



Science LEVEL 1/2

UNIT R073 - How scientists test their ideas DELIVERY GUIDE

VERSION 1 JANUARY 2013

INDEX

Introduction		Page 4
Unit R073	How scientists test their ideas	Page 5

INTRODUCTION

This Delivery Guide has been developed to provide practitioners with a variety of creative and practical ideas to support the delivery of this qualification. The Guide is a collection of lesson ideas with associated activities, which you may find helpful as you plan your lessons.

OCR has collaborated with current practitioners to ensure that the ideas put forward in this Delivery Guide are practical, realistic and dynamic. The Guide is structured by learning objective so you can see how each activity helps you cover the specification.

We appreciate that practitioners are knowledgeable in relation to what works for them and their learners. Therefore, the resources we have produced should not restrict or impact on practitioners' creativity to deliver excellent learning.

Whether you are an experienced practitioner or new to the sector, we hope you find something in this guide which will help you to deliver excellent learning.

If you have any feedback on this Delivery Guide or suggestions for other resources you would like OCR to develop, please email resourcesfeedback@ocr.org.uk.

PLEASE NOTE

The activities suggested in this Delivery Guide **MUST NOT** be used for assessment purposes. (This includes the Consolidation suggested activities).

The timings for the suggested activities in this Delivery Guide **DO NOT** relate to the Guided Learning Hours (GLHs) for each unit.

Assessment guidance can be found within the Unit document available from www.ocr.org.uk.

OPPORTUNITIES FOR ENGLISH AND MATHS SKILLS DEVELOPMENT

We believe that being able to make good progress in English and maths is essential to learners in both of these contexts and on a range of learning programmes. To help you enable your learners to progress in these subjects, we have signposted opportunities for English and maths skills practice within this resource. These suggestions are for guidance only. They are not designed to replace your own subject knowledge and expertise in deciding what is most appropriate for your learners.

KEY



English



Maths

UNIT R073 – HOW SCIENTISTS TEST THEIR IDEAS

Guided learning hours : 30

AIM OF THE UNIT

In this unit, learners will develop their skills in planning and carrying out experimental work. The Learning Outcomes for the unit **build** on those in unit **R071** and unit **R072**: in unit R071 learners have opportunities to carry out practical work, taking measurements and interpreting their results and in unit R072, learners are taught about the scientific method and how scientists carry out research.

In unit R073, learners will develop further their understanding of how scientific information is evaluated, and in the assessment task (investigation) for unit R073, learners will apply an understanding of the scientific method to their own research project.

It is recommended that the teaching for this unit should be **integrated** into the other two units so that learners develop their experimental skills in the context of the scientific content of the other two units.

The unit is weighted at 25% of the qualification and has 30 GLH.




UNIT R073 – HOW SCIENTISTS TEST THEIR IDEAS

LO1	CONTENT
LO1: Be able to plan a scientific investigation	<p>Learners should be taught the following content:</p> <p>how to plan to test a scientific idea, answer a scientific question, or solve a scientific problem, i.e.:</p> <ul style="list-style-type: none"> • how variables are controlled or taken into account • the equipment and techniques needed to minimise error and collect high quality, valid data • source of data/information
LO2	CONTENT
LO2: Be able to collect scientific data	<p>Learners should be taught the following content:</p> <p>how to collect data from primary and secondary sources, including ICT sources and tools, i.e.:</p> <p>how to work accurately and safely, individually and with others, when collecting first-hand data</p> <ul style="list-style-type: none"> • the need for a risk assessment.
LO3	CONTENT
LO3: Be able to analyse scientific information	<p>Learners should be taught the following content:</p> <p><u>In the context of scientific investigation:</u></p> <p>how to use both qualitative and quantitative approaches, i.e.:</p> <ul style="list-style-type: none"> • process data using qualitative and quantitative (graphical and mathematical) techniques to identify trends or patterns <p>how to analyse, interpret, apply and question scientific information or ideas, i.e.:</p> <ul style="list-style-type: none"> • identify relationships between variables • level of uncertainty of data, including anomalous results.

LO4	CONTENT
LO4: Be able to evaluate scientific information	<p>Learners should be taught the following content:</p> <p><u>In the context of scientific investigation:</u></p> <p>how to evaluate methods of collection of data and consider their validity and reliability as evidence, i.e.:</p> <ul style="list-style-type: none"> • assess the quality and validity of the evidence and suggest scientific explanations for unexpected results • how improvements in methods of data collection would improve the quality of the data • identify conflicting evidence, or weaknesses in the evidence, which lead to different interpretations; what further evidence would help to make a conclusion more secure <p>to show how interpretation of data, using creative thought, provides evidence to test ideas and develop theories, i.e.:</p> <ul style="list-style-type: none"> • our confidence increases in scientific explanations if hypotheses based on them are supported by results of experiments, but unexpected results can lead to new understanding of science • interpret evidence and suggest conclusions • use ideas of correlation and cause when analysing data and identify what further work would be needed to establish a causal link.

LO5	CONTENT
LO5: Be able to communicate scientific information	<p>Learners should be taught the following content:</p> <p><u>In the context of LO1-LO4:</u></p> <p>how to present information, develop an argument and draw a conclusion, using scientific, technical and mathematical language, conventions and symbols, i.e.:</p> <ul style="list-style-type: none"> • ensure that text is legible and that spelling, punctuation and grammar are accurate so that the meaning is clear • use of explanations, arguments, diagrams, graphs, flow charts, pictures and tables.

UNIT R073 – HOW SCIENTISTS TEST THEIR IDEAS

Suggested content	Suggested activities	Suggested timings	Possible relevance to
Planning a scientific investigation	Learners could work through R073 Lesson element 1 'Planning a Scientific Investigation'. This lesson element contains activities which will develop the skills required in planning a scientific investigation.	Activity 1 – 10 minutes Activity 2 – 40 minutes Activity 3 – 20-30 minutes	Activity 1 - R073: LO1, R071: LO6 Activity 2 - R073: LO1, R071: LO3, R072: LO4 Activity 3 - R073: LO1, R071: LO3
Collecting scientific data and communicating scientific information 	Learners could work through R073 Lesson element 2. This lesson element contains activities which will develop the skills required collect primary and secondary data and to carry out a risk assessment.	Activity 1a – 15 minutes Activity 1b – 15 minutes Activity 1c – 10 minutes Activity 2 – 1 hour Activity 3 – 1 hour	Activities 1a, 1b, 1c and 2 – R073: LO2 Activity 3 – R073: LO2, LO5
Analysing scientific information and communicating scientific information 	Learners could work through R073 Lesson element 3 'Analysing and Communicating Scientific Information'. The activities involve learners in processing and analysing data. Any suitable experiments can be substituted.	Activity 1 – 30-45 minutes Activity 2 – 30 minutes Activity 3 – 1 hour	Activity 1– R073: LO3 and LO5 Activity 2 - R073: LO3 and LO5, R071: LO2 Activity 3 - R073: LO3 and LO5, R071: LO7
Evaluating scientific information and communicating scientific information 	Learners could work through R073 Lesson element 4 'Evaluating and Communicating Scientific Information'. This lesson element contains activities which involve learners in evaluating methods of data collection, by considering the quality and validity of the data, suggesting improvements in methods of data collection and identifying what further evidence would be needed to make a secure conclusion.	Activity 1 – 20 minutes Activity 2 – 1 hour Activity 3 – 1 hour Activity 4 – 45 minutes	Activity 1 - R073: LO4 and LO5 Activity 2 - R073: LO4 and LO5, R071: LO3 and LO7 Activity 3 - R073: LO3, LO4 and LO5, R071 LO4 Activity 4 – R073: LO4 and LO5, R072: LO1

Contact us

Staff at the OCR Customer Contact Centre are available to take your call between 8am and 5.30pm, Monday to Friday.

Telephone 02476 851509

Email cambridgenationals@ocr.org.uk

