

Engineering

Students engaging with learning
from home





Engineering Challenges

CHALLENGE 1



Identify a mechanism at home or in your garden.

What is the purpose of the mechanism?

Is there another mechanism that could be used in its place?

Present findings through a suitable media.

Links which might help in completing this challenge:

This [6 minute video](#) explains simple machines and mechanisms.

CHALLENGE 2



Identify 5 materials in your home or in your garden that won't corrode.

Have these materials been coated in a protective layer or are they naturally resistant to corrosion?

Present findings through a suitable media.

Links which might help in completing this challenge:

This [3 minute video](#) explains corrosion.

This [5 minute video](#) explains how to prevent corrosion.



Engineering Challenges

CHALLENGE 3



Virtual Field Trip: Ford Motor Company

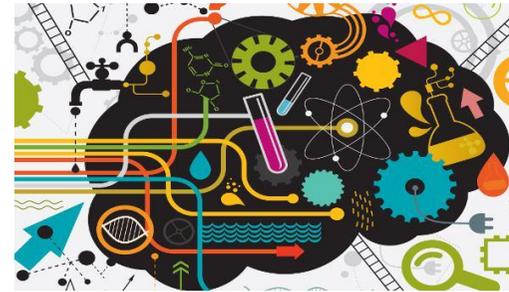
Learn how customers' needs impact the design, engineering and testing of Ford F-Series trucks.

[This video](#) will bring students on a virtual tour of a Ford motor company design studio. The video is broken down into smaller sections so one area can be chosen as a focus.

Links which might help in completing this challenge:

There are two activities from the website that could be shared with students. They can be accessed through [this link](#).

CHALLENGE 4



Inventors/Innovators

Research any Irish Inventor/Innovator.

Create a poster which outlines their contribution to society.

Links which might help in completing this challenge:

This [3 minute video](#) will introduce students to the top 10 inventors of all time.



Engineering Challenges

CHALLENGE 5



Stay Home and watch a movie

Build a projector for your smart phone.

If you don't have a magnifying glass, is there something else that could be used?

Reflect on the process and the completed project.

Links which might help in completing this challenge:

This [4 minute video](#) has all the instructions on how to build a projector from a shoe box.

[Here](#) you will find more examples and materials required to build a projector.

CHALLENGE 6



Electronics

Locate a simple device in your home which works electronically.

Investigate and **research** how this device operates and sketch the electronic circuit labelling all the components correctly using the relevant symbols.

Links which might help in completing this challenge:

This [link](#) will bring you to a PDF of electrical symbols.

[Here](#) you can watch a 10min. video on how electricity works.



Engineering Challenges

CHALLENGE 7



Newspaper Tower

Build the strongest and tallest tower with newspaper which stands firm on a flat surface.

All you need is newspaper, a scissors and Sellotape. You can use a maximum of 8 sheets of newspaper.

If the tower is falling easily, **reflect** on the process and alter some of your design to **create** a better result.

Links which might help in completing this challenge:

This [2-minute video](#) shows examples and ideas of how to construct your own newspaper tower.

[Here](#) you will find more examples and approaches to build numerous different paper towers.

CHALLENGE 8



Product Design

Can you **explore** your home for 10 minutes and with your phone, take 3 pictures of objects in your house where you can see form following function?

For each of your examples, can you **explain** how the form of the object has improved the function of the object.

Links which might help in completing this challenge:

This [6-minute video](#) will give you some examples of Form following Function and will explain the concept in detail.

[Here](#) is a link with some more information on product design outlining some simple key points to design considerations.



Engineering Challenges

CHALLENGE 9



Design and **build** your own rollercoaster to allow a table-tennis ball or marble to free-fall around the track. The ball should take more than 10 seconds and less than 30 seconds to reach its final destination.

Communicate your design with a 2-minute video and a voice-over describing how you made the structure, how you overcame some structural challenges and conclude the video capturing the ball free-falling to its destination.

Links which might help in completing this challenge:

[Here](#) is a short video outlining one approach but any number of approaches with different materials can be used.

Check out this [link](#) which will give you real insight into “A Day in the Life of a Structural Engineer”.

CHALLENGE 10



There is a limited amount of resources in the world that humans can extract from the earth in order to produce houses, cars, computers and much more. Engineers of the future must create smart solutions to manufacture products for an increasing population.

Using the video links to inform you of the process of recycling and living sustainably; **Research** 10 objects in your home that can be recycled and **design** a poster to allow your classmates to easily **identify** what can be recycled and how to do this efficiently.

Links which might help in completing this challenge:

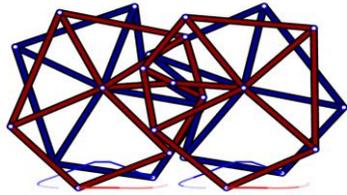
Click [here](#) to take a walk through this virtual tour of a recycling centre.

Visit this [link](#) for some ideas and approaches to becoming more environmentally sustainable at home.



Engineering Challenges

CHALLENGE 11



Mechanical linkages are commonly seen in numerous engineered products. A mechanical linkage allows two parts to move freely in a specific way. The connection between the linkage is known as a mechanical joint.

Create your own extendable scissor grabber which can lift various objects. **Test** the extendable scissor grabber on objects of different shapes, sizes and weights.

Links which might help in completing this challenge:

Follow this [link](#) to see a simple example of an extendable scissor grabber.

Check out this [2-minute video](#) to see linkages being used in an everyday real-life application.

CHALLENGE 12



An Engineer has many responsibilities and being able to solve problems is one essential skill. Problem-solving is the act of identifying a problem, understanding the main issues and finding a simple solution to that problem.

Identify a minor problem in your home or garden and **develop** a simple solution to this problem. You may **communicate** your solution via a sketch, proto-type or a clear explanation.

Links which might help in completing this challenge:

Click this [link](#) to get more information on how to “Think like an Engineer”

[Here](#) a design Engineer discusses the importance of “Defining the Problem”



Engineering Challenges

CHALLENGE 13



Internal combustion engines are the most common form of heat engines as they are used in vehicles, boats, ships, aeroplanes and trains. The fuel is ignited in order to drive these engines and the fuel/air mixture is emitted through the exhaust.

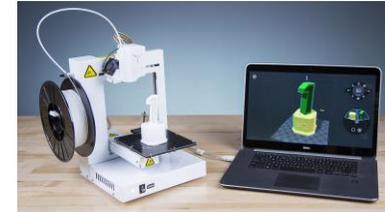
Research how a 4-stroke engine operates with a focus on each individual stroke. **Design** a poster displaying a 2D image of the engine and clearly **explain** the operation of the 4-stroke process.

Links which might help in completing this challenge:

Click on this [link](#) to view a 3-minute video on the operation of a 4-stroke engine.

To further your learning check out this [video](#) to improve your knowledge of 2-stroke engines.

CHALLENGE 14



New technological innovations have enhanced work processes, design, proto-typing, production and testing in the Engineering industry. Examples include the adoption of 3D printing, laser cutting, Computer-Aided Design (CAD), Computer-Aided Manufacturing (CAM), etc.

Explore the revolution of 3D printing in the construction industry and **develop** a 1-minute video which creatively promotes the advances being made by 3D printing over traditional manufacturing processes.

Links which might help in completing this challenge:

Check out this [3-minute video](#) "What is 3D printing and how does it work?"

Follow this [link](#) to see how 3D printing could be used to create houses in the community .

Engineering teachers ...

These activities are designed and collated for teachers whose students may have to engage with learning from home. These activities only offer, as a suggestion, some possible tasks which could be completed by students.

Teachers' knowledge of their own students' context should inform their decision around which activities would best engage their students. If students are engaging with learning from home, assessment and reporting procedures may need to be reconfigured to reflect this circumstance.

