



General Certificate of Education
Advanced Level Examination
June 2013

Biology

BIO6T/P13/TN

Unit 6T A2 Investigative Skills Assignment

Teachers' Notes

Confidential

A copy should be given immediately to the teacher responsible for
GCE Biology

Teachers' Notes

Confidential

These notes must be read in conjunction with *Instructions for the Administration of the ISA: GCE Biology* published on the AQA Website.

An investigation of human variation

Introduction

Candidates will investigate two aspects of variation in humans.

- Firstly, candidates will make measurements of their own hand spans and wrist circumferences.
- Secondly, they will investigate whether the Hardy-Weinberg principle applies to human populations. Candidates will investigate five visible characteristics which appear to have a genetic basis.

Teachers will be aware that caution is required when using human characteristics in the teaching of genetics. There is debate amongst geneticists about whether some of the examples are determined by just a single gene, or whether there is any genetic basis for the characteristic at all. However, in this investigation that does not matter and candidates are told to assume that all features used have a genetic basis.

For the second part of the investigation, candidates will collect data from a group within the age range of 15 to 25 years. They will collect data from ten 15 to 25-year-olds and be given data for a group of ten older people. They will assume that the older group represents a previous generation. The phenotypes of these people will allow them to determine **expected** frequencies of different combinations of these characteristics. Candidates **will only use** data from this part of the investigation for their statistical analysis.

According to the Hardy-Weinberg principle, without natural selection, allele frequencies, and thus phenotype frequencies of these characteristics, should remain the same from one generation to the next. Candidates will use their data to find **observed** frequencies of different combinations of these characteristics. They will then determine whether there has been any change in phenotype frequencies between a previous generation and their generation.

Candidates are not required to have knowledge of the genetics of the characteristics investigated.

Materials

In addition to access to general laboratory equipment, each candidate needs:

- ruler, or other method of measuring up to 30 cm, showing millimetre divisions
- 30 cm piece of string
- access to ten 15 to 25-year-olds (with no restrictions on size, gender or ethnicity)
- reference sheet showing illustrations of the alternative forms of each characteristic for identification purposes.

Managing the investigation

If you have queries about the practical work for the ISA, please contact your Assessment Adviser. Contact details can be obtained by emailing your centre name and number to biology-gce@aqa.org.uk.

Candidates will gather information for five different characteristics from ten subjects. The number of subjects **must** be ten to allow a comparison with the supplied data for the older age group. For simplicity, there will be ten subjects in each age group so that frequency will be shown by the number of people out of ten showing the particular combination of characteristics. This amount of data will be considered sufficient for a statistical analysis in this investigation. This is to reduce the time required to collect data.

One permissible approach, which could save time, is to allow each of the subjects, in turn, to stand in front of the rest of the class. In this approach the teacher should direct the revealing of each characteristic by the subject but candidates must decide for themselves, using the reference sheet to help, on the form that the characteristic takes. There should be **no communication between candidates during this activity**. One person's interpretation of some of these characteristics may differ from another's and this is a part of the investigation.

The teacher could ask each subject to show:

- the hand they write with
- their finger clasp
- how far they can bend their thumb back
- their eye colour
- if they can roll their tongue.

Each candidate will also have made measurements of their hand spans and wrist circumferences but it is the data from the subjects that will be used for statistical analysis. For the statistical analysis, candidates will only consider **two** characteristics.

After the data have been collected, teachers will tell each candidate which two characteristics they should use. Only with large groups should the same pair be used more than once.

Turn over ►

Teachers can remind candidates that only data for characteristics shown by the two age groups should be used for statistical analysis.

Recording data for five different characteristics allows ten different combinations meaning that few candidates then carry out the same analysis. However, all data should still be collected because questions about the whole investigation may be part of the Written Test. In assigning the two characteristics for analysis, ensure that both forms of the characteristic are shown. This was not a problem during trials. Although the nature of this investigation means there is limited scope for practical work, this approach, together with the taking of personal measurements, will make the investigation unique for each candidate. Teachers should also ensure that sufficient time is available during Stage 1 and Stage 2 of this investigation for the recording and required processing of data.

Trialling

This investigation has been successfully trialled.

In this investigation, it is not necessary for the centre to trial the task before use.

Additional Information

AQA might publish Additional Information about an ISA/EMPA practical. This will be placed on e-AQA in Secure Key Materials. We will email Exams Officers who have downloaded the particular Teachers' Notes so they can print a copy for the Head of Biology. Additional Information will cover issues such as suitable suppliers or tips on getting a practical to work.

Information to be given to candidates

Candidates must **not** be given information about an ISA assessment until one week before Stage 1. One week before sitting Stage 1 of the ISA, teachers should give their candidates the following information.

You will investigate characteristics of humans that may be genetically controlled. In addition, you will need to understand the following topics:

- inheritance
- the Hardy-Weinberg principle.

There **must** be no further discussion and candidates **must not** be given any further resources to prepare for the assessment.