

Btec Level 3 Principles and Application of Science Transition Pack



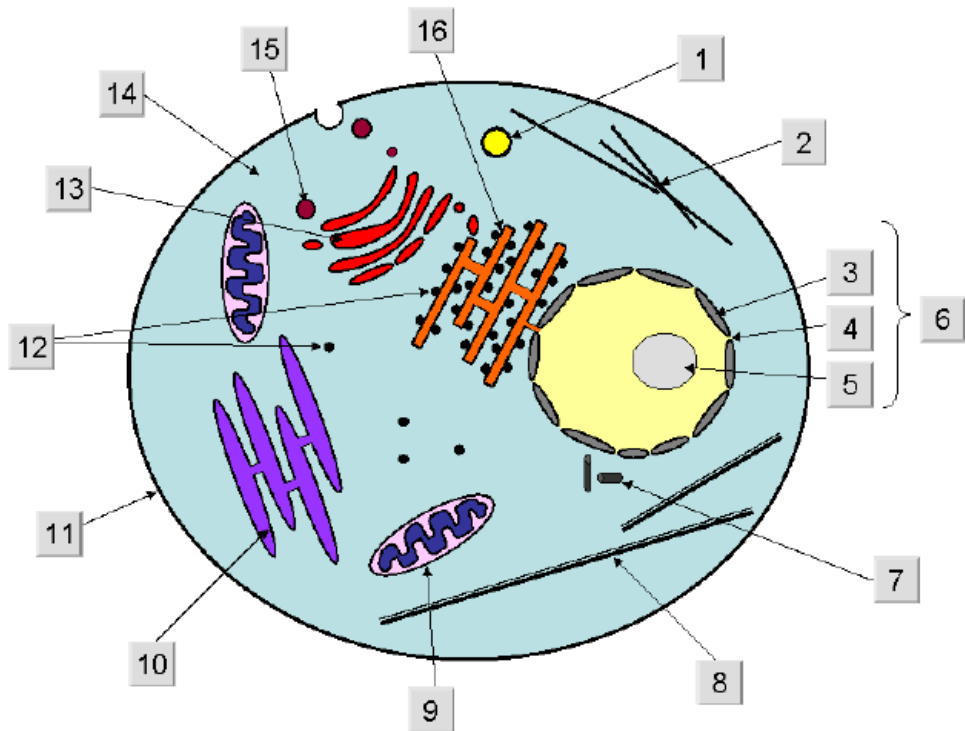
enjoylearnsucceed



Structure and function of cells and tissues

B1: Cell structure and function

Animal cell structure and function



1. _____

2. _____

3. _____

4. _____

5. _____

6. _____

7. _____

8. _____

9. _____

10. _____

11. _____

12. _____

13. _____

14. _____

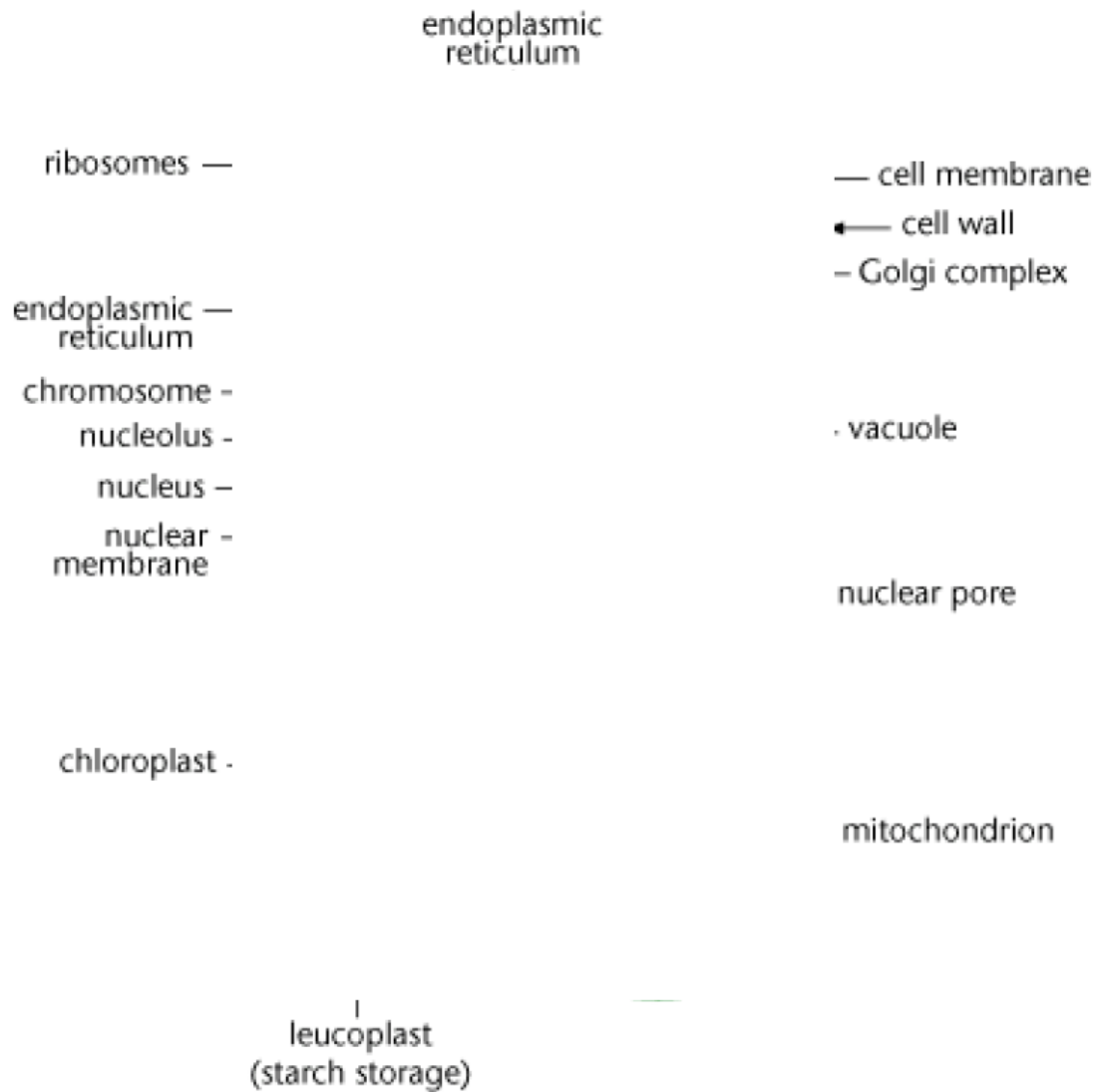
15. _____

16. _____

Animal Cell Structure	Function
Plasma membrane	
Cytoplasm	
Nucleus	
Nucleolus	
Rough endoplasmic reticulum (ER)	
Smooth endoplasmic reticulum (ER)	
Golgi apparatus	
Vesicles	
Lysosomes	
Ribosomes	
Mitochondria	
Centrioles	

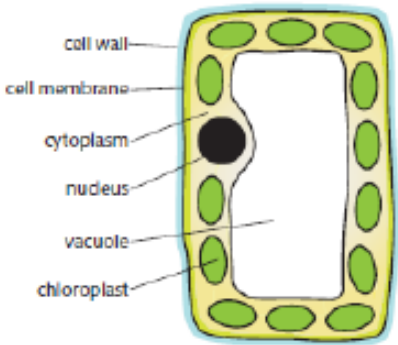
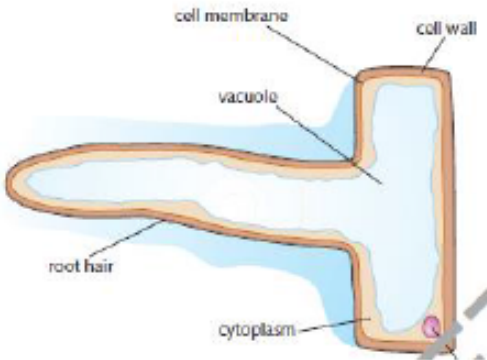
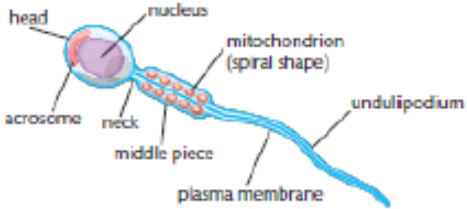
Plant cell structure and function

Draw a diagram of a plant cell and extend the labels to the correct feature.

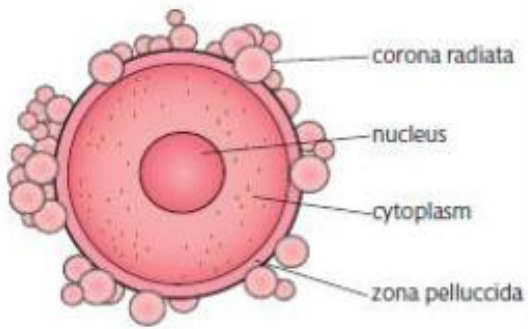


Plant Cell Structure	Function
Cell wall	
Chloroplast	
Vacuole	
Tonoplast	
Amyloplast	
Plasmodesmata	
Pits	

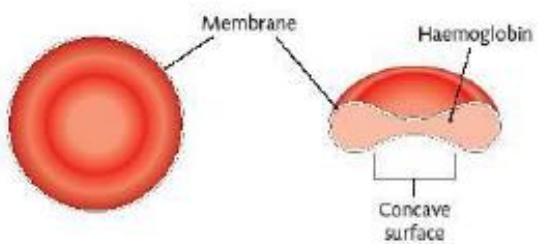
B2: Cell specialisation

Cell	Function	Specialisation
<p>Palisade mesophyll cells</p> 		
<p>Root hair cell</p> 		
<p>Sperm cell</p> 		

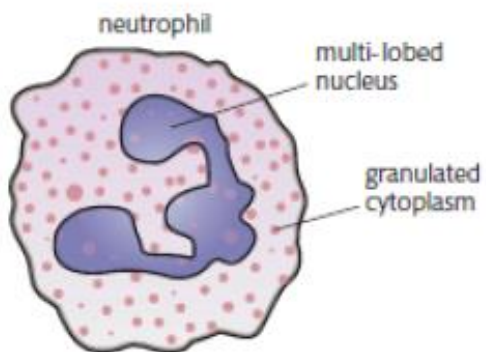
Egg cell



Red blood cell



White blood cell



B3: Tissue structure and function

A collection of differentiated cells that perform a specific function is called a tissue.

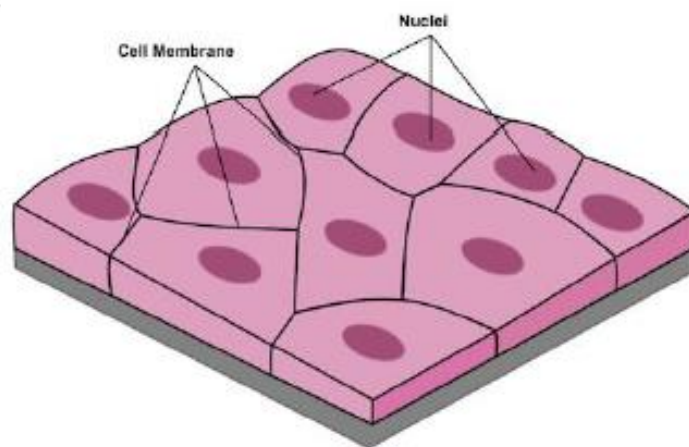
There are four main tissue types in animals:

- 1) epithelium
- 2) muscle
- 3) connective
- 4) nervous

1) Epithelium: Epithelial tissues are found lining organs and surfaces. Epithelial tissues can be divided into different types:

- squamous epithelial tissue
- columnar epithelial tissue
- endothelium tissue

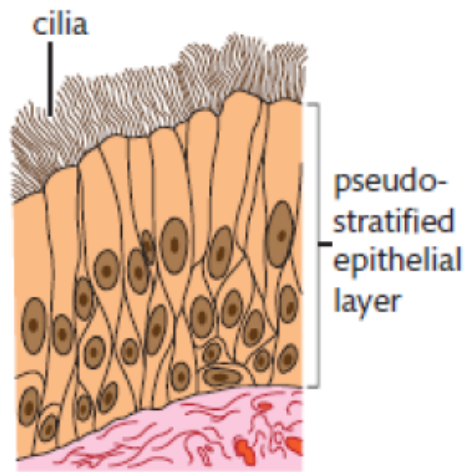
Squamous epithelial tissue



Location and function:

Damage caused by smoking:

Columnar epithelial tissue



Location and function:

How the lungs are protected:

Periodicity and properties of elements

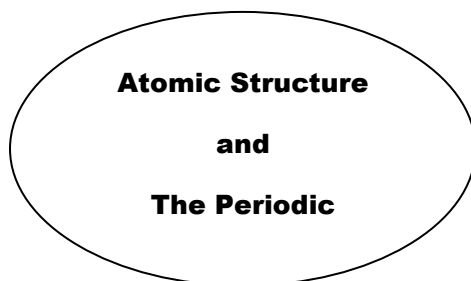
The Periodic Table of the Elements

1																	2	
H Hydrogen 1.00794																	He Helium 4.003	
3	4															9	10	
Li Lithium 6.941	Be Beryllium 9.012182															F Fluorine 18.9984032	Ne Neon 20.1797	
11	12															17	18	
Na Sodium 22.989770	Mg Magnesium 24.3050															Cl Chlorine 35.4527	Ar Argon 39.948	
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	
K Potassium 39.0983	Ca Calcium 40.078	Sc Scandium 44.955910	Ti Titanium 47.867	V Vanadium 50.9415	Cr Chromium 51.9961	Mn Manganese 54.938049	Fe Iron 55.845	Co Cobalt 58.933200	Ni Nickel 58.6934	Cu Copper 63.546	Zn Zinc 65.39	Ga Gallium 69.723	Ge Germanium 72.61	As Arsenic 74.92160	Se Selenium 78.96	Br Bromine 79.904	Kr Krypton 83.80	
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	
Rb Rubidium 85.4678	Sr Strontium 87.62	Y Yttrium 88.90585	Zr Zirconium 91.224	Nb Niobium 92.90638	Mo Molybdenum 95.94	Tc Technetium (98)	Ru Ruthenium 101.07	Rh Rhodium 102.90550	Pd Palladium 106.42	Ag Silver 107.8682	Cd Cadmium 112.411	In Indium 114.818	Sn Tin 118.710	Sb Antimony 121.760	Te Tellurium 127.60	I Iodine 126.90447	Xe Xenon 131.29	
55	56	57	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	
Cs Cesium 132.90545	Ba Barium 137.327	La Lanthanum 138.9055	Hf Hafnium 178.49	Ta Tantalum 180.9479	W Tungsten 183.84	Re Rhenium 186.207	Os Osmium 190.23	Ir Iridium 192.217	Pt Platinum 195.078	Au Gold 196.96655	Hg Mercury 200.59	Tl Thallium 204.3833	Pb Lead 207.2	Bi Bismuth 208.98038	Po Polonium (209)	At Astatine (210)	Rn Radon (222)	
87	88	89	104	105	106	107	108	109	110	111	112	113	114					
Fr Francium (223)	Ra Radium (226)	Ac Actinium (227)	Rf Rutherfordium (261)	Db Dubnium (262)	Sg Seaborgium (263)	Bh Bohrium (262)	Hs Hassium (265)	Mt Meitnerium (266)	(269)		(272)		(277)					
58	59	60	61	62	63	64	65	66	67	68	69	70	71					
Ce Cerium 140.116	Pr Praseodymium 140.90765	Nd Neodymium 144.24	Pm Promethium (145)	Sm Samarium 150.36	Eu Europium 151.964	Gd Gadolinium 157.25	Tb Terbium 158.92534	Dy Dysprosium 162.50	Ho Holmium 164.93032	Er Erbium 167.26	Tm Thulium 168.93421	Yb Ytterbium 173.04	Lu Lutetium 174.967					
90	91	92	93	94	95	96	97	98	99	100	101	102	103					
Th Thorium 232.0381	Pa Protactinium 231.03588	U Uranium 238.0289	Np Neptunium (237)	Pu Plutonium (244)	Am Americium (243)	Cm Curium (247)	Bk Berkelium (247)	Cf Californium (251)	Es Einsteinium (252)	Fm Fermium (257)	Md Mendelevium (258)	No Nobelium (259)	Lr Lawrencium (262)					

The Periodic Table

Activity 1 – What do you know already?

Complete the spider diagram below to show what you know about either Atomic Structure or the periodic table already from GCSE.



Activity 2

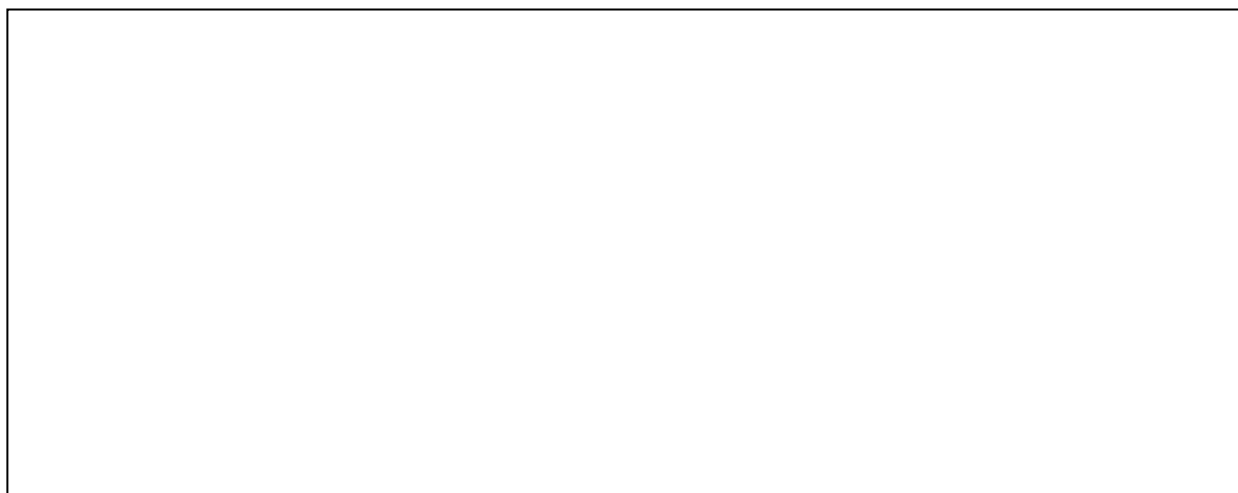
We will now focus on understanding atomic structure

- i) Write down definitions for the following three important terms
- Atomic**
number _____

Mass Number

Relative Atomic Mass

- ii) Using what you should already know about the atom draw and label an atom in the space below that contains 2 protons, 2 neutrons and 2 electrons



- iii) write a paragraph below that summaries the structure of an atom.

-
-
- iv) Pick any element off the periodic table and copy the information you can see into the box below ***exactly as you see it!*** Clearly label all the information so you know what it all means.

--

- v) Use this information to work out the number of protons, neutrons and electrons in one atom of your chosen element. *HINT* you will need to round the atomic mass to the nearest whole number!

Protons	
Neutrons	
Electrons	

Activity 3 – Protons, Neutrons and Electrons

You should now understand how to work out the number of protons, neutrons and electrons in one atom of any element. Use this knowledge to complete the table below

Element	Symbol	Protons	Neutrons	Electrons
Carbon				
	Mg			
		78		
	I			
Copper				

Equation writing

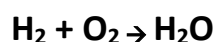
Writing and balancing chemical equations is a fundamental skill for all scientists. Equations show a chemist what will form during a chemical reaction.

Equations then need to be balanced in order to remain true with the basic law that atoms cannot be created or destroyed in a reaction, they are only rearranged.

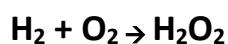
Let's attempt to balance an equation

Water is formed from the reaction of hydrogen and oxygen in the following equation:

-



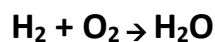
Without balancing this equation it appears that one oxygen atom has been lost! This cannot happen. We must always end up with the same number of atoms after a reaction. So can we just write this: -



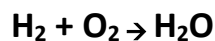
NOOOOOOOO!!!!!! You can't do this. The equation now balances but you no longer have water, you have made hydrogen peroxide!

When balancing equations it is essential that you **do not change the chemical formulae** of any reactant or product in the equation.

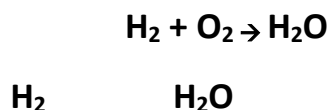
Let's try this again...



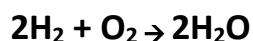
We know we need more oxygen on the product side. In order to do this I need to add another whole water molecule. This is what contains the extra oxygen



Now I have in total 4 oxygen atoms on each side and they therefore balance. But by adding in another water, I have unbalanced the hydrogen atoms. There are 2 hydrogen atoms on the left hand side and now 4 on the right. This needs to be sorted! I can't change the H_2 to H_4 so I must add another H_2 to the left hand side.

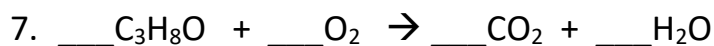
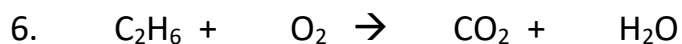
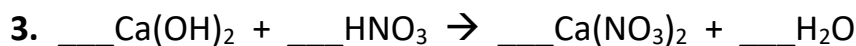
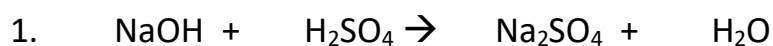


Finally to complete the balanced equation, I have to count how many of each molecule we have and write that number **in front** of the molecule (If there is only one, you don't need to write '1' you just leave it).



It's as easy as that!!

Try and balance the following equations. They get progressively more difficult so don't panic if you can't do some of them.



Waves in communication

Below are ten topics that are essential foundations for you study of A-Level Physics. Each topics has example questions and links where you can find our more information as you prepare for next year.

Symbols and Prefixes

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	$\times 10^9$

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.
Express in standard form.

8. Convert 1002 mV into V.
Express in standard form.

9. How many eV in 0.511 MeV?
Express in standard form.

10. How many m in 11 km?

Standard Form

At A level quantity will be written in standard form, and it is expected that your answers will be too.

This means answers should be written as $\dots \times 10^y$. E.g. for an answer of 1200kg we would write $1.2 \times 10^3\text{kg}$. For more information visit:

www.bbc.co.uk/education/guides/zc2hsbk/revision

1. Write 2530 in standard form.
2. Write 280 in standard form.
3. Write 0.77 in standard form.
4. Write 0.0091 in standard form.
5. Write 1 872 000 in standard form.
6. Write 12.2 in standard form.
7. Write 2.4×10^2 as a normal number.
8. Write 3.505×10^1 as a normal number.
9. Write 8.31×10^6 as a normal number.

10. Write 6.002×10^2 as a normal number.

Waves

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.

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

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

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

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

