PUPIL NAME: ___________________________________

To be completed and Returned to Mrs Garewal

The Pearson BTEC Level 3 National Extended Certificate in Applied Science is taught as follows

Year 12 - units 1 & 2 and Year 13 a further two units (3 & 8). **The bridging work is preparation for year 12 units.**

So you are considering Btec Applied Science?

**BTEC APPLIED SCIENCE: Bridging work for unit 1**

(U1) **Unit 1: Principles and Applications of Science I (see separate tasks)**

Unit 1 – Principles and applications is a unit externally examined at the end of the year in a written exam. It is based on Chemistry, Biology and Physics topics.

**Topic A: Chemistry; Periodicity and properties of elements**

**Topic B: Biology: Structure and function of cells and tissues**

**Topic C: Physics: Waves and communication**

*Unit 1 bridging work – involves a focus on chemistry to start with and requires you to some reading, understanding and application of some new and harder chemical ideas. Making cornell notes and Pixl style application questions.*
This pack contains a programme of activities and resources to prepare you to start on the chemistry sections of unit 1 (external exam components) Btec level 3 Applied Science in September. It is aimed to be used after you complete your GCSE, throughout the remainder of the summer term and over the Summer Holidays to ensure you are ready to deal with the chemistry basics for September.

**Book Recommendations**

**Periodic Tales: The Curious Lives of the Elements** (Paperback) Hugh Aldersey-Williams

ISBN-10: 0141041455

http://bit.ly/pixlchembook1

This book covers the chemical elements, where they come from and how they are used. There are loads of fascinating insights into uses for chemicals you would have never even thought about.

**The Science of Everyday Life: Why Teapots Dribble, Toast Burns and Light Bulbs Shine** (Hardback) Marty Jopson

ISBN-10: 1782434186


The title says it all really, lots of interesting stuff about the things around you home!

**Bad Science** (Paperback) Ben Goldacre

ISBN-10: 000728487X


Here Ben Goldacre takes apart anyone who published bad / misleading or dodgy science – this book will make you think about everything the advertising industry tries to sell you by making it sound ‘sciency’.

**Calculations in AS/A Level Chemistry** (Paperback) Jim Clark
If you struggle with the calculations side of chemistry, this is the book for you. Covers all the possible calculations you are ever likely to come across. Brought to you by the same guy who wrote the excellent chemguide.co.uk website.

Videos to watch online

Rough science – the Open University – 34 episodes available

Real scientists are ‘stranded’ on an island and are given scientific problems to solve using only what they can find on the island.

Great fun if you like to see how science is used in solving problems.

There are six series in total

http://bit.ly/pixlchemvid1a

http://www.dailymotion.com/playlist/x2igjq_Rough-Science_rough-science-full-series/1#video=xxw6pr

or

http://bit.ly/pixlchemvid1b

https://www.youtube.com/watch?v=lUoDWAt259I

TASK ASSESSMENT CRITERIA:

Assessment Criteria: As per instructions laid out in the task

Level 1 – notes are made in sufficient detail, questions attempted but errors evident

Level 2 - notes are made in sufficient detail, questions well attempted – some errors

Level 3 – notes are well made and questions well answered – minimal errors
PUPIL TASK A:

A: Making Cornell notes on new spec content (you also will need to look at appendices A for the spec content & B to know how to make cornell notes)

Use your online searching abilities to see if you can find out as much about the following topics as you can. Remember it you are a prospective Btec level 3 applied Science chemist, you should aim to push your knowledge.

Task Making Cornell notes: (Refer to the web link here and support materials in the appendix A):  http://coe.jmu.edu/learningtoolbox/cornellnotes.html

When making your cornell notes be sure to include the relevant detail needed by referring to the new btec specification statements provided in appendix B.

Task explained: Make a 1-page summary for each of the 8 spec topics below you research using Cornell notes:

1. The electronic structure of atoms
2. Bonding - ionic, covalent, metallic
3. Intermolecular forces
4. balanced equations, relative atomic mass, atomic number and relative molecular mass, moles, molar masses and molarities.
5. Quantitative chemistry: mass, volume of solution, concentration, reacting quantities percentage yields.
6. The periodic table
7. Physical properties of elements – including metals
8. Chemical properties of elements:
PUPIL TASK B:

**B: Pre knowledge Topics – use the web links to develop your understanding of chemistry then work through all the questions set:**

Use your online searching abilities to see if you can find out as much about the following topics as you can. Remember it you are a prospective Btec level 3 applied Science chemist, you should aim to push your knowledge.

**Pre-Knowledge Topics and questions:**

**Chemistry topic 1 – Electronic structure, how electrons are arranged around the nucleus**

A periodic table can give you the proton / atomic number of an element, this also tells you how many electrons are in the atom.

*You will have used the rule of electrons shell filling, where:*

The first shell holds up to 2 electrons, the second up to 8, the third up to 8 and the fourth up to 18 (or you may have been told 8).

The ‘shells’ can be broken down into ‘orbitals’, which are given letters: ‘s’ orbitals, ‘p’ orbitals and ‘d’ orbitals.

You can read about orbitals here:

http://bit.ly/pixlchem1
http://www.chemguide.co.uk/atoms/properties/atomorbs.html#top

**Questions to do.**

Now that you are familiar with s, p and d orbitals try these problems, write your answer in the format: 1s², 2s², 2p⁶ etc.

Q1.1 Write out the electron configuration of:

a) Ca  b) Al  c) S  d) Cl  e) Ar  f) Fe  g) V  h) Ni  i) Cu  j) Zn  k) As
Q1.2 Extension question, can you write out the electron arrangement of the following ions:

a) K⁺  
b) O²⁻  
c) Zn²⁺  
d) V⁵⁺  
e) Co²⁺

Chemistry topic 2 – Oxidation and reduction

At GCSE you know that oxidation is adding oxygen to an atom or molecule and that reduction is removing oxygen, or that oxidation is removing hydrogen and reduction is adding hydrogen. You may have also learned that oxidation is removing electrons and reduction is adding electrons.

At btec level 3 we use the idea of **oxidation number** a lot!

You know that the metals in group 1 react to form ions that are +1, i.e. Na⁺ and that group 7, the halogens, form -1 ions, i.e. Br⁻.

We say that sodium, when it has reacted has an oxidation number of +1 and that bromide has an oxidation number of -1.

All atoms that are involved in a reaction can be given an oxidation number.

An element, Na or O₂ is always given an oxidation state of zero (0), any element that has reacted has an oxidation state of + or -.

As removing electrons is **reduction**, if, in a reaction the element becomes more negative it has been reduced, if it becomes more positive it has been oxidised.

| -5 | 0 | +5 |

You can read about the rules for assigning oxidation numbers here:

[http://www.dummies.com/how-to/content/rules-for-assigning-oxidation-numbers-to-elements.html](http://www.dummies.com/how-to/content/rules-for-assigning-oxidation-numbers-to-elements.html)

Elements that you expect to have a specific oxidation state actually have different states, so for example you would expect chlorine to be -1, it can have many oxidation states: NaClO, in this compound it has an oxidation state of +1

There are a few simple rules to remember:

Metals have a + oxidation state when they react.

Oxygen is ‘king’ it always has an oxidation state of -2

Hydrogen has an oxidation state of +1 (except metal hydrides)
The charges in a molecule must cancel.

Examples: Sodium nitrate, NaNO₃

\[
\begin{array}{ccc}
\text{Na} & +1 & 3 \times \text{O}^2- \\
+1 & -6 & \\
\end{array}
\]

Sulfate ion, SO₄²⁻

\[
\begin{array}{ccc}
\text{4} \times \text{O}^2- & 2 \text{- charges ‘showing’} \\
-8 & -2 & \\
\end{array}
\]

To cancel:

\[
\begin{array}{cc}
\text{N} & = 5 \\
\text{S} & = 6 \\
\end{array}
\]

Questions to do.

Q2.1 Work out the oxidation state of the underlined atom in the following:

a) MgCO₃  

b) SO₃  

c) NaClO₃  

d) MnO₂  

e) Fe₂O₃  

f) V₂O₅  

g) KMnO₄  

h) Cr₂O₇²⁻  

i) Cl₂O₄

Chemistry topic 3 – The shapes of molecules and bonding.

Have you ever wondered why your teacher drew a water molecule like this?

The lines represent a covalent bond, but why draw them at an unusual angle?

If you are unsure about covalent bonding, read about it here:


http://www.chemguide.co.uk/atoms/bonding/covalent.html#top

At A level you are also expected to know how molecules have certain shapes and why they are the shape they are.

You can read about shapes of molecules here:


http://www.chemguide.co.uk/atoms/bonding/shapes.html#top

Questions to do.

Q3.1 Draw a dot and cross diagram to show the bonding in a molecule of aluminium chloride (AlCl₃)

Q3.2 Draw a dot and cross diagram to show the bonding in a molecule of ammonia (NH₃)

Q3.3 What is the shape and the bond angles in a molecule of methane (CH₄)?
Chemistry topic 4 – Chemical equations

Balancing chemical equations is the stepping stone to using equations to calculate masses in chemistry.

There are loads of websites that give ways of balancing equations and lots of exercises in balancing.

Some of the equations to balance may involve strange chemical, don’t worry about that, the key idea is to get balancing right.

http://www.chemteam.info/Equations/Balance-Equation.html

This website has a download; it is safe to do so:

https://phet.colorado.edu/en/simulation/balancing-chemical-equations

Questions to do.

Q4.1 Balance the following equations

a. \( \text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O} \)

b. \( \text{S}_8 + \text{O}_2 \rightarrow \text{SO}_3 \)

c. \( \text{HgO} \rightarrow \text{Hg} + \text{O}_2 \)

d. \( \text{Zn} + \text{HCl} \rightarrow \text{ZnCl}_2 + \text{H}_2 \)

e. \( \text{Na} + \text{H}_2\text{O} \rightarrow \text{NaOH} + \text{H}_2 \)

f. \( \text{C}_10\text{H}_16 + \text{Cl}_2 \rightarrow \text{C} + \text{HCl} \)

g. \( \text{Fe} + \text{O}_2 \rightarrow \text{Fe}_2\text{O}_3 \)

h. \( \text{C}_6\text{H}_12\text{O}_6 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O} \)

i. \( \text{Fe}_2\text{O}_3 + \text{H}_2 \rightarrow \text{Fe} + \text{H}_2\text{O} \)

j. \( \text{Al} + \text{FeO} \rightarrow \text{Al}_2\text{O}_3 + \text{Fe} \)
BRIDGING WORK FOR BTEC Applied Science July 2019  
(Return to Mrs H. Garewal at the start of next term in Sept 2019)

**Chemistry topic 5 – Measuring chemicals – the mole**

From this point on you need to be using an A level periodic table, not a GCSE one you can view one here:


https://secondaryscience4all.files.wordpress.com/2014/08/filestore_aqa_org_uk_subjects_aqa-2420-w-trb-ptds_pdf.png

Now that we have our chemical equations balanced, we need to be able to use them in order to work out masses of chemicals we need or we can produce.

The **mole** is the chemists equivalent of a dozen, atoms are so small that we cannot count them out individually, we weigh out chemicals.

For example:  

\[
\text{magnesium + sulfur } \rightarrow \text{ magnesium sulfide}
\]

\[
\text{Mg} + \text{S} \rightarrow \text{MgS}
\]

We can see that one atom of magnesium will react with one atom of sulfur, if we had to weigh out the atoms we need to know how heavy each atom is.

From the periodic table: \(\text{Mg} = 24.3\) and \(\text{S} = 32.1\)

If I weigh out exactly 24.3g of magnesium this will be 1 mole of magnesium, if we counted how many atoms were present in this mass it would be a huge number (\(6.02 \times 10^{23}\)), if I weigh out 32.1g of sulfur then I would have 1 mole of sulfur atoms.

So 24.3g of Mg will react precisely with 32.1g of sulfur, and will make 56.4g of magnesium sulfide.

Here is a comprehensive page on measuring moles, there are a number of descriptions, videos and practice problems.

You will find the first 6 tutorials of most use here, and problem sets 1 to 3.


http://www.chemteam.info/Mole/Mole.html

**Questions to do.**

Q 5.1 Answer the following questions on moles.

a) How many moles of phosphorus pentoxide (\(\text{P}_4\text{O}_{10}\)) are in 85.2g?

b) How many moles of potassium in 73.56g of potassium chlorate (V) (\(\text{KClO}_3\))?

c) How many moles of water are in 249.6g of hydrated copper sulfate(VI) (\(\text{CuSO}_4\cdot5\text{H}_2\text{O}\))? For this one, you need to be aware the dot followed by 5\(\text{H}_2\text{O}\) means that the molecule comes with 5 water molecules so these have to be counted in as part of the molecules mass.

d) What is the mass of 0.125 moles of tin sulfate (\(\text{SnSO}_4\))?

e) If I have 2.4g of magnesium, how many g of oxygen\((\text{O}_2)\) will I need to react completely with the magnesium? \(\text{2Mg +O}_2 \rightarrow \text{MgO}\)
Chemistry topic 6 – Solutions and concentrations

In chemistry a lot of the reactions we carry out involve mixing solutions rather than solids, gases or liquids.

You will have used bottles of acids in science that have labels saying ‘Hydrochloric acid 1M’, this is a solution of hydrochloric acid where 1 mole of HCl, hydrogen chloride (a gas) has been dissolved in 1dm³ of water.

The dm³ is a cubic decimetre, it is actually 1 litre, but from this point on as an A level chemist you will use the dm³ as your volume measurement.


http://www.docbrown.info/page04/4_73calcs11msc.htm

Questions to do.

Q6.1

a) What is the concentration (in mol dm⁻³) of 9.53g of magnesium chloride (MgCl₂) dissolved in 100cm³ of water?

b) What is the concentration (in mol dm⁻³) of 13.248g of lead nitrate (Pb(NO₃)₂) dissolved in 2dm³ of water?

c) If I add 100cm³ of 1.00 mol dm³ HCl to 1.9dm³ of water, what is the molarity of the new solution?

d) What mass of silver is present in 100cm³ of 1moldm⁻³ silver nitrate (AgNO₃)?

e) The Dead Sea, between Jordan and Israel, contains 0.0526 moldm⁻³ of Bromide ions (Br⁻), what mass of bromine is in 1dm³ of Dead Sea water?

Chemistry topic 7 – Titrations

One key skill in A level chemistry is the ability to carry out accurate titrations, you may well have carried out a titration at GCSE, at A level you will have to carry them out very precisely and be able to describe in detail how to carry out a titration - there will be questions on the exam paper about how to carry out practical procedures.

You can read about how to carry out a titration here, the next page in the series (page 5) describes how to work out the concentration of the unknown.


http://www.bbc.co.uk/schools/gcsebitesize/science/triple_aqa/further_analysis/analysing_substances/revision/4/

Remember for any titration calculation you need to have a balanced symbol equation; this will tell you the ratio in which the chemicals react.
BRIDGING WORK FOR BTEC Applied Science July 2019
(Return to Mrs H. Garewal at the start of next term in Sept 2019)

E.g. a titration of an unknown sample of sulfuric acid with sodium hydroxide.

A 25.00cm³ sample of the unknown sulfuric acid was titrated with 0.100moldm⁻³ sodium hydroxide and required exactly 27.40cm³ for neutralisation. What is the concentration of the sulfuric acid?

**Step 1:** the equation \(2\text{NaOH} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2\text{O}\)

**Step 2:** the ratios \(2 : 1\)

**Step 3:** how many moles of sodium hydroxide \(27.40\text{cm}^3 = 0.0274\text{dm}^3\)

number of moles = \(c \times v = 0.100 \times 0.0274 = 0.00274\) moles

**Step 4:** Using the ratio, how many moles of sulfuric acid for every 2 NaOH there are 1 H₂SO₄, so, we must have \(0.00274/2 = 0.00137\) moles of H₂SO₄

**Step 5:** Calculate concentration. concentration = moles/volume \(\leftarrow\text{in dm}^3 = 0.00137/0.025 = 0.0548\) moldm⁻³

Here are some additional problems, which are harder, ignore the questions about colour changes of indicators.


http://www.docbrown.info/page06/Mtestsnotes/ExtraVolCalcs1.htm

Questions to do.

Use the steps on the last page to help you

Q7.1 A solution of barium nitrate will react with a solution of sodium sulfate to produce a precipitate of barium sulfate.

\(\text{Ba(NO}_3\text{)}_2(\text{aq}) + \text{Na}_2\text{SO}_4(\text{aq}) \rightarrow \text{BaSO}_4(\text{s}) + 2\text{NaNO}_3(\text{aq})\)

What volume of 0.25moldm⁻³ sodium sulfate solution would be needed to precipitate all of the barium from 12.5cm³ of 0.15 moldm⁻³ barium nitrate?

Chemistry topic 8 – Acids, bases, pH

At GCSE you will know that an acid can dissolve in water to produce H⁺ ions, at A level you will need a greater understanding of what an acid or a base is.

Read the following page and answer the questions


http://www.chemguide.co.uk/physical/acidbaseeqia/theories.html#top
Questions to do.

Q8.1 What is your new definition of what an acid is?
Q8.2 How does ammonia (NH₃) act as a base?
http://www.chemguide.co.uk/physical/acidbaseeqia/acids.html#top

Q8.3 Ethanoic acid (vinegar) is a weak acid, what does this mean?
Q8.4 What is the pH of a solution of 0.01 moldm⁻³ of the strong acid, hydrochloric acid?

PUPIL TASK C: Complete the base line assessment task below:score= /32 marks

All data is given on this paper, you will not need a periodic table
Answer all questions.

1. Here is part of a periodic table, use it to answer the following questions

a. Which is the correct electron configuration for a nitrogen atom, circle the correct answer [1]
   1s²2p³  1s¹2p⁶  1s²2s²2p³  1s²2s⁵  1s²2s²2p⁶3s²3p²

b. Which is the correct electron configuration for a chlorine atom, circle the correct answer [1]
   1s²2s²2p⁷  1s²2s²2p⁶2d⁵  1s²2s²2p⁶3d⁷  1s²2s²2p⁶³p⁷  1s²²s²²p⁶³s²³p⁵

c. Which is the correct electron configuration for an aluminium ion, Al³⁺? Circle the correct answer [1]
   1s²2s²2p⁶  1s²2s²²p³³s²³p³  1s²2s²2p⁶3s²  1s²²s²²p⁶²d¹
2. Draw a dot and cross diagram to show the bonding in a molecule of water, H₂O.  
   Atomic numbers: H = 1, O = 8  
   [2]

3. Give the oxidation state of the underlined atom in the following chemicals.
   Useful information: H = +1, K = +1, Na = +1, Mg = +2, O = -2, Cl = -1  
   [7]
   a) CO₂  
   b) SO₃  
   c) H₂SO₄  
   d) AlCl₃  
   e) Cr₂O₃  
   f) NaNO₃  
   g) YCl₄

4. Balance the following chemical equations:
   a) C₃H₈ + ___ O₂ → ___ CO₂ + ___ H₂O  
   b) ___ HCl + Mg(OH)₂ → MgCl₂ + ___ H₂O  
   c) Na₂CO₃ + ___ HCl → ___ NaCl + ___ H₂O + CO₂  
   [3][2][3]

5. Calculate the relative formula masses of the following:
   Atomic masses: H = 1, O = 16, S = 32.1, C = 12, Ca = 40.1, Na = 23, Cl = 35.5, Zn = 65.4  
   [5]
   a) CaCl₂  
   b) H₂CO₃  
   c) Na₂SO₄  
   d) C₃H₇OH  
   e) Zn(NO₃)₂
6. Vinegar is a solution of ethanoic acid (CH₃COOH) in water. A student carried out a titration of a sample of vinegar. He used a pipette to measure exactly 25.0cm³ of vinegar into a flask, added an indicator and titrated it with a 1.00 mol dm⁻³ solution of sodium hydroxide (NaOH).

The reaction is:

\[ \text{CH}_3\text{COOH} + \text{NaOH} \rightarrow \text{CH}_3\text{COONa} + \text{H}_2\text{O} \]

The student found that his average titration was 27.50cm³

\[ c = \frac{n}{v} \quad \text{c = concentration (mol dm}^{-3}\text{), n = number of moles, v = volume (dm}^3\text{)} \]

\[ n = \frac{m}{R_{fm}} \quad \text{n = number of moles, m = mass in grams, R}_{fm} = \text{formula mass} \]

1dm³ = 1000 cm³

a. Using the chemical equation, how many moles of sodium hydroxide will react with 1 mole of ethanoic acid?

\[ \underline{\quad \text{moles}} \quad [1] \]

b. How many moles of sodium hydroxide are in 27.50cm³ of 1.00 moldm⁻³ sodium hydroxide?

\[ \underline{\quad \text{moles}} \quad [2] \]

c. How many moles of ethanoic acid are in 25.0cm³ of the vinegar sample?

\[ \underline{\quad \text{moles}} \quad [1] \]

d. How many moles of ethanoic acid are in 1dm³ of vinegar?

\[ \underline{\quad \text{moles}} \quad [1] \]

e. Ethanoic acid has a formula mass of 48. What mass of ethanoic acid is present in 1dm³ of vinegar?

\[ \underline{\quad \text{g}} \quad [2] \]
Chemistry Specifications and content to refer to when making detailed Cornell notes

UNIT 1: PRINCIPLES AND APPLICATIONS OF SCIENCE I


Chemistry Topics:

The topic areas covered in this unit include: atomic structure and bonding; chemical and physical properties of substances related to their uses.

Scientists and technicians working in the chemical industry need to have an understanding of atoms and electronic structure. This allows them to predict how chemical substances will react in the production of a wide range of products – anything from fertilisers in the farming industry to fragrances in the perfume industry.

Metals play an important role in the construction industry, in providing the structure to buildings, as well as in electrical wiring and the production of decorative features. So understanding the chemical and physical properties of metals is essential when selecting appropriate building materials.

Essential content:
The essential content is set out under content areas. Learners must cover all specified content before the assessment.

A Periodicity and properties of elements
A1 Structure and bonding in applications in science

- Understand the electronic structure of atoms:
  electronic orbitals
  Aufbau principle
  Bohr theory.

- Understand ionic bonding:
  strong electrostatic attraction between oppositely charged ions effects ionic radius and ionic charge have on the strength of ionic bonding formation of ions in terms of electron loss or gain electronic configuration diagrams of cations and anions.

- Understand covalent bonding:
  strong electrostatic attraction between two nuclei and the shared pair(s) of electrons between them dot and cross diagrams to show electrons in simple covalent molecules, including those with multiple bonds and dative covalent (coordinate) bonds the relationship between bond lengths and bond strengths in covalent bonds tetrahedral basis of organic chemistry.

- Understand metallic bonding:
  de-localised electrons
  positive metal ions
  regular layer structure.

- Understand the following intermolecular forces:
  van der Waals
dipole-dipole
hydrogen bonding.

- Understand the following:
  balanced equations
  relative atomic mass
  atomic number and relative molecular mass
BRIDGING WORK FOR BTEC Applied Science July 2019
(Return to Mrs H. Garewal at the start of next term in Sept 2019)

moles, molar masses and molarities.

- **Understand the quantities used in chemical reactions:**
  mass, volume of solution, concentration
  reacting quantities
  percentage yields.

**A2 Production and uses of substances in relation to properties**

- **Understand the periodic table:**
  Periods 1, 2, 3 and 4
  groups – s block, p block, d block
  layout of periodic table in relation to s, p, d notation
  electronic arrangement of elements using s, p, d notation.

- **Understand the physical properties of elements:**
  first ionisation energy
  reasons for trends in ionisation energy across Periods 2–4 and down groups 1, 2 and 7
  electron affinity
  atomic radius
  ionic radius
  electronegativity
  type of bonding in the element
  trends – melting point and boiling point

physical properties of metals – electrical conductivity, thermal conductivity, malleability, ductility.

- **Understand the chemical properties of elements:**
  products and reactivity of all Period 2 and 3 elements with oxygen
  products and reactivity of metals with oxygen, water, dilute hydrochloric acid and dilute sulfuric acid
  position of metals in the reactivity series in relation to position in the periodic table oxidation reduction
  variable oxidation states of transition metal ions
  displacement reactions of metals/halogens
  uses and applications of substances produced within this learning aim.
APPENDIX B:  *Making Cornell notes: http://coe.jmu.edu/learningtoolbox/cornellnotes.html*

Follow the link above

**D**ivide the paper into three sections.

- Draw a dark horizontal line about 5 or 6 lines from the bottom. Use a heavy magic marker to draw the line so that it is clear.

- Draw a dark vertical line about 2 inches from the left side of the paper from the top to the horizontal line.

**D**ocument

- Write course name, date, and topic at the top of each page.
Write notes.

- The large box to the right is for writing notes.
- Skip a line between ideas and topics.
- Don't use complete sentences. Use abbreviations, whenever possible. Develop a shorthand of your own, such as using "&" for the word "and".

Review and clarify.

- Review the notes as soon as possible after class.
- Pull out main ideas, key points, dates, and people, and write these in the left column.
BRIDGING WORK FOR BTEC Applied Science July 2019
(Return to Mrs H. Garewal at the start of next term in Sept 2019)

S ummarize.

• Write a summary of the main ideas in the bottom section.

S tudy your notes.

• Re-read your notes in the right column.
• Spend most of your time studying the ideas in the left column and the summary at the bottom. These are the most important ideas and will probably include most of the information that you will be tested on.
BRIDGING WORK FOR BTEC Applied Science July 2019
(Return to Mrs H. Garwai at the start of next term in Sept 2019)
So you are considering Btec Applied Science?

**BTEC APPLIED SCIENCE: Bridging work for unit 2 Sept 2019**

You will be expected for unit 2: Practical Scientific Procedures and Techniques to complete 4 assignments. These will be graded at a pass, merit or distinction and are internally assessed and moderated by teachers, then externally sampled and moderated by the exam board.

**(U2) Unit 2 Practical Scientific Procedures and Techniques – 4 assignments**

You will be expected for unit 2: Practical Scientific Procedures and Techniques to complete 4 assignments. These will be graded at a pass, merit or distinction.

Assignment A – Undertake titration and colorimetry to determine the concentrations of solutions

Assignment B – Undertake calorimetry to study cooling curves

Assignment C – Undertake chromatographic techniques to identify components in mixtures

Assignment D – Review personal development of scientific skills for laboratory work

In readiness for this unit 2 coursework component of the Year 12 Btec applied science. It is useful for you to familiarise yourself with some specific the GCSE required practicals. They will help form a practical bridging link from GCSE to this post 16 level 3 course. To do this you must use your log in details for gcsepod

*(I have been told by Mr Wigley that all students have their own personal logins for GCSE Pod which they should know. If they have forgotten please send them to resources to have their password reset).*

**Task: (Answer on some lined paper please)**

Look at the following Podcast on chemistry practicals and complete the tasks below:

https://members.gcsepod.com/shared/podcasts/title/11591
1. Determination of the reacting volumes of solutions a strong acid and a strong alkali by titration. [Bridging link to assignment A]

https://members.gcsepod.com/shared/podcasts/title/11591

QUESTIONS:

1. What is the name of the reaction in which acids and alkalis react together?

2. Show the general reaction in an equation for the process identified in Q.1

3. What will adding an indicator show and prove?

4. In order to exactly measure the exact volume of acid needed to neutralise a known volume of alkali we need to be ensure accuracy – what does that mean?

5. What pieces of measuring equipment would we need to use in this procedure to ensure accuracy?

6. What safety measures would you need to use and why?

7. Write a step by step write up for how carry out the investigation shown in the podcast you are viewing.
   - Include 2D diagrams drawn with pencil / ruler and labelled in pen.
   - Explain how and why we use each piece of equipment.(equipment listed and explained)
   - State the measurements you need to accurately take in clear method steps.
   - What observations you would expect using the indicator shown before, close to and at the point of neutralisation?
   - Show the results table you might use to display the measurements taken.

8. What do you do if one repeated value is very different to the others collated in your results table?

9. What does a precise repeat mean?

10. Why might cause your values not to be precise?

11. What does it mean if the results are reproducible?

12. Demonstrate what we need to do to calculate the mean volume of acid needed to neutralise the alkali?

13. How might we use this mean volume to calculate the concentration of acid used – state what you will need to use and the three steps of processing your calculations accurately – remember to show the equations you need to apply at each step?
   - Calculating the moles of sodium hydroxide used
   - Using the balanced symbol equation
   - Calculating the concentration of the unknown sulphuric acid
2. **Investigate how paper chromatography can be used to separate and tell the difference between coloured compounds.** *(Bridging link to assignment C)*

https://members.gcsepod.com/shared/podcasts/title/11591

QUESTIONS:

1. What is the technique used for – identify two examples?
2. Describe the method steps shown for identifying the components of food colourings and a mixture of different dyes. Use labelled diagrams to help show these method steps.
3. Why is a pencil used to draw the base line and not a pen?
4. Why is a thin capillary tube used for spotting the ink onto the chromatography paper?
5. Why do you think a small gap between the spots is needed when they are spotted onto the chromatography paper?
6. Why do you need to make repeated spots of the food colourings drying them in between?
7. How do you prevent cross contamination of ink spots?
8. What solvent is used in the experiment and why?
9. What would you observe happens to the spots of dye as the technique is carried out?
10. Explain why this should happen in the question 9.
11. When setting the paper in the glass beaker – what 3 things must you be careful to do?
12. What should you not do when the water (solvent) runs up the paper - explain?
13. How do you know when to remove the chromatogram?
14. How do you process and analyse the results after they have dried out?
15. State the equation for Rf values – show a working example.
16. How can you use the Rf values to identify what is in the unknown ink sample.

EXTENSION:

Research the following methods of chromatography – explain how they work and where they can be used. Include clear referencing for any secondary sources – websites or text used. Pictures must be referenced too.

- Thin layer chromatography
- Gas chromatography