Unit 202: Changing practices over time

Worksheet 1: Menai Suspension Bridge (Tutor)

Task 1: Groundworks activity

In this activity, you will learn about the groundworks involved in the construction of the Menai Suspension Bridge. You will explore the challenges faced during the excavation and ground preparation process, and learn about the tools and techniques used by the workers to create a solid foundation for the bridge.

Research the Menai Suspension Bridge and its construction, focussing on the ground works involved in creating the foundation for the towers. Use the case study provided or online resources or books to gather information about the construction process and the challenges faced by the workers during excavation and ground preparation.

1. What were some of the challenges faced during excavation and ground preparation for the Menai Suspension Bridge?

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| The Menai Strait has a strong tidal current, which made it difficult to work on the site. The workers also had to contend with hard bedrock, which required drilling and blasting to excavate. In addition, the site was prone to flooding, which made it challenging to keep the site dry. |

1. What tools and techniques were used by the workers to excavate and prepare the site?

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| The workers used a combination of hand tools and heavy machinery to excavate the site. Picks, shovels and wheelbarrows were used to remove soil and rock by hand. Dynamite was used to blast through the hard bedrock. Steam-powered cranes and derricks were used to lift heavy materials and equipment. |

1. What materials were used to create a solid foundation for the bridge?

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| To create a solid foundation for the bridge, the workers used large stone blocks to form a base, which was then topped with a layer of concrete. The base was designed to distribute the weight of the bridge evenly across the bedrock. Iron anchor bolts were then set into the concrete to secure the towers. |

1. How was the scaffolding anchored to the bedrock?

The scaffolding was anchored to the bedrock using iron rods that were drilled and grouted into the rock. The rods were then connected to the scaffolding using iron brackets. The scaffolding was used to support the workers during construction and was removed once the bridge was completed.

1. What is a cofferdam and how was it used in the construction of the Menai Suspension Bridge?

A cofferdam is a temporary watertight enclosure that is pumped dry to create a work environment below the waterline. In the construction of the Menai Suspension Bridge, cofferdams were used to create dry workspaces for the construction of the bridge's towers. The cofferdams were constructed around the site of the tower foundation excavations and were pumped dry to allow workers to excavate and build the foundation in a dry environment.

1. What type of stone was used to construct the tower foundations, and where was it sourced from?

The tower foundations of the Menai Suspension Bridge were constructed using limestone sourced from the Penmon quarries on the eastern side of the Menai Strait. The limestone was chosen for its strength and durability and was transported across the strait to the construction site using barges.

Task 2: Challenges faced by the Menai Bridge

Research the Menai Suspension Bridge and its construction, focussing on the ground works involved in creating the foundation for the towers. Use online resources or books to gather information about the construction process and the challenges faced by the workers during excavation and ground preparation.

Write an approximately 300 words essay based around the following questions:

* What were some of the challenges faced during excavation and ground preparation for the Menai Suspension Bridge?
* What tools and techniques were used by the workers to excavate and prepare the site?
* What materials were used to create a solid foundation for the bridge?
* How was the scaffolding anchored to the bedrock?

Example essay response:

The Menai Suspension Bridge is a famous bridge that spans the Menai Strait between the island of Anglesey and the mainland of Wales. The construction of the bridge began in 1819 and was completed in 1826. The bridge was designed by Thomas Telford, a renowned civil engineer, and its construction involved various groundworks to create a solid foundation for the towers. During the construction of the bridge, one of the biggest challenges faced by the workers was the difficult terrain of the Menai Strait. The workers had to excavate and prepare the site to create a solid foundation for the towers in the treacherous waters of the strait. This involved the use of cofferdams, which were large watertight enclosures that were built around the construction site to create a dry working environment.

The workers also used a variety of tools and techniques to excavate the site, including dredgers, steam-driven pumps and hand tools. The dredgers were used to remove loose sediment and debris from the riverbed, while the pumps were used to remove water from the site. Hand tools, such as shovels and picks, were also used to remove any remaining soil and rock. To create a solid foundation for the towers, the workers used a type of stone called Anglesey marble, which was sourced locally from quarries on Anglesey. This stone was known for its durability and strength, which made it an ideal material for the tower foundations.

Finally, the scaffolding for the bridge was anchored to the bedrock using large iron pins that were driven into the rock. This was a challenging process, as the bedrock was often uneven and difficult to work with. Overall, the construction of the Menai Suspension Bridge involved complex and challenging groundworks that required a high level of skill and expertise from the workers. The use of cofferdams, dredgers, pumps and hand tools, as well as the use of Anglesey marble and the anchoring of the scaffolding to the bedrock, were all critical components of the construction process.