Appendix 2:   How Science Works mapping

How Science Works reference *(see page 10)*	Unit B3 specification reference
1	1.28, 2.8, 2.12, 2.14, 2.16, 3.4, 3.9, 3.11, 3.12
2	1.18, 1.19, 1.20, 1.23, 1.27, 1.30, 2.4, 2.6, 2.12, 2.14, 2.16, 2.17, 2.18
3	1.8, 1.13, 1.18, 1.19, 2.16, 2.17
4	2.16, 2.18
5	1.28, 2.8, 3.4, 3.9, 3.11, 3.12
6	1.28, 2.8, 2.16, 3.4, 3.9, 3.11, 3.12
7	1.28, 2.8, 3.4, 3.9, 3.11, 3.12
8	1.28, 2.8, 2.16, 3.4, 3.9, 3.11, 3.12
9	Throughout the unit
10	1.23, 1.26, 1.28, 2.8, 3.4, 3.9, 3.11, 3.12
11	1.18, 1.19, 1.23, 1.26, 1.28, 2.8, 2.16, 3.4, 3.9, 3.11, 3.12
12	1.4, 1.16, 1.22, 1.25, 1.29, 2.16, 3.5, 3.7, 3.10, 3.11, 3.12, 3.15, 3.16, 3.17, 3.18, 3.19
13	1.4, 1.16, 1.22, 2.16, 3.16, 3.17
14	1.20, 1.27, 2.12, 2.14, 2.15, 2.16

How Science Works reference *(see page 10)*	Unit C3 specification reference
1	1.3, 1.4, 2.6, 2.14, 3.8, 3.12, 5.2, 5.9
2	1.4, 2.6, 2.7, 2.14, 3.8, 3.12, 4.1, 5.9
3	2.4, 2.7, 3.2, 3.11, 4.7, 4.8, 4.9, 4.10, 5.10, 5.14, 5.17, 5.19
4	5.4
5	1.4, 2.6, 2.10, 2.11, 2.13, 2.14, 3.8, 3.12, 5.2
6	1.4, 2.1, 2.6, 2.14, 3.8, 3.12
7	0.5, 0.6, 1.4, 2.6, 2.14, 3.8, 3.12
8	1.4, 2.6, 2.14, 3.8, 3.12, 4.2, 5.2
9	Throughout the unit
10	0.2, 0.3, 0.4, 1.4, 2.1, 2.6, 2.7, 2.8, 2.9, 2.14, 2.15, 3.5, 3.8, 3.12, 4.1, 4.2, 4.3, 5.2
11	0.1, 0.2, 0.3, 0.4, 1.4, 2.1, 2.6, 2.7, 2.8, 2.9, 2.14, 2.15, 3.3, 3.4, 3.5, 3.8, 3.12, 4.1, 4.2, 4.3, 5.2, 5.10, 5.14, 5.17
12	1.5, 2.3, 2.5, 3.6, 3.7, 3.13, 3.14, 4.4, 4.5, 4.10, 5.4, 5.6, 5.7, 5.12, 5.15, 5.16, 5.18, 5.20
13	1.5, 4.5, 4.10, 5.4, 5.7, 5.16
14	2.7, 4.1, 4.5, 5.4, 5.10

How Science Works reference (see page 10)	Unit P3 specification reference
1	1.8, 1.17, 1.18, 3.10, 3.12, 3.13, 4.12, 5.7, 5.9
2	1.8, 3.10, 3.12, 3.13, 4.1, 5.7, 5.9
3	1.8, 1.13, 1.14, 1.15, 3.2, 3.5, 3.6, 3.10, 3.12, 3.13, 3.14, 3.15, 3.16
4	4.1
5	1.8, 1.17, 1.18, 4.12, 5.7, 5.9
6	1.8, 1.17, 1.18, 4.12, 5.7, 5.9
7	1.8, 1.18, 4.12, 5.7, 5.9
8	1.8, 1.18, 4.12, 5.7, 5.9
9	Throughout the unit
10	1.4, 1.7, 1.8, 1.9, 1.18, 2.4, 2.5, 2.11, 3.7, 3.8, 4.12, 5.5, 5.7, 5.8, 5.9, 5.10, 5.11, 5.12
11	1.8, 1.9, 1.13, 1.14, 1.15, 1.18, 2.4, 2.5, 2.11, 3.8, 5.5, 5.7, 5.8, 5.9, 5.10, 5.11, 5.12
12	1.14, 1.18, 1.19, 1.20, 2.9, 2.10, 2.12, 2.14, 3.1, 3.20, 3.21, 3.22, 3.23, 3.24, 4.6, 4.8, 5.12
13	1.14, 1.18, 1.20, 2.8, 2.12, 3.1, 3.21, 3.22, 3.24, 4.6, 4.8
14	3.21, 3.22, 3.23, 3.24, 4.1, 4.2

Appendix 3: Mathematical skills mapping

Mathematical skills reference *(see page 11)*	Unit specification reference		
	B3	**C3**	**P3**
1		2.1, 2.6, 2.14, 2.15, 3.12, 4.1, 4.2, 4.3	1.4, 1.7, 1.8, 1.9, 2.15, 2.4, 2.5, 3.14, 3.4, 5.5, 5.7, 5.8, 5.9, 5.10, 5.11
2		2.1, 2.6, 2.8, 2.9, 2.15, 3.12	1.4, 1.7, 1.8, 1.9, 2.15, 2.4, 2.5, 3.14, 3.4, 5.5, 5.7, 5.8, 5.9, 5.10, 5.11
3	1.28, 2.8, 3.4, 3.9, 3.11, 3.12	2.1, 2.8, 2.9, 2.14, 2.15, 4.2, 4.3	1.4, 1.7, 1.8, 1.9, 2.15, 2.4, 2.5, 3.14, 3.4, 3.8, 5.5, 5.7, 5.8, 5.9, 5.10, 5.11
4		2.1, 2.8, 2.9, 2.14, 2.15	1.4, 1.7, 1.8, 1.9, 2.15, 2.4, 2.5, 2.11, 3.14, 3.4, 5.5, 5.7, 5.8, 5.9, 5.10, 5.11
5			1.4, 1.7, 1.8, 1.9, 2.15, 2.4, 2.5, 3.14, 3.4, 5.5, 5.7, 5.8, 5.9, 5.10, 5.11
6	3.3	0.2, 0.3, 0.4, 3.5	1.4, 1.7, 1.8, 1.9, 2.15, 2.4, 2.5, 3.14, 3.4, 5.5, 5.7, 5.8, 5.9, 5.10, 5.11
7	1.28, 2.8, 3.4, 3.9, 3.11, 3.12	2.14, 2.15	
8	1.28, 2.8, 3.4, 3.9, 3.11, 3.12	2.1, 2.7, 2.14, 2.15, 3.12	1.4, 1.7, 1.8, 1.9, 2.15, 2.4, 2.5, 3.14, 3.4, 5.5, 5.7, 5.8, 5.9, 5.10, 5.11
9	1.26, 1.28, 2.8, 2.18, 3.4, 3.9, 3.11, 3.12	3.12	1.4, 1.7, 1.8, 1.9, 1.17, 2.15, 2.4, 2.5, 2.7, 3.14, 3.4, 5.5, 5.7, 5.8, 5.9, 5.10, 5.11
10		2.1, 2.8, 2.9, 2.15, 3.12, 4.2, 4.3	1.4, 1.7, 1.8, 1.9, 2.4, 2.5, 2.15, 3.14, 3.4, 5.5, 5.7, 5.8, 5.9, 5.10, 5.11

Mathematical skills reference *(see page 11)*	Unit specification reference		
	B3	C3	P3
11	1.26, 1.28, 2.8, 2.18, 3.3, 3.4, 3.9, 3.11, 3.12	3.12	1.4, 1.7, 1.8, 1.9, 1.17, 2.4, 2.5, 2.15, 3.14, 3.4, 5.5, 5.7, 5.8, 5.9, 5.10, 5.11
12	1.10, 1.12, 1.23, 1.26, 1.28, 1.29, 1.30, 1.31, 1.32, 1.33, 2.8, 2.18, 3.3, 3.4, 3.9, 3.11, 3.12	3.12	1.4, 1.7, 1.8, 1.9, 1.17, 2.4, 2.5, 2.15, 3.14, 3.4, 5.5, 5.7, 5.8, 5.9, 5.10, 5.11
13			
14			1.4, 1.7, 1.8, 1.9, 2.4, 2.5, 2.15, 3.14, 3.4,
15	3.4		1.4,1.7, 1.8, 1.9, 2.4, 2.5, 2.15, 3.14, 3.4, 5.5, 5.7, 5.8, 5.9, 5.10, 5.11
16			5.10, 5.11
17		2.1, 2.8, 2.9, 2.15, 3.12, 4.2, 4.3	1.4, 1.7, 1.8, 1.9, 2.4, 2.5, 2.15, 3.4, 3.14, 5.5, 5.7, 5.8, 5.9, 5.10, 5.11
18			1.4, 1.7, 1.8, 1.9, 2.4, 2.5, 2.15, 3.4, 3.14,5.5, 5.7, 5.8, 5.9, 5.10, 5.11
19			

Appendix 4:   The periodic table of the elements

1	2												3	4	5	6	7	0
																		4 **He** helium 2
7 **Li** lithium 3	9 **Be** beryllium 4												11 **B** boron 5	12 **C** carbon 6	14 **N** nitrogen 7	16 **O** oxygen 8	19 **F** fluorine 9	20 **Ne** neon 10
23 **Na** sodium 11	24 **Mg** magnesium 12												27 **Al** aluminium 13	28 **Si** silicon 14	31 **P** phosphorus 15	32 **S** sulfur 16	35.5 **Cl** chlorine 17	40 **Ar** argon 18
39 **K** potassium 19	40 **Ca** calcium 20	45 **Sc** scandium 21	48 **Ti** titanium 22	51 **V** vanadium 23	52 **Cr** chromium 24	55 **Mn** manganese 25	56 **Fe** iron 26	59 **Co** cobalt 27	59 **Ni** nickel 28	63.5 **Cu** copper 29	65 **Zn** zinc 30		70 **Ga** gallium 31	73 **Ge** germanium 32	75 **As** arsenic 33	79 **Se** selenium 34	80 **Br** bromine 35	84 **Kr** krypton 36
85 **Rb** rubidium 37	88 **Sr** strontium 38	89 **Y** yttrium 39	91 **Zr** zirconium 40	93 **Nb** niobium 41	96 **Mo** molybdenum 42	[98] **Tc** technetium 43	101 **Ru** ruthenium 44	103 **Rh** rhodium 45	106 **Pd** palladium 46	108 **Ag** silver 47	112 **Cd** cadmium 48		115 **In** indium 49	119 **Sn** tin 50	122 **Sb** antimony 51	128 **Te** tellurium 52	127 **I** iodine 53	131 **Xe** xenon 54
133 **Cs** caesium 55	137 **Ba** barium 56	139 **La*** lanthanum 57	178 **Hf** hafnium 72	181 **Ta** tantalum 73	184 **W** tungsten 74	186 **Re** rhenium 75	190 **Os** osmium 76	192 **Ir** iridium 77	195 **Pt** platinum 78	197 **Au** gold 79	201 **Hg** mercury 80		204 **Tl** thallium 81	207 **Pb** lead 82	209 **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								

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

1
H
hydrogen
1

Elements with atomic numbers 112-116 have been reported but not fully authenticated.

The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.

Appendix 5:   Controlled Assessment Record Sheet

Centre Name:		Centre Number:	
Teacher Name:		Qualification Number:	
Qualification Title:		Examination Series:	
Candidate Name:		Candidate Number:	

One mark is required for each of the areas shown in Part A, Part B and Part C. The marks can either be for Part A, Part B and Part C from the same task or from different tasks relating to Units B3/C3/P3 for this GCSE. Centres must retain all parts of the task for moderation.

Part A – Planning			Part B – Observations			Part C – Conclusions		
Marks from	B3/C3/P3 delete as appropriate		Marks from	B3/C3/P3 delete as appropriate		Marks from	B3/C3/P3 delete as appropriate	
Area	Centre mark awarded	Max. mark	Area	Centre mark awarded	Max. mark	Area	Centre mark awarded	Max. mark
Equipment		2	Primary evidence and recording		4	Processing evidence		4
Controls		6	Secondary evidence		2	Quality of evidence		4
Hypothesis		4						
Risks		4				Conclusions based on evidence		6
Overall plan		4				Evaluation of conclusion		4
						Evaluation of method		6
Total		20	Total		6	Total		24
Total for Unit FASCA: Science controlled assessment								

Declaration of authentication

I declare that the work submitted for assessment is my own work and has been carried out without assistance, other than that which is acceptable under the scheme of assessment. The assessment complies with the rules requirements stated in the summary of conditions on pages 45-46 and 60-61.

Candidate signature _____

Teacher signature _____

Date final record sheet signed _____

By signing the above declaration, you agree to your controlled assessment task(s) being used to support Professional Development, Online Support and Training of both Centre-Assessors and Edexcel Moderators. If you have any concerns regarding this, please contact Science2011@edexcel.com.

Appendix 6:   Physics formulae

Formulae sheets will be given to students in their examinations. These will contain all the formulae from the unit which is being examined.

The following formulae are from Unit P3

Specification reference	Equation
1.11	The relationship between electric charge, current and time: charge (coulomb, C) = current (ampere, A) × time (second, s) $Q = I \times t$
2.8	The relationship between voltage, current and resistance: potential difference (volt, V) = current (ampere, A) × resistance (ohm, Ω) $V = I \times R$
2.15	The relationship between power, current and voltage electrical power (watt, W) = current (ampere, A) × potential difference (volt, V) $P = I \times V$
2.16	Calculate electrical energy: energy transferred (joule, J) = current (ampere, A) × potential difference (volt, V) × time (second, s) $E = I \times V \times t$
3.4	Calculate speed speed (m/s) = distance (m)/time (s)
3.5	Calculate acceleration acceleration (metre per second squared, m/s^2) = change in velocity (metre per second, m/s) ÷ time taken (second, s) $a = \dfrac{(v - u)}{t}$
3.13	The relationship between force, mass and acceleration force (newton, N) = mass (kilogram, kg) × acceleration (metre per second squared, m/s^2) $F = m \times a$
3.14	The relationship between mass, weight an gravitational field strength weight (newton, N) = mass (kilogram, kg) x gravitational field strength (newton per kilogram, N/kg) $W = m \times g$
4.4	The relationship between momentum, mass and velocity momentum (kilogram metre per second, kg m/s) = mass (kilogram, kg) x velocity (metre per second, m/s)

Specification reference	Equation
4.9	**Calculate the momentum conservation for a two-body collision (in one dimension only)** **force (newton, N) = change in momentum (kilogram metre per second, kg m/s) / time (second, s)** **F = (mv – mu) / t**
4.10	The relationship between work done, force and distance. work done (joule, J) = force (newton, N) × distance moved in the direction of the force (metre, m) $E = F \times d$
4.13	The relationship between power, work done and time taken power (watt, W) = work done (joule, J) / time taken (second, s) $P = \dfrac{E}{t}$
4.15	Calculate potential energy gravitational potential energy (joule, J) =mass (kilogram, kg) × gravitational field strength (newton per kilogram, N/kg)× vertical height (metre, m) $GPE = m \times g \times h$
4.16	Calculate kinetic energy: kinetic energy (joule, J) = $\frac{1}{2}$ × mass (kilogram, kg) × velocity^2 ((metre/second)^2 (m/s)^2) $KE = \frac{1}{2} \times m \times v^2$

Appendix 7:   Certification and cash-in

Certification and cash-in rules

Certification for the GCSE in Further Additional Science may be claimed in June providing all of the contributing units have been entered and assessed.

Externally assessed components

There is one unit code for any common external units.

The result of an external unit can only count towards one qualification. For example, if the result for 5BI3F (Unit 3 foundation tier) is used towards GCSE in Further Additional Science (2SF01), this same unit result cannot be used towards GCSE in Biology (2BI01), or vice versa.

Specification

To help students fulfil their potential, we have developed a new suite of GCSE qualifications for Science that:

- puts good science at the heart of teaching, learning and assessment
- is presented in clear and detailed specifications
- has examination papers designed and trialled to be accessible with appropriate stretch
- has a clear and achievable approach to new requirements for controlled assessment and practical work
- is designed to allow you to choose the best learning pathway for each student
- supports you with help available online, on the phone and locally.

You will see that this specification is extremely detailed. This is to:

- ensure that you have a clear idea about what might be assessed in an examination
- make it easy for you to plan your teaching
- make sure you don't have to cover material twice in successive units because the progression of ideas is clear.

www.edexcel.com/science2012

Our website will be regularly updated with a vast range of materials to support you with the delivery of our qualifications, including:

- our accredited specifications, sample assessment materials and sample controlled assessment materials
- free planning and teaching resources
- access to our Subject Advisor Service
- information on our published resources
- access to ResultsPlus, our FREE online results analysis and mocks analysis service
- information on events taking place in your area.