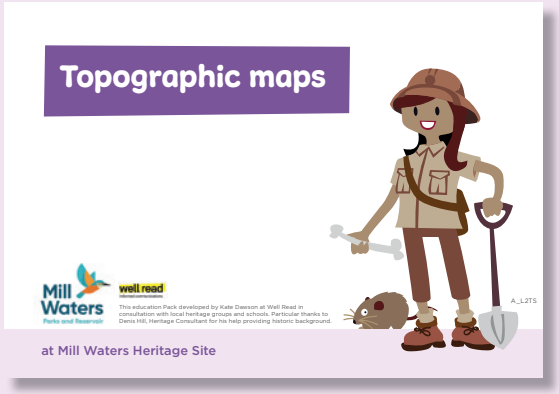
Archaeology

Topographic maps

TN
TEACHER'S NOTES

TITLE SLIDE

In this lesson you will find out what topographic maps can tell us about a landscape or area of land and why they are useful to architects, planners and archaeologists. We'll look at a few different topographic maps including one of the Mill Waters heritage site and we'll also have a go at making our own mountain and creating a topographic map of our landform.



SLIDE 2
ARCHAEOLOGISTS HELP CONSERVE HERITAGE

There is evidence of the past all around us – how people once lived, the everyday objects they used, former industries, modes of transport, religious activities and other rituals. Archaeologists are interested in ancient buildings (or their remains), monuments, and other structures. These important 'heritage assets' might have architectural, archaeological, artistic, historic or traditional value.

Discovered artefacts cannot be buried again. Ideally, they will be cared for in an archive (a special library for old records), or in a museum for the wider public to see; they might also be privately owned.

Heritage assets (buildings and their remains) can also be conserved, or preserved, for future generations to enjoy and learn about. Heritage buildings can be restored – which is slightly different. This means returning a building to its original state. This needs to be done very carefully so the work does not change how the structure looks or its heritage 'significance'.

People can be passionate about conserving heritage assets. The renowned cathedral Notre Dame, in Paris, is important to French... and British history – King Henry VI was crowned King of France in the Cathedral in 1431. When the building, which is over 850 years old, was severely damaged in a fire in 2019, £1 billion was raised to completely restore the building within 20 years.

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SLIDE 3
THE PORTLAND VIADUCT AT MILL WATERS

The Portland Viaduct at the Mill Waters heritage site is an important historic and archaeological structure providing evidence of the Mansfield and Pinxton Railway. The viaduct, named after the Duke of Portland, was built over 200 years ago in 1819.

It was originally sited 150 metres to the east of the post medieval King's Mill site. The first load of coal was carried along the line to Mansfield on 13 April 1819 and the day was declared a public holiday for the local town folk.

The viaduct features on the 1835 map produced by George Sanderson.

The viaduct is identified as a monument in the Nottinghamshire Heritage Environment Record. It is scheduled as an archaeological monument of national importance and is Grade II listed as a structure of historical and architectural importance (by Heritage England).

The viaduct was sold to Mansfield District Council in 1976 and restored around 1990. This important heritage asset became the responsibility of Ashfield District Council's in [year] due to a change in the Council's boundary.

SLIDE 4
SURVEYING HERITAGE ASSETS

Before archaeologists can begin to conserve a heritage asset, they must undertake a thorough assessment of the structure to understand how it is constructed, as well as the setting - other buildings or the landscape around it; and also what the structure is built on.

Archaeologists have lots of ways of surveying heritage assets, including taking photographs, making drawings of the structure (or specific details), conducting digs around the site, and creating topographic drawings or maps of the heritage site, which show the formation of the land around the site.

An archaeological survey must be conducted with great care so that the structure is not damaged or made unsafe.

SLIDE 5
WHAT IS A TOPOGRAPHIC SURVEY?

A topographical survey involves measuring and mapping the surface of the ground, accurately locating archaeological features, structures, finds or excavation areas.

Topographic maps are useful for archaeologists to understand the surroundings of a heritage asset and how best to protect it. They are also useful if you like going walking in the countryside, so you know how big hills are before you climb them! They are also essential for architects and town planners to provide information about things like where trees, power lines and water bodies are located to help them make decisions about where to locate new buildings.

A lot of work was done to map archaeological sites in the early 1900s and many sites or find-spots can be pin-pointed on an Ordnance Survey map.

Archaeologists begin a topographic survey by marking the corners of their site with survey nails. They then take lots of measurements using a tripod mounted 'total station' which uses lasers to measure the distance between one point and another. They may also take measurements using a conventional tape measure. The measurements are then put into a computer programme to produce a digital drawing of the plot.

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SLIDE 6
MACHU PICCHU IN PERU

Machu Picchu is a 15th century citadel in southern Peru, South America. It is located on a 2,430-metre mountain ridge in the Cusco Region, Urubamba Province, Machupicchu District, above the Sacred Valley. The Urubamba River flows past it, hundreds of feet below.

The site's excellent preservation, the quality of its architecture, and its breath-taking mountain views has made Machu Picchu one of the most famous archaeological sites in the world.

The site covers 80,000 acres (32,500 hectares). It boasts a tropical mountain climate and the terraced fields on the edge of the site were once used for growing crops, likely maize and potatoes.

The topographic maps of Machu Picchu combined with other investigations have revealed that the citadel is built over major fault zones, as lots of fractured rocks were available. The fault lines also help channel water which would have been collected by residents and provided a natural drainage system which has helped conserve the site.

SLIDE 7
HOW TO READ A TOPOGRAPHIC MAP

This slide shows a section of a topographic map.

Refer to the notes below to help you talk though some of the features with your pupils.

On a topographic map you will see contour lines - these connect points at the same height above sea level. They are plotted by taking lots of pictures from above the structure (aerial photographs). The closer these contours are — the steeper the gradient. However, the height difference between one line and the next is always the same throughout the map. This is called the contour interval.

Topographic maps also detail both the natural and human features of a landscape. Natural features include forests, rivers, lakes, mangroves, mountains and beaches while human features include roads, ridges, fences, buildings, parks, railways and mines.

Topographic maps use conventional symbols to represent all these elements and their meanings are explained in the map key or 'legend'.

Different colours are also used to indicate certain objects. For example: brown is used for natural features including contours and ridges; blue is used for all water and river features; green is used for vegetation and ground cover; and black and red are used for human features such as roads, railways and buildings.

Finally, topographic maps are overprinted with grid lines to help us locate different places. These vertical and horizontal lines are all given two-digit numbers in the map margins called area references.

The lines running up and down the map (north/south) are called eastings because the numbers increase the further east they are.

The lines running across the map horizontally (east/west) are called northings because the numbers increase the further north they are.

In an area reference, the eastings are given first then the northings, making a four-figure number. The letters AR stand for Area Reference.

There are some helpful videos on You Tube of how to read a topographic map. They explain how to measure the peak of a hill, how to detect where water flows down a river on a slope and about depressions, (dips in the landscape, for example caused by a volcano).

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SLIDE 8
WHY DO ARCHAEOLOGISTS CREATE TOPOGRAPHIC PLANS

Topographic maps are used by archaeologists to help identify and interpret any features present in the area they are surveying. Maps may shed light on ways in which more recent environmental activity may have changed the original patterns of use, and in cases where structural remains are still visible, the map can provide a starting point for planning excavations.

SLIDE 9
HOW ARE TOPOGRAPHIC DRAWINGS CREATED?

Archaeologists start a topographic survey by marking the corners of their site with survey nails.

They then take lots of measurements using a tripod mounted 'total station' which uses lasers to measure the distance between one point and another.

They may also take measurements using a conventional tape measure.

The measurements are then put into a computer programme to produce a digital drawing of the plot.

HANDOUTS

Arch_L2HO1: Guide to reading topographic maps

Arch_L2HO2: Examples of topographic maps/plans, including the Portland Viaduct

Arch_L2HO3: Create your own topographic drawing

Arch_L2HO4: Topographic map of Mill Waters jigsaw

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LEARNING ACTIVITIES

1. Spot the features in these topographic maps or plans

Take a look at these examples of some topographic maps, including one of the Portland Viaduct (Handout 2).

Applying what you have learnt about topographic drawing and how to decipher them, can you answer the questions about the topographic drawing of the Portland Viaduct?

On topological map 2 (which looks as though you are facing the viaduct) use the scale provided to work out the depth of the viaduct from the highest point to the lowest visible part of the structure (to the nearest metre).

ANSWER:

Top 134m, bottom 125m therefore 134 -125 = 9 metres

Look at Topological Map 1 (which looks as though you are seeing the viaduct from above). What do the shapes in green denote?

ANSWER:

Vegetation or hedgerows

The black lines on Topological Map 1 indicate what?

ANSWER:

A gradient flattening out as it goes away to the west of the viaduct. The closer the lines are together the steeper the gradient. A gradient is usually indicated which way it slopes down with an arrow or triangle symbol pointing down the slope.

There are a number of specific points on Topological Map 1 which are given numbers under the heading 'Eastings' and 'Northings' – what are these numbers?

ANSWER:

Eastings and Northings are coordinates on an Ordnance Survey map – the Eastings get larger as they move across the map from west to east, and the northings get larger as they move from south to north.

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LEARNING ACTIVITIES

2. Practical activity (Handout 3): Make your own topographic drawing

Directions:

1. Using modelling dough or clay design a landform (mountain). Check your landform design with your teacher.
2. Place your landform inside a plastic container. Using a measuring cup, add 1/2 cup of water to the container.
3. Place a transparency sheet on top of the container.
4. Looking down on the container, use an overhead pen and trace around where the water meets the landform. This will represent an isoline or contour, a line showing equal elevation.
5. Add another 1/2 cup of water to the system. Repeat the drawing process.

Continue to repeat this step until the water covers the landform or the container gets filled.

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LEARNING ACTIVITIES

3. Practical activity (Handout 4): Topological jigsaw puzzle of Mill Waters heritage site

Cut out the pieces which will make up a topological drawing of the Mill Waters heritage site (Handout 4)

Working in pairs, can you figure out where the pieces should be positioned to create an accurate topographical map of Mill Waters heritage site?