

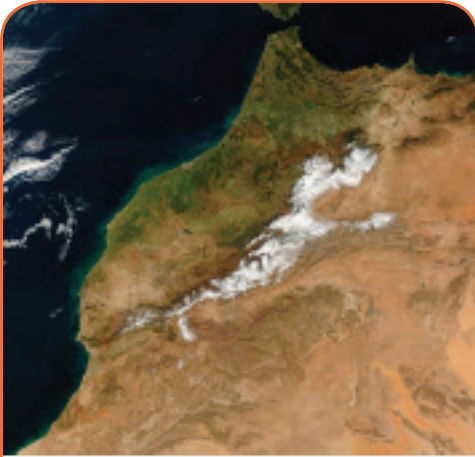


# Mapping Earth

HUMAN GEOGRAPHY • ORIENTATION AND SETTLEMENTS • MAPPING EARTH

## Section 1: Representing the World

### • Why do we divide up the world?



Satellite imagery allows us to see unusual features on Earth

As humans began to explore and populate the world, they split into different groups and claimed territories which they defended. Over time they used maps as a way of claiming these areas, but also for representing information about the known (and unknown) world. Early maps were about power, and were made on behalf of people with influence, such as those who had claimed new lands or wanted to understand more about the territories that remained unclaimed for military reasons. Even the classic Ordnance Survey (OS) maps had their origins in the military. Maps represented a need to know different landscapes in order to gain a tactical advantage and eventual control of an area. We divide the world in a similar way to how we might put up a fence to separate our garden from that of our neighbours; it is to exclude and to feel secure with what we have gained.

### • Suggested Film

- Ways of Looking At the World

### • Suggested Activity

- Ask the students to create their own country by drawing a map, a flag, and thinking about currency, language, economy and other elements.

## Extension Questions

### Q1. What are the world's oldest countries?

This is difficult to judge, because of the slow evolution towards the current world map. The first settled civilisation developed around the Tigris and Euphrates rivers in what is now Iraq around 5000 years BC.

The oldest country that has a continuous history is China, despite its conquest by various other groups, such as the Mongols. The dynasties of China tell the story of its development over thousands of years, right up to its current importance in world geography because of its growing economy.

### Q2. What are the world's newest countries?

In July 2011, South Sudan was added to the list of the world's nations, when it peacefully separated from Sudan after a national referendum (vote) on the issue. There have been over 30 new countries since 1990, mostly due to the break-up of the former USSR and Yugoslavia. Other countries, such as Palau and East Timor, have gained independence during the last few decades.

### Q3. How many countries are there?

There has been some dispute over the total number of countries, therefore different sources may provide different figures. The United Nations currently has 193 member countries, and recognises the existence of 196 official independent countries. Other countries don't have quite the same international recognition and there are many small territories which might appear on some lists, making the total over 200.

## • What is the difference between latitude and longitude?

The shape of the Earth is an oblate spheroid, which means that it is a little flattened at the poles compared to the distance around the equator. The Earth is divided by imaginary lines, which cover the 360° around its circumference. Lines of latitude increase from the equator, which is identified as being at 0°, and is one of five significant lines of latitude. These increase up to the poles, which are at 90°.

Lines of longitude are also known as 'great circles'. They travel from north to south, and all pass through both the North and South Pole. There are 360° of longitude, with lines usually shown on the map at 10° or 15° intervals. These increase to the east and west of the Prime Meridian of longitude, which passes through Greenwich in London.

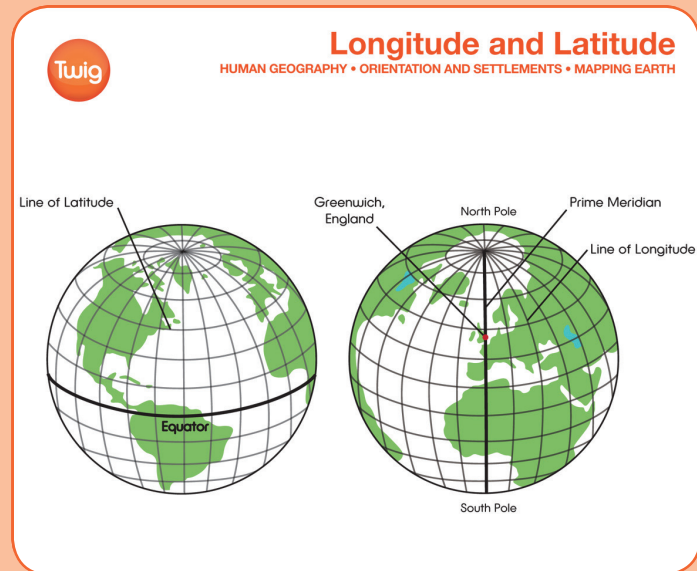
### • Suggested Film

- [The Longitude Problem](#)

### • Suggested Activities

- Ask the students to create a simple animation of the changing seasons and the relevance of the tropics and the polar circles.
- Ask the students to follow a line of latitude or longitude on its journey around the world. Ask them then to identify a line that passes through the most 'interesting' route.

## DIAGRAM 01:



### Extension Questions

#### Q4. What is the significance of the tropics?

The tropics are lines of latitude which lie at the point on the Earth where, in the summer months for either hemisphere, there is one day in the year when the Sun is directly overhead in the sky at noon. Their position is linked to the tilt of the Earth on its axis. The tropic in the northern hemisphere is called the Tropic of Cancer, and in the southern hemisphere the tropic is called the Tropic of Capricorn. The tropics extend out to 23° 26' 16" north and south of the equator.

The tropical zone gives its name to air masses which influence the global climate, and vegetation types such as tropical rainforests. They are also the place where the world's tropical storms originate.

#### Q5. What is the significance of the Arctic and Antarctic circles?

The Arctic and Antarctic Circles form the limits of the polar regions at the extreme north and south of the world. They lie at 66° 33' 44" north and south of the equator, and mark the boundary of the areas that experience at least one day of 'polar day' or 'polar night' (24 hours of daylight or darkness). Within the Arctic region, the ground begins to change to permafrost, and the climate is increasingly cold and dry.

#### Q6. How important are the lines of the tropics?

One important use of the tropics is to determine the boundaries of what might be called tropical or sub-tropical climates or regions. Similarly with the Arctic, there is a cultural significance to locations which are within the area. The steady change in climate is important, as it is thought that climate change will slowly change the relative position of these zones over time. The lines may be invisible, but their significance isn't.

• How does time vary around the world?

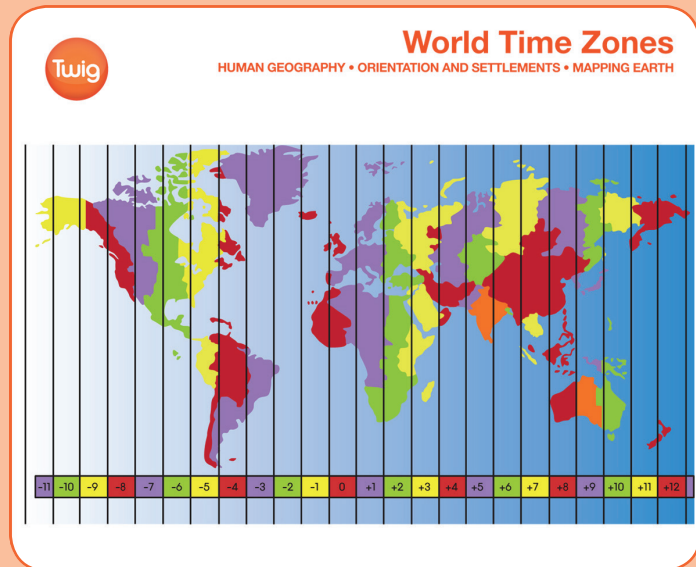
One of the consequences of the tilt of the Earth and its relative position to the Sun, is that different parts of the Earth have periods in the year when they experience more or less daylight in a given 24 hour period. Over time we have developed a clock based on a 24 hour day, with a morning (am) and an afternoon (pm). For every 15° east that is travelled around the world an hour is added.

The time zones are not all the same in terms of area, which leads to an interesting pattern of zones. These differences are brought about by the shapes of national boundaries, as there is a need to keep a standard time within a particular country wherever possible.

• Suggested Film

- Time Zones

DIAGRAM 02:



Extension Questions

Q7. Where do the time zones start?

The time zones are said to 'start' at the 0° line of longitude, which is also known as the Greenwich Meridian. They change to the east and west of this line, around to the 180° line, known as the International Date Line (IDL), which is on the opposite side of the Earth. This means that when people travel across time zones, away from their home country, the body is affected by what is known as 'jet lag'.

Q8. What is the International Date Line?

The IDL is an imaginary line which marks the division between one 'day' and the next. This means that a person travelling west will lose a day, and those travelling to the east will gain a day. The line lies at the opposite side of the world to the Greenwich Meridian, therefore the eastern date zone is one day ahead of the western, which is why Australia and New Zealand see the day arrive before people living in Europe.

Q9. Which country sees the New Year first?

When the New Year arrives, the first places to see this are Samoa, Tokelau and Kiribati, which lie just to the east of the IDL and are closest to the line itself. The first major cities to see the New Year are those in New Zealand.

• Suggested Activities

- Ask the students to identify countries that share the same time zone as their country, but are situated a lot further north or south. Ask them to then identify any countries that are particular anomalies with regards to time zones.
- Ask the students to identify which countries contain the biggest difference in time between their eastern and western extremities.



A time zone is a region on Earth which is bound by longitudinal lines

## Section 2: Maps

### • How did early navigators find their way around the world?

Early navigators used a range of techniques to help them explore the Earth, but with limited accuracy. The magnetised compass needle was used from the 1200s onwards. Thousands of years ago people believed that the world was flat and was surrounded by oceans, so sailing into them was an act of faith. The explorer Sir Francis Drake used a star globe to help him navigate by using the stars, particularly the Pole Star. Instruments to fix a boat's position relative to the Sun and stars were important, and they were even used by the polar explorer Sir Ernest Shackleton on his expedition team's famous escape when their ship was crushed by the ice. For the early explorers, clocks were also important navigation tools as it was difficult to assess how much distance east or west had been travelled.



People create and use maps to explain and navigate their way through the world

### Extension Questions

#### Q10. Who were the most 'significant' explorers?

The answer to this may depend on where you live. It may be that your own country was 'discovered' or perhaps was home to a famous explorer. Some significant explorers include Christopher Columbus, James Cook, Marco Polo, Ferdinand Magellan, Charles Darwin and Fridtjof Nansen.

#### Q11. When was Australia 'discovered'?

The answer given in many encyclopaedias is that James Cook discovered Australia in 1770; he claimed it for England after earlier sightings and landings by Dutch explorers. This would be the 'official' story perhaps, but it ignores the fact that Australia has been settled for over 40,000 years by indigenous peoples.

An interesting event happened on the day of Australia's Bicentenary in 1988, when the activist Burnum Burnum arrived in the UK. He travelled to Dover beach and planted the flag of the Aboriginal people of Australia to 'claim' the UK in the name of the Aborigines.

### • Suggested Activities

- Ask the students to research the significance of Thomas Harrison, who developed the first accurate clocks that could be used on a ship and helped fix the position of a ship with relation to the lines of longitude.
- Ask the students to research the history of exploration and retell the story of one significant explorer of their choice. Aboriginal cultures have often been excluded from history.
- Ask the students, who is the most famous explorer 'you've never heard of'?

### • Suggested Films

- Ways of Looking At the World
- Mapping the Sea

### • How are old maps different to modern maps?



Man has developed ways of representing the world using pictures

Early maps were often incomplete or had blank spaces, as places had not been properly surveyed. The certainty of present day positioning and mapping is such that we are used to knowing all about the world, but a classic label found on early maps was 'Here be Dragons', which marked unexplained territories. Very often, reports from explorers told of strange creatures and these were added to the map. Exaggerations were sometimes made to make certain places seem more important than they actually were. Maps were also drawn on vellum (calf's skin) rather than paper.

The way that places and features were represented on early maps was different to the maps we use today. Over time, the map symbols that we recognise have been developed from earlier, more pictorial symbols. Many old maps were produced by religious men who often placed the Holy Land at the centre. Contemporary maps are still not 'all knowing', as all map making involves a process of simplification and making decisions about what to include and what not.

### • Suggested Films

- [Ways of Looking At the World](#)
- [Ordnance Survey Maps](#)

### Extension Questions

#### Q12. What were the earliest maps?

The earliest maps were probably those sketched on caves to identify the route to good hunting grounds. Maps would also have been scratched into soil, sand or freshly fallen snow, and then been removed by the elements. They would also have needed the person who drew them to explain how they worked. A 'readable' map doesn't need any explanation. Of the early maps that remain, the Egyptians produced some of the earliest. A clay tablet showing a river was found in Iraq and dates back to 3800 BC. The Anglo-Saxon maps of England date back to the 11th century.

#### Q13. How accurate are maps?

All maps are inaccurate to some degree, as the reduction in scale that is needed to create them means that detail is lost, although what is chosen to be 'lost' can often be quite significant. There are also problems keeping accurate distance from one point to another, which relate to the shape of the Earth. There is a distortion whenever you transfer something which is rounded and three-dimensional to a flat piece of paper: the shape, size or proportions of any area cannot all be maintained.

#### Q14. What is the Mappa Mundi?

The Mappa Mundi is one of the earliest maps, and the name means 'Map of the World'. It was created and drawn on a large piece of vellum in or around the year 1290. Features were drawn as pictures, and there were some additional mythical creatures around the edges. The map is owned by Hereford Cathedral, in England, and it is a spiritual, as well as a geographical, representation of the world.

• What is the Ordnance Survey?

The Ordnance Survey (OS) was founded in 1791, and is the national mapping agency for Britain. As the name suggests, its first important role was in mapping territories that might involve some military action by the British army. In 1801, the classic 1 inch to 1 mile map was produced. Many maps were produced during the Second World War to help troops fighting in Europe. The OS has undergone many changes, and the 1:25,000 (1cm = 250m) and 1:50,000 (1cm = 500m) maps that it produces today are familiar to most people.

The OS MasterMap, which is the basis for all OS maps, is a database that is made up of the locations of millions of fixed objects. The location and dimensions of these objects is known, as they have a unique Topographical Identifier (TOID). The database is used to generate maps at a range of scales, which are highly accurate. A change in the database will result in a change to any future maps that are produced using it.

A team of surveyors equipped with accurate Global Positioning System (GPS) equipment is constantly working to update the OS MasterMap, in order to account for the changes in buildings, roads and other landmarks. They add new features, record changes in existing ones, and send these to be added to the database. These changes are made to the database on a daily basis so the OS MasterMap is as up to date as it can be.

• Suggested Activity

- Suggested Activity – Ask the students to examine an Ordnance Survey map, looking closely at the symbols that are used for some of the locations in their hometown. Ask them to try and spot things that are missing from the map and identify what extra information could be added. The students could create their own set of symbols for some of these places.

DIAGRAM 03:

Twig **Ordnance Survey Symbols**  
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Ordnance Survey Symbols			
Walks/trails		Traffic-free cycle route	
Wind pump		Golf courses or links	
Footpath		Bus station	
Public telephone		Car park	
View point		Mud	
Youth hostel		Campsite	
Visitor centre		Station, open to passengers; siding	
Bunkhouse/camping barn/other hostel		Current or former place of worship with tower	
Bridleway		Picnic area	

Extension Question

Q15. How has the Ordnance Survey changed in recent years?

The Ordnance Survey has changed to respond to the availability of new digital mapping. It digitised (transferred to digital form) all its earlier maps during the 1990s to produce more accurate maps that could be easily updated. It has also started to use another company to print the maps rather than using its own printing presses. Despite some companies giving away maps for free, the Ordnance Survey has continued to charge because of the effort that is required to ensure the maps are accurate. The Ordnance Survey has given millions of free maps to students in recent years, and also operates a system that allows schools to 'stream' maps to computers.

• Suggested Film

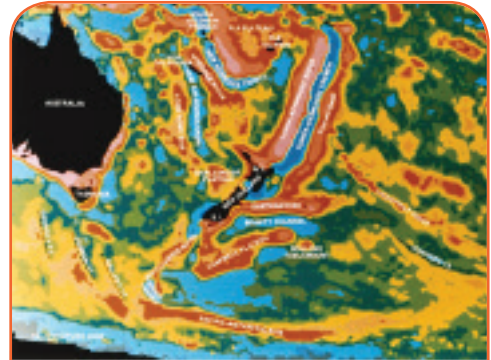
- Butler's Tourism Model

### Section 3: Mapping Techniques

#### • How was the sea mapped and why?

The seabed remains a mystery which ranks with the mysteries of outer space. The oceans are vast, and very little of the ocean floor has ever been properly explored. The deep trenches, such as the Challenger Deep, contain mysterious creatures and are almost 11,000m deep. Unmanned submarines examine these depths, encountering new species of marine creatures. Mapping is done using deep penetrating sonar and similar techniques known as bathymetry.

One major reason for mapping the sea floors, other than for the act of completion and exploration, is to determine the possible location of mineral resources. This is similar to early explorer maps, in which environmental exploitation was a central driving force. The pressures exerted beneath the sea floor on pre-existing forests means that they are most likely to contain oil and gas deposits. As the world runs short of these fossil fuels, the search for new reserves goes on. In the last few years there has also been renewed interest in the sea floor around the North Pole, due to the reduced sea ice that now forms and the opportunities for exploitation of this area.



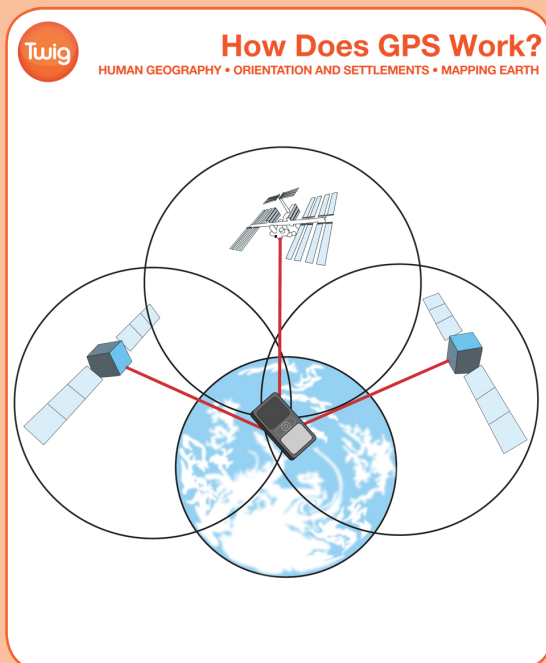
Mapping the sea floor is important in order to highlight any submerged hazards

#### • Suggested Film

- Mapping the Sea

#### • What is GPS technology?

### DIAGRAM 04:



Maps are becoming increasingly common, and they are now often digital in form. A key element of these digital maps is location: it's important to know where you are. A Global Positioning System uses a number of satellites to accurately fix a location. It needs at least three satellites to fix a point using a method called 'triangulation', but more accuracy is gained when a larger number of satellites can be viewed. These satellites were originally put up for military purposes.

A GPS receiver makes use of the signals transmitted from satellites which are orbiting the Earth. These satellites transmit time and location continuously. The receiver works out how far away the satellite is by the time that it takes the signal to reach it; the closer the satellite the less time the signal will take. It then compares its location against those three fixed points using 'triangulation'. Where the three circles overlap is where the GPS receiver should be. Most modern smartphones are equipped with GPS, and this allows them to use a range of new applications that rely on knowing where the user is located.

### Extension Questions

#### Q16. What is augmented reality?

Augmented reality was developed by a number of cartographers. It allows the addition of images, which are connected to particular locations, when used in conjunction with a smartphone that has the appropriate software. Because the phone can identify a location and even the direction that the user is facing, it can identify what the person using the phone is likely to be seeing and 'augment' or add things to their actual view.

#### Q17. Are satellite navigation systems causing us to lose our map skills?

It's certainly true that many people have stopped planning routes when travelling by car, and instead they rely on being told where to go by a sat nav. This has resulted in some lorry drivers attempting to drive down roads which are far too narrow and getting stuck. Mountain rescue teams have also reported more people relying on their mobile phone to help them rather than using a map and compass. One could argue that digital mapping has resulted in more interest in maps themselves.

### • Why are maps still important?

Humans are fascinated by maps. People like to locate their house or plot the places that are familiar to them. Maps are used to visualise data, whether this is to identify a school's catchment area, to mark the location of accidents for insurance companies, to plan a place to meet for lunch, or to plot inequality. Everything happens somewhere, therefore mapping is likely to remain just as important in the future, although the way we use it may change.

There are still many territories today which are disputed. For a publisher wanting to release a new atlas, there are some important decisions to be made about the position of borders. When East and West Germany were separate countries, maps of the city of Berlin sold in East Germany used to have a blank space where West Berlin was located.

Maps are powerful tools that can have significant symbolic meaning. For example, following the formation of the state of Israel, all place names on its maps were changed to Hebrew in order to assert Jewish identity.

### • Suggested Activities

- Ask the students to identify two or three of the territories in the world that are still disputed. Ask them to then explore the historical reasons for this dispute and the attempts that may have been made to resolve it.
- Ask the students to make a note of all the maps that they see in a 24 hour period, and record the reasons why they are being used.
- Ask the students to draw a map of their route to school. Ask them to think about what they missed out and why.



Maps use scale so that features are directly proportionate to the true size of the landscape

### • Suggested Film

- Ways of Looking At the World



### Extension Questions

#### Q18. How have maps been misused?

Maps can sometimes mislead people, and one example of this is the use of particular map projections, such as the old Mercator projection. Many people will be familiar with this in the form of world maps which show Greenland as being larger than Africa, when in fact Africa is 14 times larger than Greenland. On the Mercator map Europe appears far bigger in relation to Africa, which highlights its colonial influence. Changing maps of electoral boundaries can also result in a change to the final result, and favour one party over another.

#### Q19. What is the future for mapping?

There have been a number of changes to maps that have taken place in recent years: in both the way they are made and the way they are accessed. Maps produced by people using the OpenStreetMap project, in which maps are freely editable, are becoming more common. These were particularly useful after the Japanese Tsunami of March 2011 where every bit of the affected area had to be remapped quickly. In the future it is expected that maps will become more personalised and accessible in lots of different media.

• Quizzes

Ways of Looking at the World

Basic

• Traditionally, maps are...

- A – one dimensional drawings
- B – two dimensional drawings
- C – three dimensional drawings
- D – four dimensional drawings

• What term is used to describe map-making?

- A – topography
- B – aerial photography
- C – cartography
- D – pictography

• Why do people create and use maps?

- A – to represent geophysical features
- B – to explain and navigate the world
- C – to represent geographic concepts
- D – all the above

Advanced

• How large is the Earth's surface?

- A – 100 million square kilometres
- B – 150 million square kilometres
- C – 200 million square kilometres
- D – 250 million square kilometres

• Why do maps use scale?

- A – so the size of features is directly proportionate to the true size of the landscape
- B – because it is impossible to survey all of our surroundings from ground level
- C – to produce composite images of an entire hemisphere
- D – to allow us to see unusual features

• What technology is used to discover the topography of the seabed?

- A – aerial photography
- B – satellite imagery
- C – thematic maps
- D – sonar

**Ways of Looking at the World****Basic**

• Which of the following can be represented on a thematic map?

- A – the bottom of the sea
- B – archaeological sites
- C – population size and language distribution
- D – mountains and roads

**Advanced**

• Why are thematic maps used?

- A – to represent geophysical features
- B – to discover the bottom of the sea
- C – to represent the physical boundaries on Earth
- D – to represent geographic concepts

• Answers

Ways of Looking at the World

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## Ways of Looking at the World

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