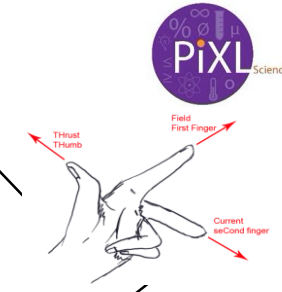


Increase strength of magnetic field	<i>Use larger current</i>
	<i>Use more turns of wire</i>
	<i>Put turns of wire closer together</i>
	<i>Use iron core in middle</i>

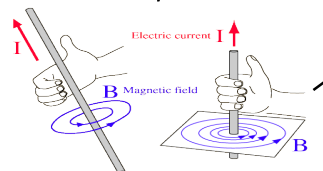
Fleming's left-hand rule	<i>To predict the direction a straight conductor moves in a magnetic field.</i>	Thumb	Direction of movement.
		First finger	Direction of magnetic field.
		Second finger	Direction of current.



Fields from individual coils cancel out to give a weaker field outside the solenoid.

Fields from individual coils add together to form an almost uniform field along the centre of solenoid.

Thumb	Direction of current.
Fingers	Direction of magnetic field.



Solenoid	<i>A long coil of wire</i>	Magnetic field from each loop adds to the next.
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A compass or iron filings placed near the wire, will show the direction of the magnetic field.

Electromagnet	<i>Lots of turns of wire increase the magnetising effect when current flows</i>
	Turn current off, magnetism lost.



If current and magnetic field are parallel to each other, no force on wire.

Electric motor	<i>Force on a conductor in a magnetic field causes rotation.</i>	A conductor carrying current produces a magnetic field. Put the conductor into another magnetic field and the two magnetic fields interact.
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Split-ring commutator makes sure current always flows in correct direction to make coil spin.

They exert equal and opposite forces on each other.

Concentric magnetic field	<i>Circles which share the same centre, perpendicular to the wire.</i>	The strength of the field depends on: • The size of current • The distance from the wire
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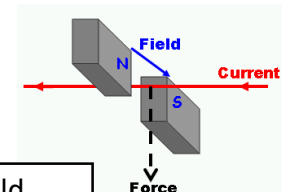
When current flows through a wire, a concentric magnetic field is created.

## Electromagnetism

### EDEXCEL TOPIC 12 MAGNETISM AND THE MOTOR EFFECT

## Magnetic forces

Magnetic force	<i>Place a wire carrying current near a magnetic, a force is exerted.</i>	An equal and opposite force acts on the magnet.
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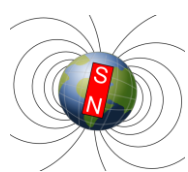
Force on a conductor at right angles to a magnetic field carrying a current = magnetic flux density X current X length.

$$F = B \times I \times l$$

## Magnets and magnetic fields

Permanent	<i>A bar magnet that produces its own magnetic field</i>	Will repel or attract other magnets and magnetic materials.
Induced	<i>A temporary magnet</i>	Becomes magnet when placed in a magnetic field.

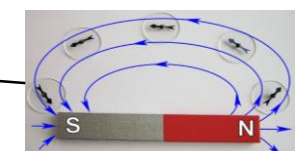
Magnetic elements are Nickle, Iron and Cobalt.



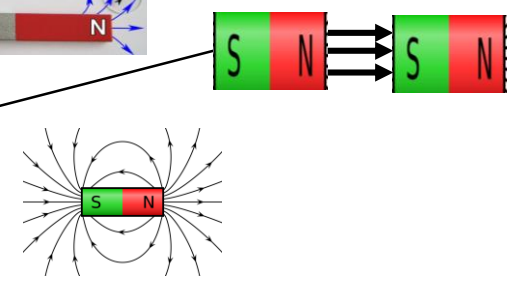
Earth's magnetic field	<i>Plotting compass needle is a tiny magnet. It points north. This behaviour is evidence that the Earth has a magnetic field.</i>	The Earth's magnetic field exists because of electric currents in the molten outer core which is made from a mixture of iron and nickel.
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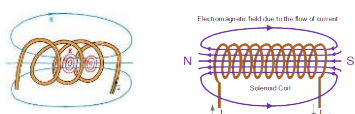
Magnetic	<i>Materials attracted by magnets</i>	Uses non-contact force to attract magnetic materials.
North seeking pole	<i>End of magnet pointing north</i>	Compass needle is a bar magnet and points north.
South seeking pole	<i>End of magnet pointing south</i>	Like poles (N – N) repel, unlike poles (N – S) attract.
Magnetic field	<i>Region of force around magnet</i>	Strong field, force big. Weak field, force small. Field is strongest at the poles.

Plotting compass	<i>Show the direction of magnetic field lines. Strongest when lines are close together.</i>
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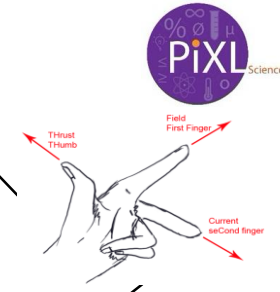
Uniform field	<i>Same strength and direction between two magnets</i>
Ununiformed field	<i>Direction goes North to South. Field lines stronger closer to magnet.</i>





	<i>Use larger current</i>
	<i>Use more turns of wire</i>
	<i>Put turns of wire closer together</i>
	<i>Use iron core in middle</i>

<i>To predict the direction a straight conductor moves in a magnetic field.</i>	Thumb	Direction of movement.
	First finger	Direction of magnetic field.
	Second finger	Direction of current.



If current and magnetic field are parallel to each other, no force on wire.

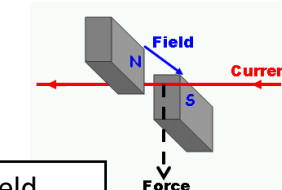
<i>Force on a conductor in a magnetic field causes rotation.</i>	A conductor carrying current produces a magnetic field. Put the conductor into another magnetic field and the two magnetic fields interact.
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They exert equal and opposite forces on each other.

Split –ring commutator makes sure current always flows in correct direction to make coil spin.

**HIGHER ONLY**

<i>Place a wire carrying current near a magnetic, a force is exerted.</i>	An equal and opposite force acts on the magnet.
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## Magnetic forces

Force on a conductor at right angles to a magnetic field carrying a current = magnetic flux density X current X length.

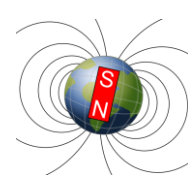
$$F = B \times I \times l$$

## Electromagnetism

## EDEXCEL TOPIC 12 MAGNETISM AND THE MOTOR EFFECT

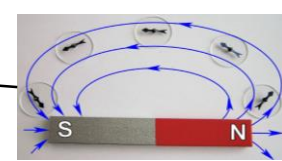
## Magnets and magnetic fields

Magnetic elements are Nickle, Iron and Cobalt.

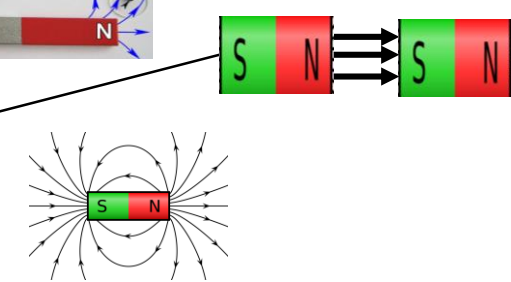


<i>Plotting compass needle is a tiny magnet. It points north. This behaviour is evidence that the Earth has a magnetic field.</i>	The Earth's magnetic field exists because of electric currents in the molten outer core which is made from a mixture of iron and nickel.
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*Show the direction of magnetic field lines. Strongest when lines are close together.*



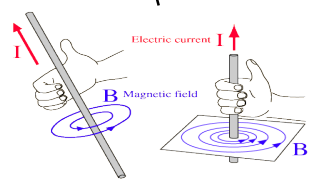
<i>Same strength and direction between two magnets</i>
<i>Direction goes North to South. Field lines stronger closer to magnet.</i>



Fields from individual coils cancel out to give a weaker field outside the solenoid.

Fields from individual coils add together to form an almost uniform field along the centre of solenoid.

	Direction of current.
	Direction of magnetic field.



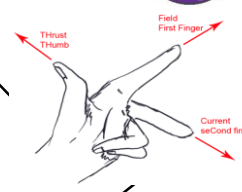
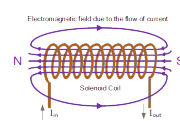
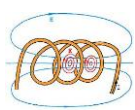
A compass or iron filings placed near the wire, will show the direction of the magnetic field.

<i>Circles which share the same centre, perpendicular to the wire.</i>	The strength of the field depends on: <ul style="list-style-type: none"> <li>The size of current</li> <li>The distance from the wire</li> </ul>
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When current flows through a wire, a concentric magnetic field is created.

<i>A bar magnet that produces its own magnetic field</i>	Will repel or attract other magnets and magnetic materials.
<i>A temporary magnet</i>	Becomes magnet when placed in a magnetic field.

<i>Materials attracted by magnets</i>	Uses non-contact force to attract magnetic materials.
<i>End of magnet pointing north</i>	Compass needle is a bar magnet and points north.
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<i>Region of force around magnet</i>	Strong field, force big. Weak field, force small. Field is strongest at the poles.



Increase strength of magnetic field	

Electromagnet	

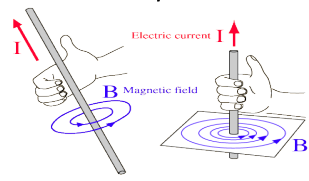
Fleming's left-hand rule			

Fields from individual coils cancel out to give a weaker field outside the solenoid.

Fields from individual coils add together to form an almost uniform field along the centre of solenoid.

Solenoid		
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Thumb	
Fingers	



A compass or iron filings

When current flows

Concentric magnetic field		

## Electromagnetism

# EDEXCEL TOPIC 12 MAGNETISM AND THE MOTOR EFFECT

Split –ring commutator makes sure current always flows in correct direction to make coil spin.

If current and magnetic field

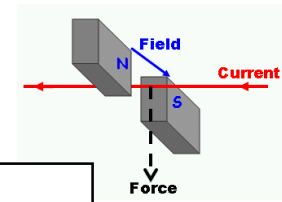
Electric motor		

They exert

Magnetic force		

HIGHER ONLY

## Magnetic forces



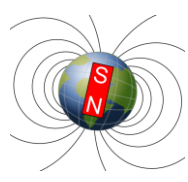
Force on a conductor

$$F = B \times I \times l$$

## Magnets and magnetic fields

Permanent		
Induced		

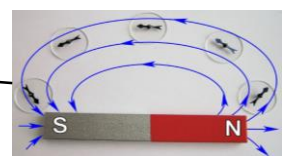
Magnetic elements



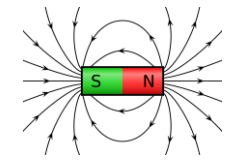
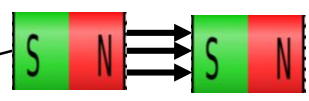
Earth's magnetic field		

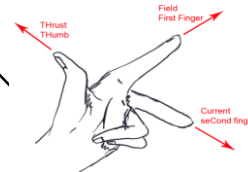
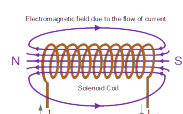
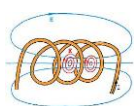
Magnetic		
North seeking pole		
South seeking pole		
Magnetic field		

Plotting compass



Uniform field	
Ununiformed field	





## Electromagnetism

### EDEXCEL TOPIC 12 MAGNETISM AND THE MOTOR EFFECT

## Magnetic forces

## Magnets and magnetic fields

When current flows

A compass

HIGHER ONLY

