

## Clarification summary

Following the ongoing review of our qualifications and feedback from teachers about the depth and breadth of some of the specification statements in GCSE Combined Science A, we have added the following clarifications to particular specification statements, as detailed in this resource. Please use this resource in conjunction with the [specification](#).

**Key:** text = a change either in wording or formatting

~~text~~ = this text has either been removed or moved from this position

**text** = higher content only

### Biology content

#### Clarification to the 'Learning outcomes' section:

Specification reference	Learning outcomes	Reasoning
B1.4f	explain the interaction of <del>these factors</del> <b>temperature, light intensity and carbon dioxide concentration</b> in limiting the rate of photosynthesis	'temperature, light intensity and carbon dioxide concentration' added to clarify 'these' and to mirror specification statement 1.4e.
B2.1e	describe the functions of stem cells <u>in embryonic and adult animals, and meristems in plants</u>	Mirrors specification statements 2.1d and 2.1f.

#### Clarification to the 'To include' section:

Specification reference	To include	Reasoning
B1.1b	nucleus, genetic material, chromosomes, plasmids, mitochondria (contain enzymes for cellular respiration), chloroplasts (contain chlorophyll), <del>and</del> cell membranes (contain receptor molecules, provides a selective barrier to molecules) <u>and ribosomes (site of protein synthesis)</u>	Currently no mention of ribosomes in the specification but this inclusion is helpful when teaching a simple description of protein synthesis in specification reference 1.2d.
B1.4f	<b><u>using graphs depicting the effects of the limiting factors</u></b>	Clarification of expectations for assessment.
B2.1b	the stages of the cell cycle as <u>cell growth</u> , DNA replication, <u>more cell growth</u> , movement of chromosomes, <del>followed by the growth of the cell</del>	Current order of the stages of the cell cycle not correct, therefore needs to be amended.
B2.2a	<u>calculation of surface area, volume and surface area: volume ratio, and reference to diffusion distances</u>	Clarification on the expectation for candidates to be able to complete calculations related to this specification statement.

Specification reference	To include	Reasoning
B2.2d	the structure of the mammalian heart with reference to the <u>cardiac muscle</u> , the names of the <u>valves</u> , chambers, <del>cardiac muscle</del> and <del>the structure of</del> blood vessels <u>into and out of the heart</u> , the structure of the <u>blood vessels</u> with reference to thickness of walls, diameter of lumen, presence of valves	Clarification on the requirements of the learning outcome.
B2.2j	<u>calculation of rate and percentage gain/loss of mass</u>	Clarification on the expectation for candidates to be able to complete calculations related to this specification statement.
B3.1a	Central Nervous System, sensory, <del>and</del> motor <u>and relay</u> neurones, <del>and</del> sensory receptors, <u>synapse and effectors</u> , <u>details of the structure of sensory and motor neurones required.</u>	Clarification on the structures that form the nervous system. The inclusion of the relay neurone aids when explaining the reflex arc in 3.1c.
B4.1c	maintaining habitats, fresh water flow of nutrients <u>and the stages of the carbon and water cycles</u>	Clarification on the requirements of the learning outcome.
B5.1c	use of examples of discontinuous (e.g. <u>eye colour</u> ) and continuous variation (e.g. <u>weight and height</u> )	Reordering to clarify that one example applies to discontinuous variation, and the other two are examples of continuous variation.
B5.1h	<u>the use of Punnett squares</u>	Clarification of expectations for assessment.
B5.1i	<u>the use of Punnett squares</u>	Clarification of expectations for assessment.
B6.2c	<b>restriction enzymes, sticky ends, <del>vectors e.g. plasmids</del>, ligase, host bacteria and selection using antibiotic resistance markers, <u>vectors e.g. plasmids</u></b>	Text moved for clarification.
B6.3f	<u>human infections: one example of each of viral, fungal, bacterial</u> plant diseases: <del>virus</del> <u>viral</u> tobacco mosaic virus (TMV), fungal <i>Erysiphe graminis</i> (barley powdery mildew), bacterial <i>Agrobacterium tumefaciens</i> (crown gall disease)	Previously examples of plant disease and a sexually transmitted infection were given but there was no guidance in terms of human infections – this has now been given.

### Clarification to the 'Practical suggestion' section:

Specification reference	Practical suggestion	Reasoning
B1.3d	Demonstration of the synthesis and breakdown of biological molecules (e.g. using Lego bricks). <u>Qualitative</u> testing of biological molecules PAG B2	Insert a return between the two sentences so easier to read. 'Qualitative' added for clarification.
B1.3e	<u>Qualitative</u> testing of biological molecules PAG B2	'Qualitative' added for clarification.
B1.3f	<u>Qualitative</u> testing of biological molecules PAG B2	'Qualitative' added for clarification.

## Chemistry content

### Clarification to the 'To include' section:

Specification reference	To include	Reasoning
C2.1g	<u>using aqueous and non-aqueous solvents and locating agents</u>	Clarification of the expectations for assessment.
C3.3k	<u>the use of universal indicator and pH meters</u>	Clarification on the requirements of the learning outcome.
C3.4d	<u>the equations and <b>half equations</b> of the reactions at the electrodes</u>	Clarification of the expectations for assessment.
C6.1a	<u>the principles of using carbon to extract iron and other metals from their ores</u>	Clarification on the requirements of the learning outcome.
C6.1d	<u>the use of resources and impact on the environment of all stages of a life-cycle assessment:</u> <ul style="list-style-type: none"> <li>• <u>making materials for a product from raw materials through to the process used to make the product</u></li> <li>• <u>the use of the product</u></li> <li>• <u>transport of the product</u></li> <li>• <u>the method used for its disposal at the end of its life</u></li> </ul>	Clarification on the requirements of the learning outcome.

### Clarification to the 'Practical suggestion' section:

Specification reference	Practical suggestion	Reasoning
C2.1g	<del>Thin</del> <u>Paper</u> or thin layer chromatography. (PAG C2)	Practical suggestion to help teachers know where the PAGs fit into the content.

### Clarification to the 'Underlying knowledge and understanding' section:

Specification reference	Underlying knowledge and understanding	Reasoning
C1.1	Learners should be familiar with the different states of matter and their properties. <u>Learners should be aware of the energy changes when a change of state occurs.</u> They should also be familiar with changes of state in terms of the particle model.	To reinforce expected knowledge from Key Stage 3.

Specification reference	Underlying knowledge and understanding	Reasoning
C2.1	Learners should be familiar with the concept of pure substances. They should have met simple separation techniques of mixtures: <u>filtration, evaporation and distillation</u> . The identification of pure substances in terms of melting point, boiling point and chromatography will also have been met before.	To reinforce expected knowledge from Key Stage 3.
C2.2	Learners should be familiar with the simple (Dalton) atomic model. <u>They should be familiar with the principles underlying the Mendeleev Periodic Table and the modern Periodic Table including periods and groups, and metals and non-metals. Learners should have some knowledge of the properties of metals and non-metals including the chemical properties of metal and non-metal oxides with respect to acidity.</u>	To reinforce expected knowledge from Key Stage 3.
C3.1	Learners should be familiar with chemical symbols and formulae for elements and compounds. They should also be familiar with representing chemical reactions using formulae <u>and equations</u> . Learners will have knowledge of conservation of mass, changes of state and chemical reactions.	To reinforce expected knowledge from Key Stage 3.
C3.3	Learners should be familiar with combustion, thermal decomposition, oxidation and displacement reactions. They will be familiar with defining acids and alkalis in terms of neutralisation reactions. Learners will have met reactions of acids with alkalis to produce a salt and water and reactions of acids with metals to produce a salt and hydrogen. <u>They should have met the pH scale for measuring acidity and alkalinity, and some indicators.</u>	To reinforce expected knowledge from Key Stage 3.
C6.1	Learners should be familiar with the properties of ceramics, polymers and composites. <u>They should have knowledge of the order of metals and carbon in the reactivity series.</u> <del>They also</del> Learners <del>will</del> <u>should</u> have met the method of using carbon to obtain metals from metal oxides. <u>They should also be aware that the earth has limited resources and the benefits of recycling materials.</u>	To reinforce expected knowledge from Key Stage 3.

## Physics content

### Clarification to the 'To include' section:

Specification reference	To include	Reasoning
P1.2d	<u>specific latent heat of fusion and specific latent heat of vaporisation</u>	Clarification on the requirements of the learning outcome.
P2.1b	<u>from graphs</u>	Clarification on the requirements of the learning outcome.
P2.2e	<b>scale drawings limited to parallel and perpendicular vectors only</b>	Clarification of the expectations for assessment.
P2.2k	<b>an idea of the law of conservation of momentum in elastic collisions</b>	Clarification of the expectations for assessment.
P4.2d	radio, microwave, <u>infrared</u> , visible (red to violet), <u>ultraviolet</u> , X-rays and <u>gamma rays</u>	For consistency.

### Clarification to the 'Learning outcomes' section:

Specification reference	Learning outcomes	Reasoning
general	Maths skills references have been removed from the learning outcomes column	References are duplicated in the Maths column.
P1.2b	describe that <del>these</del> physical changes differ from chemical changes because the material recovers its original properties if the change is reversed	Clarification of the requirements of the learning outcome because original text refers to the previous statement.
P2.2c	represent <del>such</del> forces as vectors	Clarification of the requirements of the learning outcome because original text refers to the previous statement.
P2.2j	<b>explain that inertia is a measure of how difficult it is to change the velocity of an object and that the <u>inertial</u> mass is defined as the ratio of force over acceleration</b>	Clarification of the term.
P3.2k	explain the design and use of <del>such</del> <u>d.c.</u> circuits for measurement and testing purposes	Clarification of the requirements of the learning outcome because original text refers to the previous statement.
P4.1g	<del>describe evidence that in both cases it is the wave and not the water or air itself that travels</del> <u>describe evidence for the cases of ripples on water surfaces and for sound waves in air that it is the wave that travels and not the water or the air</u>	Clarification of the requirements of the learning outcome because original text refers to the previous statement.
P4.2g	give examples of some practical uses of electromagnetic waves in the radio, <u>microwave</u> , <u>infrared</u> , visible, <u>ultraviolet</u> , X-ray and <u>gamma ray</u> regions	For consistency.

Specification reference	Learning outcomes	Reasoning
P4.2h	describe how <u>ultraviolet</u> waves, X-rays and gamma rays can have hazardous effects, notably on human bodily tissues	For consistency.
P4.3e	relate <del>these</del> the emissions of <u>alpha particles, beta particles, gamma radiation and neutrons</u> to possible changes in the mass or the charge of the nucleus, or both	Clarification of the requirements of the learning outcome because original text refers to the previous statement.
P4.3l	recall the differences in the penetration properties of <u>alpha particles, beta particles and gamma rays</u>	For consistency.

### Clarification to the 'Practical suggestion' section:

Specification reference	Practical suggestion	Reasoning
P4.2g	Use of a phone camera to look at the <u>infrared</u> emitter on a remote control. (PAG P4)	For consistency.