



**GOLD AWARD**

# AERODYNAMIC SAILS



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



**Practical  
project**

Learn about aerodynamics by studying sails and their properties.

**#physics**

**#aerodynamics**

**#sailing**



# 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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## Aerodynamic sails

In this project you will build a test rig and use it to compare the aerodynamic properties of a range of different types of sail.

### Getting Started

You should start this project with some research. Find out about how sails 'work' - what are the aerodynamic principles of a sail? Gather information on the main types of sail including the more traditional kinds.

What are the advantages and disadvantages of each type of sail?

Building a test rig: Design and build your own rig for testing different types of sail - use the internet to do some research on how to do this. Carry out your tests and show your results to your industrial contact.

Testing different sails: Now you have built your rig you should use it to test different sails. Your tests could include how fast the test rig sails and how close to the direction of the wind each design can sail. You will need to consider carefully how you will make each of your tests as fair as possible.

The results: Prepare a report presenting the results of your research including your tests of the different sail types. Evaluate your test rig and the results that you obtained - do they agree with what your research told you about the effectiveness of each type of sail?

### Things to think about

Here is a list of some sail types to investigate:  
Bermudan, gaff, lugsail, lateen, square rig.

### Useful Resources

Make contact with a yacht builder, sailmaker or University department with an interest in the aerodynamics of wings or sails. Find out from your contact how sails are tested. Try to arrange to observe a sail being tested for its aerodynamic properties. Ask for help in designing your own rig for comparing the effectiveness of different types of sail.



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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!

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.