Cambridge NATIONALS

Accredited

CAMBRIDGE NATIONALS IN SCIENCE

R071 HOW SCIENTIFIC IDEAS HAVE AN IMPACT ON OUR LIVES

R072 HOW SCIENTIFIC IDEAS HAVE DEVELOPED

R073 HOW SCIENTISTS TEST THEIR IDEAS

PROJECT IDEAS PRACTICAL ACTION

FEBRUARY 2015

PRACTICAL ACTION
Technology challenging poverty

OCR
Oxford Cambridge and RSA

This booklet shows how some Practical Action STEM challenges, map to Cambridge Nationals in Science Units R071, R072, R073.

Practical Action has some interesting ideas which will inspire your learners to consider the design of products which could improve the lives of people in different areas of the world.

The resources from Practical Action are designed to support and encourage projects with a STEM content. Project ideas enable schools to use the Practical Action resources in conjunction with the listed projects or develop similar school projects using this model. In this example, each project lists some learning outcomes of the Cambridge National in Science and show how projects link to learning resources.

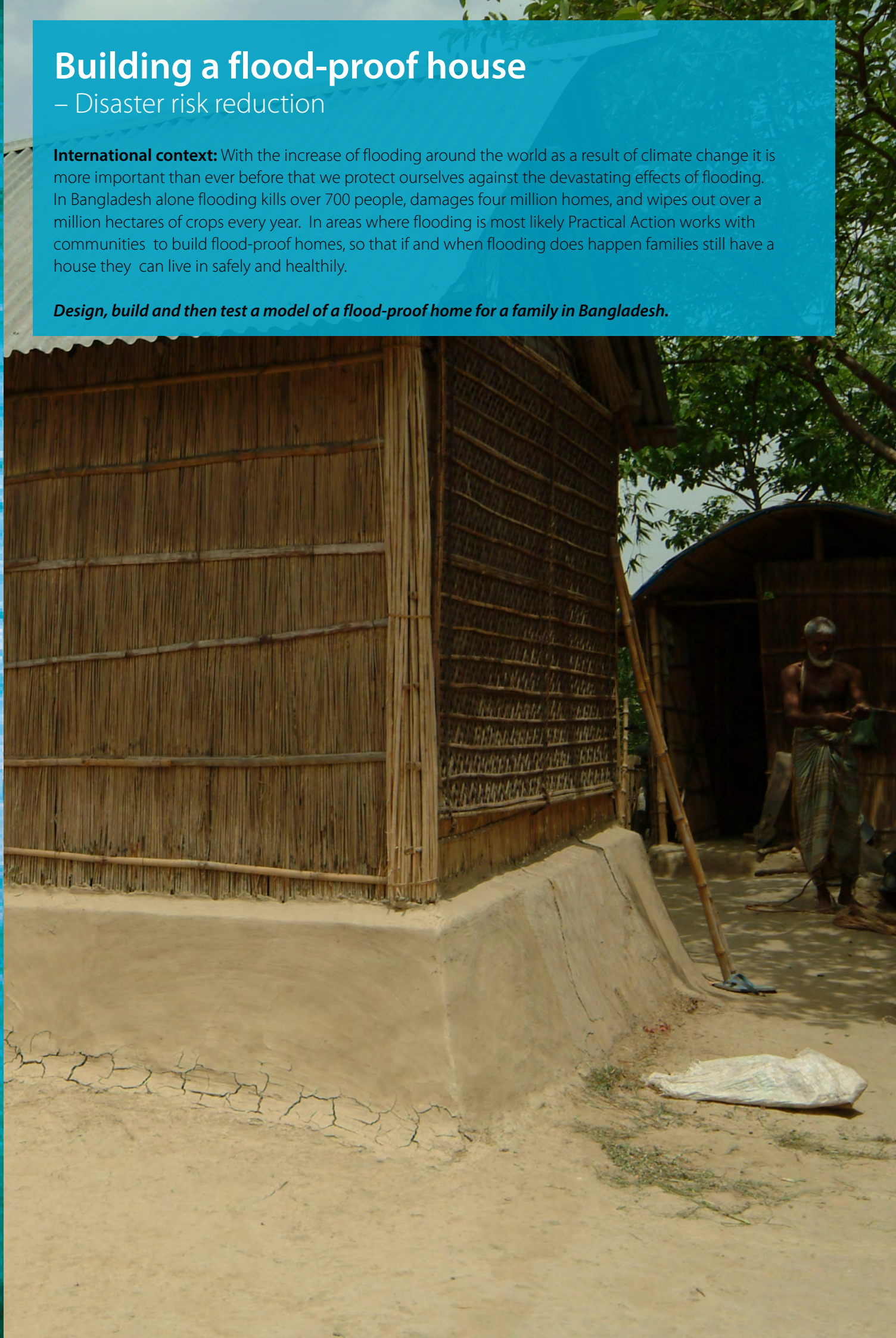
These project links cover a limited number of Learning Outcomes therefore to ensure all learning is covered through the learning experience, other projects or teaching will be necessary. We recommend centres explore the full range of learning resources and support materials available for this qualification.

We'd like to know your view on the resources we produce. By clicking on the 'Like' or 'Dislike' button you can help us to ensure that our resources work for you. When the email template pops up please add additional comments if you wish and then just click 'Send'. Thank you.

Building a flood-proof house
– Disaster risk reduction

International context: With the increase of flooding around the world as a result of climate change it is more important than ever before that we protect ourselves against the devastating effects of flooding. In Bangladesh alone flooding kills over 700 people, damages four million homes, and wipes out over a million hectares of crops every year. In areas where flooding is most likely Practical Action works with communities to build flood-proof homes, so that if and when flooding does happen families still have a house they can live in safely and healthily.

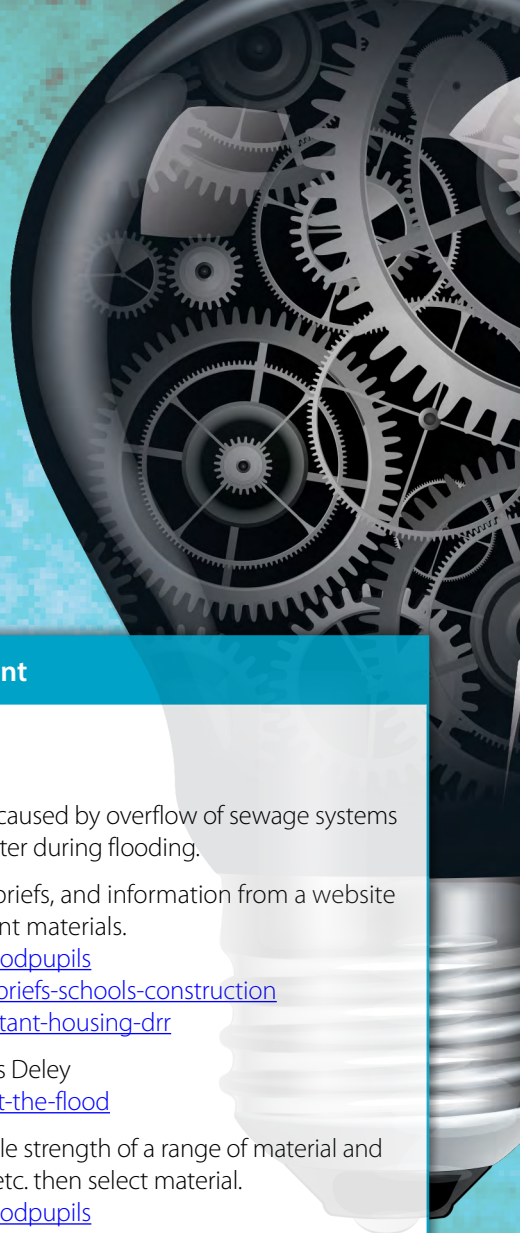
Design, build and then test a model of a flood-proof home for a family in Bangladesh.



Back up materials for Building a flood-proof house

STEM challenge Beat the Flood – practicalaction.org/beattheflood

- Technical Briefs – practicalaction.org/technical-briefs-schools-construction
- Information on different materials – practicalaction.org/material-information-product-design
- Video on flooding – www.youtube.com/watch?v=GlCQpTOsxS8
- Information on flood-proof housing on website practicalaction.org/flood-resistant-housing-drr
- Beat the flood video with Ortis Deley practicalaction.org/video-beat-the-flood



Science Units and Learning Outcomes	Ideas for activities/content
Unit R071: Design briefs, design specifications and user requirements	
LO4 Understand how human health can be improved	Look at the spread of disease caused by overflow of sewage systems and lack of access to clean water during flooding.
LO7 Understand how materials we use are made from natural resources	Use material cards technical briefs, and information from a website to gain knowledge on different materials. practicalaction.org/beatthefloodpupils practicalaction.org/technical-briefs-schools-construction practicalaction.org/flood-resistant-housing-drr
LO9 Be able to measure the properties of materials to recommend appropriate uses	Beat the flood video with Ortis Deley practicalaction.org/video-beat-the-flood Test the absorbency and tensile strength of a range of material and process data to get averages etc. then select material. practicalaction.org/beatthefloodpupils
Unit R072: How scientific ideas have developed	
LO3 Be able to evaluate scientific information	Look at variables and use qualitative and quantitative data to make a decision on house design. practicalaction.org/beatthefloodteachers
LO4 Be able to communicate scientific information	Feedback back to peers and others on the process of the project and have feedback assessed by peers. practicalaction.org/beatthefloodpupils
Unit R073: How scientist test their ideas	
LO1 Be able to plan a scientific investigation	Plan how to test for absorbency and strength of material for a model of a flood-proof house. practicalaction.org/beatthefloodpupils
LO2 Be able to collect scientific data	Collect data from experiments and secondary sources. practicalaction.org/beatthefloodpupils practicalaction.org/technical-briefs-schools-construction
LO3 Be able to analyse scientific information	Analyse qualitative and quantitative Information from testing to make an informed decision as to which materials to use in model. practicalaction.org/beatthefloodpupils
LO4 Be able to evaluate scientific information	Evaluate Information from different sources including results of testing and from secondary sources. practicalaction.org/beatthefloodpupils practicalaction.org/technical-briefs-schools-construction practicalaction.org/flood-resistant-housing-drr
LO5 Be able to communicate scientific information	Feed back to peers/other audiences on project using a variety of techniques and have feedback assessed practicalaction.org/beatthefloodpupils

Renewable energy choices
– Energy access

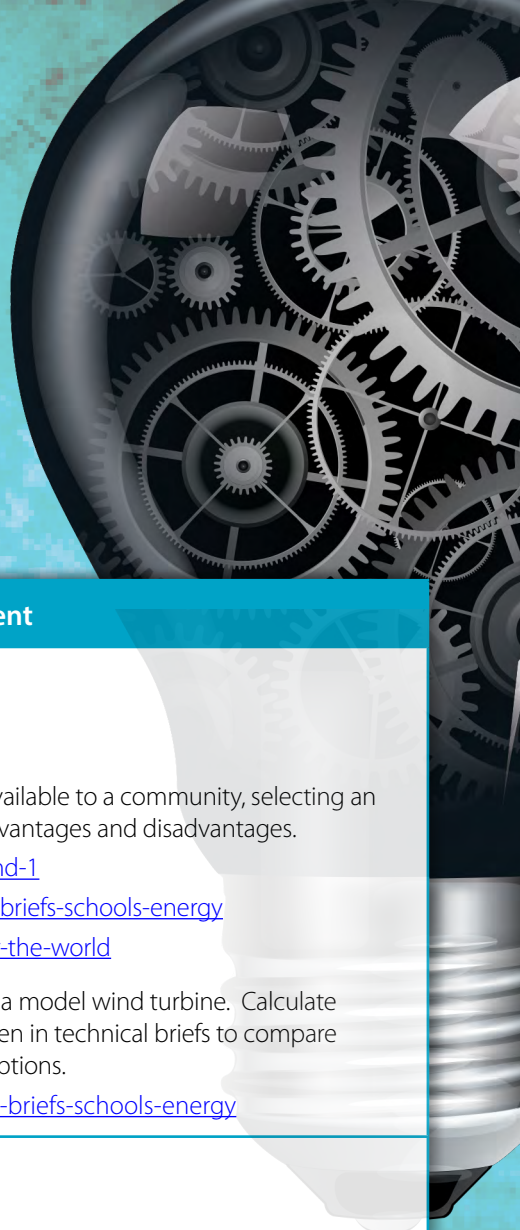
International context: 1.6 billion people, that's one third of the population, live without access to any form of electricity. In the UK we all have access to electricity and renewable energy is seen as a 'greener' option. In the developing world where many people do not have access to the national grid, small–scale renewable energy is the only option. Practical Action helps communities decide which option is right for them, and then helps them install it.

Research the advantages and disadvantages of different renewable energy options then design and test a model of a renewable energy system.

Back up materials for renewable energy choices

Projects based on STEM challenges moja island, power for the world and wind power challenge

- Technical briefs on energy – practicalaction.org/technical-briefs-schools-energy
- Video on energy – www.youtube.com/watch?v=2JHs2y9x-pw
- Posters and other renewable energy teaching materials – practicalaction.org/renewable-energy-resources
- Information on website practicalaction.org/energy



Science Units and Learning Outcomes	Ideas for activities/content
Unit R071: How scientific ideas have an impact on our lives	
LO1 Be able to analyse personal and social choices related to energy supply	Look at the energy choices available to a community, selecting an appropriate one based on advantages and disadvantages. practicalaction.org/moja-island-1 practicalaction.org/technical-briefs-schools-energy practicalaction.org/power-for-the-world
LO3 Be able to measure energy transfers and calculate efficiencies	Measure energy output from a model wind turbine. Calculate efficiencies from raw data given in technical briefs to compare different renewable energy options. practicalaction.org/technical-briefs-schools-energy
Unit R072: How scientific ideas have developed	
LO3 Be able to evaluate scientific information	Using technical briefs, evaluate the efficiency of different energy solutions. Identify what further research needs to be done etc. practicalaction.org/technical-briefs-schools-energy
LO4 Be able to communicate scientific information	Feedback back to peers and others on the process of the project.
Unit R073: How scientist test their ideas	
LO1 Be able to plan a scientific investigation	Plan an investigation in to how to measure the energy output of a model, taking variables into account.
LO2 Be able to collect scientific data	Collect data using an ammeter, observation and secondary sources.
LO3 Be able to analyse scientific information	Analyse qualitative and quantitative information from testing and secondary sources such as technical briefs and websites. practicalaction.org/technical-briefs-schools-energy practicalaction.org/energy
LO4 Be able to evaluate scientific information	Look at the quality and validity of technical briefs, info on websites etc and how this links to own results from model.
LO5 Be able to communicate scientific information	Feedback to peers/other audiences on project using a variety of presentation techniques.

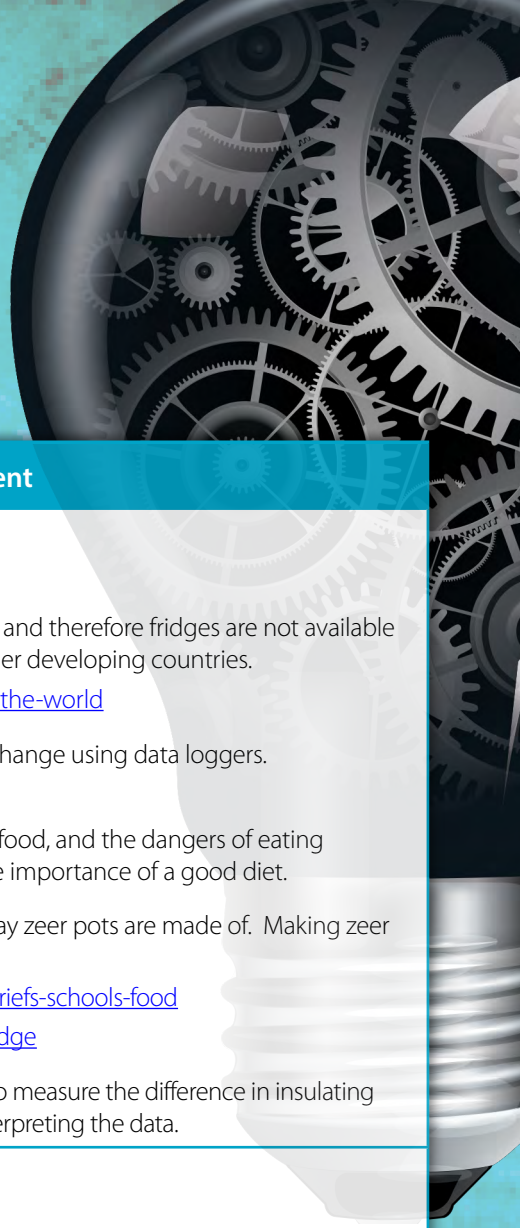
A fridge without a plug
– Food preservation

International context: Being able to preserve food is important to all of us, which is why most of us have a fridge in our house. But is it possible to keep food cool even without an electric fridge? In Sudan people do just that by making zeer pots which use evaporative cooling to prolong the life of tomatoes and other vegetables from a few days to two to three weeks.

Use unglazed clay pots (or if not possible, beakers) and different insulating materials to design, build and test a model of a small non-electric 'fridge', similar to a zeer pot, that could be used to keep food cool.

Back up materials for A fridge without a plug

- Technical brief on zeer pot – http://practicalaction.org/technical-briefs-schools-food
- Webpage including video on main website – http://practicalaction.org/zeer-pot-fridge
- Starter activity on national grid – http://practicalaction.org/power-for-the-world



Science Units and Learning Outcomes	Ideas for activities/content
Unit R071: How scientific ideas have an impact on our lives	
LO1 Be able to analyse personal and social choices related to energy supply	Understand why national grid and therefore fridges are not available to all people in Sudan and other developing countries. practicalaction.org/power-for-the-world
LO3 Be able to measure energy transfers and calculate efficiencies	Collect data on temperature change using data loggers.
LO4 Understand how human health can be improved	Investigate decomposition of food, and the dangers of eating microorganisms. Research the importance of a good diet.
LO7 Understand how materials we use are made from natural resources	Find out what materials the clay zeer pots are made of. Making zeer pots. practicalaction.org/technical-briefs-schools-food practicalaction.org/zeer-pot-fridge
LO9 Be able to measure the properties of materials to recommend appropriate uses	Use data logging equipment to measure the difference in insulating properties of materials and interpreting the data.
Unit R072: How scientific ideas have developed	
LO3 Be able to evaluate scientific information	Use results of tests on insulating materials, sizes of pots or beakers, width of 'gap' between pots or beakers to make informed decision on best design. Using information from secondary source to compare. practicalaction.org/technical-briefs-schools-food
LO4 Be able to communicate scientific information	Feedback back to peers and others on the process of the project.
Unit R073: How scientist test their ideas	
LO1 Be able to plan a scientific investigation	Plan an investigation to determine best insulating materials, width between beakers etc. for a model non-electric fridge.
LO2 Be able to collect scientific data	Collect data using data logging equipment , observation and secondary sources.
LO3 Be able to analyse scientific information	Analyse qualitative and quantitative Information from testing and secondary sources such as technical briefs and websites. practicalaction.org/technical-briefs-schools-food practicalaction.org/zeer-pot-fridge
LO4 Be able to evaluate scientific information	Look at the quality and validity of technical briefs, info on websites etc and how this links to own results from models. practicalaction.org/technical-briefs-schools-food practicalaction.org/zeer-pot-fridge
LO5 Be able to communicate scientific information	Feedback to peers/other audiences on project using a variety of presentation techniques.

Contact us

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

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