# *Investigating patterns of inheritance*

# **Teacher background notes**

**In this investigation, the inheritance of single gene traits will be investigated using animal and plant examples.**

## [Australian Curriculum: Science links](http://assist.asta.edu.au/resource/3199/investigating-patterns-inheritance-cle)

## Learning intentions

Students will be able to:

* describe the structure and function of DNA, genes and chromosomes
* understand that genetics and the environment define traits
* predict offspring genotypes and phenotypes resulting from single gene (monogenic) crosses
* explain why combining class data makes the data more reliable
* make predictions
* identify patterns in findings
* develop and justify conclusions
* explain how to increase the reliability of their data.

## Suggested time for this CLE

The time needed to complete the *Investigating patterns of inheritance* CLE will depend on the depth of the prior knowledge of students, the time to perform the three investigations (‘What traits do you have?’, ‘Exploring the inheritance of single gene traits’ and ‘Predicting the result of crossing two plants heterozygous for pigment’), any associated activities plus any follow up with extension activities. Allow 5–7 hours. Depending on the ability of the group, students could present the results of the final investigation as a scientific report.

## Prior conceptual knowledge

Science / Year 8 / Science Understanding / Biological sciences

Content description

*Multi-cellular organisms contain systems of organs that carry out specialised functions that enable them to survive and reproduce* [*(ACSSU150)*](http://www.australiancurriculum.edu.au/Curriculum/ContentDescription/ACSSU150)

**This Connected Learning Experience would be best completed after some prior teaching on the topic of genetics. For example, the concepts of trait, dominant and recessive are assumed in Investigation 1.**

## New concepts to be introduced

Students will be introduced to the term ‘genetics’ and will investigate some of the features passed from parents to offspring. They will describe the relationship between DNA, genes and chromosomes.

Students will be introduced to the terms ‘phenotype’ and ‘genotype’ and consider the relationship between these two terms. They will consider how both genes and the environment affect an organism’s phenotype.

Students will learn how different combinations of genes are labelled heterozygous and homozygous. They will learn to predict offspring phenotypes and genotypes from single gene (dominant/recessive) crosses using Punnett square diagrams.

In the investigation, students will apply what they have learnt to predict the resultant offspring phenotypic and genotypic ratios of barley seedlings resulting from a cross between two heterozygous parents.

## Possible misconceptions

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| **STUDENTS MAY THINK…** | **INSTEAD OF THINKING…** |
| Being dominant means the majority of the population express the trait. | How frequently a trait is observed in a population is not related to whether or not it is dominant or recessive. Rather it is a reflection of how frequently the form of the gene responsible for causing a trait is found. For example, polydactyly in humans, the presence of extra fingers and/or toes, can be caused by a dominant mutation. However, polydactyly only occurs in less than 6 births in 1,000, depending on ethnic background. This means it is very rare for a person to have the gene mutation that causes polydactyly, even though it is dominant. |
| The four outcomes predicted in a punnet square represent four offspring produced.  For example, if four offspring were produced then three would be green and one would be white. | The predicted outcomes of a cross represent the chance of each individual having the characteristic. For example, there is a 75% chance that each of the offspring would be green. |

## Links to further information

Further background information can be found at:

‘Genetic diagrams and pedigree analysis’ BBC Bitesize – GCSE Biology website, <http://www.bbc.co.uk/education/guides/z3g2pv4/revision/1> (Accessed July 2015)