



DISCOVERY

Getting started guide

Engage your primary or secondary students with STEM through an exciting, one-day project!

Typical age: 10-14



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

It 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

It 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 IS CREST DISCOVERY?

CREST Discovery offers a great first introduction to STEM project work. Perfect for STEM enrichment days, or transition projects, students complete either a single activity or a series of linked challenges with clear real-world contexts.

Equivalent to:

- England and Wales: Upper KS2 towards KS3
- Scotland: P5, P6 & P7
- Northern Ireland: Upper KS2 towards KS3
- International: IB Middle Years Programme

Cost	£3 per student
Student time required	5 hours
Resources	Teaching guides, printable student resources, presentations and suggested timetables available for download on website
Assessment	You or another facilitator should assess the students as they work and enter them for their award online
Upon completion	Get certificates for your students



CREST DISCOVERY OBJECTIVES

CREST projects contain the following elements:

Real-world context

Students take part in a project with links to real life problems and investigations

Problem solving

Students apply creative approaches when developing solutions

Independent working

Students gain independent working skills, completing their challenges independently of adults

Decision making

Students discuss and decide how they will carry out their investigation, with prompts and support from their facilitator

Practical science

Students complete either a single project or a series of linked challenges

Reflective practice

Students explore scientific problems and how to record results

Reporting and communicating

Students think about and share how to test their ideas, and practice telling people what they did

Research

Students acquire new knowledge relevant to the task and learn how to apply it appropriately

Creativity

Students show creative thinking in carrying out the project

TYPICAL TIMETABLE FOR A DISCOVERY DAY

Introduction

15min

Set the challenge and assign roles

15min

Student research

1 hour

Feedback and designing/making/testing solutions

1.5 hours

Finalising ideas and preparing to present

1 hour

Group presentations

30min

Reflection

30min

HOW IT WORKS

1

Sign up for a free CREST account

You can use this account to enter students, create projects, submit and assess students' work, pay CREST entry fees and request certificates. www.crestawards.org/sign-in

2

Choose your Discovery Day

Pick a Discovery Day pack from the CREST library: <http://library.crestawards.org/>

Alternatively, you could arrange for an external education provider to run a project with your students. This could be at your school, or as part of an out-of-school visit. You can find more information about local providers on our website: <https://crestawards.org/crest-accredited-resources-and-activities>

3

Run the day

This is the fun part!

You could run the activities as a full day event or spread them over several shorter sessions. Use the outline of the day on the previous page as a guide.

4

Reflection

Students fill out a CREST Discovery passport and reflect on the work they have done. Download the passport here: <https://my.crestawards.org/>

Get your students to reflect on their work by filling out the Discovery passport!

5

Assess your project(s)

CREST Awards are non-competitive and CREST Discovery is about participating in a one-day supported project. If the students have taken part and fully engaged with the activities, then they will have met the Discovery criteria.

6

Certify your project(s)

Log in to your CREST account, pay the entry fee and request certificates. These will be posted to your delivery address.



CREST RESOURCE LIBRARY

The CREST resource library hosts a wide range of Discovery Day packs. Each pack includes guidance for your students, a suggested timetable and materials for you to use, and some optional activities to kick off the day.

You can browse the Discovery Day packs we have available online at: <http://library.crestawards.org>



STOP THE SPREAD

The 'Drop by Drop' Student Pack will help you in your Stop the Spread Challenge. It contains the information and worksheets you will need to get organised and plan your project.

This pack has been ordered by Youth Grand Challenges, a charity that supports the CREST Awards scheme. CREST is a UK-wide scheme for 11-18 year olds recognising success, building skills and encouraging personal achievement in science, technology, engineering and maths project work.

To enter the Youth Grand Challenges competition, supported by the Wellcome Trust, visit www.youthgrandchallenges.org

DROP BY DROP STUDENT PACK

2 INFO SHEET: MATERIAL COSTS

You will need to buy materials to make your hand washing model. Each building material represents a different material you need to use. You must use the materials in the right way to make the model.

- Locally sourced materials - these are available close to the school and in the village or town. They are the best choice for the school.
- Imported materials - these will need to be transported from a town or city further away. Generally, they cost more to produce and you have to use for the school.

As an important part of your design you will need to balance the cost of materials with their quality and their impact on the environment.

Budget
Your budget is 25 credits. Keep track of how much you are spending on your own model. Anything you can't spend on the model is lost.

Trading
Once you have bought materials you can't give them back if you don't use them. So think carefully before you buy! If you do have materials that you don't need you can trade with other groups.

Locally sourced materials	Imported materials	Cost per unit
Cardboard box	Plasticine (white, grey, black)	1" each
String	String	1" per 10cm length
Plastic/rubber bottles	Plastic drink bottles/rubbers	1 each
Tape	Sticky tape/masking tape	2" per 10cm length
Binding material	Sticky tape	2" per 10cm length
Glue	Glue	2" per 10cm length
Imported materials	Imported materials	Cost per unit
Sheet paper - long	KTNC - long piece (10cm x 10cm)	1" each
Sheet paper - short	KTNC - short piece (5cm x 10cm)	1" each
Connector	KTNC - connecting piece (paper clip)	1" each
Pushy	Pushy	1" each
Sheet of wood	Card	1" per 10cm piece

7 INFO SHEET: WHY SANITATION MATTERS



CLEAN WATER AND SANITATION: WHY IT MATTERS

Water scarcity affects more than 40 percent of the global population and is projected to rise.

What's the goal here?

To ensure access to safe water sources and sanitation for all.

Why?

Access to water, sanitation and hygiene is a human right, yet billions are still faced with daily challenges accessing even the most basic of services.

Around 1.8 billion people globally use a source

of drinking water that is fecally contaminated. Some 2.4 billion people lack access to basic sanitation services, such as toilets or latrines. Water scarcity affects more than 40 per cent of the global population and is projected to rise. More than 80 per cent of wastewater resulting from human activities is discharged into rivers or sea without any treatment, leading to pollution.



Coding Task sheet

The use of computer programs has changed the way we live our lives. One of the greatest impacts has been through the development of the World Wide Web. It was designed by British Physicist Sir Tim Berners-Lee to allow researchers to share data easily. The result was a set of protocols that have been adopted more widely and have transformed the way we access and share information.

Aim

Working in pairs, the aim of the workshop is to investigate what we use computer programs for and how they are designed. By the end you will have investigated apps and why we use them. You should make notes as you go through this workshop as you will need to share your findings with your teammates.

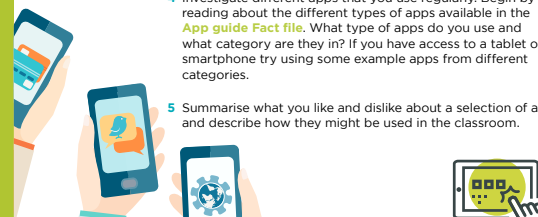
Part 1: Writing a program

- Working in pairs write down the steps for how to make a jam sandwich.
- Swap the instructions with another pair and use them to make a jam sandwich. Are the instructions accurate? Are any changes needed?

- When writing a program for a computer or app, logic statements or flow charts can be used to replace the sentences used to describe a task. Review your steps and try to replace the sentences used with logic statements or flow charts. Look at the examples in the **Logic statements Fact file**, but you should customise them for your task.

Part 2: How do programs and apps enrich our lives?

- Investigate different apps that you use regularly. Begin by reading about the different types of apps available in the **App guide Fact file**. What type of apps do you use and what category are they in? If you have access to a tablet or smartphone try using some example apps from different categories.
- Summarise what you like and dislike about a selection of apps, and describe how they might be used in the classroom.



Ergonomics Task sheet

Ergonomics is an area of science that designs products and systems with the needs of the user in mind. By considering factors such as human biology and engineering.

Aim

People who work in ergonomics study a chair, such as a school or classroom, and make it better by designing new products or ways of doing things. For example, to school you spend a lot of time sitting and writing, so we can use ergonomics to design things like the chairs that you sit on and the things you write with.

In this workshop you will work in pairs to investigate how ergonomics works in the classroom through the design of different products, specifically looking at solutions for seating and writing.

One half of the pairs in the workshop will complete Part 1 to and the other Part 2. If there is time, you can swap over. If there isn't enough time to complete both, your session leader will put you into a group with someone from the other half of the workshop so you can share what you have investigated.

You should make notes as you go through this workshop as you will need to share your findings with your teammates.

Part 1: Seating observations

1 Perform a desk check with a partner using the **Seating risk assessment Fact file**. These assessments are carried out in workplaces on a regular basis to ensure that the equipment and furniture provided is suitable for each member of staff.

2 There are many types of seating now available, including yoga balls and chairs with different arms or back rests. In some cases seating has been replaced by standing desks. Using internet research, make a list of the types of seating available and why they may be used.

3 Is there a type of seating that you would recommend for your partner?



Nanotechnology Task sheet

Nanotechnology has allowed the creation of a large range of different products with applications in healthcare, technology, communication and many other areas. Nanotechnology refers to items which are very small in size and will often require the manipulation of atoms and molecules.

Aim

Working in pairs, the aim is to investigate what nanotechnology is and to find some specific examples. Can nanotechnology be used to enrich your school? You should make notes as you go through this workshop as you will need to share your findings with your teammates.

Part 1: What is nanotechnology?

1 Your session leader will either give you a sample to investigate or show you a clip of a type of nanotechnology. You should also refer to the **Magic Sand and Penicillin Fact file**.

2 To get an idea of the difficulties of controlling atoms on a small scale, each team member should work with their partner to lay out the letters of a word (eg. NANOTECH) using sweets, counters or beads whilst wearing large gloves. You are competing against your fellow students to see who can complete the word first.

3 Research some more examples and applications using the **Nanotechnology Fact file** provided and your own internet research.

4 A time will be set by your session leader for you to gather together with the other students who are completing the nanotechnology workshop. Each pair should choose an example of nanotechnology to share with the rest of the group.

Part 2: Nanotechnology in school

5 Using the knowledge you have gained about nanotechnology, what products are available that help with the following challenges at school? Pick at least two to research.

- Grafts
- Stems in clothes
- Waterproofing of technology, e.g. phones
- Heat loss
- Electricity generation

6 How would using these impact on your school environment?



EXAMPLES OF A DISCOVERY DAY

Stop the spread

Challenge your students to think about hygiene and infectious diseases in a global context with this fun, hands-on activity.

Students design a water collection and hand washing device and create education materials to communicate the importance of handwashing to young children. Your students will need to think carefully about their mechanism of collecting and distributing the water as well as the needs of their target audience.

In this project your students will:

- Participate in a workshop about global health challenges
- Generate ideas for a water collector
- Build and test water collector prototype
- Produce a guide to communicate importance of hand washing to young children.

Outcomes

- Work with other students in a team
- Develop their presentation skills
- Reflect on their own learning and project management skills.

Enrich my classroom

Challenge your students to consider how science and technology can improve their personal experience of learning.

Students participate in workshops on various science and technology topics to help them generate ideas to enrich their classroom and working environment. They need to think carefully about the best technology to improve every day experiences. You could run this activity with a class, a club or with a whole year group. If you are in an out of school group, you could adapt the challenge to enriching your setting or learning environment.

In this project your students will:

- Participate in workshops on Coding, Nanotechnology, Ergonomics, Magnetism and Electricity
- Generate ideas for enriching the classroom
- Develop chosen idea and prepare presentation to communicate it.

Outcomes

- Work with other students in a team
- Present their findings
- Think critically about a problem and use practical investigation to solve it.



Wild creations

Challenge students to celebrate their culture and heritage through the design and creation of a model, sculpture or interactive installation. They could build a Wild Creation for their school, local area, a target audience or to promote a local or national event. They need to think carefully about the materials as well as the size and cost of building their creation.

In this project your students will:

- Investigate examples of existing Wild Creations made from different materials and in various contexts
- Develop a concept for their own Wild Creation
- Decide on a location and draw scale plans to show the position
- Build a scale model of their Wild Creation
- Create a budget for the cost of building the structure.

Outcomes

- Celebrate their culture and use science in a real-world context with their own Wild Creation
- Work with other students in a team
- Develop their communication skills
- Reflect on their own learning.



IMPACT OF CREST

Jack, a teacher from London, has been running CREST in his school for the last 6 years, and started hosted Discovery Days two years ago.

In that time, he has found CREST to be a great way “to offer something extra to students looking for a challenge”, particularly those interested in the real-world application of science.

Jack runs CREST as an extra-curricular club in his school, which he’s called the CREST Society, and it’s a space that allows students to learn new skills such as referencing, research methods and data analysis.

Jack believes that, “giving students the option to explore any topic is equally thrilling for the teachers who have to support the students, as it allows everyone to discover something new”.

If he could offer just one piece of advice to other teachers who are thinking about running CREST, he’d tell them to “talk to other teachers and get them on board”, as he believes that, “a team, however small, will make CREST more manageable and more enjoyable”.



LOOKING FORWARD TO BRONZE

Now that you and your students have finished **Discovery**, why not move onto CREST's secondary stage and complete a **CREST Bronze Award**?

Bronze projects are typically undertaken by 11-to-14-year-olds and take 10 hours to complete. They are ideal for students who want to have a bit more control over their project and start working more independently. Bronze Awards are also well suited to after-school clubs to be completed throughout a school term.

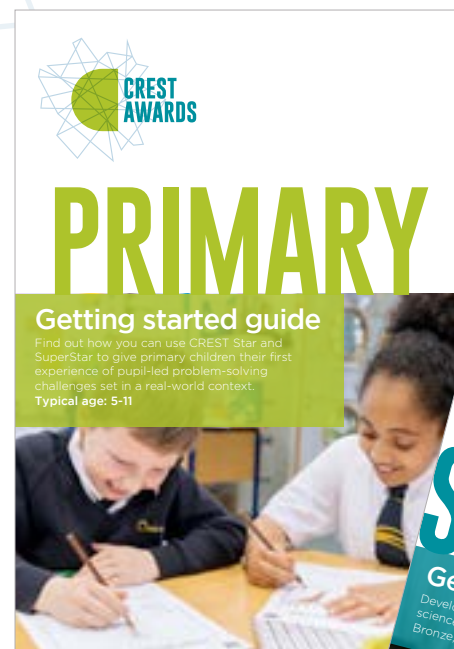
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CREST has the advantage of giving science clubs a focus. It is judged against criteria that are clear, so students know what they need to do. It encourages investigation and allows students to explore topics that are not in the curriculum.

CREST Teacher

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OTHER GUIDES AVAILABLE



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



Find out more about how to run CREST projects with students at Secondary level.

www.crestawards.org

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