Hazel Grove High School
Year 10 Homework Book
Term 2 – Spring
Focus – Biology topic 8, Chemistry topic 7 and Physics topics 12/13

Homework	Score on Quiz

Introduction to Science Homework

Science Homework will be set every week by your class teacher. In week 1 you will complete part a and week 2 part b.

a**. Knowledge notes** – Homework Part a is the key notes and facts you need to learn for each specific topic. You need to ensure that you learn and remember the information, definitions, key ideas. You are to do this by using the notes to make revision card/mind maps/revision resource etc. that works for you. You will need to bring this resource into school to show your teacher.

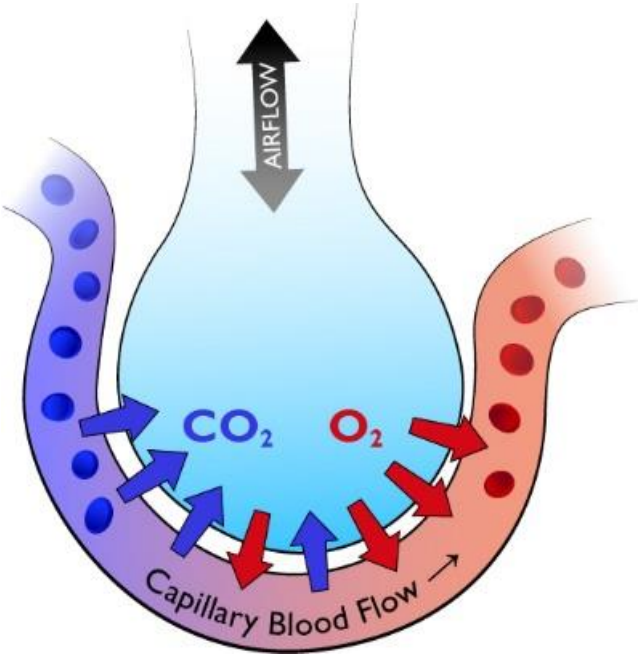
b. **Questions** – Homework part b. These will be to assess whether you have remembered/learned the knowledge from the topic in section a. This is to be carried out in 2 sections.

a. Firstly complete the questions in a blue/black pen. Answering all you can remember.
b. Then take a second different coloured pen and use the information and revision guide to answer the questions again. Focusing on making sure you have used key words and definitions. These will also need to be handed in.

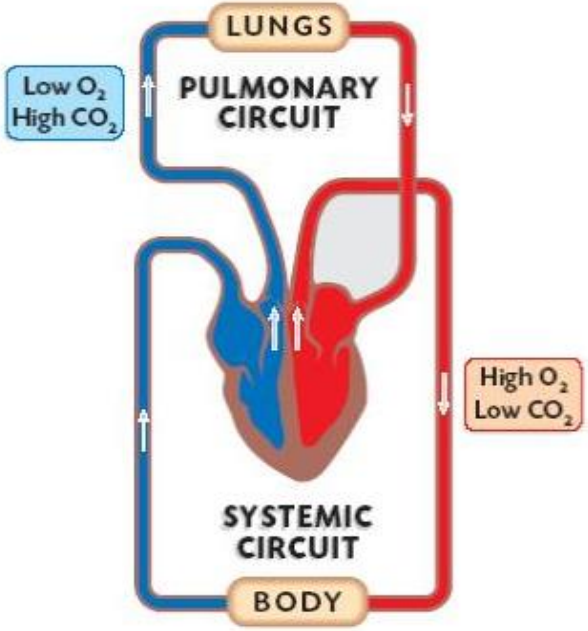
Happy learning!
The Science Department☺

Biology topic 8

Substances that are transported in organisms are Oxygen, carbon dioxide, water, dissolved food molecules, mineral ions and urea. e.g cells diffuse oxygen in for aerobic respiration and carbon dioxide out of cells (waste product)



Multicellular organisms need exchange surfaces as they have small surface area to volume ratios they can't get enough essentials so instead have an exchange surface so they can make exchange more efficient and effective



e.g Gas exchange in the Alveoli – The lungs job is to transfer oxygen to blood and remove carbon dioxide. This takes place in alveoli (air sacs.) The concentration gradient of the O_2 and CO_2 is high so diffusion is fast. They are an exchange surface and are adapted to this job: 1. Moist lining to dissolve gases 2. Good blood supply to maintain concentration gradient 3. Very thin for quick diffusion and 4. Large surface area

Blood contains

Red blood cells (erythocrytes) – carry oxygen. Has no nucleus for more room and a biconcave disc shape to fit more haemoglobin (red pigment) in. When oxygen binds to the haemoglobin called oxyhaemoglobin. In tissues opposite happens and splits up into the parts.

White blood cells (lymphocytes and phagocytes) –to fight disease - immune system

Platelets – clot. Stop bacteria entering wound and stop bleeding out. They are small fragments of cells with no nucleus.

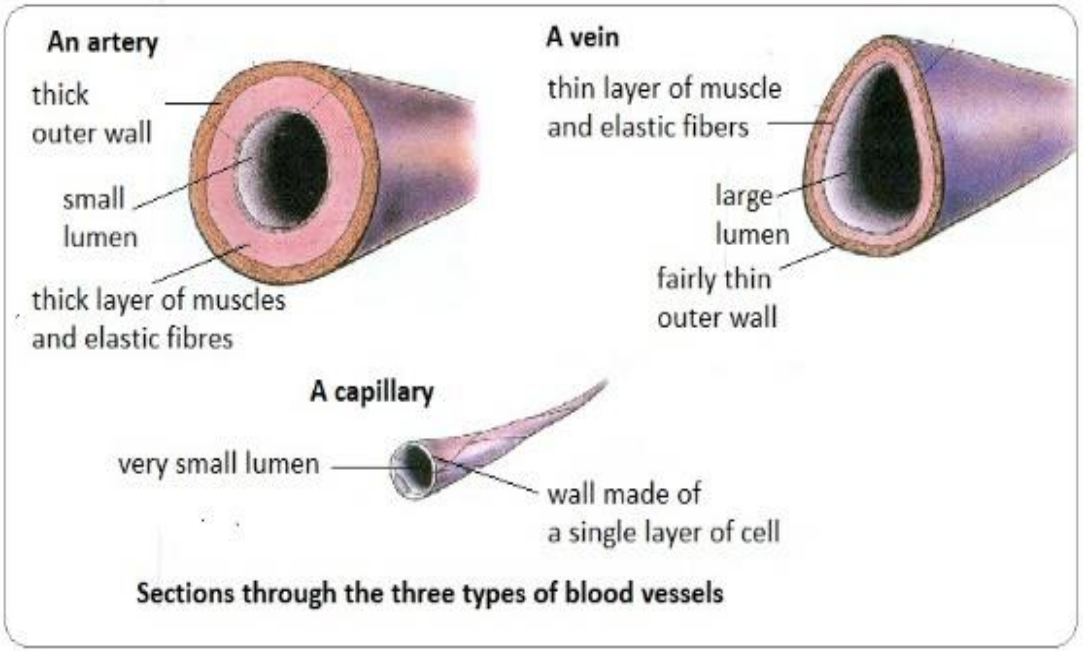
Plasma – straw coloured liquid to carry red/white blood cells, platelets, glucose, amino acids, carbon dioxide, urea, hormones, proteins, antibodies and antitoxins

Blood vessels

Arteries – carries blood **AWAY** from heart. They have thick walls, small lumen to withstand pressure as blood is pumped all over body as carries oxy-haemoglobin.

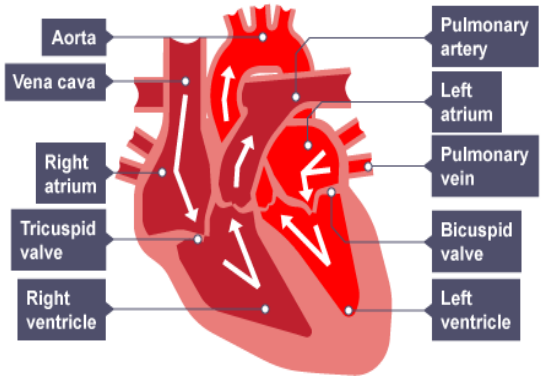
Veins – carries blood **IN *to heart*.** They have thinner walls and large lumen to carry oxygen back to heart. They contain **VALVES** which ensures that blood is carried in one direction

Capillaries – Arteries branch into capillaries. They are few cells thick and have permeable walls to allow diffusion and exchange materials and fit between cells to get blood closer to cells.



Sections through the three types of blood vessels

The Heart – The pump that contracts and relaxes
4 chambers, 2 sides, valves to ensure blood flows one direction



Route of blood from lungs to - LA - Los Angeles (via pulmonary artery) into LV – Las Vegas then all over the Body RA – Ryan air (via vena cava) finishing RV and to lungs

Cardiac output = heart rate x stroke volume

cm^3/min beats per min cm^3

Cardiac volume = total volume of blood pumped every minute.

Stroke volume = volume of blood pumped by one ventricle each time it contracts.

Specialist parts of the heart
Valves – prevent backflow - oxygen is always delivered to cells
"Try before you buy"

Left side of heart is thicker than right as higher pressure

Aerobic Respiration – making energy from the breakdown of organic compounds (usually glucose) at mitochondria with plenty of oxygen supply. (EXOthermic reaction)

Glucose + oxygen → carbon dioxide + water

$$C_6H_{12}O_6 + 6\,O_2 \rightarrow 6\,CO_2 + 6\,H_2O$$

Anaerobic Respiration – making energy without oxygen.

Glucose → lactic acid

Anaerobic respiration is much less efficient. The glucose is only partially broken down and lactic acid is produced. When lactic builds up in the muscles it leads to painful cramp and enzymes not working correctly as the pH in your cells changes.

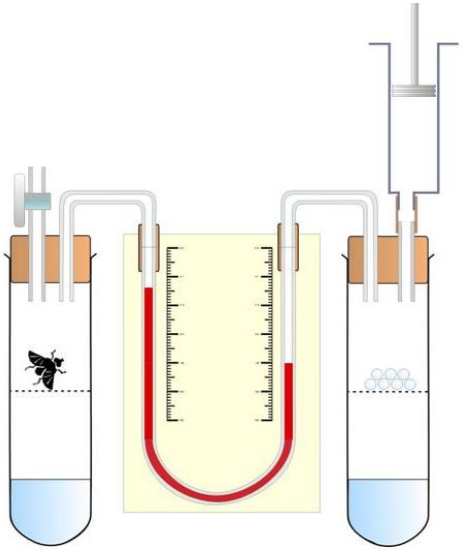
Investigating Respiration – Using a RESPIROMETER and effect of temperature on rate

Organisms use O_2 in respiration. You can measure O_2 used to calculate the organism's rate of respiration.

Equipment – organism (woodlice/maggots), soda lime (absorb CO_2), water bath (change temp), syringe (set level of manometer), manometer (tube containing coloured liquid and a scale to measure), cotton wool

1. Set up equipment as above. Make sure organisms aren't touching soda lime using cotton wool.
2. Glass beads with same mass as organism are placed in control tube
3. Use syringe to set liquid in manometer to a known level
4. Leave in water bath e.g 15^{o}C for set time e.g 10mins. During this time total gas will decrease as O2 in by organism and CO2 absorbed by soda lime
5. Decrease in volume, decreased pressure and liquid in manometer moves towards tube containing organisms. Distance moved in a set time = rate of respiration (cm^3/min)
6. **Repeat these steps and change temp of water bath**

REMEMBER ETHICS



Biology topic 8 part b questions

1. Describe gas exchange in the alveoli.

2. Describe 3 ways that the alveoli are adapted for gas exchange.

3. Write the definition for diffusion.

4. What are the four components of the blood?

5. Describe the function of each component of the blood?

6. How are red blood cells and white blood cells adapted for their functions?

7. What are the four types of blood vessel?

8. Describe the function of each type of blood vessel.

9. Describe the flow of blood through the heart.

10. Explain the difference between the left and right sides of the heart.

11. Compare aerobic and anaerobic respiration.

12. Describe a method for an investigation into respiration.

Chemistry topic 7

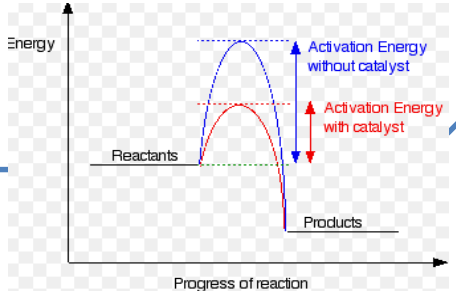
Rate of reaction – is how fast/slow a reaction happens

Measured by – 1. How quickly reactants are used up or 2. How quickly products are made

Activation Energy – Minimum energy required for a collision to be successful and break bonds.

Catalyst – Chemical that speeds up a chemical reaction without altering the products; unchanged chemically
and in mass.

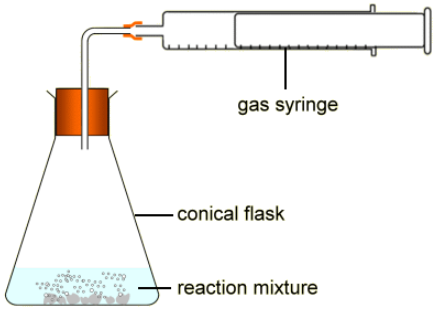
They decrease activation energy
and providing an alternative pathway
See the reaction profile diagram



Method 1 – Precipitation – 2 see through solutions which when mixed makes a precipitate (solid) which clouds solution. Can time how quickly cross disappears. E.g sodium thiosulphate & hydrochloric acid

Method 2 – Change in mass (balance) – reaction that produces a gas. Mass will decrease as gas is given off. The quicker it decreases quicker the reaction. (note no bung) e.g HCl and marble chips

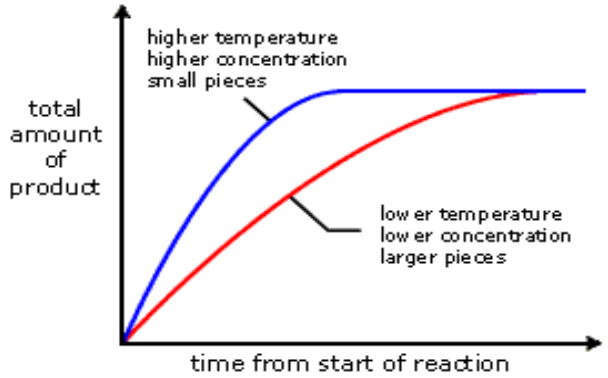
Method 3 - Volume of gas made – Gas syringe collects gas made over a set time interval. E.g HCl and marble chips



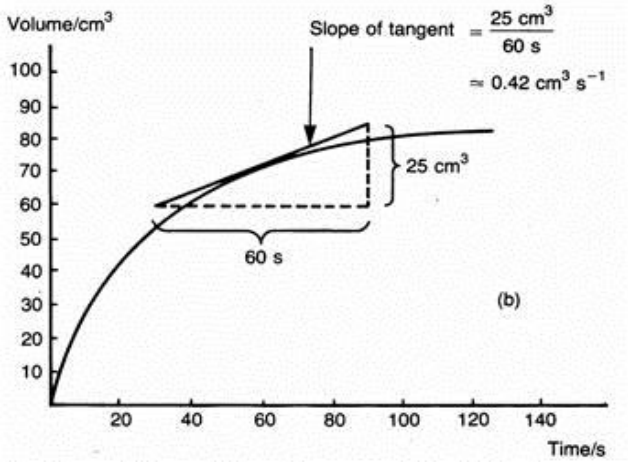
Graphs to show rate of reaction -

Steeper gradient = faster reaction

Gradient = Change in y / change in x



To find gradient of a curve a tangent must be drawn



How to speed up a Rate of reaction

1. **Increase temp –** particles have more kinetic energy so have more **successful collisions** as collide more and more have above activation energy
2. **Increase concentration** (liquid)/ pressure (gas**)– more particles in same volume** so more **successful collisions**
3. **Increase surface area** (solid) – more particles exposed so more successful collisions
4. **Add catalyst – decreases activation energy**

Exothermic and endothermic reactions

Exothermic reaction = energy given out to surroundings and thermometer goes up.

Endothermic reaction = energy taken in from surroundings and thermometer goes down

Bond breaking requires energy so is EXO

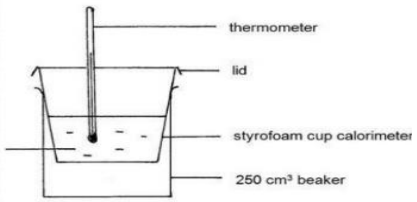
Bond making releases energy so is ENDO

In Endo reactions energy used to break bonds is greater than the energy released by forming them

In Exo reactions energy released by forming bonds is greater than the energy used to break them

Measuring Temp changes

Typical Experimental Set-up



1. Set up equipment and Fill the beaker with cotton wool to help insulate so that less heat loss (with lid) to surroundings.

2. Add known volume of 1st reagent
3. Measure initial temp
4. Add measured mass/volume of 2nd reagent
5. Measure final temperature and calc diff

Bond Energy Calculations = every chem reaction has a bond energy.
Energy change = energy to break bonds – energy released by forming bonds

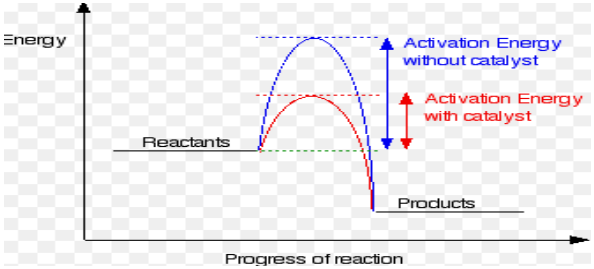
+ result = ENDO
- **Result = EXO**
UNIT = kJ mol^{-1}

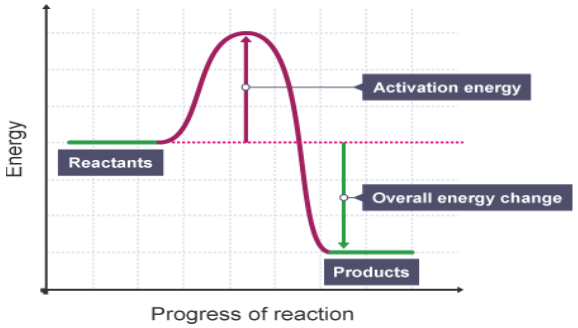
Reaction Profiles

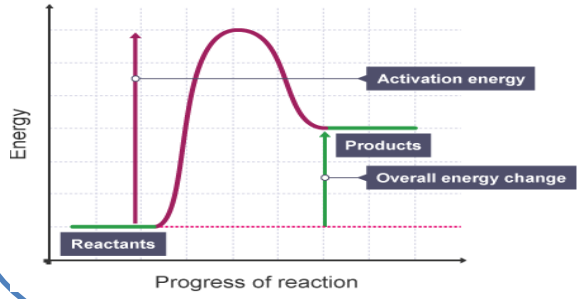
Activation Energy = difference between reactants and highest point on curve

Exothermic profile

Endothermic profile







Exo – the products are at lower energy than the reactants

Height of difference = energy given out

Endo – products are at higher energy than the reactants

Height of difference = energy taken in

Chemistry topic 7 part b questions

1. Define a catalyst and give an example of where one could be used.

2. What is activation energy?

3. Describe 2 methods of how to investigate rates of reaction.

4. Describe how we use a graph to calculate the rate of a reaction.

5. Describe 4 ways how to increase the rate of a reaction.

6. Explain (n terms of bond-making and bond-breaking) the difference between endothermic and exothermic reactions.

7. Give 2 examples of endothermic and exothermic reactions.

8. Draw and label profiles for endothermic and exothermic reactions.

9. Describe how to calculate bond energy.

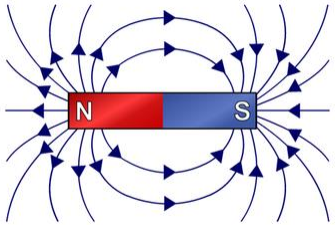
Physics topic 12/13

Induction

When a piece of magnetic material is in a magnetic field it becomes a magnet itself = induced magnet

Magnets

Bar Magnet = permanent magnet
Magnet can attract magnetic materials INC because the space around it is a magnetic field.



Earth has a magnetic field due to the molten iron and nickel outer core – evidence is compass

Shape of a magnetic field

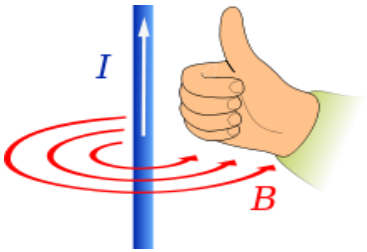
Compass can plot the shape (butterfly)
Arrows are out of south and into north.
Lines that are closer together = stronger magnetic field.

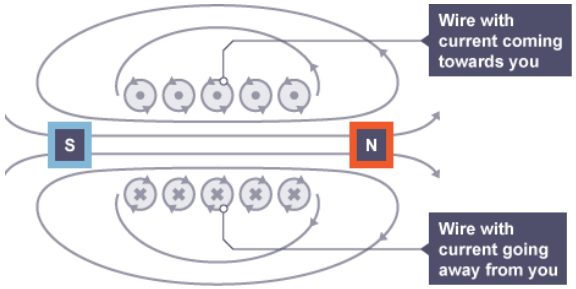
Electromagnetism basics

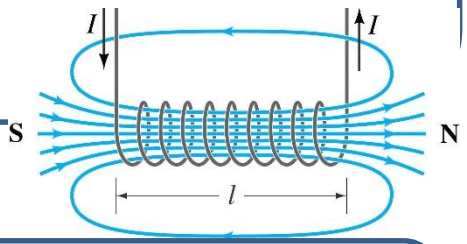
Current flowing through a wire causes a magnetic field.
Strength of magnetic field depends upon current and distance from the wire.
Turn the wire into a solenoid (coils) and you end up with a mag field:
To increase the strength of an electromagnet – 1. Increase number of coils, 2. Increase current 3. Add a temp magnet (iron core.)

Right hand Thumb Rule

Point your thumb from + to – the magnetic field goes in the direction your fingers are pointing.

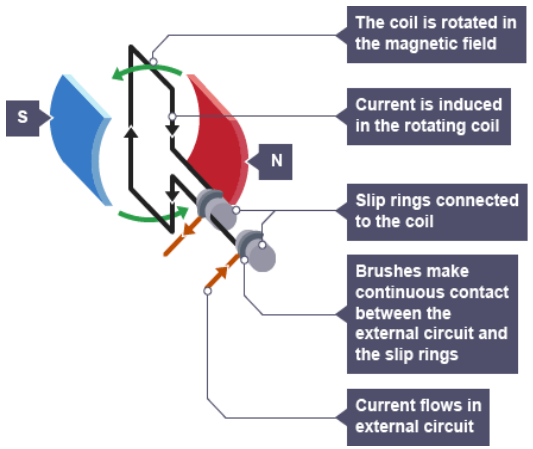






FORCE

Any wire carrying a current can experience a force near a magnetic field around the wire.

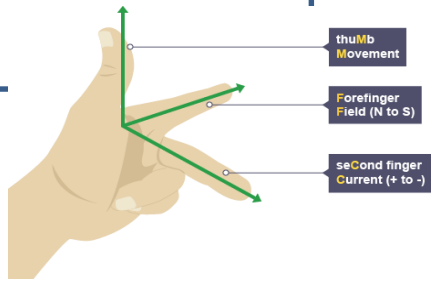


The size of the induced voltage can be increased by:

* rotating the coil or magnet faster
* using a magnet with a stronger magnetic field
* having more turns of wire in the coil
* having an iron core inside the coil

Flemming's left hand rule

When a wire is moved in the magnetic field of a generator, the movement, magnetic field and current are all at right angles to each other. If the wire is moved in the opposite direction, the induced current also moves in the opposite direction.



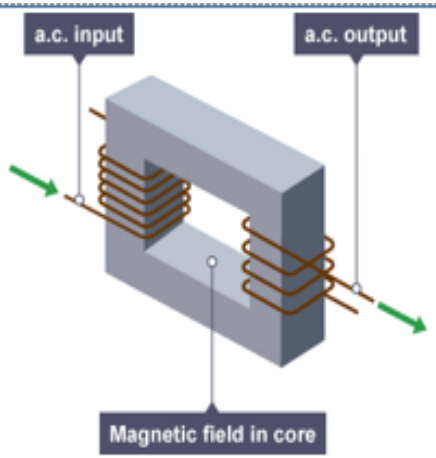
Tesla

The size of the force on the wire depends upon the magnetic field strength, the current and the length of wire. The strength of the magnetic field is measured in Tesla (T) and is given the symbol B.

Force on conductor carrying = magnetic flux density x current x length
current at right angles

F = B x I x L

(N) (N/A m or T) (A) (m)



Transformers

Used to change potential difference (voltage) of electricity supply.
A transformer is two coils of wire wrapped around an iron core – there is no electrical connection between the 2 coils.
When a voltage is applied to the primary coil (first) it induces a voltage in the second coil. This is called ELECTROMAGNETIC INDUCTION.

Transformer Power Calculations

Because .....Energy cannot be created nor destroyed only transferred (Topic 3.)..... So the power supplied to the primary coil must be the same as the secondary coil (as long as it is 100% efficient.):

Power in primary coil			=	Power in secondary coil		
Voltage across pri coil	x	current in primary coil	=	voltage in secondary coil	x	current in sec coil
V1	x	I1	=	V2	x	I2
(V)		(A)		(V)		(A)

Power

The energy transferred per second by an electrical current.

National Grid = system of wires and cables called transmission lines.

Power station generate electricity at 25kV. A step up transformer will increase to 400kV and a step down will decrease voltage to 230V to enter house.

Power Equation - Same as Topic 10

Power = current potential difference

Watts = Amps x Volts

a.c Electricity

Transformers only work with alternating current (changes direction.) This is because the changing current causes the magnetic field to continuously change so the iron core carries this magnetic field to the secondary coil.

Physics topic 12/13 part b questions

1. How can we turn an iron nail into an induced magnet?

2. Compare the Earth's magnetic field to that of a bar magnet.

3. Describe what an electromagnet is.

4. Describe how to increase the strength of an electromagnet.

5. Explain Fleming's left hand role.

6. What is the function of aa transformer?

7. Explain how a step-up transformer increases the voltage.

8. Describe the difference between a step up and a step down transformer.

9. Describe how electricity is supplied around the country.