

Academic Reading Paper 50

Locks, Migrations and Costs

Time allowed: 1 hour

INSTRUCTIONS TO CANDIDATES

- Do not open this booklet until you are told to do so.
- Write your name and the date at the top of the answer sheet.
- Answer **all** the questions.
- Write your answers **on the answer sheet**, not in this booklet.
- You must transfer your answers within the hour. **No extra time is given for transferring answers in the Reading test.**
- Do not remove this booklet from the examination room.

INFORMATION FOR CANDIDATES

- There are 40 questions in this paper.
- Each question carries one mark.
- There are three passages, with 13, 13 and 14 questions.

These passages were written for this library. They are **not** reproduced from any published past paper. The format, timing and task types follow the published specification for the Academic Reading test so that sitting this on paper feels like the real thing.

You should spend about 20 minutes on **Questions 1–13**, which are based on Reading Passage 1 below.

The canal that had to climb

The Grand Canal of China runs for something in the region of eighteen hundred kilometres between Hangzhou in the south and the neighbourhood of Beijing in the north, which makes it much the longest artificial waterway ever built. It is not, however, one thing built at one time. The oldest sections were dug in the fifth century before the common era, and what is usually described as the canal is a system assembled over two thousand years from stretches that were cut for different rulers, for different reasons, and often without any thought of joining them together.

The joining was done between 605 and 609 of the common era, under the second emperor of the Sui, who linked the existing waterways into a single route from the Yangtze valley to the north. The labour was conscripted and the numbers given in the sources are very large, running into millions of workers drafted in relays. Historians differ about how far those figures can be trusted, but they do not differ about the effect: the burden of this work and of the campaigns that accompanied it is among the reasons usually given for the collapse of the dynasty in 618, nine years after the canal was finished.

What the canal was for is stated plainly in the records and is worth stating plainly here. The productive rice land lay in the south; the capital, the court and the armies lay in the north. The canal existed to move grain from the one to the other, under a system of tribute grain that operated for the better part of a thousand years. It was an instrument for concentrating a surplus, and the engineering that made it possible was undertaken for that purpose rather than for trade in general.

The engineering problem is the opposite of the one presented by a canal cut through an isthmus at sea level. The route is not level. In Shandong it has to cross a stretch of high ground, climbing something like forty metres and then descending again, and no amount of digging removes the difficulty. The earliest answer was the double slipway: a pair of ramps up which a boat was hauled by oxen or by men at a winch, over the top, and down the other side. It worked, and it broke hulls, and it obliged a loaded vessel to sit exposed on a ramp for long enough that the theft of cargo became a recognised trade.

The solution appeared in 984, when an assistant transport commissioner named Qiao Weiyo replaced a double slipway on the Huai section with something new. He built two gates a short distance apart, enclosing a stretch of the channel. A boat entered through one gate, the gate was shut behind it, and the water level inside the enclosed basin was raised or lowered until it matched the level beyond the second gate, which was then opened. This is the pound lock, and it is the device on which every canal system since has depended. The first examples in Europe date from around four centuries later.

A lock, however, spends water. Every vessel that climbs to the summit takes a basin of water down with it on the far side, and a canal that crosses high ground must therefore have a supply at the top or it will simply drain. That problem was solved in 1411 by Song Li, working under the Ming, at a place called

Nanwang. The Wen river was diverted to arrive at the summit of the canal and there deliberately divided, with roughly six parts of the flow sent north and four sent south, held and released through a system of reservoirs and sluices. The proportions were adjusted by the men operating it according to the season.

The decline had several causes and one of them was not human. In 1855 the Yellow River, which had for centuries been contained between raised banks, broke out and shifted its course by hundreds of kilometres, cutting the canal in two and silting long stretches of it. Sea transport had already begun taking the grain traffic, and the railways took the rest. Sections of the northern canal ceased to be navigable and remained so for the better part of a century.

The canal is now celebrated, and the celebration is usually conducted in terms of length and age. Both figures deserve a note. The eighteen hundred kilometres and the two and a half thousand years describe a system whose parts were built two millennia apart and never all functioned at once, so that the single number flatters the achievement by combining works that had little to do with one another. What does not need flattering is the lock. A device that made it possible for water transport to cross high ground was invented on this canal, put to work, and used for four hundred years before anybody else arrived at it.

Questions 1–4

Do the following statements agree with the information given in Reading Passage 1?

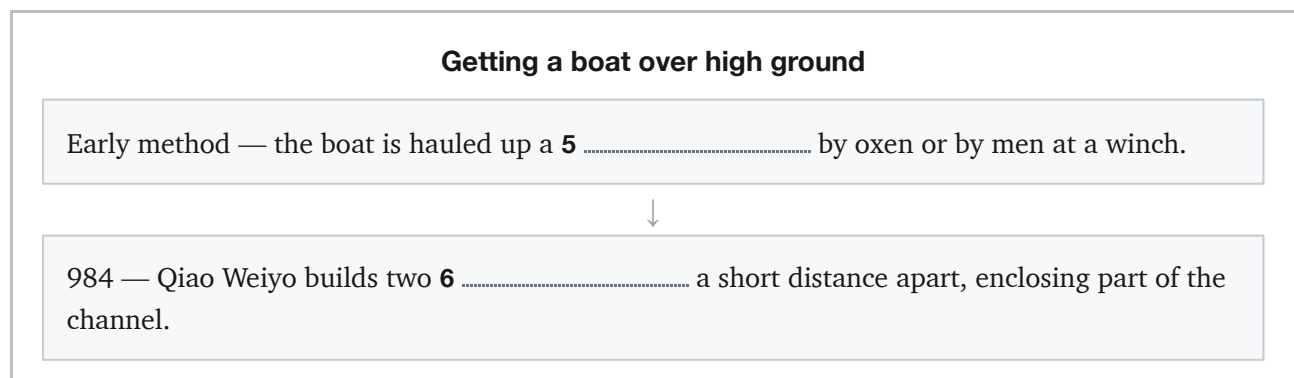
Write **TRUE** if the statement agrees with the information, **FALSE** if the statement contradicts the information, or **NOT GIVEN** if there is no information on this.

- 1 The oldest parts of the canal were dug some two thousand years before the newest.
- 2 Historians agree on how many workers were conscripted under the Sui.
- 3 The number of workers who died building the Sui section is recorded.
- 4 Boats waiting on a slipway were exposed long enough for cargo theft to become an established trade.

Questions 5–9

Complete the flow-chart below.

Choose **ONE WORD ONLY** from the passage for each answer.



↓

The boat enters and the water in the enclosed **7** is raised or lowered to match the level beyond.

↓

Each crossing takes water down the far side, so the summit needs its own **8**

↓

1411 — the Wen river is diverted to the summit and split, about six parts north and **9** parts south.

Questions 10–13

Complete the table below.

Choose **ONE WORD ONLY** from the passage for each answer.

How the canal fell out of use

Cause	What it did
1855 — the Yellow River shifts course	cutting the canal in two and 10 long stretches of it
Sea transport	had already begun taking the 11 traffic
Railways	took the rest; sections of the 12 canal stopped being navigable
Modern celebration	is usually conducted in terms of length and 13

You should spend about 20 minutes on Questions 14–26, which are based on Reading Passage 2 below.

How the routes were found

- A** For most of recorded history the disappearance of birds in autumn had no satisfactory explanation, and the explanations offered were not stupid so much as unconstrained by evidence. Aristotle suggested that some species changed into others as the season turned, redstarts becoming robins. A widely repeated view held that swallows spent the winter in the mud at the bottom of ponds, which at least had the merit of being the sort of thing that could in principle be checked. A pamphlet published in England in 1703 argued that migrating birds flew to the Moon and took sixty days over the journey. What all these accounts shared was that no method existed for following a bird beyond the horizon.
- B** The first hard evidence arrived by accident and it arrived in the neck of a stork. In 1822 a white stork was shot near Rostock in northern Germany with a wooden spear more than seventy centimetres long driven through its neck. The spear was of a type used in central Africa. The bird had been wounded there, had survived, and had flown some three thousand kilometres north with the shaft still in it. About twenty-five such specimens have been recorded since, and the first of them settled a question that centuries of argument had not. The specimen is still on display in Rostock, spear included.
- C** A single spectacular case establishes that a journey happens without establishing anything about where or when. What was needed was a method that could be applied to ordinary birds in large numbers, and it was devised by a Danish schoolteacher. From 1899 Hans Christian Cornelius Mortensen fitted starlings with light aluminium rings, each stamped with a number and an address, so that anybody who later found the bird could report where and when. The method is unglamorous and it is the foundation of everything that followed. Many millions of birds have been ringed since, under national schemes that share their records, and the great majority of what is known about where a given population goes rests on them.
- D** Ringing has a weakness that has to be understood before any map made from it is read. The proportion of ringed birds ever recovered is very small, frequently well under one in a hundred, so nothing can be learned from a few birds and enormous numbers are required. Worse, recoveries are not evenly distributed. A ring comes back when somebody finds it and troubles to report it, which happens where there are people, where birds are hunted, and where a reporting scheme is known. Early route maps therefore showed the distribution of literate and armed human beings as much as the distribution of birds.
- E** An entirely different source of information turned up during the Second World War, and it was not being looked for. Radar operators watching for aircraft saw echoes that moved too slowly, appeared in the wrong places and could not be identified, and called them angels. They were birds, in numbers large enough to be mistaken for weather. Radar showed that migration takes place at night, at

altitudes far greater than anyone had assumed, and in volumes that nobody watching from the ground could have estimated. It also removed the observer's bias at a stroke, since a radar set counts what passes over it whether or not anybody is interested.

F The instruments now used were made possible by miniaturisation. Since about 2007 it has been possible to fit a device weighing less than a gram to a small songbird. The simplest of these does not transmit anything; it records the level of daylight against a clock, from which the times of sunrise and sunset, and hence an approximate position, can be reconstructed after the device is recovered. A different approach reads the chemistry of a feather, because the stable isotopes laid down in it reflect the water the bird was drinking where the feather grew, which gives a rough latitude for the moulting site without any device at all.

G Each method carries its own bias and the honest statement of what is known has to carry them too. A geolocator has to be recovered from the bird, which means the record exists only for individuals that survived the journey and returned to the same place to breed, and those are exactly the individuals whose journeys went well. Isotope work gives a region rather than a route. Radar counts birds without identifying them. The picture of migration now available is very much better than a map drawn from recovered rings, and it is still assembled from methods that each see a different part of the thing, which is the ordinary condition of knowledge about anything that will not hold still.

Questions 14–18

Reading Passage 2 has seven paragraphs, A–G.

Which paragraph contains the following information?

Write the correct letter, A–G.

NB You may use any letter more than once.

List of Paragraphs

- A** Paragraph A
- B** Paragraph B
- C** Paragraph C
- D** Paragraph D
- E** Paragraph E
- F** Paragraph F
- G** Paragraph G

- 14** an explanation of why early maps showed where people were rather than where birds were
- 15** a method that needs nothing to be attached to the bird
- 16** a discovery made by people who were looking for something else

- 17 a set of explanations offered when no method of following a bird existed
- 18 a statement that every current method sees only part of the subject

Questions 19–22

Complete each sentence with the correct ending, A–G, below.

List of Endings

- A the proportion of ringed birds ever recovered is tiny.
- B survived the journey and returned to the same breeding place.
- C the bird had come north from central Africa.
- D migration takes place at night and at great height.
- E it records whatever passes over it, whether or not anybody is interested.
- F were carrying a transmitter.
- G had been fitted with a ring as well.

- 19 The spear in the stork's neck established that
- 20 Ringing needs to be done in enormous numbers because
- 21 Radar removed the observer's bias because
- 22 A geolocator can only record the journeys of birds that

Questions 23–26

Complete the summary below.

Choose **ONE WORD ONLY** from the passage for each answer.

Four stages of an answer

Before any method existed, the explanations included birds turning into other

- 23, wintering in mud and flying to the Moon. The first physical proof came from a stork that had carried an African 24 through its neck for three thousand kilometres. Systematic work began in 1899, when Mortensen fitted starlings with numbered
- 25 During the Second World War radar operators called their unexplained echoes 26, and they turned out to be birds.

You should spend about 20 minutes on **Questions 27–40**, which are based on Reading Passage 3 below.

Why nobody can say what it costs

Ask what a particular service costs to provide and you will be given a number. The number will be presented as a measurement, in the way that a weight or a distance is a measurement, and it is not one. Where an organisation shares its buildings, its staff, its equipment and its administration between several activities, the cost of any one of them is not discovered but decided, by choosing a rule for dividing up everything that is held in common. Different rules are defensible, and they produce different answers, and the differences are not small.

The clearest illustration is an aeroplane with one empty seat and a passenger at the desk. What does carrying that passenger cost? On one accounting the answer is a few kilograms of fuel and a meal, because the aircraft is going anyway and nothing else changes. On another it is that figure plus a share of the aircraft, the crew, the landing fees, the maintenance and the head office, which is a sum perhaps a hundred times larger. Both numbers are correct, and each of them is the only sensible answer to the question it happens to be answering. They answer different questions, and an airline that used the first for its pricing policy would not survive a year, while one that used the second would fly with empty seats it could have filled.

Hospitals face the same problem in a harder form. The cost of a particular operation includes theatre time, which is shared; nursing, which is shared; a building, which is shared; and an administration whose work has no natural unit at all. The allocation rules used are reasonable and there are several of them, and studies that recast the same procedures under different conventions routinely find variations of tens of per cent, occasionally more. The figure that reaches a policy discussion has usually lost all trace of which convention produced it.

None of this is fraud, and treating it as fraud is the first wrong turning. The people producing these numbers are following a stated method, and the method is generally written down somewhere and available. What happens is subtler. The number leaves the department that made it, arrives somewhere else in a table, and is then used to compare things that were costed under different rules, or to justify a decision that the rule was never designed to support. Nothing improper has occurred at any single step.

Activity-based costing was the attempt to solve this properly by tracing every resource to the activity that consumed it, and its history is instructive. Where it has been implemented carefully it does produce better information. It also turned out to be expensive, to require constant maintenance as processes change, and to generate arguments about the tracing that consumed more management attention than the decisions it informed. A great many organisations tried it and quietly went back to simpler rules, which is not evidence that the simpler rules are accurate.

The tempting conclusion is that costing is arbitrary and can safely be ignored in favour of judgement. This is wrong and it is dangerous. Somebody has to decide what to charge, what to keep, what to close and what to expand, and refusing to put numbers on those choices does not make them judgement-free. It transfers the decision to whoever is most confident in the meeting, which is the arrangement costing was invented to replace. A poor estimate that states its assumptions can be argued with, corrected and improved; an intuition that states nothing can only be agreed with or overruled.

The opposite conclusion is equally wrong and much more common. This is the belief that a cost figure is a fact to be looked up, so that two figures from different organisations can be set side by side, or a figure from one year compared with a figure from the next after the rule has changed. Almost every published cost comparison between institutions does this, and most of them do it without stating a rule at all, which is the condition under which a number is least useful and most persuasive.

What follows is procedural and unexciting. Publish the allocation rule with the number, every time, in the same document. Treat a cost figure that arrives without its rule as unusable rather than as approximate, because approximate implies a known answer nearby and that is precisely what is missing. And when two figures are compared, require that they were produced under the same convention, or state plainly that they were not. None of this makes costing exact. It makes the inexactness visible, which is the most that can honestly be offered and considerably more than is offered now.

Questions 27–31

Choose the correct letter, A, B, C or D.

- 27** What does the writer say a cost figure actually is?
- A a measurement, like a weight or a distance
 - B the result of choosing a rule for dividing up shared resources
 - C an estimate with a known margin of error
 - D a figure organisations are required by law to publish
- 28** What is the point of the aeroplane example?
- A that airlines set their prices badly
 - B that two figures a hundred times apart can both be correct
 - C that empty seats make a flight unprofitable
 - D that fuel is the largest single cost
- 29** What does the writer say about the people who produce these figures?
- A They generally hide the method they used.
 - B They follow a stated method that is usually written down.
 - C They are seldom qualified to do the work.
 - D They disagree with each other about the rules.

- 30** What became of activity-based costing?
- A** It was shown to give worse information than simpler rules.
 - B** Many organisations dropped it because of its cost and upkeep.
 - C** It was made compulsory in health services.
 - D** It was never put into practice anywhere.
- 31** Why does the writer single out published comparisons between institutions?
- A** because the figures in them are usually invented
 - B** because most of them state no allocation rule at all
 - C** because institutions refuse to publish their figures
 - D** because the figures used are generally out of date

Questions 32–37

Do the following statements agree with the claims of the writer in Reading Passage 3?

Write **YES** if the statement agrees with the claims of the writer, **NO** if the statement contradicts the claims of the writer, or **NOT GIVEN** if it is impossible to say what the writer thinks about this.

- 32** The writer thinks costing should be set aside in favour of judgement.
- 33** The writer accepts that activity-based costing does give better information when it is done carefully.
- 34** The writer thinks accountants should be trained differently.
- 35** The writer regards what happens to cost figures as dishonest.
- 36** The writer believes that refusing to put numbers on a choice does not remove judgement from it.
- 37** The writer thinks costing conventions should be set by an international body.

Questions 38–40

Complete the sentences below.

Choose **ONE WORD ONLY** from the passage for each answer.

- 38** The rule used should be published with the number, every time, in the same
- 39** A figure that arrives without its rule should be treated as rather than as approximate.
- 40** The proposal does not make costing exact; it makes the inexactness