



Y11-Y12 Bridging Work Applied Science

**Our Lady's Catholic College
Science Department**

2020

Welcome to OLCC Applied Science

This bridging work is to help you bridge the gap between GCSE and your BTEC Applied Science Course.

Why do bridging work?

Preparation is crucial for studying Applied Science. After completing these exercises you will need to highlight any areas that you really had trouble understanding. We are expecting you to put 100% into these tasks to show your commitment to the course.

Is the bridging work assessed?

You will be asked to bring your bridging work to your **interview for sixth form** and to **your first lesson**. To be prepared for the course, you should buy a lever arch folder and dividers to help organise your notes. Please keep all the work you complete in this folder until then.

BTEC Applied Science

We study the BTEC Applied Science Extended Certificate which contains the following units:

- Unit 1– externally assessed
- Unit 2– coursework
- Unit 3– externally assessed
- Unit 8– coursework

If you would like to find out more about the course the specification can be found out the following website:

<https://qualifications.pearson.com/en/qualifications/btec-nationals/applied-science-2016.html>

Within this course there are parts that will be familiar from GCSE Sciences and also parts that overlap with AS/A Level Biology, Chemistry and Physics. As with all parts of sixth form, this will require you to be extremely organised with your notes and also with your coursework. You will be expected to make notes on your work outside of lesson, to fully ensure you have learned the exam content and to complete all your homework on time and with your best effort.

This bridging work focuses on Unit 1 work which is externally examined but is also intended to help you develop and practice some of the independent learning skills that are required to be successful in this course.

If you have any questions on any of this work please contact me via email at k.seddon@olcc.lancs.sch.uk

Section A: Periodicity and properties of elements

Revise atomic structure and electron configuration at GCSE and complete the tasks below:

<https://www.bbc.co.uk/bitesize/guides/zscrw6f/revision/1>

Seneca (you may need to make your own account)

<https://app.senecalearning.com/classroom/course/1fd02c70-10e2-11e8-92d6-f7c3df19f7bc/section/6c01ecb0-1271-11e8-953c-337f253f0cdf/session>

Use these resources and your GCSE knowledge to find the definitions

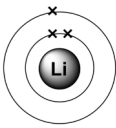
Key Word	Definition
Atom	
Ion	
Compound	
Mixture	
Molecule	

Which of the following are elements E Compounds C or Mixtures M

Put the corresponding letter next to your answer

	E.C or M
O ₂	
Na	
CO ₂	
K	
H ₂	
H ₂ O	
CH ₄	
Cl ₂	

Use the periodic table to complete the following table. The first one has been completed for you

Element	Symbol	Mass no.	Atomic No.	No of electrons	No of protons	No of neutrons	Diagram
Lithium	Li	7	3	3	3	4	
Sodium							
Oxygen							
Carbon							
Hydrogen							
Nitrogen							
Chlorine							

Features of the periodic table:

What patterns of reactivity are seen in group 1?

What patterns of reactivity are seen in group 7?

What are the key features of group 1 metals?

What are the key features of group 7 metals?

Section B: Structure and functions of cells and tissues

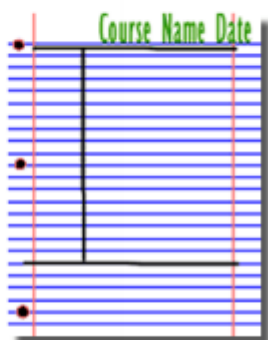
For this section you will learn how to annotate and make notes on an article and then complete some questions and definitions using the resources provided.

Research, reading and note making are essential skills for BTEC Applied Science study. For the following task you are going to produce 'cornell notes' to summarise your reading

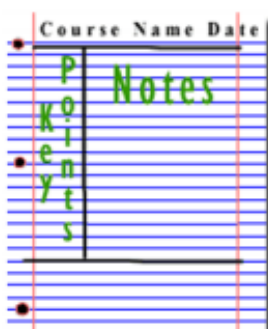
1. Divide your page into 3 sections like this



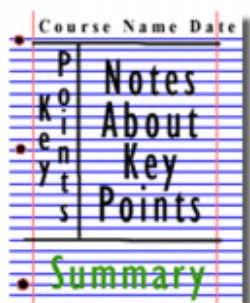
2. Write the name, date and topic at the top of the page



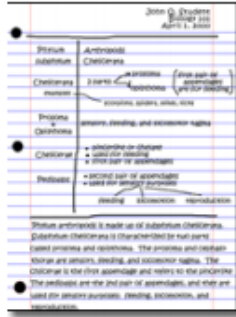
3. Use the large box to make notes. Leave a space between each separate idea. Abbreviate where possible



4. Review and identify the key points in the left hand box



5. Write a summary of the main ideas in the bottom box



Work through the videos and resources provided on the following website: <https://www.stem.org.uk/rx33sx>

Using the articles below, practice your 'Cornell Note Taking' technique as shown previously:

"Introduction of a prokaryotic cells": <https://www.stem.org.uk/sites/default/files/preview/elibrary-resources/2019/12/Introducing%20the%20prokaryotic%20cell.pdf.jpg>

"Basics of the cell" <https://www.stem.org.uk/sites/default/files/preview/elibrary-resources/2019/12/Basics%20of%20the%20cell.pdf.jpg>

There is a proforma on the next page

Title

Key Points

Notes

Summary

Title

Key Points

Notes

Summary

Section C: Working with waves

Use the following websites to revise waves

<https://www.bbc.co.uk/bitesize/guides/zs86v9q/revision/1>

<https://app.senecalearning.com/classroom/course/90ea9ab0-1012-11e8-ad8c-03a7ec7fa609/section/3441afa0-10c2-11e8-8c58-512fd9a80451/session>

Define the following terms as applied to waves

Key Term	Definition
Periodic Time	
Speed	
Wavelength	
Frequency	
Amplitude	
Oscillation	

Draw and label with key terms, a diagram of a wave:

Unit 1 Past Paper Exam Questions

Work through the questions, when you have finished use a different coloured pen and the mark scheme to mark your work

Q1. Manganese, Mn, is a metal.

It has a metallic structure.

KMnO_4 is a useful compound of manganese.

Calculate the relative formula mass for KMnO_4 .

(2)

relative formula mass =

(Total for question = 2 marks)

Q2. Figure 1 shows a molecule of the covalent compound tetrachloromethane.

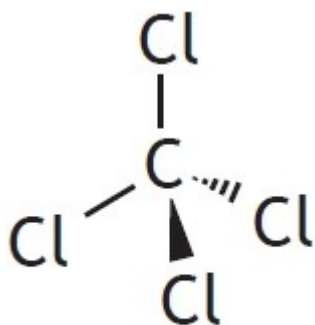


Figure 1

A sample of chlorine contains 80% chlorine-35 and 20% chlorine-37.

Calculate the relative atomic mass of this sample of chlorine.

Show your working.

(2)

relative atomic mass =

(Total for question = 2 marks)

Q3. Magnesium chloride, MgCl_2 , is an important industrial chemical. It can be made by reacting magnesium with dilute hydrochloric acid. Calculate the relative molecular mass for magnesium chloride. Show your working.

.....
(Total for question = 2 marks)

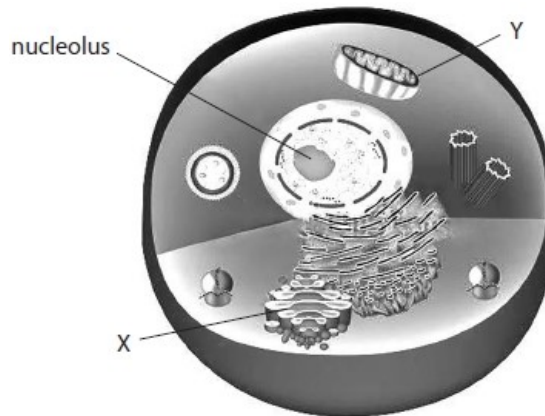
Q4. Magnesium sulfate is an ionic compound. Magnesium reacts with sulfuric acid to form magnesium sulfate and hydrogen. Complete the equation for this reaction.

(2)



(Total for question = 2 marks)

Q5. Figure 1 shows the ultra-structure of an animal cell.



© Timonina/Shutterstock

(i) Name organelle X in Figure 1.

(1)

.....

(ii) Identify organelle Y in Figure 1.

(1)

- A centriole
- B endoplasmic reticulum
- C mitochondrion
- D vesicle

(iii) Identify the function of the nucleolus.

(1)

- A forms spindle fibres during cell division
- B makes RNA and ribosomes
- C regulates cellular activity
- D synthesises and transports lipids and carbohydrates

(Total for question = 3 marks)

Q6. The human respiratory system contains ciliated epithelial cells. Ciliated epithelial cells are eukaryotic.

Which cell component is only found in eukaryotic cells?

(1)

- A capsule
- B cell membrane
- C nucleus
- D plasmid

(Total for question = 1 mark)

Q7.

Figure 1 shows the structure of a leaf.

The leaf is made of layers of cells.

One layer is the palisade mesophyll layer.

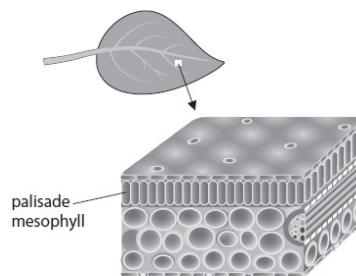


Figure 1

The palisade mesophyll layer is a tissue.

Sentence 1 gives an incomplete definition of a tissue.

A tissue is a group of similar, X cells that have a specific Y

Sentence 1

Figure 2 shows an electron micrograph of a cross section of a palisade mesophyll cell.

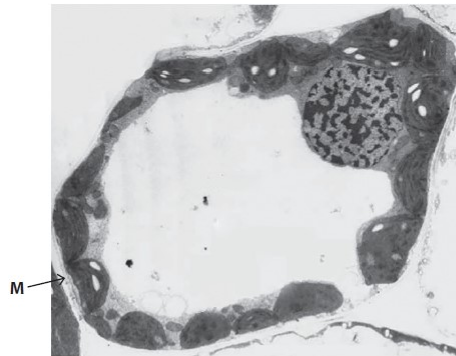


Figure 2

Identify the cell structure labelled M in Figure 2.

(1)

- A amyloplast
- B cell wall
- C plasmodesmata
- D tonoplast

(Total for question = 1 mark)

Q8. A slinky spring can be used to show different types of wave.

Figure 1a shows a longitudinal wave on a slinky spring.

The wave travels from P to Q.

Figure 1b shows a 120 mm ruler.

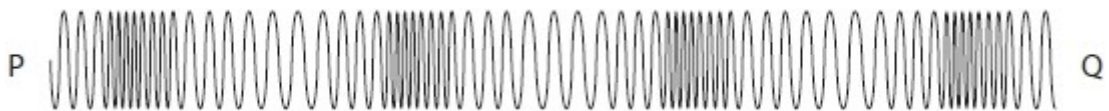


Figure 1a

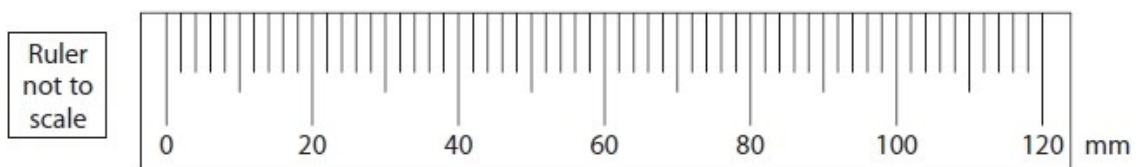


Figure 1b

Figure 2 shows a transverse wave travelling along a slinky spring.

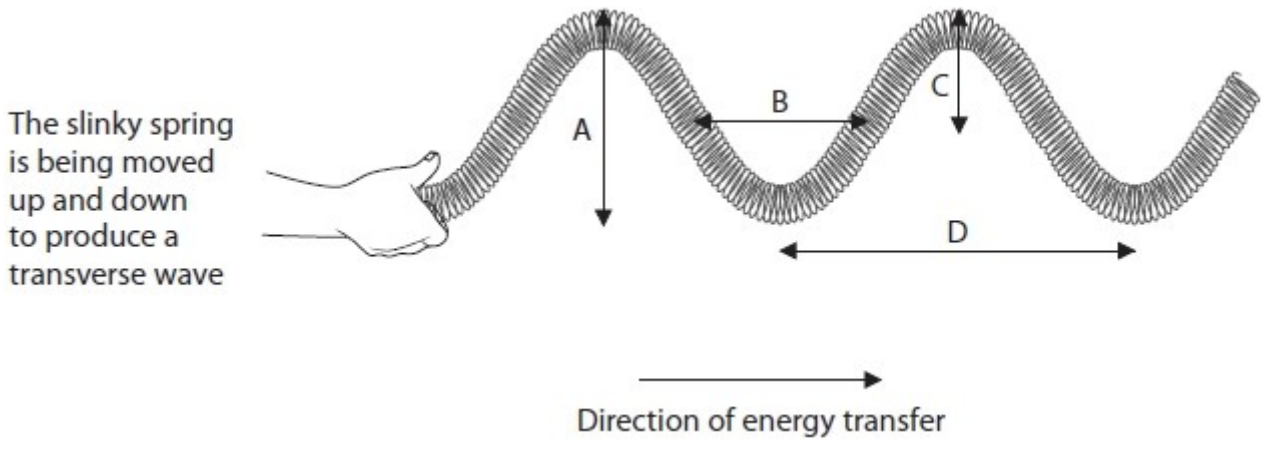


Figure 2

Which of the arrowed lines, A, B, C and D, shows the amplitude of the wave?

(1)

- A
- B
- C
- D

(Total for question = 1 mark)

Q9. Light from a sodium-vapour lamp passes through the slits in a diffraction grating and creates a pattern on a screen.

This pattern is called an emission spectrum.

For a clear diffraction pattern to be produced on the screen, the light passing through the diffraction grating has to have coherence.

Describe what is meant by coherence.

.....

.....

.....

.....

.....

.....

(Total for question = 2 marks)

Q10. Longitudinal and transverse are two types of wave.

(i) Give an example of a longitudinal wave.

(1)

.....

(ii) Describe how a longitudinal wave travels through air.

(2)

.....

.....

.....

.....

(Total for question = 3 marks)

Mark Scheme

Q1.

Question Number	Answer	Additional Guidance	Mark
	<u>Substitution (1)</u> $39.1 + 54.9 + (4 \times 16) =$ <u>Evaluation (1)</u> 158	158 with no working scores 2 marks allow working using 55 and 39 allow 76 with working (1)	2

Q2.

Question Number	Answer	Additional Guidance	Mark
	<u>substitution (1)</u> $(80 \times 35) + (20 \times 37)$ <u>percentage (1)</u> $\frac{(3540)}{100}$ allow other alternative methods	allow full marks for correct answer of 35.4 without working allow ecf Power of ten error scores 1 mark Note 35.5 or 35 with no working scores 0	2 (expert)

Q3.

Question Number	Answer	Additional guidance	Mark
	Substitution (1) $(\text{Mg}) 24.3 + \text{Cl} (35.5 \times 2)$ Evaluation (1) 95.3	95.3 alone gains both marks	2

Q4.

Question Number	Answer	Additional Guidance	Mark
	$\text{Mg} + \text{H}_2\text{SO}_4 \rightarrow \text{MgSO}_4 + \text{H}_2$ (2) Or Mg (1) H ₂ SO ₄ (1)	allow multiples allow SO ₄ H ₂ / S(HO ₂) ₂ reject H ₂ SO ₄ , H ² SO ₄ etc award 1 mark max if balanced incorrectly allow reactants in either order	2 (grad)

Q5.

Question Number	Answer	Additional Guidance	Mark
(i)	golgi (body/apparatus)	Allow phonetic spelling	1
(ii)	C - mitochondrion		1
(iii)	B - makes RNA and ribosomes		1

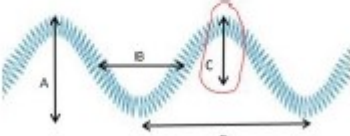
Q6.

Question Number	Answer	Additional Guidance	Mark
	C - nucleus		1

Q7.

Question Number	Answer	Additional Guidance	Mark
	B - cell wall		1

Q8.

Question Number	Answer	Additional guidance	Mark
	C 		1

Q9.

Question Number	Answer	Additional guidance	Mark
	must have the same wavelength/frequency (1) have a constant phase difference (1)		2

Q10.

Question Number	Answer	Additional guidance	Mark
(i)	sound/P waves	allow ultrasound/infrasound	1
(ii)	Any two from: - (they) move {backwards and forwards/oscillate/vibrate} (1) parallel to or in the same direction of {propagation/ energy transfer/wave travel} (1) (by a series of) either compressions or rarefactions (1)	accept a labelled diagram for all marks allow to and fro ignore up and down and left and right and side to side	2

Unit 2 Preparation

After we have completed studying for Unit 1, we will be completing Unit 2 which is course-work, based on practical investigations. You will be required to create reports about multiple investigations you have conducted. These reports will have to be presented in the correct scientific format. This is an extremely important skill if you are working in a scientific industry as it allows clear information about the work that has been carried out.

The following notes were handed to you by an intern. You will need to use this to work through the scenario and tasks that follow. There may be mistakes in this work or lack of detail, that you will need to correct.

Complete these tasks on separate lined paper or type them up as your report.

How potassium iodide affects the rate of reaction

Method

Measure 100ml of Hydrogen peroxide into a 250ml measuring cylinder. Once this is done measure out 25ml of the Potassium iodide. Put a few drops of washing up liquid into the measuring cylinder with the hydrogen peroxide. Pour the potassium iodide into the hydrogen peroxide and start the timer. Time to see how long it takes for the catalyst to produce enough bubbles to reach the top of the measuring cylinder. Stop the stopwatch when it reaches the top. Record your results. Repeat the experiment with each of the other concentrations of potassium iodide.

Results

Concentration	Time
1.0	123
2.0	91
3.0	67
4.0	34
5.0	31
6.0	10

Scenario

You are working for a major scientific industry. You have been given some results and a method by an intern who has just started at the company. Your job is to produce a report in the correct format to help teach the intern how they should present their work in the future.

Task 1

You have been given the method of an experiment that investigated the rates of reaction between 2 chemicals.

- Your task is to use this method to create an equipment list and design an appropriate table that could be used to record their results.
- Can you identify the 3 different types of variables in the experiment?
- Why is it important to be able to identify these variables?

Task 2

- Using the results you have been given, place them into the results table you have designed.
- Use these results to plot an appropriate graph with line of best fit. Ensure you have a correctly scaled X and Y axis with appropriate labels. (You can make this on excel)
- Do you notice any patterns in your results? If so what are they?

Task 3

Analyse the results of the experiment.

- Are there any anomalous results?
- Is the pattern as expected?
- Are there any errors in the method for the experiment?

Task 4

- How is this type of experiment useful in industry?
- Using your own research discuss the implications of this type of experiment on 2 different scientific industries.
- Why is this type of information valuable to them?

ANSWERS

Section A: Periodicity and properties of elements

Revise atomic structure and electron configuration at GCSE and complete the tasks below:

<https://www.bbc.co.uk/bitesize/guides/zscrw6f/revision/1>

Seneca (you may need to make your own account)

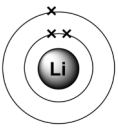
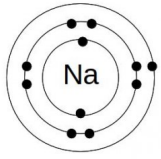
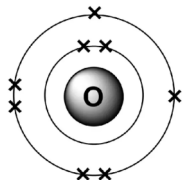
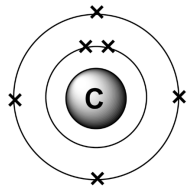
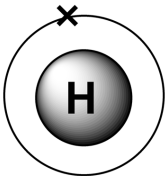
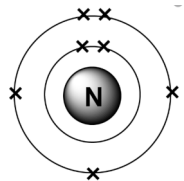
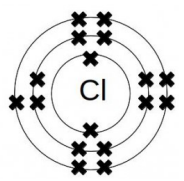
<https://app.senecalearning.com/classroom/course/1fd02c70-10e2-11e8-92d6-f7c3df19f7bc/section/6c01ecb0-1271-11e8-953c-337f253f0cdf/session>

Key Word	Definition
Atom	The smallest neutral part of an element that can take part in chemical reactions
Ion	An atom or molecule that has lost or gained electrons
Compound	Contains the atoms of two or more elements joined together
Mixture	Two or more substances mixed together but not joined to each other.
Molecule	Particle consisting of two or more atoms joined together by covalent bonding

Use these resources and your GCSE knowledge to find the definitions

	E C or M	Which of the following are elements E Compounds C or Mixtures M
O ₂	M	Put the corresponding letter next to your answer
Na	E	
CO ₂	C & M	
K	E	
H ₂	M	
H ₂ O	C & M	
CH ₄	C & M	
Cl ₂	M	

Use the periodic table to complete the following table. The first one has been completed for you

Element	Symbol	Mass no.	Atomic No.	No of electrons	No of protons	No of neutrons	Diagram
Lithium	Li	7	3	3	3	4	
Sodium	Na	23	11	11	11	12	
Oxygen	O	16	8	8	8	8	
Carbon	C	12	6	6	6	6	
Hydrogen	H	1	1	1	1	0	
Nitrogen	N	14	7	7	7	7	
Chlorine	Cl	35	17	17	17	18	

Features of the periodic table:

What patterns of reactivity are seen in group 1?

The **reactivity** of these metals increases going down the group. This pattern is seen with all reactions of group 1 elements. For example, the reaction of caesium with chlorine is more vigorous than the reaction of potassium with chlorine.

What patterns of reactivity are seen in group 7?

The halogens become less reactive as they go down the group

What are the key features of group 1 metals?

The group 1 elements are all soft, reactive metals with low melting points. They react with water to produce an alkaline metal hydroxide solution and hydrogen.

What are the key features of group 7 metals?

The group 7 elements are all reactive non-metals. They react with metals to form metal halides, and with hydrogen to form acidic hydrogen halides.

Section C: Working with waves

Use the following websites to revise waves

<https://www.bbc.co.uk/bitesize/guides/zs86v9q/revision/1>

<https://app.senecalearning.com/classroom/course/90ea9ab0-1012-11e8-ad8c-03a7ec7fa609/section/3441afa0-10c2-11e8-8c58-512fd9a80451/session>

Define the following terms as applied to waves

Key Term	Definition
Periodic Time	The time taken for one whole cycle of an oscillation. i.e. before the motion starts to repeat itself
Speed	The speed of a wave can be calculated using the equation: $\text{wave speed} = \text{frequency} \times \text{wavelength}$
Wavelength	The distance along the wave in its direction of travel (propagation) between consecutive points where the oscillations are in phase
Frequency	The number of whole cycles occurring in one second
Amplitude	The maximum value of displacement in the oscillation cycle– always measured from the mean (rest) position
Oscillation	A regularly repeating motion about a central value

Draw and label with key terms, a diagram of a wave:

