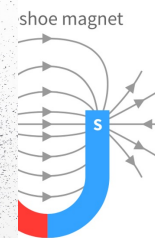
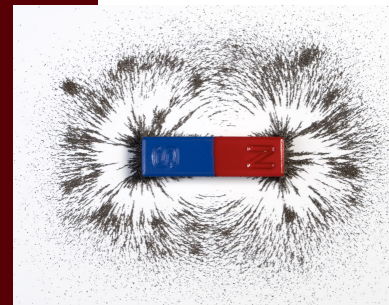
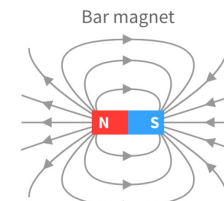
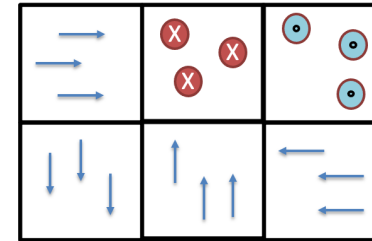
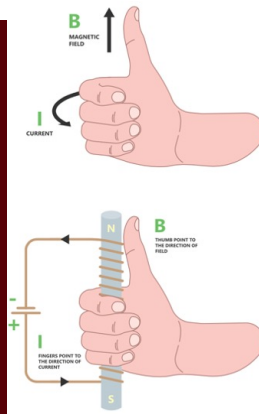
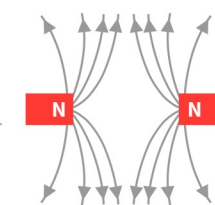


Magnetism and Electromagnetism

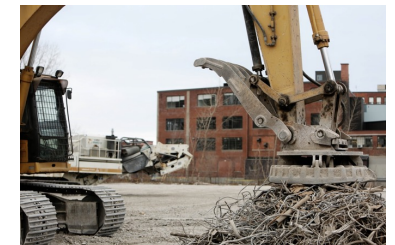
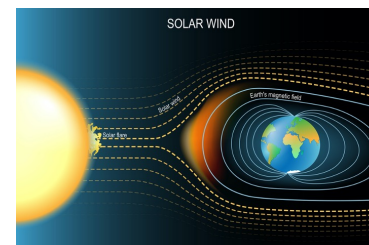
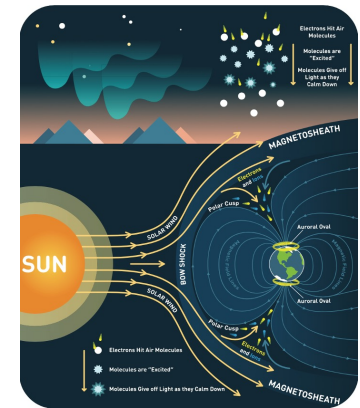
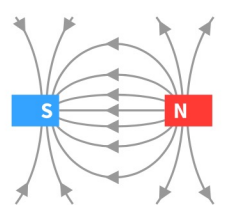
- Magnetism
- Law of Magnetic Poles
- Magnet Fields
- Iron Filings
- Earth's Magnetic Field
- The Auroras
- The Domain Theory of Magnetism
- Electromagnetism
- Right-Hand Rule for a Solenoid
- Magnetic Force on a Charge



Unlike poles attract



Like poles repel



Preview File

Please enjoy this preview of your Student Version of the presentation. Please note within this sample file:

- Some slides appear blank because they have been removed
- Student versions have portions of the text removed which is given in the teacher version and appear as _____ which the students are to fill in
- Other slides may have on them, this represents writing that has been removed on this sample

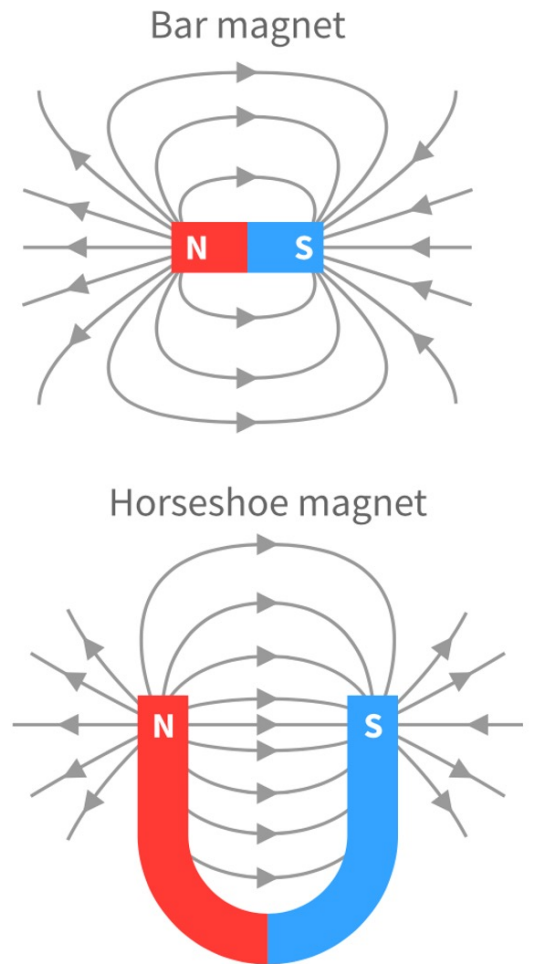
**The paid full version of your resource includes
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Magnetism

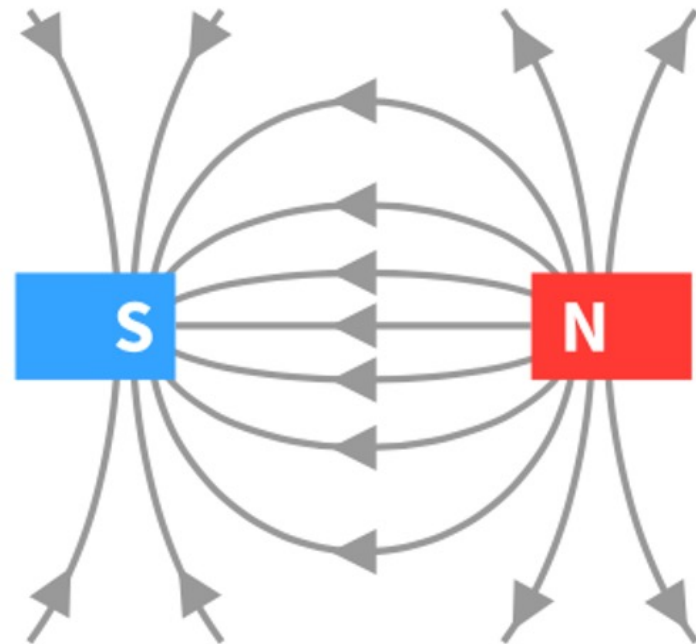
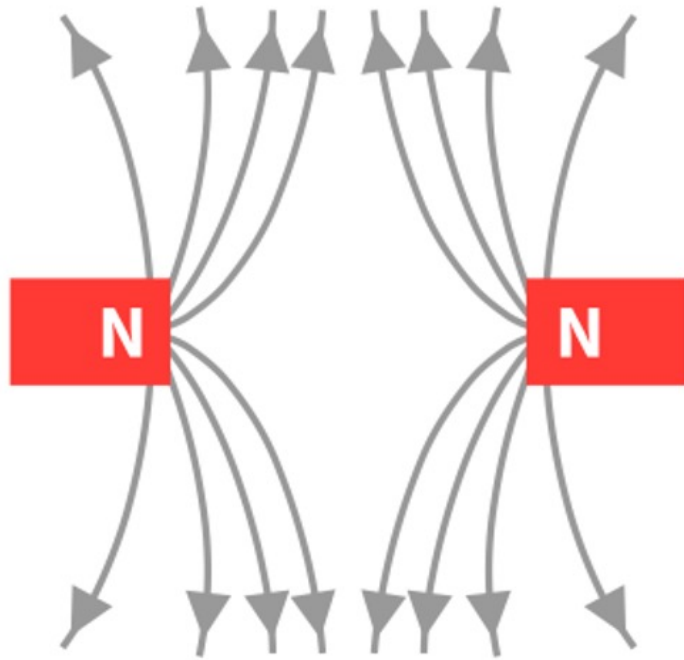
- _____

- It can influence other objects without being in physical contact with them



Law of Magnetic Poles

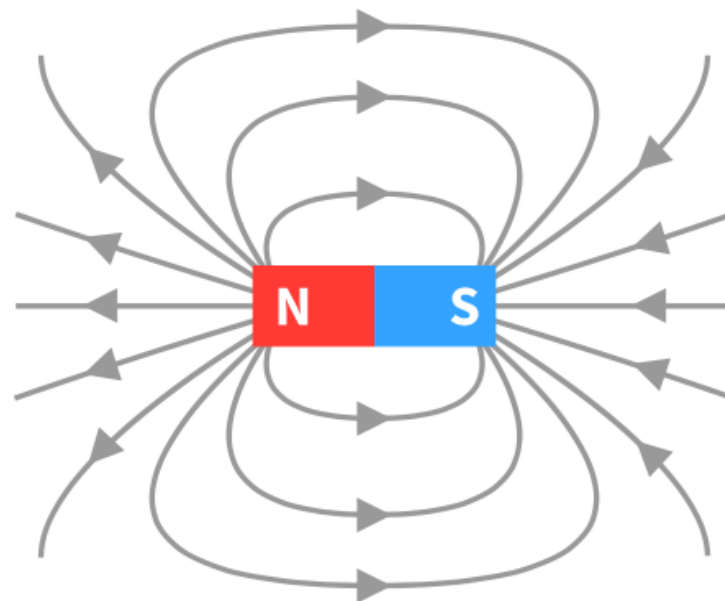
Opposite magnetic poles (+/-) attract. Like +/+ or -/- magnetic poles repel.



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Magnet Fields

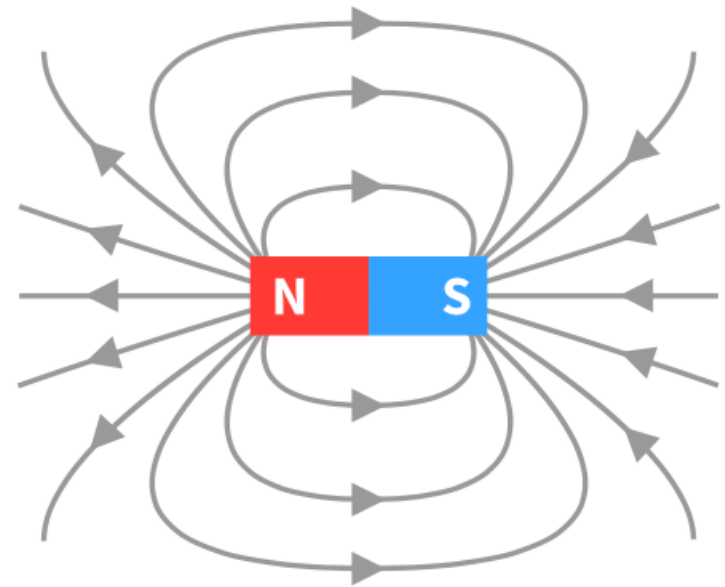
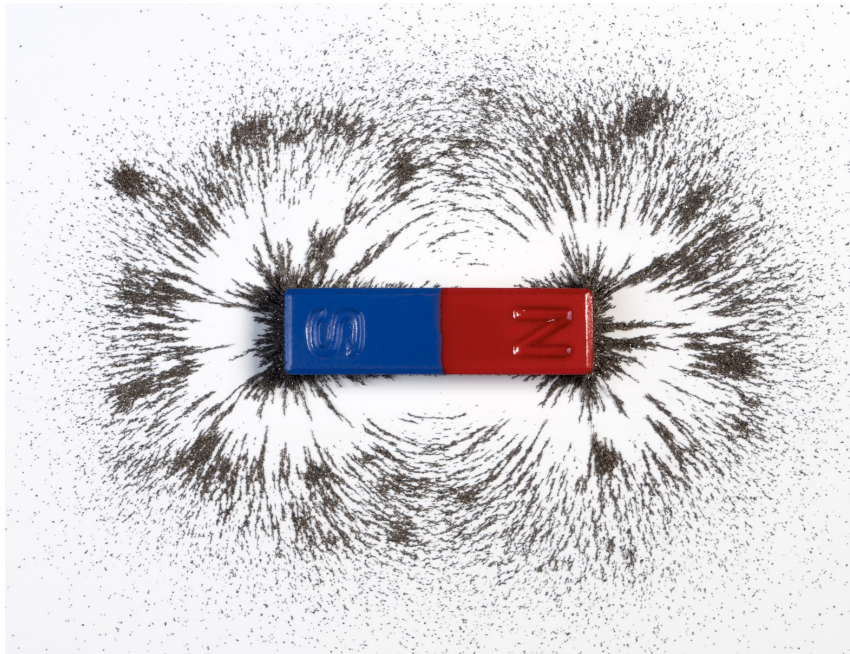
Since substances like iron experience a force when placed near a magnet, the magnet must be producing a magnetic force field.



Magnetic Field

Iron Filings and the Magnetic Field

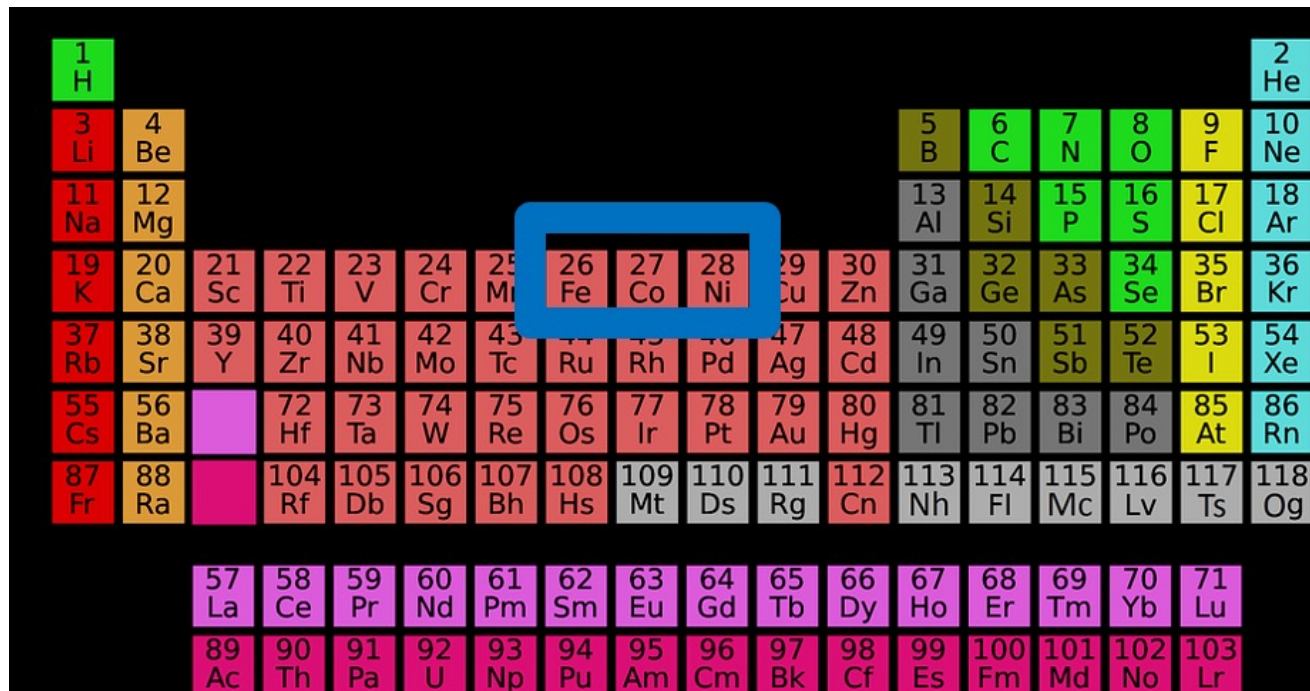
If you sprinkle iron filings near a permanent magnet, the iron filings will line up according to the magnetic field.



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Earth's Magnetic Field

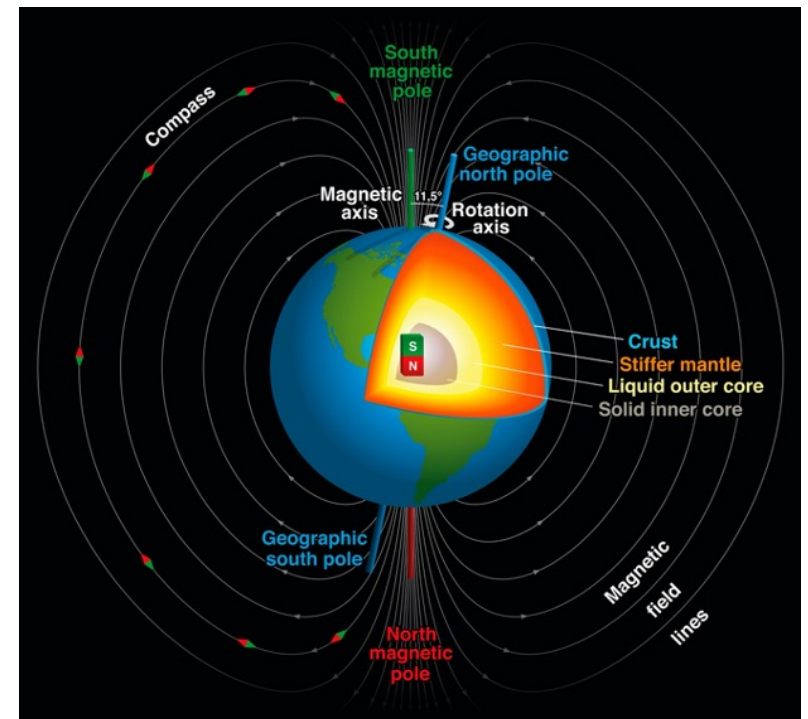
- Some objects like Iron, Nickel and Cobalt can become magnetized and produce a magnetic field (called ferromagnetic materials)
- _____



1 H																	2 He
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe
55 Cs	56 Ba		72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra		104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts	118 Og
			57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
			89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

Earth's Magnetic Field

- _____
- However, just because a metal 'can' be magnetized, does not mean it will be
- _____
- Magnetic fields and Electric fields go hand in hand... i.e., Electromagnetism!

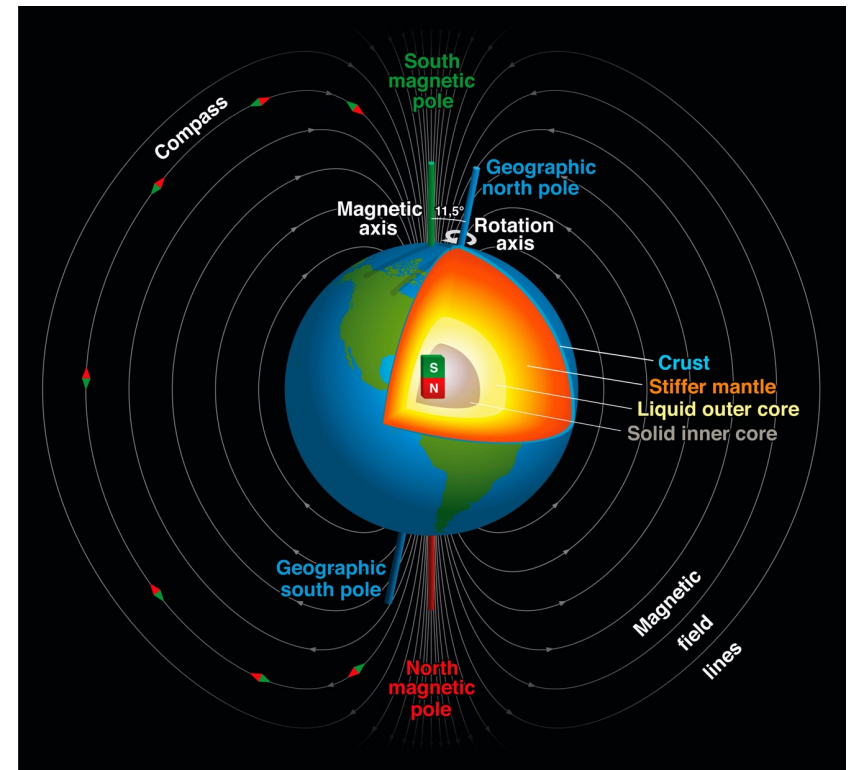


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Earth's Magnetic Field

- The inner core, being solid, does not change
- The outer core, being liquid, allows for a changing electric field to be set up inside the Earth as the liquid metal moves round the solid inner core

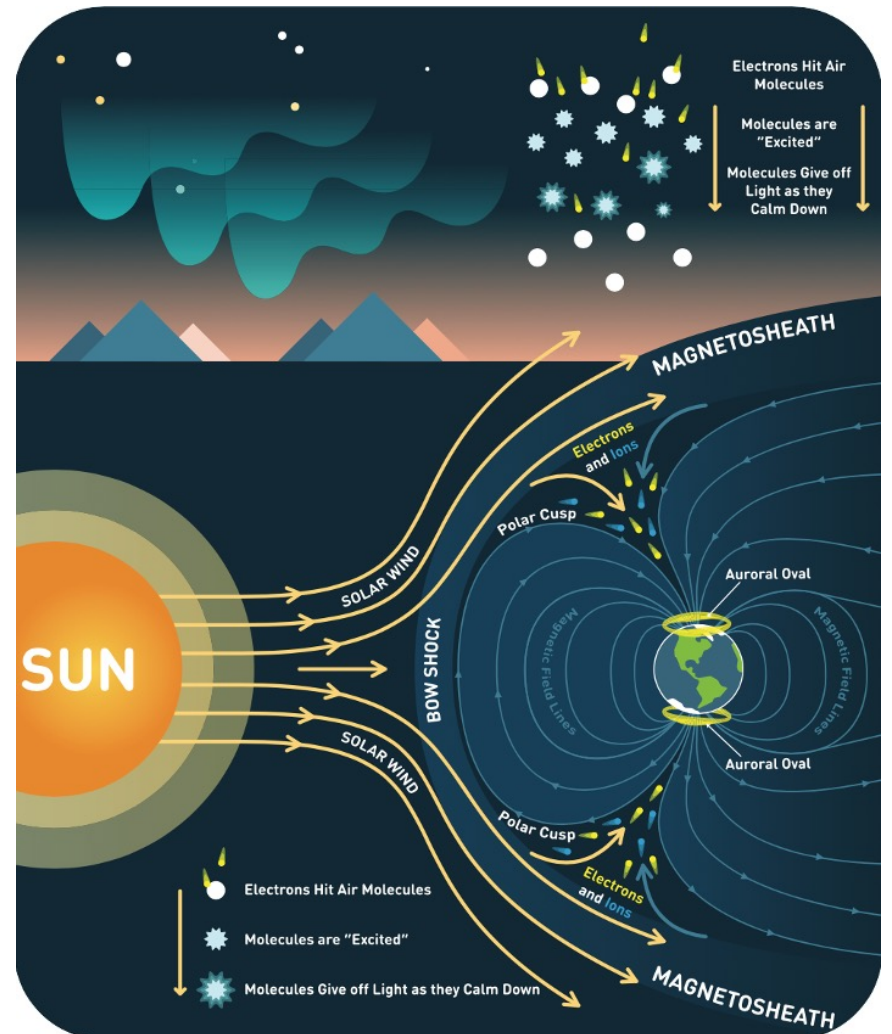
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The Auroras

- The Auroras (Northern and Southern Lights) are a result of some of these particles making it past the outer layer of Earth's magnetic field

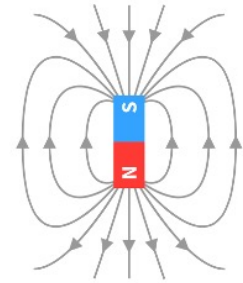
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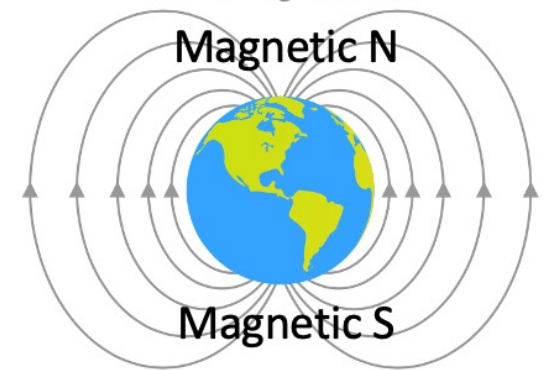
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A Compass

- _____
- Earth's magnetic field resembles the field of a large bar magnet, inclined at a slight angle to Earth's axis
- A compass points toward Earth's magnetic N-pole, rather than toward its geographic north pole



Earth's magnetic field

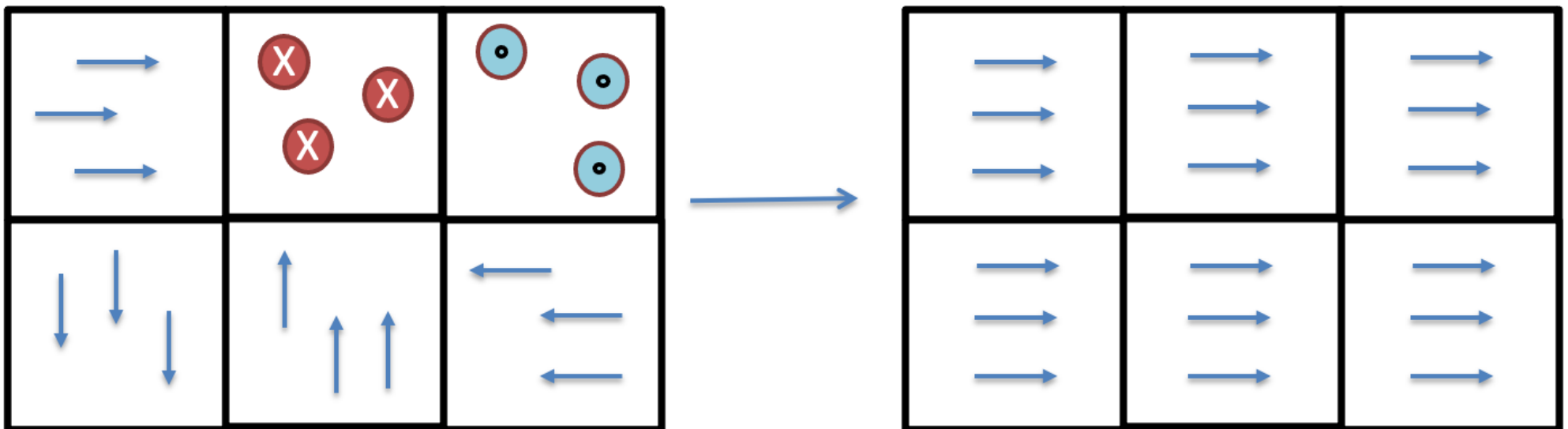


Earth's Magnetic Field

- It may be hard to believe but Earth's magnetic field has flipped many times in the past and will again in the future
- The flip can take as little as a human lifespan but could wreak havoc on us
- Watch the video and make some notes about what could possibly happen due to a flip

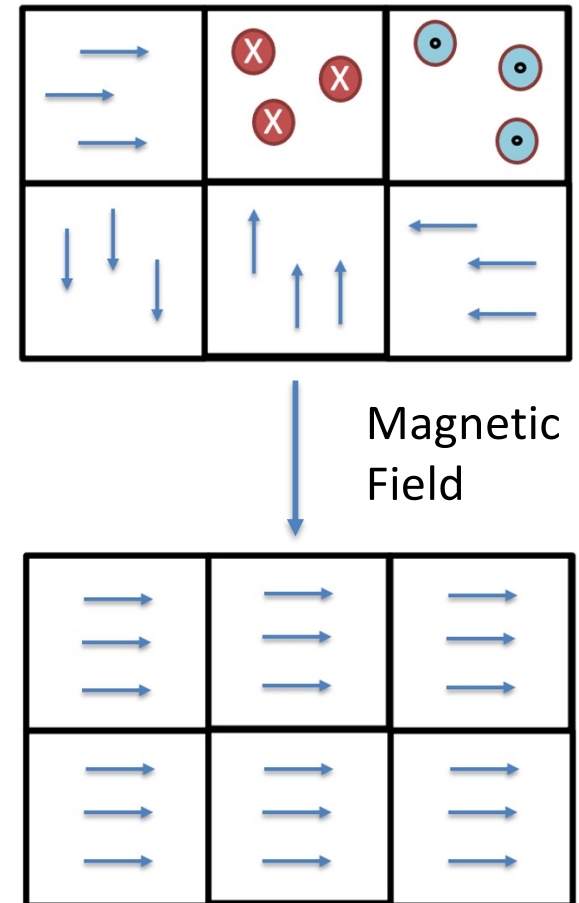
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- _____
- When the external field is removed, this orientation will return to its random state
- Magnets made in this way are known as induced magnets
- Permanent magnets keep their orientation indefinitely



Domains

- _____
- The domains are composed of billions of atoms which are all facing the same direction
- Only certain atoms have domains which can be magnetized due to their electron configuration



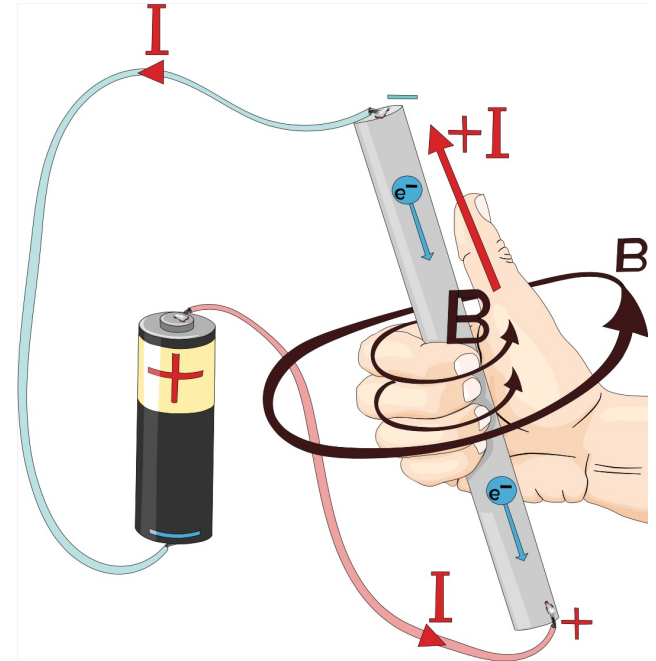
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Magnetic Field of a Straight Conductor

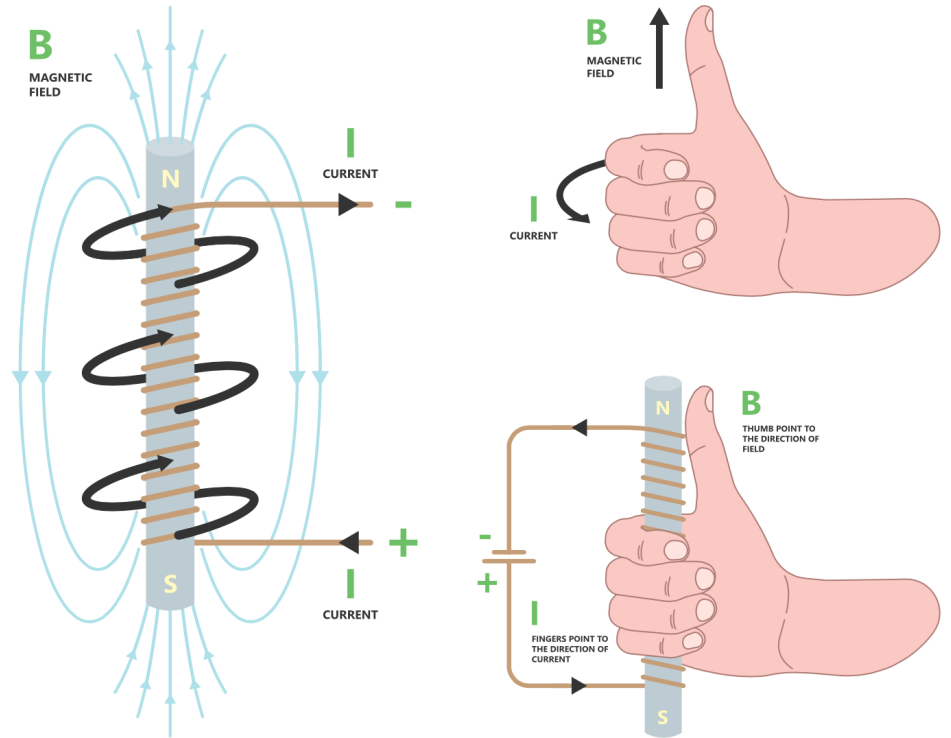
- When an electric current flows through a long, straight conductor, the resulting magnetic field (B) consists of field lines that are concentric circles, centred on the conductor

Right-Hand Rule for a Straight Conductor

- _____



Right-Hand Rule for a Solenoid (coil)



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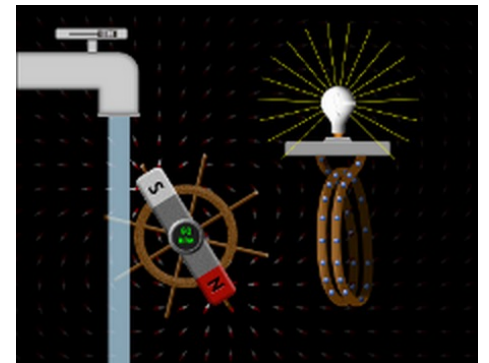
Magnetic Force on Moving Charges

- The movement of electrons allow the atoms to act like a very small magnet and allow moving electrons to produce a magnetic force

- _____

- _____

Click the
simulation



Magnetic Force on a Charge

The force of a magnetic field (F_M) on a charged object depends on:

1. _____
2. _____
3. _____
4. _____

Magnetic Force

Velocity of Charge (m/s)

Magnetic Force (N)

Angle between B and v

$$F_M = qvB \sin \theta$$

Charge moving (C)

Magnetic Field Strength (Tesla)

1 T = 1 kg/C·s

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Check Your Understanding

An airplane flying perpendicular through Earth's magnetic field at a speed of 2.0×10^2 m/s acquires a charge of 1.0×10^2 C. Calculate the maximum magnitude of the magnetic force on it in a region where the magnitude of Earth's magnetic field is 5.0×10^{-5} T.

$$F_M = qvB \sin \theta$$

$$e = 1.60 \times 10^{-19} \text{ C}$$