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# INTRODUCING MALIN YOUNG ENGINEERS

OUR TEAM WORK IN A VARIETY OF PROJECTS, ACROSS A RANGE OF SECTORS, ALL OVER THE WORLD

The Malin Group consists of a varied mix of talented individuals, who span a number of specialisms, from naval architects, design draughtsmen, structural engineers and project managers, to lifting engineers, heavy haulage experts, project managers and marine operations personnel. All have a passion for problem solving and are very creative - and all took a real interest in science, technology, engineering and maths (STEM) at school.

Our team work on designing, building, launching and maintaining ships, as well as calculating how best to move materials from A to B - that may be using a trailer, or maybe a crane. They also test the strength of structures and get involved in 3D modelling. They work on projects all over the world, and work for people such as Rolls Royce, FH Bertling, BP, BAE Systems - even the Ministry of Defence.

We are committed to supporting the next generation of engineers, so have come up with a range of challenges for you - a Malin young engineer - to complete. We hope you enjoy them, and who knows, we may be offering you a job in a few years time!



## CHALLENGE ONE: FLOATING

### HOW BEST TO LAUNCH VESSELS

For this challenge you are going to learn about submerging.

Once a vessel is ready to move to the water, there are a number of different methods that can be used:

- Gravitational launching - This may involve an oiled or roller slideway, where the vessel effectively slides down rails to the water. This method means you can use it across different styles and sizes of vessels easily, however if oil is used, it can pollute the water. This method also puts a lot of pressure on the front of the ship when it hits the water - with some even crashing into the other side!
- Floating out launching - This is when a vessel is built in a dry dock and then the dock is filled to enable the vessel to 'float-off.' This is a safe, effective and simple process but is relatively costly.
- Mechanical launching - This involves the use of mechanical aids to lift and then lower the vessel into the water. This is an expensive option and it is not suitable for large vessels owing to the weight involved.
- Barge launching - This is like the 'float-off' method, but rather than using a dry dock which is filled with water, the vessel is rolled onto a barge. The barge is then filled with ballast water so that it 'sinks' down and the vessel then floats off. Once it has done so, you empty the water from the barge. This is a safe, effective and common method for launching vessels

Malin Abram are working with BAE Systems to build Type 26 vessels for the Royal Navy and these will be launched using our Malin Augustea barge, one of the largest in Europe!

### THE CHALLENGE

Design and build a barge that will enable you to launch a vessel. The vessel and barge can be made of any household items. The barge needs to be made of something that can hold the vessel on top of it and then to be filled with water so that you may fill and let your vessel 'float off.'

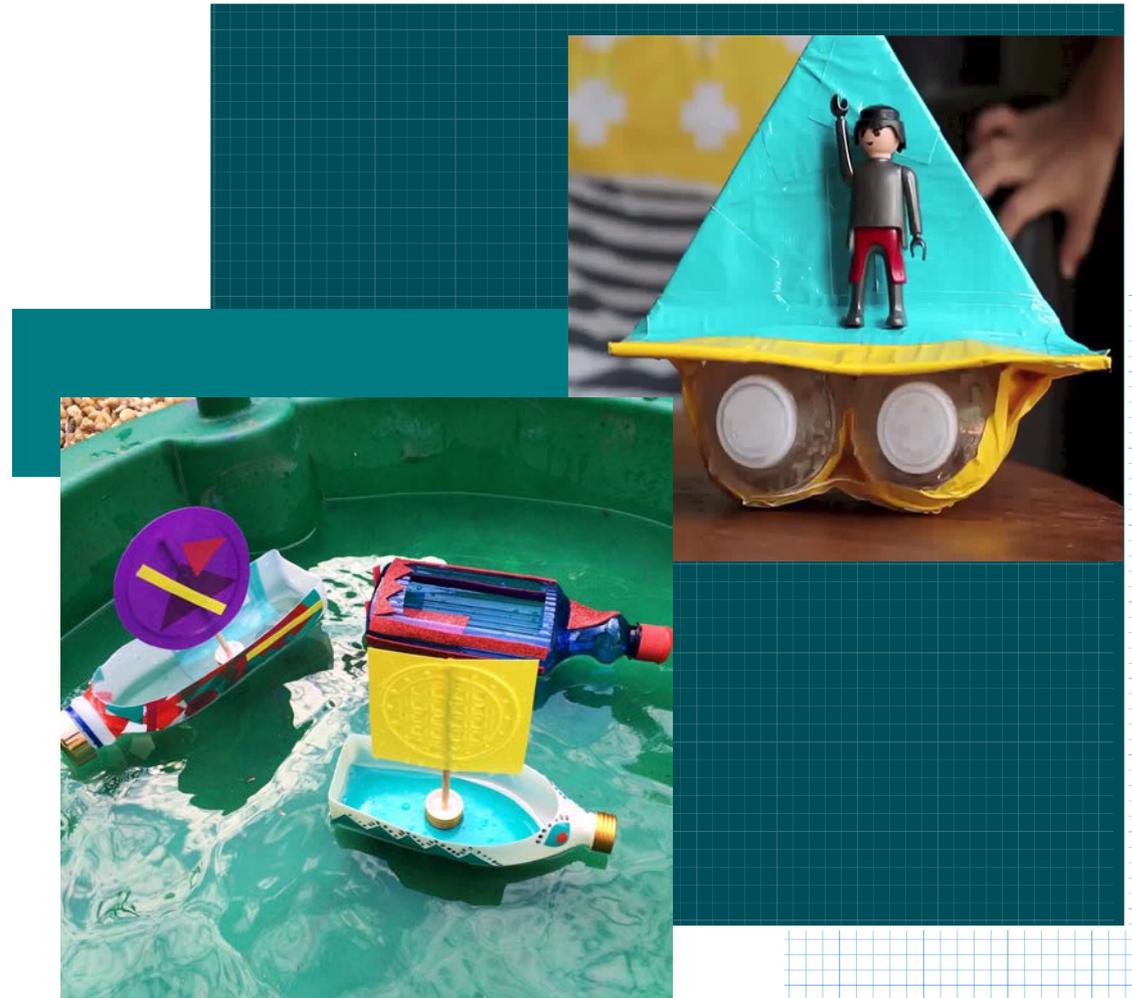
### TOP TIP

Think about the size of the barge compared to the vessel to ensure balance.

### BONUS QUESTION

What are some of the issues that may occur if you launch a vessel using gravitational launching?

### GOOD LUCK AND GET ENGINEERING...



## CHALLENGE TWO: MOTION

### LETS GET THINGS MOVING

For this challenge you are going to learn about the importance of motion and how force is required to act upon a stationary object to make it move.

### THE LAW OF MOTION

All engineers need to understand a number of central laws and principals when undertaking any engineering project. A key law is that of motion, namely that an object at rest, and an object in motion will stay at rest or in motion unless a force acts on it.

### THE CHALLENGE

Design and build a cardboard football table that shows how the moving parts, like the players and the ball, follow the law of motion. You need to think about how you can design something that will place force on the parts that need to move. You could use clothes pegs clipped on to wooden skewers, or maybe straws with cardboard figures. You can also decorate with your favourite football colours for your players and perhaps a marble as a football.

### TOP TIP

Think about how you can make the players swivel and move back and forward on the skewer.

### BONUS QUESTION

Who discovered the law of motion? And how many are there?

### GOOD LUCK AND GET ENGINEERING...



## CHALLENGE THREE: CLEAN MOTION



### THE POWER OF WIND

For this challenge you are going to build on what we learned in the last challenge around motion but also cover how natural resources may be used to act as a force to move stationary objects.

#### WHAT IMPACT MAY WIND HAVE?

We now understand the importance of using cleaner sources of energy: tidal energy, water power - or wind! Wind is one of the most popular sources of energy as it does not produce any emissions or pollutants that may be harmful to the atmosphere; this makes it one of the safest and cleanest ways to generate renewable electricity. By placing lots of wind turbines together, wind energy is trapped and then converted through turbines into electricity.

#### THE CHALLENGE

Design and create your very own wind turbine, which through movement lifts a small load. When the turbine moves with the wind, it will turn, so you will need to attach your load to the turbine to harness this movement. An option is to pop a hole either side of a used can; thread string through each hole and attach one end to your load and the other to the turbine blades. The possibilities however are endless.

#### TOP TIP

Take inspiration for your turbine from pinwheels, thinking about the length and breadth of your blades and material they are made from, as this will impact on the speed of rotation.

#### BONUS QUESTION

The earliest known use of windmills was in 200B.C. but do you know in what country?

## CHALLENGE FOUR: PROTECT THE EGG

### WHAT AN EGCELLENT CHALLENGE

For this challenge you are going to learn about the importance of patience, problem solving and engineering design.

### WHY DOES PATIENCE AND PROBLEM SOLVING MATTER?

As an engineer there are occasions when our designs do not work first time – this does not mean we give up! Instead we keep trying and make improvements to our design. We need to continue to think about what our customer is asking for, and problem solve until the desired engineering design and goal is achieved. This means we often need to try a number of different ideas, think outside the box and innovate.

### THE CHALLENGE

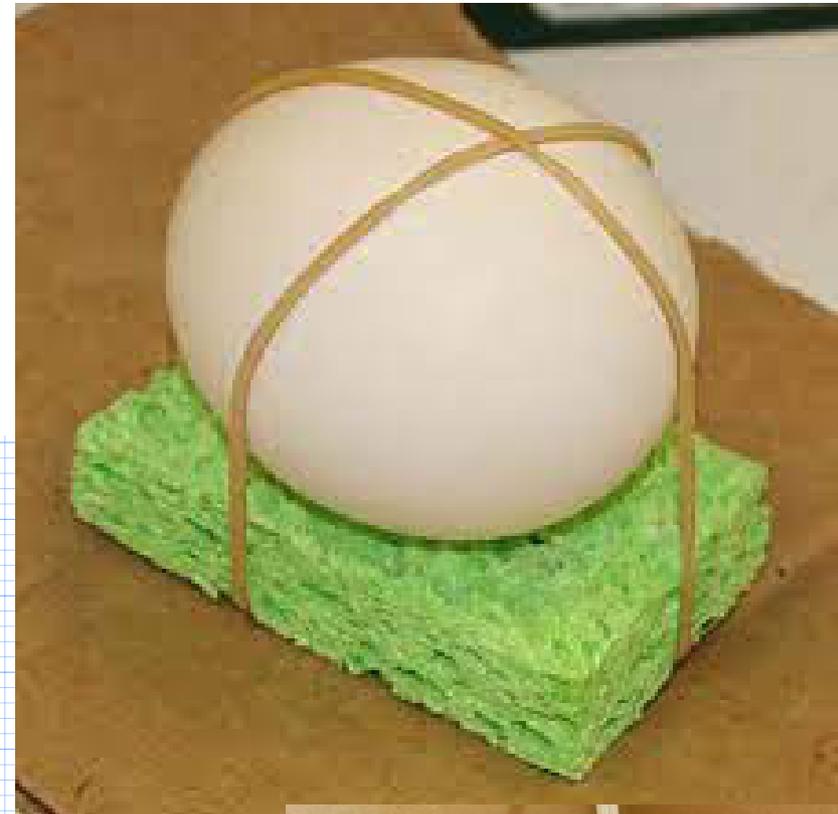
Design a structure that will protect an egg from cracking or breaking when dropped from a height of 2 meters. You can use anything from around your house including cardboard, straws, old plastic containers, cotton wool, balloons, sponges, plastic bags – anything you can find! You may want to think about the direction of your egg and how it will land. The top and bottom of your egg will be stronger than the sides – this is because the arch structure allows force to be distributed equally down the sides of the egg when it meets the ground, meaning there is less pressure on any one point.

### TOP TIP

Make sure there is something to cushion your egg and act as a shock absorber - and maybe use a chocolate for the first few tests!

### BONUS QUESTION

You can test how fresh an egg is by placing it in a glass of water. If the egg is fresh it will sink to the bottom of the glass, if the egg is old it will float to the top..... why?



# WORKING WITH US

THE MALIN GROUP OFFERS YOU AN EXCITING RANGE OF EMPLOYMENT OPPORTUNITIES, FOR THE FUTURE, SPANNING A VARIETY OF SPECIALITIES.

With the Malin Group, you are not just joining a team, you're becoming part of a family. Our headquarters, based in the South Rotunda, Glasgow, reflect our group and culture - heritage teamed with innovation and creativity. Inside this historic building, classic features are teamed with modern facilities for our staff to enjoy - including pool table, ping pong, communal lounge area with fresh fruit and snacks, PS4 and a climbing wall. Our conference room also allows a 360 view of the city centre. We have regular social events, including First Friday Drinks, client football matches, and an Annual Ceilidh - plus we have a few office dogs on occasion, which is always a nice addition!



 Malin Group

# YOUR NOTES



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