CREST AWARDS

GOLD AWARD

INVESTIGATING CRASH DAMAGE

70H

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

Practical project

Use model vehicles to investigate crash damage.

#physics
#forces
#travel

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

GOLD AWARD

Investigating crash damage

Getting Started

A family car travelling at 30mph has about 90 kJ of kinetic energy. In a crash, this reduces to zero almost instantly. Vehicle designers aim to ensure that this energy is transferred and dissipated as safely as possible. 'Crumple zones' are designed to absorb the energy by using it to bend the metal bodywork into a crumpled mass. In a head-on collision between two similar vehicles, travelling at the same speed in opposite directions, double the energy has to be dissipated. Does this result in greater damage? Is the damage evened out between the two vehicles? What if the vehicles are travelling at different speed, but the same combined speed (closing speed) as before?

First, design suitable model vehicles. The 'bodywork' must remain attached to the 'chassis' during collisions, but must be renewable after each collision. Work out a set of criteria for the bodywork design; e.g. it must crumple on collision, not just bend and spring back. You are not trying to compare materials for making actual car bodywork, but you may wish to do some preliminary tests to decide the best material to use in your models.

Taking measurements: Think about how you will measure the velocity of each vehicle just before collision. You also need to devise procedures and criteria for assessing and comparing the amount of damage caused by collisions. Initially, investigate the effects of speed on the damage caused by:

One vehicle colliding with a hard, immovable object (corresponding to a wall) at various velocities;

Two vehicles colliding head-on with various individual speeds, but a constant closing speed. Consider what other factors are likely to influence the amount of damage caused in a collision. Investigate the effects of one of these.

Things to think about

You need to devise a method of getting your vehicles up to the required speed, and of controlling and varying that speed. Controlling direction is also important if your vehicles are to collide head-on.

Useful Resources

You could seek advice and guidance for your project from professionals such as car manufacturers' design and testing departments, vehicle accident research organisations, police traffic section or professional accident investigators.

Your results

Draw conclusions from your results about the quantitative relationship between the extent of damage and the collision speed - or any other factors you investigated. Display your results in a suitable manner to illustrate your conclusions.

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.

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.