Teaching bioethics in the Victorian Curriculum F–10

Sample learning activities,
Levels 7–10,
Ethical Capability and Science

Authorised and published by the Victorian Curriculum and Assessment Authority
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Introduction

This resource supports teachers with opportunities for incorporating ethical considerations and concepts into ‘bioethics’ learning activities based on biological sciences content from the Victorian Curriculum F–10. Incorporating bioethics into the science classroom enriches students’ understanding and experiences of the science content, and it also provides opportunities for students to develop their ethical capability.

The sample learning activities in this resource draw on content from the Biological sciences and Science as a human endeavour sub-strands of the Science curriculum and also incorporate content from the Ethical Capability curriculum.

Through these learning activities students explore how science can be used to find solutions to a range of contemporary issues and how the values and needs of contemporary society influence different approaches taken when considering how to respond to particular bioethical issues. The sample learning activities allow for differentiation for the range of learners within a classroom, as well as for modifications to suit the local school context and current school priorities.

The learning activities have been designed to collect evidence of student learning in Ethical Capability, with each suggested sequence of learning including an ‘evidence of learning’ assessment grid that aligns to the relevant Ethical Capability achievement standard. Teachers can also use the learning activities to collect evidence of student learning in Science, as part of the broader Science learning program.

Ideas for additional learning activities for each curriculum band have also been provided.

**Note:** For teaching resources for Ethical Capability, including resources that unpack the content descriptions and sample units of work covering ethical obligation and ethical decision making, see the VCAA’s [Ethical Capability teaching resources](https://www.vcaa.vic.edu.au/curriculum/foundation-10/resources/ethical-capability/Pages/TeachingResources.aspx).

Teaching bioethics in the classroom

An ethical issue arises where there are competing ways to respond to a situation and the best course of action is not clear. An ethical issue becomes an ethical dilemma when it is not possible to act in a way that does not contravene a value or ethical principle, presenting us with a decision about which value or principle to prioritise over another (see [Appendix 1](#App1) for a selection of ethical principles and concepts).

In the sample learning activities, the approach taken in teaching bioethics includes an emphasis on classroom and group discussion, guided by a series of questions. The benefits of this approach are that it exposes each student to a wide range of ideas, values and perspectives, and it also develops their ability to engage in bioethical issues and dilemmas in a respectful and tolerant manner.

Teachers should ensure that students understand and are able to recognise that ethical principles and concepts are general in nature and are separate to any codes or legislation that may inform ethical conduct in scientific investigations.

Teachers should use their own judgement to select bioethical issues and learning activities that best suit their school and student cohorts, as well as to select the type of bioethical issues that will best support discussion between students in their particular classroom. For a classroom discussion to be successful, the teacher needs to facilitate it carefully, in a positive, safe atmosphere. Some good suggestions for setting classroom norms and managing classroom discussions can be found in [‘Actually, it’s OK to disagree. Here are 5 ways we can argue better’](https://theconversation.com/actually-its-ok-to-disagree-here-are-5-ways-we-can-argue-better-121178) (Hugh Breakey, The Conversation) and the [Managing Classroom Discussions webpage](https://www.sciencelearn.org.nz/resources/198-managing-classroom-discussions) of the Science Learning Hub – Pokapū Akoranga Pūtaiao (University of Waikato Te Whare Wānanga o Waikato). Further support can also be found in the VCAA’s [Teaching ethical issues: planning tool](https://www.vcaa.vic.edu.au/curriculum/foundation-10/resources/ethical-capability/planningresources/Pages/PlanningTools.aspx).

Getting students to use the VCAA’s [Student ethical issue reflection tool](https://www.vcaa.vic.edu.au/curriculum/foundation-10/resources/ethical-capability/planningresources/Pages/PlanningTools.aspx) is a useful alternative or supplement to classroom discussion, in particular when a teacher would like to observe a student’s independent ethical thinking about an issue.

Levels 7 and 8

Sample learning activities: Ethics of organ transplants

Overview

In this sample learning sequence students will investigate emerging technologies to replace organs, such as electronic hearts, dialysis machines and cochlear implants, and explore the ethical implications of organ transplants.

It is intended that this sequence of activities follow on from a broader sequence of lessons about body systems.

Duration

2 or 3 lessons

Materials and/or resources required

* [Appendix 1: A selection of ethical principles and concepts](#App1)
* [Appendix 2: Artificial organ technology (worksheet)](#App2)
* [Appendix 3: Ethical principles – organ transplants (worksheet)](#App3)

Links to Science, Levels 7 and 8

| Strand | Sub-strand | Content descriptions | Relevant aspect of the achievement standard |
| --- | --- | --- | --- |
| Science Understanding | Science as a human endeavour | Scientific knowledge and understanding of the world changes as new evidence becomes available; science knowledge can develop through collaboration and connecting ideas across the disciplines and practice of science [(VCSSU089)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU089)Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations [(VCSSU090)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU090) | By the end of Level 8, students explain how evidence has led to an improved understanding of a scientific idea. They discuss how science knowledge can be applied to generate solutions to contemporary problems and explain how these solutions may impact on society. |
| Science Understanding | Biological sciences | Multicellular organisms contain systems of organs that carry out specialised functions that enable them to survive and reproduce [(VCSSU094)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU094) | They analyse the relationship between structure and function at cell, organ and body system levels. |

Links to Ethical Capability, Levels 7 and 8

|  |  |  |
| --- | --- | --- |
| Strand | Content descriptions | Achievement standard |
| Understanding Concepts | Explore the contested meaning of concepts including freedom, justice, and rights and responsibilities, and the extent they are and should be valued by different individuals and groups [(VCECU014)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU014)Investigate why ethical principles may differ between people and groups, considering the influence of cultural norms, religion, world views and philosophical thought [(VCECU015)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU015)Investigate criteria for determining the relative importance of matters of ethical concern [(VCECU016)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU016) | By the end of Level 8, students explain different ways ethical concepts are represented and analyse their value to society, identifying areas of contestability. They articulate how criteria can be applied to determine the importance of ethical concerns.Students analyse the differences in principles between people and groups. They explain different views on the extent of ethical obligation and analyse their implications for the consequences of and duties involved in ethical decision-making and action. They analyse the role of context and experience in ethical decision-making and action. |
| Decision Making and Actions | Explore the extent of ethical obligation and the implications for thinking about consequences and duties in decision-making and action [(VCECD017)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECD017)Discuss the role of context and experience in ethical decision-making and actions [(VCECD018)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECD018) |

Suggested sequence of learning

1. Introduction to organ donation (whole class)

Before starting this sequence of activities, discuss with the class what organ donation is, how it works and the current numbers of people who need a transplant. Refer to the Australian Government resource [DonateLife](https://donatelife.gov.au/) for further information, including the comprehensive frequently asked questions section.

Watch the short video [Transplant story: A personal journey (Menzies School of Health Research)](https://www.menzies.edu.au/page/Research/Projects/Kidney/The_transplant_story_A_personal_journey/). Students will meet Aboriginal man Ronald Morgan (Ronno), who received a mother-to-child kidney transplant as a child. Now this kidney is failing and Ronno needs to relocate thousands of kilometres from home for dialysis treatment. Students will hear some of his personal story, plus learn a little about Aboriginal and Torres Strait Islander people with chronic kidney disease, as well as issues with dialysis and transplants.

2. Create an infographic about artificial organ technology (small groups or individuals)

Students complete [Appendix 2: Artificial organ technology (worksheet)](#App2), which guides them through the process of creating an infographic about the development of artificial organs.

Once students have completed their infographics, discuss:

* What criteria might a scientist use to determine when it is ethically acceptable to use an artificial organ instead of transplanting an organ from a donor?
* How might these criteria be measured?

3. Read Susannah’s transplant story (whole class)

Read [Susannah’s Transplant Story on the Gift of Life website](https://www.giftoflife.asn.au/post/susannah-s-transplant-story), about a young woman with an autoimmune disease who needed to undergo two kidney transplants – with one kidney donated by her father and one by her mother.

4. Take part in an interactive activity about kidney donation (small groups and whole class)

Most people have two kidneys. It is possible to donate one of these kidneys and still have a normal life. Someone who does this is called a living donor.

Ask students to express their opinion about where the following possible actions should be considered on a spectrum ranging from ‘obligation’ to ‘above and beyond expectations’, using an activity such as the [VAPS (Victorian Association for Philosophy in Schools) Ethical Decision Making Tool ‘Put yourself on a line and fold the line’ activity (PDF download)](https://www.vaps.vic.edu.au/wp-content/uploads/2020/10/VAPS_Ethical-Decision-Making_Put-yourself-on-a-line-and-fold-the-line.pdf).

Possible actions to consider are:

* donating a kidney to a family member once you have died
* donating a kidney to a stranger once you have died
* donating one kidney to a family member as a living donor
* donating one kidney to a stranger as a living donor.

5. Discuss key questions (whole class)

* Do you think family and/or close friends of a person who has received an organ donation are more likely to become organ donors? Why?
* What might motivate a family member to donate a kidney?
* What might motivate a stranger to donate a kidney?
* Do any obligations exist for a family member to donate a kidney if they are a match? Why or why not?
* Who holds a different perspective to you? Why?

6. Discuss ethical principles (whole class or groups)

Students will be exploring these two ethical issues in a worksheet ([Appendix 3: Ethical principles – organ transplants)](#App3) in the next step (Step 7):

* Should everyone be automatically considered an organ donor unless they register to not be an organ donor?
* Should individuals be allowed to pay money to obtain organs for donation and thus receive organ transplants before others on the transplant list?

Before completing the worksheet in Step 7, students should discuss, as a whole class or as a smaller group, the following four common principles of bioethics, as well as which principle(s) might be viewed as more or less significant depending on the ethical issue. Ethical significance can be tested by using ‘if … then ...’ reasoning and ‘this matters/does not matter because …’

**i. Autonomy (freedom):** an individual’s right to make decisions about things that will affect them

* Compare and evaluate two concepts of freedom:
* the absence of outside interference that prevents you achieving what you want
* the ability to control your own interests (self-determination)
* Discussion may cover the following:
* Issue 1: Freedom to decide what happens to your own body after you have died or the body of relatives who have died (absence of outside interference). The issue of informed consent is important here. If an individual is automatically considered an organ donor, can they have given informed consent? Conversely, the beneficence principle (the duty to ‘do good’) could be used to argue that this freedom should be forfeited to save lives.
* Issue 2: Freedom to control your own interests – but we need to consider the possible consequences if individuals were assumed to have the ability to decide for themselves on the sale or purchase of organs. These consequences could include increased trafficking in body parts (conflicting with non-maleficence) and the breaching of the principles of freedom and justice.
* Issue 3: If someone signs a consent form saying that their body will be used for research only, is a kind of promise made? If so, to what extent do we have a duty to keep it? How would duty-based and consequences-based approaches approach a dilemma involving breaking a promise in order to save lives?

**ii. Beneficence**: the duty to ‘do good’

Consider whether the duty to ‘do good’ should be used to limit a person’s right to make decisions about things that will affect them. What areas of contestability exist in relation to this ethical concept?

**Note:** Beneficence broadly includes all principles, norms and actions aimed at benefiting others, including people, animals and the broader environment. It involves actions that directly and positively promote the good and involves consideration of strength of obligation or responsibility (whether legally, as part of a role we hold, or in relation to harm that might be incurred) when deciding whether to do a beneficent act. Another consideration in relation to beneficence involves to what extent we can judge on behalf of others what a benefit for them is, as opposed to seeking and acting in accordance with the views of others.

**iii. Non-maleficence**: the duty to ‘not do bad’

Consider whether the duty to ‘not do bad’ should be used to limit freedom. What areas of contestability exist in relation to this ethical concept?

**Note:**

Non-maleficence refers to principles and actions (including doing nothing) aimed at preventing or minimising harm to others. It is often thought that non-maleficence involves acting impartially to prevent harm, or at least that non-maleficence involves more impartial judgement than is involved in determining benefits.

It is sometimes thought that there is a stronger obligation or responsibility on decision-makers to prevent or minimise harm than there is to confer benefits (beneficence). We can see this reflected in the reasons given for many punishments, that is, punishments are often given for causing harm rather than failing to confer a benefit.

**iv. Justice:** to treat all people equally and equitably

Consider whether it is always possible to treat all people equally and equitably. What areas of contestability exist in relation to this concept?

**Note:**

Justice is often considered as both being fair and what is deserved or maximising the common good. Therefore, an action may be considered just if:

* it treats people as they deserve to be treated or proportionately
* it treats everyone impartially
* it treats everyone equally
* it does no one harm
* everyone’s interests are taken into account
* it involves reciprocity (social cooperation for exchange of benefits)
* it maximises the common good.

Further consideration of justice, beneficence and respect and the application of these values and principles when conducting research involving human participants can be found in Section 1 of [National Statement on Ethical Conduct in Human Research (2007) – Updated 2018 (NHMRC)](https://www.nhmrc.gov.au/about-us/publications/national-statement-ethical-conduct-human-research-2007-updated-2018#toc__155). There are also other specialised ethical guidelines and codes of practice for specific areas of research that should be referred to as appropriate in the ethical discussion of human and non-human animal research.

7. Complete a worksheet about ethical principles (individuals)

Students complete [Appendix 3: Ethical principles – organ transplants (worksheet)](#App5).

Teachers should debrief students about their responses to the worksheet. Student responses should be used as a point of discussion to explore the contested meanings of freedom (autonomy), justice, and rights and responsibilities, and the extent these things are valued by different individuals and groups.

8. Explore three ethical approaches (whole class)

Introduce and discuss with students three commonly used ethical approaches: duty ethics, consequentialism and virtue ethics.

These three ethical approaches are outlined below with some guiding questions.

**Note:**

See the following short videos for further explanations of these ethical approaches:

* [Deontology – Ethics Defined (McCombs School of Business, YouTube)](https://youtu.be/wWZi-8Wji7M) (duty ethics)
* [Consequentialism – Ethics Defined (McCombs School of Business, YouTube)](https://youtu.be/51DZteag74A)
* [Utilitarianism – Ethics Defined (McCombs School of Business, YouTube)](https://youtu.be/-FrZl22_79Q) (a form of consequentialism)
* [Virtue Ethics – Ethics Defined (McCombs School of Business, YouTube)](https://youtu.be/NMblKpkKYao)

Duty ethics

Duty ethics involves considering how people act and places central importance on the idea that people have a duty to act in a particular way. What is right and wrong is determined by ethical principles or laws given by an external authority or chosen by the individual, regardless of the consequences that may be produced. For example, stealing is wrong; therefore it is wrong to steal food even if the harm to the victim is relatively small compared to the benefit to the recipient of the food. Guiding questions when applying or considering this approach may include:

* Who is affected by this issue?
* What duties (codes, laws, rules, principles or conventions) relate to this issue?
* What action should be taken?

Consequentialism

Consequentialism involves considering whether or not something is right by what its foreseeable consequences are. For instance, most people would agree that lying is wrong; but if telling a lie would help protect someone from harm, consequentialism may say it is the right thing to do. When weighing the significance of consequences, the intensity of benefits or harms and for whom can be considered and compared. Guiding principles when applying or considering this approach may include:

* Who or what is affected by this issue?
* What are the possible benefits for those affected?
* What are the possible harms for those affected?
* Which option(s) will produce the most good and least harm?
* If one is harmed and another benefits, how do you decide who or what matters most?
* What action should be taken?

Virtue ethics

A virtue is a disposition that the community accepts as being ‘good’, such as honesty, kindness and patience. For example, a disposition such as kindness is thought to be significant in helping make the right decisions in many instances. Virtue ethics emphasises that character is an important aspect of knowing what the right thing to do is and being able to do it, for example, from a virtue ethics perspective, helping a kitten stuck in a tree or picking up rubbish and putting it in the bin is a good thing to do, and being motivated to do good actions involves particular dispositions.

Guiding questions when applying or considering this approach include the following:

* Who or what is affected by this issue?
* What qualities make someone a ‘good’ or virtuous person?
* What decisions or actions in relation to this issue would help make you a ‘good’ person?
* Is virtue necessary to do ‘good’? Is it alone sufficient?
* What actions do particular ‘good’ dispositions (for example, honesty, kindness, patience) suggest?
* What action should be taken?
* What personal qualities might be required to undertake this action (for example, courage)?

9. Apply ethical approaches to ethical problems

Ask students to justify the two ethical problems below by using one of the three ethical approaches, through an activity such as the [VAPS Ethical Decision Making Tool ‘Put yourself on the triangle’ activity (PDF download)](https://www.vaps.vic.edu.au/wp-content/uploads/2020/10/VAPS_Ethical-Decision-Making_Put-yourself-on-the-triangle.pdf).

Ethical problems:

* Australia should move to an opt-out system for organ donation because …
* People should be allowed to pay for an organ to get one faster because …

**Note:** It might be appropriate to work with students on the justification of some easier ethical problems first, such as ‘You should never lie because …’

10. Respond to an ethical dilemma (small groups or individuals)

Allocate one ethical approach to each student or group and ask them to use it to respond to one of the ethical dilemmas below. Address one or both of these ethical dilemmas, depending on your circumstances.

**Ethical dilemma 1**

Two individuals waiting on a lung transplant are a match for a single lung that has become available. Amy is 45 years old, with young children, and needs a new lung because of damage directly resulting from many years of smoking; she quit smoking 12 months ago and believes she will not start again. James is 25 years old, single with no children, and suffers from cystic fibrosis, a congenital disease (that is, he was born with the condition). Which individual should receive the new lung?

**Ethical dilemma 2**

Sam desperately needs a new lung and will die within a year if a donor lung is not received. Experimental artificial lungs are available but they have not yet been properly tested and it is possible that they may not work. Should doctors recommend surgery to implant an artificial lung, knowing that if it does not work then there is no real lung available to transplant and Sam will die?

11. Discuss the responses (whole class and/or groups)

* Did students using the same ethical approach come to the same conclusion? Discuss the reasons why they might not have.
* Did students using different ethical approaches come to the same conclusion? Discuss the reasons why they might not have.
* What beliefs, experiences and understanding do you think influenced your thinking about the issue? Consider Susannah and Ronno, who we learnt about earlier, as well the individuals in the ethical dilemmas described above. How would your thinking change if all you knew was the age of these people? What information in their story most impacted your thinking about this issue?
* Who holds a different perspective than you? What ethical concepts and approaches can you identify to help understand the position that they have taken?

**Note:**

This is an opportunity to discuss the roles of cultural norms, religion, world views and philosophical thought and their influence on ethical decision making. This can also be used to continue to develop discussion about ethical obligation and the role of choice, for example, should a person who chooses to smoke have to pay more to cover the cost of their healthcare compared to a person with lung disease as a result of passive smoking? Does a person’s choice or lack of choice affect how we view the strength of particular obligations to help?

It should also be noted that ethical concepts and approaches are interrelated. For example, consequentialism, which involves consideration of the most benefit and least harm, involves the concept of beneficence, while beneficence can also be thought of as the virtue of benevolence. This interrelatedness can be explored by students and can mean that students produce insightful and thoughtful responses to bioethical issues through ethical concepts alone or by using them in conjunction with one or more ethical approaches.

Additional resources

* [DonateLife school education resources](https://donatelife.gov.au/resources/school-education)
* [Ethical guidelines on organ and tissue donation and transplantation (National Health and Medical Research Council, Australian Government)](https://www.nhmrc.gov.au/research-policy/ethics/ethical-guidelines-organ-and-tissue-donation-and-transplantation)

Assessment

The above sequence of learning activities has been designed to collect evidence of student learning in Ethical Capability.

Use the following ‘evidence of learning’ grid to assess student responses according to the Ethical Capability Levels 7 and 8 achievement standard:

By the end of Level 8, students explain different ways ethical concepts are represented and analyse their value to society, identifying areas of contestability. They articulate how criteria can be applied to determine the importance of ethical concerns.

Students analyse the differences in principles between people and groups. They explain different views on the extent of ethical obligation and analyse their implications for the consequences of and duties involved in ethical decision-making and action. They analyse the role of context and experience in ethical decision-making and action.

Teachers can also use these learning activities to assess aspects of student learning in Science (see [Links to Science, Levels 7 and 8](#Links7to8) in this document).

Evidence of learning grid

| Working towards Level 8 | At Level 8 | Working towards Levels 9 and 10 |
| --- | --- | --- |
| Student responses may include:* correct use of terminology that describes ethical concepts
* recognition that different cultural and/or religious groups may preference different ethical principles, when considering the two proposals to increase the number of organ donors
* suggestions that some ethical issues are more important than others
* suggestions that some individuals have or do not have obligations with respect to organ donation
* identification of the unique experiences of organ transplant patients and/or their families
* application of ethical concepts and ethical approaches to develop a response to a dilemma regarding organ donation.
 | Student responses may include:* a variety of perspectives about the concepts of freedom and justice
* reasons why different cultural and/or religious groups may preference different ethical principles, when considering the two proposals to increase the number of organ donors
* use of ‘if … then …’ reasoning to describe the relative importance of matters of ethical concern
* a discussion of how obligations affect judgement of consequences and/or duties when faced with a dilemma
* identification of obligations with respect to healthcare teams looking after transplant patients and a discussion about whether obligations exist for family members to donate a kidney
* a discussion about the experiences of organ transplant patients and their families and how this may affect their response to transplant issues.
 | Student responses may include:* identification of the differences between autonomy and freedom
* recognition that different positions are often related to commonly held ethical principles and concepts
* differentiation between the ethical and non-ethical parts of an issue
* recognition of some of the problems associated with using a particular ethical approach
* consideration of personal obligations, if any, about becoming an organ donor now that they are more aware of the issue
* recognition of organisations and individuals in sharing the experiences of transplant recipients and donors.
 |

Ideas for additional learning activities

Ethics of blood donations and transfusions

Links to Science, Levels 7 and 8

Science Understanding, Biological sciences, Levels 7 and 8 content description:

* Cells are the basic units of living things and have specialised structures and functions [(VCSSU092)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU092)

Science Understanding, Science as a human endeavour, Levels 7 and 8 content description:

* Science and technology contribute to finding solutions to a range of contemporary issues; these solutions may impact on other areas of society and involve ethical considerations [(VCSSU090)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU090)

Context

Blood includes specialised white blood cells and red blood cells, which are essential for life. Students identify the role that blood donors have in saving lives, the modern technological solutions that science has developed to screen for infectious diseases and the development of artificial blood. Students may also consider why some religious groups may refuse a blood donation.

Suggested resources

* [Blood donation (Better Health Channel)](https://www.betterhealth.vic.gov.au/health/conditionsandtreatments/blood-donation)
* [Australian Red Cross Lifeblood](https://www.donateblood.com.au/)
* [Blood products (World Health Organization)](https://www.who.int/health-topics/blood-products#tab=tab_1)
* [Blood transfusion safety (World Health Organization)](https://www.who.int/health-topics/blood-transfusion-safety#tab=tab_1)

Links to Ethical Capability, Levels 7 and 8, plus ideas and prompts for learning activities

See [Sample learning activities: Ethics of organ transplants](#SampLearn1) in this document. These activities can be readily adapted to a consideration of the ethics of blood donation, which is a more common – and in some cases a more accessible – example of tissue donation.

The ethics of palm oil use

Link to Science, Levels 7 and 8

Science Understanding, Biological sciences, Levels 7 and 8 content description:

* Interactions between organisms can be described in terms of food chains and food webs and can be affected by human activity [(VCSSU093)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU093)

Context

Students explore the impact of palm oil production on the loss of biodiversity in rainforests in countries such as Indonesia. Palm oil is ‘hidden’ in many packaged foods in Australian supermarkets, for example, under the label of ‘vegetable oils’. Campaigns such as Zoos Victoria’s ‘Don’t palm us off’ campaign call for mandatory labelling of palm oil products.

Suggested resource

[‘Don’t palm us off’ palm oil campaign, Zoos Victoria](https://www.zoo.org.au/dont-palm-us-off/)

Links to Ethical Capability, Levels 7 and 8, plus ideas and prompts for learning activities

|  |  |
| --- | --- |
| Ethical Capability content description | Ideas and prompts for learning activities |
| Explore the contested meaning of concepts including freedom, justice, and rights and responsibilities, and the extent they are and should be valued by different individuals and groups [(VCECU014)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU014) | **Freedom**: Should consumers have the freedom to purchase products containing palm oil or should this be limited by laws? Should companies be forced to label whether or not their products contain palm oil so that consumers have the freedom to choose?**Justice**: How should the palm oil farmers be treated, and is it fair that their ability to earn money may be limited to protect orangutans?**Rights and responsibilities**: If we maintain the legal right to use palm oil, what responsibility should we have to support orangutan protection efforts? |
| Investigate why ethical principles may differ between people and groups, considering the influence of cultural norms, religion, world views and philosophical thought [(VCECU015)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU015) | Students should consider a number of world views and guiding principles, including sustainability principles, and how these may vary between different people who use palm oil. See [Appendix 1](#App1) for examples of world views and sustainability principles that students may consider. |
| Investigate criteria for determining the relative importance of matters of ethical concern [(VCECU016)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU016) | Consider a number of ethical problems related to this issue, such as:* How should palm oil farmers be treated, and is it fair that their ability to earn money may be limited to protect orangutans?
* Should companies in Australia be forced to label whether or not their products contain palm oil? Why or why not?
* Is it important to preserve orangutans in the wild? Why or why not?

Use ethical approaches and/or environmental ethical principles to consider how different stakeholders might rank the importance of these issues and why. Examples of stakeholders include farmers in developing countries who produce palm oil, companies that produce products that contain palm oil, consumers and animal welfare groups. |
| Explore the extent of ethical obligation and the implications for thinking about consequences and duties in decision-making and action [(VCECD017)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECD017) | Consider the questions:* What obligation should Australians have to protect animals and rainforests in a different country?
* What are our obligations to protect endangered animals in our own country?
* How do the obligations of individuals and governments differ?
* How does our sense of obligation affect how strong we think our duty is to protect endangered animals? How does it affect our evaluation of consequences?
 |

Pest control

Link to Science, Levels 7 and 8

Science Understanding, Biological sciences, Levels 7 and 8 content description:

* Interactions between organisms can be described in terms of food chains and food webs and can be affected by human activity [(VCSSU093)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU093)

Context

Students explore the controlling of carp populations in Australian rivers and consider other issues related to the control of pest species, such as cane toads and feral cats, including the ecological and financial consequences of not controlling these feral species. Students also explore protecting Australian wildlife from domestic cats.

Suggested resources

* [Controlling Carp video (Behind the News, ABC)](https://www.abc.net.au/btn/classroom/controlling-carp/10525346)
* [Cane Toads video (Behind the News, ABC)](https://www.abc.net.au/btn/classroom/cane-toads/10537370)
* [Feral Cats video (Behind the News, ABC)](https://www.abc.net.au/btn/classroom/feral-cats/10539962)
* [Cat Ban video (Behind the News, ABC)](https://www.abc.net.au/btn/classroom/cat-ban/10527542)
* [‘Canberra cats may have to stay indoors' video (Lateline, ABC)](https://www.abc.net.au/lateline/canberra-cats-may-have-to-stay-indoors/5811020)

Links to Ethical Capability, Levels 7 and 8, plus ideas and prompts for learning activities

|  |  |
| --- | --- |
| Ethical Capability content description | Ideas and prompts for learning activities |
| Explore the contested meaning of concepts including freedom, justice, and rights and responsibilities, and the extent they are and should be valued by different individuals and groups [(VCECU014)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU014) | **Freedom:** Should cat owners be required to keep their pet cats inside at all times to protect native wildlife? Should there be a ban on goldfish to prevent them getting into Australian waterways? At what point do individual freedoms need to be restricted to protect the environment?**Justice:** What obligations, if any, do we have to fix the environmental damage done by previous generations so that the environment is better for future generations?**Rights and responsibilities**: If I want to keep the right to own a pet cat, what responsibilities do I have to ensure that it does not become feral and that it does not kill native wildlife? What responsibilities do landowners (farmers) have to control pest populations on their properties? |
| Investigate why ethical principles may differ between people and groups, considering the influence of cultural norms, religion, world views and philosophical thought [(VCECU015)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU015) | Students should consider a number of world views and guiding principles, including sustainability principles, and how these may vary between different people who are involved in the control of pest species. See [Appendix 1](#App1) for examples of world views and sustainability principles that students may consider. |
| Investigate criteria for determining the relative importance of matters of ethical concern [(VCECU016)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU016) | Consider a number of ethical problems related to this issue, such as:* What obligations, if any, do we have to fix the environmental damage done by previous generations so that the environment is better for future generations?
* Should we be allowed to keep pet cats given the damage they do to native wildlife?
* Does it matter that some of the methods of controlling feral cats may cause them pain?
* Does it matter if cats are kept locked up in a house all day?

Use ethical approaches and/or environmental ethical principles to consider how different stakeholders might rank the importance of these issues and why. Examples of stakeholders include pet owners, wildlife protection groups and environmental scientists. |
| Explore the extent of ethical obligation and the implications for thinking about consequences and duties in decision-making and action [(VCECD017)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECD017) | Consider the questions:* What obligations do we have to protect wildlife and ecosystems in Australia?
* What obligations do farmers have to control pest species, such as rabbits, on their own properties?
* How do the obligations of individuals and governments differ?
* What obligations, if any, do we have to fix the environmental damage done by previous generations so that the environment is better for future generations?
* How does our sense of obligation affect how strong we think our duty is to control pest species? How does it affect our evaluation of consequences?
 |
| Discuss the role of context and experience in ethical decision-making and actions [(VCECD018)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECD018) | Consider a number of ethical problems related to this issue, such as:* Should we be allowed to keep pet rabbits or cats given the damage they do to native wildlife? How does our own experience influence how we may assess and measure consequences?
* How can science help us judge the significance of consequences and help with foreseeing them?

Use ethical approaches and/or environmental ethical principles to consider how different stakeholders might come to different conclusions about these ethical problems and why. Examples of stakeholders include pet owners, wildlife protection groups and environmental scientists. |

Levels 9 and 10

Sample learning activities: Combating vitamin A deficiency and food security with genetically modified organisms (GMOs)

Overview

Students will investigate the sometimes controversial use of genetic engineering to modify the DNA of important commercial crops to suit human needs.

Duration

3 or 4 lessons

Materials and/or resources required

* [Appendix 1: A selection of ethical principles and concepts](#App1)
* [Appendix 4: Researching GMOs (worksheet)](#App4)
* [Appendix 5: Questions about GM bananas](#App5)

Links to Science, Levels 9 and 10

|  |  |  |  |
| --- | --- | --- | --- |
| Strand | Sub-strand | Content descriptions | Relevant aspect of the achievement standard |
| Science Understanding | Science as a human endeavour | Advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries [(VCSSU115)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU115)The values and needs of contemporary society can influence the focus of scientific research [(VCSSU116)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU116) | By the end of Level 10, students … predict how future applications of science and technology may affect people’s lives. |
| Science Understanding | Biological sciences | The transmission of heritable characteristics from one generation to the next involves DNA and genes [(VCSSU119)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU119)Multicellular organisms rely on coordinated and interdependent internal systems to respond to changes to their environment [(VCSSU117)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU117) | They explain the role of DNA and genes in cell division and genetic inheritance.They analyse how biological systems function and respond to external changes with reference to the interdependencies between individual components … |

Links to Ethical Capability, Levels 9 and 10

|  |  |  |
| --- | --- | --- |
| Strand | Content descriptions | Achievement standard |
| Understanding Concepts | Investigate the connections and distinctions between and the relative value of concepts including fairness and equality, and respect and tolerance [(VCECU019)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU019)Explore a range of ethical problems and examine the extent to which different positions are related to commonly held ethical concepts and principles, considering the influence of cultural norms, religion, world views and philosophical thought [(VCECU020)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU020)Distinguish between the ethical and non-ethical dimensions of complex issues, including the distinction between ethical and legal issues [(VCECU021)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU021) | By the end of Level 10, students explain connections and distinctions between ethical concepts, identifying areas of contestability in their meanings and relative value.Students analyse and evaluate contested approaches to thinking about consequences and duties in relation to ethical issues. They examine complex issues, identify the ethical dimensions and analyse commonality and difference between different positions. They explain how different factors involved in ethical decision-making can be managed. |
| Decision Making and Actions | Discuss issues raised by thinking about consequences and duties, in approaches to decision-making and action, and arguments for and against these approaches [(VCECD022)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECD022)Investigate how different factors involved in ethical decision-making can be managed by people and groups [(VCECD023)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECD023) |

Suggested sequence of learning

1. Discuss ‘respect’ and ‘tolerance’ (whole class)

Before starting this activity teachers should discuss the terms ‘respect’ and ‘tolerance’, including what these terms mean, how they differ and what it looks like to show respect and tolerance in a class discussion. (See the VCAA’s [Unpacking the content descriptions](https://www.vcaa.vic.edu.au/curriculum/foundation-10/resources/ethical-capability/Pages/TeachingResources.aspx) resources for more information on respect and tolerance.)

2. Explore GMOs grown in Australia (individual) and discuss golden rice (whole class)

Students read the fact sheet [Genetically modified (GM) crops in Australia (Office of the Gene Technology Regulator, Department of Health, Australian Government – PDF download)](http://www.ogtr.gov.au/internet/ogtr/publishing.nsf/Content/9AA09BB4515EBAA2CA257D6B00155C53/%24File/11%20-%20Genetically%20modified%20%28GM%29%20crops%20in%20Australia.pdf) and use it to answer the following questions:

* Other than experimental crops, what GM crops can be grown in Australia?
* What experimental crops are currently approved for trials in Australia?
* What conditions need to be met for these crops and experimental trials to be approved?

Golden rice is a GM variety of rice that has been modified to increase the level of vitamin A available. This has been done in an attempt to reduce vitamin A deficiency in certain populations. Vitamin A deficiency is a leading cause of blindness and death in many developing countries. Golden rice has been approved by Foods Standards Australia New Zealand (FSANZ) but has not been approved by the Office of the Gene Technology Regulator. What does this mean for growing and selling golden rice in Australia?

Most Australians do not have vitamin A deficiency so golden rice is not likely to be sold commercially in Australia. Why then has FSANZ approved golden rice? (Possible answers: Non-GM rice that contains traces of golden rice can still be imported to Australia, which means that rice-exporting countries that benefit from golden rice can still safely export rice to Australia without worrying about contamination and, therefore, maintain their markets; and countries that are more likely to benefit from golden rice may not be as well-equipped financially nor have the expertise to assess the safety of golden rice, but they can use the findings of FSANZ as a guide.)

3. Research GMOs (small groups)

Students work in research groups of three or four to complete the table in [Appendix 4: Researching GMOs (worksheet)](#App4), with each group completing the table for a different GMO currently grown in Australia either commercially or experimentally. When their table is completed, students form new groups to share their findings, with each new group consisting of one person from each of the research groups.

4. Learn about GM bananas (whole class)

The Queensland University of Technology (QUT) has been leading research into the development of genetically modified bananas. Students learn about what QUT are doing to ensure food security and prevent vitamin A deficiencies with genetically modified bananas.

Students watch and read the following:

* short video about banana wilt in Uganda – [GMO banana: Overcoming bacterial wilt (The Cornell Alliance for Science, YouTube)](https://youtu.be/coqsLf5qcUk)
* news article and short video about preventing vitamin A deficiencies with fortified bananas – [Bananas with boosted vitamin A developed in Queensland to save African lives’ (ABC News)](https://www.abc.net.au/news/2017-07-07/bananas-boosted-with-vitamin-a-hoped-to-save-lives-in-africa/8660500) and [Golden bananas – Professor James Dale interview (TheQUTube, YouTube)](https://youtu.be/yxbaqPdomso)
* science magazine article as additional reading – [‘Super bananas’ enter US market trials (Scientific American)](https://www.scientificamerican.com/article/super-bananas-enter-u-s-market-trials/).

5. Complete questions (individuals or groups) and discuss (groups or whole class)

Students complete the questions about the GM bananas in [Appendix 5: Questions about GM bananas](#App5) and then discuss the answers as a group or class.

6. Explore fairness and the sharing of scientific research (whole class)

* Ask students to express their opinion about whether it is fair that Australian scientists and universities are spending time and money to solve a problem that does not affect Australians. To do this, use an activity such as [VAPS Ethical Decision Making Tool ‘Put yourself on a line and fold the line’ activity (PDF download)](https://www.vaps.vic.edu.au/ethical-capability/ethical-decision-making/).
* Discuss with students what it means to act fairly and how the term ‘fairness’ has contested meaning and differs from ‘equality’. (See the VCAA’s [Unpacking the content descriptions](https://www.vcaa.vic.edu.au/curriculum/foundation-10/resources/ethical-capability/Pages/TeachingResources.aspx) resources for more information on areas of contestability.)
* How does the example of the GM bananas demonstrate the differences between fairness and equality?
* Consider the following criteria for fairness (Philip Cam 2006, *20 Thinking Tools: Collaborative Inquiry for the Classroom*, Australian Council for Education Research, page 83):
An action is fair if:
* it treats people as they deserve to be treated
* it treats everyone equally
* it does no one harm
* everyone’s interests are taken into account.

7. Identify ethical issues (whole class)

As a class students identify and differentiate between the different dimensions of the vitamin A deficiency issue by categorising them in a table like the one below. Discuss why each issue or challenge belongs in each category.

| **Ethical issues** | **Scientific challenges** | **Cultural issues** | **Political and legal issues** |
| --- | --- | --- | --- |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

When considering the safety of GMOs, what legal obligations do scientists, FSANZ and the Office of the Gene Regulator have? What moral obligations do they have? Are there any instances where scientists may have a moral obligation even if there is no legal obligation?

8. Review and use three ethical approaches (whole class)

Review three commonly used ethical approaches (duty ethics, consequentialism and virtue ethics) in regards to an ethical issue related to GMOs.

Ethical approaches represent different strategies for determining right and wrong based on an underlying philosophical world view. These three ethical approaches are outlined below with some guiding questions.

**Note:**

See the following short videos for further explanations of these ethical approaches:

* [Deontology – Ethics Defined (McCombs School of Business, YouTube)](https://youtu.be/wWZi-8Wji7M) (duty ethics)
* [Consequentialism – Ethics Defined (McCombs School of Business, YouTube)](https://youtu.be/51DZteag74A)
* [Utilitarianism – Ethics Defined (McCombs School of Business, YouTube)](https://youtu.be/-FrZl22_79Q) (a form of consequentialism)
* [Virtue Ethics – Ethics Defined (McCombs School of Business, YouTube)](https://youtu.be/NMblKpkKYao)

See also the VCAA’s [Unpacking the content descriptions](https://www.vcaa.vic.edu.au/curriculum/foundation-10/resources/ethical-capability/Pages/TeachingResources.aspx) resources for more information on areas of contestability for different ethical approaches.

Duty ethics

Duty ethics involves considering how people act and places central importance on the idea that people have a duty to act in a particular way. What is right and wrong is determined by ethical principles or laws given by an external authority or chosen by the individual, regardless of the consequences that may be produced. For example, stealing is wrong; therefore it is wrong to steal food even if the harm to the victim is relatively small compared to the benefit to the recipient of the food. Guiding questions when applying or considering this approach may include:

* Who is affected by this issue?
* What duties (codes, laws, rules, principles or conventions) relate to this issue?
* What action should be taken?

Consequentialism

Consequentialism involves considering whether or not something is right by what its foreseeable consequences are. For instance, most people would agree that lying is wrong; but if telling a lie would help protect someone from harm, consequentialism may say it is the right thing to do. When weighing the significance of consequences, the intensity of benefits or harms and for whom can be considered and compared. Guiding principles when applying or considering this approach may include:

* Who or what is affected by this issue?
* What are the possible benefits for those affected?
* What are the possible harms for those affected?
* Which option(s) will produce the most good and least harm?
* If one is harmed and another benefits, how do you decide who or what matters most?
* What action should be taken?

Virtue ethics

A virtue is a disposition that the community accepts as being ‘good’, such as honesty, kindness and patience. For example, a disposition such as kindness is thought to be significant in helping make the right decisions in many instances. Virtue ethics emphasises that character is an important aspect of knowing what the right thing to do is and being able to do it, for example, from a virtue ethics perspective, helping a kitten stuck in a tree or picking up rubbish and putting it in the bin is a good thing to do, and being motivated to do good actions involves particular dispositions.

Guiding questions when applying or considering this approach include the following:

* Who or what is affected by this issue?
* What qualities make someone a ‘good’ or virtuous person?
* What decisions or actions in relation to this issue would help make you a ‘good’ person?
* Is virtue necessary to do ‘good’? Is it alone sufficient?
* What actions do particular ‘good’ dispositions (for example, honesty, kindness, patience) suggest?
* What action should be taken?
* What personal qualities might be required to undertake this action (for example, courage)?

9. Respond to an ethical dilemma (individuals or whole class)

Investigate how different people determine right and wrong, using the following ethical dilemma.

**Ethical dilemma: Disease-resistant bananas**

Scientists are currently developing a genetically modified variety of banana that is resistant to a fungal disease that is threatening to destroy banana plantations in Australia and has already significantly reduced banana production globally. Is it appropriate for scientists to genetically modify bananas that will be used for human consumption?

Ask students to interview a range of different people about the ethical dilemma and find out why these people arrive at the conclusions they do. This could be done as an online survey. Either independently or as a class, students could construct a questionnaire to identify what ethical approach each person is using, which ones are most common, and if there is any relationship between the ethical reasoning used and the world views or values that people identify with.

**Note:** Teachers and schools have a legal and moral responsibility to ensure that students demonstrate ethical conduct at all times when undertaking such investigations. Teachers should refer to the [National Statement on Ethical Conduct in Human Research (2007), Updated 2018 (NHMRC)](https://www.nhmrc.gov.au/about-us/publications/national-statement-ethical-conduct-human-research-2007-updated-2018) for detailed advice.

10. Respond to an ethical approach (individuals or groups) and discuss (groups or whole class)

* Allocate each student or group one of the three ethical approaches and ask them to use it to respond to the ethical dilemma ‘Should Australian universities be developing GM bananas for Uganda?’
* Discuss:
* Did students using the same ethical approach come to the same conclusion? Discuss the reasons why they might not have.
* Did students using different ethical approaches come to the same conclusion? Discuss the reasons why they might or might not have.
* What beliefs, experiences and understanding do you think influenced your thinking about the issue?
* Consider how people with similar world views or value systems can reach different positions or conclusions based on the ethical approaches and concepts they place importance on.

11. Class discussion *Q+A*-style (groups and whole class)

Conduct a discussion in the style of the ABC’s *Q+A* current affairs program.

* Possible additional readings for students include:
* science magazine article [‘Super bananas’ enter US market trials (Scientific American)](https://www.scientificamerican.com/article/super-bananas-enter-u-s-market-trials/)
* university blog article [Good as gold: Can Golden Rice and other biofortified crops prevent malnutrition? (Harvard University)](https://sitn.hms.harvard.edu/flash/2015/good-as-gold-can-golden-rice-and-other-biofortified-crops-prevent-malnutrition/)
* industry news article [GMO potatoes provide improved Vitamin A and E profiles (Genetic Engineering and Biotechnology News)](https://www.genengnews.com/topics/translational-medicine/gmo-potatoes-provide-improved-vitamin-a-and-e-profiles/).
* Prior to this activity, discuss with students the importance of respecting other people in the class and their views. Discuss the differences between respecting and tolerating people and their views. Can examples of both respect and tolerance be seen in media presentations about GMO topics? How should you present yourself as respectful and/or tolerant in the debate? How can you ensure that you will be open-minded when considering someone else’s argument or position?

**Note:** See the introduction in this document for links to some good suggestions for setting classroom norms and managing classroom discussions.

* Divide the class into six groups and assign each one a hypothetical panel participant (see the suggested panel participants below). Each group will research how the individual they are assigned may respond to the issue and will come up with some questions to ask the other panel members from that perspective.
* Suggested panel participants are a subsistence farmer, agricultural scientist, humanitarian non-government organisation (NGO) representative, anti-GMO activist, religious leader and medical doctor.
* Groups should describe one possible world view that is likely to be used by the participant that they are representing. Students may consider adapting one of the environmental world views identified below but they also need to recognise that world views are unique to individuals. Students can gain an insight into the world views of their hypothetical individual by reading and listening to the views of others in that profession and making some generalised guiding principles.
* Students should then use the four common principles of bioethics (see below) as well as the guiding principle(s) for the world view they are representing to help guide how the person they are representing would respond to the issue. (See [Appendix 1](#App1) for a selection of ethical principles and concepts.)

Four common principles of bioethics

* autonomy (respect for the individual’s right to self-determination),
* beneficence (the duty to ‘do good’)
* non-maleficence (the duty to ‘not do bad’)
* justice (to treat all people equally and equitably)
* Once the research stage is complete one student from each group joins the *Q+A* panel while the rest of the group becomes the studio audience. The panel should be chaired by the teacher or a student leader who can call on the audience to ask questions, ask additional questions themselves and moderate the debate.

12. Reflection (whole class)

After the *Q+A*-style discussion, discuss how people with different world views or value systems reached different and/or similar positions based on the ethical approaches and/or concepts they placed importance on. Evaluate the usefulness and areas of contestability of the ethical approaches that were used by each stakeholder during the discussion.

Assessment

The above sequence of learning activities has been designed to collect evidence of student learning in Ethical Capability.

Use the assessment grid below to assess student responses according to the Ethical Capability Levels 9 and 10 achievement standard:

By the end of Level 10, students explain connections and distinctions between ethical concepts, identifying areas of contestability in their meanings and relative value.

Students analyse and evaluate contested approaches to thinking about consequences and duties in relation to ethical issues. They examine complex issues, identify the ethical dimensions and analyse commonality and difference between different positions. They explain how different factors involved in ethical decision-making can be managed.

Teachers can also use these learning activities to assess aspects of student learning in Science (see [Links to Science, Levels 9 and 10](#Links9to10) in this document).

Evidence of learning grid

| Working towards Level 10 | At Level 10 | Extending |
| --- | --- | --- |
| Student responses may include:* demonstration of respectful behaviour towards people with different opinions
* identification of principles and concepts commonly held by specific world views
* distinction between ethical and non-ethical issues
* identification of the consequences of gene technology
* use of different ethical approaches
* references to the Office of the Gene Technology Regulator and FSANZ.
 | Student responses may include:* appropriate use and distinction of the terms ‘fairness’ and ‘equality’, and ‘respect’ and ‘tolerance’, along with a demonstration of respectful behaviour and tolerant attitude
* use of principles and concepts commonly held by specific world views to justify ethical conclusions from a perspective other than their own
* recognition that individuals who share a common cultural, religious or philosophical world view may still come to different conclusions about GMOs
* distinction between ethical, non-ethical, legal and scientific issues
* identification of and discussions about the consequences of gene technology
* use and justification of different ethical approaches
* an evaluation of the usefulness of different ethical approaches and areas of contestability in different ethical approaches
* explanations of the different roles of the Office of the Gene Technology Regulator and FSANZ.
 | Student responses may include:* observations about the role of personal choice in determining what is fair and equitable
* observations that scientist may have an ethical obligation even if no legal obligation exists concerning the safety of GMOs
* reasonable speculations about the possible implications and consequences of gene technology
* evaluations of the different roles of the Office of the Gene Technology Regulator and FSANZ.
 |

Ideas for additional learning activities

Disabilities resulting from spinal cord damage

Links to Science, Levels 9 and 10

Science Understanding, Biological sciences, Levels 9 and 10 content description:

* An animal’s response to a stimulus is coordinated by its central nervous system (brain and spinal cord); neurons transmit electrical impulses and are connected by synapses [(VCSSU118)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU118)

Science Understanding, Science as a human endeavour, Levels 9 and 10 content descriptions:

* Scientific understanding, including models and theories, are contestable and are refined over time through a process of review by the scientific community [(VCSSU114)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU114)
* Advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries [(VCSSU115)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU115)
* The values and needs of contemporary society can influence the focus of scientific research [(VCSSU116)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU116)

Context

Students consider ethical issues about access to services and treatment for people with a disability due to spinal cord damage, including advances in treating spinal cord damage.

Suggested resources

* science article [Japan's approval of stem-cell treatment for spinal-cord injury concerns scientists (Nature)](https://www.nature.com/articles/d41586-019-00178-x)
* news article [Paraplegic patients walk again with spinal cord implants (ABC News)](https://www.abc.net.au/news/health/2018-11-01/neurotechnology-restores-walking-spinal-cord-injury/10446050)
* news article [Paraplegic man walks with own legs again (The Guardian)](https://www.theguardian.com/science/2015/sep/24/paraplegic-man-walks-with-own-legs-again)

Links to Ethical Capability, Levels 9 and 10, plus ideas and prompts for learning activities

|  |  |
| --- | --- |
| Ethical Capability content description | Ideas and prompts for learning activities |
| Investigate the connections and distinctions between and the relative value of concepts including fairness and equality, and respect and tolerance [(VCECU019)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU019) | **Respect and tolerance:** Discuss the role of respect and tolerance in class discussions about ethical issues.**Fairness and equality:** Discuss the difference between fairness and equality. * **Fairness:** Providing individuals and the families of individuals with spinal cord injury with equal access to treatment and equipment regardless of socioeconomic status. Consider: What extra costs may be associated with supporting someone in a wheelchair? Who should pay for experimental spinal cord treatment if there are high costs involved? Would it be better to spend money on experimental treatments aimed at saving lives, or to spend that money on less experimental treatment aimed at improving quality of life over a shorter life span?
* **Equality:** Providing individuals and the families of individuals with spinal cord injury with appropriate support so they can access the same opportunities as other individuals without spinal cord injury. Review access at your school and determine whether the level of access to facilities would provide equal access to opportunities for a person in a wheelchair compared to a person not in a wheelchair.
 |
| Explore a range of ethical problems and examine the extent to which different positions are related to commonly held ethical concepts and principles, considering the influence of cultural norms, religion, world views and philosophical thought [(VCECU020)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU020) | Consider four common principles of bioethics: * **autonomy** (respect for the individual’s right to self-determination)
* **beneficence** (the duty to ‘do good’)
* **non-maleficence** (the duty to ‘not do bad’)
* **justice** (to treat all people equally and equitably).

Explore how people of diverse world views approach these issues and how, even if they have the same world view, people may come to different positions or reach different conclusionsConsider: Who should receive experimental treatment for spinal cord injuries if there are limited resources and only a limited number of people can receive treatment? Should access to treatment be based on ability to pay, the age of the person, their ability to contribute to society after treatment, the geopolitical region that they live in and/or some other attribute? What level of evidence for the safety and efficacy (whether it works) of a procedure should be required before it is offered to patients and before patients, families or institutions such as public health facilities are asked to cover the costs of the treatment? |
| Distinguish between the ethical and non-ethical dimensions of complex issues, including the distinction between ethical and legal issues [(VCECU021)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU021) | What are the scientific, ethical and legal challenges associated with experimental treatment of spinal cord damage? **Scientific considerations:** How can technology be used to treat individuals with spinal cord injury? How effective are the treatments for spinal cord injuries? How safe are the treatments for spinal cord injuries?**Ethical considerations:** Who has access to experimental treatment? What ethical or moral responsibilities do institutions such as schools, universities and libraries and private businesses such as shops and entertainment venues have to provide access to people who use a wheelchair?**Legal considerations:** Discuss how experimental treatments obtain ethical approval and identify the government bodies responsible for the final approval of medical treatments in Australia. (Note: This issue should be linked to [VCECD023](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECD023).) What legal obligations do institutions such as schools, universities and libraries and private businesses such as shops and entertainment venues have to provide access to people who use a wheelchair? **Consider the interaction between scientific, ethical and legal issues**. How do legal requirements differ in other countries and what are the implications? In the science article [Japan’s approval of stem-cell treatment for spinal-cord injury concerns scientists (*Nature*)](https://www.nature.com/articles/d41586-019-00178-x), the Japanese researcher did not do a double-blind trial because regulations did not require it. While this might not have been illegal, was it the best scientific practice and was it ethical? (Note: This issue should be linked to [VCECD023](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECD023).) |
| Discuss issues raised by thinking about consequences and duties, in approaches to decision-making and action, and arguments for and against these approaches [(VCECD022)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECD022) | Use two different ethical approaches, such as consequentialism, duty ethics and/or virtue ethics, to make decisions about an ethical problem.Compare the outcome of using different approaches and explore why they did or did not result in different decisions.Should individuals who receive a spinal injury as the result of their own decisions (for example, drink driving) be given the same level of financial support as those who were not responsible for the actions that resulted in their injury? |
| Investigate how different factors involved in ethical decision-making can be managed by people and groups [(VCECD023)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECD023) | Research different support and advocacy groups for people with spinal cord injury. How do these groups engage with governments, scientists and community members, and do they change their approach to suit the audience they are addressing?Discuss how researchers obtain ethical approval for experimental treatments and identify the government bodies responsible for the final approval of medical treatments in Australia. |

The effects of alcohol and drugs on the central nervous system

Link to Science, Levels 9 and 10

Science Understanding, Biological sciences, Levels 9 and 10 content description:

* An animal’s response to a stimulus is coordinated by its central nervous system (brain and spinal cord); neurons transmit electrical impulses and are connected by synapses [(VCSSU118)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU118)

Context

Alcohol, illicit drugs and some pain medications change or block neural messages as they cross the synapses. Consider measures to regulate or limit the availability of drugs and alcohol, especially to minors, and the consequences of alcohol abuse including fetal alcohol syndrome, increased domestic and community violence, and an increased risk of cancer, liver disease, stroke and other health concerns.

**Note:** Another suitable context teachers may choose to apply is the use of performance-enhancing drugs, exploring how they affect the nervous system and issues of fairness in sport.

Suggested resources

* [FASD Hub Australia](https://www.fasdhub.org.au/) – information on Fetal Alcohol Spectrum Disorder (FASD)
* [Reports and data, Alcohol (Australian Institute of Health and Welfare)](https://www.aihw.gov.au/reports-data/behaviours-risk-factors/alcohol/overview)
* [Reports and data, Illicit use of drugs (Australian Institute of Health and Welfare)](https://www.aihw.gov.au/reports-data/behaviours-risk-factors/illicit-use-of-drugs/overview)
* [Alcohol and young people (Australian Government, Department of Health)](https://www.health.gov.au/health-topics/alcohol/alcohol-throughout-life/alcohol-and-young-people)
* [About drugs (Australian Government, Department of Health)](https://www.health.gov.au/health-topics/drugs/about-drugs)
* editorial [Second safe injecting room is good news (The Age)](https://www.theage.com.au/national/victoria/second-safe-injecting-room-is-good-news-20200608-p550er.html)
* [The Brain & Drugs (YouthAOD Toolbox)](https://www.youthaodtoolbox.org.au/brain-drugs) – includes a clear summary of how drugs affect neurotransmitters, as well as tools and other information about alcohol- and drug-related issues

Links to Ethical Capability, Levels 9 and 10, plus ideas and prompts for learning activities

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| Ethical Capability content description | Ideas and prompts for learning activities |
| Investigate the connections and distinctions between and the relative value of concepts including fairness and equality, and respect and tolerance [(VCECU019)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU019) | Discuss the role of respect and tolerance in class discussions about ethical issues.**Fairness and equality:** The public consumption of alcohol is restricted in many parks, reserves and public spaces, including for special events such as New Year’s Eve. The level of restrictions often depends on local council or state regulations. Is it fair and/or equitable that alcohol restrictions are different for different communities? |
| Explore a range of ethical problems and examine the extent to which different positions are related to commonly held ethical concepts and principles, considering the influence of cultural norms, religion, world views and philosophical thought [(VCECU020)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU020) | Consider four common principles of bioethics:* **autonomy** (respect for the individual’s right to self-determination)
* **beneficence** (the duty to ‘do good’)
* **non-maleficence** (the duty to ‘not do bad’)
* **justice** (to treat all people equally and equitably).

Explore how people of diverse world views approach these issues differently.Analyse health messages around the use of drugs and alcohol and identify which ethical concepts and/or approaches underpin them. Consider different perspectives on alcohol and drugs, including harm minimisation, abstinence, safe injecting rooms and legal age limits; the positive and negative consequences of these different messages; and the individuals or groups that promote them. |
| Distinguish between the ethical and non-ethical dimensions of complex issues, including the distinction between ethical and legal issues [(VCECU021)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU021) | What are the legal restrictions on alcohol and drug use in Australia? What are the scientific and ethical challenges? **Scientific considerations:** How do drugs change the behaviour and reactions of individuals? What are the short-term and long-term health risks associated with alcohol and/or drug use? Is there a safe level of recreational use for some drugs and if so, what is it? What strategies are most effective at treating drug abuse disorders?**Ethical considerations:** Is it ethically acceptable to drink alcohol if you are under age but know that you will not get caught? Drinking any amount of alcohol while pregnant may result in fetal alcohol syndrome for the child; is it acceptable to drink alcohol if you are or might be pregnant given that you are aware of this scientific knowledge? What is the responsibility of communities to support alcohol- and drug-dependent individuals? Do any short-term enjoyable effects of alcohol use justify the possible long-term risks?**Legal considerations:** What are the current legal restrictions for alcohol and illicit drug use in Australia? Differentiate between the different classes of drugs, such as illicit, pharmacy only, over the counter and recreational drugs. How does this compare between states in Australia and/or other countries?Consider the interaction between legal and ethical issues. Should drivers be legally and morally responsible for their actions while under the influence of alcohol or drugs? Is it acceptable to provide illegal drugs to individuals if it prevents them from committing ‘worse’ crimes in order to obtain the drugs? Consider the role of safe injecting rooms, which provide a place for people to use illicit drugs where their safety can be monitored. Is it ethically appropriate to legally force an individual to attend a rehabilitation program if they do not want to?  |
| Discuss issues raised by thinking about consequences and duties, in approaches to decision-making and action, and arguments for and against these approaches [(VCECD022)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECD022) | Use two different ethical approaches, such as consequentialism, duty ethics and/or virtue ethics, to make decisions about an ethical problem.Compare the outcome of using different approaches and explore why they did or did not result in different decisions.Possible ethical problems:* Should the drinking age be increased, or should marijuana be legalised?
* Considering fetal alcohol syndrome, what should be the ethical responsibilities and roles of mothers, extended family, friends and governments in preventing the disorder?
 |
| Investigate how different factors involved in ethical decision-making can be managed by people and groups [(VCECD023)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECD023) | Consider the many different levels of government, plus the doctors and community groups involved in making decisions about access to alcohol, drugs and medication. |

Preimplantation genetic testing

Links to Science, Levels 9 and 10

Science Understanding, Biological sciences, Levels 9 and 10 content description:

* The transmission of heritable characteristics from one generation to the next involves DNA and genes [(VCSSU119)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU119)

Science Understanding, Science as a human endeavour, Levels 9 and 10 content descriptions:

* Advances in scientific understanding often rely on developments in technology and technological advances are often linked to scientific discoveries [(VCSSU115)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU115)
* The values and needs of contemporary society can influence the focus of scientific research [(VCSSU116)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU116)

Context

Students explore the science and ethics of preimplantation genetic testing for the prevention of disease in children, gender selection, and ‘saviour siblings’ (where a genetic match is selected so that the child can act as a bone marrow donor or other type of donor for an older sibling).

Suggested resources

* news article [IVF sex selection sparks ethical debate (ABC News)](https://www.abc.net.au/news/2019-08-10/ivf-australia-sex-selection-procedure/11387160?nw=0)
* news article [Australian couples travel overseas to avoid ban on choosing their baby’s sex (ABC News)](https://www.abc.net.au/news/2013-09-01/ivf-gender-sex-selection-thailand-clinic-baby-foetus/4927340?nw=0)
* news article [I paid $50,000 to have a girl (Sydney Morning Herald)](https://www.smh.com.au/lifestyle/i-paid-50000-to-have-a-girl-20141106-11aqrl.html)
* short video [Parent’s conceive baby for bone marrow transplant for sick sibling, 60 Minutes Australia (60 Minutes Australia, YouTube)](https://www.youtube.com/watch?v=4BeGSixUjZ4)
* news article [Wanting babies like themselves, some parents choose genetic defects (The New York Times)](https://www.nytimes.com/2006/12/05/health/05essa.html)

**Note:**

Resources for teachers include:

* video lecture [Robert Sparrow – Yesterday’s Child: Gene Editing, Enhancement and Obsolescence, (Science, Technology and the Future, YouTube)](https://www.youtube.com/watch?v=swPbJz-EZvg)
* recorded interview [Speaking with: Julian Savulescu on the ethics of genetic modification in humans (The Conversation)](https://theconversation.com/speaking-with-julian-savulescu-on-the-ethics-of-genetic-modification-in-humans-78249).

Links to Ethical Capability, Levels 9 and 10, plus ideas and prompts for learning activities

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| Ethical Capability content description | Ideas and prompts for learning activities |
| Investigate the connections and distinctions between and the relative value of concepts including fairness and equality, and respect and tolerance [(VCECU019)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU019) | Discuss the role of respect and tolerance in class discussions about ethical issues.Discuss the role of fairness and equality in regards to access to genetic diagnosis and screening tests and in relation to perceived gender roles and community expectations. |
| Explore a range of ethical problems and examine the extent to which different positions are related to commonly held ethical concepts and principles, considering the influence of cultural norms, religion, world views and philosophical thought [(VCECU020)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU020) | Consider four common principles of bioethics: * **autonomy** (respect for the individual’s right to self-determination)
* **beneficence** (the duty to ‘do good’)
* **non-maleficence** (the duty to ‘not do bad’)
* **justice** (to treat all people equally and equitably).

Explore how people of diverse world views approach the following issues and interpret and work with particular ethical concepts and approaches differently. Also consider how people with similar world views can reach different positions or conclusions based on the ethical approaches and concepts they may place importance on. |
| Distinguish between the ethical and non-ethical dimensions of complex issues, including the distinction between ethical and legal issues [(VCECU021)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU021) | What are the legal restrictions on preimplantation genetic testing in Australia and in other countries? What are the ethical and scientific challenges?**Possible scientific considerations:** How accurate and reliable are genetic diagnoses and screening tests? What are the potential physical harms of the procedures? How can preimplantation genetic testing be used to select a ‘saviour sibling’ to help treat a sibling requiring special medical treatment?**Possible ethical considerations:** What should happen to an embryo if preimplantation genetic testing shows a significant health issue? Is it acceptable to choose the traits of offspring? Could preimplantation genetic testing move society towards a eugenics-focused world where children are valued more for their genotype than for their inherent characteristics? What rights should parents have to choose the gender or genetics of their offspring? Does the prevention of serious health defects justify the use of preimplantation genetic testing?If a child is born with significant health issues that could have been detected but the parents chose not to perform genetic testing, should the community cover the costs of caring for the child? What might be lost from society if all individuals with significant health conditions were never born? (For example, would the world have benefited from the insights of Stephen Hawking if this technology was available when he was conceived?) On the other hand, is it acceptable to select for a disability such as deafness, for example if both parents are deaf? (See the news article [Wanting babies like themselves, some parents choose genetic defects, The New York Times](https://www.nytimes.com/2006/12/05/health/05essa.html).)**Possible legal considerations:** What are the current legal restrictions for preimplantation genetic screening in Australia? How does this differ in other countries? What legal responsibilities do medical companies have if preimplantation genetic diagnostic testing turns out to be wrong and a child is born with significant health conditions?**Consider the interaction between legal and ethical issues**. Gender selection for non-medical reasons is prohibited in Australia, but is it acceptable for people to obtain this service overseas?  |
| Discuss issues raised by thinking about consequences and duties, in approaches to decision-making and action, and arguments for and against these approaches [(VCECD022)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECD022) | Use two different ethical approaches, such as consequentialism, duty ethics and/or virtue ethics, to make decisions about an ethical problem.Compare the outcome of using different approaches and explore why they did or did not result in different decisions.Possible ethical problems:* Explore unintended consequences of genetic testing. Does it provide information about the genetics of the parents or relatives that they may not want to know?
* What conditions is it okay to screen for and is this a ‘slippery slope’ to unacceptable ethical decisions?
* Should parents accept having a child with a genetic disorder regardless of the consequences (for example, emotional consequences, physical pain for the child, financial costs)? What are some possible positive consequences of having a child with a genetic disorder?
 |

Inherited genetic disorders in purebred dogs

Links to Science, Levels 9 and 10

Science Understanding, Biological sciences, Levels 9 and 10 content descriptions:

* The transmission of heritable characteristics from one generation to the next involves DNA and genes [(VCSSU119)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU119)
* The theory of evolution by natural selection explains the diversity of living things and is supported by a range of scientific evidence [(VCSSU120)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU120)

Context

Students should explore how selective breeding has been used to obtain desired characteristics in certain dog breeds but as a result many breeds of dogs also have inherited genetic disorders. Is it acceptable to continue breeding pets, especially dogs, that have genetic disorders that cause pain or suffering for the animals?

Suggested resource

Science article [Although purebred dogs can be best in show, are they worst in health? (Scientific American)](https://www.scientificamerican.com/article/although-purebred-dogs-can-be-best-in-show-are-they-worst-in-health/#:~:text=As%20a%20result%2C%20purebred%20dogs,the%20kneecap%2C%20in%20toy%20and)

Links to Ethical Capability, Levels 9 and 10, plus ideas and prompts for learning activities

|  |  |
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| Ethical Capability content description | Ideas and prompts for learning activities |
| Investigate the connections and distinctions between and the relative value of concepts including fairness and equality, and respect and tolerance [(VCECU019)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU019) | Discuss the role of respect and tolerance in class discussions about ethical issues. |
| Explore a range of ethical problems and examine the extent to which different positions are related to commonly held ethical concepts and principles, considering the influence of cultural norms, religion, world views and philosophical thought [(VCECU020)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU020) | Consider four common principles of bioethics: * **autonomy** (respect for the individual’s right to self-determination)
* **beneficence** (the duty to ‘do good’)
* **non-maleficence** (the duty to ‘not do bad’)
* **justice** (to treat all people equally and equitably).

Are all of these principles appropriate for discussing issues that involve animals rather than humans?Explore how people of diverse world views approach these issues differently. This ethical issue clearly demonstrates how different groups, such as animal welfare groups and animal rights groups, can share a common perspective (that animals should not suffer) and yet come up with very different conclusions on an ethical issue. |
| Distinguish between the ethical and non-ethical dimensions of complex issues, including the distinction between ethical and legal issues [(VCECU021)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU021) | Identify which are the scientific and which are the ethical dimensions of the issue.**Possible scientific considerations:** What can breeders do to minimise the chance of these defects being a problem? Are there any scientific solutions to the genetic defects, such as through gene editing, selective breeding or medical interventions? Are the dogs experiencing pain?If you were in charge of scientific funding, should it be directed to prevention or treatment?**Possible ethical considerations:** Is it acceptable that animals should suffer for the enjoyment or pleasure of humans?Does it matter that some dogs suffer pain because of their breeding?Do pet owners have an obligation to select breeds that are less likely to have genetic defects?**Legal considerations:** Are there any legal requirements that breeders need to adhere to? If the law merely says only ‘healthy’ dogs can be bred and sold, it is okay to allow dogs that may suffer from genetic disorders to be bred, as long as it the disorder is able to be treated?Consider the interaction between legal and ethical issues. Breeders have legal responsibilities to ensure their animals are healthy but if they can get away with breeding healthy animals with desired characteristics but also genetic defects, should they still breed those animals? If an animal rights activist believes strongly that animals are being harmed, is it ethically acceptable to break a particular law to bring attention to the issue and prevent the further suffering of these animals? |
| Discuss issues raised by thinking about consequences and duties, in approaches to decision-making and action, and arguments for and against these approaches [(VCECD022)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECD022) | Use two different ethical approaches, such as consequentialism, duty ethics and/or virtue ethics, to make decisions about this ethical issue.Compare the advantages and disadvantages of particular outcomes using different approaches and explore why they did or did not result in different decisions. |
| Investigate how different factors involved in ethical decision-making can be managed by people and groups [(VCECD023)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECD023) | Consider the role of scientists, governments, farmers and pet owners in this ethical issue. |

Controlling rabbit populations in Australia

Link to Science, Levels 9 and 10

Science Understanding, Biological sciences, Levels 9 and 10 content description:

* Ecosystems consist of communities of interdependent organisms and abiotic components of the environment; matter and energy flow through these systems [(VCSSU121)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCSSU121)

Context

Australia has fought an ongoing battle to control rabbit populations. Rabbits cause significant destruction to native vegetation and ecosystems, as well as decrease the productivity of farmland. Current control strategies rely heavily on the use of disease vectors, such as myxomatosis and calicivirus, to kill wild rabbits; however, these same disease vectors have created significant ecological problems in Europe where rabbits are the staple prey for a number of threatened European predators.

Suggested resource

* [Rabbit Scan video (Behind the News)](https://www.abc.net.au/btn/classroom/rabbit-scan/10539160)
* [Rabbit Restrictions video (Behind the News)](https://www.abc.net.au/btn/classroom/rabbit-restrictions/10527494)
* [160 year battle against one of Australia's worst natives, Meet the Ferals Ep 6, ABC Australia (ABC Australia, YouTube)](https://www.youtube.com/watch?v=778Da7NCF6s)

Links to Ethical Capability, Levels 9 and 10, plus ideas and prompts for learning activities

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| Ethical Capability content description | Ideas and prompts for learning activities |
| Investigate the connections and distinctions between and the relative value of concepts including fairness and equality, and respect and tolerance [(VCECU019)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU019) | Discuss the role of respect and tolerance in class discussions about ethical issues.Is it fair that people who live in Queensland are not allowed to have pet rabbits? And how is that ‘fairness’ different from equality? |
| Explore a range of ethical problems and examine the extent to which different positions are related to commonly held ethical concepts and principles, considering the influence of cultural norms, religion, world views and philosophical thought [(VCECU020)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU020) | Students should consider a number of world views and guiding principles, including sustainability principles, and how these may vary between different people who are involved in the issue of controlling rabbit species. See [Appendix 1](#App1) for examples of world views and sustainability principles that students may consider.Explore how people of diverse world views approach the issues relating to the control of pests and work with particular ethical concepts and approaches to develop different positions and conclusions. Also consider how people with similar world views can reach different positions or conclusions based on the ethical approaches and concepts they may place importance on. |
| Distinguish between the ethical and non-ethical dimensions of complex issues, including the distinction between ethical and legal issues [(VCECU021)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECU021) | What are the scientific, ethical and legal aspects of this issue?**Scientific dimensions:** Are rabbits developing resistance to calicivirus? What research should scientists prioritise to help resolve the ethical issues involved in rabbit control? Measure the success of the rabbit control mechanisms and the environmental impact (both positive and negative) of controlling rabbit populations. Do rabbits feel pain when they get sick with calicivirus? How can I protect my pet rabbit from getting sick?**Ethical dimensions:** Is it acceptable to deny pet owners the ability to have a pet rabbit? Does it matter if rabbits feel pain when they get sick with calicivirus?Is it acceptable that a pet rabbit that is kept in the city could be infected with calicivirus? And what impact might this have on the children who own the rabbit?Calicivirus escaped from an island where it was being tested and at the time there was significant debate about whether the virus had been properly tested to ensure it did not infect native wildlife. In these circumstances, was this accidental release ethically acceptable given that the outcome was positive? The disappearance of rabbits in Australia would lead to the greening of marginal arid lands and the opportunity for native plants to flourish again. Is it acceptable if this then leads to an expansion of agriculture on these now viable lands, as herds of sheep, with their trampling hooves, do as much damage to fragile pastures as rabbits?**Legal dimensions:** What legal responsibility do individuals, farmers and pet owners have to control rabbit populations, and are they enforceable? If I live in Queensland and can get away with owning a pet rabbit, should I nevertheless not do it?  |
| Discuss issues raised by thinking about consequences and duties, in approaches to decision-making and action, and arguments for and against these approaches [(VCECD022)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECD022) | Use two different ethical approaches, such as consequentialism, duty ethics and/or virtue ethics, to make decisions about an ethical problem.Compare the advantages and disadvantages of particular outcomes using different approaches and explore why they did or did not result in different decisions.  |
| Investigate how different factors involved in ethical decision-making can be managed by people and groups [(VCECD023)](https://victoriancurriculum.vcaa.vic.edu.au/Curriculum/ContentDescription/VCECD023) | Consider the role of scientists, governments, farmers and pet owners in controlling rabbit populations in Australia. |

Appendices

Appendix 1: A selection of ethical principles and concepts

The Ethical Capability curriculum requires students to understand and apply ethical principles and concepts. Ethical principles can be derived from values, which are in turn informed by cultural norms and other forms of socialisation; philosophical thought; or religious or non-religious world views.

The following approaches to bioethics, ethical concepts, world views and sustainability principles may assist students when analysing and evaluating bioethical issues within the Victorian Curriculum F–10.

For more general information regarding the selection of ethical principles in the Victorian Curriculum F–10: Ethical Capability, see the VCAA’s [List of ethical principles](https://www.vcaa.vic.edu.au/curriculum/foundation-10/resources/ethical-capability/planningresources/Pages/PlanningTools.aspx) resource. For key disputes regarding the approaches and concepts in this appendix, see the VCAA’s [Unpacking the content descriptions](https://www.vcaa.vic.edu.au/curriculum/foundation-10/resources/ethical-capability/Pages/TeachingResources.aspx) resources.

Approaches to bioethics

* **Consequences-based approach** places central importance on the consideration of the consequences of an action (the ends), with the aim of achieving maximisation of positive outcomes and minimisation of negative effects.
* **Duty- and/or rule-based approach** is concerned with how people act (the means) and places central importance on the idea that people have a duty to act in a particular way, and/or that certain ethical rules must be followed, regardless of the consequences that may be produced.
* **Virtues-based approach** is person- rather than action-based. Consideration is given to the virtue or moral character of the person carrying out the action, providing guidance about the characteristics that a good person would seek to achieve that are then necessary to being able to act in the right way.

Ethical concepts and principles

* **Beneficence** is the commitment to maximising benefits and minimising the risks and harms involved in taking a particular position or course of action.
* **Equality** is the quality of being the same in one or more characteristics, such as status, income or being human. It involves treating someone with the same concern and respect but not necessarily in the same way.
* **Fairness** is the quality of being unbiased and impartial – such as giving individuals the same choices or chances no matter their status in life – but it also involves consideration of everyone’s interests, what is deserved, what is owed and reciprocity. To discern what is fair, it is also thought that impartiality is required (the idea that ‘justice is blind’).
* **Integrity** is the commitment to searching for knowledge and understanding and the honest reporting of all sources of information and communication of results, whether favourable or unfavourable, in ways that permit scrutiny and contribute to public knowledge and understanding.
* **Justice** is the moral obligation to ensure that there is fair consideration of competing claims; that there is no unfair burden on a particular group from an action; and that there is fair distribution and access to the benefits of an action.
* **Non-maleficence** involves avoiding the causations of harm; however, as positions or courses of actions in scientific research may involve some degree of harm, the concept of non-maleficence implies that the harm resulting from any position or course of action should not be disproportionate to the benefits from any position or course of action.
* **Respect** involves consideration of the extent to which living things have an intrinsic value and/or instrumental value; giving due regard to the welfare, liberty and autonomy, beliefs, perceptions, customs and cultural heritage of both the individual and the collective; consideration of the capacity of living things to make their own decisions; and when living things have diminished capacity to make their own decisions, ensuring that they are empowered where possible and protected as necessary.
* **Tolerance** involves disagreeing with something but nevertheless accepting it or not interfering with it. This is because the reasons for accepting it do not overstep identified limits to tolerance for that particular context. It assumes some kind of power to interfere, making it distinct from ‘enduring’ something. Tolerance is not morally good in all cases; and further, tolerance taken to its extreme means tolerating intolerance, which is self-contradictory. One area of contestability concerning tolerance is where to set the limits, that is, identifying where reasons for non-acceptance or interference become stronger than acceptance.

World views and guiding principles

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| **World view or value system** | **Guiding principle** |
| **Anthropocentrism** | Any actions that provide a benefit to humans are preferred, even if other animals or the environment are damaged as a consequence |
| **Biocentrism** | Any action needs to consider and minimise the negative consequences for all living things |
| **Technocentrism** | Technology should be used to control and protect the environment. Environmental problems are challenges to be solved using rational, scientific and technological means |

Sustainability principles

* **Conservation of biodiversity and ecological integrity:** maintenance of the abundance of different species living within a particular region, the genetic diversity in a population and the ability of an ecosystem to maintain its biotic and abiotic organisation and function in the face of changing environmental conditions, including a capacity for self-renewal
* **Efficiency of resource use:** use of smaller amounts of physical resources to produce the same product or service while minimising environmental impact
* **Intergenerational equity:** preserving natural resources and the environment for the benefit of future generations
* **Intragenerational equity:** preserving natural resources and the environment for the benefit of the current generation
* **Precautionary principle:** is triggered when the risk of harm to the environment due to a proposed action is high but the scientific evidence is uncertain, requiring that measures be taken to prevent environmental damage and that the proof of no, or minimal, harm be provided by the proposer
* **User pays principle**: calls upon the user of a service or resource to pay directly for the amount they use, rather than the cost being shared by all the users or a community equally

Appendix 2: Artificial organ technology (worksheet)

**1.** Complete the table below.

**2.** Use the information in the table to create an infographic of a bionic human who uses artificial organs. In your infographic include information about the problems scientists are trying to solve by creating artificial organs.

|  |  |  |
| --- | --- | --- |
| **Organ** | **Status**  | **Notes** |
| **Available now** | **Human trials** | **In development** |
| ear (cochlear) |  |  |  | Implant of the inner ear stimulates nerves to send signals that are processed by the brain as sounds |
| eye |  |  |  | A camera in the patient’s glasses sends images to a microchip in the retina. This microchip then stimulates retinal cells to send electrical signals to the brain, which it turns into shapes and patterns. |
| heart |  |  |  | A battery-powered pump delivers blood around the body |
| lung |  |  |  | A thin, artificial membrane adds oxygen and removes carbon dioxide in a similar way to a real lung |
| spleen |  |  |  | A chip filters out and traps infections in a patient’s blood |
| pancreas |  |  |  | Reacts to rising blood sugar levels to release insulin |
| blood |  |  |  | Made totally from plastic, this blood has a much longer shelf life and is infection-free |
| kidney |  |  |  | Prototype shrinks a large dialysis machine into a unit small enough to carry with you |

**3a.** Select one artificial organ and do some further research about who developed it and how it works. Add this information to your infographic.

Artificial organ:

How it works:

**b.** What are the scientific or technological challenges with the development or implementation of this technology?

**c.** What are the ethical challenges involved in the development and/or implementation of the technology?

Appendix 3: Ethical principles – organ transplants (worksheet)

One way of increasing the number of organs available for transplant is to use an opt-out system instead of the opt-in system currently used in Australia. Currently Australians need to opt in and choose to become an organ donor once they die and [fill in a form to register as an organ donor](https://donatelife.gov.au/register-donor-today).

Another way of increasing the number of organs available could be through payment. In some countries people who need organ transplants can pay families of a potential donor, to encourage them to donate the organs of the deceased.

**Proposal 1:** All citizens are automatically considered an organ donor unless they register to not be an organ donor.

**Proposal 2:** Individuals can pay money to obtain organs for donation and thus receive organ transplants before others on the transplant list.

**1.** Consider the two proposals above and write in the table how you think someone might respond, according to each ethical principle, if they were a member of the family of an organ donor compared to the family of an organ recipient.

| **Ethical principle** | **Family of organ donor** | **Family of organ recipient** |
| --- | --- | --- |
| **Autonomy**an individual’s right to make decisions about things that will affect them | Proposal 1Proposal 2 | Proposal 1Proposal 2 |
| **Beneficence**the duty to ‘do good’ | Proposal 1Proposal 2 | Proposal 1Proposal 2 |
| **Non-maleficence** the duty to ‘not do bad’ | Proposal 1Proposal 2 | Proposal 1Proposal 2 |
| **Justice**to treat others fairly, including according to what is deserved  | Proposal 1Proposal 2 | Proposal 1Proposal 2 |

**2.** Consider the consequences of these proposals.

**Proposal 1:** All citizens are automatically considered an organ donor unless they register to not be an organ donor.

|  |  |
| --- | --- |
| **Positive consequences** | **Negative consequences** |
|  |  |

**Proposal 2:** Individuals can pay money to obtain organs for donation and thus receive organ transplants before others on the transplant list.

|  |  |
| --- | --- |
| **Positive consequences** | **Negative consequences** |
|  |  |

**3.** Consider the importance of this issue. Complete the statements below.

*If more people become organ donors then …*

*Convincing more people to become organ donors matters because …*

**Personal reflection**

**4.** Do you agree with the proposal that ‘All citizens are automatically considered an organ donor unless they register to not be an organ donor’? Which response/argument from Question 1 or possible consequence from Question 2 was most convincing for you?

5. Do you agree that individuals should be able to pay money to obtain organs for donation and thus receive organ transplants before others on a transplant list.? Which response/argument from Question 1 or possible consequence from Question 2 was most convincing for you?

**6.** Do you think that individuals have an obligation to be donors if they or their family receive an organ donation or would like to be considered for an organ donation in the future? Explain your response.

**7.** Do any obligations exist for a family member to donate a kidney if they are a match? Why or why not?

**8.** What might be some personal actions you could take in relation to this issue (for example, talking to your family about whether or not you would like to become an organ donor, or identifying ways you can continue to stay informed on this issue)?

Appendix 4: Researching GMOs (worksheet)

**Genetically modified organism: ..............................................................................................**

|  |  |  |
| --- | --- | --- |
|  | **Group response** | **References**(Name the author or group that provided the information and copy the webpage address that you got your information from.) |
| **Picture of the plant** |  |  |
| **The gene (trait) that was added or removed from the DNA** |  |  |
| **The benefits of adding or removing the gene (trait)** |  |  |
| **Support for the modification** |  |  |
| **Opposition to the modification** |  |  |

Appendix 5: Questions about GM bananas

1. a. What have the scientists changed in the banana?

b. Why have scientists genetically engineered the banana in this way?

c. Who is funding the project?

d. What are the effects of vitamin A deficiency?

1. To test if the bananas are actually effective in increasing vitamin A levels in humans, it will be necessary to undergo human trials.

a. Write a possible hypothesis for the human trial.

b. Design an experiment to test your hypothesis and identify what results would indicate that the hypothesis is correct.

1. Research: What other strategies to alleviate vitamin A deficiency have been tried?
2. Research: The gene added to the GM banana was from a wild banana plant. Why is it so difficult to use traditional breeding methods with bananas?
3. Research: Not everyone agrees that the GM banana is a good idea. What are their reasons for not supporting the GM banana? (Include the source of your information – the organisation that the author belongs to, the website, etc.)
4. What may be motivating the scientists and those funding the research? How might concepts such as integrity, justice, beneficence, non-maleficence and respect be involved in the motivation and implementation of this research?
5. Although there is much support for introducing the GM banana in Uganda there are still some considerable cultural challenges. Consider these comments by Ugandan activist Bridget Mugambe, quoted in the news article [Yes, we have no GMO bananas. For now. (USA Today)](https://www.usatoday.com/story/news/nation/2015/01/13/iowa-trial-of-gmo-bananas-is-delayed/21678303/):

Just because the GM banana has been developed in Australia and is being tested in the US does not make it super! … Ugandans know what is super because we have been eating homegrown GM-free bananas for centuries. This GM banana is an insult to our food, to our culture, to us a nation, and we strongly condemn it.

1. How might supporters of this research try to response to cultural needs? How could cultural needs be further supported and how could other objections be managed?