

AIMING FOR
AWESOME

2018

1918



Radars

Student's Guide



ROYAL
ACADEMY OF
ENGINEERING



The aim of this resource is to give students the opportunity to investigate the impact of science, technology, engineering and mathematics (STEM) on radar technology.



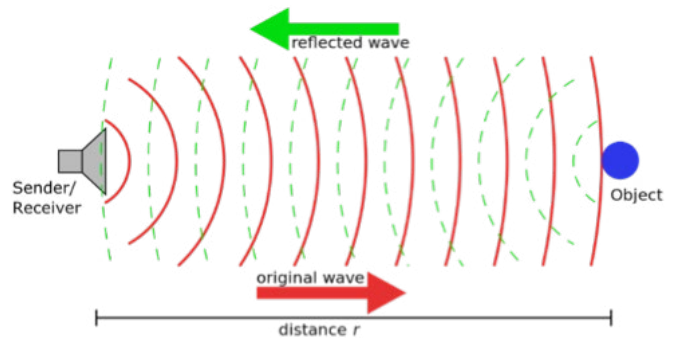
Radar

British physicist Robert Watson-Watt is often referred to as the father of radar.

Initially appointed by the Air Ministry to develop a weapon in response to rumours of a German death ray machine in 1934, Watson-Watt instead began experimenting on the potential use of radar. Building on previous research by German scientists such as Christian Huelsmeyer and Heinrich Hertz, Watson-Watt developed a radar system which played a pivotal role during the Battle of Britain.

Radar is used to detect objects including aircraft, ships and even weather formations and can be used to determine the range, angle, or velocity of objects.

A radar system has a transmitter that emits radio waves. Radio waves from the transmitter reflect off the object and return to the receiver, giving information about the object's location and speed.



TIME TO INVESTIGATE

Radar systems are on top of towers so that the signal can travel longer distances without being stopped by land features such as hills or valleys.

Engineers use different shapes when building towers. Investigate the strongest shapes.

1. Cut the artstraws in half
2. Make a triangle square and pentagon with the artstraws, securing the corners with split pins
3. Push the top of the shapes and record your observations in the table below.

Shape	Observation
Triangle	
Square	
Pentagon	

Which shape is stronger and why?

.....

.....

.....

Radar towers

You are part of the first response team to Typhoon Haiyan and have been deployed to set up communications. The terrain is uneven and the highest hill is one metre above your base camp.

Design Challenge

Use tubes to build a tower to hold a 300g radar facility.

Each member of your project team will be assigned a role but you must work together.

Part one

First create an initial design for your radar tower.

The project team should think about:

- » The cost of the materials required
- » How tall does the radar tower need to be?
- » What shapes are strongest? Think about tall building or pylons.

Your project team has £100 to spend on building materials and all purchases should be recorded on Radar support sheet two.

Part two

Now your project team need to build the radar tower you have designed.

Purchase materials from the shop and record how much you have spent. Make sure you stay in budget.

Part three

Create a poster to explain the changes made to your initial idea. Include the following:

- » A diagram of your initial design and your finished tower.
- » Why was it necessary to make these changes?
- » How has the cost changed and why?

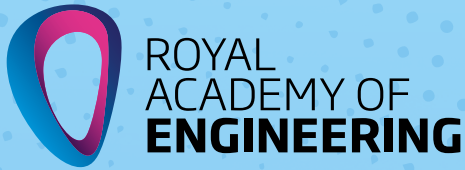
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Radar



Royal Academy of Engineering

As the UK's national academy for engineering, we bring together the most successful and talented engineers for a shared purpose: to advance and promote excellence in engineering.

We have four strategic challenges:

Make the UK the leading nation for engineering innovation

Supporting the development of successful engineering innovation and businesses in the UK in order to create wealth, employment and benefit for the nation.

Address the engineering skills crisis

Meeting the UK's needs by inspiring a generation of young people from all backgrounds and equipping them with the high quality skills they need for a rewarding career in engineering.

Position engineering at the heart of society

Improving public awareness and recognition of the crucial role of engineers everywhere.

Lead the profession

Harnessing the expertise, energy and capacity of the profession to provide strategic direction for engineering and collaborate on solutions to engineering grand challenges.



The RAF 100 Youth & STEM programme has been designed to engage and inspire young people by building their interest in engineering and technical career pathways.

From cyber specialists to aerospace, aviation, electronics and mechanical disciplines, the RAF is committed to using our centenary celebrations to extend opportunity to all and to encourage greater diversity in this critical area of national skills shortages.



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