Pearson Edexcel

International GCSE Biology (2017)

How to use the Scheme of Work

This Scheme of Work (SoW) has been made available on a word document rather than PDF, allowing you to edit the document in a way that suits your teaching style and learner needs.

International GCSEs have 120 - 140 guided learning hours.

**Guidance provided within the course planners, schemes of work and lesson plans are suggested approaches which can be adapted by centres to suit their particular context.**

**The following SoW is based on 2 hours of teaching time per week over 60 weeks** **and can be adjusted to how centres will use time for practical activities differently; you should edit this planner to suit your teaching approach.**

The course planner, in the *Getting Started Guide,* provides a high level view of how you could approach the topics to cover the specification content across two years.

The columns in this lesson plan indicate:

* An overview of the time allocated to lessons
* Which section of the specification this lesson (or group of lessons) relates to
* The learning outcomes of those lessons.
* The activities and resources that could be used to support the teaching of this lesson
* Transferable skills support, see below for further information

Why transferable skills?

In recent years, higher education institutions and global employers have consistently flagged the need for students to develop a range of transferable skills to enable them to respond with confidence to the demands of undergraduate study and the world of work.

To support the design of our qualifications, we have mapped them to a transferable skills framework. The framework includes cognitive, intrapersonal skills and interpersonal skills and each skill has been interpreted for each specification to ensure they are appropriate for the subject.  Further information on transferable skills is available on the website.  Pearson materials, including this scheme of work will support you in identifying and developing these skills in students.

In the final two columns of this scheme of work we have indicated which transferable skills are explicitly assessed, and also where there are opportunities for them to be developed through teaching. Our intention is that teachers can use these columns to increase opportunities for transferable skills development in learners.

Other course planning support

You will find other support for planning the course in the Teacher Support Materials. There are free downloadable resources that you can access [here](https://qualifications.pearson.com/en/qualifications/edexcel-international-gcses-and-edexcel-certificates/international-gcse-biology-2017.coursematerials.html#filterQuery=category:Pearson-UK:Category%2FSpecification-and-sample-assessments).

Teaching resource exemplars

The scheme of work contains suggestions for resources that you can use to support your teaching. These are suggestions only of material you may find useful and you are encouraged to use a wide range of resources that suit the needs of your students.

Other teaching resources

* Student Books – full colour textbooks matched to the specification.
* ActiveBook – a digital copy of the Student Book in the back of every copy.

Further details can be found at [www.pearsonschools.co.uk](http://www.pearsonschools.co.uk). Search for this title: Edexcel IGCSE Biology Student Book.

Edexcel Subject Advisors

Pearson has a team of specialist subject advisors available to help you with the implementation of this specification. You can contact them by:

* Email: [Teaching](mailto:Teaching)Science@pearson.com
* Telephone: UK: 020 7010 2190. International: +44 20 7010 2190
* Twitter: [@PearsonSciences](https://twitter.com/@PearsonSciences)

Health and safety

The practicals and experiments suggested within this scheme of work are those we believe are not banned or restricted in any way and are still currently used in most schools and colleges. The International GCSE encourages experimental work with the assessment of investigative skills being made in the written examinations.

We advise teachers and technicians to discuss the merits of the suggested practicals when deciding which to carry out and how they will be carried out. For example, will it be demonstrated by the teacher or technician, or conducted by students themselves, either individually or in small groups, under the guidance and direction of the teacher?

You may have ideas for practical work that we have not suggested but would work equally well.

As in all practical work, a risk assessment is expected as part of good health and safety practice in all centres and we understand that many schools and colleges refer to the CLEAPSS service: <http://www.cleapss.org.uk/> for guidance and support in conducting science practical work.

Websites

There are links to relevant websites in this scheme of work. In order to ensure that the links are up to date, that the links work, and that the sites are not inadvertently linked to sites that could be considered offensive, we also have made many of the links available on our website at [www.pearsonhotlinks.co.uk](http://www.pearsonhotlinks.co.uk/). If you find that a link from the scheme of work no longer works, please go to the pearsonhotlinks site to report it.  Please note: some of the BBC websites might not be available to certain international schools.

Edexcel International GCSE in Biology (2017)

| Week | Content coverage | Learning outcomes | Exemplar activities | Exemplar resources | Which transferable skills are explicitly assessed through examination | Which transferable skills could also be  acquired through teaching and delivery |
| --- | --- | --- | --- | --- | --- | --- |
| 1(a) | **Section 1: The nature and variety of living organisms**  **a)** Characteristics of living organisms | Students will be assessed on their ability to:  **1.1** understand that living organisms share the following characteristics:   * they require nutrition * they respire * they excrete their waste * they respond to their surroundings * they move * they control their internal conditions * they reproduce * they grow and develop. | **Activities:**   * Produce a poster to describe and illustrate one of the basic characteristics. * Consider to what extent a motor car or petrol lawnmower, for example, can meet the characteristics of life. | Edexcel International GCSE Biology Student Book: Pages 1–13  Edexcel International GCSE Biology Revision Guide: Page 1 | Critical thinking  Problem solving  Reasoning  Interpretation  Adaptive learning  Adaptability | Reasoning  Interpretation  Adaptive learning  Adaptability  Initiative  Self-direction  Self monitoring/self evaluation/self reinforcement  Communication |
| 1(b) | **Section 1: The nature and variety of living organisms**  **b)** Variety of living organisms | Students will be assessed on their ability to:  **1.2** describe the common features shown by eukaryotic organisms: plants, animals, fungi and protoctists.  Plants: these are multicellular organisms; their cells contain chloroplasts and are able  to carry out photosynthesis; their cells have cellulose cell walls; they store carbohydrates as starch or sucrose. Examples include flowering plants, such as a cereal (for example maize), and a herbaceous legume (for example peas or beans).  Animals: these are multicellular organisms; their cells do not contain chloroplasts and  are not able to carry out photosynthesis; they have no cell walls; they usually have  nervous coordination and are able to move from one place to another; they often store carbohydrate as glycogen. Examples include mammals (for example humans)  and insects (for example housefly and mosquito).  Fungi: these are organisms that are not able to carry out photosynthesis; their body is usually organised into a  mycelium made from thread-like  structures called hyphae,  which contain many nuclei; some examples are single-celled; their cells have walls made of chitin; they feed by extracellular secretion of digestive enzymes onto food  material and absorption of the organic products; this is known as saprotrophic nutrition; they may store carbohydrate as glycogen. Examples include *Mucor*, which has the typical fungal hyphal structure, and yeast, which is single-celled.  Protoctists: these are microscopic single-celled organisms. Some, like *Amoeba*, that live in pond water, have features like an animal cell, while others, like *Chlorella*, have  chloroplasts and are more like plants. A pathogenic example is *Plasmodium*, responsible for causing malaria. | **Activity:**   * Table to compare plants, animals, fungi and protoctists.   **Class practicals:**   * Pictures/specimens to place into correct main groups. * Expose nutrient agar plates to the environment and observe fungal colonies that grow. * Observation of protoctists using microscopes and cavity slides. These may be found in pond water or ordered from biological suppliers. | Edexcel International GCSE Biology Student Book: Pages 16–17  Edexcel International GCSE Biology Revision Guide: Pages 5–7  **Video clips:**   * BBC Life on Earth DVD sections on protoctist, plant, fungi & animal groups. * BBC “After life the strange science of decay” – fungal decomposition | Critical thinking  Problem solving  Reasoning  Interpretation  Adaptive learning  Adaptability | Reasoning  Interpretation  Adaptive learning  Adaptability  Initiative  Self-direction  Responsibility  Productivity |
| 2(a) | **Section 1: The nature and variety of living organisms**  **b)** Variety of living organisms | Students will be assessed on their ability to:  **1.3** describe the common features shown by prokaryotic organisms such as bacteria.  Bacteria: these are microscopic single-celled organisms; they have a cell wall, cell membrane, cytoplasm and plasmids; they lack a nucleus but contain a circular chromosome of DNA; some bacteria can carry out photosynthesis but most feed off  other living or dead organisms.  Examples include *Lactobacillus bulgaricus*, a rod-shaped bacterium used in the production of yoghurt from milk, and *Pneumococcus*, a spherical bacterium that acts as the pathogen causing pneumonia.  **1.4** understand the term pathogen and know that pathogens may include fungi, bacteria,  protoctists or viruses.  Viruses: these are not living organisms. They are small particles, smaller than bacteria; they are parasitic and can reproduce only inside living cells; they infect every type of living organism. They have a wide variety of shapes and sizes; they have no cellular structure but have a protein coat and contain one type of nucleic acid, either DNA or RNA. Examples include the tobacco mosaic virus that causes discolouring of the leaves of tobacco plants by preventing the formation of chloroplasts, the influenza virus that causes ‘flu’ and the HIV virus that causes AIDS. | **Activities:**   * ActiveBook – find out more about viruses, bacteria and fungi. * Consider current or recent appropriate news items relating to viruses, for example swine flu or bird flu, or to bacteria.   **Animation:**   * [Cells Alive – size of micro-organisms](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59774).   **Class practicals:**   * Pictures/specimens to place into correct main groups. * Observe *Amoeba* movement – using microscopes or through: [*Amoeba* movement.](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59481) | Edexcel International GCSE Biology Student Book: Pages 17–21  ActiveBook: Page 19  Edexcel International GCSE Biology Revision Guide: Pages 5–7  Society for General Microbiology | Critical thinking  Problem solving  Reasoning  Interpretation  Adaptive learning  Adaptability | Reasoning  Interpretation  Adaptive learning  Adaptability  Initiative  Self-direction  Responsibility  Perseverance  Self- regulation (metacognition, forethought, reflection)  Self- presentation |
| 2(b) | **Section 1: The nature and variety of living organisms** | Consolidation and assessment | * Introduce examination-style questions on the topics covered, with a focus on one or two command words such as ‘Name’ and ‘Label’. | Edexcel International GCSE Biology Student Book Questions – Pages 14–15 and 22  Self-assessment on Page 22 of ActiveBook  Edexcel International GCSE Biology Revision Guide: Pages 4, 5 and 8 | Problem solving  Reasoning  Interpretation  Adaptive learning  Adaptability | Problem solving  Reasoning  Interpretation  Adaptive learning  Adaptability  Continuous learning  Initiative  Self-direction  Responsibility  Perseverance  Productivity  Self- regulation (metacognition, forethought, reflection)  Self monitoring/self evaluation/self reinforcement |
| 3 | **Section 2: Structures and functions in living organisms**  **a)** Levels of organisation  b) Cell structure | Students will be assessed on their ability to:  **2.1** describe the levels of organisation in organisms: organelles, cells, tissues, organs and systems  **2.2** describe cell structures, including the nucleus, cytoplasm, cell membrane, cell wall,  mitochondria, chloroplasts, ribosomes and vacuole  **2.3** describe the functions of the nucleus, cytoplasm, cell membrane, cell wall, mitochondria, chloroplasts, ribosomes and vacuole  **2.4** know the similarities and differences in the structure of plant and animal cells. | **Activities:**   * View images of plant and animal cells then construct a table to show similarities and differences.   **Class practicals:**   * Staining and observing onion epidermis. * Staining and observing cheek cells and comparing to the onion epidermis. * Compare two different stains. * Viewing pondweed leaves with a microscope / leaves. | Edexcel International GCSE Biology Student Book: Pages 1–3 and 12–13  ActiveBook Page 1 – cell labelling resource  Edexcel International GCSE Biology Revision Guide: Pages 1–4  **Video clips:**   * BBC clip 10602 ([plant and animal cells](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59778)) (2min 12sec) * [Dnatube – *Elodea canadensis*](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59483)   **Website:**  [Cells Alive](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59482) | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Adaptability  Creativity | Critical thinking  Problem solving  Reasoning  Intellectual interest and curiosity  Initiative  Self-direction  Collaboration  Teamwork  Cooperation  Interpersonal skills  Leadership |
| 4 | **Section 2: Structures and functions in living organisms**  a) Levels of organisation  b) Cell structure | Students will be assessed on their ability to:  **2.5B explain the importance of cell differentiation in the development of specialised cells**  **2.6B understand the advantages and disadvantages of using stem cells in Medicine.** | **Activities:**   * View abpi poster of stem cells. * Carry out interactive web exercise on stem cells (<http://www.abpischools.org.uk/page/resource/age.cfm>). * Class debate on the ethics of stem cell use. * Make an information leaflet for a doctor’s surgery informing patients on the uses of stem cells. | **Websites:**   * Association of the British Pharmaceutical Industry (ABPI) website provides posters, information and interactive exercises on stems cells (<http://www.abpischools.org.uk/page/about.cfm>)   **Video clips:**   * BBC DVD about stem cells and uses in medicine – Fix Me – Horizon | Personal and social responsibility  Adaptability  Problem solving  Reasoning  Interpretation  Adaptive learning  Adaptability  Creativity | Personal and social responsibility  Adaptability  Intellectual interest and curiosity  Perseverance  Communication  Collaboration  Teamwork  Ethics  Cooperation  Interpersonal skills  Leadership  Responsibility  Assertive communication  Self- presentation |
| 5 | **Section 2: Structures and functions in living organisms**  c) Biological molecules | Students will be assessed on their ability to:  **2.7** identify the chemical elements present in carbohydrates, proteins and lipids (fats and oils)  **2.8** describe the structure of carbohydrates, proteins and lipids as large molecules made up from smaller basic units: starch and glycogen from simple sugar; protein from amino acids; lipid from fatty acids and glycerol  **2.9** practical: investigate food samples for the presence of glucose, starch, protein and fat. | **Activities:**   * View models of the biological molecules to ascertain common elements. * Make paper models of large molecules from simple basic units. * [Build a Carbohydrate](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59484) interactive game.   **Animation:**   * Virtual laboratory – starch test   Class practical:   * Tests for starch, glucose, fats and proteins. * Use the food tests to test the composition of “unknown foods”. | Edexcel International GCSE Biology Student Book: Pages 37–43  Experiment 6 – Student Book: Page 43 and pdf on ActiveBook Page 42  Edexcel International GCSE Biology Revision Guide: Page 15  **Practicals:**  Practical guides containing student, teacher and technician guides are at: http://www.biology-resources.com/biology-experiments2.html | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Creativity  Innovation  Adaptability | Intellectual interest and curiosity  Reasoning  Interpretation  Decision making  Adaptive learning  Initiative  Self-direction  Self regulation (metacognition, forethought, reflection)  Communication  Collaboration  Teamwork  Cooperation  Interpersonal skills |
| 6 | **Section 2: Structures and functions in living organisms**  **c)** Biological molecules | Students will be assessed on their ability to:  **2.10** understand the role of enzymes as biological catalysts in metabolic reactions  **2.11** understand how the functioning of enzymes can be affected by changes in temperature, including changes to the shape of the active site  **2.12** practical: investigate how enzyme activity can be affected by changes in temperature. | **Activities:**   * Use supplied data to plot a graph of effect of temperature on enzyme activity. * Compare diagrams of an enzyme before and after denaturing. Relate this to shape of the substrate and altered shape of the active site. * [How do enzymes work?](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59485)   **Animation:**   * [How enzymes work](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59486).   **Demonstration / Class practical:**   * Catalase compared to denatured catalase on hydrogen peroxide. * Effect of temperature on activity of amylase. | Edexcel International GCSE Biology Student Book: Pages 3–6 and 48  Edexcel International GCSE Biology Revision Guide: Page 2  **Video clip:**   * [Dnatube: Enzyme action](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59488)   **Practical:**  Practical guides containing student, teacher and technician guides are at: <http://www.biology-resources.com/biology-experiments2.html> | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Innovation | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Executive function  Intellectual interest and curiosity  Self- regulation (metacognition, forethought, reflection)  Teamwork  Cooperation  Interpersonal skills |
| 7 | **Section 2: Structures and functions in living organisms**  **c)** Biological molecules | Students will be assessed on their ability to:  **2.13** understand how enzyme function can be affected by changes in pH altering the active  site  **2.14B practical: investigate how enzyme activity can be affected by changes in pH.** | **Activity:**   * Compare class data with data on Page 6 of Student Book/ActiveBook.   **Class practical:**   * Effect of pH on trypsin / pepsin digestion of albumin / re-suspended powdered milk.   **Demonstration:**   * Starch-amylase prior to class practical. | Edexcel International GCSE Biology Student Book: Pages 5–6/ActiveBook  Edexcel International GCSE Biology Revision Guide: Page 2  **Practical:**  Experiment 1, Page 5 of Student Book  Practical guides containing student, teacher and technician guides are at:  http://www.biology-resources.com/biology-experiments2.html  <http://www.biology-resources.com/biology-experiments-sup.html> | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Innovation | Problem solving  Analysis  Reasoning  Interpretation  Decision making  Executive function  Intellectual interest and curiosity  Self- regulation (metacognition, forethought, reflection)  Collaboration  Teamwork  Cooperation  Interpersonal skills |
| 8 | **Section 2: Structures and functions in living organisms**  d) Movement of substances into and out of cells | Students will be assessed on their ability to:  **2.15** understand the processes of diffusion, osmosis and active transport by which substances move into and out of cells. | **Activities:**   * Small-group activity with a series of cards that need to be sorted to produce diffusion, osmosis and active transport definitions. * Word search game: [Diffusion and Osmosis](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59489).   **Animation:**   * Animation on ActiveBook. * Interactive software package on Multimedia Science School (http://multimediasciencesimulations.com/biology.php)   **Demonstrations:**   * Diffusion in air and water (ammonia and HCl in tube / iodine in water). * Use Visking tubing, distilled water and a concentrated solute solution to show that osmosis can occur in both directions. | Edexcel International GCSE Biology Student Book: Pages 9–11 and 122  ActiveBook: Page 10  Edexcel International GCSE Biology Revision Guide: Page 3  **Practical:**  Practical guides containing student, teacher and technician guides are at:  http://www.biology-resources.com/biology-experiments2.html  http://www.biology-resources.com/biology-experiments-sup.html | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Creativity  Innovation | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Intellectual interest and curiosity  Self-regulation (metacognition, forethought, reflection)  Collaboration  Teamwork  Cooperation  Interpersonal skills  Assertive communication  Self- presentation |
| 9 | **Section 2: Structures and functions in living organisms**  d) Movement of substances into and out of cells | Students will be assessed on their ability to:  **2.16** understand how factors affect the rate of movement of substances into and out of cells, including the effects of surface area to volume ratio, distance, temperature and concentration gradient  **2.17** practical: investigate diffusion and using living and non-living systems. | **Activity:**   * List some substances that cells take in and those that cells remove and suggest mechanism of movement for each.   **Class practical:**   * Investigating the effects of temperature / surface area to volume ratio and / or concentration gradient on diffusion of acid into agar. | Edexcel International GCSE Biology Student Book: Pages 9–11  Edexcel International GCSE Biology Revision Guide: Page 3  **Practical:**  Practical guides containing student, teacher and technician guides are at:  http://www.biology-resources.com/biology-experiments2.html  http://www.biology-resources.com/biology-experiments-sup.html  Practical on page 10 of Student Book Protocol also via [SoB/Practicalbiology](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59487) | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Innovation | Critical thinking  Problem solving  Analysis  Reasoning  Adaptive learning  Creativity  Innovation  Intellectual interest and curiosity  Initiative  Communication  Collaboration  Teamwork  Cooperation  Interpersonal skills |
| 10 (a) | **Section 2: Structures and functions in living organisms**  d) Movement of substances into and out of cells | Students will be assessed on their ability to:  **2.17** practical: investigate osmosis using living and non-living systems. | **Animation:**   * Red blood cells bursting/crenulations as an example of osmotic effect on animal cells.   **Class practical:**   * Experiments 11 and 12: Investigating the effects of osmosis in onion epidermis cells and on potato tuber tissue. * This is a useful place to bring in the idea of how to calculate percentage change.   **Demonstration:**   * Investigating the role of osmosis in turgor pressure by placing syrup into visking tubing and placing this into water. * Investigating osmosis by placing eggs with their shell removed by acid treatment into different concentrations of salt. | Edexcel International GCSE Biology Student Book: Pages 9–11 and 122–126  Edexcel International GCSE Biology Revision Guide: Pages 44–45  Experiment 11 – Page 125 and Experiment 12 – Page 126 of Student Book  **Practical:**  Various osmosis practicals on [SoB/Practicalbiology](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59487)  Also, practical guides containing student, teacher and technician guides are at:  http://www.biology-resources.com/biology-experiments2.html  http://www.biology-resources.com/biology-experiments-sup.html  **Video clip:**   * Using red onion to show turgor | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Innovation | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Innovation  Intellectual interest and curiosity  Communication  Collaboration  Teamwork  Cooperation  Interpersonal skills |
| 10 (b) | Section 2: Structures and functions in living organisms | Consolidation and assessment | * Students can produce a table to compare osmosis, diffusion and active transport. | Edexcel International GCSE Biology Student Book questions – Pages 14–15 and 51–52  Edexcel International GCSE Biology Revision Guide: Pages 4–5 and 17  Self- assessment on Page 15 of ActiveBook  Edexcel International GCSE Biology Revision Guide: Page 3 | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Innovation | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Continuous learning  Initiative  Self-direction  Responsibility  Perseverance  Productivity  Self regulation (metacognition, forethought, reflection)  Integrity  Self- monitoring/self- evaluation/self- reinforcement |
| 11 | **Section 2: Structures and functions in living organisms**  **e)** Nutrition | Students will be assessed on their ability to:  **2.18** understand the process of photosynthesis and its importance in the conversion of light energy to chemical energy  **2.19** know the word equation and the balanced chemical symbol equation for photosynthesis  **2.23** practical: investigate photosynthesis, showing the evolution of oxygen from a water plant, the production of starch and the requirements of light, carbon dioxide and chlorophyll. | **Activity:**   * Use animation resource on ActiveBook to produce word and symbol equations.   **Activity:**   * Use Figure 10.4 to link to equation and discuss whether photosynthesis will occur.   **Class practical:**   * Use variegated leaves from de-starched plants, with areas covered to exclude light, to test the need for chlorophyll in photosynthesis.   **Demonstration:**   * Set up a plant with leaves without light (foil) and carbon dioxide (soda lime). Useful point to demonstrate need for control experiments. | Edexcel International GCSE Biology Student Book: Pages 109–112  ActiveBook: Page 112  Edexcel International GCSE Biology Revision Guide: Pages 40–41  Experiment 8 – Pages 109–110 of Student Book  **Practical:**  Practical guides containing student, teacher and technician guides are at:  http://www.biology-resources.com/biology-experiments2.html  http://www.biology-resources.com/biology-experiments-sup.html  **Video clip:**   * [Photosynthesis song](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59490) | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Innovation | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Executive function  Creativity  Innovation  Intellectual interest and curiosity  Productivity  Self- regulation (metacognition, forethought, reflection) |
| 12 | **Section 2: Structures and functions in living organisms**  **e)** Nutrition | Students will be assessed on their ability to:  **2.20** understand how varying carbon dioxide concentration, light intensity and temperature  affect the rate of photosynthesis  **2.23** practical: investigate photosynthesis, showing the evolution of oxygen from a water  plant, the production of starch and the requirements of light, carbon dioxide and chlorophyll. | **Activities:**   * In groups of three, each consider a different factor and explain it to the other group members. * Undertake [interactive task on requirements for factors limiting photosynthesis](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=61736). * BBC Bitesize [Factors limiting photosynthesis](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59492).   **Animation:**   * Consider animation on effect of light.   **Class practical:**   * Measuring the rate of photosynthesis using pondweed. | Edexcel International GCSE Biology Student Book: Pages 109–111  Edexcel International GCSE Biology Revision Guide: Pages 40–41  Experiment 8 – Pages 109–110 of Student Book  Edexcel International GCSE Biology Student Book: Pages 114–117  Edexcel International GCSE Biology Revision Guide: Page 41  Experiment 10 – Pages 116–117 of Student Book  **Practical:**  Practical also on [SoB/Practicalbiology](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59487)  Practical guides containing student, teacher and technician guides are at:  http://www.biology-resources.com/biology-experiments2.html  <http://www.biology-resources.com/biology-experiments-sup.html> | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Innovation  Adaptability | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Executive function  Creativity  Innovation  Intellectual interest and curiosity  Initiative  Communication  Collaboration  Teamwork  Cooperation  Interpersonal skills |
| 13 | **Section 2: Structures and functions in living organisms**  **e)** Nutrition | Students will be assessed on their ability to:  **2.21** describe the structure of the leaf and explain how it is adapted for photosynthesis  **2.22** understand that plants require mineral ions for growth, and that magnesium ions are needed for chlorophyll and nitrate ions are needed for amino acids. | **Activities:**   * Produce a presentation (for example ppt/TV ad/interview sketch/music) to highlight the importance of magnesium and nitrate ions. * Undertake the interactive task [on Plant mineral nutrition](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59493). * Label a diagram of TS of a leaf. * Make a 3D model of a section through a leaf. * Produce a table with two columns. First is for structural adaptation of the leaf, and second column shows how the adaptation enables/increases photosynthesis. * Multimedia Science School photosynthesis simulation.   **Demonstrations:**   * Show images of plants lacking named mineral ions. * Set up plant cultures that lack named mineral ions such as nitrate and phosphate. | Edexcel International GCSE Biology Student Book: Pages 118–119  Edexcel International GCSE Biology Revision Guide: Page 42  **Video clip:**  BBC clip 213 ([plant growth – soil and nutrients](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59610)) (58 sec)  Edexcel International GCSE Biology Student Book Pages 112–114  Edexcel International GCSE Biology Revision Guide Page 42  **Video clip:**  BBC clip 10655 ([adaptations of the leaf for photosynthesis](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59609)) (3 min 13 sec)  **Software:**  http://multimediasciencesimulations.com/demonstration.php | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Creativity  Innovation  Adaptability | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Initiative  Self-direction  Responsibility  Perseverance  Self- regulation (metacognition, forethought, reflection) |
| 14(a) | Section 2: Structures and functions in living organisms | Consolidation and assessment | * Questions should focus on allowing students to describe and explain how the leaf is adapted for photosynthesis. | Edexcel International GCSE Biology Student Book questions – Pages 120–121  Self- assessment on Page 121 of ActiveBook  Edexcel International GCSE Biology Revision Guide: Pages 42–44 | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Innovation  Adaptability | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Continuous learning  Initiative  Self-direction  Responsibility  Perseverance  Productivity  Self- regulation (metacognition, forethought, reflection)  Ethics  Integrity  Self- monitoring/self- evaluation/self- reinforcement |
| 14(b) | **Section 2: Structures and functions in living organisms**  **e)** Nutrition | Students will be assessed on their ability to:  **2.24** understand that a balanced diet should include appropriate proportions of  carbohydrate, protein, lipid, vitamins, minerals, water and dietary fibre  **2.25** identify the sources and describe the functions of carbohydrate, protein, lipids (fats and oils), vitamins A, C and D, the mineral ions calcium and iron, water and dietary fibre as components of the diet. | **Activities:**   * Students to categorise their meal items over one day into carbohydrates, proteins, lipids. * Do a literature/internet search to find the functions of fibre. * Three-way cut and paste matching activity, linking listed components of diet with sources and functions. * Interactive diet analysis (<http://multimediasciencesimulations.com/biology.php>)   **Class practical:**   * Use food tests (from week 5) on various foods such as bread, potatoes, butter, soya, chicken, etc.   **Demonstration:**   * Show images of various sources of dietary components. | Edexcel International GCSE Biology Student Book: Pages 37–42  Edexcel International GCSE Biology Revision Guide: Pages 14–15 | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Creativity  Innovation  Adaptability | Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Intellectual interest and curiosity  Initiative  Self-direction  Responsibility  Perseverance  Productivity  Self- regulation (metacognition, forethought, reflection)  Communication  Collaboration  Teamwork  Cooperation  Interpersonal skills |
| 15 | **Section 2: Structures and functions in living organisms**  **e)** Nutrition | Students will be assessed on their ability to:  **2.26** understand how energy requirements vary with activity levels, age and pregnancy  **2.27** describe the structure and function of the human alimentary canal, including the  mouth, oesophagus, stomach, small intestine (duodenum and ileum), large intestine  (colon and rectum) and pancreas  **2.28** understand how food is moved through the gut by peristalsis. | **Activities:**   * Use/build a model of the alimentary canal. * Label a diagram of the alimentary canal.   **Animation:**   * [Dnatube – enzymes, food digestion](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59494).   **Demonstration:**   * Peristalsis by trying to get a small ball or dried pea out of a length of (clear) plastic tubing. Then repeat with some vegetable oil as a lubricant. | Edexcel International GCSE Biology Student Book: Pages 43–45 and 46–50, and ActiveBook  Edexcel International GCSE Biology Revision Guide: Pages 14 and 16  **Video clip:**   * Living Body | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Personal and social responsibility  Adaptability | Analysis  Reasoning  Interpretation  Initiative  Self-direction  Responsibility  Self- regulation (metacognition, forethought, reflection)  Communication |
| 17 | Section 2: Structures and functions in living organisms  **e)** Nutrition | Students will be assessed on their ability to:  **2.29** understand the role of digestive enzymes, including the digestion of starch to glucose by amylase and maltase, the digestion of proteins to amino acids by proteases and the digestion of lipids to fatty acids and glycerol by lipases. | **Animation:**   * Animation on ActiveBook.   **Class practical:**   * Model gut using Visking tubing. | Edexcel International GCSE Biology Student Book: Pages 46–49  ActiveBook: Page 46  Edexcel International GCSE Biology Revision Guide: Page 17  **Practical:**  Practical guides containing student, teacher and technician guides are at:  http://www.biology-resources.com/biology-experiments2.html  http://www.biology-resources.com/biology-experiments-sup.html  Model gut practical on [SoB/Practicalbiology](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59487)  **Video clips:**   * Living Body/New Living Body * Alice Roberts, BBC - Don’t die young | Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Adaptability | Problem solving  Analysis  Reasoning  Interpretation  Initiative  Self-direction  Responsibility  Self- monitoring/self- evaluation/self- reinforcement |
| 18 | **Section 2: Structures and functions in living organisms**  **e)** Nutrition | Students will be assessed on their ability to:  **2.30** understand that bile is produced by the liver and stored in the gall bladder  **2.31** understand the role of bile in neutralising stomach acid and emulsifying lipids  **2.32** understand how the small intestine is adapted for absorption, including the structure of a villus. | **Activities:**   * Draw and label a villus. Annotate various structural adaptations with an explanation of how they help absorption. * Make a crossword puzzle or word search. * Compare experiment 7 with the use of a food industry calorimeter. * Complete Nuffield worksheet “Value of Villi”.   **Animation:**   * Emulsification animation. * Lipase and bile action on fat digestion in milk changing pH. | Edexcel International GCSE Biology Student Book: Pages 48–50  Edexcel International GCSE Biology Revision Guide: Page 17  Experiment 7 – Page 45 of Student Book  **Practical:**  Practical guides containing student, teacher and technician guides are at:  http://www.biology-resources.com/biology-experiments2.html  <http://www.biology-resources.com/biology-experiments-sup.html>  **Worksheets:**  Nuffield worksheets may be obtained from:  https://www.stem.org.uk/elibrary/resource/32773  **Video clip:**   * BBC clip 10649 ([digestive enzymes](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59787))  (2 min 55 sec) | Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Innovation  Adaptability | Analysis  Reasoning  Interpretation  Intellectual interest and curiosity  Initiative  Self-direction  Communication  Collaboration  Teamwork  Cooperation  Interpersonal skills |
| 19 (a) | **Section 2: Structures and functions in living organisms**  **e)** Nutrition | Students will be assessed on their ability to:  **2.32** describe an experiment to investigate the energy content in a food sample. | **Class practical:**  Measuring the energy content of a food.  **Activity:**  Comparing simple laboratory calorimeters with more advanced ones. The terms accuracy and reliability can be introduced. | **Practical:**  Edexcel International GCSE Biology Student Book: pages 44-45  Practical guides containing student, teacher and technician guides are at:  http://www.biology-resources.com/biology-experiments2.html  <http://www.biology-resources.com/biology-experiments-sup.html>  Nuffield Biology for GCSE https://www.stem.org.uk/elibrary/resource/32773 | Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Innovation  Adaptability | Analysis  Reasoning  Interpretation  Decision making  Executive function  Intellectual interest and curiosity  Self- regulation (metacognition, forethought, reflection) |
| 19(b) | Section 2: Structures and functions in living organisms | Consolidation and assessment |  | Edexcel International GCSE Biology Student Book questions – Pages 51–52  Self -assessment on Page 52 of ActiveBook  Edexcel International GCSE Biology Revision Guide: Page 17–19 | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Innovation  Adaptability | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive  Initiative  Self-direction  Responsibility  Perseverance  Productivity  Self- regulation (metacognition, forethought, reflection)  Integrity  Self- monitoring/self -evaluation/self- reinforcement |
| 20 | **Section 2: Structures and functions in living organisms**  **f)** Respiration | Students will be assessed on their ability to:  **2.34** understand how the process of respiration produces ATP in living organisms  **2.35** know that ATP provides energy for cells  **2.36** describe the differences between aerobic and anaerobic respiration. | **Activities:**   * Produce a table to compare differences between aerobic and anaerobic respiration. * Comparing Olympic winning times for athletics from Olympic Games between 1956 and 1976. Mexico City is high altitude in 1968.   **Class practical:**   * Comparing inhaled and exhaled air using limewater.   **Demonstration:**   * Yeast releasing carbon dioxide/dough rising in a measuring cylinder. | Edexcel International GCSE Biology Student Book: Pages 6–9  Edexcel International GCSE Biology Revision Guide: Pages 2–3 | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Creativity  Innovation  Adaptability | Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Creativity  Intellectual interest and curiosity  Collaboration  Teamwork  Cooperation  Interpersonal skills  Leadership  Responsibility |
| 21 | **Section 2: Structures and functions in living organisms**  **f)** Respiration | Students will be assessed on their ability to:  **2.37** know the word equation and the balanced chemical symbol equation for aerobic respiration in living organisms  **2.38** know the word equation for anaerobic respiration in plants and in animals  **2.39** practical: investigate the evolution of carbon dioxide and heat from respiring seeds or other suitable living organisms. | **Demonstration:**   * Experiment 2: Demonstration of the production of carbon dioxide by small living organisms and Experiment 3: Demonstration that heat is produced by respiration.   **Class practical:**   * Investigating the effect of temperature on anaerobic respiration of yeast by measuring rate of carbon dioxide production. | Edexcel International GCSE Biology Student Book: Page 7  Edexcel International GCSE Biology Revision Guide: Pages 2–3  Experiments 2 and 3: Page 8 of Student Book  **Video clips:**   * BBC clip 10885 ([aerobic and anaerobic respiration](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59788)) (4 min 36 sec) * New Living Body “muscles”   **Practical:**  Practical guides containing student, teacher and technician guides are at:  http://www.biology-resources.com/biology-experiments2.html  <http://www.biology-resources.com/biology-experiments-sup.html> | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Innovation  Adaptability | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Intellectual interest and curiosity  Communication  Collaboration  Teamwork  Cooperation  Interpersonal skills |
| 22(a) | **Section 2: Structures and functions in living organisms**  **g)** Gas exchange | Students will be assessed on their ability to:  **2.40B understand the role of diffusion in gas exchange**  **2.41B understand gas exchange (of carbon dioxide and oxygen) in relation to**  **respiration and photosynthesis**  **2.42B understand how the structure of the leaf is adapted for gas exchange**  **2.43B describe the role of stomata in gas exchange.** | **Animation:**   * Resource on ActiveBook (teacher driven).   **Demonstrations:**   * Data logger with oxygen, carbon dioxide and light probes plus light on/light off over a 24-h period with pondweed. * Placing leaves into boiling water to see location of stomata. * Clear sticky tape/clear nail varnish on leaves to shown stomata/guard cells. | Edexcel International GCSE Biology Student Book: Pages 114–115  ActiveBook Page 115  Edexcel International GCSE Biology Revision Guide: Pages 10 and 41 | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Creativity  Adaptability | Problem solving  Analysis  Reasoning  Interpretation  Decision making  Intellectual interest and curiosity  Self- regulation (metacognition, forethought, reflection)  Communication  Collaboration  Teamwork  Cooperation  Interpersonal skills |
| 22(b) | **Section 2: Structures and functions in living organisms**  **g)** Gas exchange | Students will be assessed on their ability to:  **2.44B understand how respiration continues during the day and night, but that the net exchange of carbon dioxide and oxygen depends on the intensity of light**  **2.45B practical: investigate the effect of light on net gas exchange from a leaf, using hydrogen-carbonate indicator.** | **Activity:**   * Study a 3D model of the leaf and relate it to Figure 10.6 Page 113.   **Animation:**   * Resource on ActiveBook to show role of stomata.   **Class practical:**   * Investigating the effect of light on gas exchange by a leaf by placing it in hydrogen-carbonate indicator. | Edexcel International GCSE Biology Student Book: Pages 112–115  Experiment 9: Page 115 of Student Book  Edexcel International GCSE Biology Revision Guide: Page 41  **Practical:**  Practical guides containing student, teacher and technician guides are at:  http://www.biology-resources.com/biology-experiments2.html  <http://www.biology-resources.com/biology-experiments-sup.html> | Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Innovation  Adaptability | Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Intellectual interest and curiosity  Initiative  Self-direction  Cooperation  Interpersonal skills  Self- presentation |
| 23 | **Section 2: Structures and functions in living organisms**  **g)** Gas exchange | Students will be assessed on their ability to:  **Humans**  **2.46** describe the structure of the thorax, including the ribs, intercostal muscles, diaphragm, trachea, bronchi, bronchioles, alveoli and pleural membranes  **2.48** explain how alveoli are adapted for gas exchange by diffusion between air in the lungs and blood in capillaries. | **Activities:**   * Build a paper model of the thorax. Relate to Figure 3.1 Page 26. * Undertake interactive task: [Lungs](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59495). * Interactive software exercise (http://multimediasciencesimulations.com/biology.php)   **Demonstrations:**   * View model of a pair of lungs or show video clip below. * Place wet microscope slides together to show function of pleural fluid. | Edexcel International GCSE Biology Student Book: Pages 26–27 and 29–30  Edexcel International GCSE Biology Revision Guide: Pages 10–11  Check recall of activity using resource on Page 26 of ActiveBook  Lung dissection protocol on [SoB/Practicalbiology](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59487)  Pleural fluid demo available in: Nuffield Biology for GCSE <https://www.stem.org.uk/elibrary/resource/32773>  **Video clip:**   * BBC clip 5373 ([anatomy and physiology of the lungs](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59773)) (3 min 16 sec) | Problem solving  Reasoning  Interpretation  Decision making  Adaptive learning  Creativity  Innovation  Adaptability | Problem solving  Reasoning  Interpretation  Decision making  Adaptive learning  Initiative  Self- regulation (metacognition, forethought, reflection)  Ethics  Integrity  Self- monitoring/self- evaluation/self -reinforcement |
| 24 | **Section 2: Structures and functions in living organisms**  **g)** Gas exchange | Students will be assessed on their ability to:  **2.47** understand the role of the intercostal muscles and the diaphragm in ventilation  **2.50** practical: investigate breathing in humans, including the release of carbon dioxide and the effect of exercise. | **Activities:**   * Analyse data from Page 30 and make conclusions. Link to Experiment 5: An investigation into the effect of exercise on breathing rate. * Use hand-held spirometer to measure maximum expiratory volume of class, plot histogram of results, and relate to body size and fitness.   **Class practical:**   * Experiment 5.   **Demonstration:**   * Demo balloons in a plastic bottle (this could then be used to consider whether it is a good or poor model for ventilation). | Edexcel International GCSE Biology Student Book: Pages 27–28  Edexcel International GCSE Biology Revision Guide: Pages 11–12  Experiment 5 – Page 30 of Student Book Demo-resource on Page 28 of ActiveBook  **Video clip:**   * Living Body/New Living Body | Critical thinking  Problem solving  Analysis  Decision making  Executive function | Critical thinking  Problem solving  Analysis  Decision making  Executive function Initiative  Productivity  Self- regulation (metacognition, forethought, reflection)  Communication  Collaboration  Teamwork  Cooperation  Interpersonal skills |
| 25(a) | **Section 2: Structures and functions in living organisms**  **g)** Gas exchange | Students will be assessed on their ability to:  **2.49** understand the biological consequences of smoking in relation to the lungs and the  circulatory system, including coronary heart disease. | **Activity:**   * Students to produce posters on various effects of smoking including coronary heart disease.   **Demonstration:**   * ‘Smoking machine’ (in a fume cupboard). | Edexcel International GCSE Biology Student Book: Pages 30–34  Edexcel International GCSE Biology Revision Guide: Pages 12–13  Smoking machine protocol on [SoB/Practicalbiology](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59487)  ASH ([Action on Smoking and Health](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59496)) website  **Video clip:**  BBC (Alice Roberts) –Don’t die young | Critical thinking  Analysis  Reasoning  Interpretation  Creativity  Innovation  Personal and social responsibility | Critical thinking  Analysis  Reasoning  Interpretation  Creativity  Innovation  Personal and social responsibility  Initiative  Self-direction  Responsibility  Communication  Self- presentation |
| **25(b)** | **Section 2: Structures and functions in living organisms** | Consolidation and assessment | * It would be useful to introduce examination-style questions on the topics covered, with a focus on production of a graph. | Edexcel International GCSE Biology Student Book questions – Pages 14–15, 35–36 and 120–121  Self- assessment on Pages 36 and 121 of ActiveBook  Edexcel International GCSE Biology Revision Guide: Pages 4–5, 13–14 and 42–44 | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Personal and social responsibility  Adaptability | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Personal and social responsibility  Adaptability  Continuous learning  Initiative  Self-direction  Responsibility  Perseverance  Productivity  Self- regulation (metacognition, forethought, reflection)  Integrity  Self- monitoring/self- evaluation/self -reinforcement |
| 26 | **Section 2: Structures and functions in living organisms**  h) Transport | Students will be assessed on their ability to:  **2.51** understand why simple, unicellular organisms can rely on diffusion for movement of substances in and out of the cell  **2.52** understand the need for a transport system in multicellular organisms  **Flowering plants**  **2.53** describe the role of phloem in transporting sucrose and amino acids between the leaves and other parts of the plant. | **Activity:**   * Work out surface area, volume, and surface area to volume ratio for three different sized cubes. Then compare back to Experiment 4: Demonstration of diffusion in a jelly.   **Class practical:**   * Observe *Amoeba*. | Edexcel International GCSE Biology Student Book: Pages 53–54  Edexcel International GCSE Biology Revision Guide Page 2  Experiment 4 – Page 10 of Student Book | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Adaptability | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Intellectual interest and curiosity  Initiative  Self-direction  Self- regulation (metacognition, forethought, reflection) |
| 27 | **Section 2: Structures and functions in living organisms**  **h)** Transport | Students will be assessed on their ability to:  **Flowering plants**  **2.54** describe the role of xylem in transporting water and mineral ions from the roots to  other parts of the plant  **2.55B understand how water is absorbed by root hair cells.** | **Activities:**   * Identify roles of the root. * Draw and label root hair cell with (i) typical cell structures, and then (ii) label and annotate structures with a specific uptake function. * Recall role of magnesium and nitrate ions.   **Animation:**   * Use resource on ActiveBook.   **Class practical:**   * Place celery in coloured food dye and then dissect out xylem tissue. View XS and LS using microscopes. Observe how it enters the leaves.   **Demonstrations:**   * View TS of stem and root showing xylem. * Look at tree rings to show annual growth of xylem. | Edexcel International GCSE Biology Student Book: Pages 127–130 and 131–132  ActiveBook: Page 132  Edexcel International GCSE Biology Revision Guide: Pages 44 and 45  **Video clip:**  BBC – Private life of plants, “growing | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Adaptability | Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Initiative  Self- regulation (metacognition, forethought, reflection)  Communication  Collaboration  Teamwork  Cooperation  Interpersonal skills |
| 28 | **Section 2: Structures and functions in living organisms**  h) Transport | Students will be assessed on their ability to:  **2.56B understand that transpiration is the evaporation of water from the surface of**  **a plant**  **2.57B understand how the rate of transpiration is affected by changes in humidity, wind speed, temperature and light intensity**  **2.58B practical: investigate the role of environmental factors in determining the**  **rate of transpiration from a leafy shoot.** | **Activity:**   * Computer simulation of transpiration; use data to plot a graph.   **Class practical:**   * Use a potometer to investigate the effect of wind speed on transpiration rate.   **Demonstration:**   * Show a ‘weight’ potometer (Figure 11.19, Page 130) and a volume potometer (Figure 11.20, Page 131). | Edexcel International GCSE Biology Student Book: Pages 127–131  Edexcel International GCSE Biology Revision Guide: Page 46  **Practical:**  Practical guides containing student, teacher and technician guides are at:  http://www.biology-resources.com/biology-experiments2.html  <http://www.biology-resources.com/biology-experiments-sup.html> | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Innovation  Adaptability | Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Intellectual interest and curiosity  Self- regulation (metacognition, forethought, reflection)  Collaboration  Teamwork  Cooperation  Interpersonal skills |
| 29 | **Section 2: Structures and functions in living organisms**  h) Transport | Students will be assessed on their ability to:  **Humans**  **2.59** describe the composition of the blood: red blood cells, white blood cells, platelets and plasma  **2.60** understand the role of plasma in the transport of carbon dioxide, digested food, urea, hormones and heat energy  **2.61** understand how adaptations of red blood cells make them suitable for the transport of oxygen, including shape, the absence of a nucleus and the presence of haemoglobin. | **Activities:**  [Red blood cell jigsaw](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59798) from Cells Alive website.   * Virtual centrifugation of blood to discover solid and liquid fractions. * Students to produce presentations on red blood cell structural adaptations, shape adaptations or presence of haemoglobin for oxygen carriage. Create models of red blood cells using plasticine or playdough. | Edexcel International GCSE Biology Student Book: Pages 60–62  Edexcel International GCSE Biology Revision Guide: Page 22 | Critical thinking  Problem solving  Analysis  Reasoning  Adaptive learning  Creativity  Adaptability | Critical thinking  Problem solving  Analysis  Reasoning  Adaptive learning  Creativity  Intellectual interest and curiosity  Initiative  Self-direction  Responsibility  Communication |
| **30** | **Section 2: Structures and functions in living organisms**  h) Transport | Students will be assessed on their ability to:  **2.62** understand how the immune system responds to disease using white blood cells,  illustrated by phagocytes ingesting pathogens and lymphocytes releasing antibodies specific to the pathogen  **2.63B understand how vaccination results in the manufacture of memory cells, which enable future antibody production to the pathogen to occur sooner, faster and in greater quantity**  **2.64B understand how platelets are involved in blood clotting, which prevents blood loss and the entry of micro-organisms.** | **Activities:**   * Produce a mind map/spider diagram of how the immune system responds to disease. * Find out about Edward Jenner. * Produce a blood clotting flow diagram.   **Animations:**   * Resource on ActiveBook * Immunity [Ouch!](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59497) from Cells Alive website. * Antibody–antigen interaction.   **Class practical:**   * [Infectious disease - simulation](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=62400) (simulations showing how an infectious disease can spread through a human population). | Edexcel International GCSE Biology Student Book: Pages 61–62  ActiveBook: Page 62  Edexcel International GCSE Biology Revision Guide: Pages 22–23  **Video clips:**   * BBC clip 1838 ([phagocytosis](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59775)) (1min 9 sec) * BBC clip 2456 ([on Jenner](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59777)) (3 min 18 sec) * BBC – Don’t Die Young | Critical thinking  Problem solving  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Adaptability | Problem solving  Reasoning  Interpretation  Adaptive learning  Creativity  Initiative  Self-direction  Responsibility |
| 31 | **Section 2: Structures and functions in living organisms**  h) Transport | Students will be assessed on their ability to:  **2.65** describe the structure of the heart and how it functions  **2.66** explain how the heart rate changes during exercise and under the influence of adrenaline. | **Activities:**   * Undertake interactive task: [Heart](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59498). * Cloze loop of question and answer cards.   **Animation:**   * Various on the internet such as [howstuffworks](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59499).   **Class practicals:**   * Heart dissection. * Heart rate at different exercise levels; could also do before and after adrenaline flowing.   **Demonstration:**   * Data logger recording heart rate at varying exercise levels. | Edexcel International GCSE Biology Student Book: Pages 56–58  Edexcel International GCSE Biology Revision Guide: Page 21  Heart dissection practical on [SoB/Practicalbiology](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59487)  Also [SoB/Practicalbiology](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59487) for practical on effects of exercise on heart rate  **Video clip:**   * [Pumping myocytes](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59500) from Cells Alive website | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Creativity  Innovation  Adaptability | Problem solving  Analysis  Reasoning  Interpretation  Self- regulation (metacognition, forethought, reflection)  Collaboration  Teamwork  Cooperation  Interpersonal skills |
| 32 | **Section 2: Structures and functions in living organisms**  h) Transport | Students will be assessed on their ability to:  **2.68** understand how the structure of arteries, veins and capillaries relate to their function  **2.69** understand the general structure of the circulation system, including the blood vessels to and from the heart and lungs, liver and kidneys. | **Activities:**   * Students to make own route plans for a red blood cell travelling from one organ to another using a circulation system plan; then test fellow students in small groups. * Look at prepared slides of vessels to compare them. * Multimedia science school interactive software on transport.   **Animation:**   * BBC GCSE Bitesize ([introduction to blood](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59789)).   **Class practical:**   * Harvey’s vein demonstration to show valves in veins.   **Demonstration:**   * Hanging weights off circles of artery and vein dissected from heart and lungs to compare strength and elasticity | Edexcel International GCSE Biology Student Book: Pages 54–57 and 58–59  Edexcel International GCSE Biology Revision Guide: Pages 19–20  Observing blood circulation practical on [SoB/Practicalbiology](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59487)  **Software:**  <http://multimediasciencesimulations.com/demonstration.php>  **Video clips:**   * BBC clip 1466 ([heart activity, ECG](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59790))  (2 min 24 sec). * New Living body | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Adaptability | Intellectual interest and curiosity  Initiative  Self- regulation (metacognition, forethought, reflection)  communication |
| 33(a) | **Section 2: Structures and functions in living organisms**  h) **Transport** | Students will be assessed on their ability to:  **2.67** understand how factors may increase the risk of developing coronary heart disease. | **Activity:**   * Produce a leaflet to inform people on what heart disease is and the factors that increase the risks of developing it. | **Video clips:**   * BBC – Don’t Die Young (Alice Roberts) * C4 “Bodystory”   **Website:**  British Heart Foundation;  https://www.bhf.org.uk/ | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Personal and social responsibility  Adaptability | Reasoning  Interpretation  Adaptive learning  Creativity  Initiative  Self-direction  Responsibility  Communication  Collaboration  Teamwork  Cooperation |
| 33(b) | **Section 2: Structures and functions in living organisms** | Consolidation and assessment |  | Edexcel International GCSE Biology Student Book questions – Pages 63–64 and 133–134  Self- assessment test – Page 64 on ActiveBook  Edexcel International GCSE Biology Revision Guide: Pages 23–24 and 46–48 | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Innovation  Personal and social responsibility  Adaptability | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Continuous learning  Self-direction  Responsibility  Perseverance  Self- regulation (metacognition, forethought, reflection)  Integrity  Self-monitoring/self- evaluation/self -reinforcement |
| 34 | **Section 2: Structures and functions in living organisms**  i) Excretion | Students will be assessed on their ability to:  **Flowering plants**  **2.70** understand the origin of carbon dioxide and oxygen as waste products of metabolism and their loss from the stomata of a leaf  **Humans**  **2.71** know the excretory products of the lungs, kidneys and skin (organs of excretion)  **2.72B understand how the kidney carries out its roles of excretion and osmoregulation**  **2.73B describe the structure of the urinary system, including the kidneys, ureters, bladder and urethra.** | **Activity:**   * Make a table to state organs of excretion and what is excreted and why.   **Class practical:**   * Kidney dissection. | Edexcel International GCSE Biology Student Book: Pages 85–86  Edexcel International GCSE Biology Revision Guide: Pages 32–33  **Video clip:**   * BBC clip 5370 ([kidney structure and function](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59791)) (3 min 18 sec)   NB: Video could be used as an alternative to dissection. | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Adaptability | Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Initiative  Self-direction |
| 35 | **Section 2: Structures and functions in living organisms**  i) Excretion | Students will be assessed on their ability to:  **2.74B describe the structure of a nephron, including the Bowman’s capsule and glomerulus, convoluted tubules, loop of Henle and collecting duct**  **2.75B describe ultrafiltration in the Bowman’s capsule and the composition of the glomerular filtrate**  **2.76B understand how water is reabsorbed into the blood from the collecting duct**  **2.77B understand why selective reabsorption of glucose occurs at the proximal convoluted tubule.** | **Activities:**   * Make notes from resource on ActiveBook. * ‘Snap’ match structure to function for parts of a nephron.   **Animation:**   * See resource above.   AFL: opportunity for students to produce a table of differences between selective reabsorption and ultrafiltration.  **Class practical:**   * Comparing “mock urine” samples to identify and explain presence of protein (high blood pressure), glucose (diabetes) and high concentration due to dehydration (dark colour). This revisits food tests. | Edexcel International GCSE Biology Student Book: Pages 86–89  ActiveBook: Page 87  Edexcel International GCSE Biology Revision Guide: Pages 32–33 | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Adaptability | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Intellectual interest and curiosity  Initiative  Self-direction  Perseverance  Productivity  Self- regulation (metacognition, forethought, reflection)  Self- presentation |
| 36 | **Section 2: Structures and functions in living organisms**  i) Excretion | Students will be assessed on their ability to:  **2.78B describe the role of ADH in regulating the water content of the blood**  **2.79B understand that urine contains water, urea and ions.** | **Activity:**   * Students could explore [howstuffworks](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59499) website for ADH function. * Multimedia science school interactive software.   AFL: opportunity for students to produce a table of differences between excretion and egestion. | Edexcel International GCSE Biology Student Book: Pages 89–90  Edexcel International GCSE Biology Revision Guide: Page 33  **Video clip:**  BBC– Don’t Die Young | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Adaptability | Problem solving  Analysis  Reasoning  Interpretation  Initiative  Self-direction  Responsibility  Perseverance  Self- presentation |
| **37** | **Section 2: Structures and functions in living organisms**  **j)** Coordination and response | Students will be assessed on their ability to:  **2.80** understand how organisms are able to respond to changes in their environment  **2.81** understand that homeostasis is the maintenance of a constant internal environment, and that body water content and body temperature are both examples of homeostasis  **2.82** understand that a co-ordinated response requires a stimulus, a receptor and an effector. | **Activity:**   * Students could list the receptor and effector for each image of a stimulus presented. * [Thermoregulation worksheet.](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59501)   **Class practical:**   * Assessing skin sensitivity to temperature.   **Demonstration:**   * Water (sweat) level and temperature before and after exercise. | Edexcel International GCSE Biology Student Book: Pages 65–66, 83–84 and 90–93  Edexcel International GCSE Biology Revision Guide: Pages 24–25 and 33–34  Skin sensitivity practical on SoB/Practicalbiology  **Video clips:**   * Stimulus–response * New living body (marathon) | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Creativity  Innovation  Adaptability | Critical thinking  Problem solving  Analysis  Reasoning  Creativity  Innovation  Initiative  Self-direction  Communication  Collaboration  Teamwork  Cooperation  Interpersonal skills  Self- presentation |
| **38** | **Section 2: Structures and functions in living organisms**  **j)** Coordination and response | Students will be assessed on their ability to:  **Flowering plants**  **2.83** understand that plants respond to stimuli  **2.84** describe the geotropic and phototropic responses of roots and stems  **2.85** understand the role of auxin in the phototropic response of stems. | **Activity:**   * Plant responses to stimuli.   **Demonstration:**   * Experiments 13–15: Which part of a shoot is sensitive to light, Effects of auxin in lanolin on growth of coleoptiles, and use of clinostat to show geotropism in roots.   **Class practicals:**   * Placing cress with light from one direction. * Investigating the effects of auxin on tips of oat or wheat coleoptiles. | Edexcel International GCSE Biology Student Book: Pages 135–141  Edexcel International GCSE Biology Revision Guide: Pages 48–49  **Practical:**  Experiment 13 – Page 139, Experiment 14 –Page 140 and Experiment 15 – Page 141 of Student Book  Activity on plant response to stimuli from [SoB/Practicalbiology](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59487)  Practical guides containing student, teacher and technician guides are at:  http://www.biology-resources.com/biology-experiments2.html  <http://www.biology-resources.com/biology-experiments-sup.html>  **Video clip:**   * [Phototropism time-lapse video from YouTube](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59502) | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Creativity  Innovation  Adaptability | Problem solving  Analysis  Reasoning  Interpretation  Decision making  Intellectual interest and curiosity  Initiative  Communication  Collaboration  Teamwork  Cooperation  Interpersonal skills  Leadership |
| **39** | **Section 2: Structures and functions in living organisms**  **j)** Coordination and response | Students will be assessed on their ability to:  **Humans**  **2.86** describe how nervous and hormonal communication control responses and understand the differences between the two systems  **2.87** understand that the central nervous system consists of the brain and spinal cord and is linked to sense organs by nerves  **2.88** understand that stimulation of receptors in the sense organs sends electrical impulses along nerves into and out of the central nervous system, resulting in rapid responses  **2.89** understand the role of neurotransmitters at synapses  **2.90** describe the structure and functioning of a simple reflex arc illustrated by the withdrawal of a finger from a hot object. | **Activity:**   * View model of the vertebral column to recognise position of spinal cord, etc.   **Animation:**   * See Living Body video.   **Class practicals:**   * Comparing reaction speeds of sight and touch when catching a falling ruler. * Investigating the sensitivities of different areas of skin. | Edexcel International GCSE Biology Student Book: Pages 65–68 and 72–75  Edexcel International GCSE Biology Revision Guide: Pages 24–26 and 31  **Practical:**  Practical guides containing student, teacher and technician guides are at: http://www.biology-resources.com/biology-experiments2.html  <http://www.biology-resources.com/biology-experiments-sup.html>  Measuring reaction practical on [SoB/Practicalbiology](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59487)  **Video clip:**   * Living Body | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Creativity  Innovation  Adaptability | Reasoning  Interpretation  Decision making  Self-direction  Communication  Collaboration  Teamwork  Cooperation  Interpersonal skills  Leadership  Responsibility |
| **40** | **Section 2: Structures and functions in living organisms**  **j)** Coordination and response | Students will be assessed on their ability to:  **2.91** describe the structure and function of the eye as a receptor  **2.92** understand the function of the eye in focusing on near and distant objects, and in responding to changes in light intensity. | **Activity:**   * View a model of the eye.   **Animation:**  [Sight animation](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59503).  **Class practicals:**   * Eye dissection. * Iris reflex. * Investigating distance judgement and link to eye position of prey and predators.   **Demonstration:**   * Eye test experiments / colour vision. * Demonstrate focusing in the eye using a model in which lens can change shape. * Demonstrate eye dominance / blind spots. | Edexcel International GCSE Biology Student Book: Pages 68–71  Edexcel International GCSE Biology Revision Guide: Pages 26–27  **Practical:**  Practical guides containing student, teacher and technician guides are at: http://www.biology-resources.com/biology-experiments2.html  <http://www.biology-resources.com/biology-experiments-sup.html>  **Video clip:**   * BBC clip 6016 ([eye structure and function](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59779) plus focusing and varying light intensity response) (4 min 2 sec) | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Creativity  Innovation  Adaptability | Analysis  Reasoning  Interpretation  Initiative  Self-direction  Productivity  Self- regulation (metacognition, forethought, reflection) |
| **41(a)** | **Section 2: Structures and functions in living organisms**  **j)** Coordination and response | Students will be assessed on their ability to:  **2.93** describe the role of the skin in temperature regulation, with reference to sweating, vasoconstriction and vasodilation  **2.94** understand the sources, roles and effects of the following hormones: adrenaline,  insulin, testosterone, progesterone and oestrogen  **2.95B understand the sources, roles and effects of the following hormones: ADH,**  **FSH and LH.** | **Activity:**   * Match the sources, roles and effects, possibly as a series of cards so that students form correct triplets. * Interactive software package on menstrual cycle (http://multimediasciencesimulations.com/biology.php)   **Class practical:**   * Whether adrenaline alters ability on [Shooting Sheep Game](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59504). | Edexcel International GCSE Biology Student Book: Pages 78–81  Edexcel International GCSE Biology Revision Guide: Pages 33–34  **Video clips:**   * Living Body (Hormones) * BBC – Don’t Die Young (skin) | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Creativity  Innovation  Adaptability | Problem solving  Analysis  Reasoning  Interpretation  Initiative  Self-direction |
| 41(b) | **Section 2: Structures and functions in living organisms** | Consolidation and assessment |  | Edexcel International GCSE Biology Student Book questions – Pages 76–77, 82, 94–95 and 142  Self- assessment on Pages 77, 82, 95 and 142 of ActiveBook  Edexcel International GCSE Biology Revision Guide Pages 27–29, 34–35 and 50 | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Creativity  Innovation  Adaptability | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Creativity  Continuous learning  Initiative  Self-direction  Responsibility  Perseverance  Self- regulation (metacognition, forethought, reflection)  Integrity  Self- monitoring/self- evaluation/self- reinforcement |
| **42** | **Section 3: Reproduction and inheritance**  **a)** Reproduction | Students will be assessed on their ability to:  3.1 understand the differences between sexual and asexual reproduction  **3.2** understand that fertilisation involves the fusion of a male and female gamete to produce a zygote that undergoes cell division and develops into an embryo  ***Flowering plants***  **3.3** describe the structures of an insect-pollinated and a wind-pollinated flower and explain how each is adapted for pollination. | **Activities:**   * Build a model of an insect-pollinated flower. * Table to compare insect- and wind- pollinated flower structure. * Research effect of reduced bee numbers on pollination by using two different sources, for example [Telegraph Science](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59505) and [BBC News](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59506).   **Animation:**   * Resource on ActiveBook.   **Class practical:**   * Flower dissection. | Edexcel International GCSE Biology Student Book: Pages 96–97, and 143 and 144  ActiveBook: Page 79  Edexcel International GCSE Biology Revision Guide: Pages 50–51  **Video clip:**  BBC – Private Life of plants – flowering | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Adaptability | Problem solving  Reasoning  Interpretation  Creativity  Intellectual interest and curiosity  Initiative  Self-direction  Communication  Self- presentation |
| **43** | **Section 3: Reproduction and inheritance**  **a)** Reproduction | Students will be assessed on their ability to:  **3.3** describe the structures of an insect-pollinated and a wind-pollinated flower and  explain how each is adapted for pollination  **3.4** understand that the growth of the pollen tube followed by fertilisation leads to seed  and fruit formation  **3.5** *practical: investigate the conditions needed for seed germination*  **3.6** understand how germinating seeds utilise food reserves until the seedling can carry  out photosynthesis  **3.7** understand that plants can reproduce asexually by natural methods (illustrated by runners) and by artificial methods (illustrated by cuttings). | **Animation:**   * Resource on ActiveBook.   **Demonstrations:**   * Take cuttings. * Fruit demonstration showing the different methods for seed dispersal. * Observe pollen tube growth in flowers such as the lily. * Demonstrate different asexual methods such as spider plants.   **Class practical:**   * Conditions required for seed germination (placing cress seeds in conditions lacking one factor). | Edexcel International GCSE Biology Student Book:Pages 145–147  ActiveBook: Page 144  Edexcel International GCSE Biology Revision Guide: Pages 50–52  **Video clip:**  BBC – Private Life of plants – travelling  **Practical:**  Practical guides containing student, teacher and technician guides are at: http://www.biology-resources.com/biology-experiments2.html  <http://www.biology-resources.com/biology-experiments-sup.html> | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Innovation  Adaptability | Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Initiative  Self-direction  Responsibility  Creativity  Innovation  Adaptability  Collaboration  Teamwork  Cooperation  Interpersonal skills |
| **44** | **Section 3: Reproduction and inheritance**  **a)** Reproduction | Students will be assessed on their ability to:  **Humans**  **3.8** understand how the structure of the male and female reproductive systems are adapted for their functions  **3.9** understand the roles of oestrogen and progesterone in the menstrual cycle  **3.10B understand the roles of FSH and LH in the menstrual cycle**  **3.13** understand the roles of oestrogen and testosterone in the development of secondary sexual characteristics. | **Activities:**   * Label male and female reproductive systems and state functions. * Summarise in a table the four hormones, functions and sites of production. * Summarise primary and secondary sexual characteristics.   **Animation:**   * Resource on ActiveBook. | Edexcel International GCSE Biology Student Book: Pages 96–101  ActiveBook: Page 99  Edexcel International GCSE Biology Revision Guide Pages 35–36  **Video clip:**  C4– Body story – teen dreams | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Personal and social responsibility  Adaptability | Problem solving  Analysis  Reasoning  Interpretation  Initiative  Self-direction  Responsibility  Perseverance  Self- regulation (metacognition, forethought, reflection) |
| **45(a)** | **Section 3: Reproduction and inheritance**  **a)** Reproduction | Students will be assessed on their ability to:  **3.11** describe the role of the placenta in the nutrition of the developing embryo  **3.12** understand how the developing embryo is protected by amniotic fluid. | **Activity:**   * View different representations of the menstrual cycle and link together (for example Figure 9.11 Page 102 and Figure 9.12 Page 103).   **Animation:**   * Resource on ActiveBook (students to complete). | Edexcel International GCSE Biology Student Book: Pages 101–104  ActiveBook: Page 103  Edexcel International GCSE Biology Revision Guide: Pages 37  **Video clips:**   * BBC clip 1851 ([role of placenta](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59792))  (3 min 9 sec) * C4 – Body story – the takeover | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Adaptability | Analysis  Reasoning  Interpretation  Initiative  Self-direction  Perseverance |
| **45(b)** | Section 3: Reproduction and inheritance | Consolidation and assessment |  | Edexcel International GCSE Biology Student Book questions – Pages 105–106 and 150–151  Self- assessment on Pages 106 and 149 of ActiveBook  Edexcel International GCSE Biology Revision Guide: Pages 38–39 and 53–54 | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Innovation  Personal and social responsibility  Adaptability | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Continuous learning  Self-direction  Perseverance  Self -regulation (metacognition, forethought, reflection)  Integrity  Self- monitoring/self- evaluation/self –reinforcement |
| **46(a)** | **Section 3: Reproduction and inheritance**  **b)** Inheritance | Students will be assessed on their ability to:  **3.14** understand that the genome is the entire DNA of an organism and that a gene is a section of a molecule of DNA that codes for a specific protein  **3.15** understand that the nucleus of a cell contains chromosomes on which genes are located  **3.16B describe a DNA molecule as two strands coiled to form a double helix, the strands being linked by a series of paired bases: adenine (A) with thymine (T), and cytosine (C) with guanine (G).** | **Activities:**   * Make a ‘big (cell) to small (bases)’ flow diagram. * Build a paper / origami DNA model.   **Animation:**   * Resources on ActiveBook.   **Class practical:**   * DNA extraction from onions / kiwi fruit. | Edexcel International GCSE Biology Student Book: Pages 181–187  ActiveBook: Pages 181 and 182  Edexcel International GCSE Biology Revision Guide: Page 67  NCBE website for ‘[DNA your onions?](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59793)’ protocol | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Adaptability | Problem solving  Analysis  Reasoning  Interpretation  Initiative  Self-direction  Responsibility  Perseverance  Communication |
| **46(b)** | **Section 3: Reproduction and inheritance**  **b)** Inheritance | Students will be assessed on their ability to:  **3.18B describe the stages of protein synthesis including transcription and translation, including the role of mRNA, ribosomes, tRNA, codons and anticodons**  **3.19** understand how genes exist in alternative forms called alleles which give rise to differences in inherited characteristics  **3.20** understand the meaning of the terms: dominant, recessive, homozygous, heterozygous, phenotype, and genotype  **3.21B understand the meaning of the term codominance.** | **Activities:**   * Produce a cartoon strip / storyboard showing the steps in protein synthesis. * Investigate protein synthesis on the web (www.dnai.org). * Cloze loop activity with questions and answers on genetic terms. * Genetics crossword for terms.   **Demonstration:**   * Ability to taste PTC. | Edexcel International GCSE Biology Student Book :Pages 182–183  **Website:**  http://www.dnai.org/ | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Adaptability | Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Intellectual interest and curiosity  Initiative  Self-direction  Responsibility  Self- presentation |
| **47** | **Section 3: Reproduction and inheritance**  **b)** Inheritance | Students will be assessed on their ability to:  **3.22** understand that most phenotypic features are the result of polygenic inheritance rather than single genes  **3.23** describe patterns of monohybrid inheritance using a genetic diagram  **3.24** understand how to interpret family pedigrees  **3.25** predict probabilities of outcomes from monohybrid crosses  **3.26** understand how the sex of a person is controlled by one pair of chromosomes, XX in a female and XY in a male  **3.27** describe the determination of the sex of offspring at fertilisation, using a genetic diagram. | **Activities:**   * Carry out a range of crosses. * Various on the internet, for example [Monohybrid crosses](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59508). * Interactive software package on inheritance on Multimedia Science School. | Edexcel International GCSE Biology Student Book:Pages 197- 205  ActiveBook: Page 191  Edexcel International GCSE Biology Revision Guide: Pages 69–71 and 75  **Video clips:**   * BBC clip 10652 ([genetics of sex determination](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59781)) (2 min 40 sec) * BBC clip 10651 (introduction to terms dominant and recessive) (1 min 19 sec) * BBC clip 10653 ([mutations and genetic diseases](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59784); describes cystic fibrosis and Down’s syndrome) (3 min 41 sec) | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Adaptability | Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Intellectual interest and curiosity  Initiative  Self-direction |
| **48** | **Section 3: Reproduction and inheritance**  **b)** Inheritance | Students will be assessed on their ability to:  **3.28** understand how division of a diploid cell by mitosis produces two cells that contain  identical sets of chromosomes  **3.29** understand that mitosis occurs during growth, repair, cloning and asexual reproduction  **3.30** understand how division of a cell by meiosis produces four cells, each with half the number of chromosomes, and that this results in the formation of genetically different haploid gametes  **3.31** understand how random fertilisation produces genetic variation of offspring  **3.32** know that in human cells the diploid number of chromosomes is 46 and the haploid number is 23. | **Activities:**   * Compare identical and non-identical twins. * Use resource on ActiveBook and [BBC clip 6022](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59780) to compare mitosis and meiosis. * Use pipe cleaners and plasticine to model mitosis.     **Interactive software:**  Multimedia Science School – cell division  **Animation:**   * Cells Alive website for mitosis and meiosis. | Edexcel International GCSE Biology Student Book: Pages 190–194  Edexcel International GCSE Biology Revision Guide: Pages 68 and 71  **Video clip:**   * BBC clip 6022 ([mitosis and meiosis](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59780))  (2 min 24 sec) | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Adaptability | Problem solving  Reasoning  Interpretation  Adaptive learning  Creativity  Intellectual interest and curiosity  Initiative |
| **49** | **Section 3: Reproduction and inheritance**  **b)** Inheritance | Students will be assessed on their ability to:  **3.33** understand that variation within a species can be genetic, environmental, or a  combination of both  **3.34** understand that mutation is a rare, random change in genetic material that can be inherited  **3.35B understand how a change in DNA can affect the phenotype by altering the**  **sequence of amino acids in a protein**  **3.36B understand how most genetic mutations have no effect on the phenotype, some have a small effect and rarely do they have a significant effect**  **3.37B understand that the incidence of mutations can be increased by exposure to ionising radiation (for example, gamma rays, x-rays and ultraviolet rays) and some chemical mutagens (for example, chemicals in tobacco).** | **Activities:**   * Research effects of mutation in areas where radioactivity has been high (Chernobyl, Hiroshima). * Investigate radon distribution around UK and its effects (http://www.ukradon.org/information/ukmaps)   **Demonstration:**  [How to make a DNA model with a mutation](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59510).  **Class practical:**   * Collect class data on: earlobes, eye colour, hair colour, tongue rolling and height. Data can be presented in a table and one characteristic presented graphically. Compare height with other traits. | Edexcel International GCSE Biology Student Book: Pages 183–184 and 193–194  Edexcel International GCSE Biology Revision Guide: Pages 68 and 71  **Web page:**  (http://www.ukradon.org/information/ukmaps) | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Personal and social responsibility  Adaptability | Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Intellectual interest and curiosity  Initiative  Self- regulation (metacognition, forethought, reflection)  Ethics  Integrity  Self- monitoring/self- evaluation/self reinforcement  Communication |
| **50(a)** |  | Students will be assessed on their ability to:  **3.38** explain Darwin’s theory of evolution by natural selection  **3.39** understand how resistance to antibiotics can increase in bacterial populations, and appreciate how such an increase can lead to infections being difficult to control. | **Activities:**   * Students to find out about the life of Charles Darwin. * To write an article for a magazine to explain how the giraffe evolved to have a long neck. * Analyse data on the increase in MRSA cases.   **Animation:**   * Resource on ActiveBook.   **Demonstrations:**   * Computer simulations of evolution. * Antibiotic resistance using antibiotic multi-discs.   **Class practical:**   * Simple models for natural selection. | Edexcel International GCSE Biology Student Book: Pages 208–216  ActiveBook: Page 210  Edexcel International GCSE Biology Revision Guide: Pages 77–79  Models for natural selection from [SoB/Practicalbiology](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59487)  [Antibiotic Resistance, Mutation Rates and MRSA](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=61735)  **Video clips:**   * BBC clip 5519 ([Darwin – On the Origin of Species’](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59794)). * BBC – Great Britons – Darwin | Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Adaptability | Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Initiative  Self-direction  Responsibility  Perseverance  Productivity  Self- regulation (metacognition, forethought, reflection)  Self- monitoring/self- evaluation/self -reinforcement  Communication |
| **50(b)** | **Section 3: Reproduction and inheritance** | Consolidation and assessment | * Introduce examination-style questions on the topics covered, with a focus on genetic crosses and family pedigrees. | Edexcel International GCSE Biology Student Book questions – Pages: 188–189, 195–196, 206–207 and 217  Self- assessment on Pages: 189, 196, 207 and 217 of ActiveBook  Edexcel International GCSE Biology Revision Guide Pages: 68–69, 72, 76–77 and 79–80 | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Creativity  Innovation  Personal and social responsibility  Adaptability | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Creativity  Innovation  Personal and social responsibility  Continuous learning  Self-direction  Responsibility  Perseverance  Self- regulation (metacognition, forethought, reflection)  Integrity  Self- monitoring/self- evaluation/self –reinforcement |
| **51** | **Section 4: Ecology and the environment**  **a)** The organism in the environment | Students will be assessed on their ability to:  **4.1** understand the terms population, community, habitat and ecosystem  **4.2** practical: investigate the population size of an organism in two different areas using quadrats  **4.5** understand how abiotic and biotic factors affect the population size and distribution of Organisms. | **Class practicals:**   * Using quadrats to sample from a habitat. * Use quadrats to randomly sample one species in two different areas, for example sunny and shaded areas, to find population sizes. | Edexcel International GCSE Biology Student Book: Pages 152–154  Edexcel International GCSE Biology Revision Guide: Page 56  Experiment 16 – Page 154 of Student Book  Distribution of *Pleurococcus* from [SoB/Practicalbiology](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59487) | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Innovation  Adaptability | Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Initiative  Self-direction  Responsibility  Communication  Collaboration  Teamwork  Cooperation  Interpersonal skills  Leadership |
| **52** | **Section 4: Ecology and the environment**  **b)** Feeding relationships | Students will be assessed on their ability to:  **4.3B understand the term biodiversity**  **4.4B practical: investigate the distribution of organisms in their habitats and**  **measure biodiversity using quadrats**  **4.6** understand the names given to different trophic levels, including producers, primary,  secondary and tertiary consumers and decomposers  **4.7** understand the concepts of food chains, food webs, pyramids of number, pyramids of biomass and pyramids of energy transfer. | **Activities:**   * Produce a poster of a food web. Could use images from magazines/internet etc. to illustrate the poster. * Construct a pyramid of energy on graph paper using data from Figure 14.12 Page 158. * Carry out a belt transect, using a quadrat and tape measure/rope, to determine the distribution of one organism, for example up a rocky shore, away from a pond or tree. * Multimedia Science School food web simulation.   **Animation:**   * Resources on ActiveBook. | Edexcel International GCSE Biology Student Book: Pages 155–158  Three resources on Page 155 of ActiveBook: interdependence, food chains and webs, food webs and pyramids  Edexcel International GCSE Biology Revision Guide: Pages 56–57  **Video clips:**   * BBC clip 10600 ([introduction to food chains](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59795)) (2 min 51 sec) * BBC clip 201 ([pyramid of numbers](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59796))  (1 min 16 sec) | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Innovation  Adaptability | Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Initiative  Self-direction  Responsibility  Productivity  Communication  Collaboration  Teamwork  Cooperation  Interpersonal skills  Leadership  Responsibility |
| **53** | **Section 4: Ecology and the environment**  **b)** Feeding relationships | Students will be assessed on their ability to:  **4.8** understand the transfer of substances and energy along a food chain  **4.9** understand why only about 10% of energy is transferred from one trophic level to the next. | **Activities:**   * Use information to explain why food chains tend to be relatively short. * Interconvert percentage and energy units as they move along food chain.   **Demonstration:**   * Effect of moving fingers in water on water temperature to illustrate heat loss. | Edexcel International GCSE Biology Student Book: Pages 157–158  Edexcel International GCSE Biology Revision Guide: Page 57  **Video clip:**   * BBC clip 200 ([reasons for only 10% energy transfer in food chains](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59797)) (3 min 37 sec) | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Adaptability | Problem solving  Analysis  Reasoning  Interpretation |
| **54** | **Section 4: Ecology and the environment**  **c)** Cycles within ecosystems | Students will be assessed on their ability to:  **4.10** describe the stages in the carbon cycle, including respiration, photosynthesis,  decomposition and combustion  **4.11B describe the stages in the nitrogen cycle, including the roles of nitrogen fixing bacteria, decomposers, nitrifying bacteria.** | **Activity:**   * Produce a presentation/poem/song etc. about the carbon cycle.   **Animation:**   * Resource on ActiveBook (carbon cycle). * Water cycle   **Class practical:**   * ‘Microbes ate my homework’.   **Demonstration:**   * Nitrifying bacteria in soil practical. | Edexcel International GCSE Biology Student Book: Pages 159–161  ActiveBook: Page 159  Edexcel International GCSE Biology Revision Guide: Pages 57–59  ‘Microbes ate my homework’ practical from [SoB/Practicalbiology](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59487)  **Practical:**  Practical guides containing student, teacher and technician guides are at:  http://www.biology-resources.com/biology-experiments2.html  <http://www.biology-resources.com/biology-experiments-sup.html>  **Video clip:**   * Bellamy Rides Again – Carbon cycle / Nitrogen cycle * BBC– Strange Science of decay | Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Personal and social responsibility  Adaptability | Interpretation  Adaptive learning  Creativity  Innovation  Personal and social responsibility  Intellectual interest and curiosity  Initiative  Self-direction  Responsibility  Self- regulation (metacognition, forethought, reflection)  Ethics  Self- monitoring/self -evaluation/self -reinforcement  Communication  Self presentation |
| **55** | **Section 4: Ecology and the environment**  **d)** Human influences on the environment | Students will be assessed on their ability to:  **4.12** understand the biological consequences of pollution of air by sulfur dioxide and  carbon monoxide  **4.13** understand that water vapour, carbon dioxide, nitrous oxide, methane and CFCs are  greenhouse gases  **4.14** understand how human activities contribute to greenhouse gases  **4.15** understand how an increase in greenhouse gases results in an enhanced greenhouse effect and that this may lead to global warming and its consequences  **4.18B understand the effects of deforestation, including leaching, soil erosion, disturbance of evapotranspiration and the carbon cycle, and the balance of**  **atmospheric gases.** | **Activities:**   * Relate how a greenhouse works with the enhanced greenhouse effect. * Produce a summary poster with each pollutant, what produces them and their effects.   **Animation:**   * Resource on ActiveBook.   **Class practical:**   * Effect of different sulfur dioxide concentrations on mustard seed germination and seedling growth.   **Demonstration:**   * Effect of carbon dioxide gas in a jar on rate of cooling.   **Video clip:**   * Resource on ActiveBook. | Edexcel International GCSE Biology Student Book :Pages 170–173  ActiveBook: Page 171  Edexcel International GCSE Biology Revision Guide: Pages 61–63  Resources on global warming (animation) and greenhouse effect (video)  **Video clip:**  BBC – Britain Under Threat | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Personal and social responsibility  Adaptability | Interpretation  Adaptive learning  Creativity  Innovation  Personal and social responsibility  Intellectual interest and curiosity  Initiative  Self-direction  Productivity  Self- regulation (metacognition, forethought, reflection)  Ethics  Communication  Self presentation |
| **56(a)** | **Section 4: Ecology and the environment**  **d)** Human influences on the environment | Students will be assessed on their ability to:  **4.16** understand the biological consequences of pollution of water by sewage  **4.17** understand the biological consequences of eutrophication caused by leached minerals  from fertiliser. | **Activities:**   * Offer students two newspaper articles on deforestation to compare. * Poster.   **Animation:**   * Resource on ActiveBook. | Edexcel International GCSE Biology Student Book: Pages 173–176  ActiveBook: Page 173  Edexcel International GCSE Biology Revision Guide: Pages 61–63 | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Personal and social responsibility  Adaptability | Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Intellectual interest and curiosity  Self-direction  Self- regulation (metacognition, forethought, reflection)  Ethics  Integrity  Communication  Self presentation |
| **56(b)** | **Section 4: Ecology and the environment** | Consolidation and assessment | Introduce examination-style questions on the topics covered, with a focus on designing your own practical. | Edexcel International GCSE Biology Student Book questions – Pages :162–163, 177–178 and 225–226  Self- assessment on Pages: 163, 178 and 225 of ActiveBook  Edexcel International GCSE Biology Revision Guide Pages: 59–61, 63–65 and 83–84 | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Executive function  Creativity  Innovation  Personal and social responsibility  Adaptability | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Continuous learning  Initiative  Self-direction  Responsibility  Perseverance  Self- regulation (metacognition, forethought, reflection)  Self- monitoring/self- evaluation/self- reinforcement  Assertive communication  Self- presentation |
| **57** | **Section 5: Use of biological resources**  **a)** Food production  **b)** Selective breeding | Students will be assessed on their ability to:  ***Crop plants***  **5.1** describe how glasshouses and polythene tunnels can be used to increase the yield of certain crops  **5.2** understand the effects on crop yield of increased carbon dioxide and increased temperature in glasshouses  **5.3** understand how the use of fertiliser can increase crop yield  **5.4** understand the reasons for pest control and the advantages and disadvantages of using pesticides and biological control with crop plants  ***Fish farming***  **5.9B understand the methods used to farm large numbers of fish to provide a source of protein, including maintaining water quality, controlling intraspecific and interspecific predation, controlling disease, removing waste products, controlling the quality and frequency of feeding, and selective breeding**  **5.10** understand how selective breeding can develop plants with desired characteristics  **5.11** understand how selective breeding can develop animals with desired characteristics. | Activities:   * Assign students specific details about advantages and disadvantages of pesticide or biological control to allow group discussions. * Students to suggest features to select for when breeding cattle and wheat or rice. * Design a sustainable fish farm that minimises pollution and spread of disease. * Choose one animal and one plant and explain how it has been selectively bred.   **Animation:**   * Resource on ActiveBook.   AFL: opportunity for students to produce a table to compare artificial selection (as in selective breeding) with natural selection and water pollution by sewage and by fertiliser. | Edexcel International GCSE Biology Student Book Pages: 164–170 and 218–221  ActiveBook: Page 175  Edexcel International GCSE Biology Revision Guide Pages: 61–62 and 81  **Web page:**  Different animal varieties (<http://www.ansi.okstate.edu/breeds/cattle>)  **Video clips:**  Salmon farming: <https://www.youtube.com/watch?v=o0Xxypp39Sg>  <https://www.youtube.com/watch?v=qYCEGtMdORU>  environmental impacts:  <https://www.youtube.com/watch?v=kA5_y73pc4A>  Selective breeding:  DVD Channel 4 “Animal farm” episode 1 (https://www.youtube.com/watch?v=8JqZvE55a\_U) | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Creativity  Innovation  Personal and social responsibility  Adaptability | Problem solving  Reasoning  Interpretation  Decision making  Creativity  Innovation  Intellectual interest and curiosity  Initiative  Self-direction  Responsibility  Productivity  Self- regulation (metacognition, forethought, reflection)  Ethics  Integrity  Communication  Collaboration  Teamwork  Cooperation  Interpersonal skills  Leadership  Responsibility  Assertive communication  Self- presentation |
| **58** | **Section 5: Use of biological resources**  **a)** Food production | Students will be assessed on their ability to:  ***Microorganisms***  **5.5** understand the role of yeast in the production of food including bread  **5.6** *practical: investigate the role of anaerobic respiration by yeast in different conditions*  **5.7** understand the role of bacteria (*Lactobacillus*) in the production of yoghurt  **5.8** understand the use of an industrial fermenter and explain the need to provide suitable conditions in the fermenter, including aseptic precautions, nutrients, optimum temperature and pH, oxygenation and agitation, for the growth of microorganisms. | **Activity:**   * Build a paper model of a fermenter. Label and annotate it.   **Animation:**   * Resources on ActiveBook.   **Class practicals:**   * Demonstrating the products of anaerobic respiration in yeast. * Making yoghurt. * Baking bread.   **Demonstration:**   * Set up a fermenter or biogas digester. | Edexcel International GCSE Biology Student Book: Pages 228–233  ActiveBook: Pages 228, 231 and 233  Edexcel International GCSE Biology Revision Guide: Pages 85–86 and 87  Experiment 17 – Page 232 of Student Book  [NCBE website – Practical fermentation](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59612)  **Video clip:**   * BBC clip 4198 ([use of microbes in the food and drink industry](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59785)) (2 min 5 sec) | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Decision making  Adaptive learning  Creativity  Innovation  Personal and social responsibility  Adaptability | Problem solving  Analysis  Reasoning  Interpretation  Initiative  Self-direction  Responsibility  Productivity  Collaboration  Teamwork  Cooperation  Interpersonal skills  Leadership |
| **59** | **Section 5: Use of biological resources**  **c)** Genetic modification (genetic engineering) | Students will be assessed on their ability to:  **5.12** understand how restriction enzymes are used to cut DNA at specific sites and ligase enzymes are used to join pieces of DNA together  **5.13** understand how plasmids and viruses can act as vectors, which take up pieces of DNA, and then insert this recombinant DNA into other cells  **5.14** understand how large amounts of human insulin can be manufactured from genetically modified bacteria that are grown in a fermenter  **5.15** understand how genetically modified plants can be used to improve food production  **5.16** understand that the term transgenic means the transfer of  genetic material from one species to a different species. | **Activities:**   * Shuffle a series of statements or diagrams to describe the GM process. * Weigh up arguments in favour of and against the use of GMOs ([arguments for GMOs](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=62398) and [arguments against GMOs](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=62399)).   **Animation:**   * Resource on ActiveBook. | Edexcel International GCSE Biology Student Book: Pages 235–243  ActiveBook: Pages 235 (video) and 238 (animation)  Edexcel International GCSE Biology Revision Guide: Pages 89–90  **Video clips:**   * Resource on ActiveBook * [Dnatube - Bacteria: genetic engineering](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59511) * DVD Channel 4 –Animal farm <https://www.youtube.com/watch?v=8JqZvE55a_U> (animals and golden rice) |  | Intellectual interest and curiosity  Initiative  Self-direction  Responsibility  Productivity  Self- regulation (metacognition, forethought, reflection)  Ethics  Integrity  Communication  Collaboration  Teamwork  Cooperation  Leadership  Responsibility  Assertive communication  Self- presentation |
| **60(a)** | **Section 5: Use of biological resources**  **d)** Cloning | Students will be assessed on their ability to:  **5.17B describe the process of micropropagation (tissue culture) in which explants are grown *in vitro***  **5.18B understand how micropropagation can be used to produce commercial quantities of genetically identical plants with desirable characteristics**  **5.19B describe the stages in the production of cloned mammals involving the introduction of a diploid nucleus from a mature cell into an enucleated egg cell, illustrated by Dolly the sheep**  **5.20B understand how cloned transgenic animals can be used to produce human Proteins.** | **Activity:**   * Use resource and Figure 20.10 Page 223 to produce a detailed written flow chart of how Dolly was formed.   **Animation:**   * Resource on ActiveBook.   **Class practical:**   * Cloned cauliflower. | Edexcel International GCSE Biology Student Book: Pages 221–224 and questions – Page 225  ActiveBook: Page 223  Edexcel International GCSE Biology Revision Guide: Page 82  **Practical**  [NCBE website – ‘Cloned cauliflower’ protocol](http://www.pearsonhotlinks.co.uk/url.aspx?urlid=59613)  **Video clip:**  Channel 4 - Animal farm episode 3 (cloned animals) | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Personal and social responsibility  Adaptability | Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Intellectual interest and curiosity  Initiative  Self-direction  Responsibility  Productivity  Self- regulation (metacognition, forethought, reflection)  Integrity  Self monitoring/self evaluation/self reinforcement  Communication  Cooperation  Interpersonal skills  Responsibility  Self- presentation |
| **60(b)** | **Section 5: Use of biological resources** | Consolidation and assessment |  | Edexcel International GCSE Biology Student Book questions – Pages: 225, 234 and 244  Self- assessment on Pages: 225, 234 and 244 of ActiveBook  Edexcel International GCSE Biology Revision Guide: Pages 83–84, 87–88 and 90–92 | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Innovation  Personal and social responsibility  Adaptability | Critical thinking  Problem solving  Analysis  Reasoning  Interpretation  Adaptive learning  Creativity  Continuous learning  Self-direction  Responsibility  Perseverance  Self- regulation (metacognition, forethought, reflection)  Integrity  Self- monitoring/self- evaluation/self- reinforcement |