CREST AWARDS

YOUTH GRAND CHALLENGES

TEACHER GUIDE

SILVER AWARD

PROJECT IDEAS
INCREDIBLE INOCULATIONS

Inspired by the Global Grand Challenges presented by infectious diseases, three project ideas have been developed:

Research: VIVA LA VACCINE
Practical: ELECTRICITY FREE FRIDGE
Communication: THE POWER OF PERSUASION

YOUTH GRAND CHALLENGES

The Youth Grand Challenges is a new STEM competition that aims to inspire young people, aged 11-to-19, to see how science and technology can be deployed to tackle global health issues. The competition calls on students to come up with innovative solutions that have the potential to change the world, and will reward the best projects from young people created in response. The theme for 2016/17 is infectious diseases.

To participate in the Youth Grand Challenges competition, students must undertake a CREST project on a topic of their choice that relates to the overarching theme of infectious diseases – such as mosquitos, sanitation, or vaccines, and that is in an eligible topic area aligned with a current theme of research supported by the Global Grand Challenges http://gcgh.grandchallenges.org/

To enter your students for the Youth Grand Challenges competition, go to www.youthgrandchallenges.org

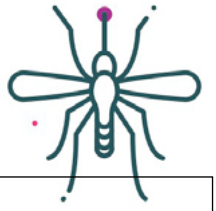
SUPPORTING YOUR STUDENTS

To support educators and young people in the Youth Grand Challenges competition the British Science Association has released a suite of new CREST resources on the theme of infectious diseases. These resources have been produced by Practical Action and 4Science for the Youth Grand Challenges, in partnership with the CREST Awards scheme.

For each project, there is a Student Brief, providing a project idea and questions to get your students started, and a Teacher Guide, with some useful links and tips for prompting your students in their projects.

If you would like your students to achieve a CREST Award for their project, or for more information on how to support your students in their CREST Award project please go to www.crestawards.org.

Alternatively, if you do not wish to register for the full CREST Award, you can still use these resources on their own.



VIVA LA VACCINE!

Research project

Which vaccine will you look into?
- Think about all the vaccines available
- Choose one or two that are particularly significant in the developing world

The company that developed and produced it
- Find out who researched and developed your chosen vaccine

Processes involved in moving from small scale to large scale production
- How do developers work in the early stages of a project?
- How is this expanded to trial the vaccine?
- How does that turn into a full scale production?

Storage and distribution of vaccines
- What conditions do the vaccines need to be stored in?
- How long can they be stored?
- Will one dose be enough?

Who the vaccine will be administered to
- Which groups of people receive the vaccines ?
- Where do they live?
- What challenges does the environment they live in create for them and for the vaccination programme?

Costs of the vaccine
- Use historical data to estimate the cost range for a vaccine's development, testing and production.
- Will a vaccine for a new or emerging disease cost more?

Benefits of a vaccination programmes
- What are the benefits to individuals and whole communities?
- Is there likely to be an impact on productivity, life expectancy?
- Will successful programmes reduce the need for aid or other interventions?

ELECTRICITY FREE FRIDGE

Practical project

Examples that already exist
- Find out what has already been developed and what can we learn from history and other cultures

Any improvements that could be made
- What do you know about factors affecting evaporation?
- Could you use these ideas to improve an existing design or design something new?

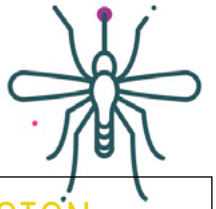
The use of different materials
- Are there advantages to the use of high tech materials?
- Can your ideas be adapted to use cheaper and/or locally sourced materials for use in the developing world?
- Think about making your product more sustainable, could it be made of recycled or reused materials?

Testing your design
- How will you find out if it is working?
- Can you take measurements automatically over time?

What temperature would you need your fridge to be?
- What temperature do vaccines need to be kept below?
- If you are competing with other groups will you need to agree a temperature so the test is fair?

Evaluating your design
- Can early experiments help you identify what is working well
- Can you identify what needs improving?
- What can you learn from other groups?

Comparing your design with others working on the same project
- sharing data helps everyone improve
- peer review is an important scientific process, can you use it?



THE POWER OF PERSUASION

Communication project

What the long term benefits to people might be
- How can you help people understand how it will impact on them personally?
- What will it mean for their long term ability to work and be productive for their families?
- How might it help their children?

How vaccines work and how they will help them
- How do vaccines work?
- How might you explain this in simple terms?

The group effect or 'herd effect' of vaccinations are not the easiest things to explain to people
- What is meant by the 'community immunity' or 'herd effect'?
- Why is it beneficial?

The importance of everyone attending
- What is the short term effect of not vaccinating everyone in a population?
- How might that affect children who are not yet born?

The consequences if they don't
- What is meant by eradication?
- Are there long term effects of the fight to eradicate diseases?
- What diseases have been eradicated?

Low literacy levels might mean you will need to use a variety of approaches
- The variety of literacy levels in a community mean many approaches might be needed?
- What about people of different ages?

Visual images work well
- Can you develop clear, engaging images for people?
- Images are often more memorable, what makes an image memorable and how can you use that?

Useful Links

The following links are recommended in the pupil notes:

www.un.org/sustainabledevelopment/health/
Information on Global Goal 3 'Health and Well-being'

www.nhs.uk/conditions/vaccinations/pages/the-history-of-vaccination.aspx
The history of vaccines

www.immunizebc.ca/facts-on-immunity/how-vaccines-work
Videos and downloads on how vaccines work

www.practicalaction.org/zeer-pot-fridge
An electricity free fridge used in developing countries like Sudan

www.practicalaction.org/technical-briefs-schools-food
Technical briefs on evaporative cooling and the zeer pot

https://en.wikipedia.org/wiki/Herd_immunity
Information on how the herd effect works from Wikipedia

Health and safety

Please do encourage students to take out their own risk assessments if they are carrying out a practical project or a survey, then check them yourself. CLEAPSS will provide any advice should you need it.

www.cleapss.org.uk

GENERAL GUIDANCE

Project health and safety

Students should be encouraged to make their own risk assessment before they carry out any activity, including surveys. In all circumstances this must be checked by a competent person. Students using specialised equipment should be supervised at all times.

Students may want to set up unorthodox experiments and you may need to seek specialist advice.

Organisations such as CLEAPSS and the Royal Society of Chemistry are able to help. The MISAC (Microbiology in Schools Advisory Committee) can provide advice concerning microbiological investigations.

Support and Guidance

CREST gives students the chance to participate in hands-on science through investigations and enquiry-based learning. Students must decide their own focus; however, you may need to give additional support to students.

Your role is to:

- Act as a sounding board for students' ideas and nurture the students' work
- Help students see mistakes and setbacks as an opportunity for positive learning and lateral thinking (leading to creativity)
- Encourage your students in reflecting on their own performance and learning
- Where relevant, support students to find mentors from academia/industry
- Where relevant, ensure technician support is available to students
- Provide access to the Internet, library books and magazines (such as New Scientist)
- Provide direction to identify suitable sources of relevant information at an appropriate level. (NB. Students must research and select information for themselves.)

Prompts

The student briefs give some triggers to start students thinking. They should realise that each trigger implies several items to research and compare. Encourage students to identify these themselves.

If students struggle to identify these the teacher guide provides extra prompts to help you guide them.

CREST AWARDS

Silver

By working towards a CREST Silver Award, students begin to develop their own project idea – they are encouraged to lead it and use their teacher, club leader or supervisor as a sounding board for discussions.

They are also expected to consider the broader impact of their project, demonstrate an innovative approach, and write a project report or portfolio of evidence to present to their CREST assessor.

To use their project to achieve a CREST Silver 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 and using a student profile form

For full details about the CREST Silver Award visit www.crestawards.org/run-crest-awards/crest-silver/