

## **Year 12 into 13 BTEC Applied Science Bridging Work**

There are four tasks below that you must complete over the course of your summer break. When you return to school in September, on your first lesson back you must bring with you the following pieces of work –

- Unit 1 Biology revision notes
- Unit 1 Biology Mind map
- Unit 1 Biology past paper
- Unit 1 Chemistry revision notes
- Unit 1 Chemistry mind map
- Unit 1 Chemistry past paper
- Unit 1 Physics revision notes
- Unit 1 Physics mind map
- Unit 1 Physics past paper

### **Task 1**

#### **Biology:**

##### **Watch this :**

[https://www.youtube.com/watch?v=NFVSWOaU0f0&list=PLLCQesGbl\\_kU0EfQ\\_m385bUjpDCb-zWVN](https://www.youtube.com/watch?v=NFVSWOaU0f0&list=PLLCQesGbl_kU0EfQ_m385bUjpDCb-zWVN)

Make notes on the above video and then complete the following:

Complete the revision mats for Biology and complete a full set of revision notes (this may include a poster, mind map, flash cards) on all concepts covered in biology, use the powerpoints that can be found on Sharepoint to complete your notes.

### **Task 2**

#### **Chemistry:**

##### **Watch this :**

[https://www.youtube.com/watch?v=9YwdeEDrfPI&list=PLev8qQzUSJazEs16k\\_l7ARnJuV-vF81UL&index=5](https://www.youtube.com/watch?v=9YwdeEDrfPI&list=PLev8qQzUSJazEs16k_l7ARnJuV-vF81UL&index=5)

Make notes on the above video and then complete the following:

Complete the revision mats for Chemistry topics and complete a full set of revision notes (this may include a poster, mind map, flash cards) on all concepts covered in chemistry, use the powerpoints that can be found on Sharepoint to complete your notes.

### **Task 3**

#### **Physics:**

**Watch this :** [https://www.youtube.com/watch?v=q24\\_FDY9KbQ](https://www.youtube.com/watch?v=q24_FDY9KbQ)

Make notes on the above video and then complete the following:

Complete the revision mats for Physics and complete a full set of revision notes (this may include a poster, mind map, flash cards) on all concepts covered in physics, use the powerpoints found on Sharepoint to complete your notes.

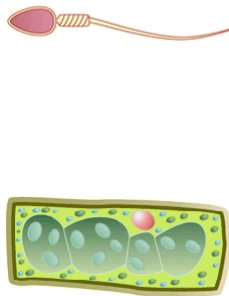
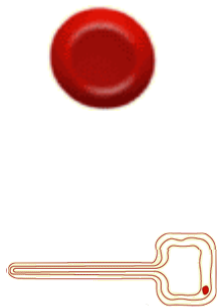
### **Task 4**

On Microsoft Teams – I will be assigning two past papers for Unit 1 Biology, Chemistry and Physics. Please could you complete these past papers under timed conditions (30 minutes) without using any revision materials. In the last week of the summer holidays I will upload the mark schemes, please then mark your work and make sure you have a score for each paper to share with me in the new term.

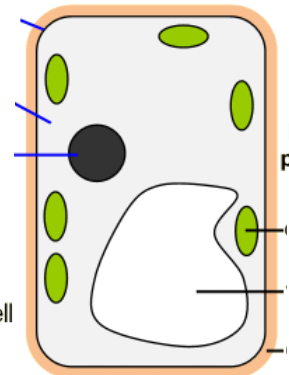
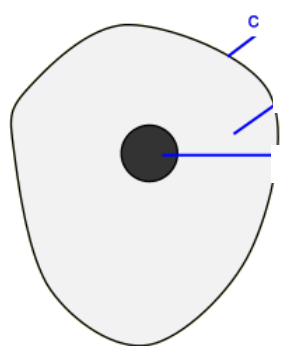
Name the cell and explain how it is adapted

Which DNA base codes with which?

Label the cells



A	T
C	
T	
A	
T	
G	



Found in plant cells only

plant cell

animal cell

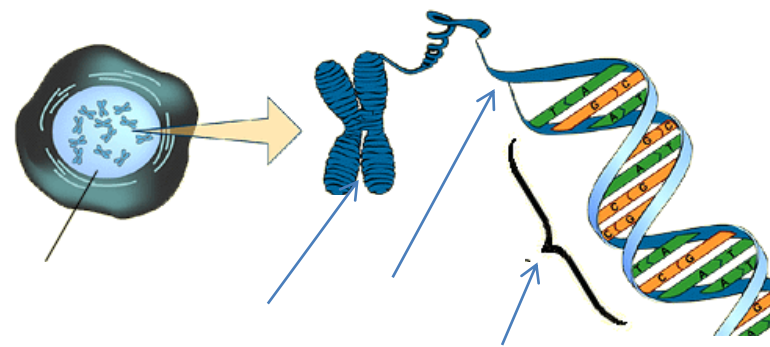
Dominant alleles are shown by **CAPITAL/lower case** letters.

If a characteristic is dominant it **will/will not** be shown is an allele is present. Eg BB- Blue eyes Bb I blue eyes

Recessive alleles are shown by **CAPITAL/lower case** letters.

If a characteristic is recessive it **will/will not** be shown unless both recessive alleles are present eg. bb- brown eyes.

Draw a plant and label where the following parts are :roots, root hair cells, leaves, phloem and xylem, stomata



Put these labels in the right places:

**Gene, Chromosome, Nucleus, DNA**

Inside each normal human cell there is a \_\_\_\_\_ this contains genetic information in 23 pairs of \_\_\_\_\_. Chromosomes are made of a chemical called \_\_\_\_\_, A section of DNA that codes for a certain characteristic is called a \_\_\_\_\_.

Transpiration is when water is \_\_\_\_\_ from the plant. Water enters the plant through the \_\_\_\_\_ and leaves the plant from the \_\_\_\_\_.

Match up the parts to the functions

- Mitochondria
- Cell wall
- Cell membrane
- Chloroplast
- Nucleus
- Cytoplasm
- Vacuole

Function	Animal	Plant
Contains genes and controls cell	Yes	Yes
Where respiration happens		
Gives cell structural support		
Lets substances in and out of cell		
Where chemical reactions happen		
Where photosynthesis happens		

Put these in size order  
Organ, cell, tissue, organ system

\_\_\_\_\_

Add to the spider diagrams to explain what happens when your body is:



Hormones are used to send messages around the body they are \_\_\_\_\_ that are released by \_\_\_\_\_ in the body. They travel in the \_\_\_\_\_.

The pancreas releases 2 hormones that control blood \_\_\_\_\_ level.  
\_\_\_\_\_ is used to reduce the level of glucose in the blood.  
\_\_\_\_\_ increases the amount of glucose in the blood.

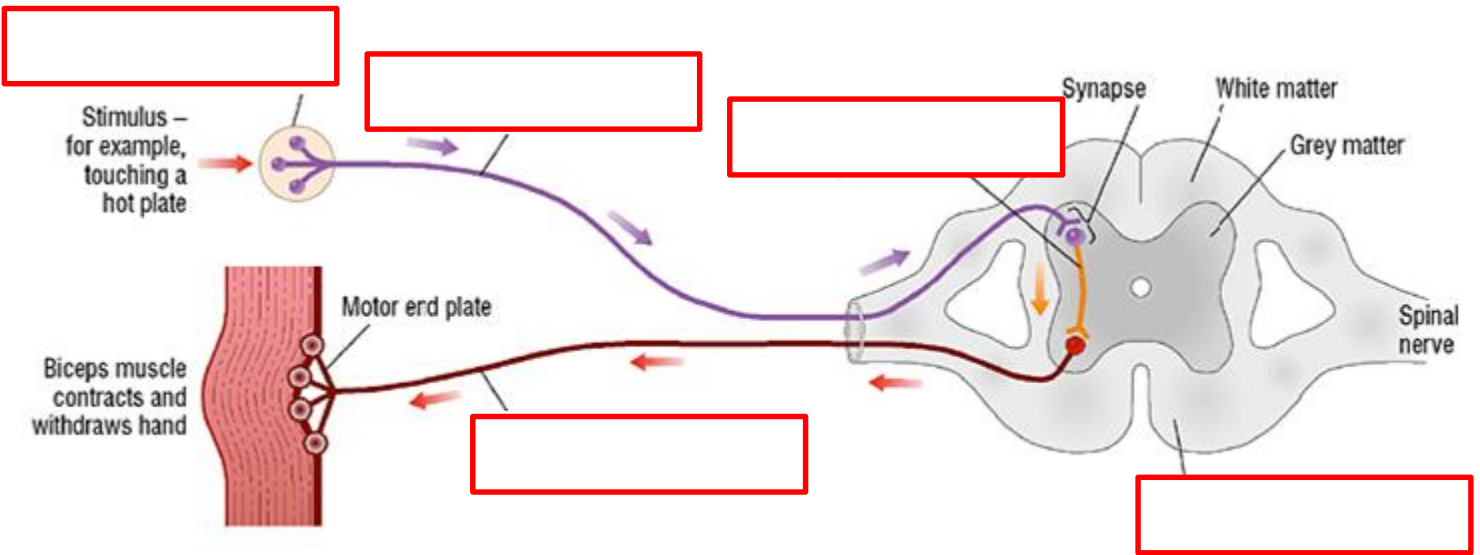
**Key words**  
**Blood chemical glucose glucagon insulin glands**

Fill in the boxes on the diagram with the words below:

**Receptor                      Motor neurone                      Sensory neurone                      Relay neurone**  
**Spinal cord**

What is the name for the gap between neurones ?

How do messages cross this gap?



# Unit 1 Revision Mats

1. Electrons and Periodic Table
2. Ionic and Metallic Bonding
3. Covalent Bonding and Intermolecular Forces
4. Periodic Trends
5. Reactivity and Redox
6. Calculations

# Electron Configuration & Periodic Table

## Keywords

Atomic number—

Mass number—

Period-

Group-

### Electronic Configuration-

## Groups and Periods

Elements in the same row group have \_\_\_\_\_.

Elements in the same period have \_\_\_\_\_.

Circle the element that is in Group 2:

(a)  $1s^2 2s^2 2p^2$  (b)  $1s^2 2s^1$  (c)  $1s^2 2s^2 2p^6 3s^2$

Circle the element that is in Period 2:

(a)  $1s^2 2s^2 2p^2$  (b)  $1s^2$  (c)  $1s^2 2s^2 2p^6 3s^2$

# Orbitals and Energy Levels

**How many electrons can the following orbitals hold?**

s-orbital

p-orbital

d-orbital

**Name all the orbitals present:**

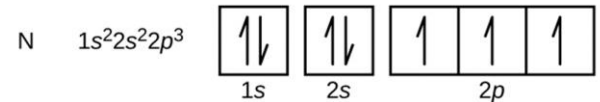
First shell (first energy level):

Second shell (second energy level):

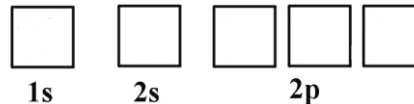
Third shell (third energy level):

## Arrow in a Box Notation

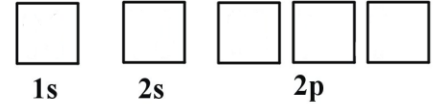
When orbitals are being filled, they fill singly before doubling up. Electrons have opposite spins.



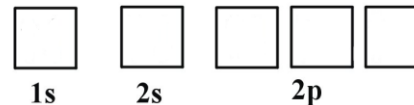
# B



F



O



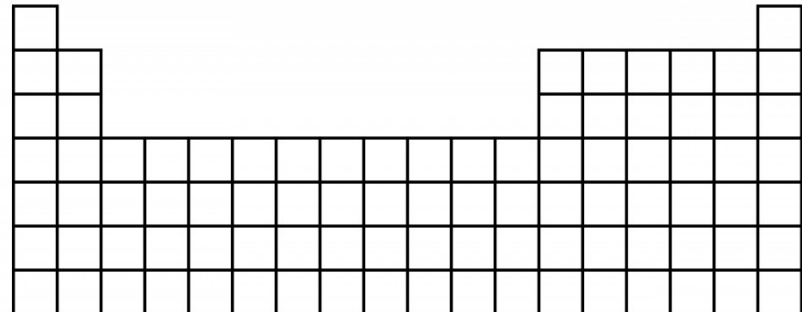
Ne



Element	Number of Electrons	Electronic Configuration
Boron	5	$1s^2 2s^2 2p^1$
Carbon	6	
Sodium		
Cl <sup>-</sup>		
Ca <sup>2+</sup>		

## S, P, D-Blocks

Label the s-block, p-block and d-block and explain your answer.



# Metallic & Ionic Bonding

## Keywords

Ionic Bond—

Electrostatic—

Malleable-

Ductile-

## Ionic Bonds - Trends

Name the two factors that determine the strength of an ionic bond:

- 1.
- 2.

What happens to the size of an ion as you go down a group? Explain why.

- 
- 

Which compound would have the strongest ionic bond: NaF or CaO? Explain why.

- 
- 
- 
- 

## Metallic Bonding

Draw and label a diagram showing metallic bonding.

## Dot and Cross Diagrams

Draw dot and cross diagrams for the following ionic compounds:

Sodium Chloride (NaCl)

Magnesium Oxide (MgO)

Sodium Oxide (Na<sub>2</sub>O)

Calcium Chloride (CaCl<sub>2</sub>)

## Metals – Properties and Trends

List some properties of metals:

Explain why metals conduct electricity

- 
- 
- 
- 

Explain why metals are malleable and ductile.

Down a group, the strength of a metallic bond \_\_\_\_\_. The melting point \_\_\_\_\_. Explanation:

Across a period, the strength of a metallic bond \_\_\_\_\_. The melting point \_\_\_\_\_. Explanation:

# Covalent Bonding and Intermolecular Forces

## Keywords

Covalent Bond–

Dative Covalent Bond–

van der Waals force/London–

Dipole-dipole–

Hydrogen bond–

Polar v. Non-polar–

## Dot and Cross Diagrams

Draw dot and cross diagrams for the following:



Draw a diagram showing the dative bond between  $\text{NH}_4^+$  and  $\text{H}^+$

## Covalent Bonds - Trends

Which are stronger: shorter or longer bonds?

Which are stronger: single, double or triple bonds?

Which are shorter: single, double or triple bonds?

## Intermolecular Forces

Fill in the table:

Electronegativity Difference	Type of Bond	Type of Intermolecular Forces
0 to 0.4		
0.4 to 1.8		
1.8+	Ionic	Electrostatic

What is the trend in electronegativity down a group?

What is the trend in electronegativity across a period?

Describe the type of intermolecular forces in:  
 $\text{HCl}$  (electronegativity of  $\text{H}=2.20$  and  $\text{Cl}=3.16$ )

$\text{H}_2\text{O}$  (electronegativity of  $\text{H}=2.20$  and  $\text{O}=3.44$ )

$\text{CH}_4$  (electronegativity of  $\text{H}=2.20$  and  $\text{C}=3.16$ )

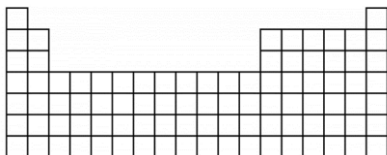
Draw the dipole for  $\text{HF}$



# Periodic Trends

## Atomic Radius- Trends

Label the periodic table to show the trends in atomic radius down a group and across a period.



Explain why.

- 
- 

How does the size of a  $\text{Na}^+$  ion compare to that of Na?

How does the size of a  $\text{Cl}^-$  ion compare to Cl?

## Keywords

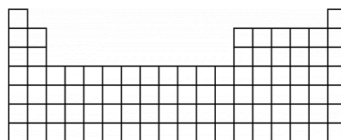
Electronegativity—

Ionisation Energy—

Electron Affinity—

## Electron Affinity-Trends

Label the periodic table to show the trends in atomic radius down a group and across a period.

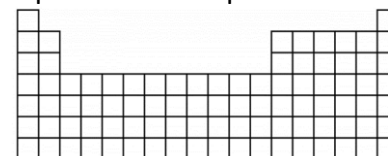


Explain why.

- 
- 

## Ionisation Energy-Trends

Label the periodic table to show the trends in atomic radius down a group and across a period.

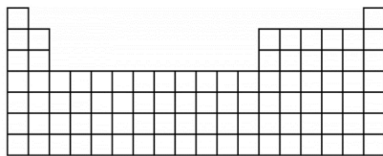


Explain why.

- 
- 

## Electronegativity Trends

Label the periodic table to show the trends in atomic radius down a group and across a period.



Explain why.

- 
- 

## Type of Bonding & Melting Points

Period 2	Li	Be	B	C	N	O	F
Period 3	Na	Mg	Al	Si	P	S	Cl
Type of Bonding							
Bonds/forces broken on melting Is mp high or low?							

What is the trend in melting points of metals down a group?

What is the trend of melting points of metals across a period?

# Reactivity and Redox

## Keywords

Oxidation—  
Reduction-  
Displacement-

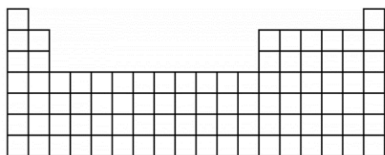
Which of the following reactions will take place:

1. Iron + Copper Sulfate  $\rightarrow$
2. Zinc + Potassium Chloride  $\rightarrow$
3. Copper + Silver Nitrate  $\rightarrow$
4. Potassium + Iron Oxide  $\rightarrow$

## Reactivity of Metals

Label this periodic table to show the trends of reactivity of metals.

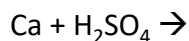
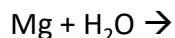
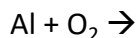
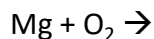
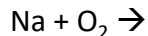
Indicate the charge formed by metals in Groups 1-3



Explain these trends in reactivity.

-  
-  
-

Write a balanced equation for the products of the following:



**Oxidation States:** Complete this table of oxidation states.

Element	Oxidation State	Exceptions
Group 1 (e.g. Na)		
Group 2 (e.g. Mg)		
Group 3 (e.g. Al)		
O		-1 in peroxides, +2 when bonded to F
F		
Cl, Br, I		when bonded to non-metals
H		

1. What is the oxidation number of each atom in:  
(a)  $\text{F}_2$  (b)  $\text{NaClO}_3$  (c)  $\text{H}_2\text{S}$  (d)  $\text{KMnO}_4$
2. Work out the oxidation number of Cl in the following: (a)  $\text{HCl}$  (b)  $\text{HClO}$   
(c)  $\text{NaClO}_2$  (d)  $\text{KClO}_3$  (e)  $\text{Cl}_2\text{O}_7$
3. Iron reacts with chlorine to form iron chloride. The equation is  
 $2\text{Fe(s)} + 3\text{Cl}_2\text{(g)} \rightarrow 2\text{FeCl}_3\text{(s)}$   
What is oxidised and what is reduced?

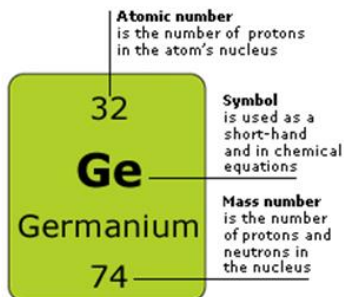
## Reactions with Oxygen

What is the difference between complete and incomplete combustion?

Carbon undergoes complete combustion to form  $\text{CO}_2$  and incomplete combustion to form  $\text{CO}$ . Write a balanced symbol equation both reactions.

# Calculations

## Relative Formula Mass/Molar Mass



Using the mass number from the periodic table.

1. Calculate the relative formula mass of  $\text{CaCO}_3$ .
2. Calculate the relative formula mass of  $\text{Mg}(\text{OH})_2$

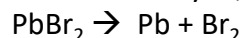
$$\text{Reacting Masses} = \frac{\text{Mass of the known}}{\text{RFM of known}} \times \text{RFM of unknown}$$

**Example:** Calculate the mass of magnesium Chloride ( $\text{MgCl}_2$ ) formed from 480g of Magnesium (Mg) when it is reacted with excess Hydrochloric acid (HCl).  $\text{Mg} + \text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$

Step 1: Calculate the RFM of the  $\text{MgCl}_2$ .  $= 24 + (35.5 \times 2) = 95$

Step 2: equation:  $= \frac{480}{24} \times 95 = 1900\text{g}$

1. In electrolysis, molten sodium bromide is decomposed.

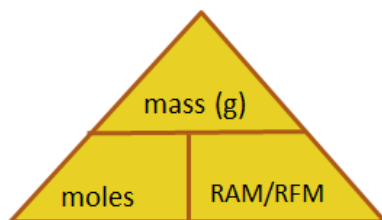


Calculate the mass of lead that could be formed from 205g of lead bromide.

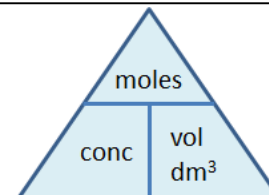
## Moles

1. Calculate the number of moles in 5g of NaCl.

2. Calculate the number of grams 2.5 moles of  $\text{CO}_2$ .



## Concentration



1. What is the relative formula mass/molar mass of  $\text{CaCl}_2$ ?
2. A standard solution of  $\text{CaCl}_2$  was made by dissolving 17g into  $250 \text{ cm}^3$  of water. What is the volume in  $\text{dm}^3$ ?
3. How many moles are there in 17g of  $\text{CaCl}_2$ ?
4. Calculate the concentration of the  $\text{CaCl}_2$  solution using your answers from 2 and 3 above.
5. Calculate the concentration in  $\text{mol dm}^{-3}$  of a solution made by dissolving 55g of NaOH into  $500 \text{ cm}^3$  of water.

## Percent Yield

$$\text{percent yield} = \frac{\text{actual yield}}{\text{theoretical yield}} \times 100\%$$

1. What is the percentage yield of a reaction where the theoretical yield was 75 kg but the actual yield was 68 kg?

Type of energy	Description	Example
Electrical		
	From the sun and light bulbs	
		Speakers
Nuclear		
	From hot objects	
Gravitational potential		
	In stretched springs	Bungee jump
Chemical		
	Things that are moving	

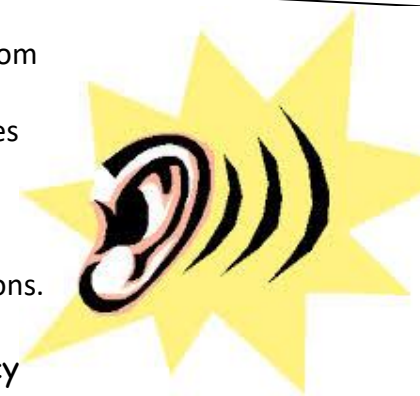
**Conservation of energy** means that energy can/can't be created or destroyed. You can /can't only change energy from one type to another.

What are the energy transfers?

TV                      Electrical energy → sound energy+ light energy  
 Wind up toy        \_\_\_\_\_ → \_\_\_\_\_  
 Electric kettle      \_\_\_\_\_ → \_\_\_\_\_  
 Battery powered torch \_\_\_\_\_ → \_\_\_\_\_

**True or false?**

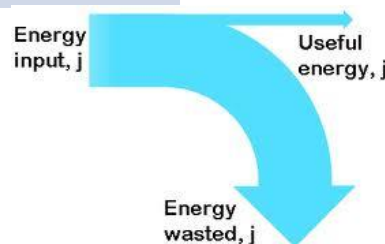
- Sound energy can be transferred from one place to another. \_\_\_\_\_
- Sound energy doesn't need particles to travel. \_\_\_\_\_
- Sound energy is transferred by convection. \_\_\_\_\_
- Sound waves are caused by vibrations. \_\_\_\_\_



**Energy & Efficiency**

What does this diagram show?

What is it called?



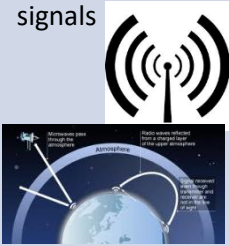
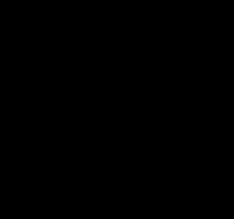
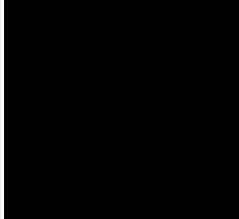
$$\text{Efficiency} = \frac{\text{useful energy transferred by the appliance}}{\text{total energy supplied to the appliance}} (\times 100\%)$$

Does efficiency have a unit?

In a light bulb, for 25 joules of energy that are supplied to the bulb, 5 joules are usefully transferred into light energy. What is the efficiency of the bulb?

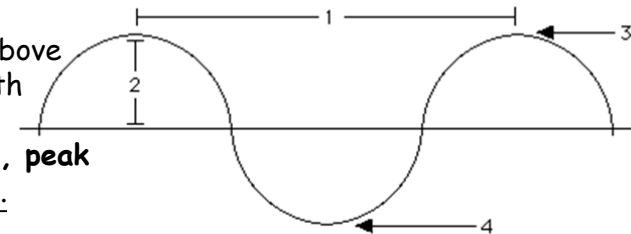
Heat energy is transferred from one place to another when there is a difference in temperature. **Match the types of heat transfer with descriptions**

- |            |   |
|------------|---|
| Conduction | • When particles in solids pass on energy to the particles next to them.      |
| Convection | • Heat is given out as infra red radiation. Objects can emit and absorb this. |
| Radiation  | • When particles in liquids and gases move from a hot place to a cooler one.  |

Electromagnetic spectrum	Radio Waves	M_____	I_____	V_____ L_____	U_____ V_____	X-_____	G_____ R_____
Uses Draw a picture or write the uses in	TV and radio signals 						
Dangers							

	Renewable	Non Renewable
Pros ☺		
Cons ☹		

Label the above diagram with **Amplitude, wavelength, peak and trough.**



Add more examples of each

Coal

Non-Renewable Energy sources

Wind power

Renewable Energy sources

Match the statements with on of the numbers in the picture.

\_\_\_\_ Water is heated by burning fossil fuels.

\_\_\_\_ Steam turns the turbine.

\_\_\_\_ The turbine turns the generator which generates electricity.

