

ICAS-STYLE PREPARATION SERIES

Paper I

English · Writing · Science · Mathematics

Form 5 / Secondary 4–5

An independent preparation resource to help students prepare with confidence. All questions are original and written specifically for this workbook.

● English · 35 Q

● Writing · 2 tasks

● Science · 10 Q

● Mathematics · 12 Q

THIS WORKBOOK BELONGS TO

NAME

CLASS / FORM

SCHOOL

DATE STARTED



How to Use This Workbook

PAPER I • FORM 5 / SECONDARY 4–5

This workbook is an independent preparation resource for students preparing for the ICAS-style Paper I assessments in English, Writing, Science and Mathematics. Every question is original, written specifically for this workbook, and designed to test the same skills and knowledge areas as the real Paper I assessment. Paper I is offered under the ICAS format only — not Reach — and represents the highest level of the series available in Malaysia (Form 5 / Lower 6) and Singapore (Secondary 4–5 / 5).

Paper I raises the bar significantly from Paper H. In English, texts are denser and more abstract; questions now ask you to evaluate the writer's own argument against criteria the writer has established, translate a text's ideas into new scenarios, and track tonal differences across two texts simultaneously. In Mathematics, fractional indices, compound interest, the sine and cosine rules, three-dimensional trigonometry, and conditional probability are all expected knowledge. In Science, you will meet Le Châtelier's principle, genetics and pedigree analysis, AC and DC circuits, the law of constant proportion, and the counter-intuitive behaviour of buoyant objects in accelerating systems. Writing rewards not just correct argument but genuine voice — a piece whose final paragraph leaves the reader somewhere distinctly different from where the opening left them.

Do each section timed. Use scratch paper for Mathematics and Science calculations. Mark your work against the Answers section, read every explanation — including for questions you got right — and return to any question you found difficult after two or three days have passed. The questions you answer correctly on the second attempt are the ones that have genuinely moved into long-term memory.

At a glance — official Paper I format (Sources: eats.com.my · eats.com.sg)

SUBJECT	QUESTIONS	TIME	NOTES
English	55	1 hour	Reading comprehension, writer's craft, syntax, vocabulary · MCQ
Writing	1 task	35 minutes	Narrative or persuasive · common marking scale · lockdown browser
Mathematics	40	1 hour	Multiple choice · Q36–40 free response in real paper
Science	40	1 hour	Multiple choice · every question with visual stimulus
Digital Technologies	—	—	Not offered at Paper I

THE THREE-PASS STRATEGY – PAPER I VERSION

At Paper I the average question requires three or four reasoning steps. A single slow pass through the paper is a losing strategy. Use three passes instead:

- **Pass 1 — Sweep.** Answer every question solvable in under 45 seconds. Mark anything requiring more and move on. Reach the last question before the halfway mark on the clock. At Paper I this means roughly a third of questions will be marked on the first pass — that is normal and expected.
- **Pass 2 — Settle.** Return to marked questions with the remaining time. Two to three minutes per question is appropriate. At Paper I many of the hardest questions (genetic pedigrees, two-graph chains, multi-step algebraic rate problems) reward the second attempt more than the first precisely because you have already read the stimulus once.
- **Pass 3 — Check.** The last three to four minutes: re-read any answer where you were uncertain. At Paper I the most common error is not a wrong concept but a correct reasoning chain applied to the wrong referent — the wrong column in a table, the wrong strand in a stem-and-leaf plot, the wrong paragraph in a passage.



English

READING · WRITER'S CRAFT · VOCABULARY ·
SYNTAX

35 questions

~45 min

At Paper I, every text is genuinely demanding — philosophically, syntactically, or rhetorically. Questions will frequently ask you to evaluate the writer's own argument against criteria the writer has established, to reconstruct what has been implied or omitted, or to translate a text's central insight into a new context. The hardest questions have no directly quotable answer; you have to build the answer from inference across the whole text.

WHAT IS NEW AT PAPER I

- **Meta-argumentative questions.** The writer's own argument may depend on an assumption the writer elsewhere questions. To answer these correctly you have to step outside the text and evaluate the argument's structure from the outside.
- **Applied synthesis.** "Which situation is most similar to the insight described in the final paragraph?" — you must translate the text's claim into a new context, which requires understanding the claim in the abstract, not just in the passage.
- **Cross-text tone comparison.** In the paired text set, you will be asked how the tone at the end of the poem differs from the tone at the end of the prose text. Both words in the pair must be right.
- **Two-column table questions.** These appear 2–3 times. They compare two characters' positions, two moments in a text, or two texts' treatments of the same idea. Read all four rows before selecting.
- **NOT questions on grammatical function.** Three of the four labelled words in the passage will be performing the stated grammatical role. One will not. Eliminate carefully.

The Examined Life

A PHILOSOPHICAL ESSAY

The question Socrates posed (that the unexamined life is not worth living) has survived for two and a half millennia not because everyone agrees with it but because everyone who has thought carefully about their own experience suspects it might be true. The phrase has a satisfying quality: the quality of a sentence that sounds obviously right until you try to live by it.

Begin by noticing what the claim requires. It requires, first, that you be capable of stepping back from your life in order to observe it: there must be a vantage point from which the living can be looked at. This is less straightforward than it sounds. The vantage point is not given; it has to be constructed, and the construction takes time, attention, and a willingness to be made uncomfortable. Second, the claim requires that the examination produce something (insight, revision, improvement) rather than merely producing more examination. A life spent examining itself and arriving at nothing new is not, on Socrates' view, enriched; it has simply exchanged one form of thoughtlessness for another.

Those who find the claim compelling argue that the alternative is worse. Without examination, they say, we are at the mercy of instinct, habit, and other people's assumptions about what matters. The examined life, even imperfectly examined, is at least one we have some hand in choosing. The Stoics made this point with particular force: what we cannot examine, we cannot govern, and what we cannot govern is not, in any meaningful sense, ours.

The difficulty arrives when we turn from the argument's logic to its practice. Examination, it turns out, is easier to perform than to sustain. There is a kind of person, recognisable in any university seminar, in any long-running therapy, in any philosophical conversation that has gone on too long, who has become so accomplished at examining their life that the examination has become the life. Every decision is appraised before it is made, every relationship evaluated before it is experienced, every feeling annotated before it has finished being felt. The examined life, at this extreme, consumes its subject. The person who can describe themselves with perfect clarity is not necessarily the person who knows what to do next.

There is also a question about the direction of causality that the claim does not address. Socrates assumed that examination produces wisdom, and wisdom produces better living. But the relationship may run the other way. Those who are living well, absorbed in work they find meaningful and relationships they find sustaining, may have little occasion to examine their lives because their lives are already answering the questions that examination is supposed to resolve. The examined life may be the consolation of those whose unexamined life has, for one reason or another, stopped working.

None of this is to say that Socrates was wrong. The instinct to understand one's own experience is too deep, and too obviously connected to human flourishing, to be dismissed. But the wisdom may lie in a less absolute version of the claim: not the unexamined life, but the life that cannot be examined at all: the life that resists reflection not out of contented fullness but out of fear. That life is the one we should be most worried about.

1

WRITER'S CRAFT • ANALYSE/EVALUATE

The opening paragraph is most effective because it

- A establishes a claim that appears settled and then immediately questions whether it can be put into practice, positioning the reader to hold both responses simultaneously.
- B provides a historical overview of how the Socratic claim has been interpreted across two and a half millennia.
- C concedes the weakness of Socrates' position before defending a modified version of it.
- D defines the precise terms that the rest of the essay will use to evaluate the examined life.

2

TEXT COMPREHENSION • UNDERSTAND/EXPLAIN

The main counter-argument that the writer attributes to defenders of examination is that

- A without examination, we remain subject to instinct, habit, and assumptions absorbed uncritically from those around us.
- B the Stoic tradition provides the strongest available evidence that self-examination produces lasting wisdom.
- C the difficulty of examination is itself a sign that it is producing something worthwhile.
- D examination is valuable precisely because it is difficult to sustain across a lifetime.

3

WRITER'S CRAFT • ANALYSE/EVALUATE

The main purpose of the fourth paragraph, which describes the person who has become too accomplished at self-examination, is to

- A provide a biographical example of the kind of person Socrates was criticising.
- B demonstrate that the examined life, pursued without limit, can produce the same emptiness the claim was designed to prevent.
- C establish that most people who believe they are examining their lives are not doing so sincerely.
- D argue that philosophical conversations are a particularly harmful form of self-examination.

4

VOCABULARY • UNDERSTAND/EXPLAIN

Which word is closest in meaning to *accomplished* as it is used in the fourth paragraph?

- A celebrated
- B skilled
- C burdened
- D finished

5

TEXT COMPREHENSION • ANALYSE/EVALUATE

The writer's own argument that examination should produce something rather than merely more examination itself depends on being able to identify when examination has become excessive. The most accurate description of this is that the argument

- A is internally consistent and does not rely on any unstated assumption.
- B is internally inconsistent because the writer both defends and attacks Socrates.
- C requires precisely the kind of reflective vantage point whose availability the writer elsewhere questions — the capacity to observe one's own examination from the outside.
- D is borrowed from the Stoic tradition without acknowledgement.

A committed defender of the Socratic position would most likely respond to the writer's fifth paragraph, which suggests that the examined life may be a consolation for those whose unexamined life has stopped working, by arguing that

- A** the Stoics were not genuinely committed to self-examination and should not be cited in its defence.
- B** the distinction between living well and examining one's life is false, because genuine examination is already a form of living well.
- C** the writer has confused self-examination with self-indulgence throughout the essay.
- D** the apparent fullness of an unexamined but successful life is itself unexamined, and therefore cannot be reliably identified as fullness rather than as comfortable avoidance.

The Companion

FROM A NOVEL

Mrs Hartley was one of those people who never let you finish carrying anything. Before the sentence could be completed, the offer of help still forming in the air, the bag was already out of your hands, the door already held, the difficulty already navigated. At Brentwood, where she had been companion to the elderly Lady Pryce for eleven years, she was regarded with a warmth that had at its edges something almost like suspicion, though it could not quite be called that, in the minds of those who experienced her.

I had come to speak to Lady Pryce about the possibility of having her memoirs written. I found, instead, that I was observing Mrs Hartley. She was a woman of forty-something, with an air of assiduous tidiness — someone who had arranged herself very carefully, down to the plain band of her watch and the particular angle at which she folded her hands. She anticipated Lady Pryce's every requirement with a precision that, when I thought about it later, was not quite the same as knowing her well. It was more like having memorised a part. She knew the lines; she also knew when they were about to be delivered.

'She is extraordinary,' I said to Mrs Fordham, Lady Pryce's solicitor of thirty years, who had agreed to speak to me over tea in the library. I said it as a compliment, and Mrs Fordham received it as one, briefly, before adding: 'She is the most useful person I have ever met. Which is not, you understand, the same thing as the most kind.'

I turned this over for several days. What Mrs Fordham was pointing at was something I had noticed but not named: that Mrs Hartley's helpfulness had a quality one wanted to call *directed*. It was not random. It settled most fully on those who were positioned to be grateful in ways that could be observed by others, and it retreated, imperceptibly, from those who were not. A visitor who was already comfortable required less of her attention than one who was visibly grateful. Whether this was calculation or simply a very refined sensitivity to need, I was not able to say with certainty.

What unsettled me most was the moment, late in my third visit, when I realised I had been talking for twenty minutes about a project of mine that had nothing to do with Lady Pryce. Mrs Hartley had asked two questions. What I remembered was not the questions but the quality of her attention: focused, patient, receiving every word as if it were exactly the word she had been waiting for. When I was done she said something generous and precise about what I had said, and I thanked her, and walked to my car feeling better about the project than when I had arrived.

In the car I sat for a moment with the leather-covered journal I had been carrying all afternoon: the one with which she had not offered to help, I now realised. She had not offered to help me with it. I had been holding it in plain sight for three hours, and she had not once reached for it.

I started the car. I did not quite know what to think. But I held the journal a little more carefully than I needed to, as if keeping a grip on something that could still be taken.

7

TEXT COMPREHENSION • UNDERSTAND/EXPLAIN

What does the narrator ultimately discover about Mrs Hartley?

- A She is genuinely and unselfconsciously kind, with no strategic intention behind her helpfulness.
- B She is deliberately unkind to people she dislikes, and uses helpfulness as a tool of social exclusion.
- C Her helpfulness appears to have a directed quality — settling most on those who can be visibly grateful — though whether this reflects calculation or refined sensitivity the narrator cannot determine.
- D She has memorised the narrator's project in advance and is merely pretending to be hearing about it for the first time.

8

VOCABULARY • UNDERSTAND/EXPLAIN

The word *assiduous*, as used in the second paragraph, most nearly means

- A self-conscious and slightly anxious in manner.
- B showing great care and thoroughness in all that one does.
- C quiet and reserved in company.
- D elegant in dress and manner.

The leather-covered journal is introduced at the start of the sixth paragraph and revisited at the close. What is the main effect of this structural choice?

- A** It creates a closing frame that makes Mrs Hartley's failure to offer help the single most significant fact in the story — not a neutral omission but a silence that speaks.
- B** It establishes the narrator's profession as a writer, explaining why they carry a journal at all times.
- C** It provides a contrast between what Mrs Hartley does (helps with bags) and what she cannot understand (intellectual work).
- D** It signals that the narrator does not trust Mrs Hartley enough to set the journal down.

The narrator and Mrs Fordham arrive at different conclusions about Mrs Hartley. Which option correctly represents both positions?

	NARRATOR'S POSITION	MRS FORDHAM'S POSITION
A	Mrs Hartley is extraordinary and should be admired without reservation.	Mrs Hartley is extraordinarily competent and genuinely kind.
B	Mrs Hartley's helpfulness is warm but inconsistent.	Mrs Hartley helps everyone equally.
C	Mrs Hartley's helpfulness may be directed by who is positioned to be visibly grateful, though the narrator cannot be certain it is calculated.	Mrs Hartley is the most useful person she knows, but useful and kind are not the same thing.
D	Mrs Hartley is genuinely kind but tactless in her expression of it.	Mrs Hartley is kind only to those she admires.

11

SYNTAX · ANALYSE/EVALUATE

Which of the following quotations from the passage is NOT used as an adverb?

A 'imperceptibly' (paragraph 4)

B 'briefly' (paragraph 3)

C 'directed' (paragraph 4)

D 'carefully' (paragraph 7)

12

TEXT COMPREHENSION · ANALYSE/EVALUATE

In the final sentence, the narrator says "I held the journal a little more carefully than I needed to, as if keeping a grip on something that could still be taken." What does this suggest?

A the narrator suspects Mrs Hartley will follow them to the car to take the journal.

B the narrator is concerned that the journal contains information Mrs Hartley might find useful.

C the narrator has internalised the logic of Mrs Hartley's behaviour — that things can be removed from you without your quite noticing — and now applies it instinctively to themselves.

D the narrator regrets having spoken so openly about their project and wishes to protect the written record of it.

13

WRITER'S CRAFT · ANALYSE/EVALUATE

The tone of the passage is best described as

A sentimental and nostalgic

B analytical and warily admiring

C dismissive and envious

D warm and uncritical

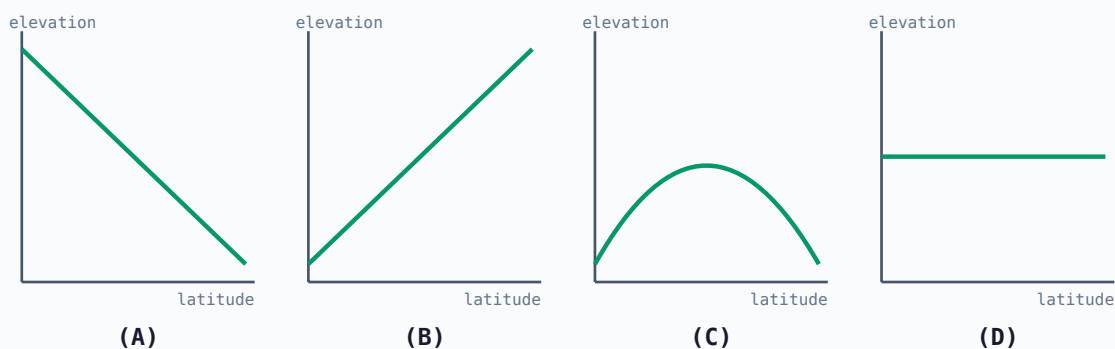
The Invention of the Horizon

A HISTORICAL TEXT

In the first decades of the eighteenth century, a ship's navigator faced a problem that was at once conceptual and practical. To fix a vessel's latitude, the navigator needed to measure the angle between the sun or a star and the horizontal. The horizontal, however, was not always visible. At sea, in rolling swells, the true horizontal had to be inferred rather than observed. The measurement was only as reliable as the navigator's capacity to identify where, precisely, the surface of the sea ended and the sky began.

The instrument that resolved this difficulty was the octant, developed by John Hadley in England and Thomas Godfrey in Philadelphia in the early 1730s. The octant's mechanism was elegant: it used a mirror system to superimpose the reflected image of the sun directly onto the image of the horizon, so that the navigator could align the two in a single view — one eye, one instrument, two reference points fused into one measurement. At the equator, the sun climbs to near-vertical at solar noon; at higher latitudes, that noon angle is progressively lower, approaching the horizon at the poles. This relationship between the sun's apparent elevation at solar noon and the navigator's latitude is represented graphically in the diagram below.

CHOOSE THE GRAPH THAT BEST REPRESENTS THE RELATIONSHIP DESCRIBED



What was novel about this solution was not the optical principle but the insight it embodied about measurement. Previous instruments had asked the navigator to judge the angle directly, estimating the horizon's position by eye. The octant made the horizon a component of the instrument rather than an external reference. The ship no longer navigated relative to the horizon; the horizon, in effect, navigated relative to the ship.

By the 1760s, a refined version — the sextant — had become the standard instrument of ocean navigation. Its superiority lay not only in its greater range but in **21** the double-reflection principle allowed: measuring the angle between two celestial bodies simultaneously, providing a

cross-check of position that single-body measurements could not offer. **22** the instrument became available, reliable longitude determination at sea became possible for the first time in routine practice.

The irony of this story is that the horizon, which navigators had always treated as an imprecise nuisance, became the most precisely used reference point in the history of navigation. What had seemed to be the problem turned out, once properly harnessed, to be the solution. **23** , the instrument exploited the horizon's apparent sharpness at sea level to produce measurements of exceptional accuracy that an artificial horizon aboard a moving ship could not replicate.

14

TEXT COMPREHENSION • UNDERSTAND/EXPLAIN

The main purpose of the opening paragraph is to

- A** provide a biographical account of the navigators who relied on the octant.
- B** establish the practical difficulty that the instrument described in the text was designed to solve.
- C** argue that eighteenth-century navigation was less advanced than previously believed.
- D** compare the challenges of measuring latitude with the challenges of measuring longitude.

15

TEXT COMPREHENSION • IDENTIFY • DIAGRAMMATIC

The text describes how a navigator's latitude determines the sun's apparent elevation at solar noon. Based on the information in the passage, which graph best represents the relationship between latitude (x-axis) and the sun's noon elevation (y-axis)?

- A** Graph A
- B** Graph B
- C** Graph C
- D** Graph D

16

VOCABULARY • UNDERSTAND/EXPLAIN

In the third paragraph, the word *novel* is used to describe the octant's solution. In this context, *novel* most nearly means

☐ A fictional☐ B innovative☐ C published☐ D complicated

17

SYNTAX • CLOZE

Choose the option that best completes blank 21.

☐ A what☐ B which☐ C that☐ D how

18

SYNTAX • CLOZE

Choose the option that best completes blank 22.

☐ A Once☐ B Before☐ C Unless☐ D Although

19

SYNTAX • CLOZE

Choose the option that best completes blank 23.

☐ A Nevertheless☐ B Conversely☐ C Despite this☐ D In this way

The Assessment

FROM A SHORT STORY

The inspector arrives at quarter to nine, which is twelve minutes early. In her experience, schools that know they are being assessed respond to an early arrival in one of two ways: they perform a rapid, visible busyness that is slightly more active than normal activity, or they carry on as if she is not there. The second response is rarer and harder to produce, because it requires the staff to have internalised the idea that what they do is correct regardless of whether anyone is watching. The school before her is doing the second thing.

She has been inspecting schools for fourteen years. In that time she has seen two teachers cry at lunch, one headteacher refuse to speak to her for an entire day, and a class of eleven-year-olds perform a piece of drama so genuinely extraordinary that she had to leave the room for a moment to compose herself. She has also seen a great deal of correctly filed paperwork.

Mr Anand is standing at the whiteboard when she enters his classroom. He has written three sentences on the board, each with a word crossed out in red. He is asking his students to find the word that does more work than the one he removed. Two students answer simultaneously. He holds up a hand, patient rather than dismissive, and waits for the second student to finish before responding to either. He does not look at the inspector.

She watches for forty minutes. During those forty minutes she writes almost nothing in her notebook. *This* is because what is happening is happening too quickly and at too many levels to be easily reduced to notes.

At the end of the lesson she asks whether she might look at three or four exercise books from students who represent the range of the class. He selects four without hesitation. The first book she opens has thirty pages of writing. The marginal comments are in green pen. There are no ticks.

'What is the green for?' she asks.

'The students write in blue. I write in green. They can see exactly which thoughts are theirs and which are mine.'

She closes the book. She is aware, sitting in the plastic chair across from him, of something she has not felt in an inspection for some years: the sense that she is the one being assessed. Not by him; he is looking at the corridor of students filing past. But by the room itself, by the evidence of what work looks like when it is done correctly. She thinks about the fourteen schools she has visited this year and wonders, in each of them, who is writing in green.

She writes two words in her notebook. She closes the notebook.

The second paragraph is written in italics and placed between two passages of present-tense narration. What is the main effect of this?

- A It introduces a second narrator who offers a contrasting view of the inspector.
- B It provides a frame of reference accumulated over fourteen years against which the rarity of what she is now witnessing can be measured without being stated directly.
- C It explains why the inspector was selected for this particular school.
- D It signals a flashback to an earlier point in the inspection day.

The irony of the story's closing ("She writes two words in her notebook. She closes the notebook.") lies in the fact that

- A she has been told by her supervisor to write more detailed notes.
- B the notebook is the wrong colour for the assessment she is conducting.
- C a person whose professional purpose is to produce written assessments of teaching cannot adequately capture in her own medium what she has just witnessed — the medium fails where the teaching did not.
- D she suspects Mr Anand has been writing notes about her visit in his own notebook throughout the lesson.

22

TEXT COMPREHENSION • ANALYSE/EVALUATE

Which of the following does the writer NOT use in this passage?

- ☐ A free indirect discourse, entering the inspector's thoughts while maintaining third-person narration
- ☐ B a symbolic object that functions as a structural device across the whole story (the notebook; the green pen)
- ☐ C direct dialogue between the inspector and the teacher
- ☐ D an explicit statement of the inspector's final written assessment of Mr Anand's teaching

23

TEXT COMPREHENSION • ANALYSE/EVALUATE

The inspector's state of mind shifts across the passage. Which pair of adjectives most accurately captures this shift from beginning to end?

- ☐ A professional to humbled
- ☐ B confident to defensive
- ☐ C methodical to quietly unsettled
- ☐ D detached to envious

24

SYNTAX • UNDERSTAND/EXPLAIN

In paragraph four, the sentence reads: "During those forty minutes she writes almost nothing in her notebook. *This* is because what is happening is happening too quickly..." What does the word *This* refer to?

- ☐ A The fact that forty minutes have elapsed without the inspector speaking.
- ☐ B The fact that she is recording very little in her notebook.
- ☐ C The teaching method Mr Anand is using with the crossed-out sentences.
- ☐ D The arrival of the inspector twelve minutes before the lesson began.

The experience the inspector has in this story, of possessing developed criteria for assessment, then encountering something those criteria cannot adequately capture, is most similar to which of the following situations?

- A** A scientist whose experimental results contradict an accepted theory, leading them to doubt their own method.
- B** A music critic who recognises, while hearing a live performance, that the usual language of musical assessment is inadequate for what they are experiencing in the room.
- C** A doctor who diagnoses a patient correctly but realises afterwards that they used the wrong diagnostic process.
- D** A teacher who discovers mid-lesson that a student has already mastered the material being taught.

Still Life with Light: The Photography of Anna Bergström

A REVIEW OF AN EXHIBITION

The photographs of Anna Bergström were taken over forty years, in six countries, with three different cameras, and were exhibited publicly only twice before her death. The retrospective now showing at the Meridian Gallery brings together one hundred and twelve of them — the first major survey of her work — and I will say at once that it is one of the most significant photographic exhibitions I have reviewed in twenty years of writing about photography. I will also say that I am not a disinterested party: Bergström taught the workshop in which I first learned to develop film, and several of the photographs now on these walls were hanging in her studio when I arrived there as a student. I knew them before I could explain what they were doing to me.

What Bergström was doing, across forty years, was a single thing: she was looking at the way light falls on objects that are not trying to be seen. Not portrait light, not theatrical light: the light that arrives uninvited on a cup on a windowsill, on the back of a coat draped over a chair, on the particular surface of a wall where a picture used to hang. Her subjects are not absent. They are simply elsewhere, leaving behind only the evidence of their presence: a shadow where a hand was, the slight asymmetry of a duvet imperfectly smoothed.

The effect, across a sequence of these photographs, is of reading a language in which the subject is always the implied antecedent of a sentence whose grammatical subject has been removed. You are never quite sure what you are looking for; you are only certain that something was very recently there.

The exhibition's arrangement — chronological, divided by city — is conservative and sensible, and I would have preferred something less so. The conversations between early and late work are more interesting than the argument the chronological arrangement implies. She did not get better over time. She got quieter. The early photographs reach; the late ones wait. Both are doing something that most photographers spend entire careers attempting.

She did not believe, she once told me, that a photograph was a record of what was there. She believed it was a record of what was about to no longer be there.

I have not forgotten the afternoon she said that. Several of the photographs on these walls suggest she had not forgotten it either.

The reviewer's overall judgement of the exhibition is that it is

- A** a technically accomplished show whose value is limited by the reviewer's personal connection to the subject.
- B** a mediocre exhibition made memorable only by the quality of Bergström's early photographs.
- C** a significant exhibition of unusual work, with one curatorial decision (the chronological arrangement) that the reviewer would have made differently.
- D** an emotionally affecting display that lacks the historical context needed to appreciate Bergström's contribution to photography.

The reviewer explicitly declares a personal connection to Bergström in the opening paragraph. How does this affect the reviewer's relationship with the reader?

- A** It undermines the review's authority by signalling an obvious conflict of interest.
- B** It creates intimacy with the reader by making visible the reviewer's own position rather than claiming a neutrality that would be false.
- C** It positions the reviewer above the reader by asserting specialist knowledge the reader cannot access.
- D** It distances the reader by assuming they share the reviewer's personal history with Bergström.

The final two paragraphs are the shortest in the review. What is the main function of this structural choice?

- A** They pivot from analysis to personal testimony, giving the review its final emotional weight by allowing Bergström's own words, and the reviewer's quiet witness to them, to do the work that further argument cannot.
- B** They summarise the preceding argument in a form the reader can take away.
- C** They shift the review's tone from admiring to ambivalent at the last moment.
- D** They reveal that the reviewer ultimately disagrees with Bergström's artistic philosophy.

Which of the following does the reviewer NOT use in the review?

- A** analogy
- B** self-disclosure
- C** extended direct quotation from Bergström's published writing or interviews
- D** structural critique

Text 5 of 5 (Poem) · Questions 30–35

Developing

A POEM · READ ALONGSIDE 'STILL LIFE WITH LIGHT'

- 1 Illumination in the dark room — safelight red,
- 2 that long exhale before the image swims
- 3 up through the chemicals, a stranger's cup,
- 4 a window-ledge, the residue of light
- 5 on everything that waited.
- 6 You were not there when I began this.
- 7 Only the evidence — a shadow where the coat hung,
- 8 the slight depression of a life

9 conducted in a room that kept no record
10 except this one.

11 The paper knows what colour dark is.
12 I ask it only this: to hold a moment
13 after the moment has moved on — to be the room
14 where the gone thing rests.

15 What the print keeps is not the subject.
16 It keeps the quality of light — its angle, temperature,
17 the particular mercy of that afternoon —
18 the way it fell on objects that were not
19 trying to be anything.

20 In the fixing bath I hold you still.
21 You will not fade. You simply do not change.
22 Everything else does; you alone are fixed —
23 perfect, finished, permanently unfinished.

— *after the work of A. B.*

30

WRITER'S CRAFT • IDENTIFY

The closing dedication "after the work of A. B." functions as

- A a simile, comparing the structure of the poem to Bergström's photographs.
- B an allusion, invoking Bergström's work as a source and intertext without fully naming her, an act that mirrors the poem's own interest in presence through evidence rather than direct statement.
- C personification, treating the photographic work as if it were a person the poem addresses.
- D a metonym for all photographers who work in the darkroom tradition.

31

TEXT COMPREHENSION • ANALYSE/EVALUATE

Which quotation from the poem could best be read as a metaphor for what Bergström's photography achieves, according to both the poem and the review?

- A 'to be the room / where the gone thing rests' (lines 13–14)
- B 'the safelight red' (line 1)
- C 'I ask it only this: to hold a moment / after the moment has moved on' (lines 12–13)
- D 'You will not fade' (line 21)

32

TEXT COMPREHENSION • ANALYSE/EVALUATE

The poet reinforces a key idea across different stanzas. Which option correctly matches lines that echo the same central idea?

	FIRST INSTANCE	ECHOING INSTANCE
A	'that long exhale before the image swims' (line 2)	'permanently unfinished' (line 23)
B	'that long exhale before the image swims' (line 2)	'In the fixing bath I hold you still' (line 20)
C	'Only the evidence' (line 7)	'What the print keeps is not the subject' (line 15)
D	'safelight red' (line 1)	'In the fixing bath I hold you still' (line 20)

The gaps between stanzas are noticeably wider than is common in short poems. What is the main effect of this layout choice?

- A** They indicate shifts in the poem's setting from the darkroom to the finished print to the exhibition.
- B** They create a visual rhythm that enacts the experience of waiting — the held breath in the dark before the image appears — and prompt the reader to perform the pause the poem describes.
- C** They signal that lines have been removed from the original draft of the poem.
- D** They emphasise the contrast between the photographer's physical presence and her eventual absence.

How does the tone at the end of the poem differ from the tone at the end of the review?

- A** celebratory versus mournful
- B** melancholic versus analytical
- C** paradoxical and unresolved versus quietly reverential and retrospective
- D** intimate versus scholarly

Refer to **both** the poem and the review. Which of the following does **NOT** present a contrast that is highlighted in one or both of the texts?

- A the permanence of the photograph and the transience of the moment it records
- B what is visible in Bergström's images (light, objects, traces) and what is absent (the people those traces belong to)
- C the technical process of making a photograph and the emotional or philosophical effect of looking at one
- D Bergström's early photographic career and her later commercial success as a photographer



Writing

PERSUASIVE & NARRATIVE · COMMON MARKING SCALE

2 tasks

35 min each

ICAS Writing is marked on a common scale across all levels. The real Paper I gives you **one** task — either narrative or persuasive — with 35 minutes. This workbook provides both so you can practise each genre. Set a timer for 35 minutes per task and treat each one independently.

At Paper I, the Syntax/Punctuation section of the marking rubric is a baseline, not a differentiator. Students who score in the top band at this level are winning in Genre — in the quality and distinctiveness of their thinking — not simply in the correctness of their grammar. The rubric wording is identical at every level; what "creative and skilful integration" means at Paper I is substantially different from what it meant at Paper G.

TASK 1 · PERSUASIVE

The Examined Life

The philosopher Socrates argued that 'the unexamined life is not worth living.' Others argue that the compulsion to examine and justify one's existence is itself a form of anxiety that prevents people from living fully. Take one position. Your piece must state the opposing view in its strongest form — not a weakened version — and then answer that form directly.

GENRE: Persuasive / Opinion piece · TIME: 35 minutes · AUDIENCE: A thoughtful adult reader

BEFORE YOU WRITE • TASK 1

- The Socrates quotation is there to orient you, not to open your piece. Beginning 'Socrates once said...' starts you at Paper E level. Your opening should place the reader immediately inside the question.
- Write the opposing view as one full sentence in your plan *before* you begin drafting, and make it as strong as you can. Your piece must answer that version — not a weaker proxy for it.
- The strongest rebuttal at Paper I does not simply say the other side is wrong. It says: 'Those who hold the opposing view are right about X — and X is genuinely important — but they are wrong that X is decisive, because Y.' Both parts of that move must be present.
- Your final paragraph should leave the reader somewhere different from where the opening left them. If the last paragraph could be read independently of the first, the essay has not moved.
- Avoid the first person announcement of opinion ('I think,' 'In my view'). At Paper I, your position should be visible in the structure and texture of the sentences themselves.

TASK 2 · NARRATIVE

Second Reading

Write the conclusion of a story in which a character re-encounters something they knew well — a place, an object, a piece of writing, a person — and finds that it means something entirely different from what it meant before. You must not explain the change directly. The reader should understand what has changed, and why it matters, entirely from what the character notices and how they notice it.

GENRE: Narrative (conclusion stage) · TIME: 35 minutes · AUDIENCE: A reader who is paying attention

BEFORE YOU WRITE · TASK 2

- Plan both encounters before you write a word: what did this thing mean *before*, and what does it mean *now*? The gap between those two answers is your entire story. If you cannot state both clearly in your plan, the reader will not be able to reconstruct them from the prose.
- You are writing a *conclusion*, not an opening. Begin at the moment of re-encounter — not with backstory. The reader should feel they are arriving at the end of something, not starting at the beginning.
- The constraint is absolute: no sentence may directly state what has changed or how the character feels about it. Everything must be done through what the character sees, touches, remembers, or does — and through the specific language they use to notice these things.
- Two timelines coexist in this piece: the present re-encounter and the memory of the first encounter. Moving between them without a tense slip is part of the craft test. Plan which tense each timeline uses before you begin.
- One sentence doing the work of a paragraph scores higher than a paragraph doing the work of one sentence. Restraint is rewarded. The final image or action should do the work of a page of explanation.



Science

REASONING · INVESTIGATING · INTERPRETING
· PREDICTING

10 questions

~18 min

At Paper I, Science questions give you the science in the stimulus and test whether you can reason with it to reach a conclusion that is not stated anywhere on the page. Nearly half of all questions require Reasoning and Problem Solving. Many require you to chain two graphs, apply a formula in reverse, identify an experimental flaw more subtle than "no control group", or hold two opposing physical effects simultaneously in mind. Read every stimulus carefully — the answer is always derivable from what you are given.

WHAT IS NEW AT PAPER I

- **Wind chill and human physiology.** A simplified formula will be given. Apply it with both variables — do not substitute only one.
- **Law of constant proportion + limiting reagent.** Establish the fixed ratio from the first experiment, then identify which reactant runs out first in the second. Do not assume the reactant listed first is limiting.
- **Le Châtelier's principle.** The question will not ask what high temperature does. It will ask why moderate temperature is the industrial choice — which requires holding two opposing effects (rate vs yield) simultaneously.
- **Genetics and pedigree.** Questions may require conditional probability: $P(\text{carrier} \mid \text{no symptoms})$, not just $P(\text{carrier})$. Eliminate genotypes excluded by the condition first.
- **AC vs DC circuits.** Remember that a diode (or LED) only conducts in one direction — it will only emit during the half of the AC cycle when it is forward-biased.
- **Critique of experiments.** At Paper I, the flaw is always specific, not generic. "The sample size is small" is rarely the answer when a specific methodological error is identifiable.

Wind chill is the perceived decrease in air temperature felt by the body due to the flow of air across a surface. A simplified wind chill model gives the **apparent temperature** (T_{app}) that a person feels:

SIMPLIFIED WIND CHILL FORMULA

$$T_{\text{app}} = T - 0.7 \times (v - 5)$$

where T = actual air temperature ($^{\circ}\text{C}$) and v = wind speed (km/h)

Valid only when $v > 5$ km/h. When $v \leq 5$ km/h, $T_{\text{app}} = T$.

CONDITION	TEMPERATURE (T)	WIND SPEED (v)
Morning	-5°C	30 km/h
Afternoon	$+2^{\circ}\text{C}$	50 km/h

What is the difference in apparent temperature between the morning and afternoon conditions?

A 14.5°C

B 16.5°C

C 7°C

D 29.5°C

The Big Bang theory proposes that the universe began approximately 13.8 billion years ago from an extremely hot, dense state and has been expanding ever since. Several independent lines of observational evidence support this model.

FOUR OBSERVATIONS ABOUT THE UNIVERSE

OBSERVATION	DESCRIPTION
P	The cosmic microwave background (CMB) — a nearly uniform glow of microwave radiation detected in all directions from Earth, with a temperature of about 2.7 K.
Q	The light from almost all distant galaxies is redshifted — its wavelengths are stretched towards the red end of the spectrum, indicating those galaxies are moving away from us.
R	The observed abundance of hydrogen (about 75%) and helium (about 25%) in the universe matches the ratio predicted by Big Bang nucleosynthesis calculations.
S	The Andromeda Galaxy, our nearest large neighbour, is currently moving <i>towards</i> Earth at approximately 110 km/s.

Which observation does **NOT** provide evidence that the universe began with a Big Bang and has been expanding since?

A Observation P

B Observation Q

C Observation R

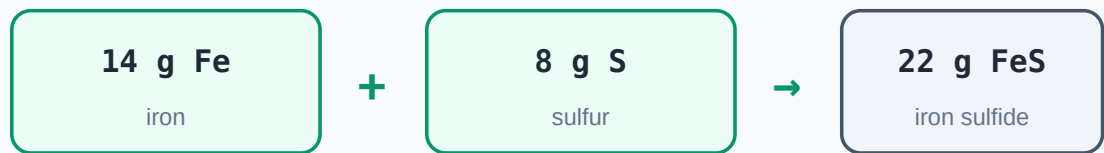
D Observation S

Whenever iron reacts with sulfur, the two elements combine in the same fixed ratio of masses.

In a first experiment, 14 g of iron was completely reacted with 8 g of sulfur to produce 22 g of iron sulfide (FeS). No reactant was left over.

In a second experiment, 21 g of iron was heated with 8 g of sulfur until the reaction was complete.

MASS RATIO FROM EXPERIMENT 1



What mass of iron sulfide is produced in the second experiment?

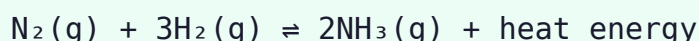
A 22 g

B 29 g

C 33 g

D 36 g

The industrial production of ammonia uses the **Haber process**:



Le Châtelier's principle states that if a system at equilibrium is disturbed, it shifts to counteract the disturbance. The table below summarises how temperature and pressure affect this reaction:

EFFECT OF CONDITIONS ON YIELD AND RATE

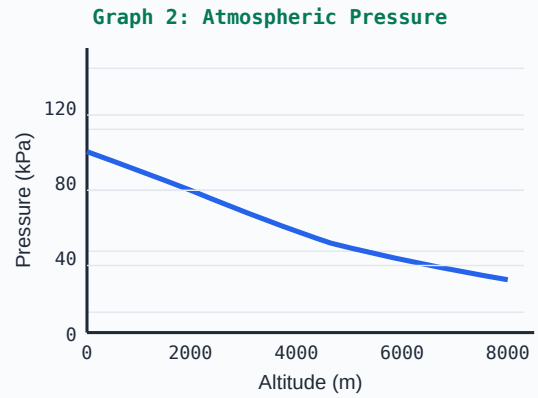
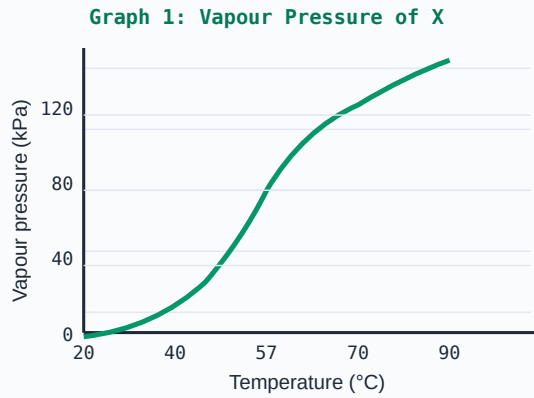
CONDITION	EFFECT ON EQUILIBRIUM YIELD OF NH_3	EFFECT ON REACTION RATE
↑ Temperature	Decreases (shifts left — exothermic reaction)	Increases
↓ Temperature	Increases (shifts right)	Decreases
↑ Pressure	Increases (fewer moles of gas on right)	Increases
↓ Pressure	Decreases	Decreases

To achieve both an acceptable yield **and** a practical reaction rate, the Haber process is run at a *moderately high* temperature (around 450 °C) rather than at either extreme. This is because

- A** high temperature gives both high yield and high rate, making lower temperatures unnecessary.
- B** low temperature gives the highest yield but an unacceptably slow rate, while high temperature gives an acceptable rate but shifts the equilibrium to reduce yield — a moderate temperature balances both requirements.
- C** high temperature increases pressure, which independently increases yield.
- D** the catalyst used in the process only functions within a narrow temperature band around 450 °C.

The two graphs below show the vapour pressure of liquid X at different temperatures (Graph 1) and the atmospheric pressure at different altitudes above sea level (Graph 2).

GRAPH 1: VAPOUR PRESSURE OF LIQUID X • GRAPH 2: ATMOSPHERIC PRESSURE VS ALTITUDE



At approximately what altitude above sea level will liquid X boil at **57 °C**?

A Approximately 500 m

B Approximately 2000 m

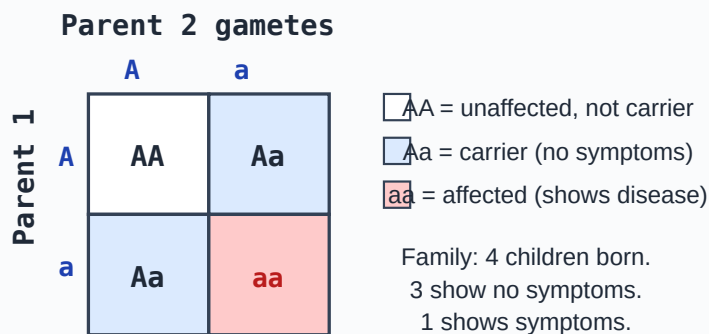
C Approximately 5000 m

D Approximately 7500 m

A disease is caused by a **recessive allele** (a). Only individuals who inherit two copies of the recessive allele (genotype aa) show the symptoms. Individuals with one copy (Aa) are **carriers**. They do not show symptoms but can pass the allele to offspring.

Both parents in the diagram are carriers (genotype Aa). They have four children.

PUNNETT SQUARE FOR AA × AA CROSS AND FAMILY OUTCOMES



Among the **three unaffected children**, what is the probability that **exactly two** of them are carriers (genotype Aa)?

A 4/9

B 2/3

C 4/27

D 1/3

A student investigated whether caffeine improves performance on a memory test. She designed the following experiment.

EXPERIMENTAL DESIGN

FEATURE	DETAIL
Participants	10 university students, all aged 19–21
Test A	All 10 students took a memory test after drinking a glass of plain water (no caffeine)
Test B	The same 10 students took the same memory test two weeks later, after drinking a cup of coffee (caffeine)
Result compared	Mean score in Test A vs mean score in Test B
Finding	Mean score was higher in Test B (caffeine condition)

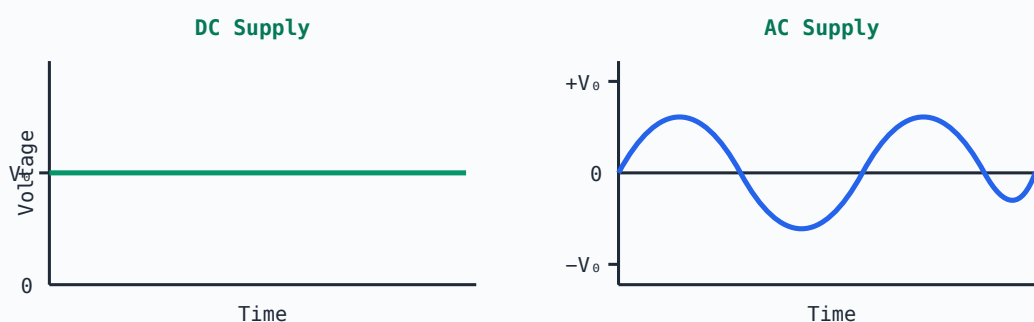
The student concluded that caffeine improves memory performance. The investigation has a primary flaw that makes this conclusion invalid. What is it?

- A** The sample size of 10 students is too small to detect any real effect of caffeine.
- B** The students took the same memory test both times — familiarity with the test from Test A is likely to have improved their performance in Test B independently of the caffeine, making the comparison invalid. The order of conditions was not counterbalanced.
- C** The students should have been told they were in a caffeine study so they could give informed consent.
- D** The study should have used a double-blind design so the student researcher did not know which condition each participant was in.

Electrical current can be either **direct current** (DC), which flows in one direction only, or **alternating current** (AC), which periodically reverses direction. The graphs show how voltage varies with time for each type.

An **LED** (light-emitting diode) has two key properties: it only allows current to flow through it in one direction (forward bias), and it emits light only when current is flowing through it.

VOLTAGE VS TIME FOR DC AND AC SOURCES (SAME PEAK VOLTAGE V_0)



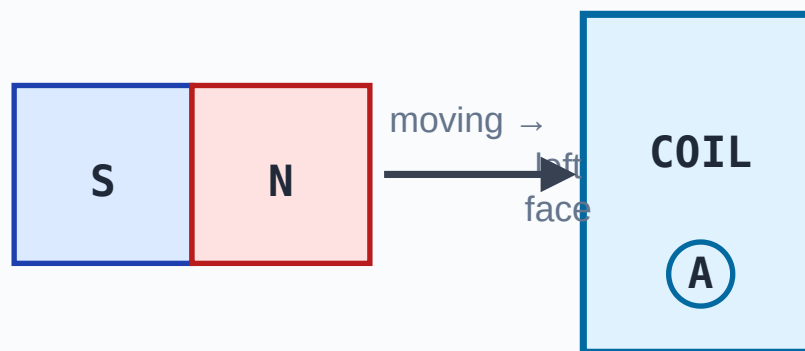
An LED is connected to the AC supply shown. Compared to the same LED connected to the DC supply of the same peak voltage, the LED in the AC circuit will

- A** be brighter, because the AC supply reaches a higher instantaneous voltage (V_0) than the DC supply.
- B** appear dimmer, because it can only conduct and emit light during the half of each cycle when voltage is in the forward-bias direction, so it is emitting for less than half the time compared to the DC-powered LED.
- C** emit light of a different colour, because AC reverses the direction of current flow through the semiconductor.
- D** emit no light at all, because an LED cannot function with alternating current.

Electromagnetic induction occurs when a conductor moves through a magnetic field, or when the magnetic field through a conductor changes. **Lenz's law** states that the induced current always flows in a direction that opposes the change causing it.

The diagram shows a wire coil connected to a sensitive ammeter. A bar magnet is moved towards the coil with its north pole facing the coil.

COIL AND APPROACHING MAGNET – CHOOSE THE CORRECT DESCRIPTION OF THE INDUCED CURRENT



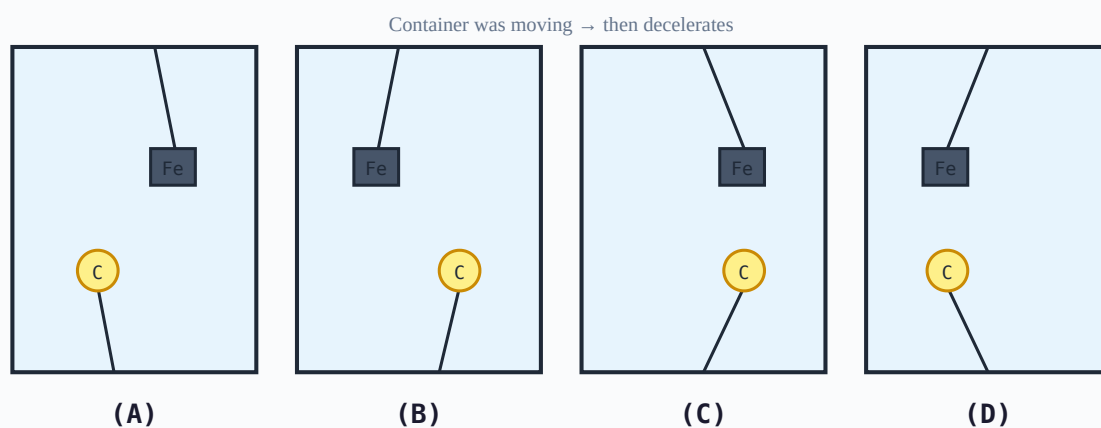
As the north pole of the magnet moves **towards** the coil, which statement correctly describes the induced current, according to Lenz's law?

- A** The current flows so that the left face of the coil **north** , repelling the approaching (closest to the approaching magnet) becomes a **pole** north pole and opposing the change.
- B** The current flows so that the left face **south** , attracting the approaching north pole of the coil becomes a **pole** and assisting the motion.
- C** No current is induced until the magnet physically enters the interior of the coil.
- D** The direction of the induced current depends on the speed of the magnet, not its pole orientation.

The **inertia** of an object is its tendency to continue in its current state of motion. When a container accelerates, a dense object tends to lag behind — tilting away from the direction of acceleration. A buoyant object (like a cork) behaves oppositely: because buoyancy acts against the effective gravitational field in the accelerating frame, it tilts towards the direction of acceleration.

The diagram shows a sealed, water-filled container moving at constant speed to the right. A dense iron mass hangs from the top by a string. A buoyant cork is held down by a string from the bottom.

WHICH DIAGRAM SHOWS THE POSITIONS OF THE IRON MASS AND CORK WHEN THE CONTAINER DECELERATES SUDDENLY?



Which diagram correctly shows the positions of the iron mass and the cork when the container **decelerates suddenly** while moving to the right?

A Diagram A

B Diagram B

C Diagram C

D Diagram D



Mathematics

NUMBER · ALGEBRA · GEOMETRY · PROBABILITY
& STATISTICS

12 questions

~22 min

All twelve questions are calibrated to the harder half of the Paper I Mathematics paper (equivalent to question 13 and above). In the real assessment the final five questions are free-response; all questions here are multiple choice to allow for self-marking. Use scratch paper — most questions require several working steps. No marks are deducted for wrong answers, so always select an answer even when uncertain.

KEY TOPICS AT PAPER I

- **Compound interest with rate changes.** When the rate changes after some years, treat it as two separate investments. The accumulated total after the first period becomes the new principal for the second.
- **Fractional and negative indices.** Express all bases as powers of the same prime before applying index laws. Never add or multiply indices unless the bases are identical.
- **Surd simplification.** To match $\sqrt{a-b}$ to $\sqrt{p}-\sqrt{q}$ form, square both sides and equate rational and irrational parts separately.
- **Sine and cosine rules.** For any non-right triangle, the sine rule connects all three angles and their opposite sides: $a/\sin A = b/\sin B = c/\sin C$.
- **3-D trigonometry.** Always find the base diagonal first when calculating the space diagonal angle to the base.
- **Conditional probability.** $P(A|B) = P(A \cap B) / P(B)$. Use the total for the given condition as the denominator, not the grand total.

1

NUMBER · COMPOUND INTEREST

Mia invested \$2 000 at 5% compound interest per year. After 2 years she withdrew all the money and reinvested the entire amount in a new account that paid 8% compound interest per year for a further 3 years. How much money, to the nearest dollar, did she have at the end of 5 years?

A \$2 508

B \$2 678

C \$2 778

D \$2 930

2

NUMBER · INDEX LAWS

Simplify fully:

$$(27^{2/3} \times 9^{1/2}) \div 3^{1/2}$$

A 9

B $9\sqrt{3}$

C 27

D $27\sqrt{3}$

3

NUMBER · SURDS

It is given that $\sqrt{(17 - 4\sqrt{15})} = \sqrt{a} - \sqrt{b}$, where a and b are positive integers and $a > b$. Find the value of ab .

A 36

B 48

C 60

D 80

4

ALGEBRA · QUADRATIC GRAPHS

The graph of $y = (x - 3)^2 - 4$ is obtained from the graph of $y = x^2$ by a translation. The x -intercepts of $y = (x - 3)^2 - 4$ are

A $x = 1$ and $x = 5$ B $x = -1$ and $x = 7$ C $x = -1$ and $x = -5$ D $x = 1$ and $x = 7$

5

ALGEBRA · INEQUALITIES

Solve the inequality $2(3 - x) < 4x + 2$ and state the **smallest integer** value of x that satisfies it.

A 0

B 1

C 2

D -1

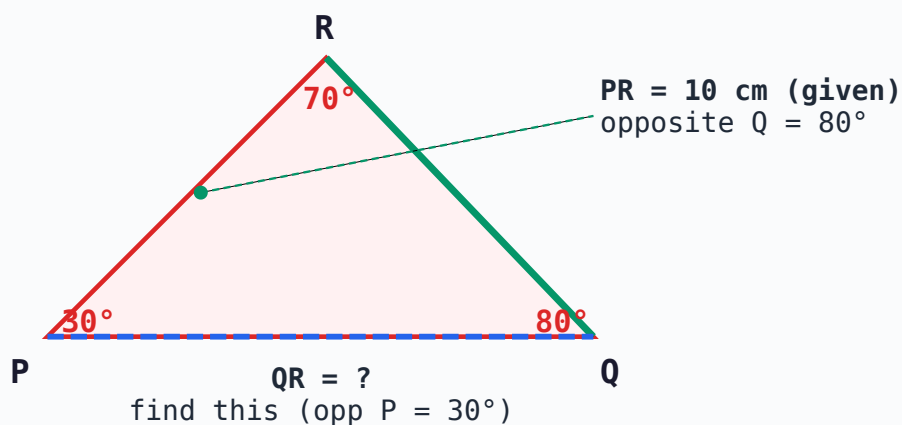
6

NUMBER · RATES

A cyclist rode a total journey in three equal stages of distance d km each. She cycled the first stage at speed v km/h, the second stage at $3v/2$ km/h, and the third stage at $v/3$ km/h. What was her average speed for the entire journey? Give your answer in terms of v .

A $9v/14$ B $3v/14$ C $7v/9$ D $9v/7$

In triangle PQR, angle P = 30° , angle Q = 80° , and angle R = 70° . The side PR (which is opposite angle Q = 80°) has length 10 cm. Calculate the length of side QR (opposite angle P = 30°), correct to one decimal place.



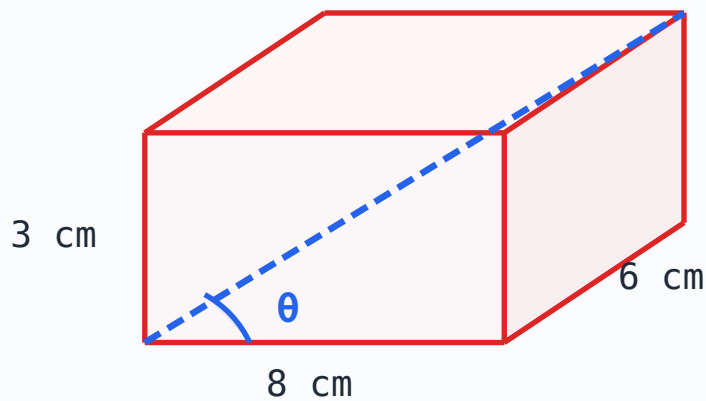
A 5.1 cm

B 5.8 cm

C 18.8 cm

D 9.7 cm

A rectangular box has dimensions $8\text{ cm} \times 6\text{ cm} \times 3\text{ cm}$. Calculate the angle between the **space diagonal** (the diagonal from one corner of the box to the diagonally opposite corner) and the base of the box. Give your answer correct to one decimal place.



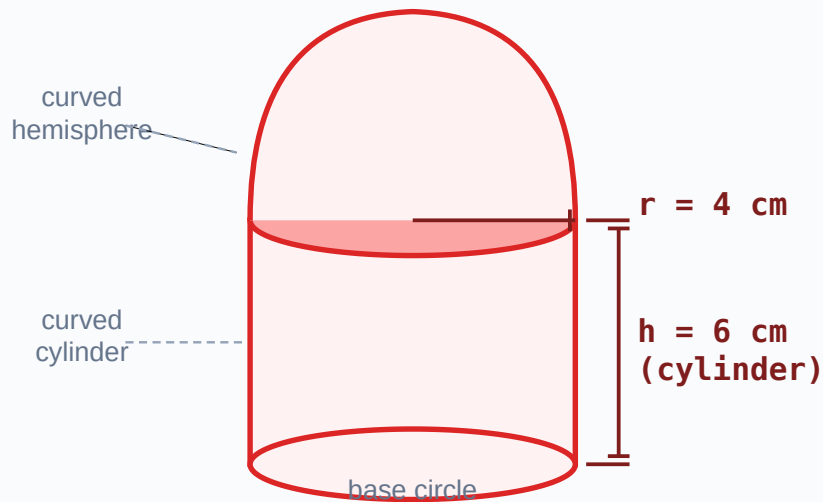
A 16.7°

B 21.8°

C 23.2°

D 73.3°

A toy consists of a solid hemisphere of radius 4 cm placed on top of a solid cylinder of radius 4 cm and height 6 cm, as shown. The flat circular face of the hemisphere sits flush on the flat circular top of the cylinder. Calculate the total **outer** surface area of the toy.



A $80\pi \text{ cm}^2$

B $96\pi \text{ cm}^2$

C $112\pi \text{ cm}^2$

D $128\pi \text{ cm}^2$

10

PROBABILITY & STATISTICS · CONDITIONAL PROBABILITY

A survey of 200 students at a school recorded whether each student participates in sport and/or studies music. The results are shown in the table.

SURVEY RESULTS: 200 STUDENTS

	STUDIES MUSIC	DOES NOT STUDY MUSIC	TOTAL
Participates in Sport	45	75	120
Does not participate in Sport	25	55	80
Total	70	130	200

A student is selected at random from those who **participate in sport**. What is the probability that this student also **studies music**?

A 3/8

B 9/40

C 9/14

D 7/24

11

PROBABILITY & STATISTICS · PROBABILITY

Events A and B are **not mutually exclusive**. It is given that $P(A) = 0.6$, $P(B) = 0.5$, and $P(A \cap B) = 0.3$. Find $P(A \cup B)$.

A 0.5

B 0.7

C 0.8

D 1.1

The back-to-back stem-and-leaf diagram below shows the scores of teams A and B in seven and six matches respectively. (Team A leaves are read from the centre to the left; Team B leaves are read from the centre to the right.)

BACK-TO-BACK STEM-AND-LEAF · TEAM A VS TEAM B

Team A (read →)	Stem	Team B (read →)
2 6	3	1 4
1 3 5	4	0 6
2 8	5	3 4

Example: 6 | 3 | 1 means Team A scored 36 and Team B scored 31

A player is to be transferred: the **highest scorer** from Team A moves to Team B, and simultaneously the **lowest scorer** from Team B moves to Team A. How many such transfers are needed before Team B's median score is **strictly greater than** Team A's median score?

A 1

B 2

C 3

D 4

Answers & Explanations

PAPER I · USE WITH ALL FOUR SUBJECTS

● English · Q1–Q35

Q1 A	Q2 A	Q3 B	Q4 B	Q5 C	Q6 D	Q7 C
Q8 B	Q9 A	Q10 C	Q11 C	Q12 C	Q13 B	Q14 B
Q15 A	Q16 B	Q17 A	Q18 A	Q19 D	Q20 B	Q21 C
Q22 D	Q23 C	Q24 B	Q25 B	Q26 C	Q27 B	Q28 A
Q29 C	Q30 B	Q31 A	Q32 C	Q33 B	Q34 C	Q35 D

Q1 **A**

The opening does both things simultaneously: it states the Socratic claim as if settled ("the quality of a sentence that sounds obviously right") then immediately creates doubt ("until you try to live by it"). This is not a concession or a historical summary — it is a double gesture that positions the reader to hold the claim and its complication at once.

B A historical overview would describe interpretations across time; the paragraph does not. **C** The writer does not concede Socrates' weakness in the opening; that move comes in paragraph five. **D** No definitions are offered.

Q2 **A**

Paragraph 3 states the defenders' argument directly: "without examination, they say, we are at the mercy of instinct, habit, and other people's assumptions about what matters." The Stoics support this argument but are not themselves the argument.

B The Stoics are cited as supporters, not as the main argument. **C** This is not stated anywhere. **D** No such claim is made by defenders in the text.

Q3 **B**

Paragraph 4 describes someone who examines so much that "the examination has become the life." This illustrates that an unmoderated examined life produces the very thoughtlessness it was meant to prevent — consuming rather than enhancing its subject. It is not about Socrates' contemporaries (A), it makes no claim about most people (C), and it does not single out philosophy as uniquely harmful (D).

Q4 **B**

"Accomplished at examining their life" means practised and proficient in examination — skilled. The word carries its primary sense of expertise acquired through effort and repetition. "Celebrated" (A) is an unrelated secondary meaning. "Burdened" (C) and "finished" (D) do not fit the context.

Q5 **C**

This is a meta-argumentative question. The writer argues that examination should produce something rather than merely more examination. But to identify when examination has become excessive — consumed by itself — you need to be able to observe your own examination from the outside. That is exactly the "vantage point" whose availability the writer questions in paragraph 2. The argument uses the very capacity it casts doubt on.

A The argument is not internally consistent for precisely this reason. **B** The writer does not fully attack Socrates — they end with a modified defence. **D** The Stoics are not the source of this argument in the essay.

Q6 **D**

The writer's paragraph 5 claim is that those living well may not need to examine because their lives are already working. A Socratic defender would reply that this "fullness" is itself unexamined: you cannot know it is genuine fullness rather than comfortable avoidance without examining it. This reinstates examination as necessary even for apparently successful lives. Options A–C are not the strongest available Socratic counter-argument.

Q7 **C**

The narrator's conclusion is carefully hedged: Mrs Hartley's help "settled most fully on those who were positioned to be grateful in ways that could be observed" — but the narrator explicitly says they cannot be certain whether this is "calculation or simply a very refined sensitivity." Option C captures both the observation and the uncertainty.

A The narrator does not conclude she is genuinely kind without reservation. **B** "Deliberately unkind" is far beyond what the text supports. **D** No evidence suggests she memorised the narrator's project in advance.

Q8 B

"Assiduous" describes someone who applies great care and thoroughness to everything they do — the full image of Mrs Hartley's carefully arranged self. "Self-conscious and anxious" (A) is a distractor that fits the general scene but not the word. "Quiet and reserved" (C) and "elegant" (D) are unrelated.

Q9 A

The journal is introduced carrying nothing particular and becomes the closing frame only when the narrator — sitting in the car — realises Mrs Hartley did not offer to help with it. This makes that single omission the most significant datum in the entire visit: not just a neutral failure to assist, but a silence that speaks. The structural return to the object enacts the dawning realisation.

Q10 C

The narrator suspects the directed quality of Mrs Hartley's help (C, left column) but remains uncertain. Mrs Fordham draws a distinction between being "the most useful person" and being "the most kind" (C, right column). Both positions are hedged and specific.

A, B, D All misrepresent one or both characters' positions as stated or strongly implied in the text.

Q11 C

"Directed" in paragraph 4 is used as an adjective modifying "quality" — "a directed quality." Adjectives modify nouns; adverbs modify verbs, adjectives, or other adverbs. "Imperceptibly" (A), "briefly" (B), and "carefully" (D) are all adverbs (modifying "retreated", "received", and "held" respectively). "Directed" is the only adjective in the list, so it is NOT used as an adverb.

Q12 C

The final sentence — "I held the journal a little more carefully than I needed to, as if keeping a grip on something that could still be taken" — reveals the narrator has internalised Mrs Hartley's logic. If Mrs Hartley moves things from people's hands without their quite noticing, then the narrator — now alert to this — grips what is theirs more tightly. The logic of the story has entered the narrator's body.

A, B, D All impose a literal reading that the text does not support. There is no suggestion Mrs Hartley follows people to the car or that the journal contains sensitive information.

Q13 **B**

The narrator is conducting a careful, methodical analysis of Mrs Hartley (analytical) while simultaneously describing moments of genuine admiration — the quality of her attention, Mrs Fordham's testimony — with a guarded edge that cannot quite endorse her fully (warily admiring). "Sentimental" and "nostalgic" (A) overstate the warmth; "dismissive and envious" (C) overstates the critique; "warm and uncritical" (D) misses the hedging throughout.

Q14 **B**

The opening paragraph describes the navigator's challenge: measuring the angle to the horizontal when the horizontal "had to be inferred rather than observed." This establishes the problem the octant was designed to solve. It does not offer biographical details (A), argue navigation was less advanced (C), or compare latitude with longitude (D).

Q15 **A**

As latitude increases from the equator (0°) towards the poles (90°), the sun's elevation at solar noon decreases. At the equator, the sun at noon is close to directly overhead; at high latitudes, it is close to the horizon. Graph A shows a negative linear relationship (as x — latitude — increases, y — elevation — decreases), which matches this description. Graph B is positive (wrong direction), C is parabolic (wrong shape), D is flat (wrong — elevation does vary with latitude).

Q16 **B**

"Novel" in context ("what was novel about this solution") means new, not previously used or seen — innovative. The word has a second, unrelated meaning as a type of long prose fiction, but this is not its sense here. "Fictional" (A) confuses the two senses. "Published" (C) and "complicated" (D) do not fit.

Q17 **A**

The blank occurs after "its superiority lay not only in its greater range but in _____ the double-reflection principle allowed." The phrase needs a noun clause functioning as the object of the preposition "in." "What the double-reflection principle allowed" is a fused relative (nominal) clause — "what" serves as both determiner and pronoun. "Which" (B) would require a preceding noun. "That" (C) does not work after a preposition without "the fact." "How" (D) changes the meaning — the superiority lay in what was possible, not in how it was done.

Q18 **A**

"Once the instrument became available, reliable longitude determination became possible for the first time." "Once" is a subordinating conjunction meaning "from the moment that" — expressing a temporal boundary, the point at which the possibility became real. "Before" (B) reverses the logic. "Unless" (C) is conditional, not temporal. "Although" (D) is concessive and creates contradiction.

Q19 **D**

The sentence before [23] establishes that the horizon was the solution; [23] introduces the sentence explaining the mechanism. "In this way" connects the abstract claim (horizon = solution) to the specific mechanism (it used the horizon's apparent sharpness). "Nevertheless" (A), "Conversely" (B), and "Despite this" (C) all introduce contrast or concession, which contradicts the relationship — the mechanism explains and confirms the irony, it does not contradict it.

Q20 **B**

The italicised paragraph is a compressed career archive — two teachers who cried, a headteacher who refused to speak, one extraordinary class — all in past tense. When the reader then returns to Mr Anand's lesson in the present tense, they feel the rarity of what they are watching because the inspector's internal measuring-stick has been made visible. The paragraph does not introduce a second narrator (A), does not explain her selection for this school (C), and is not a flashback within the same day (D).

Q21 **C**

The irony is structural: an inspector whose entire function is to produce written assessments cannot reduce what she has seen to written form. She writes two words and closes the notebook — the writing instrument that has defined her professional identity for fourteen years fails at the moment she most needs it. This is a failure internal to the medium of assessment, not a personal failure or a social one.

Q22 **D**

The text uses free indirect discourse extensively ("In her experience, schools that know they are being assessed..."; the narrator uses third person but enters the inspector's thoughts). It uses symbolic objects (the notebook; the green pen). It includes direct dialogue. It does NOT tell us what she writes — the two words remain unknown. The final written assessment is withheld entirely.

Q23 **C**

The inspector arrives with a functioning professional routine — "twelve minutes early," cataloguing the school's response, taking notes. This is methodical. By the end, she is writing "almost nothing," aware of being the one assessed, wondering about the green pen and the fourteen other schools. She is not destroyed by this — she is quietly unsettled. "Confident to defensive" (B) overstates; "detached to envious" (D) imposes a misreading of the final paragraph.

Q24 **B**

"This is because what is happening is happening too quickly..." — "This" is a demonstrative pronoun used as subject. It refers backward to the clause just completed: "she writes almost nothing in her notebook." The use of "This" as a sentence-opener signals that the preceding sentence is about to be explained. The demonstrative cannot refer forward (to what is happening) — the explanatory clause follows the connector "because."

Q25 **B**

The inspector's situation: she has developed professional criteria for assessing teaching over fourteen years, and now encounters teaching that her criteria cannot adequately capture — the notebook barely fills. The music critic situation (B) is structurally identical: professional criteria, encounter that the criteria cannot contain, awareness that the tools of assessment are inadequate for the experience. Options A, C, D all involve different kinds of professional surprise that do not turn on the inadequacy of the assessment medium itself.

Q26 **C**

The reviewer says "it is one of the most significant photographic exhibitions I have reviewed in twenty years" (positive judgement, para 1) and "I would have preferred something less so" about the chronological arrangement (specific curatorial criticism, para 4). Neither of the other options is supported: the personal connection is declared as a bias but does not limit the exhibition's significance (A); the early photographs are not singled out as the only strong ones (B); historical context is not described as lacking (D).

Q27 **B**

Declaring "I am not a disinterested party" in the opening paragraph is a move of intellectual honesty: the reviewer shows their hand rather than pretending to a neutrality that would be false. This invites the reader in rather than positioning the reviewer above them. It does not undermine authority (A) — transparency is a form of credibility, not a reduction of it. Option C is wrong because the disclosure makes visible, not superior. Option D mistakes acknowledgement of connection for assumption of shared experience.

Q28 **A**

The final two paragraphs are short for a reason: they move from the reviewer's analysis of the work to personal testimony — a memory of what Bergström said, and the reviewer's quiet act of not having forgotten it. No further argument is needed; the words are left to carry their own weight. "She did not believe that a photograph was a record of what was there" is the thesis of Bergström's entire practice, delivered in a sentence, and then the review simply closes. This is not ambivalence (C) and not disagreement (D).

Q29 **C**

The review contains one very brief direct quotation from a personal conversation ("She did not believe... that a photograph was a record of what was there") — but no extended quotation from published writing or formal interviews. The analogy (implied antecedent), self-disclosure, and structural critique are all present and identifiable in the text.

Q30 **B**

An allusion refers to something outside the text (a person, work, or event) without fully naming or explaining it. "After the work of A. B." invokes Bergström's photographs without spelling out her name — a gesture that mirrors the poem's central interest in presence through evidence rather than declaration. This is not a simile (no comparison structure), personification (A. B. is not treated as a person in this moment), or metonym (A. B. is not a substitution for a broader category).

Q31 **A**

"To be the room / where the gone thing rests" (lines 13–14) — photography as a space of preservation for what has departed. Both the poem and the review describe Bergström's photographs as capturing what is no longer present: "a shadow where a hand was," "what was about to no longer be there." Option A is the only quotation that directly figures this act of preservation. Options C and D describe process rather than purpose; B describes technique.

Q32 **C**

"Only the evidence" (line 7) and "What the print keeps is not the subject" (line 15) both articulate the same central idea: the photograph does not capture the person or thing itself — only the traces they leave. This is the poem's most sustained argument and these two lines are its clearest statements, separated by eight lines but saying the same thing from different directions.

A (line 2 / line 23) — both involve time, but line 2 describes the moment of developing while line 23 states the final paradox of permanence; they are narrative endpoints, not a shared claim. **B (line 2 / line 20)** — both reference darkroom stages (developing/fixing bath) but describe different technical moments, not a repeated idea. **D (line 1 / line 20)** — "safelight red" and "fixing bath" are both darkroom setting details, not thematic echoes of the poem's argument.

Q33 **B**

The gaps between stanzas are wider than is typical, creating pauses the reader must inhabit. The poem is about the pause before an image emerges — "that long exhale before the image swims / up through the chemicals." The layout performs the experience: you wait, as the paper waits, as the photographer waited. The gaps are not structural labels (A), are not evidence of excised lines (C), and are too evenly distributed throughout to be making a specific person/absence contrast (D).

Q34 **C**

The poem ends on a paradox — "perfect, finished, permanently unfinished" — that is held in tension without resolution. The oxymoron keeps the poem open. The review ends on quiet retrospect: "Several of the photographs on these walls suggest she had not forgotten it either" — elegiac, personal, reverential. Neither is celebratory; neither is simply mournful or analytical. The closest accurate pair is "paradoxical and unresolved" (poem) versus "quietly reverential and retrospective" (review).

Q35 **D**

Option D — "Bergström's early career and her later commercial success" — is not a contrast mentioned in either text. The review explicitly says she did not get "better" in any straightforward developmental sense, and the poem does not distinguish early from late periods at all. Neither text mentions commercial success as a dimension of her life or work. Options A, B, and C are all contrasts clearly present in one or both texts.

● Writing · Paper I Rubric

Writing is assessed across three marking columns. At Paper I the descriptors set a high bar at every band — the Strong band requires not just correctness but distinctiveness of thinking.

GENRE CONVENTIONS

STRONG

Operates with full command of the chosen genre. Persuasive: argument is genuinely contested; counter-argument is presented in its strongest available form and answered precisely; position evolves across the piece rather than simply being restated.

Narrative: the change in the character's relationship to the subject is made visible through what they notice and how — never stated directly; the conclusion feels earned and inevitable in retrospect.

SOUND

Genre requirements are met consistently. Persuasive: counter-argument is present but not in its fullest form; rebuttal is sound. Narrative: the change is shown rather than told but may be signalled too directly at one point.

EMERGING

Genre features are present but inconsistently applied. Counter-argument may be briefly included before being dismissed. Narrative change may be stated as well as shown.

BASIC

Writes in general prose that shows awareness of the genre but does not consistently apply its conventions. May list opinions without arguing or describe events without accumulating meaning.

TEXTUAL GRAMMAR

STRONG

Control of structure at every level: sentence, paragraph, and whole-text. Each paragraph does identifiable work toward the argument or narrative arc. The final paragraph arrives somewhere distinctly different from the opening. Vocabulary is chosen for precision and effect — not just correctness.

SOUND

Paragraphing is logical. Opening and closing show awareness of the whole. Vocabulary is generally appropriate and sometimes well-chosen.

EMERGING

Paragraphing is present but may not always be purposeful. Some linking between sentences but limited control of the arc across the whole piece.

BASIC

Ideas are expressed but with limited organisational control. Sentences may be strung together without intentional structure.

SYNTAX & PUNCTUATION

STRONG

Syntax is varied and purposeful — not just correct. Punctuation is used to control pace and emphasis, not merely to separate clauses. Sentence-level variation creates rhythm that serves the tone of the piece. Complex punctuation (semicolons, dashes, colons) used accurately and with effect.

SOUND

Sentences are grammatically correct throughout. Range of sentence types. Punctuation is accurate with minor errors only.

EMERGING

Most sentences are correctly formed. Some punctuation errors that do not obscure meaning. Limited variety in sentence structure.

BASIC

Some sentences correctly formed but errors are frequent. Punctuation may be absent or used inconsistently.

● Science • S1–S10

S1 **C**

S2 **D**

S3 **A**

S4 **B**

S5 **B**

S6 **A**

S7 **B**

S8 **B**

S9 **A**

S10 **A**

S1 **C** • 7 °C

Morning apparent temperature: $T_{\text{app}} = -5 - 0.7 \times (30 - 5) = -5 - 0.7 \times 25 = -5 - 17.5 = -22.5\text{ °C}$.

Afternoon apparent temperature: $T_{\text{app}} = +2 - 0.7 \times (50 - 5) = 2 - 0.7 \times 45 = 2 - 31.5 = -29.5\text{ °C}$.

Difference = $|-22.5 - (-29.5)| = 7.0\text{ °C}$. The morning feels warmer than the afternoon even though the actual temperature is higher in the afternoon, because the afternoon wind speed is much greater and imposes a larger wind chill penalty.

A (14.5°C) — uses only the morning calculation and takes the difference from the actual temperature ($-22.5 - (-5) = -17.5$, a possible rounding path). **B (16.5°C)** — from forgetting to subtract 5 from v in the afternoon: $0.7 \times 50 = 35$ instead of $0.7 \times 45 = 31.5$. **D (29.5°C)** — the absolute afternoon apparent temperature read as the answer, not the difference between morning and afternoon.

S2 **D**

The Big Bang theory predicts universal expansion. Observations P (CMB), Q (galactic redshift indicating recession), and R (hydrogen/helium abundance ratio) all support the model. Observation S — the Andromeda galaxy moving *towards* us — appears to contradict expansion. However, Andromeda's approach is a local gravitational interaction, not a violation of universal expansion (the universe expands but local gravity can still dominate at short range). The key point is that Observation S does NOT support Big Bang expansion — it is the anomalous local effect. For the purpose of this question, S is the answer because it is the only observation that fails to provide evidence for the Big Bang model, and was designed to test whether students confuse local motion with cosmological expansion.

S3 A

Step 1 — establish the mass ratio. From Experiment 1: Fe : S = 14 : 8 = 7 : 4. **Step 2 — find the limiting reagent.** In Experiment 2, there is 21 g Fe and 8 g S. To react all 21 g Fe, we need $(4/7) \times 21 = 12$ g S. But only 8 g S is available. Therefore **sulfur is the limiting reagent**. **Step 3 — find the yield.** 8 g S reacts with $(7/4) \times 8 = 14$ g Fe to give $14 + 8 = 22$ g FeS — the same as Experiment 1. 7 g Fe is left unreacted.

B (29g) — adds all mass without applying the ratio: $21 + 8 = 29$ g, ignoring that not all iron can react.

C (33g) — incorrectly treats iron as the limiting reagent: $21 \times (22/14) = 33$ g, as if all 21 g Fe reacts. **D**

(36g) — a further error; possibly doubles the sulfur or miscalculates the ratio.

S4 B

The Haber process is exothermic. At low temperature, the equilibrium favours the right (more NH_3 is produced — high yield) but the reaction rate is very slow. At high temperature, the rate is fast but the equilibrium shifts left (low yield). The industrial compromise — moderately high temperature ($\sim 450^\circ\text{C}$) — accepts a reduced yield in exchange for a commercially practical reaction rate. Option B correctly identifies both trade-offs without oversimplifying to one variable.

A — incorrect; high temperature reduces yield. **C** — temperature does not independently raise pressure in an open industrial vessel. **D** — catalyst temperature specificity is a real factor but is not the reason stated in the question.

S5 B

Step 1 — Graph 1. Read off the vapour pressure of liquid X at 57°C . Following the curve to 57°C on the x-axis, the curve meets the 80 kPa grid line, giving a vapour pressure of approximately **80 kPa**.

Step 2 — Graph 2. A liquid boils when its vapour pressure equals the atmospheric pressure. Find the altitude where atmospheric pressure = 80 kPa. On Graph 2, the curve crosses the 80 kPa grid line at approximately **2000 m**.

A (500 m) — at 500 m, atmospheric pressure is still very close to sea-level pressure (~ 100 kPa), which is higher than 80 kPa; liquid X would not yet boil at 57°C . **C (5000 m)** — atmospheric pressure at 5000 m is approximately 55 kPa, which is too low; the boiling point would be below 57°C . **D (7500 m)** — at this altitude, pressure is around 40 kPa, far below 80 kPa.

S6 A

Step 1 — Punnett square. $Aa \times Aa$ gives: AA (1/4), Aa (2/4), aa (1/4). **Step 2 — Conditional probability.** Given that a child is unaffected (not aa), the sample space is {AA, Aa, Aa}. $P(\text{carrier} \mid \text{unaffected}) = 2/3$. **Step 3 — Binomial probability.** $P(\text{exactly 2 of 3 unaffected children are carriers}) = C(3,2) \times (2/3)^2 \times (1/3)^1 = 3 \times (4/9) \times (1/3) = 12/27 = 4/9$.

B (2/3) — probability that one unaffected child is a carrier; not applied to three children. **C (4/27)** — uses unconditional $P(Aa) = 1/2$ without conditioning on "unaffected." **D (1/3)** — $P(AA \mid \text{unaffected})$, i.e. the complement of being a carrier.

S7 B

The primary flaw is a **practice effect** caused by lack of counterbalancing. All students did Test A (water) first and Test B (caffeine) second, using the same memory test both times. The students had already seen the test once — familiarity with its content, format, and questions independently improves performance the second time. Any higher score in Test B therefore cannot be attributed to caffeine alone; it may simply reflect that the students remembered or recognised material from Test A. To eliminate this confound, the order should be counterbalanced: half the students do caffeine first, the other half do water first.

A — sample size is a real concern, but not the primary flaw that makes the caffeine conclusion invalid; even with a larger sample, the order confound would remain. **C** — informed consent is an ethical requirement, not a methodological flaw affecting the validity of the comparison. **D** — a double-blind design would help control for expectation effects, but is a secondary concern compared to the fundamental order confound.

S8 B

An LED only conducts and emits light when it is forward-biased (voltage in one direction). In an AC circuit, voltage alternates — during the positive half-cycle the LED is forward-biased and emits; during the negative half-cycle it is reverse-biased and does not emit. The LED therefore emits for approximately half the time. Even during the conducting half, the average voltage is less than the peak. The LED connected to DC of the same peak voltage emits continuously. The AC-connected LED will appear dimmer.

A — although peak voltage is the same, the LED only uses the forward half of the cycle. **C** — LEDs emit at a colour determined by the semiconductor material, not by current direction. **D** — LEDs do function with AC but only conduct during one half-cycle.

S9 A

By Lenz's law, the induced current must oppose the change causing it. As the north pole approaches, the flux through the coil increases. To oppose this increase, the coil must generate a magnetic field pointing back towards the approaching magnet — i.e., the left face of the coil must become a **north pole** (like poles repel). Using the right-hand rule for the coil, the current flows in the direction that makes the left face north.

B — if the left face became south, it would attract the north pole and assist the motion, which violates Lenz's law. **C** — induction begins as soon as the flux changes, which is as soon as the magnet moves. **D** — the direction of induced current is determined by the orientation of the pole and the direction of motion, not just by speed.

S10 A

When the container **decelerates** (while moving right), its contents tend to continue moving right by inertia. The **iron mass** (denser than water) has more inertia relative to the water — it tends to continue rightward, so it tilts to the right (forward). The **cork** (less dense than water, held down by string) behaves opposite to the iron because it is displaced by the water column acting as an inertial system: as the water/iron system shifts right, the cork is effectively pushed left relative to the container. Diagram A shows iron tilted right, cork tilted left — the correct result.

B — reverses the directions. **C, D** — both objects cannot tilt in the same direction; buoyancy and inertia produce opposite effects.

● Mathematics • M1–M12

M1 C	M2 B	M3 C	M4 A	M5 B	M6 A
M7 A	M8 A	M9 B	M10 A	M11 C	M12 A

M1 C • \$2 778

Period 1: $\$2000 \times (1.05)^2 = \$2000 \times 1.1025 = \$2205.00$. **Period 2:** $\$2205 \times (1.08)^3 = \$2205 \times 1.259712 = \$2777.62 \approx \$2778$. The key step: the accumulated amount after 2 years (\$2205) becomes the new principal — do not apply the second rate to the original \$2000.

A (\$2508) — uses simple interest for both periods. **B (\$2678)** — compound for period 1, simple for period 2. **D (\$2930)** — applies 8% to original \$2000 for all 5 years.

M2 **B · 9√3**

Express all in powers of 3: $27 = 3^3$, $9 = 3^2$. Numerator: $(3^3)^{(2/3)} \times (3^2)^{(1/2)} = 3^2 \times 3^1 = 3^3 = 27$.
Denominator: $3^{(1/2)} = \sqrt{3}$. Result: $27/\sqrt{3} = 27\sqrt{3}/3 = 9\sqrt{3}$.

A (9) — forgot to retain the $\sqrt{3}$. **C (27)** — did not divide by $\sqrt{3}$. **D (27√3)** — multiplied instead of dividing.

M3 **C · 60**

Square both sides: $17 - 4\sqrt{15} = a + b - 2\sqrt{ab}$. Equating rational parts: $a + b = 17$. Equating irrational parts: $2\sqrt{ab} = 4\sqrt{15} \rightarrow ab = (2\sqrt{15})^2 = 4 \times 15 = 60$. Verify: a and b satisfy $x^2 - 17x + 60 = 0 \rightarrow (x-5)(x-12) = 0 \rightarrow a = 12, b = 5$. Check: $\sqrt{12} - \sqrt{5} = 2\sqrt{3} - \sqrt{5} \approx 3.46 - 2.24 = 1.22$; $\sqrt{(17 - 4\sqrt{15})} \approx \sqrt{(17 - 15.49)} \approx \sqrt{1.51} \approx 1.23$. ✓

M4 **A · x = 1 and x = 5**

Set $y = 0$: $(x - 3)^2 - 4 = 0 \rightarrow (x - 3)^2 = 4 \rightarrow x - 3 = \pm 2 \rightarrow x = 5$ or $x = 1$.

B (-1 and 7) — sign confusion: treats the shift as +3 not -3. **C (-1 and -5)** — shifts in the wrong direction entirely. **D** — mixed error in both intercepts.

M5 **B · 1**

Expand: $6 - 2x < 4x + 2 \rightarrow 4 < 6x \rightarrow x > 2/3$. The smallest integer strictly greater than $2/3$ is **1**.

A (0) — 0 is not greater than $2/3$. **C (2)** — correct but not the smallest. **D (-1)** — does not satisfy $x > 2/3$.

M6 **A · 9v/14**

Time for each stage: $t_1 = d/v$; $t_2 = d/(3v/2) = 2d/3v$; $t_3 = d/(v/3) = 3d/v$. Total time = $d/v + 2d/3v + 3d/v = 3d/3v + 2d/3v + 9d/3v = 14d/3v$. Average speed = total distance / total time = $3d \div (14d/3v) = 3d \times 3v/14d = 9v/14$.

B (3v/14) — divided total time by 3 again by mistake. **C (7v/9)** — incorrectly averaged the three speeds arithmetically: $(v + 3v/2 + v/3) / 3$. **D (9v/7)** — inverted the ratio.

M7 **A · 5.1 cm**

Sine rule: $QR / \sin P = PR / \sin Q$. Substituting the given values: $QR / \sin 30^\circ = 10 / \sin 80^\circ$.

Therefore $QR = 10 \times \sin 30^\circ / \sin 80^\circ = 10 \times 0.5 / 0.9848 \approx \mathbf{5.076 \approx 5.1 \text{ cm}}$. The key step is identifying which side is given ($PR = 10 \text{ cm}$, opposite $Q = 80^\circ$) and which is required (QR , opposite $P = 30^\circ$), then placing each in the correct position in the sine rule ratio.

B (5.8 cm) — likely from a rounding error or using an incorrect angle approximation. **C (18.8 cm)** — from misidentifying which angle is opposite PR : if a student treats PR as opposite $R = 70^\circ$ (rather than the correct $Q = 80^\circ$), the denominator becomes $\sin 70^\circ$ and $QR = 10 \times \sin 70^\circ / \sin 30^\circ \approx 18.8 \text{ cm}$. **D (9.7 cm)** — from a similar angle-labelling error: using $10 \times \sin 70^\circ / \sin 80^\circ \approx 9.5 \text{ cm}$, or another mis-assignment of the sine rule ratio.

M8 **A · 16.7°**

Step 1 — base diagonal. The base has dimensions $8 \times 6 \text{ cm}$. Base diagonal $= \sqrt{(8^2 + 6^2)} = \sqrt{(64 + 36)} = \sqrt{100} = 10 \text{ cm}$. **Step 2 — space diagonal angle.** The box height is 3 cm . $\tan \theta = \text{height} / \text{base diagonal} = 3 / 10 = 0.3$. $\theta = \arctan(0.3) \approx \mathbf{16.7^\circ}$.

B (21.8°) — used only one face dimension (6 cm) instead of base diagonal: $\arctan(3/6) = 26.6^\circ$. **C (23.2°)** — used $\arctan(3/7)$ using only the 7 cm approximation. **D (73.3°)** — the complement: $90^\circ - 16.7^\circ$.

M9 **B · $96\pi \text{ cm}^2$**

Three surfaces contribute: (1) **Curved cylinder:** $2\pi rh = 2\pi(4)(6) = 48\pi$. (2) **Cylinder base:** $\pi r^2 = \pi(4^2) = 16\pi$. (3) **Curved hemisphere:** $2\pi r^2 = 2\pi(4^2) = 32\pi$. The flat circle where hemisphere meets cylinder is an interior join — it is not part of the outer surface. Total $= 48\pi + 16\pi + 32\pi = \mathbf{96\pi \text{ cm}^2}$.

A (80π) — omits hemisphere curved surface. **C (112π)** — includes full sphere curved surface ($4\pi r^2 = 64\pi$) instead of hemisphere. **D (128π)** — double-counts the join circle.

M10 **A · 3/8**

We need $P(\text{Music} \mid \text{Sport})$. Using conditional probability: $P(\text{Music} \mid \text{Sport}) = P(\text{Music} \cap \text{Sport}) / P(\text{Sport}) = 45/120 = \mathbf{3/8}$. The denominator is the total number of students who participate in sport (120), not the grand total (200).

B ($9/40$) $= 45/200$ — divided by grand total. **C ($9/14$)** $= 45/70$ — divided by total who study music (wrong condition). **D ($7/24$)** — arithmetic error.

M11 C • 0.8

$P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.6 + 0.5 - 0.3 = \mathbf{0.8}$. The intersection must be subtracted because it is counted twice when $P(A)$ and $P(B)$ are added.

A (0.5) — just $P(B)$. **B (0.7)** — forgot to subtract the intersection: $0.6 + 0.5 - 0.3 \neq 0.7$. Wait: $0.6 + 0.5 = 1.1$, minus $0.3 = 0.8$. 0.7 would come from $0.6 + 0.5 - 0.4$. **D (1.1)** — forgot to subtract intersection entirely.

M12 A • 1 transfer

Before any transfer: Team A scores: 32, 36, 41, 43, 45, 52, 58 ($n=7$). Median = 43. Team B scores: 31, 34, 40, 46, 53, 54 ($n=6$). Median = $(40+46)/2 = 43$. Equal, so B not strictly greater. **Transfer 1:** Move 58 (highest A) to B; move 31 (lowest B) to A. Team A: 31, 32, 36, 41, 43, 45, 52 ($n=7$). Median = 41. Team B: 34, 40, 46, 53, 54, 58 ($n=6$). Median = $(46+53)/2 = 49.5$. Team B median (49.5) > Team A median (41). ✓ **1 transfer is sufficient.**

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