

Academic Reading Paper 07

Glass, Maps and Ruins

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.

How glass became clear

Roman glass is usually green. Not decoratively green — faintly, unavoidably green, the colour of a bottle held against the light, and the reason is iron. Ordinary sand carries iron oxide as an impurity, and iron in glass produces a blue-green tint that no amount of care in the furnace will remove. For most of the history of the material this was simply what glass looked like, and a window made of it admitted light without letting anybody see through it properly. The story of how glass became clear is a story about impurities, and it takes about fifteen hundred years.

The first part of the answer was chemical and was found early. Adding a small quantity of manganese dioxide to the melt produces a colour that is the complement of the iron green, so the two cancel and the glass reads as colourless. Roman glassmakers knew this and the mineral was later called glassmaker's soap, which describes what it appears to do rather than what it does. The difficulty was that manganese only cancels; it does not clean. Too little and the green survives, too much and the glass turns faintly purple, and the correct quantity depends on how much iron happened to be in that batch of sand.

The second part was institutional. In 1291 the Venetian Senate ordered the city's glass furnaces moved to the island of Murano, officially because a furnace in a city of wooden buildings is a fire waiting to happen. The effect, whatever the intention, was a controlled community of glassmakers who could not easily leave and whose knowledge could not easily go anywhere else. Skills accumulated on the island for a century and a half, and around 1450 one of its masters, Angelo Barovier, produced a glass clear enough to be named for rock crystal. Cristallo was made with purified plant ash imported from Spain and the Levant, and with a manganese correction judged by eye.

It was not, however, a good material for everything. Cristallo is soft and it cools quickly, which suits a glassblower making something thin and elaborate and defeats anybody wanting to cut a pattern into a heavy surface. The next move was English and came much later. In 1674 George Ravenscroft, working under a patent, added lead oxide to the batch. The result was heavier, slower to cool, easier to cut and considerably better at bending light. Lead crystal made possible both the cut glass of the eighteenth-century table and the lenses of instruments that had previously been limited by the material available to grind.

Flat glass was a separate problem and remained one for another three centuries. A window pane had to be cast on a table as a rough slab and then ground and polished on both sides until it was flat and parallel, which is slow, wasteful and expensive; the mirrors of the Hall of Mirrors at Versailles were among the most costly objects in France when they were installed. Every improvement up to the middle of the twentieth century made the grinding faster without removing it.

The removal came from a single idea. In the 1950s Alastair Pilkington, working in St Helens in the north of England, proposed pouring the molten glass onto a bath of molten tin. Glass floats on tin; both surfaces of a floating ribbon settle flat under gravity and surface tension; and glass that arrives flat does not need to be ground at all. The idea took seven years and something like seven million pounds to make work, most of it spent on production runs that had to be scrapped, and the first saleable glass came off the line in 1959. Today around nine tenths of the world's flat glass is made this way.

What clear glass then did is easy to underrate because it happened everywhere at once. A clear mirror is a scientific instrument as well as a domestic object. A clear lens is the difference between a microscope that shows something and one that shows an argument. Windows large enough and clear enough to see through changed what a building could be, which is why the architecture of the last century looks as it does and the architecture before it does not.

There is a small irony in the sequence. The material was held back for fifteen centuries by a contaminant nobody could see and few could name, and the eventual industrial solution was not to purify the sand at all. It was to stop grinding.

Questions 1–6

Complete the notes below.

Choose **NO MORE THAN TWO WORDS AND/OR A NUMBER** from the passage for each answer.

Clearing the glass

The problem

- Ordinary sand contains iron oxide, which tints glass blue-green.
- Adding **1** produces a colour that cancels the green.
- Use too much of it and the glass turns faintly **2**

Venice

- 1291 — the furnaces are moved to the island of **3**, officially because of fire risk.
- c.1450 — Barovier's cristallo is made with purified **4** brought from Spain and the Levant.

England and after

- 1674 — Ravenscroft adds **5**, giving a glass that is heavier and easier to cut.
- 1959 — the first glass made by floating it on molten **6** is sold.

Questions 7–13

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.

- 7** The green tint of Roman glass came from something the glassmakers did not intend to add.
- 8** Manganese was first used to decolourise glass in fifteenth-century Venice.
- 9** The float process took about seven million pounds to develop.
- 10** Glassmakers who left Murano were pursued by the Venetian authorities.
- 11** Cristallo was a poor material for engraved decoration.
- 12** The float process works by grinding both surfaces of the glass at once.
- 13** Lead crystal was more expensive to produce than cristallo.

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

How the brain makes a map

- A** An animal moving through the world has two ways of knowing where it is. It can remember the sequence of moves it has made — left at the tree, then straight, then right — which works until something interrupts it, or it can hold a representation of the place itself and locate itself within that. The first is a list of instructions. The second is a map, and for most of the twentieth century it was an open question whether brains contained anything of the kind or whether the appearance of one was produced by clever chaining of the first sort.
- B** The question turned into a finding in 1971. John O'Keefe, recording from single cells in the hippocampus of a rat allowed to wander a small enclosure, found neurons that fired when the animal was in one particular part of the box and fell silent everywhere else. Move the rat to the far corner and a different cell took over. The cells were not responding to a smell or a landmark or a direction of travel; they were responding to a position. O'Keefe called them place cells, and their existence settled the argument: something in the brain is keeping track of location as location.
- C** A place cell tells an animal where it is but not how the places relate to one another, and a map needs a measure of distance and direction as well as a set of positions. Where that came from remained unclear for another thirty years. In 2005 May-Britt and Edvard Moser, recording in the entorhinal cortex just upstream of the hippocampus, found cells that fired not in one place but in many — and the many places, plotted, formed a regular triangular lattice extending across the whole enclosure, like the vertices of a tiling. Different cells carried lattices of different spacing and orientation. What the grid cells supply is a coordinate system: a way of measuring how far the animal has moved in what direction, independent of any particular landmark.
- D** Other cell types filled in the rest. Head-direction cells, first described by James Ranck in the 1980s, fire according to the way the animal's head is pointing and take no interest in where it is standing; they behave like a compass whose north is set by the room. Boundary cells respond to walls and edges at a particular distance and bearing. None of these is a map on its own. Together they are the components a map requires — position, distance, direction, edge — and they sit in adjacent pieces of tissue wired to one another.
- E** The obvious question is whether any of this applies to people, and the study that made the case best was not about rats at all. To be licensed as a London taxi driver a candidate must pass an examination called the Knowledge, which requires memorising some twenty-five thousand streets and the routes between them and typically takes three or four years. Eleanor Maguire compared the brains of qualified drivers with those of matched controls and found that the drivers' posterior hippocampi were larger, and that the difference grew with the number of years a driver had been working.

- F** That result on its own could be read the other way round: perhaps people with large posterior hippocampi are the ones who pass. Maguire's group answered the objection by following trainees over time, scanning them before they began and again several years later. Those who qualified showed the growth; those who trained and failed, and the controls who never trained, did not. The change was produced by the learning rather than the other way about, which is a much stronger claim and one that very few studies of the human brain are in a position to make.
- G** The field was recognised with a Nobel Prize in 2014, shared between O'Keefe and the Mosers. What the prize marked was not the discovery of one cell type but the assembly of a system: an animal's sense of place turns out to be built from separable components that can be recorded one at a time, damaged one at a time, and in the human case grown by practice.
- H** There is a coda that has changed how the work is read. The same region degrades early in Alzheimer's disease, and the earliest reliable symptoms are not failures of memory for facts but failures of orientation — the patient who cannot find their way back along a route they have used for thirty years. Reading that symptom as an early sign of damage to a mapping system, rather than as ordinary forgetfulness, is a direct consequence of knowing what the tissue does.

Questions 14–19

Reading Passage 2 has eight sections, A–H.

Choose the correct heading for sections A–D, F and H from the list of headings below.

Write the correct number, I–X.

List of Headings

- i** Two ways of knowing where you are
- ii** Two ways of getting lost
- iii** Cells that answer where
- iv** Cells that answer how far
- v** The parts that are not a map on their own
- vi** The part that is a map on its own
- vii** Ruling out the opposite explanation
- viii** Confirming the first explanation
- ix** A symptom read differently
- x** A treatment read differently

- 14** Section A
- 15** Section B
- 16** Section C

17 Section D

18 Section F

19 Section H

Questions 20–23

Look at the following findings and the list of researchers below.

Match each finding with the correct researcher, A–D.

NB You may use any letter more than once.

List of Researchers

- A** John O'Keefe
- B** May-Britt and Edvard Moser
- C** James Ranck
- D** Eleanor Maguire

20 He found cells that fire in one location and nowhere else.

21 They found cells whose firing positions form a regular lattice.

22 He described cells that behave like a compass.

23 She showed that a change in the brain followed from training rather than preceding it.

Questions 24–26

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

24 To qualify, a London taxi driver must learn

- A** around twenty-five thousand streets.
- B** around twenty-five thousand routes.
- C** the Knowledge in three or four attempts.
- D** a fixed set of three or four routes.

25 Why does the writer say a place cell is not by itself a map?

- A** Because it fires in more than one location.
- B** Because it gives no measure of distance or direction.
- C** Because it depends on a landmark.
- D** Because it is found only in rats.

- 26** The 2014 Nobel Prize is described as recognising
- A** the discovery of a single type of cell.
 - B** the assembly of a system from separable parts.
 - C** the treatment of Alzheimer's disease.
 - D** the first recordings made in human subjects.

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

What are we preserving?

The shrine at Ise in Japan has stood for something like thirteen hundred years, and no part of it is more than twenty years old. Every two decades the buildings are taken down and rebuilt on an adjacent plot to the same design, using the same techniques, by carpenters who learned them from the carpenters who did it last time; the old site is left empty and waits its turn. The most recent rebuilding was the sixty-second. By the criterion that governed international conservation for most of the twentieth century, this extraordinary act of continuity produces a building with no historical authenticity whatever.

That criterion has a history of its own, and it is worth recovering because it is usually presented as common sense. In the nineteenth century two positions were staked out. Eugène Viollet-le-Duc held that to restore a building is to return it to a complete state, which may be a state it never actually occupied; he rebuilt accordingly, and much of what visitors admire in medieval France is his. John Ruskin thought this a species of lying. A building's value lay in the marks of the hands that made it and of the centuries that had worn it, and since neither can be reproduced, the honest course was to maintain a building carefully and then let it die.

Ruskin won, in the sense that the documents did. The Venice Charter of 1964, which shaped conservation practice across the world for a generation, locates authenticity in original fabric: the material itself, in its original arrangement, carrying the evidence of its own age. Replacement is permitted where necessary and must be distinguishable from what it replaces. This is a coherent doctrine and it protects against a real danger, which is the developer's argument that a convincing copy serves every purpose the original did and costs less.

It is also, on inspection, a local convention that was written up as a universal one. A doctrine that locates authenticity in surviving material is well suited to a tradition that builds in stone and expects a building to outlast its makers by centuries. It fits considerably less well where the tradition builds in timber and thatch in a wet climate, where the expectation is not that the fabric will survive but that the knowledge of how to make it will. Ise is the clearest case, but it is not a curiosity: it is one of many traditions in which the thing being handed on is a practice.

The correction, when it came, came from the people the doctrine fitted worst. The Nara Document on Authenticity, agreed in 1994 at a conference convened in Japan, restated authenticity as something that may reside in form and design, in materials, in use and function, in traditions and techniques, in location and setting, and in spirit and feeling — and, crucially, that must be judged within the cultural context of the property rather than against a single standard. It did not abolish the older criterion. It demoted it from the definition to one item on a list.

It would be comfortable to end there, and the comfortable version is worth resisting, because a doctrine that accepts many kinds of authenticity is also a doctrine that is harder to use against people acting in bad faith. If tradition and technique can carry authenticity, then a demolished building rebuilt in replica by a property company can be presented as continuous with what it replaced, and it will be. The Venice Charter's rigidity was doing work, and anyone who welcomes the Nara Document has to say what now does that work instead.

The answer is not another criterion but a different question. Asking whether a building is authentic invites a yes or a no about the object. Asking what the building is for, and to whom, produces an argument that can actually be had: a shrine whose purpose is the continuity of a rite is served by rebuilding, and a bombed cathedral kept as a ruin is serving a purpose that a restoration would destroy. In both cases the fabric is a means. The mistake the twentieth century made was to promote the means to the definition and then export it.

None of which is an argument for relaxing standards, and it is not a defence of the replica. It is an argument that the standard was always local, that it was carried abroad without anybody noticing that it had been, and that the work of deciding what to keep cannot be done by a criterion. It has to be done by an argument about purpose, conducted by the people the building belongs to.

Questions 27–32

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.

- 27** The Nara Document abolished the criterion set out in the Venice Charter.
- 28** The writer regards the Venice Charter's strictness as having served no purpose.
- 29** Viollet-le-Duc's restorations were criticised by his contemporaries in France.
- 30** The writer thinks a doctrine allowing several kinds of authenticity is easier to misuse.
- 31** The writer believes the Nara Document should be revised again.
- 32** The writer holds that decisions about what to preserve belong to the communities concerned.

Questions 33–36

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

Endings

- A returns a building to a condition it may never have been in.
- B treats the surviving material as the location of a building's authenticity.
- C hands on a practice rather than a fabric.
- D makes the question of purpose harder to avoid.
- E proves that replicas are as valuable as originals.
- F was written by the countries the doctrine suited best.
- G abolished the distinction between repair and rebuilding.

33 Restoration as Viollet-le-Duc practised it

34 The Venice Charter of 1964

35 The rebuilding of the shrine at Ise

36 The writer's own proposal

Questions 37–40

Complete the summary using the list of words, A–H, below.

List of Words

- A fabric
- B practice
- C purpose
- D age
- E means
- F definition
- G context
- H copy

Where the argument went wrong

Twentieth-century conservation treated surviving **37** as the test of whether a building was genuine. That suits a tradition building in stone and suits far less well one whose

continuity rests on a transmitted **38** The Nara Document answered this by requiring that authenticity be judged within the cultural **39** of each property. For the writer the deeper error was promoting a **40** to a definition, and then carrying it abroad as though it were universal.