

Academic Reading Paper 41

Grids, Resistance and Practice

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 plan of 1811

In 1807 the council of New York asked three men to decide what the rest of Manhattan would look like. The city then occupied the southern tip of the island, a tangle of lanes that had grown outward from a Dutch trading post, and everything north of it was farmland, marsh, woodland and outcrops of rock. The commissioners were given four years and no obligation to consult anybody. What they produced in 1811 was a rectangular grid of twelve avenues running the length of the island and one hundred and fifty-five streets crossing them, drawn over ground that in places had never been walked.

The survey was the work of John Randel, a young engineer who spent nearly a decade in the field. He had to fix the position of every future intersection on land that was still in private hands, and he marked them as he went, setting marble monuments where the rock allowed and driving iron bolts into it where it did not. Something like fifteen hundred and fifty markers were placed. Landowners understood exactly what the markers meant and reacted accordingly. Randel was sued, obstructed, pelted with vegetables and on at least one occasion had dogs set on him, and he kept going. The city eventually passed a law protecting him and his instruments, which is a measure of how the work was received.

The dimensions were not chosen for appearance. Streets were made sixty feet wide and avenues a hundred, and the blocks were set two hundred feet from one cross street to the next while running much further in the other direction. That shape follows from the building lot the commissioners had in mind, a rectangle twenty-five feet wide and a hundred feet deep, which fits neatly along the long side of such a block. The grid is, in effect, a lot size repeated until it runs out of island.

The most criticised decision was the absence of large public space. The plan set aside a parade ground and a few small squares and nothing else, and the commissioners defended this in writing. Manhattan was an island, they argued, and the rivers on either side would supply the air and the openness that parks provide elsewhere. They also thought the land too valuable to leave empty. Central Park was laid out four decades later, between 1853 and 1857, and creating it required buying and clearing ground that people were already living on, including a settled village of several hundred residents.

They were equally unapologetic about the aesthetic objection, which was made at once and has never stopped being made. A grid, the critics said, was monotonous, mechanical and unworthy of a great city, and the commissioners replied that a city is composed principally of the dwellings of men, and that straight-sided and right-angled houses are the cheapest to build and the most convenient to live in. The plan was optimised for construction and for the transfer of property, and it says so.

What it was not optimised for was the ground. The island the grid was drawn over had hills, streams and marshes, and the grid took no notice of any of them. Over the following century hills were cut down, valleys filled and watercourses buried in pipes so that the streets could run straight and level, an operation

whose cost was never added up because it was spread over a hundred years and thousands of separate building projects. A few features were too large to remove and survive as anomalies, the outcrops in the northern parks among them, where the rock the grid was drawn across is still visible above street level.

One earlier road was allowed to stay. Broadway ran diagonally across the island before the plan existed, following an old route that predated the city, and it was left in place. Where it crosses the avenues it produces the triangular open spaces that the plan itself did not provide, and several of them became the squares the city is now known for, which is an unintended result of leaving one thing alone.

The effect the commissioners said least about has turned out to be the most useful. Because the streets are numbered in sequence and the avenues are too, an address in Manhattan is a pair of coordinates, and a person who has never been to the city can find a building from its number alone without a map and without asking. That was not among the aims set out in 1811. It is a by-product of having repeated one shape across an island, and it is the reason a plan attacked for two centuries as unimaginative is copied more often than any plan that was praised.

Questions 1–5

Complete the table below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

What the commissioners decided	
Question before them	What the plan did
Public open space	set aside a 1 and a few small squares
Justification for that decision	the 2 on either side would provide air and openness
Roads already on the ground	kept 3 , which crossed the island diagonally
The shape of the ground	hills were cut down, valleys filled and watercourses buried in 4
Objections to the design	right-angled houses are the cheapest to build and the most 5 to live in

Questions 6–9

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.

- 6 The commissioners were under no requirement to seek anybody's opinion.
- 7 The commissioners themselves fixed the position of each future intersection on the ground.
- 8 Randel was paid less for the survey than he had been promised.
- 9 Every natural feature of the island was removed so that the streets could run straight.

Questions 10–13

Complete the sentences below.

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

- 10 The commissioners were allowed in which to produce the plan.
- 11 Central Park was laid out between 1853 and
- 12 Where Broadway meets the avenues it produces open spaces.
- 13 Because both streets and avenues are numbered, a Manhattan address works as a pair of
..... •

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

Older than the cure

- A** Resistance to antibiotics is usually presented as damage we have done. The drugs were introduced, they were overused in medicine and poured into animal feed, and bacteria adapted, so that a problem which did not exist in 1940 now kills well over a million people a year. Every part of that account is true except the last clause of the first sentence, and the exception matters more than it sounds, because it changes what the problem is and therefore what can be expected of any response to it. Resistance did not begin with us. It was already there, in the ground, in quantity, long before anybody had a drug for it to resist.
- B** The first sign came before the drug did. In 1940 Edward Abraham and Ernst Chain, working in the Oxford group that was still trying to turn penicillin into a usable medicine, reported an enzyme produced by a common gut bacterium that destroyed penicillin. Penicillin had at that point been given to no patient at all, and would not be for another year. The organism had not encountered the drug in a hospital, because there were no hospitals using it, and whatever the enzyme was for, it was not a response to human treatment. The observation was published, noted as a practical obstacle, and its wider implication was left alone for decades.
- C** The explanation is that antibiotics are not human inventions. They are weapons made by microbes, mostly soil-dwelling ones, and used against other microbes in a competition that has been running for a very long time, in soil that holds thousands of competing species in a spoonful. The great majority of the drugs in clinical use are these compounds or chemical modifications of them. If the weapons are ancient, the defences against them must be at least as old, because an organism that made a poison in a crowded environment would be surrounded by neighbours under pressure to survive it. Resistance is the other half of the same arms race, and we walked into the middle of it.
- D** Gerard Wright's laboratory tested this directly. His group cultured hundreds of bacteria from soils across a continent and challenged each one with a panel of antibiotics. Every isolate resisted several, and the average was closer to eight. More striking, some resisted drugs that no soil organism could have met, because they were synthetic compounds made in a laboratory and never released into the environment. The resistance mechanisms were general enough to cover molecules that had not existed when they evolved. A pump that removes a broad class of foreign compounds from a cell does not need to have been shaped by any particular one of them.
- E** A stronger test needs bacteria that could not have been contaminated by anything modern. Hazel Barton, a microbiologist who works underground, collected them from Lechuguilla Cave in New Mexico, in chambers that water takes millions of years to reach and that no human had entered before the 1980s. Tested afterwards in Wright's laboratory, the bacteria taken from those rock surfaces proved resistant to most of the antibiotics they were offered, including several introduced in the

second half of the twentieth century, and one organism resisted twenty-six of them. Because the cave sits under a thick and unbroken seal of rock, the possibility that these bacteria had recently met a hospital drug can be ruled out rather than merely thought unlikely.

F Ancient DNA supplied the date. A team working with Hendrik Poinar recovered genetic material from Yukon permafrost sediments dated to about thirty thousand years ago and found genes for resistance to several drug families, among them vancomycin, which was not used in medicine until the 1950s. The obvious worry with any such result is that modern material has seeped into the sample, and the team addressed it in the way this field has learned to: by checking that the DNA carried the chemical damage that genuine ancient DNA accumulates, and by rebuilding one of the genes in the laboratory and showing that the protein it made worked.

G None of this makes the way we use antibiotics harmless, and the finding has been quoted to suggest that it does. The reservoir is ancient; the emergency is not. What human use has done is to apply enormous and continuous selection inside hospitals and farms, which converts a scattered ability held by harmless soil organisms into a common feature of the bacteria that infect people, and to provide the crowding and the gene-swapping that move those genes across from one to the other. The distinction is practical rather than academic. It tells you that resistance can be slowed and cannot be eliminated, and that a strategy which assumes the second is aiming at something that was never available.

Questions 14–20

Reading Passage 2 has seven paragraphs, A–G.

Choose the correct heading for each paragraph from the list of headings below.

Write the correct number, I–X.

List of Headings

- i** A defence that also covers modern compounds
- ii** A defence that covers natural compounds only
- iii** Weapons that were not our invention
- iv** Evidence from a place nothing modern could reach
- v** Evidence that came with a date attached
- vi** A warning against the wrong conclusion
- vii** A finding that came before the drug was in use
- viii** The usual account, and the one thing wrong with it
- ix** The usual account, and why none of it holds
- x** How the first supplies were manufactured

14 Paragraph A

15 Paragraph B

- 16 Paragraph C
- 17 Paragraph D
- 18 Paragraph E
- 19 Paragraph F
- 20 Paragraph G

Questions 21–24

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

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

List of Researchers
A Abraham and Chain
B Gerard Wright
C Hazel Barton
D Hendrik Poinar

- 21 described a penicillin-destroying enzyme before any patient had been given the drug
- 22 showed that soil bacteria could resist compounds made only in a laboratory
- 23 worked with genetic material recovered from permanently frozen ground
- 24 collected the samples from a cave that people had not entered until the 1980s

Questions 25–26

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

- 25 Why does the writer mention that some soil bacteria resisted synthetic drugs?
- A to show that laboratory compounds are more dangerous than natural ones
 - B because it shows the defences are not specific to any single molecule
 - C to explain why synthetic antibiotics were abandoned
 - D because soil organisms were the original source of those drugs
- 26 What does the writer say the ancient reservoir means in practice?
- A Careful use of antibiotics makes no difference to the outcome.
 - B Resistance can be slowed but not got rid of.
 - C New drugs will continue to be found in soil.
 - D Hospitals are not where resistance arises.

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

Why practice stops working

Almost everybody who does something for a living gets better at it for a while and then stops. The curve is the same across an unlikely range of occupations. Improvement is rapid at first, slows, and flattens, and the flat part can last thirty years. Typists reach a speed and keep it. Drivers are no safer in their fortieth year than in their fifteenth. Studies of several clinical specialities have found that the number of years a practitioner has been working predicts performance weakly, and in some measures predicts it in the wrong direction, with the longest-serving practitioners scoring below those a decade behind them.

The popular explanations are both wrong and they are wrong in opposite ways. One says that expertise is a matter of accumulated hours, so that anybody who puts in enough time will arrive. The other says that hours are beside the point and the difference is talent, so that those who plateau were never going to do better. The first cannot explain the plateau, since the hours continue and the improvement does not. The second cannot explain the people who break out of it, often late, and often after changing how they work rather than how hard.

The mechanism is easier to see if you ask what practice is actually doing. Early on, a skill is assembled deliberately: each part is attended to, each part is slow, and the whole thing occupies the mind completely. With repetition the parts run together and drop out of awareness, until the skill executes itself and the attention it used to consume is released for something else. This is not a side effect. It is the point of practice, and it is what makes a skill usable in real conditions.

It is also the reason improvement stops. A process that runs without attention cannot be adjusted, because adjusting it requires noticing it. Once driving is automatic the driver is no longer practising driving; the driver is driving, and doing so while thinking about something else. Twenty more years of that produce twenty more years of the same performance, very reliably delivered. Automaticity buys competence at the price of further change, and most working environments are arranged to collect the competence and never ask for the change.

What breaks the plateau is well described and rarely available. It requires working slightly beyond current reliability, where errors are frequent enough to be informative; it requires knowing within seconds or minutes whether each attempt was right, which ordinary work almost never supplies; and it requires attention on the process rather than the result. Anders Ericsson, who spent a career documenting this, found the pattern in musicians, chess players and athletes, and found that it is exhausting, that few people manage more than a few hours of it a day, and that it looks nothing like doing the job. His subjects were not repeating performances; they were isolating the parts of a performance they could not yet do.

The conditions are worth stating plainly because they explain the distribution. Surgeons who operate on the same procedure daily may never learn whether a patient did well six months later, so the feedback that would drive improvement does not arrive. Teachers see their results years after they can act on

them, and by then the class has dispersed and the lesson that produced the result cannot be identified. Forecasters who make vague predictions can never be scored, and a prediction that cannot be scored cannot be learned from. In every one of these cases the person is working hard, is experienced and is not improving, and the reason is not effort or ability but a missing signal.

The concession is substantial and should be made without hedging. Automaticity is not a defect to be trained away. Nobody could drive, operate or teach while deliberating over every component, and a practitioner who tried would be worse at the job, not better. Deliberate practice is also not a general prescription for a working life: it is uncomfortable, it cannot be sustained for eight hours, and treating every task as an occasion for self-improvement is a good way to do the task badly. Most of what anybody does should run on rails.

What follows is narrower than the usual advice. If improvement matters in a particular skill, it will not come from doing the skill more; it must be arranged for separately, in short sessions, on a component chosen because it is unreliable, with a source of feedback built in beforehand rather than hoped for. And when it has not been arranged, the honest thing is to stop describing the resulting plateau as experience, since experience is what the years produce whether or not anything improves.

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 writer thinks people who stop improving have reached the limit of their ability.
- 28 The writer regards automatic performance as necessary rather than as a fault.
- 29 The writer thinks employers should pay for the time deliberate practice takes.
- 30 The writer believes that the absence of prompt feedback explains many plateaus.
- 31 The writer recommends treating every task as an opportunity to improve.
- 32 The writer considers musicians easier to study than surgeons.

Questions 33–36

Complete the summary below.

Choose **NO MORE THAN TWO WORDS** from the passage for each answer.

Why the curve flattens

In the early stages a skill is put together **33**, with every part slow and attended to. Repetition runs the parts together until the skill executes itself, which releases the

34 it used to take up. That is the purpose of practice, and also the reason change

stops, because a process running without notice cannot be **35** Leaving the plateau means working just beyond present **36**, where mistakes come often enough to teach something.

Questions 37–40

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

- 37** What does the passage say about years of experience in clinical work?
- A They reliably improve performance.
 - B They predict performance weakly, and sometimes in reverse.
 - C They matter less than the number of patients seen.
 - D They have not been examined.
- 38** According to the writer, why is ordinary work a poor setting for improvement?
- A The tasks involved are too varied.
 - B Results arrive too late to be attached to what caused them.
 - C People are not sufficiently motivated to improve.
 - D Employers actively discourage experiment.
- 39** What does the writer say about Ericsson's findings?
- A They show that natural talent decides the outcome.
 - B They describe an activity quite unlike doing the job.
 - C They apply only to musicians.
 - D They show that more hours are always better.
- 40** What does the writer conclude about the word *experience*?
- A It should be reserved for skill that can be measured.
 - B It names what the years produce, whether or not anything improved.
 - C It is a better guide to quality than a test score.
 - D It has no useful meaning.