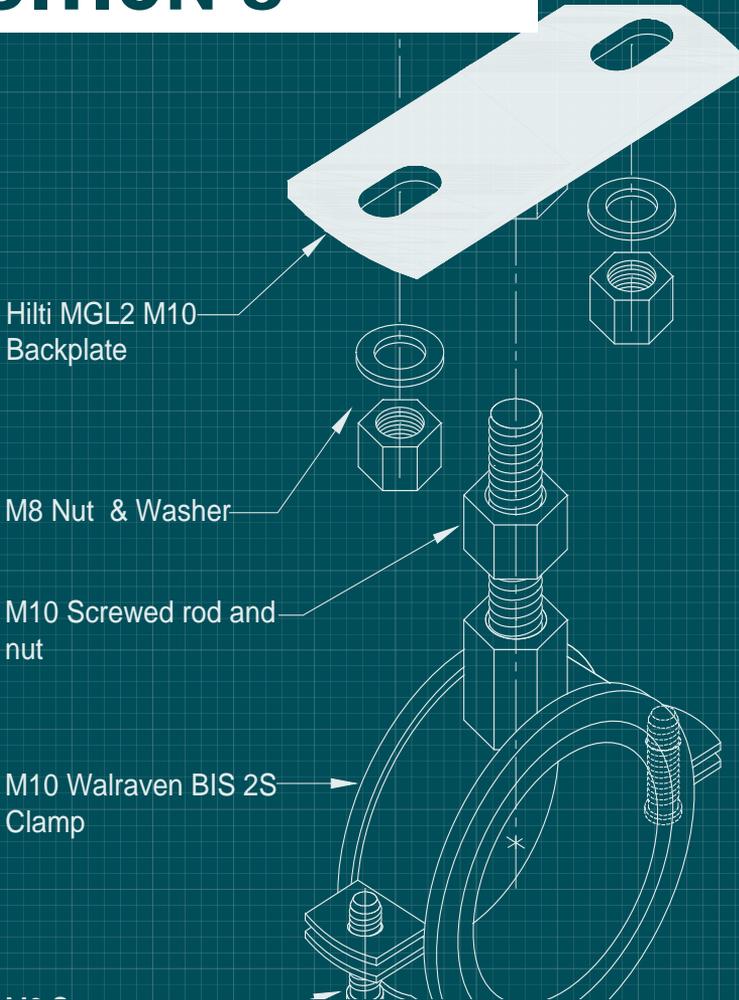


MALIN YOUNG ENGINEERS: EDITION 8





CONTENTS

- 4 Introducing Malin young engineers
- 6 Challenge one
- 8 Challenge two
- 10 Challenge three
- 12 Challenge four
- 15 Your notes

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

INTRODUCING MALIN YOUNG ENGINEERS

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 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!

www.malingroup.com

Malin Group

malingroup.com

CHALLENGE ONE: BUILD YOUR OWN DEN

SHAPES IN STRUCTURES

For this challenge you are going to learn that the shapes used in any design are just as important as the materials used in making strong structures.

Particular shapes tend to be used by engineers in their designs, as they make much stronger structures than other shapes.

STRONG SHAPES

When an engineer is designing a structure - whether a tower block, bridge or vessel, a lot of consideration is given to how to ensure it is strong - and whether it can bear weight. In other words, they do not want the structure to fall down or break when a force is applied to it, whether it is the cargo loaded to a vessel, or traffic going across a bridge.

Triangles are very good at bearing weight. This is because when weight is placed on the top of the triangle, the two sides are squeezed, or compressed and the third is stretched, or put under tension. This means the weight is distributed across the shape so it doesn't bend or break.

THE CHALLENGE

You are going to build your own fort using newspaper, staples and tape - that's it! Take two sheets of newspaper at a time and tightly roll from corner to corner to create a tight tube. You can use three of these to create a triangle shape that is stapled together at each corner. You can then use the triangles to form any shaped den of your choice. Once created, it should be strong enough to be covered by a blanket or more sheets of paper to make it a secret den!

TOP TIP

Make sure you have enough triangles for the roof as these will provide the stability for the den - you may also want to apply extra tape to the joints to make sure your hideaway is sturdy.



CHALLENGE TWO: MAKING MOTIONS

NEWTON'S THIRD LAW

For this challenge you are going to learn about Newton's third law; that for every action, there is an equal and opposite reaction.

WHY DO THINGS MOVE?

Newton had three laws, with each explaining a different aspect of motion. The first law states that an object, if stationary, will not move unless a force acts on it - for example someone pushes it, or the wind blows. The second law lays out how to calculate the force dependant upon mass and acceleration. The third law however shows that if you exert a force on an object, an opposite yet equal reaction will occur - in this case, the force of the air escaping will make the pinwheel rotate.

THE CHALLENGE

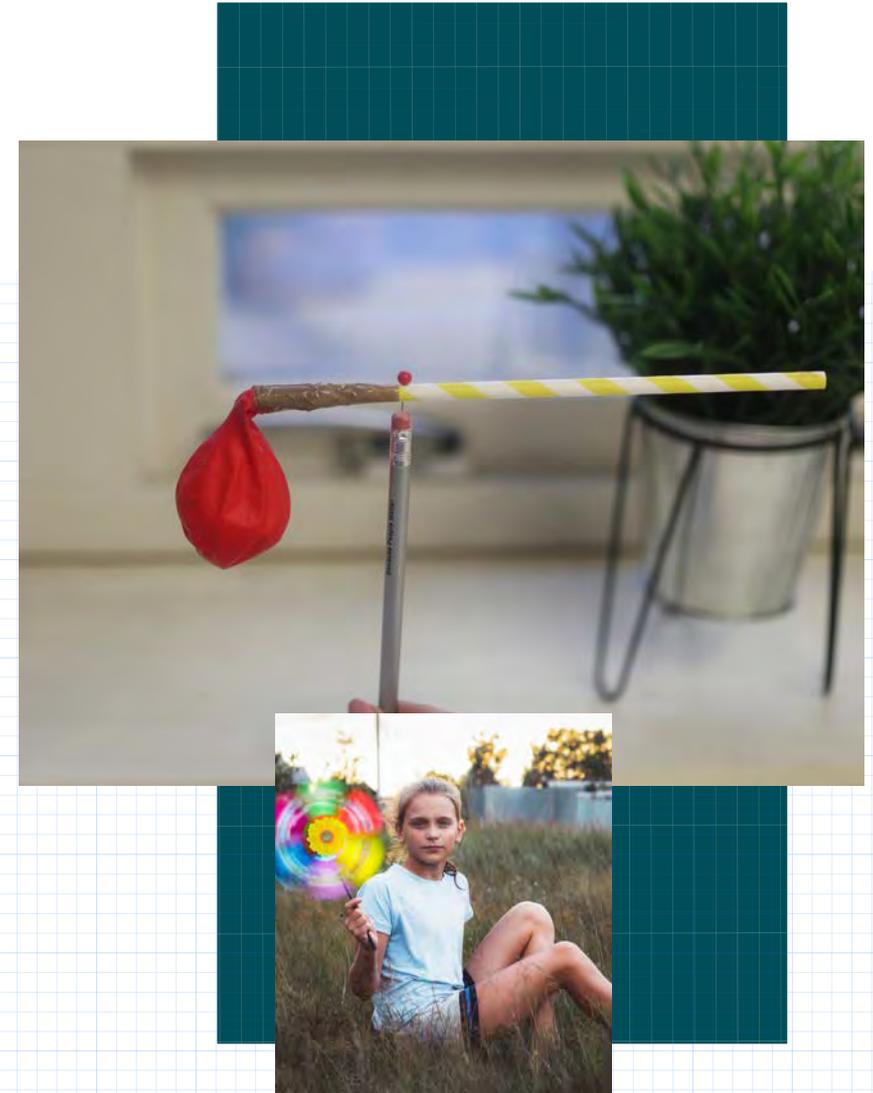
You are going to make a pinwheel using a balloon, duct tape, a pin, pencil and a straw. Firstly, you must secure the balloon to the end of the straw and seal tightly with duct tape. Hold this on your finger to find where the balance point is, and then use the pin to secure the straw balloon to the pencil end with the pin. Holding your new creation by the pencil, you must then blow through the straw to make the balloon inflate then release it. The balloon will start to turn round. As air comes out of the straw, it pushes the straw in the opposite direction!

TOP TIP

Make sure you seal the balloon to the straw completely - maybe get an adult to help, so no air escapes except through the end of the straw until after you have inflated it.

BONUS QUESTION

An example of Newton's third law is a hammer hitting a nail - can you think of another?



CHALLENGE THREE: MAKING ART

MAGNETIC MAGIC

For this challenge you are going to use magnets to show how engineering combines science with art.

A SCIENTIFIC SUBJECT

Most would argue that engineering is a science. It has clear laws and mathematical principles which are carefully applied to create the effect expected from careful planning. Despite this, many things created by engineers are a thing of beauty - large buildings, vessels or even sculptures. By viewing engineering as spanning both subjects, it reminds us of the importance of combining maths with art. Engineers must be measured, but they can also be innovative or inventive in their solutions.

THE CHALLENGE

You are going to make a sculpture using magnets, a metal lid and some nuts and bolts. Place two large ceramic magnets on the underside of a metal lid. You then simply turn the lid over and use the nuts and bolts to create a sculpture. You can test the magnetism by seeing how far you can spread the nuts and bolts - or how high you can go.

TOP TIP

Once you are finished you can paint and keep your sculpture - or change it as many times as you like.

BONUS QUESTION

Did you know your breakfast cereal contains iron? It means sometimes the pieces may be attracted to a magnet! Can you think of other things in your home that contains magnets?

NOTICE

Complete adult supervision is required for this activity to ensure magnets are used safely.



CHALLENGE FOUR: KEEP OUR OCEANS CLEAN

THE OCEANS MATTER

For this challenge you are going to learn about what impact materials may have on our oceans and what efforts are needed to clean them up.

THE DANGER FOR OUR SEAS

Whilst the shipping industry is a necessity for transporting people and other cargo, it can have damaging effects on our oceans. If vessel owners are not careful, they can release polluted water into the ocean or even worse, cause an oil spill. As you can imagine, this causes lots of problems for local wildlife as well as the people living in that area.

THE CHALLENGE

In this challenge you are going to use the materials provided to try and clean the oil up from the pool - as well as the oil on the feathers! You will have a large foil container or basin with water, oil and some feathers on the surface - as this shows how quickly and easily oil sticks; imagine what it is like for birds! Fill your container with water and pop the feathers on the top. Now add a few teaspoons of oil - vegetable oil works fine! You should then use sponges, cotton wool and tissue paper....what do you think will work best to soak up the oil from the water safely? Note each item on a pad and how well it worked, then report back your results.

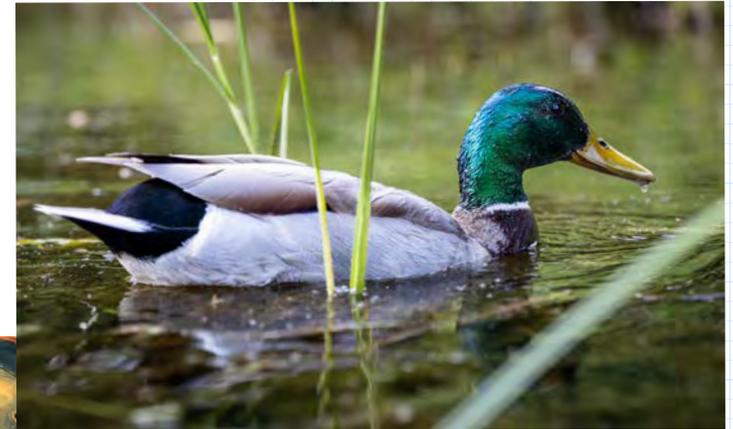
TOP TIP

Remember oil and water don't mix so you are looking to get the oil from the surface of the water.

BONUS QUESTION

Can you research about some of the oil spills in recent times and why it is so damaging for wildlife?

GOOD LUCK AND GET ENGINEERING...



WORKING WITH US

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

With 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 degree 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



MALIN GROUP
SOUTH ROTUNDA
100 GOVAN ROAD
GLASGOW
G51 1AY
T: (+44) 141 221 3075
E: INFO@MALINGROUP.CO.UK
W: MALINGROUP.COM