

Academic Reading Paper 34

Needlework, Exoplanets and Rules

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.

Made by the losing side

The Bayeux Tapestry is not a tapestry. A tapestry is woven, with the picture built into the cloth as it is made, and this is embroidery: a strip of bleached linen about sixty-eight metres long and half a metre high, onto which wool has been stitched. The distinction is not pedantry, because the technique explains the survival. The stitch used for the filled areas lays long threads across the shape, then lays a second set across those, then tacks the whole arrangement down with small stitches at intervals. It covers ground quickly and uses perhaps a third of the wool that a solid stitch would need, and it leaves the linen underneath still flexible. A lighter cloth is a cloth that can be rolled, moved and stored for nine centuries, and a heavier one would have cracked along its folds long ago.

The colours come from three plants. Woad gives blue, madder gives red and terracotta, weld gives yellow, and by combining and diluting them the workshop produced eight shades in all, which is a small palette used with some discipline. Horses are worked in whatever colour suits the composition rather than the colour a horse would be, so a blue horse stands beside a red one and a green one, sometimes with two legs of each colour, and nobody appears to have thought this required explanation.

The scale of the thing is easier to state than to imagine. There are fifty-eight scenes running continuously from left to right, containing six hundred and twenty-six human figures, two hundred and two horses and mules, and more than five hundred other animals and birds, most of them in the narrow decorative bands above and below the main action. Latin captions run along the top of the picture, naming people and announcing what is happening, in a style closer to a caption than to a chronicle, telling the viewer who is who rather than arguing a case.

It was almost certainly made within twenty years of the events it shows, and the patron was almost certainly Odo, bishop of Bayeux, who was William's half-brother. He appears three times, in each case doing something creditable, and one scene credits him with rallying the Norman line at a moment when it was breaking. No independent account gives him that role. A man who commissions a picture of a battle tends to appear in it, and to appear well.

The interesting question is who held the needle, and the evidence points across the Channel. English embroidery was the finest in Europe at the time, known on the continent by a Latin name meaning simply English work, and was exported as a luxury. The Latin contains spellings that follow English rather than continental practice. Several of the drawn figures and decorative creatures can be matched against manuscripts known to have been produced at Canterbury, down to the postures of particular beasts, and Canterbury was in Odo's hands after the conquest. The likeliest account is that a Norman patron commissioned an English workshop, in a city he now governed, to illustrate a Norman victory over the English.

That arrangement leaves marks. The English characters are not treated as one would expect from a purely Norman account. Harold is shown rescuing two men from quicksand during the Breton campaign, an act of courage that does nothing for the Norman case. The scene of the oath, on which the whole Norman claim depends, is captioned so briefly that it does not say what Harold swore, and the design gives no help either. An artist wholly committed to the patron's argument would have made that panel unambiguous, since it is the hinge on which everything else turns, and this one did not.

Whether this reflects quiet resistance or simple politeness is not decidable from the cloth, and confident readings in either direction go beyond what the evidence can carry. What is clear is that the object is not a Norman document. It is a Norman commission executed by people from the defeated side, and the seams show, which makes it a better historical source than a piece of straightforward propaganda would have been.

Its survival owes a good deal to luck. In 1792 revolutionary authorities in Bayeux requisitioned it as canvas for covering wagons, and a local lawyer intervened and substituted other cloth. Napoleon had it brought to Paris and put on public display while he was contemplating an invasion of England, as an illustration of what had been done before, and sent it back when the plan was abandoned. In 1944 a German research organisation had it moved to the Louvre with a view to taking it to Berlin, and the war ended first.

Questions 1–5

Complete the table below.

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

What the object is made of		
Element	Detail	Why it matters
The ground cloth	bleached 1 , about sixty-eight metres long	it can be rolled and moved
The stitch	long threads laid across the shape and tacked down at 2	it uses about a 3 of the wool a solid stitch would need
The dyes	three plants: woad, madder and 4	combined and diluted to give 5 shades in all

Questions 6–9

Complete the sentences below.

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

- 6** Across fifty-eight scenes there are 626 human figures and 202 horses and
..... •
- 7** Most of the five hundred other animals appear in the narrow decorative
above and below the main action.
- 8** Harold is shown rescuing two men from during the Breton campaign.
- 9** In 1792 the authorities in Bayeux wanted to use it as canvas for covering
..... •

Questions 10–13

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.

- 10** The horses are worked in colours chosen for the design rather than for realism.
- 11** Other sources confirm the role the work gives to Odo at the battle.
- 12** The embroiderers deliberately undermined the Norman case.
- 13** The object is described in the passage as a straightforward piece of propaganda.

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

The planets nobody expected

- A** For most of the twentieth century the existence of planets around other stars was assumed rather than known, and the assumption rested on the fact that we have some. Detecting one directly is close to impossible, because a planet shines only by reflected light and sits, from our distance, at a hair's breadth from an object billions of times brighter. The methods that eventually worked do not look at the planet at all. They look at the star and infer the planet from what it does to it, which is why the first ones found were the ones that do the most to their star, and why the earliest catalogue was a catalogue of extremes.
- B** The first confirmed detection is the one that gets left out of the story. In 1992 Aleksander Wolszczan and Dale Frail reported planets orbiting a pulsar, the collapsed remnant of an exploded star, detected from tiny regular variations in the arrival times of its radio pulses. A pulsar is an exceptionally precise clock, more regular than most laboratory standards, so very small movements of it show up as changes in the timing of pulses that arrive on schedule to the microsecond. The finding was solid and it was strange enough to be filed as a curiosity, since nobody had asked whether planets could exist around an object of that kind, and it did not feel like an answer to the question people were actually asking, which was whether there are other systems like ours.
- C** That question was answered in 1995 by Michel Mayor and Didier Queloz, who measured the wobble of an ordinary star. A planet does not orbit its star so much as the two orbit their common centre of mass, so the star moves in a small circle, and that motion shifts the wavelengths of its light rhythmically. The planet they found around the star 51 Pegasi had roughly the mass of Jupiter and completed an orbit in four days, which placed it far closer to its star than Mercury is to ours, and gave it a surface temperature above a thousand degrees.
- D** Nothing in the accepted theory of how planets form permitted such an object. A gas giant was supposed to require the cold outer part of a system, where ice can survive to build a core large enough to hold an atmosphere. A Jupiter in a four-day orbit was therefore not a discovery that filled a gap; it was a result that broke the model, and the model had to be rebuilt around the idea that planets can form where the theory allowed and then migrate inwards through the disc of gas they were born in.
- E** There is a detail here that ought to be taught more often. A Canadian team led by Bruce Campbell and Gordon Walker had been measuring stellar wobbles since the early 1980s, with equipment good enough to have found such planets, and their data contained signals of the right kind. They did not claim them. The signals implied objects in orbits the theory said could not exist, and the responsible reading of an impossible result is that the instrument or the method is at fault. They pub-

lished cautiously, doubted themselves, and were right about everything except the theory they were checking their result against. Doubting an anomalous measurement is correct behaviour in almost every case, which is what makes this one uncomfortable.

F The method that produced the numbers came later and works differently. If a planet's orbit happens to lie edge-on to us, the planet crosses the face of its star once per orbit and the star dims very slightly, by about one part in ten thousand for an Earth-sized planet. The Kepler telescope stared at a single patch of sky from 2009, watching about a hundred and fifty thousand stars continuously for years, and produced several thousand confirmed planets. Its real contribution was statistical rather than a matter of individual discoveries: small planets turn out to be common, and a large fraction of ordinary stars have at least one.

G Every one of these methods is biased in the same direction, and the bias has to be held in mind whenever a census is quoted. A wobble is easier to see if the planet is heavy and close. A transit is easier to see if the planet is large and its year is short, since a long orbit means waiting years for a second crossing. The catalogue is therefore not a sample of what is out there; it is a sample of what these techniques can reach, and the shape of the real population has to be reconstructed by correcting for what the instruments could not have seen.

Questions 14–18

Reading Passage 2 has seven sections, A–G.

Which section contains the following information?

Write the correct letter, A–G.

NB You may use any letter more than once.

- 14** a warning about how a catalogue should be read
- 15** an acknowledgement that the cautious response was normally the right one
- 16** a reason why a genuine result was treated as a curiosity
- 17** the size of the dimming a small planet produces
- 18** an explanation of why direct observation is impractical

Questions 19–22

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

Match each statement with the correct researchers, A–C.

NB You may use any letter more than once.

List of Researchers

- A Wolszczan and Frail
- B Mayor and Queloz
- C Campbell and Walker

- 19 They detected planets using an object that keeps time to the microsecond.
- 20 They found an object that the theory of planet formation did not allow.
- 21 They had signals of the right kind and declined to claim them.
- 22 They measured the rhythmic shift in the wavelengths of a star's light.

Questions 23–26

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

List of Words

- A reflected
- B migrate
- C transit
- D extremes
- E statistical
- F pressure
- G sample
- H instrument

What the methods can and cannot see

Because a planet shines only by **23** light, the methods that work examine the star instead, and the earliest catalogue was therefore a catalogue of **24** The 51 Pegasi result forced the model to allow planets to **25** inwards after forming. Kepler's main contribution was **26** rather than a matter of individual discoveries.

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

When a rule beats a judgement

The argument between rules and discretion is usually conducted as a question about trust. One side holds that a rule is a crude instrument written by somebody who has not met the case in front of you, and that a competent person should be allowed to decide. The other holds that judgement is where bias, fatigue and self-interest enter, and that a rule is how an institution protects the people it serves from the people it employs. Both are describing real failures, and both can produce a long list of cases. The argument goes nowhere because it is being conducted about the wrong thing.

The question is not which is better in general. It is which features of a decision make a rule worth having, and there are three that matter. The first is repetition: a rule is a fixed cost that is paid once and recovered over every instance, so it pays for itself where the same decision recurs and is a waste where it does not. The second is the cost of an error, and in particular whether errors are recoverable. The third is the position of the person deciding, and this is the one that is usually left out.

That third condition deserves stating plainly, because it is where most of the value sits. A rule is not only a constraint on the decider; it is a protection for them. A doctor who has a protocol for when to admit a patient has something to point at when a family is insisting. An official who cannot make an exception cannot be pressed to make one, and cannot be blamed for not making one. Where a decision attracts pressure — from a customer, a superior, a relative, or the decider's own tiredness at the end of a shift — the rule is doing work that has nothing to do with anybody's competence.

This explains a pattern that otherwise looks like distrust of professionals. Airline crews are forbidden to hold non-essential conversation below ten thousand feet, and nobody thinks the pilots are incapable of judging when to stop chatting. The rule exists because the judgement is being made under exactly the conditions that degrade it, by somebody who will be busy and who cannot be interrupted to reason about it. Binding yourself in advance, at a calm moment, about a decision you will later make badly is not a confession of incompetence. It is the ordinary use of a rule.

The other side of the ledger is equally clear and rather easier to see, since everyone has been on the wrong end of it. A rule is written from the cases the author could imagine, and the world produces cases they could not. When one arrives, everybody involved can see that the rule is producing an absurd result, and the rule does not care. The person applying it is often blamed for the absurdity, which is unfair, since following it was the whole of their job as defined by the institution that wrote it.

So the interesting question about any rule system is not the quality of the rules. It is the override: who may set one aside, what they must record when they do, and whether doing so is treated as a fault. A system where nobody can override anything will produce visible cruelties and will be defended on the

grounds that the alternative is chaos. A system where anybody can override anything has a rule in name only, and reintroduces every pressure the rule was there to absorb. What works is a narrow power to override, held by somebody identifiable, exercised in writing, and reviewed.

The writing matters more than it sounds. An override that has to be recorded is one that has to be justified, which filters out the ones made from fatigue or pressure while allowing the ones made from a genuine feature of the case. It also produces the only thing that improves a rule over time, which is a list of the situations in which it failed. A rule system with no record of its own exceptions cannot learn, and will drift further from the world every year while appearing to work perfectly.

None of this settles any particular case, and it is not meant to. What it replaces is the general argument, which cannot be won, with four specific questions: does this decision recur, how bad is an error, is the decider under pressure, and who may set the rule aside. Two people who disagree about rules in the abstract will often find they agree about a case once those are asked, which is a reasonable test of whether a distinction is worth anything at all.

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 the sterile-cockpit rule implies pilots cannot be trusted to judge for themselves.
- 28** The writer accepts that a rule can protect the person applying it.
- 29** Most institutions currently record their overrides in writing.
- 30** The writer believes a person who applies a rule to an absurd case deserves the blame.
- 31** The writer holds that a system in which anybody may override a rule has a rule in name only.
- 32** Written rules work better in large organisations than in small ones.

Questions 33–36

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

Endings

- A it is a fixed cost recovered over every instance.
- B the judgement is being made under conditions that degrade it.
- C it filters out the ones made from fatigue or pressure.
- D the rule produces an absurd result and does not care.
- E the people writing the rules were not competent.
- F professionals resent being supervised.
- G the institution can then avoid recording anything.

- 33 A rule pays for itself where a decision recurs, because
- 34 Airline crews are forbidden non-essential conversation below ten thousand feet because
- 35 When a case arrives that the author could not imagine,
- 36 Requiring an override to be written down is valuable because

Questions 37–40

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

- 37 Which of the three conditions does the passage say is usually left out?
- A Whether the decision recurs.
 - B How costly an error is.
 - C The position of the person deciding.
 - D How long the rule has been in force.
- 38 Which position does the writer reject?
- A That a rule system should have a narrow power of override.
 - B That the quality of the rules is the interesting question.
 - C That a rule can be written only from cases its author imagined.
 - D That recording exceptions is how a rule system learns.
- 39 What does the passage say happens to a rule system that keeps no record of its exceptions?
- A It becomes more flexible over time.
 - B It drifts from the world while appearing to work perfectly.
 - C It is quickly abandoned.
 - D It produces fewer absurd results.

- 40** Which of the following best expresses the writer's proposal?
- A** Replace the general argument with four questions about the particular decision.
 - B** Prefer rules to judgement wherever possible.
 - C** Prefer judgement to rules wherever possible.
 - D** Write more detailed rules so that fewer cases fall outside them.