

Applied Science Bridging Course

Name: _____

Which course did you do at GCSE? Combined F Combined H Triple

Congratulations on choosing to study Applied Science in our Sixth Form. We hope that you really enjoy the subject and your time in our lessons.

To give you an idea of the main topics that you will be studying at the start of your course we would like you to prepare the following material to show that you are prepared to do some work before joining us in September. This work will form part of your Applied Science notes. You will need to research the topics using websites, textbooks and revision guides. If you get stuck then email us at stthomas@stjosephs.uk.net for Biology or twillis@stjosephs.uk.net for Chemistry & Physics.

Please complete your work in this booklet and bring to your first Applied Science lesson in September.

We look forward to meeting and working with you.

Mr S B Thomas Head of Science

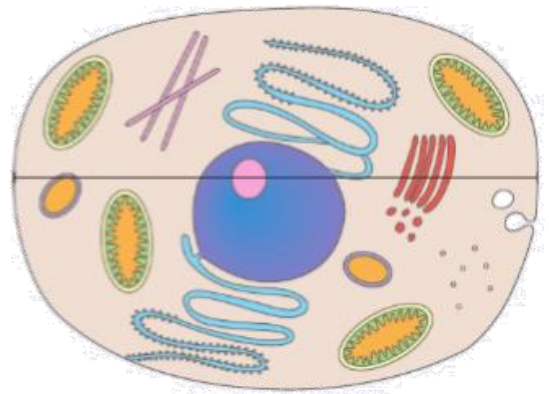
Mr T M Willis Head of Biology

Unit 1 Biology

1. Draw a large, labelled diagram of an animal cell as seen under an electron microscope. **Do not print out a copy from the internet – you need to hand draw it.** Your diagram should have the following labels on it:
 - a. Nucleus
 - b. Mitochondria
 - c. Smooth endoplasmic reticulum
 - d. Rough endoplasmic reticulum
 - e. Lysosome
 - f. Golgi body/apparatus
 - g. Ribosomes
 - h. Cell surface membrane
2. Make a table explaining the **function** of each of the above structures.
3. Show all your working out for the following question:

Work out the magnification for the diagram.
 The actual size of the cell shown in the image is 200 μm .

- 1 Use your ruler to measure the size of the cell shown in the image in mm.
- 2 The actual size of the cell is 200 μm . You need to convert this to mm so they are both in the same units.
- 3 Put both figures into the magnification equation and work out the magnification.



4. Copy & complete the table below to compare prokaryotic & eukaryotic cells:

Prokaryotic	Eukaryotic
1
2
3

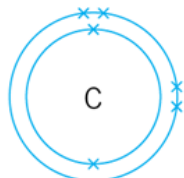
5. Draw labelled diagrams of the following cells & describe & explain how they are adapted for their functions:
 - a. Palisade mesophyll cell
 - b. Root hair cell
 - c. Sperm cell
 - d. Egg cell
 - e. Red blood cell
 - f. White blood cell
6. Describe each of these types of tissue: epithelial, endothelial, muscular & nervous.

Unit 1 Biology – space for answers

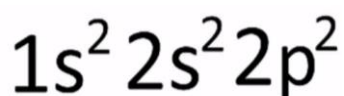
Unit 1 Chemistry

A copy of the periodic table is found on the last page of the booklet to help you.

1. Draw the electron structures of the first 20 elements in the periodic table using Bohr Theory.
For example here is carbon:



2. Research how to write the electron structures of the first 20 elements to show the subshells.
For example here is carbon:



3. Create a table like the one below to describe different types of bonding:

	<u>Found</u>	<u>Bonding</u>	<u>Properties</u>	<u>Examples</u>
<u>Ionic</u>				
<u>Simple Molecular (covalent)</u>				
<u>Giant Covalent</u>				
<u>Metallic</u>				

4. Draw dot & cross diagrams for the molecules: sodium chloride & carbon dioxide.
5. Write balanced symbol equations for the reactions of these elements with oxygen: magnesium, carbon, aluminium & sodium.
6. Plot a graph to show the melting points of the first 20 elements:

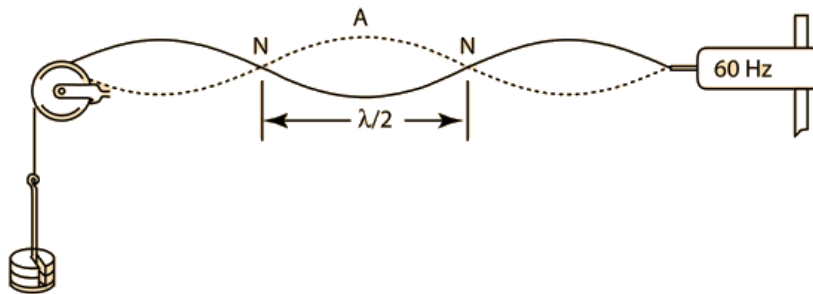
<u>Element</u>	<u>Melting Point (°K)</u>	<u>Element</u>	<u>Melting Point (°K)</u>
Hydrogen	14	Sodium	371
Helium	1	Magnesium	922
Lithium	454	Aluminium	933
Beryllium	1551	Silicon	1683
Boron	2573	Phosphorus	317
Carbon	3823	Sulphur	386
Nitrogen	64	Chlorine	173
Oxygen	55	Argon	84
Fluorine	54	Potassium	336
Neon	25	Calcium	1112

Unit 1 Chemistry – space for answers

Unit 1 Physics

A copy of the physics equations is found below to help you.

1. Draw a transverse & a longitudinal wave.
Label the key features of each wave & describe them.
2. Using the correct equation, show all working out to calculate:
 - a. Wavespeed when the frequency is 50Hz & wavelength is 1.5m.
 - b. Frequency when wavespeed is 306ms^{-1} & wavelength is 18m.
 - c. Wavelength when wavespeed is 14.76ms^{-1} & frequency is 3.6Hz.
3. Describe & explain how to create a standing wave:



4. Draw labelled light ray diagrams with a pencil & ruler to show the following:
 - a. Reflection in a mirror.
 - b. Refraction as light passes through a rectangular glass block.
 - c. Total internal reflection in a fibre optic cable.
5. Research how an endoscope works & why this is useful in medicine.
6. Draw a labelled diagram of the electromagnetic spectrum & describe uses for each part of the spectrum.

Formulae sheet

Wave speed

$$v = f\lambda$$

Speed of a transverse wave on a string

$$v = \sqrt{\frac{T}{\mu}}$$

Refractive index

$$n = \frac{c}{v} = \frac{\sin i}{\sin r}$$

Critical angle

$$\sin C = \frac{1}{n}$$

Inverse square law in relation to the intensity of a wave $I = \frac{k}{r^2}$

Unit 1 Physics – space for answers

The Periodic Table of Elements

1	2											3	4	5	6	7	0 (8)	
																		(18)
																		4.0
																		He helium 2
(1)	(2)											(13)	(14)	(15)	(16)	(17)		
6.9 Li lithium 3	9.0 Be beryllium 4											10.8 B boron 5	12.0 C carbon 6	14.0 N nitrogen 7	16.0 O oxygen 8	19.0 F fluorine 9	20.2 Ne neon 10	
23.0 Na sodium 11	24.3 Mg magnesium 12											27.0 Al aluminium 13	28.1 Si silicon 14	31.0 P phosphorus 15	32.1 S sulfur 16	35.5 Cl chlorine 17	39.9 Ar argon 18	
		(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)							
39.1 K potassium 19	40.1 Ca calcium 20	45.0 Sc scandium 21	47.9 Ti titanium 22	50.9 V vanadium 23	52.0 Cr chromium 24	54.9 Mn manganese 25	55.8 Fe iron 26	58.9 Co cobalt 27	58.7 Ni nickel 28	63.5 Cu copper 29	65.4 Zn zinc 30	69.7 Ga gallium 31	72.6 Ge germanium 32	74.9 As arsenic 33	79.0 Se selenium 34	79.9 Br bromine 35	83.8 Kr krypton 36	
85.5 Rb rubidium 37	87.6 Sr strontium 38	88.9 Y yttrium 39	91.2 Zr zirconium 40	92.9 Nb niobium 41	95.9 Mo molybdenum 42	[98] Tc technetium 43	101.1 Ru ruthenium 44	102.9 Rh rhodium 45	106.4 Pd palladium 46	107.9 Ag silver 47	112.4 Cd cadmium 48	114.8 In indium 49	118.7 Sn tin 50	121.8 Sb antimony 51	127.6 Te tellurium 52	126.9 I iodine 53	131.3 Xe xenon 54	
132.9 Cs caesium 55	137.3 Ba barium 56	138.9 La* lanthanum 57	178.5 Hf hafnium 72	180.9 Ta tantalum 73	183.8 W tungsten 74	186.2 Re rhenium 75	190.2 Os osmium 76	192.2 Ir iridium 77	195.1 Pt platinum 78	197.0 Au gold 79	200.6 Hg mercury 80	204.4 Tl thallium 81	207.2 Pb lead 82	209.0 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86	
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[261] Rf rutherfordium 104	[262] Db dubnium 105	[266] Sg seaborgium 106	[264] Bh bohrium 107	[277] Hs hassium 108	[268] Mt meitnerium 109	[271] Ds darmstadtium 110	[272] Rg roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated							

* Lanthanide series

* Actinide series

140 Ce cerium 58	141 Pr praseodymium 59	144 Nd neodymium 60	[147] Pm promethium 61	150 Sm samarium 62	152 Eu europium 63	157 Gd gadolinium 64	159 Tb terbium 65	163 Dy dysprosium 66	165 Ho holmium 67	167 Er erbium 68	169 Tm thulium 69	173 Yb ytterbium 70	175 Lu lutetium 71
232 Th thorium 90	[231] Pa protactinium 91	238 U uranium 92	[237] Np neptunium 93	[242] Pu plutonium 94	[243] Am americium 95	[247] Cm curium 96	[245] Bk berkelium 97	[251] Cf californium 98	[254] Es einsteinium 99	[253] Fm fermium 100	[256] Md mendelevium 101	[254] No nobelium 102	[257] Lr lawrencium 103