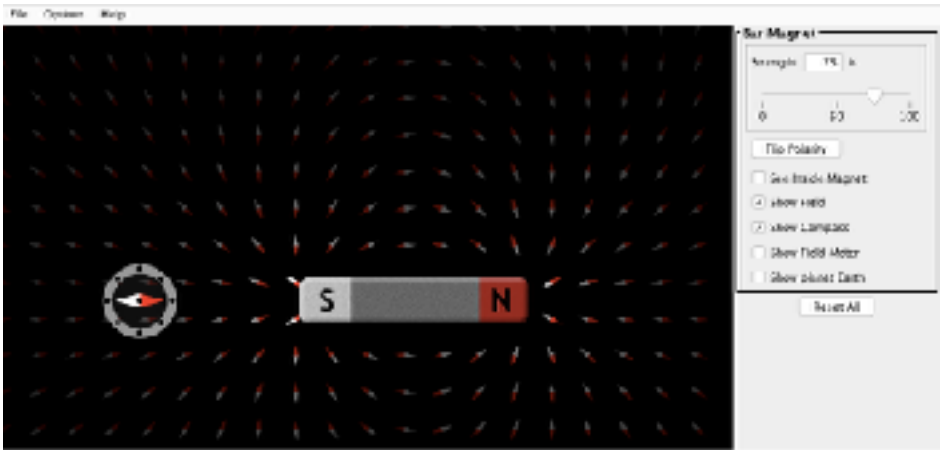
Magnets and Compasses

In this activity students will be exploring magnetic fields and magnetic field strength using a compass and a bar magnet using PhET simulation.

Open the simulation by clicking on the link:

https://phet.colorado.edu/en/simulation/legacy/magnet-and-compass

Take a look at the explanatory video via YouTube:
https://youtu.be/D-PPj-8KAWE



Learning Objectives

By the end of these activities it is hoped that students will have an acquired the following skills:

- Following explicit instructions to gain acquired knowledge
- Understand the nature and pattern of magnetic fields
- Understand how the strength of magnetic fields vary with distance
- Link magnetic fields of a bar magnet to those that exist around the planet Earth

Activity A: Identifying the nature of Magnetic Fields

- Click on the button on the right side "*See inside magnet*" and "*show compass*".
- Drag the compass around to the bar magnet. Watch the red arrow of the compass needle.

- **What do you notice about the needle colour as you drag it around the magnet?**

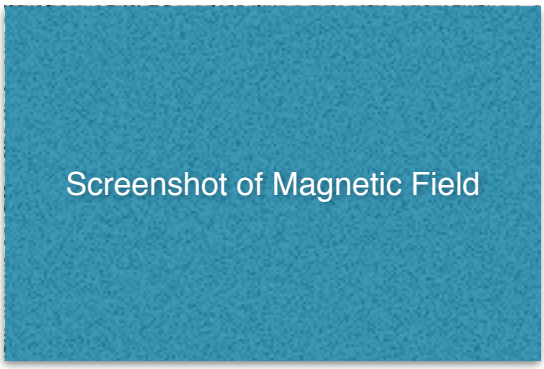
- Take screen shot at the South and North pole to prove your point and place below.

Screenshot at South pole

Screenshot at North pole

- Now click the flip the polarity button and do exactly the same thing.
- **What do you notice about the needle?**

- Now click on the "*Field*" button and take a snapshot and place below:



- Draw a diagrammatic version of this field around the bar magnet below. Place arrows on the field going from North to South.

Activity B: Identifying the Magnetic Field Strength

- Click on the "*Field Meter*", concentrate on top field strength value.
- Place the "*+*" of the meter close to the South pole.
- Drag the "*+*" from South to North approximately the same distant. Take a reading at five points from South to North and place in the column "Distance 1" in table 1 below:

Table 1:

	Distance 1	Distance 2	Distance 3
South			
Point 2			
Point 3			
Point 4			
North			

- Now do exactly the same but pull the "*+*" further away from the South pole and ready five points approximately the same distance and place in "Distance 2" and then pull even further out and place in "Distance 3".
- **What do you conclude from the data you have collected?**

- Now do exactly the same as above but change the bar magnets strength down to 30%. Take 5 readings for three distances, from the magnet.
- **What do you notice compared to the previous conclusion?**

Activity C: The Earth's Magnetic Field

- Click on the "*Show the Planet Earth*" and "*Show Field*" button.
- **What do you notice from your earlier diagram about the magnetic field of a magnet and that of the planet Earth?**

- Click on the "*Field Meter*" and drag it around the Earth at different distances.
- **What do you notice in relation to what you have already learnt?**

SUMMARY:

- **Field lines of a magnet move in which direction?**

- **As you move away from a magnet what happens to the field strength?**

- **If the red on the magnet and the compass needle is the north pole what can we say happens to the needle of the compass as it moves around the magnet?**