# *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](mailto: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 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 **Separate / Combined** | 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 microorganisms  PAG7 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 photosynthesis  PAG4 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 osmosis  PAG1 Describe how to use a light microscope to observe the structure of the xylem and phloem  PAG6 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: B2 Keeping Healthy

## Suggested teaching time for chapter: 26/18 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** |
| B2.1.2 & B2.1.3 | A [BBC class clip](https://www.bbc.co.uk/teach/class-clips-video/biology-ks3-gcse-microorganisms-and-bacteria/zrkxy9q) about bacteria, and how they grow. It also includes bacteria growing on agar plates. Students can watch the video and complete the worksheet about [communicable diseases](https://www.tes.com/teaching-resource/gcse-biology-9-1-communicable-infectious-disease-worksheet-and-video-12030882) and how they spread. There are also answers that students can check themselves against. |
| B2.2.2, B2.2.4 & B2.2.5 | This Amoeba sisters [video](https://www.youtube.com/watch?v=fSEFXl2XQpc) can be used for independent learning about the immune system. This [interactive website](https://www.abpischools.org.uk/topic/infectiousdiseases-immunity) contains information, glossaries, animations and quizzes that students can work through about the immune system. |
| **B2.4.4 & B2.4.5** | These [revision pages and interactive quiz](https://www.bbc.co.uk/bitesize/guides/zy6dpbk/revision/1) can be used by students to review their learning about monoclonal antibodies. There are several other revision pages and interactive quizzes on BBC Bitesize that are suitable for this topic, as well as the rest of the topics in GCSE Biology. |
| B2.3.2 & B2.6.4 | This [interactive website](https://www.abpischools.org.uk/topic/infectiousdiseases-medicines) contains information, glossaries, animations and quizzes that students can work through independently about medicines and antibiotic resistance. |

### B2.1 What are the causes of disease?

**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 | B2.1.1 describe the relationship between health and disease  B2.1.2 describe different types of diseases (including communicable and non-communicable diseases) | Ask the class to discuss (in small groups then with the whole class) diseases they know and to sort them in to groups – those that you can catch and those that you cannot. Build on this with a more general discussion about causes of disease e.g. genetic, environmental, lifestyle etc.  Brainstorm what types of microorganisms cause different communicable diseases and pose the question “Why do microorganisms like to grow in humans?  Student sort the [statements](http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-biology-a-j247-from-2016/delivery-guide/Images/123-367964-lr1-v3.docx) into communicable and non-communicable diseases.  Teacher notes to accompany the task are found [here](http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-biology-a-j247-from-2016/delivery-guide/Images/123-367972-tr1-v3.docx). | OUP GCSE Biology textbook page 36–39 |
| 2 | B2.1.4 describe common human infections including influenza (viral), Salmonella (bacterial), Athlete’s foot (fungal) and malaria (protist) and sexually transmitted infections in humans including HIV/AIDS (viral) | Activity 4 from the Keeping Healthy Delivery Guide [here](http://www.ocr.org.uk/Images/276915-keeping-healthy-delivery-guide.pdf) or the information on the interactive pages [here](https://www.abpischools.org.uk/topic/infectiousdiseases-pathogens/1/1) are intended to be used to help the research into all of these diseases. | This could be set as homework / flipped learning and different activities considered to reinforce learning and understanding in the classroom.  Learners could make presentations to the class, posters or models of the different microbes and the ways in which they are transmitted, their symptoms etc. This learning outcome has scope to be delivered in a variety of creative ways.  OUP GCSE Biology textbook pages 40-1 |
| 3 | B2.1.5 describe plant diseases including tobacco mosaic virus (viral), ash dieback (fungal) and crown gall disease (bacterial) | Activity 4 from the Keeping Healthy Delivery Guide [here](http://www.ocr.org.uk/Images/276915-keeping-healthy-delivery-guide.pdf) is intended to be used to help the research into all of these diseases. | This could be set as homework / flipped learning and different activities considered to reinforce learning and understanding in the classroom.  Learners could make presentations to the class, posters or models of the different microbes and the ways in which they are transmitted, their symptoms etc. This learning outcome has scope to be delivered in a variety of creative ways.  Learners are likely to have less knowledge of common plant diseases so this could be a real area of discovery.  OUP GCSE Biology textbook pages 41 |
| 4 & 5 | B2.1.3 explain how communicable diseases (caused by viruses, bacteria, protists and fungi) are spread in animals and plants | Brainstorm / discuss ways in which disease are passed from person to person and in plants e.g. direct contact, via animals, from food, droplet infection, sexual transmission and in plants – contaminated soil, spores in the air, contaminated seeds.  Activity 1 from the Keeping Healthy Delivery Guide [here](http://www.ocr.org.uk/Images/276915-keeping-healthy-delivery-guide.pdf) is an activity that can be used to help with the delivery of ideas relating to spread of communicable diseases.  This [activity](https://www.nlm.nih.gov/exhibition/againsttheodds/pdfs/ss/lesson_plan_science_and_society.pdf) is a fun and visual way of showing how viruses spread. | OUP GCSE Biology textbook pages 40-41 |

### B2.2 How do organisms protect themselves against pathogens?

| Lesson | Statements | Teaching activities | Notes |
| --- | --- | --- | --- |
| 1 & 2 | B2.2.1 describe non-specific defence systems of the human body against pathogens, including examples of physical, chemical and microbial defences | Activity 1 from the Keeping Healthy Delivery Guide [here](http://www.ocr.org.uk/Images/276915-keeping-healthy-delivery-guide.pdf) is about skin as the first line of defence. | OUP GCSE Biology textbook page 42 |
| 3, 4 & 5 | B2.2.4 explain the role of the immune system of the human body in defence against disease  B2.2.2 explain how platelets are adapted to their function in the blood  B2.2.5 explain how white blood cells are adapted to their functions in the blood, including what they do and how it helps protect against disease | Students work in groups to write a play showing how the body defends itself against microorganisms once they have entered the body using the [teacher instructions](http://www.ocr.org.uk/qualifications/gcse-gateway-science-suite-biology-a-j247-from-2016/delivery-guide/Images/123-367982-tr4-v3.docx) here. Plays are then performed to the rest of the class.  Students could be shown this [video](https://www.youtube.com/watch?v=MoAUfnKcA3I) of white blood cells attacking and engulfing sperm cells. | OUP GCSE Biology textbook page 42, 44-45  The terminology associated with this section means that it is necessary to spend some time to ensure that students have grasped all of the key ideas. |
| 6 | B2.2.3 describe physical plant defences, including leaf cuticle and cell wall  (separate science only)  B2.2.6 describe chemical plant defence responses, including antimicrobial substances  (separate science only) | Activity 4 from the Keeping Healthy Delivery Guide [here](http://www.ocr.org.uk/Images/276915-keeping-healthy-delivery-guide.pdf) is a starting point for plant defence against disease.  The following lesson element found [here](https://www.ocr.org.uk/Images/267041-plant-diseases-lesson-element.docx) can also be used to develop learning and understanding of the plant disease topic. | OUP GCSE Biology textbook page 43 and 45 |

### B2.3 How can we prevent the spread of infections?

| Lesson | Statements | Teaching activities | Notes |
| --- | --- | --- | --- |
| 1 | B2.3.1 explain how the spread of communicable diseases may be reduced or prevented in animals and plants, to include a minimum of one common human infection, one plant disease and sexually transmitted infections in humans including HIV/AIDS | There is plenty of information available on the prevention of the spread of communicable diseases so students could research one or more example and prepare a presentation. Alternatively, they could present the information in the form of a health leaflet.  Activity 3 from the Keeping Healthy Delivery Guide [here](http://www.ocr.org.uk/Images/276915-keeping-healthy-delivery-guide.pdf) is a look at the transmission and prevention of HIV. | OUP GCSE Biology textbook pages 46–50 |
| 2 & 3 | B2.3.2 explain the use of vaccines in the prevention of disease, including the use of safe forms of pathogens and the need to vaccinate a large proportion of the population | This is an area that students may already know something about and have some ideas about, including recent personal experience of vaccinations, such as HPV or diphtheria, polio, tetanus and meningitis boosters. They may not understand what they have had and be interested in the way in which vaccinations work.  The lesson [here](http://thescienceteacher.co.uk/vaccines/) is an interesting and engaging way of using the recent Ebola outbreak to connect to various ideas linked to disease and vaccines. There is a literacy activity that encourages students to read and summarise the main points from an article.  Students need to consider the benefits and risks of vaccination and within this, the idea of herd immunity and side effects.  A model could work quite well here. Take students to an open space such as a hall or a court. A tennis ball or football is used to represent a microorganism. The ball is thrown around and if a student catches the ball, they are infected with the disease caused by the microbe and have symptoms. So, ask students to throw the ball from one to another – this is the situation when nobody is vaccinated. Assign “Vaccinated Status” to 90% of the students by telling them that they are no longer able to catch the ball. If the students are spread out far enough, it will be very difficult for the remaining 10% to successfully pass the ball between each other. The majority of vaccinated people protect the minority of unvaccinated people and this is called herd immunity. Add a few more unvaccinated people to and this will show how it is easier for the disease to spread when vaccination levels fall below the level required for herd immunity to be successful.  Activities 1 and 2 from the Keeping Healthy Delivery Guide [here](http://www.ocr.org.uk/Images/276915-keeping-healthy-delivery-guide.pdf) are focused on extension activities around vaccination. This BBC Bitesize page found [here](https://www.bbc.co.uk/bitesize/guides/zpn9q6f/revision/2) is suitable for Activity 2 in the Delivery Guide. | The ideas in this learning outcome need to be covered once students have fully grasped the how the immune system operates as vaccination relies on the harnessing of the power of the immune system to provide immunity without causing disease symptoms first.  IaS3.4 Use a variety of models  IaS4.1 Examples of applications of science that have made a positive difference  IaS4.4 Suggest reasons why different decision on the same issue might be appropriate  IaS4.5 Involvement of ethical issues  OUP GCSE Biology textbook pages 51–54 |

### B2.4 How can we identify the cause of an infection? (Separate science only)

| Lesson | Statements | Teaching activities | Notes |
| --- | --- | --- | --- |
| 1, 2 & 3 | B2.4.1 a) describe ways in which diseases, including plant diseases, can be detected and identified, in the lab and in the field  b) describe how to use a light microscope to observe microorganisms  *PAG1*  B2.4.2 describe and explain the aseptic techniques used in culturing organisms  *PAG 7*  B2.4.3 calculate cross-sectional areas of bacterial cultures and of clear zones around antibiotic discs on agar jelly using  M5c  *PAG7* | There is a variety of ways that these practical activities can be carried out but it is good if students can experience as much of it for themselves. Aseptic techniques practised in the lab are a great way of making the important point of maintaining sterile conditions when growing microorganisms.  Activity 1 from the Keeping Healthy Delivery Guide [here](http://www.ocr.org.uk/Images/276915-keeping-healthy-delivery-guide.pdf) is a good introduction to the growth of bacteria.  Activity 3 from the Keeping Healthy Delivery Guide [here](http://www.ocr.org.uk/Images/276915-keeping-healthy-delivery-guide.pdf) moves on to look at bacterial culturing and aseptic techniques. This [virtual lab](http://www.glencoe.com/sites/common_assets/science/virtual_labs/LS08/LS08.html) allows students to carry out a virtual zone of inhibition investigation.  Activity 2 from the Keeping Healthy Delivery Guide [here](http://www.ocr.org.uk/Images/276915-keeping-healthy-delivery-guide.pdf) looks at the identification of plant diseases in a fun and engaging way. | OUP GCSE Biology textbook pages 55–58  The mathematical learning outcome will also be covered in B2.6 when antibiotics are discussed in detail.  This mathematical learning outcome can be covered by using practical results but also by using examples from model data if students are struggling with it from a conceptual or mathematical point of view. |
| 4 | **B2.4.4 describe how monoclonal antibodies are produced including the following steps:**   1. **antigen injected into an animal** 2. **antibody-producing cells taken from animal** 3. **cells producing the correct antibody selected then cultured**   **B2.4.5 describe some of the ways in which monoclonal antibodies can be used in diagnostic tests** | This [link](http://www.abpischools.org.uk/page/modules/infectiousdiseases_immunity/immunity5.cfm?coSiteNavigation_allTopic=1) introduces the concept of monoclonal antibody production in a straightforward way.  This [lesson](https://www.tes.com/teaching-resource/monoclonal-antibodies-lesson-6426297) can be downloaded and is quite a good starting point for a lesson on monoclonal antibodies.  Activity 4 from the Keeping Healthy Delivery Guide [here](http://www.ocr.org.uk/Images/276915-keeping-healthy-delivery-guide.pdf) provides some more possibilities to look at these ideas. | IaS4.1 Examples of applications of science that have made a positive difference  OUP GCSE Biology textbook pages 59–60 |

### B2.5 How can lifestyle, genes and the environment affect health?

| Lesson | Statements | Teaching activities | Notes |
| --- | --- | --- | --- |
| 1, 2 & 3 | B2.5.1 a) describe how the interaction of genetic and lifestyle factors can increase or decrease the risk of developing non-communicable human diseases, including cardiovascular diseases, many forms of cancer, some lung and liver diseases and diseases influenced by nutrition, including type 2 diabetes  b) describe how to practically investigate the effect of exercise on pulse rate and recovery rate  *PAG6* | This is a topic that students will probably have some knowledge of and will probably also be harbouring some misconceptions e.g. a lack of understanding of one condition being the result of another condition.  Students could examine some “case studies” of individuals and examine the risk factors present in each case and the diseases that they are at risk from. Risks could include smoking, obesity, lack of exercise, high cholesterol intake, alcohol consumption, genetic factors and diseases could include various cardiovascular diseases, lung cancer and type 2 diabetes.  This is also an area that could be left open for students to research. There is plenty of information available on the risk factors for non-communicable diseases so students could research one or more example and prepare a presentation. Alternatively, they could present the information in the form of a health leaflet.  A practical procedure for investigating the effects of exercise on the body can be found in Activity1 from the Keeping Healthy Delivery Guide [here](http://www.ocr.org.uk/Images/276915-keeping-healthy-delivery-guide.pdf). | From the Key Stage 3 Programme of Study:   * The impact of exercise, asthma and smoking on the human gas exchange system.   OUP GCSE Biology textbook pages 61–66 |
| 4 | B2.5.2 use given data to explain the incidence of non-communicable diseases at local, national and global levels with reference to lifestyle factors, including exercise, diet, alcohol and smoking  B2.5.3 in the context of data related to the causes, spread, effects and treatment of disease:  a) translate information between graphical and numerical forms  M4a  b) construct and interpret frequency tables and diagrams, bar charts and histograms  M4a, M4c  c) understand the principles of sampling as applied to scientific data  M2d  d) use a scatter diagram to identify a correlation between two variables  M2g | Map of the UK showing the incidence of cardiovascular disease (CVD).   Students identify areas with the highest and lowest incidence of CVD using this data from [British Heart Foundation](file:///C:\Users\foulkb\Downloads\bhf_cvd-statistics-2014_web_2.pdf).  Analyse and explain data correlations found [here](http://www.who.int/topics/noncommunicable_diseases/en/) between lifestyle factors and incidence of non-communicable diseases:    Students can complete this [worksheet](https://www.tes.com/teaching-resource/b7-1-non-communicable-diseases-11443655) on analysing data. |  |
| 5 | B2.5.4 describe interactions between different types of disease | Students could be given some possible different types of disease interactions to research and report back to the class about or to produce a written report about. | OUP GCSE Biology textbook pages 67–69 |

### B2.6 How can we treat disease?

| Lesson | Statements | Teaching activities | Notes |
| --- | --- | --- | --- |
| 1 | B2.6.1 explain the use of medicines, including antibiotics, in the treatment of disease  B2.6.2 calculate cross-sectional areas of bacterial cultures and of clear zones around antibiotic discs on agar jelly using  M5c  *PAG7* | This [link](https://www.gov.uk/government/collections/european-antibiotic-awareness-day-resources) takes you to the government’s Antibiotic Awareness website where there are a number of resources about antibiotics to consider.  Students will probably know about antibiotics so it should be possible to brainstorm a list of antibiotics and define the action of antibiotics.  Possible practical work includes using pre-seeded agar plates (*E.coli* or *S.albus*). Students can place antibiotic discs (penicillin and streptomycin) using aseptic techniques on to the agar. Discuss with students the way in which the effectiveness of the antibiotic will be determined. What effect is the antibiotic having on the bacteria (either killing or stopping growth)? They can then use any results to consider the mathematical learning outcome in this section.  Activity 1 from the Keeping Healthy Delivery Guide [here](http://www.ocr.org.uk/Images/276915-keeping-healthy-delivery-guide.pdf) provides some more possibilities to look at these ideas about antibiotics.  Antibiotic resistance also needs to be discussed, such as in the context of MRSA. Discuss the danger of MRSA and antibiotic resistance. What instructions do doctors commonly give out about antibiotics? Students could complete a poster to illustrate what happens in antibiotic resistance selection when someone doesn’t complete a course of antibiotics. | IaS4.1 Examples of applications of science that have made a positive difference  OUP GCSE Biology textbook pages 70–72 |
| 2 | B2.6.3 evaluate some different treatments for cardiovascular disease, including lifestyle changes, medicines and surgery | Activity 2 from the Keeping Healthy Delivery Guide [here](http://www.ocr.org.uk/Images/276915-keeping-healthy-delivery-guide.pdf) provides some information and starting points for this section. | OUP GCSE Biology textbook page 73 |
| 3 | B2.6.4 describe the process of discovery and development of potential new medicines including preclinical and clinical testing  **B2.6**.**5 describe how monoclonal antibodies can be used to treat cancer including:**   * **produce monoclonal antibodies specific to a cancer cell antigen** * **inject the antibodies into the blood** * **the antibodies bind to cancer cells, tagging them for attack by white blood cells** * **the antibodies can also be attached to a radioactive or toxic substance to deliver it to cancer cells**   (separate science only) | Discuss with students how do we know paracetamol (or any other commonly used medicine) is safe?  Students could construct a flow chart to show the stages in drug testing. Discuss the use of placebos to act as a reference point/control and to avoid the placebo effect and discuss how long-term human trials can reveal possible side effects.  The following question could be considered - when would it be unethical to use a placebo (e.g. cancer patients)?  Use Activity 3 from the Keeping Healthy Delivery Guide [here](http://www.ocr.org.uk/Images/276915-keeping-healthy-delivery-guide.pdf) to consider some of the wider issues around clinical trials.  Activity 4 from the Keeping Healthy Delivery Guide [here](http://www.ocr.org.uk/Images/276915-keeping-healthy-delivery-guide.pdf) can be used to look at the use of monoclonal antibodies as a tool to treat cancer. | IaS4.1 Examples of applications of science that have made a positive difference  IaS4.5 Involvement of ethical issues  OUP GCSE Biology textbook page 74–79 |

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