Transition Pack for Level 3 Applied Science

Get ready for Science!

A guide to help you get ready for Level 3 Applied Science, including everything from topic guides to days out and online learning courses.

Preparing to study Level 3 Applied Science

This pack contains activities and resources to prepare you to start Applied Science. 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 start your course in September.

For each of the following topics, you need to use the resources suggested to produce one page of notes. If you find topics you are still unsure about, please use other websites to aid your understanding. Some of the research questions are followed with questions to check your knowledge.

Topic 1: The Cell

Available at: http://bigpictureeducation.com/cell

The cell is the building block of life. Each of us starts from a single cell, a zygote, and grows into a complex organism made of trillions of cells. This explores what we know – and what we don't yet know – about the cells that are the basis of us all and how they reproduce, grow, move, communicate and die.

Topic 2: The Immune System

Available at: http://bigpictureeducation.com/immune

The immune system is what keeps us healthy in spite of the many organisms and substances that can do us harm. Explore how our bodies are designed to prevent potentially harmful objects from getting inside, and what happens when bacteria, viruses, fungi or other foreign organisms or substances breach these barriers.

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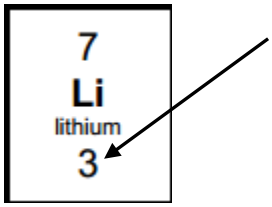
Topic 3: Electronic structure in atoms

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).



Atomic number =3, electrons = 3, arrangement 2 in the first shell and 1 in the second or Li = 2,1

You will learn that the electron structure is more complex than this, and can be used to explain a lot of the chemical properties of elements. 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

Make sure you make some notes.

Now that you are familiar with s, p and d orbitals try these problems, write your answer in the format: $1s^2$, $2s^2$, $2p^6$ etc.

Q1 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

Topic 4 - Chemical equations

Balancing chemical equations is the stepping stone to calculate masses in chemistry. There are loads of websites that give ways of balancing equations and lots of exercises in balancing.

http://bit.ly/pixlchem7

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

http://bit.ly/pixlchem8

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

Q1 Balance the following equations

a. $H_2 + 0_2 \rightarrow H_20$

b. $S_8 + 0_2 \rightarrow S0_3$

c. $HgO \rightarrow Hg + 0_2$

d. $Zn + HCl \rightarrow ZnCl_2 + H_2$

e. $Na + H_20 \rightarrow NaOH + H_2$

f. $C_{10}H_{16} + Cl_2 \rightarrow C + HCl$

g. $Fe + 0_2 \rightarrow Fe_20_3$

h. $C_6H_{12}0_6 + 0_2 \rightarrow C0_2 + H_20$

i. $Fe_20_3 + H_2 \rightarrow Fe + H_20$

j. $Al + FeO \rightarrow Al_2O_3 + Fe$

Topic 5 - Symbols and Prefixes

In Science we use a few symbols and prefixes to save us time writing lots of 0000. Some of these you will already be familiar with. Try and memorise the ones you do not know.

Prefix	Symbol	Power of ten
Nano	n	$\times 10^{-9}$
Micro	μ	$\times 10^{-6}$
Milli	m	$\times 10^{-3}$
Centi	c	$\times 10^{-2}$
Kilo	k	$\times 10^{3}$
Mega	M	$\times 10^{6}$
Giga	G	$\times 10^{9}$

Q1 Solve the following:

1. How many metres in 2.4 km?
2. How many joules in 8.1 MJ?
3. Convert 326 GW into W.
4. Convert 54 600 mm into m.
5. How many grams in 240 kg?
6. Convert 0.18 nm into m.
7. Convert 632 nm into m.
8. How many m in 11 km?

Topic 6 - Waves

At GCSE you have studied different types of waves and used the wave equation to calculate speed, frequency and wavelength. You will also have studied reflection and refraction.

Use the following links to review this topic **and make notes.**

http://www.bbc.co.uk/education/clips/zb7gkqt

https://www.khanacademy.org/science/physics/mechanical-waves-and-sound/mechanical-waves/v/introduction-to-waves

Topic 7 – Refraction

1) Draw a diagram showing the refraction of a wave through a rectangular glass block. Explain why the ray of light takes this path.

2) Describe the difference between a longitudinal and transverse waves and give an example of each

3) Draw a wave and label the wavelength and amplitude