CREST AWARDS

SILVER AWARD

How strong are climbing ropes?

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

Practical project

Investigate and test the properties of climbing ropes.

#chemistry
#materials
#sport

HOW TO RUN CREST USING THIS ACTIVITY

Entering your project without a teacher or facilitator? No problem 1 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/stemambassadors/localstem-ambassadorhubs**

To use their project to achieve a Silver CREST 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 Silver CREST Award

Hard work deserves a reward! Celebrate and certify your students' achievements by entering their project for a Silver CREST 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

How strong are climbing ropes?

In this project you will investigate the properties of climbing and industrial safety ropes and find out how they are tested. You will then design your own tests to measure the strength of rope samples.

Getting started

You should start this project with some research. Find out about the properties of modern climbing ropes and ropes used in industrial safety applications.

Devise ways of testing ropes for yourself. You may be able to do some investigation of the properties of real ropes but, more likely, you will need to devise experiments for testing thinner samples (for example, nylon fishing line). You should investigate more than one property and compare your results with what you have found out about real ropes.

You should probably concentrate on measuring the breaking strength of your samples and investigating how they stretch as the load on them is increased. You could devise your own version of the 'drop test' used by manufacturers.

You must consider how you will make your tests as fair as possible so that you can make comparisons between different diameters of different materials.

You will need to present the findings of your research into the properties and uses of ropes.

Decide on a good way of displaying your results. Make sure that you compare your results with what you have found out about real ropes.

Things to think about

Find out about the different types of rope available and how their properties make them suitable for different applications.

Useful resources

You could arrange to see a range of ropes in action - you might even want to sign up for an introductory session to climbing and rope work. Alternatively, you could visit an industrial site where safety ropes are used – perhaps a training centre for tree surgeons.

Find out about ways of investigating the properties of ropes – how are ropes tested by the manufacturers? Find out about the 'drop test' carried out on climbing ropes.

STUDENT BRIEF

SILVER AWARD

Health and safety

A 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.

Wear eye protection when testing the ropes. Some fibres store a lot of energy and then whip dangerously when they break

If your method involved heavy loads beware of damage to your toes and the floor! Put a box of crumpled paper underneath the load to catch them.

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.