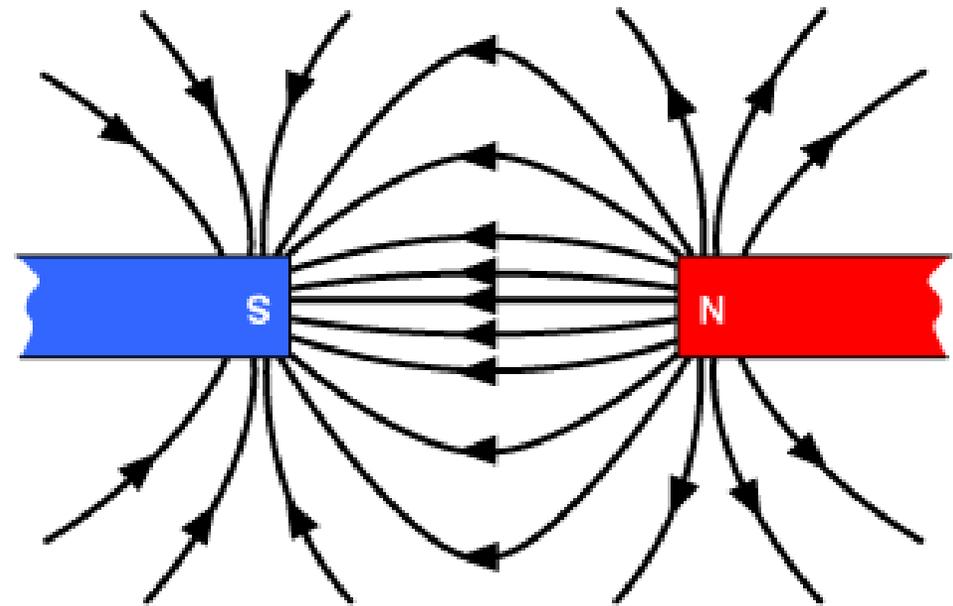
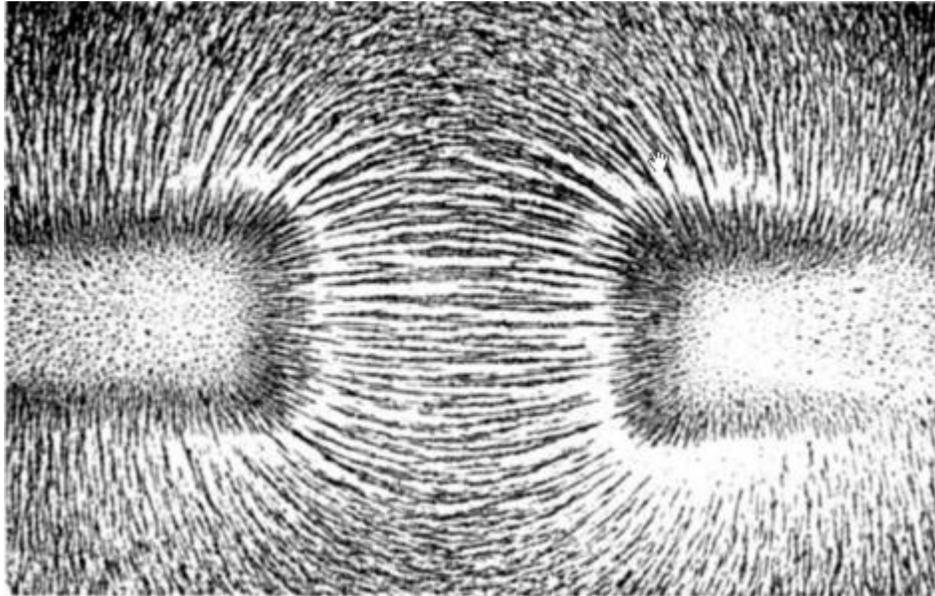
The direction can be determined by placing a compass in the magnetic field.

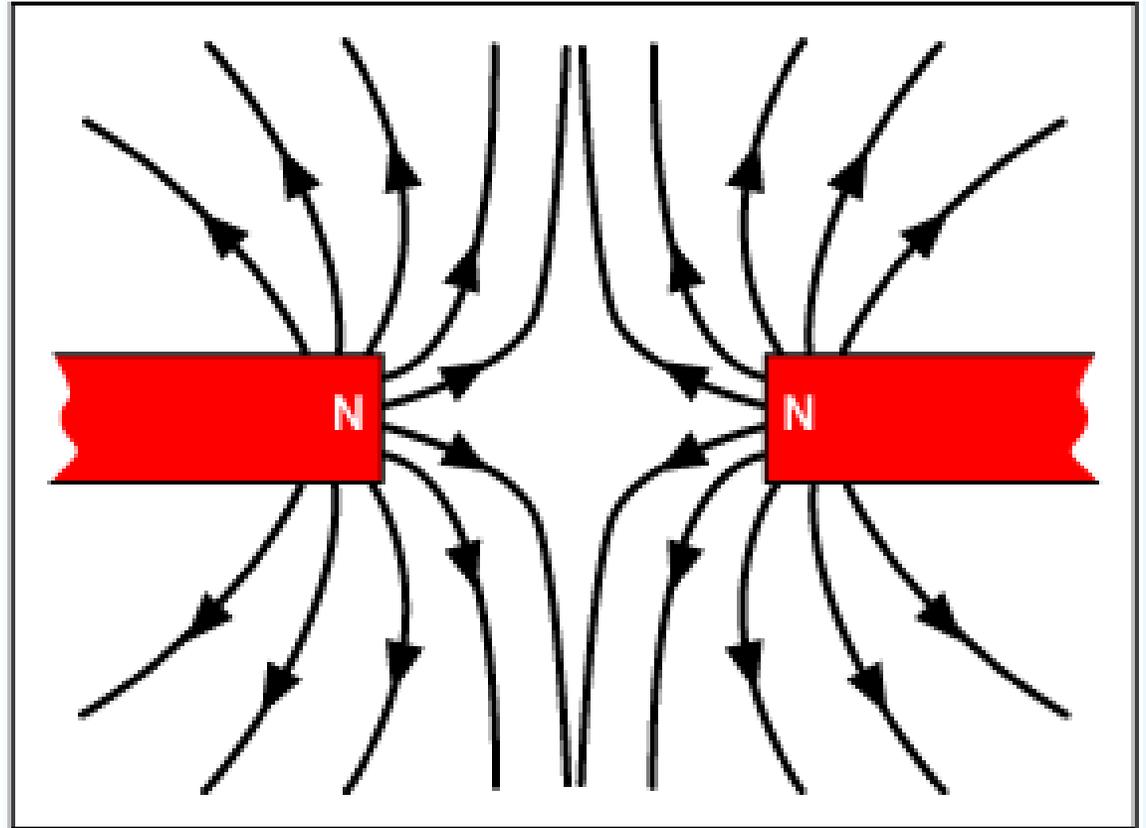
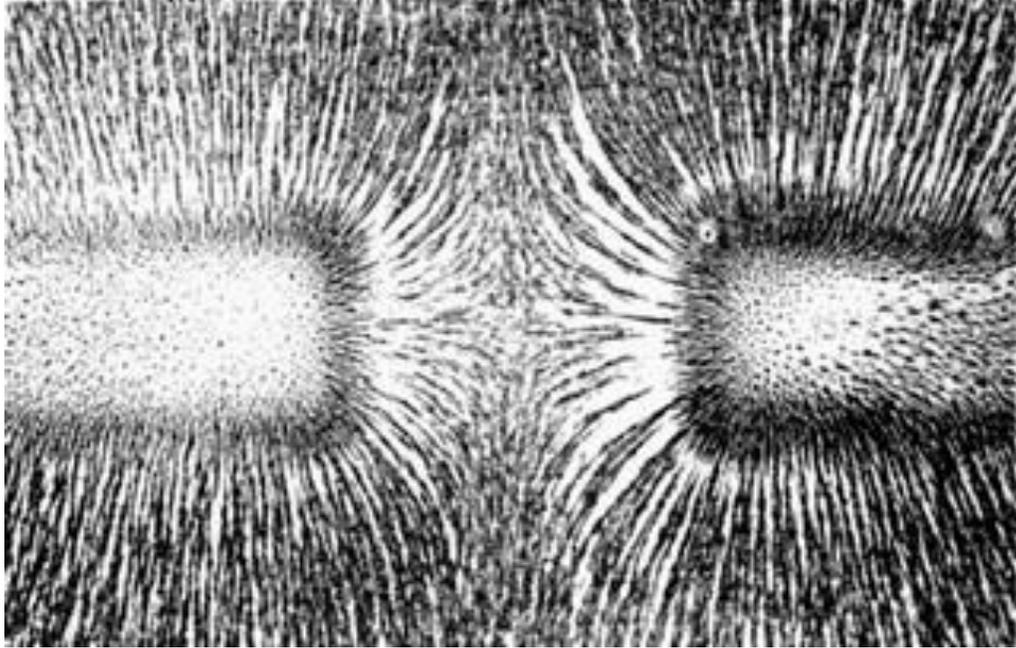


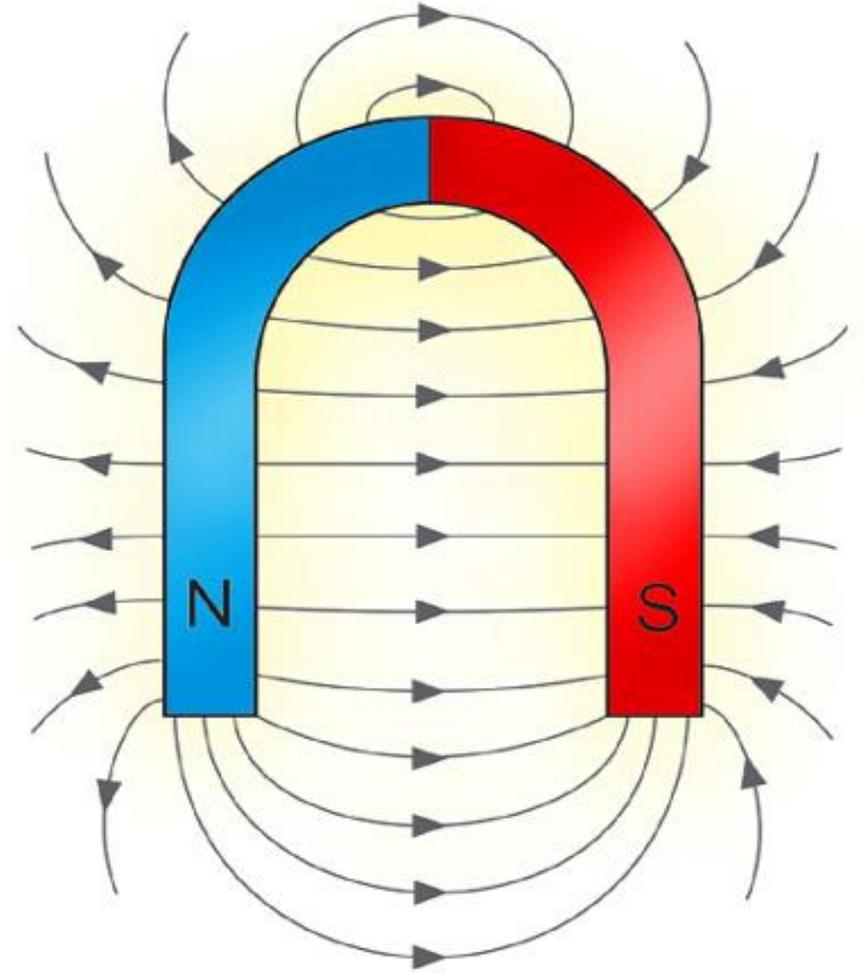
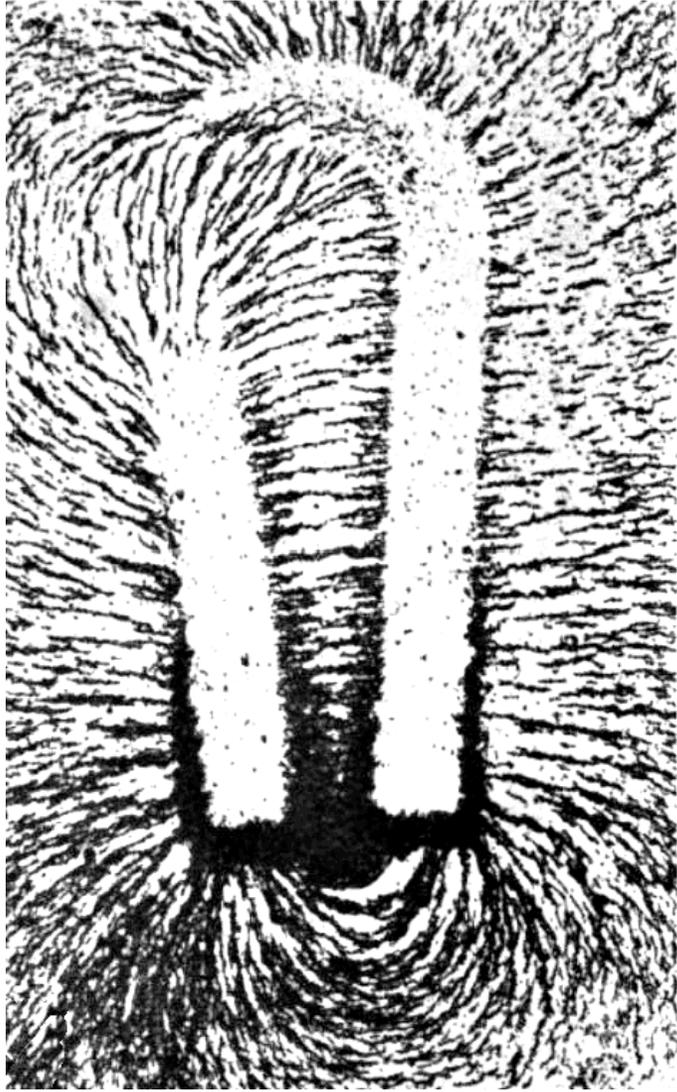
# LAB RESULTS











# MAGNETIC FIELD DIRECTION

- What do we notice about the magnetic field direction?
  - **Always from North to South**

# EARTH'S MAGNETIC FIELD

- The Earth's core is filled with **ferromagnetic liquids (Fe, Co, Ni)**
- These liquids are constantly in **motion** (due to the **Earth's rotation**)
- This motion creates a **giant magnetic field** that can be felt all over the Earth

# EARTH'S MAGNETIC FIELD

- What way does a compass point?
  - **Geographic North**
- The North pole of a magnet is attracted to...
  - **Magnetic South**

# EARTH'S MAGNETIC FIELD

- SO:

- This means that our **geographic North** is actually a **magnetic South pole**

