



12 Pages

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3. The answers must be legibly written. The Examiners can either ignore illegible script or have it typed and the expense of typing charged to the candidate.
4. Write your answers in ink.
5. Begin each answer on a fresh page. Do all rough work in the answer book and cross it through.
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(Gweler yr ochr arall am y fersiwn Cymraeg)

FORENAME(S): KAREN

[illegible]

(See the other side for English version)

6. Ni ddylid rhwgo unrhyw ran o'r llyfr hwn; rhaid ei gyflwyno yn gyfan.
7. Os defnyddir mwy nag un llyfr, rhwymwch hwy gyda'i gilydd gan ddefnyddio'r tagiau sydd ar gael oddi wrth y gwyllwr/gwilywr.
8. Rhaid dychwelyd pob llyfr. Ni chaniateir mynd â llyfrau atebion, wedi eu defnyddio neu heb eu defnyddio, allan o'r lleoliad arholi o dan unrhyw amgylchiadau.

3. Rhaid i'r atebion fod mewn llawysgriften ddarlleuadwy. Gall yr Arholwyr naill ai anwybyddu sgrïpt annarllleuadwy, neu drefnu iddi gael ei theipio a chael yr ymgeisydd i dalu.
4. Ysgrifennwch eich atebion mewn inc.
5. Dechreuwch bob ateb ar dudalen newydd. Gwnewch unrhyw fras nodiadau yn y llyfr atebion a thynnu llinell drwyddyt.

1. Rhwch yr holl wybodaeth y gofynnir amdani yn y blychau isod.
2. Rhwch eich enw yn lle a ddarparwyd ar y dde, plynghwch et a'i seio i lawr (gan dddefnyddio'r label a ddarparwyd) i guddio'ch enw.

Cyfarwyddiadau i Ymgeiswyr

12 Tudalen

Llyfr Atebion Arholiadau



Prifysgol Cymru
University of Wales
Trinity Saint David

Lienwch, plygwch a selwch (gweler nodyn 2 isod)

CYFENN:

ENW(AU) CYNTAF:

1. The development of SCUBA in the 1940s and the improvement in techniques of sonar and other geophysical methods means that archaeological techniques for prospection and survey have refined dramatically over the past 70 years.

Careful planning is required to ensure appropriate methods are used for the prospective project.

Consideration must be allocated to

- type of project
- scale of project
- divers - number + experience
- time allocated
- location of project

Prospection can be divided into different categories.

Initially, documentary evidence can provide clues as to location of shipwrecks, eg Lloyds list, Armada records for Spanish ships off N.W. coast of British Isles + Ireland, Spanish records for colonization of S. America.

Divers may be used for crude prospection if conditions are appropriate.

There are usually visual searches where divers ~~area~~ use particular formations to search specified areas.

These formations may be freeline, corridor, ^{grid} + circular. Divers may also be towed over an area where large, very evident, remains are expected.

Magnetometers may be used to detect anomalies on the seabed arising from disturbances of the magnetic results because

1. d) large accumulations of ferrous materials. These are towed, preferably ~~well~~ well away from the boat to avoid interference with the signal. Metal detectors may be used to identify presence of ferrous and non-ferrous materials, these can also be towed behind a boat or used by a diver as a hand-held tool, allowing for a more precise coverage of a smaller area.

Echo sounders are another crude but reasonably effective tool to identify anomalies.

Another aid is local knowledge - where an approximate site is known, local fisherman may know of areas of interest because of snagging of fishing nets, ~~etc.~~

Prospection initially may use a combination of techniques to allow progression to more detailed scientific methods.

Geophysical methods have changed dramatically as scientific methods develop, and the data obtainable is refining constantly.

Acoustic methods include narrow-beam magnetometer which is cheap and easy to use but a relatively crude method now. Only a narrow area of the seabed is mapped. Multi-beam swath sonar is a system that is towed behind a boat or a frame or installed in a frame on a boat. The beams are reflected at approximately 50 per second and it builds up a ^{wide} picture below and to the side of the boat. As long as the boat is

1. travelling slowly, it provides a precise and accurate picture, with good horizontal and vertical precision. It is quick and relatively inexpensive. It is also useful for repeating surveys for monitoring purposes. One drawback was that it produces a very large amount of data but increasing computing power means the capacity to process this data has increased and this is less of a problem today. One area where this method has been used successfully is in mapping the wrecks in Scapa Flow, with detailed pictures being formed. Care is needed with the data being extrapolated ~~from~~ by the software and infilling gaps - eg holes in hulls in shipwrecks. Generally, 3 point data clouds have been used to build up a picture of these.

Research is now taking place to combine magnetometers and multi-beam swath sonar to refine identification of the sea-bed consistency, ie whether it's mud, gravel, clay, etc.

Side-scan sonar is another development which also builds up a broad picture of the seabed. An additional element is the display of acoustic shadow which improves the quality of the display and helps interpretation.

Remotely operated vehicles (ROVs) and Automatic underwater vehicles (AUVs) are methods of using mini-submarine type vehicles to prospect areas which are unsuitable for divers or acoustic methods, ie too deep or remote. ROVs are tethered

1. to a mother ship and operated from a control panel, whereas AUVs are independent. They can be used for photography, video and other film techniques, sampling and exploration, most famously with the Titanic wreck. Recent use of an AUV was the Shackleton wrecksite which was unfortunately unsuccessful, which shows the challenges these face, despite technological progress.

Sub-bottom profiling is another method of acoustic signalling which allows prospection of buried items. These can be split into three methods

low frequency called Pingers and Boomers, and high^{meth} frequency called CHIRPS

The low frequency suffer from a conflict between depth and coverage.

CHIRPS is towed as close to the sea bed as possible and provides a deeper coverage. The best technique is a combination of, say, Boomer and CHIRPS.

CHIRPS is being developed and refined and has been used on the Mary Rose and Grace Dieu shipwrecks.

A combination of ^{geophysical} prospection methods is ideal to build up pictures of the site - for instance the Yarmouth Roads shipwreck was assessed using magnetometer, multi-beam swath sonar, and Boomer techniques.

Another advantage of side-scan sonar is the ability to alter the angle of

1. the survey to get a different but complementary picture of the site. A final crude but effective method of prospection is the use of aerial photography where investigation of intertidal and freshore sites may be done quickly & effectively. Drone technology is having an effect on this method.

There is a cross-over between the geophysical techniques as they can be used for prospection and survey. With the development of computer technology, these techniques can be linked to on-site computers allowing the data produced to be analysed by software and thence produce detailed mapping of the sites. Layering techniques can allow pictures to be built with 3D displays. This is an area of enormous potential as technology refines and processing power increases, allowing the large volumes of data to be interrogated and interpreted. However, it is always important to remember "rubbish in, rubbish out", so data needs to be analysed carefully to ensure it is valid.

Once a shipwreck has been discovered, different techniques will be used to survey it. If conditions are appropriate, divers will be used to perform traditional surveys, but in a hostile environment. Survey grids may be set up, dependent on the terrain, with

1. divers doing visual mapping within the grids, recording what is on the sea bed using appropriate materials, such as clear plastic sheets for drawing artefacts, using DSM for plotting placement, + triangulation points to ensure accuracy. The surveying is plotting the arrangement of the wreck-site and its contents and accuracy is extremely important for the later interpretation process. Ensuring good effective labelling, accurate measurement, and continuous recording is imperative. "Ground truthing", ie finding out what is there, is very important for later interpretation of the context of the wreck-site, the wreck-formation and interpretation. Photogrammetry is another very important technique of recording which is being refined constantly and can provide very useful information, as long as conditions allow, ie it can only really be used in good visibility at present. It can be used to build up 3D models of artefacts and wreck-sites, using an overlay of many photographs. Increased computing power and the use of visualization techniques from other technologies means methods are changing constantly but this is an exciting time for seabed prospectors and survey.
- It is important to remember these methods are being used in the "real world" and are subject to environmental conditions.
- ~~Site~~ Site prospecting is subject to

1. challenges. Divers are limited in terms of depth to be dived, temperature of water, availability of medical facilities in remote locations, and water conditions such as tides and currents affect prospecting and surveying. The topography of the sea-bed will affect choices of methods used and analysis of bathymetry and other data is necessary to plan an effective survey and prospecting.

2. The evidence existing for the use of boats and ships in late prehistoric Northern Europe can be split into primary and secondary evidence, with the primary being the remains of actual boats themselves, and the secondary being evidence from iconography, documents, material culture and coastal settlements.

Sean McGrail suggests that the palaeogeography of the coastline of the British Isles has been from 1500 BC to 1500 AD is similar to the coastline of today, although the east coast has suffered significant erosion in parts, and, in Scandinavia, it has been suggested that boat ~~hangar~~ rock art is situated in areas where the coastline has altered and where the rock art no longer looks over a watery landscape.

Logboats have been found throughout Northern Europe with 17 found in Southern Britain. Their dates range from the Early Bronze Age to Iron Age, 1525 - 750 BC. At Must Farm near Peterborough, eight Bronze Age (1,325 BC) and pre Iron Age (825 BC) logboats have been found on one site which is currently being analysed. These logboats were built from oak logs with a groove at the stern for a transom. The unusual thing about these logboats was that the transom had been removed, giving rise to questions about

2. depositional context. Another logboat was the Brigg logboat found on the bank of the River Ancholme in Lincolnshire. This was the largest logboat found in Britain at 14.8m but was unfortunately destroyed in a World War II bombing raid. It dated to the Bronze Age. The Haselme logboat was found in E. Yorkshire where land was being drained. This was unusual in that it had a two part bow with cleats allowing transverse rails. It was made from an oak log and had a transom at the stern. Dating shows it to be Iron Age.

Further evidence are sewn-plank ~~boats~~ boats which are unique to the British Isles and show a technological development of great importance. There have been ten found in Britain, and they all share common characteristics. They are made from oak planks with bevelled edges, sewn or stitched with willow or yew, with cleats allowing transverse fittings to improve rigidity. They have been split into two sub-groups which roughly corresponds to earlier and later vessels:

1. North Ferriby boats 1, 2 + 3, Caldicot 1 and Dover boat
These have all been tied together by using yew lashings which are individual stitches with relatively large stitch holes. Dates 2,030 cal BC.
2. Brigg 'raft', Caldicot 2 and Goldcliff
These have been tied together using

2. continuous stitching (over the length of the plank) and using willow withies and with relatively small lures. Dates 1,030 BC.

The other two boats, Testwood Lake and Kilnsea, are too fragmentary to indicate which sub-group they may be allocated to.

The Dover boat was an extremely important site as it is relatively large with interesting aspects of construction. It has a double rail ~~that~~ ^{transverse} running down the hull through which wedges run; with cleats allowing transverse rails. It also contains ribs and is the only prehistoric boat found so far showing this feature.

In 2006 Ole Crumlin - Pedersen reassessed the Dover boat reconstruction by Owain Roberts, suggesting ~~it was~~ its pattern of wear on the hull pointed to a raised central area along the central join, rather than a completely flat-bottom as originally reconstructed.

Sean McGrail and Owain Roberts also dismissed different interpretations of the Dover 'Raft', with McGrail pointing to a flat bottomed raft ^{with some possible rockering} used as a ferry across the Humber, and Roberts suggesting a rounded bilge which would favour different usage with possible coastal or even sea-faring voyages.

These debates highlight the problems for archaeologists of interpreting fragmentary

2. remains, and archaeologists have reiterated it is important to pay attention to the context of the find, the technology of the artefact and the excavation and post-excavation analysis - all of which help to arrive at an objective analysis of the boat itself and its possible usage.

Many of the semi-plank boats have been found recently and these are examples of development-led archaeology where the economic redevelopment of areas of Britain have led to sites being found, which is a possible reason for the current distribution pattern. This bias should be accounted for in any analysis of their distribution.

Most semi-plank boats have been found in estuary contexts, although the Dover boat was coastal and the inclusion of a piece of Kimmeridge slate points to possible coastal use for moving materials. Logboats have generally been found in inland waters or on rivers so it is assumed they were ^{not} used for seafaring, although one logboat at Grey Abbey Bay, Co. Antrim, has been found in a purely coastal context. As further boats are found, a better understanding will develop as to usage.

Evidence that is definitive has not been found for hide boats, although

2. Some burial remains have been ~~thought~~ thought to be possibly indications ~~of~~ of coracle or curragh remains, but these are too ephemeral to be certain.

There is documentary evidence of hide boats from Caesar in *De Bello Gallico* and Arrian in *Ora Maritima* so, although actual remains are not evident, it is certain that they did exist.

Caesar mentions the Gallo-Celtic boats were better suited to sea conditions than his boats, which suggests sophisticated sea-faring. Arrian has a pilot's periplus describing how 2 day voyages were made from Britain to Ireland and Britain to get raw materials for metal working such as tin.

Iconographic evidence of boats comes from the many rock art carvings from S.W. Uppland, and from the Scandinavian engravings on items such as the Rorby sword and the many razors. Boat-shaped cairns with stone orthostats are found in Scania, and logboat-shaped coffins have been found in Yorkshire. Models of boats, such as the Brighton model, show oars, a steering oar and mast. Coinage also shows stylised boats, particularly of the Gallo-Roman period, showing boats similar to Blackfriars 1 and

2. (continued) the St. Peter Port wreck in Guernsey.

Material culture shows evidence that trading routes existed throughout northern Europe, shown from the existence of amber spacer beads from the Baltic in burial contexts. Blaker people being excavated with European ancestry, eg Amesbury Archer and oxygen isotope analysis showing northern European ancestry, and a double burial in Trumpington with a DNA analysis pointing to their ancestry being from the Netherlands. A French saddlegum was found at Maiden Castle showing trading routes.

A pattern of burial culture has been posited along the north-west coast which is thought to follow fish migratory patterns and might show fish trading routes, and it is thought that some coastal megaliths were built to act as a navigational aid for seafaring people.

Island communities have left middens with evidence of shellfish and deep-sea fish which might indicate fishermen using boats to travel further out to sea than purely coastal to acquire the food products, eg scallops, cod, ling, pollack. The existence of island communities, such as on Orkney, the Outer Hebrides,

Rhif y Cwestiwn		Arholwr yn unig		Rhif y Cwestiwn		Arholwr yn unig	
2. and the Scilly Isles, could be considered as evidence for seafaring possibilities.							