# *PLANNING SUPPORT BOOKLET*

**J257, J260**

**For first teaching in 2016**

This support material booklet is designed to accompany the OCR GCSE (9–1) in Biology B and Combined Science B (Twenty First Century).

***DISCLAIMER***

This resource was designed using the most up to date information from the specification at the time it was published. Specifications are updated over time, which means there may be contradictions between the resource and the specification, therefore please use the information on the latest specification at all times.If you do notice a discrepancy please contact us on the following email address: resources.feedback@ocr.org.uk

# Introduction

This support material is designed to accompany the OCR GCSE (9–1) specification for first teaching from September 2016 for:

* [Biology B (Twenty First Century Science – J257)](http://www.ocr.org.uk/Images/234595-specification-accredited-gcse-twenty-first-century-science-suite-biology-b-j257.pdf)
* [Combined Science B (Twenty First Century Science – J260)](http://www.ocr.org.uk/Images/234597-specification-accredited-gcse-twenty-first-century-science-suite-combined-science-b-j260.pdf)

The Planning Guidance table on the following pages sets out suggested teaching times for the topics within the specification. Note that we always recommend that individual centres plan their schemes of work according to their individual needs. Actual teaching times for topics will depend on the amount of practical work done within each topic and the emphasis placed on development of practical skills in various areas, as well as use of contexts, case studies and other work to support depth of understanding and application of knowledge and understanding. It will also depend on the level of prior knowledge and understanding that learners bring to the course.

The table follows the order of the topics in the specification. It is not implied that centres teach the specification topics in the order shown, centres are free to teach the specification in the order that suits them.

## Delivery guides

Delivery guides are individual teacher guides available from the GCSE Biology B and Combined Science B q qualification pages.

* <http://www.ocr.org.uk/qualifications/gcse-twenty-first-century-science-suite-biology-b-j257-from-2016/>
* http://www.ocr.org.uk/qualifications/gcse-twenty-first-century-science-suite-combined-science-b-j260-from-2016/

These Delivery guides provide further guidance and suggestions for teaching of individual topics, including links to a range of activities that may be used and guidance on resolving common misconceptions.

## Ideas about Science (B7) and Practical Work (B8)

Specification Chapter B7 (Ideas about Science) and Chapter B8 (Practical skills) are not included explicitly in the Planning Guidance table. The expectation is that these ideas and practical skills are developed throughout the course and in support of conceptual understanding.

Links to B7 learning outcomes and suggestions where the PAG techniques can be included are found throughout the table. This is by no means an exhaustive list of potential practical activities.

|  |  |  |
| --- | --- | --- |
| Chapter | Estimated teaching hours | Comments and PAG opportunities |
| **Chapter 1: You and Your Genes** |
| 1.1 What is the genome and what does it do? | 7 / 4 | PAG1 Describe how to use a light microscope to observe a variety of plant and animal cells |
| 1.2 How is genetic information inherited? | 4 / 3 |  |
| 1.3 How can and should genetic information be used? | 5 / 5 |  |
|  | **Total 16 / 12** |  |
| **Chapter 2: Keeping Healthy** |
| 2.1 What are the causes of disease? | 5 / 5 |  |
| 2.2 How do organisms protect themselves against pathogens? | 6 / 5 |  |
| 2.3 How can we prevent the spread of infections? | 3 / 3 |  |
| 2.4 How can we identify the cause of an infection? | 5 / 0 | PAG1 Describe how to use a light microscope to observe microorganismsPAG7 Describe and explain the aseptic techniques used in culturing microorganisms |
| 2.5 How can lifestyle, genes and the environment affect health? | 4 / 3 | PAG6 Describe how to practically investigate the effect of exercise on pulse rate and recovery rate |
| 2.6 How can we treat disease? | 3 / 2 | PAG7 Calculate cross-sectional areas of bacterial cultures and of clear zones around antibiotic discs on agar jelly using πr2 |
|  | **Total 26 / 18** |  |
| **Chapter 3 Living Together – Food and Ecosystems** |
| 3.1 What happens during photosynthesis? | 10 / 9 | PAG5 Describe practical investigations into the requirements and products of photosynthesisPAG4 Describe practical investigations into the effect of substrate concentration, temperature and pH on the rate of enzyme controlled reactions |
| 3.2 How do producers get the substances they need? | 8 / 7 | PAG8 Describe practical investigations into the processes of diffusion and osmosisPAG1 Describe how to use a light microscope to observe the structure of the xylem and phloemPAG6 Describe how to use a simple potometer |
| 3.3 How are organisms in an ecosystem interdependent? | 7 / 4 | PAG2 Describe the use of qualitative tests for biological molecules |
| 3.4 How are populations affected by conditions in an ecosystem? | 3 / 3 | PAG3 Describe how to carry out a field investigation into the distribution and abundance of organisms in an ecosystem |
|  | **Total 28 / 23** |  |
| **Chapter 4 Using Food and Controlling Growth** |
| 4.1 What happens during cellular respiration? | 3 / 3 | PAG5 Describe practical investigations into the effect of different substrates on the rate of respiration in yeast |
| 4.2 How do we know about mitochondria and other cell structures? | 1 / 1 |  |
| 4.3 How do organisms grow and develop? | 5 / 5 | PAG1 Describe how to use a light microscope to observe stages of mitosis |
| 4.4 How is plant growth controlled? | 3 / 0 | PAG6 Describe practical investigations into the role of auxin in phototropism |
| 4.5 Should stem cells be used to treat damage and disease? | 1 / 1 |  |
|  | **Total 13 / 10** |  |
| **Chapter 5 The Human Body – Staying Alive** |
| 5.1 How do substances get into, out of and around our bodies? | 7 / 6 |  |
| 5.2 How does the nervous system help us respond to changes? | 5 / 2 | PAG6 Describe practical investigations into reflex actions |
| 5.3 How do hormones control responses in the human body? | 2 / 2 |  |
| 5.4 Why do we need to maintain a constant internal environment? | 5 / 1 | PAG6 Describe practical investigations into temperature control in the body |
| 5.5 What role do hormones play in human reproduction? | 5 / 5 |  |
| 5.6 What can happen when organs and control systems stop working? | 7 / 2 | PAG6 Describe practical investigations into the response of the pupil in different light conditions |
|  | **Total 31 / 18** |  |
| **Chapter 6 Life on Earth – Past and Present** |
| 6.1 How was the theory of evolution developed? | 8 / 5 |  |
| 6.2 How do sexual and asexual reproduction affect evolution? | 1 / 0 |  |
| 6.3 How does our understanding of biology help us classify the diversity of organisms on Earth? | 1 / 1 |  |
| 6.4 How is biodiversity threatened and how can we protect it? | 8 / 3 |  |
|  | **Total 18 / 9** |  |

**Total teaching hours = 132 / 90 hours**

# Outline Scheme of Work: B4 Using food and controlling growth

## Suggested teaching time for chapter: 13/10 hours

|  |
| --- |
| **Additional remote learning opportunities*****As a response to the Covid-19 outbreak, additional online learning opportunities were identified for each topic in June 2020.***  |
| **Statement**  | **Teaching activities**  |
| B4.1.1, B4.1.2 & B4.1.4  | This [BBC class clip](https://www.bbc.co.uk/teach/class-clips-video/biology-ks3-gcse-aerobic-respiration/zmncqp3)could be given to students as a KS3 recap prior to starting this section. It could then be followed by this [BBC Bitesize interactive remote lesso](https://www.bbc.co.uk/bitesize/articles/z4hx6v4)n, which contains three videos and three practice activities to reinforce learning.  |
| B4.2.1  | Here is a [video](https://www.bbc.co.uk/teach/class-clips-video/biology-ks3-gcse-microscopy/znykmfr) comparing light and electron microscopes, with examples such as red blood cells and plant cells shown. This [second video](https://www.youtube.com/watch?v=VBdVARYWq1c) fully compares light and electron microscopes, and goes through magnification calculations with practice questions. This [oak national academy resource](https://classroom.thenational.academy/lessons/microscopes) has lesson slides, and questions to check students understanding of the differences between the microscopes, as well as practising converting between units. |
| B4.3.1 | This [mitosis animation](http://highered.mheducation.com/sites/0072495855/student_view0/chapter2/animation__mitosis_and_cytokinesis.html) shows the process of animation and is followed by interactive multiple choice questions. This [clip](https://www.bbc.co.uk/bitesize/guides/zq4sk2p/video) from BBC bitesize can be used by students for independent learning of the cell cycle and cell specialisation. This Amoeba sisters [video](https://www.youtube.com/watch?v=f-ldPgEfAHI&t=2s) could be used alternatively for independent learning of mitosis.. |
| B4.3.3 | This Amoeba sisters [video](https://www.youtube.com/watch?v=VzDMG7ke69g) can be used for independent learning about meiosis. This [interactive website](https://www.footprints-science.co.uk/) has some free animations and quizzes students can work through. This includes a variety of quizzes about meiosis, such as a multiple choice quiz, fill in the gaps tasks and connecting ideas together.  |
| B4.3.4 | This Oak National Academy [interactive remote lesson](https://classroom.thenational.academy/lessons/stem-cells) on stem cells contains a recap quiz, presentation and worksheets for students to work through. This [animation](https://www.saps.org.uk/secondary/themes/1290) demonstrates growth, mitosis and differentiation in plants. There is also a teacher guide that can be used alongside it. Students can use these revision pages about [mitosis and cell specialisation](https://www.bbc.co.uk/bitesize/guides/zq4sk2p/revision/1), which end in an interactive test to review learning. There are also relevant pages about the [challenges of size in animals](https://www.bbc.co.uk/bitesize/guides/z3pjsrd/revision/1) and the [challenges of size in plants](https://www.bbc.co.uk/bitesize/guides/z936gdm/revision/1) that students can also be directed to.  |
| B4.4.1 & B4.4.2 | This [video](https://www.youtube.com/watch?v=U7U60HqsQs4) demonstrates the effect of light on the growth of seedlings, and relates to PAG B6. This is a [stop-motion video](https://www.youtube.com/watch?v=DhITXtENPrU) of phototropism in seedlings.  |

### B4.1 What happens during cellular respiration?

**Notes:**

* Statements in bold are for higher tier learners only.
* A reference to PAG indicates an opportunity to cover some skills from one of the Practical Activity Groups – see Chapter 8: Practical Skills of the Biology B specification for more information.
* A reference prefixed with “M” indicates an opportunity to cover some of the mathematical skills required for this qualification – see Appendix 5d of the Biology B specification for more information.

| Lesson | Statements | Teaching activities | Notes |
| --- | --- | --- | --- |
| 1 | B4.1.1 compare the processes of aerobic and anaerobic respiration, including conditions under which they occur, the inputs and outputs, and comparative yields of ATP | The ideas covered here are really revision of concepts covered at Key Stage 3 so it is fair to assume that learners may have some ideas about the material in this lesson.The activities on page 5 of the Respiration Transition Guide, found [here](http://www.ocr.org.uk/Images/307872-respiration-transition-guide.pdf), all have a Key Stage 3 focus so could be considered as a way to assess learner’s familiarity with the ideas and the terminology and their readiness to move on and consider the topic in more detail.Checkpoint task 1, part of the Respiration Transition Guide, found [here](http://www.ocr.org.uk/Images/305593-respiration-checkpoint-task.doc), is intended to be used to revise knowledge of ideas about aerobic and anaerobic respiration from Key Stage 3 so this could be considered as part of this lesson.**Aerobic vs anaerobic respiration**A clear [overview](http://www.sciencemadesimple.co.uk/curriculum-blogs/biology-blogs/winter-olympics-energy) of aerobic and anaerobic respiration along with a short video clip by BBC Bitesize will allow learners to develop a basic understanding of the processes.When looking at the chemical equation for aerobic respiration, molecular modelling kits could be used to help learners with the balancing of the equation. | From the Key Stage 3 Programme of Study:* Aerobic and anaerobic respiration in living organisms, including the breakdown of organic molecules to enable all the other chemical processes necessary for life.
* A word summary for aerobic respiration.
* The process of anaerobic respiration in humans and microorganisms, including fermentation, and a word summary for anaerobic respiration.
* The differences between aerobic and anaerobic respiration in terms of the reactants, the products formed and the implications for the organism.
 |
| 2 | B4.1.2 explain why cellular respiration occurs continuously in all living cellsB4.1.3 explain how mitochondria in eukaryotic cells (plants and animals) are related to cellular respirationB4.1.4 describe cellular respiration as an exothermic process | Learners need to know about the role of respiration in living organisms so a discussion is required about the release of energy through respiration for activities such as movement, active transport and the synthesis of large molecules e.g. in plants, the formation of starch and cellulose and the synthesis of amino acids from glucose and nitrates to form proteins.**Photosynthesis and respiration game**This [game](https://biomanbio.com/HTML5GamesandLabs/PhotoRespgames/photoresphtml5page.html) by Bioman Games allows learners to develop an understanding of the relationship between respiration and photosynthesis.**Build a better mitochondrion**This [resource](http://www.ocr.org.uk/qualifications/gcse-twenty-first-century-science-suite-biology-b-j257-from-2016/delivery-guide/Images/123-282273-g-bio-b-lr1-v1.doc) is a nice way to introduce the topic of respiration. Learners produce a model mitochondrion either in class or as homework that they then use to teach others in the class. There are a variety of activities to be found on pages 7 and 8 of the Respiration Transition Guide, found [here](http://www.ocr.org.uk/Images/307872-respiration-transition-guide.pdf), which can be used to help learners explore ideas such as the role of the mitochondria and the release of energy from food as a demonstration of the exothermic nature of respiration. |  |
| 3  | B4.1.5 a) describe practical investigations into the effect of different substrates on the rate of respiration in *PAG6*b) carry out rate calculations for chemical reactions in the context of cellular respirationM1a, M1c | Practical investigations are among the activities with a Key Stage 4 focus that can be found on page 7 and 8 of the Respiration Transition Guide, [here](http://www.ocr.org.uk/Images/307872-respiration-transition-guide.pdf), and can be used as a starting point to explore the ideas about rate of respiration in yeast.The mathematical ideas associated with rate of reaction may be assessed in the examinations so it is important that learners have the opportunity to explore them in a practical context.One possible practical procedure to investigate the effect of different temperatures on the rate of yeast respiration can be found as part of these [investigation instructions](file:///C%3A%5CUsers%5Cfoulkb%5CDownloads%5CRevised-GCSE-BIOL-REVISED-Support-22590.pdf). This BBC Bitesize [page](https://www.bbc.co.uk/bitesize/guides/zwy6gdm/revision/4) includes a practical method, and questions around controls and rate calculations for students to answer. | Various protocols could be used to demonstrate the effect of different substrates on the rate of respiration in yeast and these will cover the skills required for *PAG6.* |

### B4.2 How do we know about mitochondria and other cell structures?

| Lesson | Statements | Teaching activities | Notes |
| --- | --- | --- | --- |
| 1 | B4.2.1 explain how electron microscopy has increased our understanding of sub-cellular structuresB4.2.2 in the context of cells and sub-cellular structures:a) demonstrate an understanding of number, size and scale and the quantitative relationship between unitsM2a, M2hb) use estimations and explain when they should be usedM1d**c) calculate with numbers written in standard form****M1b** | **Virtual cell**Learn Genetics provide an excellent [resource](https://learn.genetics.utah.edu/content/cells/insideacell/) that allows learners to investigate a virtual cell. Learners can then use the resource to independently produce their own cell information poster as they investigate the functions of cells organelles.**Using an electron microscope**For the most able of learners the Australian Microscopy and Microanalysis Research Facility provide a [resource](https://myscope.training/#/SEMlevel_3_1) to allow learners to gain an understanding of how to use an electron microscope. |  |

### B4.3 How do organisms grow and develop?

| Lesson | Statements | Teaching activities | Notes |
| --- | --- | --- | --- |
| 1 & 2 | B4.3.1 a) describe the role of the cell cycle in growth, including interphase and mitosisb) describe how to use a light microscope to observe stages of mitosis*PAG1 (Separate Science) / PAG B1 (Combined Science)* | Page 4 of the BBC Bitesize site, [here](http://www.bbc.co.uk/education/guides/zvb7hyc/revision/4), covers mitosis and could be used to support part of an introduction. Page 5 goes on to look at meiosis, which could be looked at in lesson 4. There is also an activity and a test which include content from chapter B1 about inheritance and DNA so has a synoptic function.[This](https://www.youtube.com/watch?v=eV6nbisahek) video clip is a good visual representation and summary of mitosis and, again, could be used as an introduction. It emphasises the main points e.g. mitosis is used for growth and results in genetically identical daughter cells but does not include unnecessary details.Learners do not need to know the names of the stages of mitosis so beware of activities that go into this unnecessary detail. The one [here](https://www.tes.com/teaching-resource/ocr-gateway-b3-mitosis-6130730) is at the right level. **Stages of mitosis**A simple animation of the stages of mitosis is provided by Pearson that the learners can use to develop a basic understanding of the process. A second more in-depth animation can also be found at the following link:[View full activity in B4.3 How do organisms grow and develop? – Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-twenty-first-century-science-suite-biology-b-j257-from-2016/delivery-guide/topic-gbb004-b4-using-food-and-controlling-growth/delivery-guide-gbbdg016-b43-how-do-organisms-grow-and-develop?activity=282352#282352)**Cell cycle**This [visual representation](https://www.bbc.co.uk/bitesize/guides/zgtdb82/revision/2) of the cell cycle and DNA replication can be used by the learners to allow them to independently study the process and produce their own revision resource.The practical procedure found [here](https://www.tes.com/teaching-resource/root-tip-squash-practical-6361267) is a simple and clear way to carry out a root tip squash and examine cells undergoing mitosis under a light microscope. Learners could also look at pre-prepared slides the root tips of various species of plant e.g. *Allium spp.*  | Learners can look at mitosis under the microscope and cover the skills required for *PAG1 (Separate Science) / PAG B1 (Combined Science).* |
| 3 | B4.3.2 describe cancer as the result of changes in cells that lead to uncontrolled growth and division | **Tumour development**This [short video clip](https://dnalc.cshl.edu/view/15536-Cell-division-tumor-growth-and-metastasis-3D-animation-with-basic-narration.html) shows how tumours develop, how they become vascularised and how metastasis occurs.**Formation of cancer**The [video clip](https://www.cancerquest.org/education-center/videos/cancer-biology-animations) by CancerQuest which is 11 minutes long provides detailed documentary on the formation of cancer. This provides a great opportunity for stretch and challenge of learners.[This](http://www.abpischools.org.uk/page/modules/celldiv_cancer/cancer4.cfm?coSiteNavigation_allTopic=1) is a link to a site where there is information about cell division, mitosis and cancer, including an animation and a description of the causes of cancer at the right level and some examples of types of cancer. |  |
| 4 | B4.3.3 explain the role of meiotic cell division in halving the chromosome number to form gametes, including the stages of interphase and two meiotic divisions | Page 5 of the BBC Bitesize site, [here](http://www.bbc.co.uk/education/guides/zvb7hyc/revision/4), covers meiosis and could be used to support part of an introduction. There is also an activity and a test which include content from chapter B1 about inheritance and DNA so has a synoptic function.[This](https://www.youtube.com/watch?v=D1_-mQS_FZ0) video clip is a good visual representation and summary of meiosis and, again, could be used as an introduction. It emphasises the main points e.g. the shuffling of genetic material resulting in genetically unique cells but does mention homologous pairs which needs to be glossed over as this is unnecessary terminology at this level.The activity described [here](http://www.ocr.org.uk/Images/179003-mitosis-and-meiosis-activity.doc) focuses on both mitosis and meiosis and could be used as consolidation once the main ideas about meiosis have been explored.The presentation found [here](https://www.tes.com/teaching-resource/meiosis-lesson-6064522) summarises the main points about meiosis at about the right level and does not include detail about the individual phases which learners do not need to know.There are various resources available that compare the processes of mitosis and meiosis and these can be used as consolidation and to ensure that learners have grasped the main points of each. Often the difficulties in their learning of this topic show up when trying to compare the two or identify one or the other from a list of features. Possible activities can be found [here](https://www.tes.com/teaching-resource/mitosis-and-meiosis-6113203) and [here](https://www.tes.com/teaching-resource/mitosis-or-meiosis-6306647) but there are many more. |  |
| 5 | B4.3.4 describe the function of stem cells in embryonic and adult animals and meristems in plantsB4.3.5 explain the importance of cell differentiation, in which cells become specialised by switching genes off and on to form tissues with particular functions | **Actions of embryonic stem cells**The ‘Human embryonic stem cells’ [animation](http://www.sumanasinc.com/scienceinfocus/stemcells/stemcells.html) provides learners with a clear yet high level description of how embryonic stem cells may be used in the lab to produce a particular specialised cell type.**Stem cells or meristem?**Stem cells and their uses are clearly described by this BBC [resource](https://www.bbc.co.uk/bitesize/guides/zghqfcw/revision/4) whilst the YouTube [clip](https://www.youtube.com/watch?v=h9kCPO7oMf8) on the function of meristems video provides an overview of meristematic tissue.A [practical experiment](https://www.saps.org.uk/secondary/teaching-resources/706-cauliflower-cloning-tissue-culture-and-micropropagation) is detailed by SAPs that allows learners to clone their own cauliflower plants and bring together their knowledge of mitosis with totipotent cells.**Cell differentiation**Cell differentiation is summarised in this concise description before links are made to stem cells and stem cell treatments.[View full activity in B4.3 How do organisms grow and develop? – Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-twenty-first-century-science-suite-biology-b-j257-from-2016/delivery-guide/topic-gbb004-b4-using-food-and-controlling-growth/delivery-guide-gbbdg016-b43-how-do-organisms-grow-and-develop?activity=282370#282370) |  |

### B4.4 How is plant growth controlled? (Separate science only)

| Lesson | Statements | Teaching activities | Notes |
| --- | --- | --- | --- |
| 1 | B4.4.1 a) explain how plant hormones are important in the control and coordination of plant growth and development, with reference to the role of auxins in phototropisms and gravitropismsb) describe practical investigations into the role of auxin in phototropism*PAG6* | **Auxin** Kscience provides a short self study [activity](http://www.kscience.co.uk/animations/auxin.htm) on auxin that could be used as part of a homework or plenary before learners attempt the ‘test yourself’ section of the resource.**Tropisms and the role of auxin**Sumanas provide a clear animation showing the action of auxin within the plant. Learners can use the resource to produce labelled diagrams before they put their learning into practice by carrying out an investigation into phototropism as provided by SAPs.[View full activity in B4.4 How is plant growth controlled? – Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-twenty-first-century-science-suite-biology-b-j257-from-2016/delivery-guide/topic-gbb004-b4-using-food-and-controlling-growth/delivery-guide-gbbdg017-b44-how-is-plant-growth-controlled?activity=282382#282382)**Interpreting practical investigations in plant hormones**Learners are able to interpret practical investigations into phototropism as set out by [Nuffield Foundation.](https://pbiol.rsb.org.uk/control-and-communication/plant-responses-to-stimuli)[This](https://www.youtube.com/watch?v=PB1_IzCkbRM) video clip introduces the ideas of growth responses in plants in an engaging way.Pages 3, 4 and 5 of the BBC Bitesize site [here](http://www.bbc.co.uk/education/guides/z98p34j/revision/3) give a good description of the ideas of auxins and tropisms at the right level.The activity found [here](https://www.tes.com/teaching-resource/auxin-experiment-results-sort-6136555) is based around experimental work on auxins and will help learners to connect the results and explanations.[This](https://www.tes.com/teaching-resource/igcse-plant-hormones-revision-6195052) revision activity summarises the action of auxin and its effects on plants in a clear and concise way.Science and Plants for Schools (SAPS) have produced [this](http://www.saps.org.uk/secondary/teaching-resources/185-student-sheet-8-the-response-of-seedlings-to-light-phototropism-experiment) practical activity investigating the response of seedlings to light. | Carrying out an investigation such as one looking at the response of seedlings to light will cover the skills and techniques required for PAG6. |
| 2 | **B4.4.2 describe some of the variety of effects of plant hormones, relating to gibberellins and ethene** | This is a part of the specification that could be covered by learners doing some research of their own and then presenting it as a poster, leaflet or similar. There is plenty of information available and it is quite accessible.  |  |
| 3 | **B4.4.3 describe some of the different ways in which people use plant hormones to control plant growth** | **Using plant hormones**Learners can independently discover some of the other uses of plant hormones before testing themselves with the [‘test bite’.](https://www.bbc.co.uk/bitesize/guides/zpjcmsg/revision/6)A mindmap can be found [here](https://getrevising.co.uk/diagrams/commerical_use_of) which summarises the commercial uses of plant hormones.The activity found [here](https://www.tes.com/teaching-resource/commercial-use-of-plant-hormones-6412844) is a task where learners can use the limited information on the sheet and other sources to provide an article on commercial uses. |  |

### B4.5 Should stem cells be used to treat damage and disease?

| Lesson | Statements | Teaching activities | Notes |
| --- | --- | --- | --- |
| 1 | B4.5.1 discuss potential benefits, risks and ethical issues associated with the use of stem cells in medicine | **Ethics of stem cells**Learners can read about stem cell research and watch a short video clip on the ethical arguments. The class can then be divided into two groups to debate the pros and cons of the technique. [View full activity in B4.5 Should we use stem cells to treat damage and disease? – Online delivery guide](http://www.ocr.org.uk/qualifications/gcse-twenty-first-century-science-suite-biology-b-j257-from-2016/delivery-guide/topic-gbb004-b4-using-food-and-controlling-growth/delivery-guide-gbbdg018-b45-should-we-use-stem-cells-to-treat-damage-and-disease?activity=282389#282389)**Stem cell research**[This](http://www.abpischools.org.uk/page/modules/stemcellnew/index.cfm?coSiteNavigation_allTopic=1) webpage has a selection of information about stem cells and research and ends with an activity for learners to write an article about stem cell research which will help to develop literacy skills.There is a selection of activities [here](https://www.tes.com/teaching-resource/stem-cell-activities-6036610) based around stem cell research, including a presentation and a card sort activity which will help learners to think about the advantages and disadvantages. |  |

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