

LIFELINES Mission Planning: Teacher Notes

Description

This project is designed to replicate the calculations that our pilots carry out on a daily basis to ensure that they fly safely and efficiently to a mission. It can be used to support classroom learning or used in STEM clubs. This is a perfect example of real-life application of **mathematics** and **physics** and allows for discussions around STEM careers.

Curriculum Links: Key Stage 3 Physics and Mathematics

- Motion and Forces
- Describing Motion
- Speed and the Quantitative

Learning Objectives

During this project students will:

- Calculate the centre of gravity of the Air Ambulance Helicopter.
- Create a graph to demonstrate mass and CofG limits for flight.
- Plot a mission using bearings and speed, as well as distance and time equations.
- Be introduced to STEM careers and real- life application of mathematics and physics.

Learning Outcomes

Students will be able to:

- Apply mathematical concepts and calculate results.
- Present observations and data using appropriate methods, including tables and graphs.
- Use and derive simple equations and carry out appropriate calculations.
- Understand simple aviation terminology.

Running The Project: (60 mins Total)

Introduction Activity (15 mins)

Before you start the project, encourage pupils to find out a bit more about Hampshire and Isle of Wight Air Ambulance by using the following websites: www.hiowaa.org and www.hiowaa.org/lifelines. Ask pupils to research the following questions and discuss as a group or class:

1. What are the key benefits of the Air Ambulance?
2. How much does it cost to run per day and how is it funded?
3. Explain the key roles of each Critical Care Team member – The Pilot, The Paramedic, The Doctor and The Engineer.

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Main Project (35 mins)

NOTES

- Pupils can use the downloadable worksheet to work through the project.
- You can download and use the accompanying Power Point presentation to help guide pupils during the project: www.hiowaa.org/lifelines/stemprojects
- Pupils can work individually, in pairs or as a team.
- There are plenty of inspirational short videos of our Critical Care Team on our LifeLines website. These will help to identify the real-life aspect of this project.

Project Equipment

- The Project Pack
- Graph Paper
- Ruler
- Protractor
- Scissors
- Sticky tape, glue or stapler
- Calculator (Optional)
- Pens / Pencils

Pilot Test (10mins)

This project includes terminology that your pupils may not have heard before. Test how much they have learnt by asking them to complete the 'Pilot Test' at the end of the work sheet. This can be completed as a whole class, in teams or individually. Some on-line research may be required for pupils to find some of the answers. (*Answers Below*)

STEM Careers: Useful Links

There are a variety of video clips on our LifeLines website which will help to give pupils more of an insight into the daily lives of our team: www.hiowaa.org/lifelines

Here is a fantastic gallery and interview with Prince William who was a pilot for East Anglian Air Ambulance: <http://www.bbc.com/future/gallery/20160914-inside-the-trauma-team-where-prince-william-is-a-pilot>

Our helicopter and pilots are leased by a company called Babcock. Here is link to help pupils find out more about the different types of service they provide:

<https://www.babcockinternational.com/en/Sectors/Emergency%20Services/Aerial%20Emergencies>

The Royal Academy of Engineering have fantastic educational resources:

<http://www.raeng.org.uk/education>

STEM Now (Winchester Science Centre) delivers educational STEM projects, teacher and STEM professional CPD: http://www.winchestersciencecentre.org/stem-now/overview/#.Wb_RobpFzIU

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Share

We would love to hear from you! Please share your thoughts and photos of your group during the project by emailing : joanna@hiowaa.org

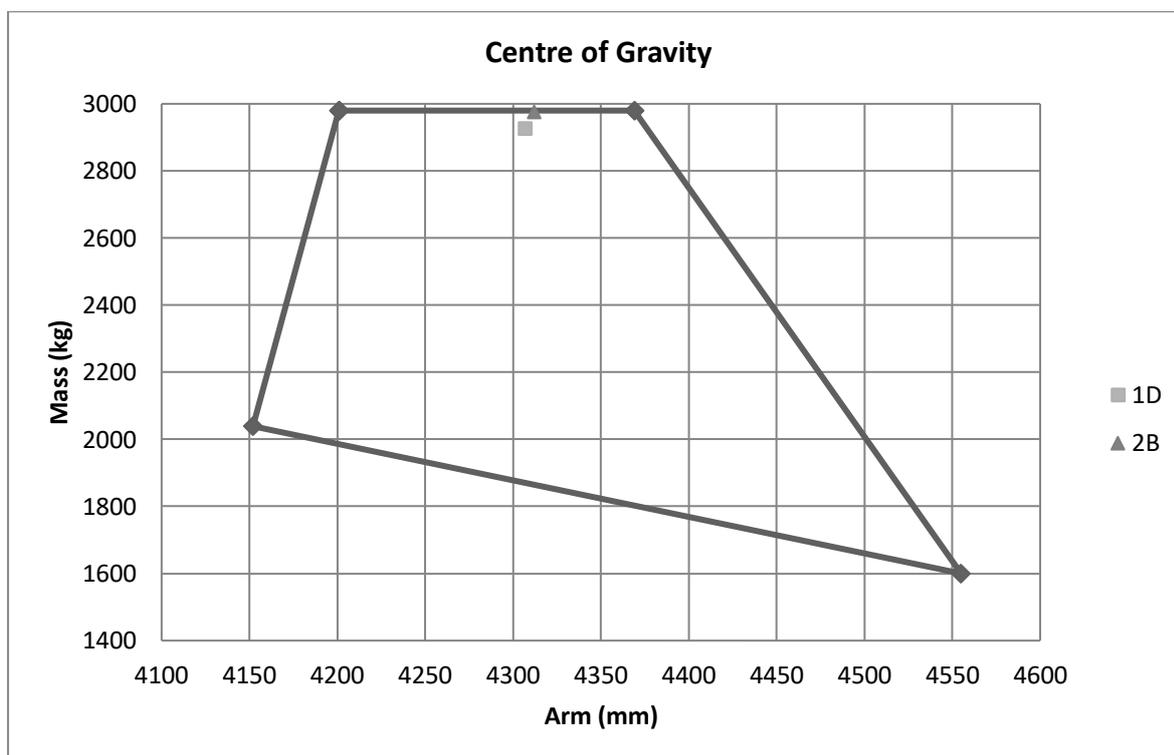
Take the Challenge

Get your pupils involved in The LifeLines Challenge. This is a four step programme which includes a one hour workshop at your school and a visit to our air base at Thruxton. For more information visit: www.hiowaa.org/lifelines/the-challenge

Worksheet Answers

Task 1: A

Here is an example of how the graph should look, however, this may differ slightly depending on the scale pupils have chosen to use.



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Task 1: B

	Mass (kg)	Arm (mm)	Moment
APS (see note)	2143	4502	9647786
Pilot - Dave Nicholls	85	2428	206380
Paramedic – Nicola Hawkes	75	2672	200400
Paramedic – Mike Funge	104	4323	449592
Doctor – David Sutton	99	3465	343035
Zero Fuel Totals (add each column)	2506		10847193
Centre of gravity = $\frac{\text{Total moment}}{\text{Total mass}}$ =			4328

Task 1:C

	Mass (kg)
Maximum Mass	2980
Zero Fuel Mass	2506
Payload	474

Task 1: D

	Mass (kg)	Arm (mm)	Moment
Zero fuel totals	2506	4328	10847193
420 kg of fuel	420	4181	1756020
Totals	2926		12603213
Centre of gravity = $\frac{\text{Total moment}}{\text{Total mass}}$ =			4307

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Task 2: A



NOTE: Line up the protractor with the closest North / South line to Thruxton. N/S lines on an aviation map do not run parallel to the edges of the map.

NOTE: Make sure you use the correct scale (1:250,000) on the aviation ruler.

See above graph to find where CofG (1: D) is plotted.

Thruxton to Bishop's Waltham

Bearing	<i>Between 135° - 138°</i>
Distance	<i>Approx. 20 miles *</i>
Speed	120 mph (2 miles per minute)
Time (How long will it take)	<i>Approx. 10 mins *</i>

**The miles and time may differ slightly.*

Task 2: B

	Mass (kg)	Arm (mm)	Moment
Zero fuel totals	<i>2506</i>	<i>4328</i>	<i>10847193</i>
390kg of fuel	390	4193	<i>1635270</i>
Patient	80	4383	<i>350640</i>
Totals	<i>2976</i>		<i>12833103</i>
Centre of gravity = $\frac{\text{Total moment}}{\text{Total mass}}$ =			<i>4312</i>

See above graph to find where CofG (2: B) is plotted.

Task 2:C

Bearing	<i>Between 253° - 256°</i>
Distance	<i>Approx. 7.5miles *</i>
Speed	<i>Approx. 112.5 mph (1.9 miles per minute)</i>
Time	4 mins

**The miles and time may differ slightly.*

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Pilot Test - Answers

Wording	What does it mean?
Helimed 56	<i>The radio call sign for Hampshire and Isle of Wight Air Ambulance. All Air Ambulances across the UK have their own call sign.</i>
Critical Care Team	<i>The name for our team of pilots, paramedics and doctors.</i>
HLOWAA	<i>An abbreviation of Hampshire and Islle Of Wight Air Ambulance.</i>
HEMS	<i>An abbreviation of Helicopter Emergency Medical Services. This is the term for used for all Air Ambulance services across the UK.</i>
Centre of Gravity	<i>The point at which the entire weight of a body may be considered as concentrated so that if supported at this point, the body would remain balanced in any position.</i>
Datum Point	<i>An imaginary point just in front of the helicopter.</i>
The Arm of the Helicopter	<i>The distance from the datum point (the whole body of the helicopter)</i>
APS	<i>Aircraft Prepared State – The weight and balance of the helicopter without crew or fuel.</i>
Zero Fuel Weight	<i>The total weight of the helicopter, including the crew, minus the fuel weight.</i>
Payload	<i>The spare weight available to carry patients in the aircraft.</i>