CREST AWARDS

SILVER AWARD

BUILD A MODEL PIRATE SHIP RIDE

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

Design & make project

Learn about weights and counterweights by designing your own model pirate ship.

#physics
#engineering
#entertainment

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/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**

Build a model pirate ship ride

Pieces of eight, pieces of eight! Ahoy there, shipmates – the Pirate Ship awaits! No theme park is complete without a pirate ship ride. This classic ride involves a swinging 'gondola' on a rigid support, often balanced by a large counterweight.

Getting started

Imagine you're a manufacturer of theme park rides. A new theme park is opening near you, and the theme park owner has chosen you to design the pirate ship ride. You should build a model to help you work out things like how big it will and how big the counterweight should be. When you've made a working model you can show the theme park owner.

Designing your ride:
Carry out some research into the design of theme park rides. You need to think carefully about your design for the ride. The way you decide to support the swinging parts is vital. If your supports are too flimsy then the whole thing could collapse. This is unsafe and will ruin your investigation.

Another vital component is the support that holds the gondola and the counterweight. This needs to be strong and rigid enough to brace the two weights but, if you are going to investigate your design, you need to be able to change its length. The gondola is the component that 'holds' the people. People can be 'modelled' using metal weights – you need to think how to distribute them evenly along the gondola, yet keep them firmly fixed inside.

Investigating your model:
Once you have built your model you should investigate how the following things affect the swing of your model:

- Length of support
- Mass of 'passengers'
- Mass of the counterweight (if you have one)

Design an electric motor and gearing system to swing your ride. How will you control the motor to supply energy only when you need it?

Design a presentation to give to the theme park owner.

Things to think about

How will you control the amount of swing?

If you are going to investigate how your ride moves, what factors are you going to measure? Swing time and speed of swing seem good factors to measure, but how will you measure them?

As the Pirate Ship swings back and forth it will lose energy, mostly through friction with the bearing and air resistance. How does the amplitude of the swing vary with time?

Why not go to a fair or theme park to get first-hand experience of how a model pirate ship works?

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.

Take care when using tools. Remember, any use of tools needs to be well supervised, possibly in a workshop (depending on the tools used).

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.