CREST AWARDS

SILVER AWARD

MONITORING WATER POLLUTION

30H Typically 30 hours of project work
Recommended for 14-16 year olds

Practical project

Investigate the effect of industry or agriculture on a water course, by comparing levels of pollution.

#chemistry
#environment
#pollution

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**

Looking for some support? Find a mentor by contacting your local STEM Ambassador hub: **https://www.stem.org.uk/stem-ambassadors/local-stem-ambassador-hubs**

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

- **Develop and lead the project**
- **Complete a minimum of 30 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**

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

Run the project

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.

Encourage your students to use the Silver 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.

Make sure you 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 Silver Award. Simply:

Log in to your CREST account at **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 Silver!

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.

The scientific discovery doesn't need to end here. Students can have a go at the next level up – CREST Gold.

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**

STUDENT BRIEF

SILVER AWARD

Monitoring water pollution

Contrary to what water authorities and bottled water manufacturers would have us believe, pure water is extremely rare. Drinking water is a carefully controlled solution. Natural water courses, even in the depths of the countryside are a complex cocktail of different substances. In this project, you will check two different bodies of water for pollutants – i.e. solutes regarded as undesirable.

Getting Started

The objective of this project is to investigate the effect of industry or agriculture on a water course, by comparing levels of pollution with those in an 'unspoilt' body of water. You need to consider what form any pollution is likely to take. If possible, choose sites where you can sample the water upstream and downstream from a likely source of pollution.

Any site that uses water for cooling is thus a potential polluter. Don't forget to identify a body of water unpolluted by effluents, to use as your comparison. You will need to think carefully about this in an urban area.

Testing for pollutants:

- What pollutants are present will depend on the types of activity being carried out alongside the water course, both locally and upstream. Survey your target area to decide what types of waste materials are likely to be discharged into the water. Don't be over-ambitious. Limit your project to testing for three or four pollutants. You can extend the range later, if time allows.
- Oxygen is not a pollutant, but dissolved oxygen levels are a good pollution indicator.
- Decide which pollutants must be tested for 'on-site', and which can be analysed back in the laboratory.
- Depending on what you decide to test for, you might use dedicated water testing kits, or devise your own procedures.
- Perform the same tests on samples from your polluted and 'unspoilt' sources, so that you can make direct comparisons.

Your results:

- Decide on a good way to display your results visually, so that the level of pollution in your two water sources can be easily compared.
- Suggest explanations for your findings, in relation to nearby industrial and/or agricultural activities.

Things to think about

Bear in mind that most land is private.

Useful Resources

Try to arrange a visit to an industrial site to see how pollutants in effluents are minimised, and how their concentrations are monitored.

STUDENT BRIEF

SILVER AWARD

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.

Never go sampling on your own, you must be supervised by an adult. Water may have hazardous contaminants, for example, rat urine which can lead to Weil's disease. Make sure any cuts or open wounds are covered with waterproof plasters and wash hands well after sampling.

Remember some tests may require hazardous chemicals.

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.