CREST AWARDS

GOLD AWARD

BUILD A MODEL WALTZER

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

Design & make project

Build a waltzer and learn about forces.

#physics
#forces
#design

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: **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**

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**

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**

STUDENT BRIEF

Build a model waltzer

GOLD AWARD

As a waltzer moves around, the people in each 'car' experience a force. The bigger the force, the bigger the 'thrill'. Can you build a model waltzer system that measures this force?

Getting started

First, think about the kind of force sensor that could be used, and decide on one.

Making the sensor:

How can you measure force? Usually, a newton meter is used. Newton meters work using a spring-balance system, a weight pulls on the spring and the force is measured by the extension of the spring. If you're going to measure the force as the waltzer moves around, how can you read the scale? Is it possible to design a sensor that works on the same principles, but allows remote measurements? Invariably this will need an electric or electronic system.

Building the waltzer:

The main component of your waltzer needs to be a 'car' that rotates and spins in a controlled manner. Your force sensor needs to be mounted in the car, and the signals from the sensor need to be detected.

- How will you do this without getting a load of wires tangled up?
- How will you get the whole ride to move?
- How can the cars spin? How can the cars move up and down?
- You may need several motors that control a movement each but how will you control the speed of each motor?

Testing your ride:

How does the force vary as you change the ride? What happens if the force gets too big? Is there a limit to the amount of force that a passenger can take?

Things to think about

Once you have a working sensor, how will you mount it onto a model waltzer?

How can you get the waltzer to rotate?

Can you think of how to get the cars to rotate as the whole ride rotates?

Can you get the cars to move up and down as the whole thing moves around?

Useful resources

You could contact a local electronics company to see if they can help you build a sensor.

You could try to contact a company that manufacture theme park rides. You'll need to find out if, for example, there is a maximum amount of G-Force that rides are legally (and safely) allowed to produce. You can also find out how they test their rides.

STUDENT BRIEF

GOLD 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.