



# SECONDARY

## Getting started guide

Develop your students' project skills and make science personally relevant to them with CREST Bronze, Silver and Gold. **Typical age: 11-19**



# THE CREST FRAMEWORK

**CREST STAR AND SUPERSTAR** are aimed at primary school students aged 5-to-11 years. Students solve eight one-hour science, technology, engineering, and maths challenges through practical investigation.

**CREST DISCOVERY** is a great first introduction to project work and can be done in one day; typically undertaken by 10-to-14 year-olds.

**CREST BRONZE** allows students to experience the project process; improving their enquiry, problem solving and communication skills. Typically completed by 11-to-14 year-olds.

**CREST SILVER** allows students to develop their own project idea and gain experience of the scientific process. Typically completed by 13-to-16 years.

**CREST GOLD** can be used to enhance UCAS personal statements and is well regarded by employers. Typically completed by 16-to-19 year-olds.

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# WHAT IS CREST?

CREST is a scheme that inspires young people to think and behave like scientists and engineers.

## Student-led

It is the UK's only nationally recognised scheme for student-led project work in STEM subjects (science, technology, engineering and maths).

## Flexible

CREST gives young people aged 5-19 the chance to choose their own subject and methodology for their hands-on investigation.

## Trusted

A consistent, high standard of assessment and moderation is achieved for the scheme via our network of industry experts from the STEM and education sectors. It has been running since 1986 with tens of thousands of young people taking part each year.

## Accessible

CREST provides activities and project ideas for a range of ages, group sizes and abilities. From off-the-shelf, one-hour long challenges through to large-scale, student-led projects of over 70 hours of work or more, CREST can be done by anyone.

# WHAT ARE CREST BRONZE, SILVER AND GOLD?

**CREST Bronze** provides a real-life experience of 'being' a scientist. It allows students to experience the project process; improving their enquiry, problem solving and communication skills.

England and Wales: KS3/ Level 1

Scotland: S1, S2 & S3

Northern Ireland: KS3

International: IB Middle Years Programme

Cost	£5 per student
Student time required	10 hours
Assessment	You or another facilitator should assess the students as they work and then submit their projects online
Upon completion	Get certificates for your students



Research shows that **CREST Silver** improves GCSE grades and increases interest in continuing in STEM education. Students develop their own project idea and gain experience of the scientific process.

England and Wales: KS4/Level 2  
 Scotland: S4, S5 & S6  
 Northern Ireland: KS4  
 International: IB Diploma Programme

Cost	£10 per student
Student time required	30 hours
Assessment	Students or the facilitator should enter the project online to be assessed by a trained assessor
Upon completion	Get professional assessment and personalised certificates for your students

**CREST Gold** can be used to enhance UCAS personal statements and is well regarded by employers. Gold Awards allow students to conduct real research, contributing something new to a field of study.

England and Wales: KS5/Level 3  
 Scotland: S6  
 Northern Ireland: KS5  
 International: IB Diploma Programme

Cost	£20 per student
Student time required	70 hours
Assessment	Students or the facilitator should enter the project online to be assessed by a trained assessor
Upon completion	Get professional assessment and personalised certificates for your students

# THE CREST CRITERIA

CREST projects contain the following elements:

## Project aims and objectives

Students clearly communicate their broad aim and specific objectives.

## Understanding of project outcome

Students show understanding of the significance of their outcomes.

## Project context

Students consider the broader implications of their project.

## Reflection on learning

Students indicate their own role in the project and reflect on what they have learnt.

## Selection of approach

Students identify a range of relevant possible approaches to achieving their aim.

## Scientific or technical level

Student shows scientific knowledge suited to the level.

## Project strategy

Students communicate a clear strategy for their project.

## Decision making

Students lead the project and make decisions.

## Planning and organising

Students work independently to plan and organise their project.

## Creativity

Students demonstrate they have approached the project in an innovative way and explore novel outcomes.

## Use of material and human resources

Students actively seek out appropriate resources.

## Problem solving

Students analyse facts and develop original solutions.

## Research

Students research and reference the background to their project.

## Communication

Students show clear communication skills.

## Conclusions and implications

Students explore the direct and indirect implications of their work.

# HOW IT WORKS

1

Sign up for a free CREST account

Sign up for a free CREST account online. You or your students can use these accounts to enter students, create projects, submit and assess project work and pay CREST entry fees.  
[www.crestawards.org/sign-in](http://www.crestawards.org/sign-in)

2

Choose project(s)

Students have many options when deciding on a project.  
  
Go to page 10 to find out more.

3

Run the project(s)

This is the fun part!  
  
Your students should work independently (either in groups or individually), with your support. The CREST Teacher and Student Guides can help guide you through the project process. Find the guides when you log in to your CREST account [www.crestawards.org/sign-in](http://www.crestawards.org/sign-in).

4

Record project work

**Bronze:**  
Students can either complete a CREST Bronze workbook or write a project report and accompanying profile form.  
  
**Silver and Gold:**  
Students should create a project report and complete the accompanying profile form.

5

Assess your project(s)

Bronze Awards should be assessed by you (or another educator), using our tried and tested assessment framework. You can then upload a sample of the work your students completed.  
  
Silver and Gold Awards assessed by a trained assessor from industry or academia, working in a similar field to the project.

6

Certify your project(s)

Go online, pay and submit your students work.  
  
At Silver and Gold level your students can also do this themselves.

**Student/Team member report**

Project title

Monitor name

**Before you start:** Check the CREST Gold Award student guide for all the guidance and information you'll need to complete your CREST Award.

**During the project:** Use the checklist on the next page to make sure your project is on track.

**Completing your project:** To complete your project, you should upload the following documents:

- A project report
- This student profile
- If you're doing a team project, each team member should have a separate student profile. Groups that have done separate project work should submit separately, so that each project is assessed on its own merits.

**Tip for your project report:**

- Use pictures, graphs, diagrams or photos to help explain things
- Include where you found the information for your background research
- Use the checklist on the next page to make sure you include everything you need to achieve your CREST Gold Award
- Number the pages in your report
- Do not upload documents or images that could be used to identify yourself e.g. photos of you or your classmates, personal contact details etc.

**Mentors**

Mentors are strongly recommended at Gold level, preferred at Silver, and optional at Bronze. Go to page 11 to find out more.

## Mentors

Mentors are strongly recommended at Gold level, preferred at Silver, and optional at Bronze. Go to page 11 to find out more.

For all levels, students should each complete a profile form (or workbook at Bronze level). The project report can take any shape but should meet at least 11 of the 15 criteria.

Have a look at the criteria on page 7.



# CHOOSING A PROJECT IDEA

There are three options for choosing a project:

## 1. Support students to create and design their own project

You can build CREST into the curriculum to help students look at topics in a new, innovative way.

Or, you can encourage students to undertake a project on something they've always been interested in.

The flexibility of CREST means there's something for everyone!

## 2. Arrange for an external education provider to run a project with your students

This could be at your school or at a location with an accredited resource, such as a museum.

We have lots of great accredited resources or activities. If you'd like to visit somewhere or have someone come into your school, take a look at this list of accredited resources. <https://crestawards.org/crest-accredited-resources-and-activities>

## 3. Use a resource from the CREST library

We've got tons of resources to choose from. Help your students find one that fits their interests and helps them look at the world in a more creative, analytical way. <http://library.crestawards.org/>

## Mentors

Mentors are strongly recommended at Gold level, preferred at Silver and optional at Bronze. To find a mentor for a project, you can:

- Request support through the STEM Ambassadors Scheme
- Contact local universities with a public outreach department

We encourage students to access support from a mentor who works in a STEM field related to their CREST project topic. Mentors can play an important role in CREST projects by offering their experience, knowledge and enthusiasm to help inspire students. They can open a window into what working in STEM can be like and help students value the work they are doing.

Find out more about getting a mentor here: <http://bsa.sc/crest-mentor>

Below you can see some example project titles

Bronze	<ul style="list-style-type: none"><li>• How do rockets work?</li><li>• Incredible inoculations</li><li>• Future travel research</li><li>• Make your own toothpaste</li></ul>
Silver	<ul style="list-style-type: none"><li>• Design and make a catamaran</li><li>• Art restoration</li><li>• Build a robot</li><li>• Monitoring water pollution</li></ul>
Gold	<ul style="list-style-type: none"><li>• Design and build a speaker system</li><li>• Build a model waltzer</li><li>• Detecting food fraud</li><li>• Investigating crash damage</li></ul>



# TYPICAL PROJECT TIMELINE

## Planning and research

2- 10 hours

Make sure your students spend some time undertaking background research on the topic they are exploring.

Get your students to plan their approach to the project – this might change, but it's still important to record their initial thoughts.

Consider finding a mentor (see page 11).

## Undertaking the project

6- 40 hours

Get your students working on their design/ practical investigation or other project work.

They should record their progress and any changes to the approach. Get their mentor involved if they have one!

## Reflecting and evaluating

2- 10 hours

Get your students to reflect on the work they have done.

CREST assessors are looking for the creative process of the project, so make sure the students reflect on their work and how they could have improved it. An unsuccessful science experiment does not equal an unsuccessful CREST project!

# FEATURED BRONZE PROJECT

## Make your own toothpaste

In this project, students will make their own toothpaste and compare it to other commercially available toothpastes. Students then develop a recipe and write a standard operating procedure so that anyone can make the toothpaste.

**Get a taste of the resource with the below extract:**

First things first, you need a recipe for toothpaste. You could find your own on the internet - try searching for 'homemade toothpaste'.

You could do a taste test with your toothpaste by asking your classmates to taste a little bit of it (but don't swallow!) and say what they think. They should do the same with other types of toothpaste – don't tell them which is which!

Look at all the things your classmates said about the different toothpastes and decide if you think your recipe needs to be changed slightly. For example, you might want to add a little bit more flavour or add a different colour.

Download the full activity from the CREST library at: <http://library.crestawards.org>



## FEATURED SILVER PROJECT

### Build a catamaran

In this project, students will design and build a simple model catamaran. Students will then use their model to test the effectiveness of a range of different types of sail.

**Test the waters with the below extract:**

You should start this project with some research. Find out how sails 'work' – what are the aerodynamic principles of a sail?

Gather information on the main types of sail, including the more traditional types of sail. What are the advantages and disadvantages of each?

Design and build a model catamaran for use on water if a suitable lake or pond is available.

Now you've built your model, you should use it to test the effectiveness of different types of sails. Decide how you are going to make your tests as fair as possible.

Download the full activity from the CREST library at: <http://library.crestawards.org>



## FEATURED GOLD PROJECT

### Detecting food fraud

Your students will investigate how to use chemical analysis to detect food fraud.

**Get the flavour of this project with the extract below:**

Periodically, a new food scam hits the headlines...

- **1985** - Several Austrian wine producers added 'antifreeze' to sweeten their wine
- **2004** - Specially purified water turned out to be bottled tap water and contained a suspected carcinogen (cancer-causing chemical)
- **2013** - DNA testing showed that several processed beef products contained horse meat

Devise a method for performing 'consumer tests' on one such product. Determine the concentration of several brands over a range of prices and compare their value for money. Are 'value' brands actually good value?

You have undertaken the role of an analyst commissioned to test the products. Produce a report for your customer, detailing your evidence and conclusions.

Remember, your evidence must stand up in court, so you need to make sure that you can answer any objections that may be raised and disprove any counter-arguments.

Download the full activity from the CREST library at: <http://library.crestawards.org>



# IMPACT OF CREST

CREST helps young people become independent and reflective learners through enquiry-based project work.

## A measurable improvement in exam results

In January 2016, we published a report by a team of economists from Pro Bono Economics. This revealed that students who have taken a CREST Silver Award achieved half a grade higher on their best science GCSE result and were more likely to continue with STEM education, compared to a matched control group.

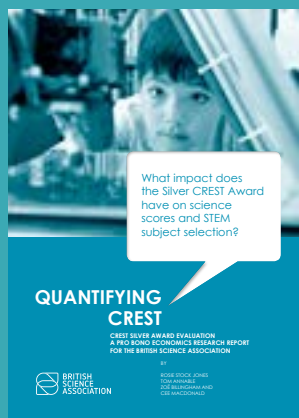
## A greater impact for more disadvantaged students

The report also showed that Silver CREST students eligible for Free School Meals (FSM) saw a larger increase in their best science GCSE (two-thirds of a grade) compared to a matched control group who were also eligible for FSM.

Students who were eligible for FSM and took part in a CREST Silver Award were 38% more likely to take a STEM subject at AS Level than the matched control group.

Find out more here:

<https://crestawards.org/why-crest/>



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CREST has the advantage of giving science clubs a focus. It is judged against criteria that are clear, so students know what they need to do. It encourages investigation and allows students to investigate topics that are not in the curriculum. All participants can succeed as they can keep developing their projects.

Maggie, CREST Teacher

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# MAKING THE MOST OF CREST

CREST Awards can be used together with a range of other activities, to maximise the recognition and reward the efforts of your students.

You can count it towards your Duke of Edinburgh's Award Skills section at Bronze, Silver and Gold levels.

You can achieve a CREST Gold Award for Extended Project Qualification (EPQ) work in science, technology, engineering or maths.

CREST also counts towards the Children's University passport for learning at every level.

You can make the most of the skills and experiences you have gained through your CREST Award to help you stand out from the crowd. When you're applying for university, for an apprenticeship or for a job, you can use CREST to enhance your application – they're well regarded, high-quality and a tangible recognition of success.

**Enter your students' project into The Big Bang Competition.**

The Big Bang Competition provides opportunities for young people to showcase their STEM projects and be recognised and rewarded for their achievements. CREST and The Big Bang Competition provide an excellent forum for students to discuss, challenge and share ideas.

Finalists in The Competition will be invited to The Big Bang Fair where they will compete for a range of prizes, including cash prizes, business & industry sponsored awards, international opportunities, top and runner-up prizes in the Junior, Intermediate & Senior categories for science and engineering, and the coveted title of GSK UK Young Scientist & UK Young Engineer of the Year.

Check out The Big Bang Competition website for more details:

<https://competition.thebigbangfair.co.uk/>



# OTHER GUIDES AVAILABLE

Run a CREST project in a day with your students!



Find out about the range of activities and challenges available at Primary level.

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