

# A TO Z OF ENGINEERING

## WORKSHOP 6: Speed

Welcome to Engineer Academy where we're exploring an A to Z of Engineering – everything from acoustics to zoos!

So what does engineering actually mean? Well, anything that is built – whether a bridge, building, washing machine and even your smartphone, must first be engineered.

An engineer is a person who designs and builds complex products, machines, systems or structures. They want to know how and why things work, and have scientific training that they use to make practical things. Engineers often specialise in a specific branch of engineering, such as civil, electrical, mechanical and chemical engineering. You can think of engineers as problem solvers – so if you like solving puzzles you might make a great engineer!

Some of the different types of engineers you will come across are...

**Demolition Engineers** – What goes up must come down! This is the science and engineering in safely and efficiently tearing down of buildings and other artificial structures while carefully preserving valuable elements for reuse purposes.

**Nanotechnology Engineering** – designing, producing, and using structures, devices, and systems by manipulating atoms and molecules at nanoscale – things hundreds if not thousands of times smaller than the width of a human hair.



Royal Academy  
of Engineering

Engineer Academy – Exploring an A to Z of Engineering is created with support from a Royal Academy of Engineering Ingenious Grant.

Find out more at [www.funkidslive.com/engineer](http://www.funkidslive.com/engineer)

# Engineering through the Ages

From paper to artificial limbs to electric cars, engineering has been a big part of human history for thousands of years.

Today's engineers use the most advanced technologies, alongside established scientific principles, to apply cutting edge solutions and innovation to real world challenges.

But engineering isn't just about structures or circuits, it's also behind some of the FASTEST new technology.

We've always had an interest in SPEED! When you think about it, one of the earliest inventions – the wheel – was designed to help us to travel more quickly. Whether a jet engine to get us from one corner of the world to another, or a thrilling Formula 1 race, we're always pushing the limits of how fast we can travel. Let's find out more!

## F is for Formula 1

Formula 1 cars are pretty speedy – whilst not as fast as a jet engine, they can accelerate from 0 to 60mph in under 3 seconds and reach speeds over 220 mph. They can do this because of their carefully engineered aerodynamics as well as powerful engines.

Engineers also have to think carefully about the materials they use – balancing resilience with weight to get the fastest – and safest design.

There's a wide range of engineers who work in motorsport:

- Design Engineers – they analyse previous performance and look at ways to improve individual parts of the car – from changing suspension springs to how a car can improve its cornering.
- Test Engineers – put new designs through computer simulations and real life tests to ensure they perform efficiently and safely.
- Build Engineers – assembling cars by hand or programme assembly robotic machinery.
- Maintenance Engineers – make regular checks on the cars, repairing any defects and damage both between races and during races themselves.
- Pit Crew – fast moving technicians who replace tyres during pit stop – frequently in less than 2 seconds.
- Equipment Engineers – design helmets, gloves, communications equipment and anything and everything else that's needed to pass the chequered flag!



# J is for Jets



Jet engines are behind some of the most awe-inspiring moments in our history – from helping us travel thousands of miles in a matter of hours to taking us into space and even landing on the moon. But it's not just a case of screwing a few parts together. Jet engines need to be very robust to their job efficiently and safely. These are some of the things that jet engineers need to think about:

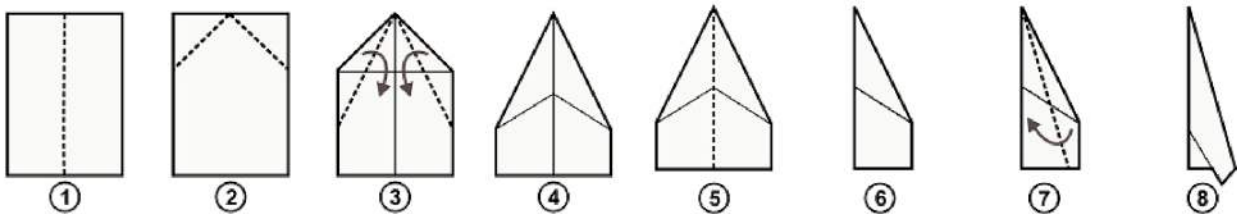
- Drag: Resistance that slows an object down in the air. Items that are streamlined – cars, trains, planes, have less drag.
- Fan: The fan is the first component of the turbofan engine, with its many blades pulling air into the engine.
- Gravity: A force that pulls objects down to earth.
- Lift: A force that pushes objects upwards.
- Propulsion: The thrust that's needed for a plane to take off and fly through the air.
- Thrust: The force of flight that pushes a plane forward. The engine provides the thrust for flight.

## Academy Challenge

Use the guide below to make a paper plane.

How far can you make it go?

Think about what changes you could make to the design to make it go farther. You can challenge your friends or brothers and sisters to a race!



# Wordsearch

D S M R L S R S K A P E Q V M W C U  
E I P A O I N Z T E I C H L O W L V  
S M R Y I Z F B U R T T T L T L H G  
I U O V A N Y T R O C E H A O E O V  
G L P K P C T A B D R S R R R N W J  
N A U S K J G E I Y E T U C S G D I  
H T L R C D N U N N W B S J P I R N  
G I S J P N G E E A U I T T O N A J  
I O I G F R N I N M N H L O R E G E  
I N O M Y A J M Q I P C E B T Q S T  
G N N H G K N X I C M J E O L L D G  
T G R A V I T Y X S R W X B K D J A

Can you find  
these words?

DRAG  
ENGINE  
FAN  
GRAVITY  
LIFT  
PROPULSION  
THRUST  
MAINTENANCE

TURBINE  
JET  
AERODYNAMICS  
MOTORSPORT  
DESIGN  
SIMULATION  
TEST  
PIT CREW

