



General Certificate of Education  
Advanced Level Examination  
June 2014

**Biology**

**BIO6T/P14/TN**

**Unit 6T A2 Investigative Skills Assignment**

**Teachers' Notes**

**Confidential**

The Exams Officer should make two copies of these Teachers' Notes; one copy for the Head of A-level Biology and one for the technician.

These copies can be released to the Head of A-level Biology and the technician at any point following publication but must be kept under secure conditions at all times.

Teachers can have sight of the Teachers' Notes but no further copies should be made.

All teacher-assessed marks to be submitted by 15 May

## Teachers' Notes

### Confidential

These notes must be read in conjunction with **Instructions for the Administration of the ISA: A-level Biology** published on the AQA Website. Please note that these have been revised for 2014.

## Investigating reaction times

### Introduction

Candidates will investigate the effect of temperature on reaction times. They will use a simple stick test to measure the distance a stick falls prior to it being caught by another person, before and after this person has submerged their hand in an ice-water bath. Candidates will be given a formula to use to convert distance into a reaction time.

### Materials

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

- access to at least two people (no restrictions on age, sex or ethnicity)
- half-metre or metre ruler (or suitable 'stick' that will allow measurements to be made)
- ruler graduated in millimetres to measure 7 cm
- water bath for ice-water (an ice cream tub or similar will suffice but it must be large enough to allow a hand to be submerged in the ice-water)
- access to water (tap water is sufficient)
- supply of ice
- thermometer
- timer (but sight of a clock or candidates using their own watch is adequate)
- paper towels.

### Managing the investigation

If you have any 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 [science-gce@aqa.org.uk](mailto:science-gce@aqa.org.uk)

Candidates will need at least two people as subjects for their investigation. These could be people who are not part of the class. This may not always be possible and an acceptable alternative approach is to allow candidates in the class to collect data from each other. In this case, candidates will take turns to be the experimenter and the subject in the investigation. Participants must be willing to immerse their hand in ice-water for short periods of time. One minute was not found to be a problem during trials, but the time period could be shortened if necessary. Candidates **must** record their own data.

Candidates will collect sets of measurements from a minimum of two people up to a maximum of five people. Centres are provided with some choice of how they organise this. Candidates could collect all five sets of measurements themselves. If this is not possible, each candidate must collect a minimum of two sets of measurements. The centre may then provide each candidate with further sets of measurements taken from other members of the class or from the centre's own trials. If a candidate collects the minimum of two sets of measurements, the centre may provide a further three; if a candidate is able to collect three sets of measurements, the centre may provide a further two, and so on.

**Each candidate must collect a minimum of two sets of measurements.**

If a person is to be used as a subject more than once, sufficient recovery time should be allowed. Alternatively, the person could use their right hand on the first occasion and their left hand on the second occasion.

To avoid further time for data collection, in this investigation five sets of data will be considered sufficient for a statistical analysis.

In trials, the difference in measurements taken before and after exposure to cold varied with individuals. For some, there was little difference and during your candidates' investigations, the difference may not prove to be significant. That does not matter and, whatever the outcome, candidates will still be able to carry out a statistical analysis.

### **Trialling**

The task **must** be trialled 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 that 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, teachers should give their candidates the following information.

You will investigate the effect of temperature on reaction times. In addition, you will need to understand the following topics:

- survival and response
- nerve impulses
- synaptic transmission
- temperature control.

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

**Turn over ►**

## Task Sheet

### Investigating reaction times

#### Introduction

In this investigation, you will determine whether reaction time is affected by a brief exposure to a cold temperature.

Your teacher will tell you how many people you will use. If you investigate the reactions of fewer than five people, your teacher will give you additional data to use during your analysis.

#### Materials

You are provided with the following:

- access to at least two people
- measuring stick, such as a metre ruler
- ruler to allow you to measure the gap between each person's finger and thumb
- water bath for ice-water
- access to water
- supply of ice
- thermometer
- timer (or sight of classroom clock or your own watch)
- paper towels.

You may ask your teacher for any other apparatus you require.

Teacher Use Only

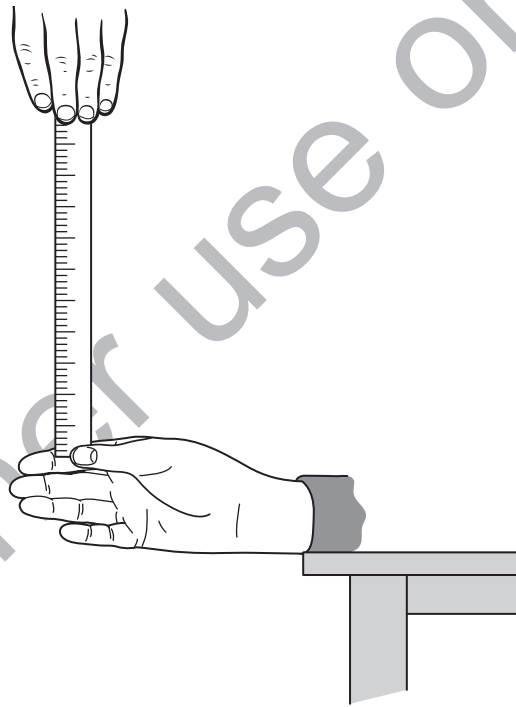
## Method

Read these instructions carefully before you start your investigation.

### Reaction before exposure to cold

1. Sit the first person (Person 1) by a table or bench with the arm of their choice resting on the work surface. Tell the person to keep the arm on the work surface but to adjust its position so that the wrist and hand overhang the edge.
2. Ask the person to open their chosen hand and use the ruler to ensure they have a gap of 7 cm between the index finger and thumb.
3. Hold the measuring stick vertically, as shown in **Figure 1**, above the person's hand so that the starting point or zero on the scale is between their thumb and index finger and without the person touching it.

Figure 1



4. Read the following instructions to the person.  
"I will drop the stick without warning. When I drop the stick, you must catch it as quickly as you can between your thumb and index finger."
5. Let the stick drop sometime within a 5-second period after you finish reading the instructions.
6. Measure the distance the stick has fallen, in centimetres, by reading the value where the stick is held by the person (or mark this point and place the stick by a ruler or tape measure so that you can determine the distance it has fallen). Record this as Trial 1 in **Table 1** on page 4.
7. Repeat steps 2 to 6 twice with Person 1 but, during step 5, vary the time when you release the stick within the 5-second period. Record these as Trial 2 and Trial 3 in **Table 1** on page 4.

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**Reaction after exposure to cold**

8. Set up an ice-water bath by adding ice cubes to cold water. The depth of water must be sufficient for a hand to be submerged without overflowing. Keep the ice-water at a temperature of about 5 °C.
9. Ask the person to place the same hand they used in step 1 into the water bath. Make sure their hand is fully submerged and then time 1 minute.
10. After 1 minute, tell the person to remove their hand from the water bath, dry it and resume the position of their arm on the work surface.
11. Repeat steps 2 to 7 as quickly as possible.
12. Repeat steps 1 to 11 with the second person (Person 2).
13. Your teacher will either tell you to repeat steps 1 to 11 with more people or provide you with further sets of data.

You will now have results for five people. You may assume that this will give you sufficient data for a statistical test.

**You will need to decide for yourself:**

- when you will drop the measuring stick
- the point on the measuring stick where it is caught by the person
- how you will maintain a suitable temperature in the water bath.