



**GOLD AWARD**

# THE PROPERTIES OF SAUCEPANS



Typically 70 hours of project work  
Recommended for 16-18 year olds



**Practical  
project**

Research the various properties of materials used to make a cooking utensil of your choice.

**#chemistry**

**#materials**

**#food**



# HOW TO RUN CREST USING THIS ACTIVITY

Entering your project without a teacher or facilitator? No problem! You can enter your work yourself by following this link: [www.crestawards.org/sign-in](http://www.crestawards.org/sign-in)

Looking for some support? Find a mentor by contacting your local STEM Ambassador hub: [www.stem.org.uk/stem-ambassadors/local-stem-ambassador-hubs](http://www.stem.org.uk/stem-ambassadors/local-stem-ambassador-hubs)

To use their project to achieve a CREST Gold Award your students will need to:

- **Develop and lead the project**
- **Complete a minimum of 70 hours of project work**
- **Consider the broader impact of their project and demonstrate an innovative approach**
- **Write a project report or portfolio of evidence**
- **Reflect on their work during the project using a student profile form**

## Preparation

Ready to get going with CREST? Sign up for a CREST account here: [www.crestawards.org/sign-in](http://www.crestawards.org/sign-in)

Create a new Gold Award project with the name(s) of the student(s) and the title of their project. If you don't have all these details, you can fill them in later!

We have some super handy workbooks and profiles for your students to use when running a CREST Award. You can download these when you create your CREST account by following the link above.

## Run the project

Encourage your students to use the Gold student guide to plan and carry out their project. Each student involved in the project should complete their own profile form.

You don't want all their good work to go to waste, so be sure they keep a record of all their amazing progress. Keeping a regular project diary will save them precious time when writing their final project report.

The students should spend at least 70 hours on the project in total.

Remember to consider safety and risks!

## Reflection

So, your students have been hard at work and completed their CREST project, but don't let this be the end of their learning. At the end of the project, each student should complete a Gold profile form and communicate their project. This is a chance for them to reflect on all the interesting things they've learnt and the invaluable skills they have used.

Students working in a group can either submit a joint report or separate reports, but they must each complete a profile form.

Use the CREST criteria on the profile form to help the students check that they have included everything in their report.

## Enter your project for a CREST Gold Award

Hard work deserves a reward! Celebrate and certify your student's achievements by entering their project for a CREST Gold Award. Simply:

Log in to your CREST account at [www.crestawards.org/sign-in](http://www.crestawards.org/sign-in)

Select your project and upload the profile form per student, project report and other evidence, such as pictures and diagrams.

Finally, complete the delivery and payment details for assessment and to order your snazzy certificates.

Congratulations on submitting for CREST Gold!

## What next?

Is university on the horizon for your students? They can use their project to help demonstrate their newly found STEM skills and knowledge in UCAS personal statements.

Don't keep all the fun to yourselves, encourage others to take part in CREST projects and share the wonder of science. For free ideas on how to get started, see [www.crestawards.org](http://www.crestawards.org)

# STUDENT BRIEF

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## The properties of saucepans

There are lots of different properties that are essential for cooking utensils. In this project, you will research the various properties of materials used to make a cooking utensil of your choice - we have chosen saucepans.

### Getting Started

Check the properties of different materials used to make saucepans and create a list of the essential properties required for a saucepan.

Properties of materials can be split into three categories: chemical, physical and mechanical. Take your list of essential properties for a saucepan and sort them into these categories.

You need to design some tests to:

- Look at the properties of materials used to make saucepans - these tests will allow you to determine quantitative values for the properties.
- Compare saucepans made from a range of different materials - these tests will allow you to gain some comparative values and decide which of the tested saucepans is best, and which you think is best value for money.

When designing your tests try to make sure you get quantitative results. If you test for thermal conductivity you should gain a value for the rate at which heat flows through a cross-sectional area of material.

Find out if there are any British Standards for your utensils - try to get hold of the Standard Procedures used to test them in industry.

Comparing saucepans - you could do some research or design some tests to investigate:

- Which saucepans boil water quickest? Do they retain heat as well?
- Does it make a difference what heat source is used? For example, try the different saucepans on halogen hobs, electric hobs, gas hobs or an Aga.
- Which saucepans are non-stick? Try testing with different foods, such as potato, which has relatively high starch content.
- Which saucepans are scratched by abrasives e.g. dish clothes, wire wool etc.?
- Do other kitchen utensils scratch the saucepan? Should you stir food with wooden or plastic spoons, or is it OK to use metal spoons, and if so, what type of metal?

### Things to think about

Properties of materials - some properties of materials you could investigate include:

Hardness  
Strength  
Stiffness  
Density  
Thermal conductivity  
Melting point  
Thermal expansivity  
Specific heat capacity

Resistance to chemicals: You could also think about any finishes applied to the utensils. For example, test the properties of non-stick surfaces.

### Useful Resources

Try to detect metal ions released when cooking. You probably won't be able to do this in your school/college, as the traces of metal ions are likely to be extremely small - you'll have to link up with somebody from industry to use specialist equipment. Research the sorts of techniques used for metal ion detection - these include voltammetry using diamond electrodes and spectrophotometric methods.

Suggest why some cookware is so much more expensive than others.

Why do we still have to carry out tests on materials even though you can look up their properties in data books and databases?

Investigate why some people have thrown away their aluminium pans and find out why you shouldn't make jam in a copper pan.



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## Health and Safety

Science project work is both dynamic and exciting but can also carry some risk. To avoid any accidents, make sure you stick to the following health and safety guidelines before getting started:

- find out if any of the materials, equipment or methods are hazardous;
- assess the risks (think about what could go wrong and how serious it might be);
- decide what you need to do to reduce any risks (such as wearing personal protective equipment, knowing how to deal with emergencies and so on);
- make sure your teacher agrees with your plan and risk assessment.

**Remember to think about any safety issues before you start testing.**

## Remember!

Science isn't just about data. The most successful projects will demonstrate good communication skills and show original ideas that address a real-world problem.

Look at the world around you and consider all the innovative ways that you could address the challenge. Even if things go wrong, use this to show what you have learned. Don't forget to use the student profile form to help structure your project.