

Flight Plan: Plotting a course using compass directions

Materials

- › Pencil and rubber
- › Ruler
- › Printer
- › Scissors
- › A4 Paper



Activity Overview

- › A compass utilizes the Earth's magnetic field to help people navigate, especially our pilots!
- › Using the map provided, draw out the flight plan, following the directions, to help the Air Ambulance get the patients to hospital.

Activity Plan

- › Read the information on magnetic fields, how they work and how it helps us navigate.
- › Print out the compass, helicopter and two maps.
- › Cut out the compass and helicopter.
- › Set the compass on BASE and ensure it is aligned to north from the map.
- › Using the table on the first map, mark the next point on the map. Using your compass and a ruler, work out the direction and distance of travel.
- › Continue this until you have returned to base. Fly your helicopter along the route like a true pilot would after mapping their path.
- › On the second map, you are given the direction and distance of travel, use this to determine the reference and to identify the sites you visit along the way.

Learning Objective

- › Understand what the Earth's magnetic field looks like.
- › Understand what happens to a magnetic object when placed in a magnetic field.
- › Be able to use compass directions to plot a flight path.



Reflection Questions

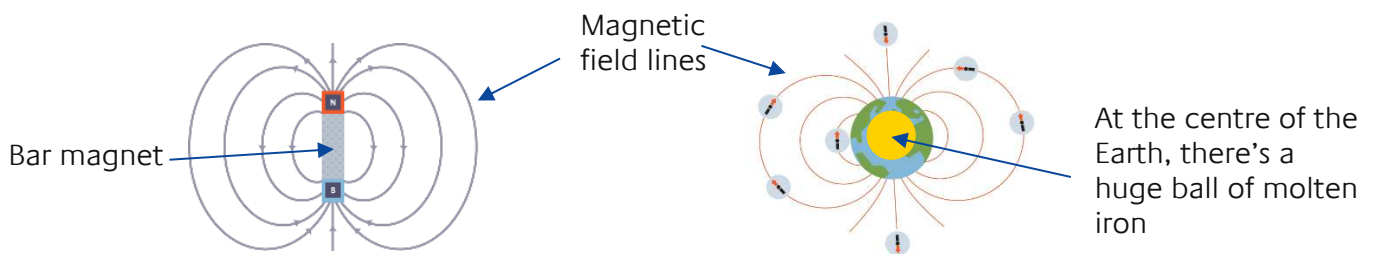
- › What was the total distance traveled on each trip?
- › How does a compass work so that you know which direction to head?
- › Can you use a compass to map a route around your house?



Is it a bird, is it a plane? Navigating via the Earth's magnetic field

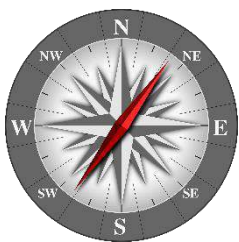
Many animals migrate seasonally to take advantage of more plentiful resources – these being mainly food and better places to lay nests. Different animals have developed clever ways to help them navigate, such as using the stars, memorizing landmarks and even using their sense of smell! However, some birds, particularly the European Robin, are thought to have a very mysterious method, which involves sensing the Earth's magnetic field...but how does it all work?

Just like a magnet, the Earth has its own magnetic field which is generated by its huge molten iron core. A magnetic field is invisible to the human eye, but we can represent them as lines coming out of the North Pole and entering the South Pole as below:



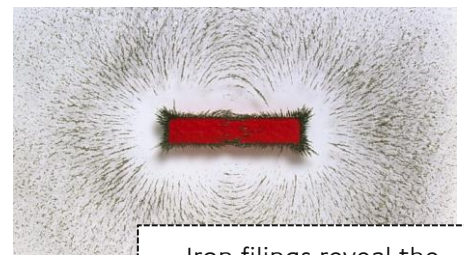
When a magnetic material (such as iron, cobalt or nickel) is placed in a magnetic field, it will feel a force and consequently align with the magnetic field lines.

People have developed a tool called a compass, which takes advantage of the Earth's magnetic field to help us navigate, especially our pilots!



A compass consists of:

- › A tiny magnetic needle, which is free to move in the magnetic field.
- › A dial to show which direction the needle points.



Iron filings reveal the shape of a magnetic field

Just like the iron filings, the needle feels a force and aligns with the field – By watching where the red tip points, we can figure out which direction is north, east, south or west!

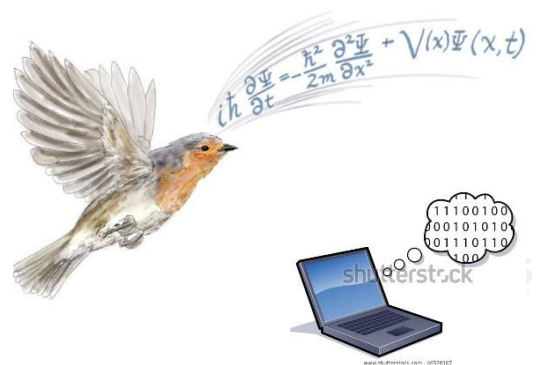
All of our aircraft are fitted with a compass to help our pilots find their way. Whether that's putting out fires over Italy, training fighter pilots in France or saving people with the Air Ambulance in the UK, it all relies on compass navigation!



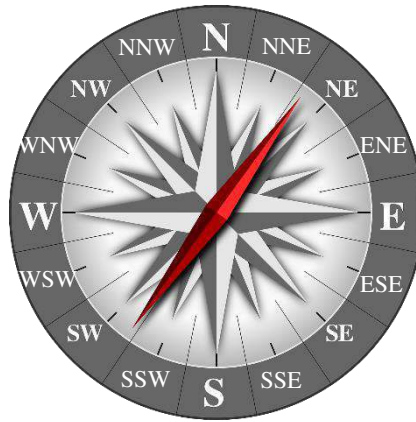
Cockpits in modern aircraft (like the one above) have very sophisticated navigation equipment, which relies not only on the Earth's magnetic field, but also electronic onboard computers that bounce signals off satellites in space! The computers perform calculations very fast, which relay the aircraft's position to the pilots. This is similar to how our mobile phones can track our location.

Just like our aircraft, scientists believe that some birds, such as the European Robin also have a compass of their own. Unlike the compasses that people have built, which are mechanical and made of metal, the Robin's compass is biological and relies on some very spooky science called quantum physics. Similar to onboard computers, extremely fast quantum calculations take place, which allow the Robin to 'sense' the Earth's magnetic field and fly in the right direction during their migratory flights.

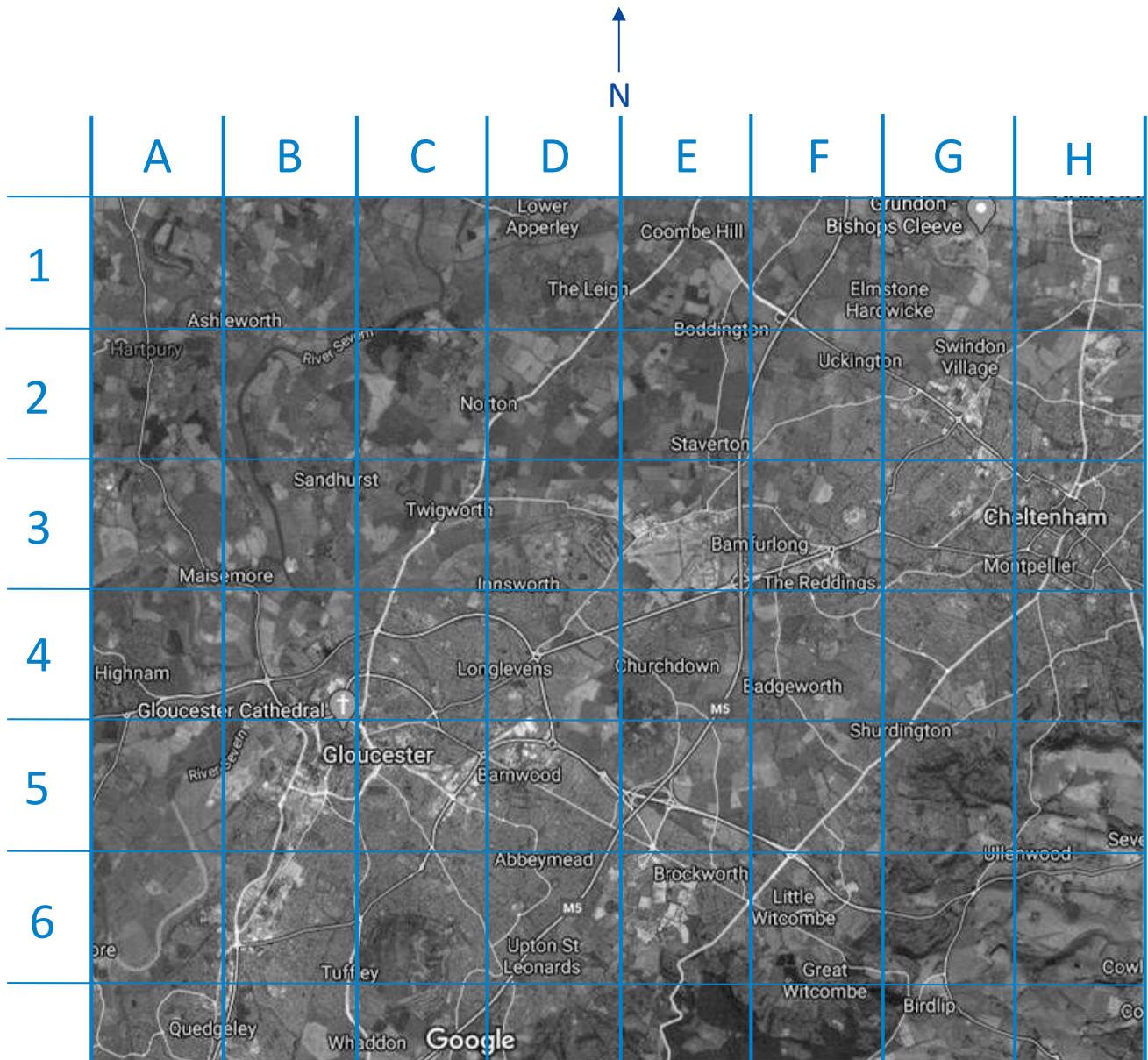
Perhaps one day we will discover the secret behind the Robin's mysterious compass and harness it to help our pilots save lives and protect the communities of the future...



Print the maps and the compass and helicopter.
Cut out the compass and helicopter

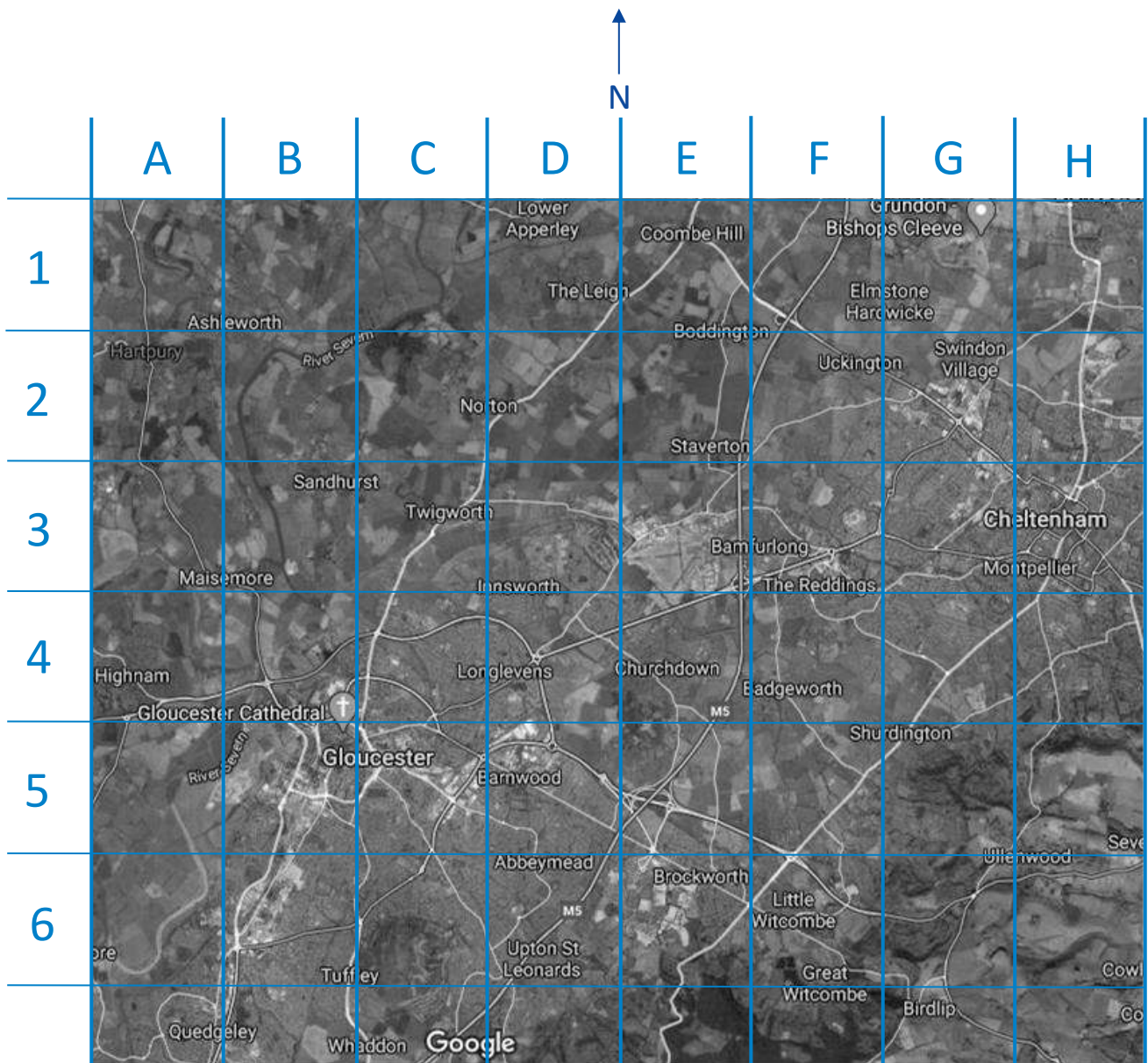


Fill in the missing information in the table



Location	Direction	Distance	Co-ordinate
Base	0	0	E3
Patient 1			B2
Hospital			E5
Patient 2			G6
Hospital			E5
Base			E3

Fill in the missing information in the table



Location	Direction	Distance	Co-ordinate
Base	0	0	E3
Patient 1	SE	5cm	
Hospital	WNW	7cm	
Patient 2	SW	4cm	
	NE	4cm	
	ENE	3cm	
Patient 3	NW	4cm	
	S	4cm	
	ENE	3cm	