Year 12 into 13 BTEC Applied Science Bridging Work

Well done for completing the first year of BTEC Applied Science, in order to best prepare yourself for next year and your first set of external exams which you will be sitting in January 2022. As part of this please make sure you bring the below work to your first lesson back in September.

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 (Task 1)
- Unit 1 Biology mind map (Task 1)
- Unit 1 Biology past paper (Task 4)
- Unit 1 Chemistry revision notes (Task 2)
- Unit 1 Chemistry mind map (Task 2)
- Unit 1 Chemistry past paper (Task 4)
- Unit 1 Physics revision notes (Task 3)
- Unit 1 Physics mind map (Task 3)
- Unit 1 Physics past paper (Task 4)

Task 1

Biology:

Watch this :
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

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

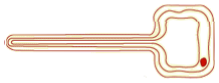
Make notes on the above video and then complete the following:

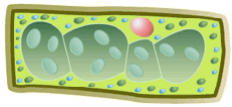
Complete the revision mats for Physics and complete a full set of revision notes (this may include a poster, mind map, flash cards) on all concepts covered in physics, use the powerpoints found on Sharepoint to complete you notes.

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

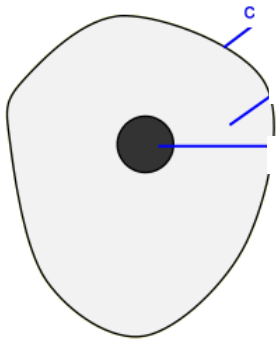




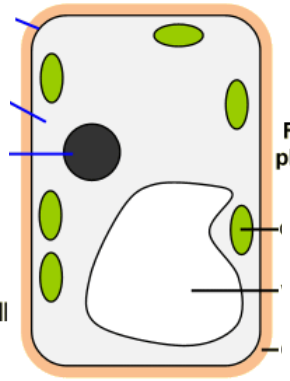
Which DNA base codes with which?

A	T
C	
T	
A	
T	
G	

Label the cells

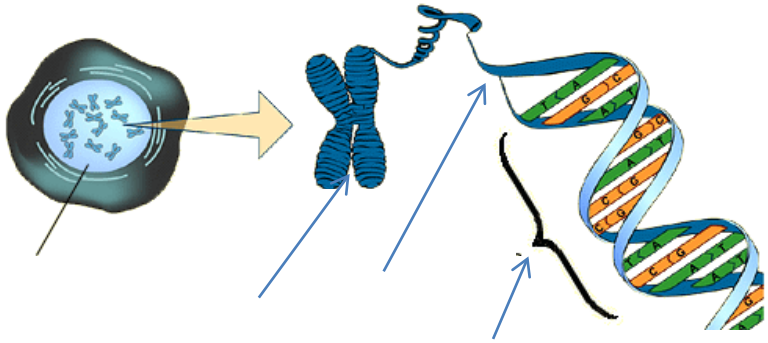


animal cell



plant cell

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 _____s. Chromosomes are made of a chemical called _____, A section of DNA that codes for a certain characteristic is called a _____.

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.

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

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

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		

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

Too hot

Too cold

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 glucose glucagon insulin glands chemical

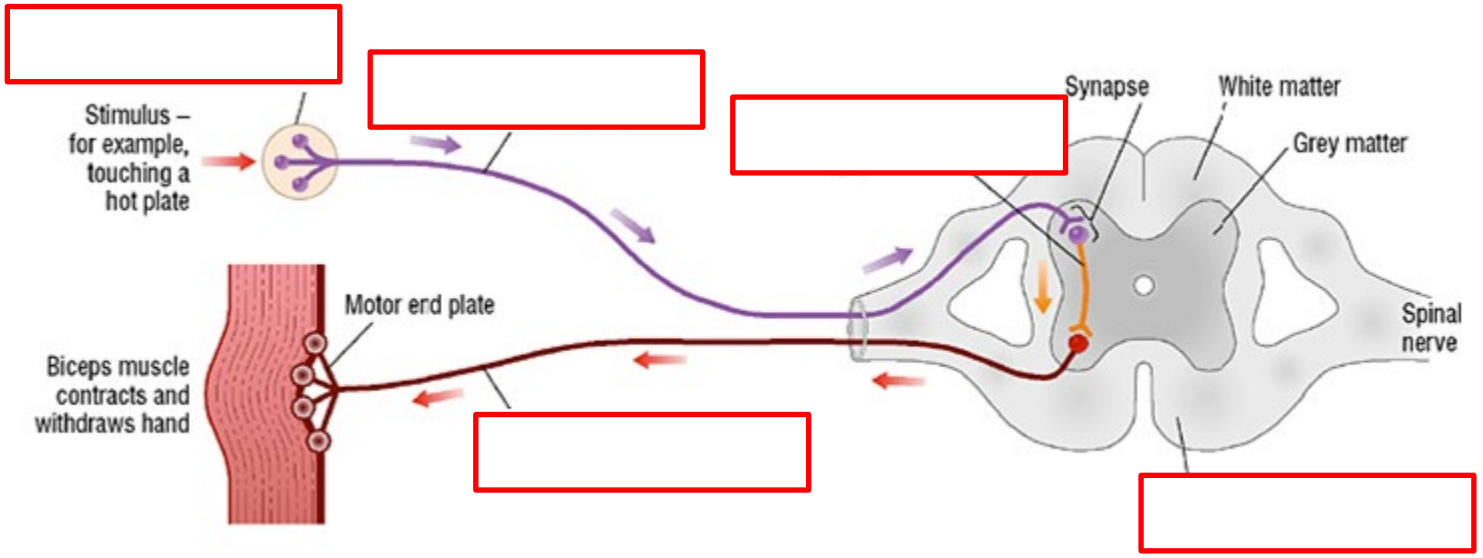
Fill in the boxes on the diagram with the words below:

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) $1s^2 2s^2 2p^6 3s^2$

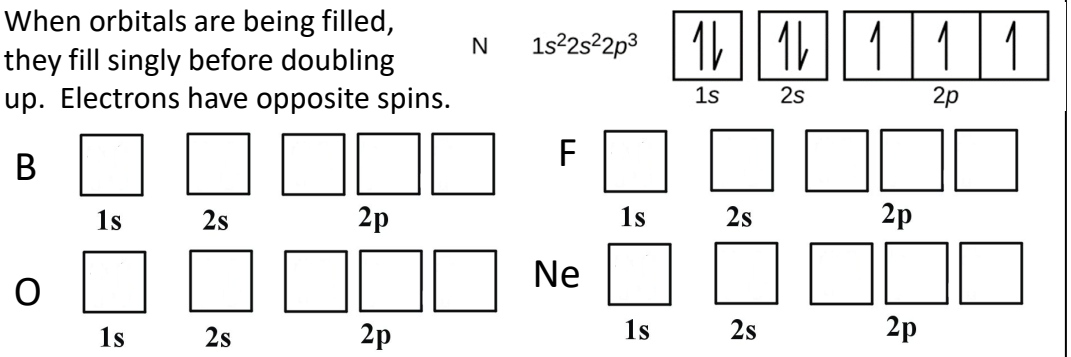
Orbitals and Energy Levels

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

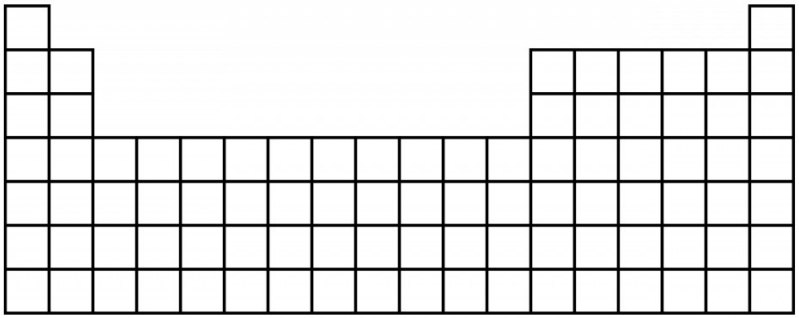
When orbitals are being filled, they fill singly before doubling up. Electrons have opposite spins.



Element	Number of Electrons	Electronic Configuration
Boron	5	$1s^2\ 2s^2\ 2p^1$
Carbon	6	
Sodium		
Cl^-		
Ca^{2+}		

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_2O)

Calcium Chloride ($CaCl_2$)

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:

H_2O

Cl_2

CH_4

N_2

O_2

CO_2

Draw a diagram showing the dative bond between NH_4^+ and 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:
HCl (electronegativity of H=2.20 and Cl=3.16)

H_2O (electronegativity of H=2.20 and O=3.44)

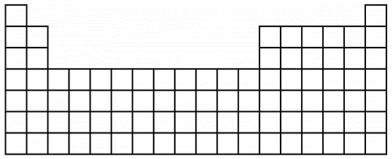
CH_4 (electronegativity of H=2.20 and C=3.16)

Draw the dipole for 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 Na^+ ion compare to that of Na?

How does the size of a Cl^- ion compare to Cl?

Keywords

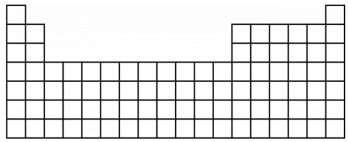
Electronegativity—

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.



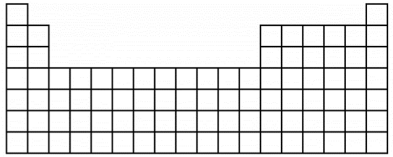
Explain why.

-

-

Ionisation Energy-Trends

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



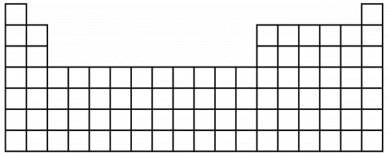
Explain why.

-

-

Electronegativity Trends

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



Explain why.

-

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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

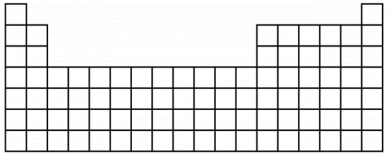
Oxidation—
Reduction-
Displacement-

Which of the following reactions will take place:

1. Iron + Copper Sulfate →
2. Zinc + Potassium Chloride →
3. Copper + Silver Nitrate →
4. Potassium + Iron Oxide →

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:

$Na + O_2$ →

$Mg + O_2$ →

$Al + O_2$ →

$Mg + H_2O$ →

$Ca + HCl$ →

$Ca + H_2SO_4$ →

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) F_2 (b) $NaClO_3$ (c) H_2S (d) $KMnO_4$
2. Work out the oxidation number of Cl in the following: (a) HCl (b) HClO (c) $NaClO_2$ (d) $KClO_3$ (e) Cl_2O_7
3. Iron reacts with chlorine to form iron chloride. The equation is
$2Fe(s) + 3Cl_2(g) \rightarrow 2FeCl_3(s)$
What is oxidised and what is reduced?

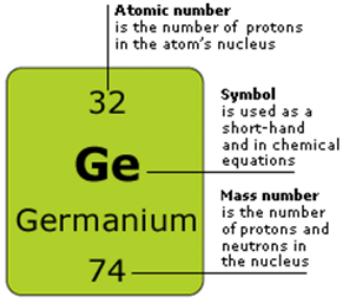
Reactions with Oxygen

What is the difference between complete and incomplete combustion?

Carbon undergoes complete combustion to form CO_2 and incomplete combustion to form 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 $CaCO_3$.

2. Calculate the relative formula mass of $Mg(OH)_2$

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

Example: Calculate the mass of magnesium Chloride ($MgCl_2$) formed from 480g of Magnesium (Mg) when it is reacted with excess Hydrochloric acid (HCl). $Mg + HCl \longrightarrow MgCl_2 + H_2$

Step 1: Calculate the RFM of the $MgCl_2$. =24 + (35.5x2) = 95

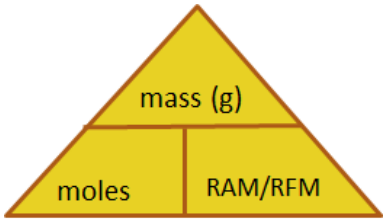
Step 2: equation: $= \frac{480}{24} \text{x} 95 =$ 1900g

1. In electrolysis, molten sodium bromide is decomposed.
$PbBr_2 \rightarrow Pb + Br_2$
Calculate the mass of lead that could be formed from 205g of lead bromide.

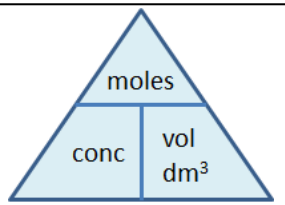
Moles

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

2. Calculate the number of grams 2.5 moles of CO_2.



Concentration



1. What is the relative formula mass/molar mass of $CaCl_2$?

2. A standard solution of $CaCl_2$ was made by dissolving 17g into 250 cm^3 of water. What is the volume in dm^3?

3. How many moles are there in 17g of $CaCl_2$?

4. Calculate the concentration of the $CaCl_2$ solution using your answers from 2 and 3 above.

5. Calculate the concentration in mol dm^{-3} of a solution made by dissolving 55g of NaOH into 500 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 **<u>can/can't</u>** be created or destroyed. You **<u>can /can't</u>** 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 _____ _____ → _____ _____

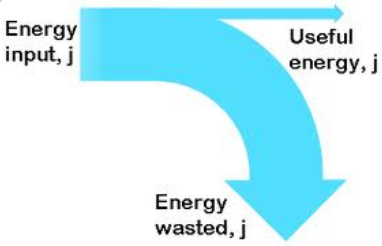
<u>True or false?</u>

- 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. _____

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.

Energy & Efficiency



What does this diagram show?

What is it called?

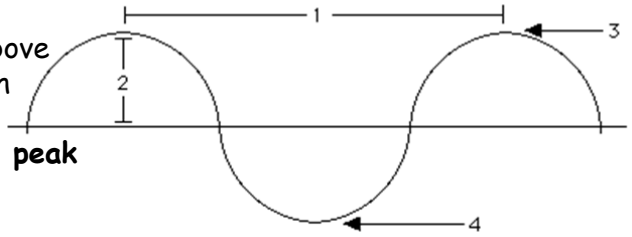
$$\text{Efficiency} = \frac{\textit{useful energy transferred by the appliance}}{\textit{total energy supplied to the appliance}} \quad (\times 100\%)$$

Does efficiency have a unit?

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

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	[redacted]			[redacted]			

	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.