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ICAS-Style Practice Series

Paper F · F2 / S1 / Y7 · 2026



ICAS-STYLE PREPARATION SERIES

Paper **F** — Form 2 / Secondary 1 / Year 7 Student Workbook

Original ICAS-style practice questions with full worked answers — for students sitting ICAS Paper F, taken by Form 2 (Malaysia), Secondary 1 (Singapore), and Year 7 (Australia) students.



English · 28 Q



Writing · 2 tasks



Science · 10 Q



Maths · 12 Q

STUDENT NAME

SCHOOL

DATE

TOTAL QUESTIONS

50 original ICAS-style questions + 2 writing tasks

ANSWERS

Full worked explanations at back

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How to Use This Workbook

Every question in this workbook is an original ICAS-style practice question carefully written to match the format, text types, difficulty, and question style of real ICAS Paper F. The same paper is taken by students in Form 2 (Malaysia), Secondary 1 (Singapore), and Year 7 (Australia).

★ MOST IMPORTANT RULE

Do each subject with a timer running. Resist checking answers mid-way. When time is up, go to the answers — and read every explanation carefully, including for questions you got right. Understanding the reasoning is the whole point.

Your Test at a Glance — Paper F (Official ICAS Format)

SUBJECT	QUESTIONS	TIME	TIME GUIDANCE	HALFWAY CHECK	FORMAT
 English	50	55 min	~11 min per passage (read + answer)	Passage 3 by 28 min	Passage-based MCQ
 Writing	1 task	35 min	5 min plan · 25 min write · 5 min check	Writing by 5 min	Extended Response
 Science	40	60 min	~90 sec per Q	Q20 by 30 min	MCQ with diagrams
 Mathematics	40	60 min	~90 sec per Q	Q20 by 30 min	MCQ · No Calculator

🎯 THE 3-PASS STRATEGY — USE EVERY TIME

Pass 1: Answer every question you're confident about. Flag anything uncertain — don't get stuck.

Pass 2: Return to flagged questions. Eliminate at least 2 options, then choose your best answer.

Pass 3: If time allows, check questions where you made a very quick choice. There is NO penalty for a wrong answer — always answer every question.



At Paper F level, the texts you read are longer, more varied, and more layered than earlier papers. You'll see classic literary prose with archaic vocabulary, reflective essays where the writer is thinking rather than narrating, and journalistic features where statistics, quotes, and the writer's own voice all work together. Key vocabulary words are underlined in some texts as they appear in the real test.



ENGLISH STRATEGY FOR PAPER F

Many questions test fine discrimination: which of four near-synonyms fits the exact shade of meaning; which technique creates a particular effect; which connector makes logical sense in a cloze. Read the whole text first. Then let the questions guide your re-reading — don't rely on memory for precise answers.

TEXT 1 OF 5 — INFORMATIONAL ARTICLE

The city that cooks itself

Original article for ICAS preparation purposes

Walk from a shaded park into the centre of a large city on a summer afternoon and you will feel the temperature rise. Sometimes the difference is as much as eight degrees. This is not your imagination — it is a phenomenon called the *urban heat island effect*, and it is reshaping how architects, city planners, and public health officials think about the places we live.

Why does a city get hotter than the countryside around it? The answer lies in what cities are made of. Concrete, brick, and asphalt absorb sunlight and release it slowly as heat, long after the sun has set. Glass towers reflect radiation between each other in narrow streets, trapping warm air at ground level. Millions of air conditioners pump heat out of buildings and into the air around them. Cars, buses, and factories add still more. Unlike a forest or grassland, a city cannot cool itself through transpiration — it has no leaves to breathe out water vapour.

COOLING STRATEGIES OLD AND NEW

Some of the most effective solutions are also the oldest. Trees lining a street can lower the temperature beneath them by up to four degrees through shade and transpiration. White or reflective roof coatings, known as "cool roofs", bounce sunlight away instead of absorbing it. In several cities, planners now require new developments to include "green walls" — living vertical gardens that insulate buildings and release moisture into the surrounding air.

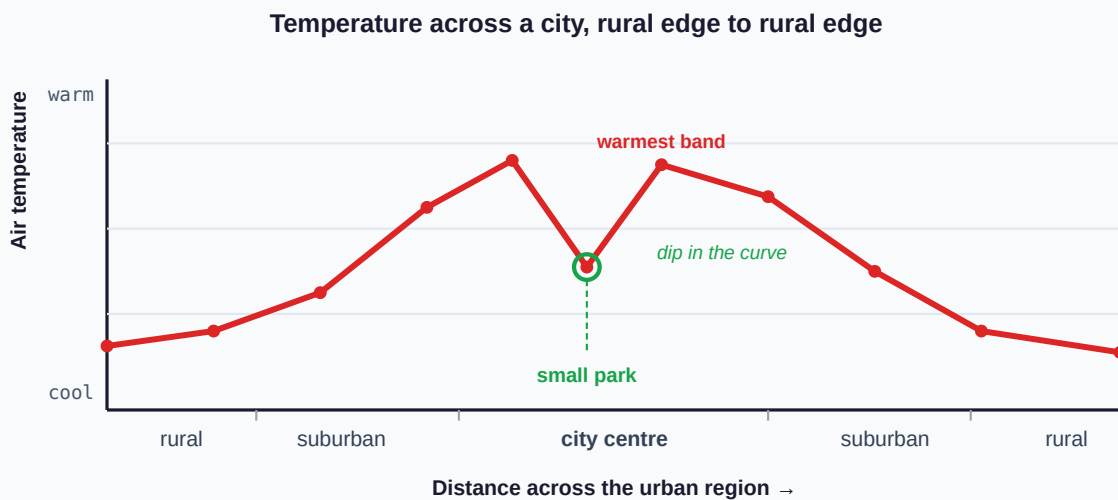


Figure 1: Temperature variation across a typical urban region on a clear summer evening. The curve rises toward the dense city centre and falls toward the rural edges; a small park produces a distinct dip.

Figure 1 shows how the temperature varies across a typical urban region on a clear evening in summer. The warmest band sits directly over the densest part of the city, falling away once the buildings thin out. Even small green spaces — a single square of trees in the middle of the city — create measurable dips in the curve.

The urban heat island is not a small problem. In heatwaves, city-dwellers die at higher rates than rural populations, and elderly residents and young children are particularly vulnerable. As heatwaves grow more frequent, understanding and moderating the heat islands beneath us will become one of the quiet priorities of city life.

Questions 1–6 are about *The city that cooks itself*

1

WRITER'S CRAFT — OPENING STRATEGY

The writer engages readers in the first paragraph by

- A using specialist vocabulary.
- B quoting an expert.
- C inviting them to recall a shared everyday experience.
- D challenging a widely-held belief.

2

TEXT COMPREHENSION — INTERPRET A DIAGRAM

According to Figure 1, the effect of a small green space in the middle of the city is

- A to have no measurable effect on temperature.
- B to create a noticeable dip in the temperature curve.
- C to make the surrounding streets hotter.
- D to extend the warm band further outward.

3

VOCABULARY — WORD MEANING IN CONTEXT

As used in the text, the word transpiration refers to

- A the movement of water through a plant and its release as vapour.
- B the breakdown of sunlight by leaves.
- C the growth of new leaves in spring.
- D the fall of leaves in autumn.

4

WRITER'S CRAFT — PURPOSE OF A SECTION

The main purpose of the section headed 'Cooling strategies old and new' is

- A to argue that new technologies are always better than traditional ones.
- B to outline practical measures and give examples of where they are used.
- C to criticise cities that have not adopted cooling strategies.
- D to predict which cooling methods will be most popular in future.

5

TEXT COMPREHENSION — LITERAL/INFERENCE

According to the text, air conditioners contribute to the urban heat island because they

- A cool the inside of buildings too efficiently.
- B require too much electricity to run.
- C release heat from inside buildings into the outside air.
- D reflect sunlight between buildings.

6

WRITER'S CRAFT — IMAGERY AND PURPOSE

Which option correctly matches an image from the text with its purpose?

- A 'bounce sunlight away' — to explain how air conditioners warm cities
- B 'breathe out water vapour' — to describe how plants cool the air around them
- C 'cooks itself' — to describe a particular kind of building material
- D 'trapping warm air' — to explain how trees lower the temperature

TEXT 2 OF 5 — LITERARY FICTION

Lessons at Marlowe Hall

Original fiction extract for ICAS preparation purposes

The schoolroom at Marlowe Hall was, as Mr Peregrine Crane was fond of observing to any visitor who would listen, a place where the modern cult of feeling found no purchase. Here the windows were tall and narrow, admitting a thin wintry light that fell upon the heads of the pupils without warming them; here the benches were arranged in rows as uniform as the headstones of a cemetery; and here — above all — here, facts were honoured.

On the particular morning of which I now write, a new pupil had arrived. She was a slight thing, perhaps ten years of age, with hair the colour of stripped willow and eyes that darted about the room like moths seeking a candle.

'Your name, girl,' said Mr Crane, his forefinger — long, thin, and disquietingly pale — pointed at her as though at a specimen on a pin.

'Susannah, sir,' whispered the child.

'A sentimental name. To whom does it belong?'

'To me, sir.'

Mr Crane permitted himself the quietest of smiles — a mere twitching of the cheek, which, in a man of his compressed temperament, answered to what in others might have been open laughter.

'A name belongs to what it describes. You possess no sentiment; therefore you do not belong to your name. Henceforth you shall be Pupil Seven. Do you understand?'

Susannah — or Pupil Seven, as we must now call her — nodded mutely. About her, the other children watched with that stillness which, in the young, is indistinguishable from fear. Above the master's desk, a framed inscription read: *What is Useful, What Endures*. A soft grey line of dust lay along its upper edge.

Outside, though Pupil Seven could not yet see it, a rook was picking its way across the frozen lawn, black against the white, leaving tracks that filled in behind it as soon as they were made.

Questions 7–12 are about *Lessons at Marlowe Hall*

7

VOCABULARY — ARCHAIC IDIOM

The phrase 'the modern cult of feeling found no purchase' suggests that in the schoolroom

- A feelings were actively celebrated.
- B the pupils worshipped their teacher.
- C emotion had no place and was not welcomed.
- D modern methods had been abandoned in favour of older ones.

8

WRITER'S CRAFT — SYMBOLIC DETAIL

The detail that 'a soft grey line of dust lay along' the upper edge of the inscription most strongly suggests

- A the schoolroom is unusually clean.
- B the principles on the inscription are no longer genuinely lived out.
- C the school has been recently built.
- D the children are afraid of the inscription.

9

TEXT COMPREHENSION — CHARACTERISATION

Mr Crane's dialogue and manner portray him as

- A warm in spirit but strict in manner.
- B cold and rigidly logical.
- C uncertain of his own authority.
- D impatient and absent-minded.

10

TEXT COMPREHENSION — MOOD

The overall mood of the text is

- | | |
|------------|----------------|
| A playful. | B oppressive. |
| C comic. | D sentimental. |

11

SYNTAX — PUNCTUATION AS DEVICE

In the paragraph beginning 'Mr Crane permitted himself...', the long dashes are used to

- ☐ A signal a break in dialogue.
- ☐ B mark a list of items.
- ☐ C enclose an explanatory comment within the sentence.
- ☐ D indicate a change of speaker.

12

VOCABULARY — NEAR-SYNONYM

Which word best captures the way the other children watched in the second-last paragraph?

- | | |
|-------------------------------------|---------------------------------|
| ☐ A inquisitive | ☐ B wary |
| ☐ C bored | ☐ D restive |

The translator at her desk

An essay by Marisol Reis, literary translator. Original essay written for ICAS preparation purposes.

People sometimes ask me what I do for a living, and when I answer that I translate novels from Portuguese into English, a small misunderstanding usually follows. They imagine, I think, that I sit at my desk with two thick dictionaries and replace one word with another, like someone assembling a jigsaw. If that were the work, machines would have taken it over years ago — and in some workmanlike sense they have.

What I actually do is more like the work of a potter who receives another potter's clay. The clay has already been shaped; my job is to reshape it in a different material, for different hands. Sometimes the new bowl comes out cruder than the original; sometimes — rarely, and only with luck — it comes out more beautiful. It will never come out the same.

Take the Portuguese word *saudade*. Every translator knows it and dreads it. It means something like longing, something like nostalgia, something like the presence of an absence. English has no single word for it, which does not mean English cannot express it — only that English must take a longer road. Where a Brazilian writer drops *saudade* into a sentence like a stone into water, and the rings spread outward effortlessly, I must build my rings by hand, plank by plank, out of English.

I used to find this frustrating. I no longer do. The more I translate, the more I come to think that each language is like a differently-shaped musical instrument. A violin cannot sound like a piano, and a piano cannot sound like a violin, and neither is a failed version of the other. They are simply different, and the music they each produce is native to them. My task, then, is not to make the English piano sound like a Portuguese violin. My task is to play — on the piano I have — the same song.

Questions 13–17 are about *The translator at her desk*

13

TEXT COMPREHENSION — INTERPRET A PHRASE

The phrase 'a small misunderstanding usually follows' most likely refers to the fact that

- A people forget which language the writer works with.
- B people underestimate what the writer's work actually involves.
- C people confuse the writer with someone else.
- D people think the writer prefers fiction to non-fiction.

14

WRITER'S CRAFT — ANALOGY

The writer compares her work to that of a potter receiving another potter's clay in order to

- A suggest that translation is unpredictable and often goes wrong.
- B argue that translators should also learn a manual craft.
- C show that translation reshapes an existing work rather than creating one from nothing.
- D explain why she prefers working with clay to working with words.

15

WRITER'S CRAFT — PARADOXICAL PHRASE

The phrase 'the presence of an absence' is used to

- A give a precise English equivalent for *saudade*.
- B demonstrate that English is a richer language than Portuguese.
- C capture a paradoxical feeling that resists any single-word translation.
- D argue that Portuguese writers are more poetic than English ones.

16

VOCABULARY — NEAR-SYNONYM

As used in the text, the word workmanlike is closest in meaning to

A enthusiastic

B competent but uninspired

C exhausting

D dishonest

17

TEXT COMPREHENSION — EXTENDED METAPHOR

In the final paragraph, the writer uses the comparison between a violin and a piano to make the point that

A some languages are inherently more musical than others.

B each language has its own nature, which should be honoured rather than disguised.

C translators should choose languages that sound similar to each other.

D musical instruments and languages are too different to be compared.

TEXT 4 OF 5 — JOURNALISTIC FEATURE

The quiet map of you

Investigative feature by Aarav Banerjee. Original feature written for ICAS preparation purposes.

I am sitting in the bright, unhurried office of a company most people have never heard of, and a woman called Dr Ines Vargas is telling me, in the friendliest voice imaginable, how much she knows about me. She knows I like early-morning runs. She knows I prefer a particular grocery chain. She knows the approximate times I arrive home each evening, and that I travelled to a conference in a southern European city three weeks ago.

'It's all from public sources,' she says, smiling, as though this makes it less startling. 'We don't hack anyone's phone. We just stitch together what people have already given away.'

Dr Vargas works at one of the largest data brokers in the region — a company that buys, sells, and repackages information about individuals. This is not an illegal industry. In most countries it is not even tightly regulated. A 2023 study from the University of Utrecht found that an average internet user's behaviour is tracked by around 78 different companies over the course of a single day of ordinary browsing. Most of those companies the user has never heard of, and has certainly never signed up with.

How did we get here? Dr Vargas offers an analogy. 'Imagine,' she says, 'that every time you walked through a supermarket, someone followed you at a respectful distance and noted down everything you looked at, for how long, and whether you ended up buying it. Then imagine that person selling their notebook, at the end of the day, to a hundred other shops.'

I ask her whether it troubles her — whether she, a person inside this industry, feels uneasy about what her industry does. She pauses.

'Every so often,' she admits. 'Mostly at night.'

The most valuable data, it turns out, are not what we type into search bars. They are the smaller, stranger fragments: which articles we scroll past, which advertisements make us linger for a second longer than we realise, which app we open first when we wake up. These are the quieter signals — the ones we do not know we are giving.

Walking out of the building into the afternoon sun, I noticed my hand, for the first time I could remember, lingering for a moment before I checked my phone.

Questions 18–23 are about *The quiet map of you*

18

WRITER'S CRAFT — TITLE METAPHOR

The title 'The quiet map of you' refers to

- A a physical map displayed in Dr Vargas's office.
- B the accumulated profile of an individual built from small, often invisible sources.
- C a popular fitness-tracking application.
- D the fact that the office where the interview took place was quiet.

19

WRITER'S CRAFT — NOT A PURPOSE

Which of the following is **NOT** a purpose for which the writer uses the statistic from the University of Utrecht?

- A to quantify the scale of tracking that occurs in ordinary browsing
- B to support the claim that most tracking is invisible to users
- C to lend authority to the writer's own observations
- D to promote the University of Utrecht's research programmes

20

TEXT COMPREHENSION — INFER FROM A PAUSE

When Dr Vargas pauses before answering whether she feels uneasy about her industry, this most likely suggests that

- A she has never considered the question before.
- B she does not want to answer at all.
- C she is weighing how honest to be.
- D she disagrees entirely with the premise of the question.

21

TEXT COMPREHENSION — ARC OF ATTITUDE

The writer's attitude across the article can best be described as moving from

- A friendly curiosity to quiet unease.
- B suspicion to admiration.
- C anger to resigned acceptance.
- D confusion to full understanding.

22

VOCABULARY — NEAR-SYNONYM

As used in the text, the phrase stitch together is closest in meaning to

A fabricate

B assemble

C embroider

D repair

23

WRITER'S CRAFT — CLOSING IMAGE

The final sentence, describing the writer's hand 'lingering for a moment before I checked my phone', is used to

A describe the weather as the writer left the building.

B suggest that the writer's phone had run out of battery.

C show that the interview has left a small but lasting change in the writer's own behaviour.

D imply that the writer was physically tired after the interview.

READING CLOZE QUESTIONS

Read the whole passage first, lightly, with the blanks in place. Then for each blank, decide what *kind* of word or phrase the gap needs — is it contrasting two ideas, adding to them, or explaining a cause? Once you know what's needed, the wrong options tend to reveal themselves quickly.

TEXT 5 OF 5 — CLOZE PASSAGE

The slow return of the seagrass

Original cloze passage for ICAS preparation purposes. For each numbered blank, choose the option that best completes the text.

Seagrass meadows, (24) dramatically in the past century, remain among the most productive ecosystems on Earth. Per square metre, seagrass captures carbon up to thirty-five times faster than tropical forest. Worldwide, an estimated thirty per cent of these meadows has been lost, (25) coastal development, pollution, and the scraping of boat anchors along the sea floor.

In recent years, a new approach has emerged. (26) replanting seeds one by one — a method that proved slow and rarely successful — marine biologists now focus on protecting existing meadows and allowing them to spread outward naturally. In parts of the Baltic, (27) parts of the Mediterranean, such protected areas have recovered to levels not seen in decades.

The work is far from finished. Recovery is slow; (28), it is real — and for a planet in urgent need of carbon absorption it is one of the quieter pieces of good news.

24

SYNTAX — POSSESSIVE RELATIVE

Choose the option that best completes blank (24).

- ☐ A whose global extent has shrunk
- ☐ B which global extent has shrunk
- ☐ C whose global extent have shrunk
- ☐ D which global extent have shrunk

25

SYNTAX — CAUSAL CONNECTOR

Choose the option that best completes blank (25).☐ A mainly owing to☐ B despite being☐ C resulted from☐ D in contrast with

26

SYNTAX — SUBSTITUTIVE CONNECTOR

Choose the option that best completes blank (26).☐ A Rather than☐ B Because of☐ C In addition to☐ D Regardless of

27

SYNTAX — ADDITIVE CONNECTOR

Choose the option that best completes blank (27).☐ A as well as in☐ B rather than in☐ C despite the☐ D instead of in

28

SYNTAX — CONTRASTIVE CONNECTOR

Choose the option that best completes blank (28).☐ A therefore☐ B however☐ C because☐ D for example



Writing

Practice · 2 tasks · ~35 min each · Plan, write, check

2

TASKS

35

MIN EACH

The real ICAS Paper F Writing asks for **one** extended response (35 minutes). This workbook gives you **two** different tasks so you can practise both major text types that appear across ICAS Paper F: a **persuasive opinion piece** and a **narrative complication**. Plan first. Write second. Check last.



WRITING STRATEGY FOR PAPER F

ICAS Writing is marked on three things: **Genre** (do you meet the conventions of the text type?), **Textual Grammar** (are your paragraphs, cohesion, and sentence structure strong?), and **Syntax & Punctuation** (is your writing technically accurate?). At Paper F, persuasive pieces are expected to acknowledge and refute a counter-argument, and narratives are expected to show craft — varied sentence lengths, sensory detail, and pacing — not just plot.

Task 1 — Persuasive



YOUR WRITING TASK

Some schools in several countries are considering banning mobile phones during the *entire* school day — not just in classrooms, but also during breaks, lunch, and between lessons.

Supporters of the ban say phones make it harder for students to focus, socialise face-to-face, and sleep well. Critics say phones are essential tools students rely on for safety, for communicating with family, and for organising their lives outside school.

Write a persuasive **opinion piece for your school newsletter**, approximately **300–400 words**, arguing either **for** or **against** a full-day mobile phone ban at your school. Your piece should include:

- A clear opening position.
- At least three supporting arguments with reasons or examples.
- Explicit acknowledgement and refutation of at least one opposing view.
- A persuasive closing sentence.

PLANNING BOX — 5 MINUTES

Plan 5 min	Your position (for or against):
	Argument 1:
	Argument 2:
	Argument 3:
	Opposing view I will refute:

Task 2 — Narrative

YOUR WRITING TASK

Write the complication of a story — the moment an ordinary day suddenly goes wrong.

You do not need to tell the whole story. Focus on that *one moment*: what your character notices, what they think, and what they decide to do. Write approximately **300–400 words**. Your piece should:

- Stay with a single character throughout.
- Use sensory detail (sight, sound, touch, smell) — show, don't tell.
- Vary sentence length deliberately — short sentences for tension, longer ones for reflection.
- End at a point that leaves the reader wanting to know what happens next.

You do NOT need a full beginning or ending — just write the complication as a single vivid scene.

PLANNING BOX — 5 MINUTES

Plan
5 min

My character (one or two words — no backstory needed):

The ordinary moment just before everything changes:

The complication — what goes wrong:

Two sensory details I want to include:

Character's first thought, and first action:

Read your piece *out loud* in your head. Check: (1) Does every paragraph have a clear purpose? (2) Have I used a variety of sentence lengths? (3) Is my punctuation correct — especially commas, apostrophes, and speech marks? (4) Have I stayed in the same tense throughout? (5) Does my last sentence land strongly? Small fixes in the final five minutes can move your writing up a whole band on the scale.



Science

Practice · 10 questions · ~15 minutes

10

QUESTIONS

15

MINUTES

At Paper F level, Science tests *reasoning* as much as *knowledge*. Every formula you need is given in the question — your job is to apply it accurately. Expect to combine two concepts in a single question, tell apart observations from inferences, and evaluate whether experimental data actually supports a claim.



SCIENCE STRATEGY FOR PAPER F

When a question gives you a formula, write down what each letter means and what value you have for each *before* substituting. Most errors at this level aren't conceptual — they're careless: dropping a unit, squaring instead of doubling, or dividing the wrong way up. Slow down at the arithmetic, not the reasoning.

1

INTERPRETING — MULTI-CONSTRAINT TABLE LOOKUP

A field biologist is identifying wild mushrooms using a reference table. Four features are tested for each species: cap shape, spore colour, stem texture, and how the mushroom's flesh reacts to a drop of potassium hydroxide (KOH).

FIELD REFERENCE TABLE

SPECIES	CAP SHAPE	SPORE COLOUR	STEM	FLESH IN KOH
A	domed	white	smooth	no change
B	convex	pink	smooth	no change
C	flat	white	fibrous	no change
D	domed	white	smooth	turns bright yellow
E	convex	white	smooth	turns bright yellow

The biologist finds a mushroom with a domed cap, white spores, a smooth stem, and flesh that turns bright yellow in KOH. Which species is it?

A Species A

B Species C

C Species D

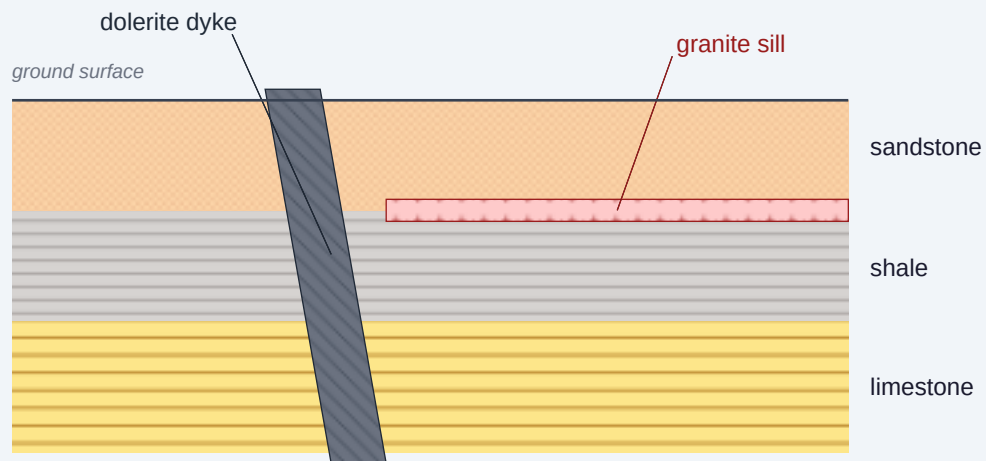
D Species E

2

REASONING — ROCK SEQUENCING

Two general rules apply to layers of rock: (i) younger sedimentary rocks lie on top of older ones; (ii) intrusive igneous rocks are younger than the rocks they cut through. The diagram shows a cross-section of a rocky area. A granite sill has formed between two sedimentary layers, and a dolerite dyke cuts through every rock including the granite.

CROSS-SECTION OF ROCK LAYERS



Which rock in the diagram is the youngest?

A limestone

B sandstone

C granite

D dolerite

Symbiosis is a close, long-term relationship between two different species. The table below shows the main types.

TYPES OF SYMBIOSIS

TYPE	EFFECT ON SPECIES 1	EFFECT ON SPECIES 2
Mutualism	benefits	benefits
Commensalism	benefits	no effect
Parasitism	benefits	is harmed
Amensalism	is harmed	no effect

Many orchid species live in a mutualistic relationship with a particular fungus in the soil: the orchid supplies the fungus with sugars; the fungus helps the orchid absorb minerals. Suppose a disease kills most of the orchids in a particular forest. What is the most likely immediate effect on the fungus population?

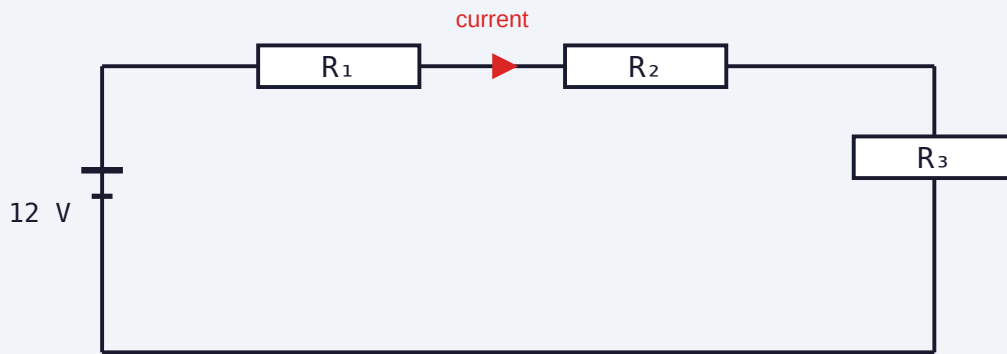
- A It will increase, as there is now less competition for space.
- B It will decrease, because the fungus depends on the orchid for sugars.
- C It will stay the same, because fungi do not need plants.
- D It will become parasitic on the remaining orchids.

4

REASONING — CIRCUIT TOPOLOGY

In a circuit, components can be connected in series (on a single path with the same current through each) or in parallel (on separate paths between the same two points). The diagram shows a circuit with a battery and three resistors, R_1 , R_2 and R_3 .

CIRCUIT WITH THREE RESISTORS



The circuit forms one single loop with no branches.

Which statement correctly describes the connections?

- ☐ A R_1 and R_2 are in series; R_3 is in parallel with them.
- ☐ B All three resistors are in parallel with one another.
- ☐ C R_1 and R_2 are in series; R_3 is on a separate branch.
- ☐ D All three resistors are in series with one another.

5

INVESTIGATING — OBSERVATION VS INFERENCE

Four students watched a piece of magnesium ribbon being placed in a test tube of dilute hydrochloric acid. Each student wrote one statement about what happened.

STUDENT STATEMENTS

STUDENT	STATEMENT
Ajay	"A reaction is taking place, because bubbles are forming."
Bea	"The gas being released is hydrogen."
Chen	"Small bubbles are rising from the ribbon."
Dimo	"Magnesium reacts more quickly with this acid than copper would."

Which student wrote a pure observation (a statement based only on what can be directly seen or measured)?

☐ A Ajay☐ B Bea☐ C Chen☐ D Dimo

6

CONCLUDING — EVIDENCE QUALITY

A company claims that a herbal sleep supplement increases the length of a person's night-time sleep. Three trials were carried out. In each, some patients were given the supplement and others were given a placebo (a harmless tablet with no active ingredient). The results are shown below.

RESULTS OF THREE TRIALS

TRIAL	SUPPLEMENT (N)	CHANGE (HRS)	PLACEBO (N)	CHANGE (HRS)
1	40	+0.3	38	+0.1
2	32	-0.1	30	+0.2
3	55	0.0	52	0.0

Do these results give definitive evidence that the supplement increases sleep time?

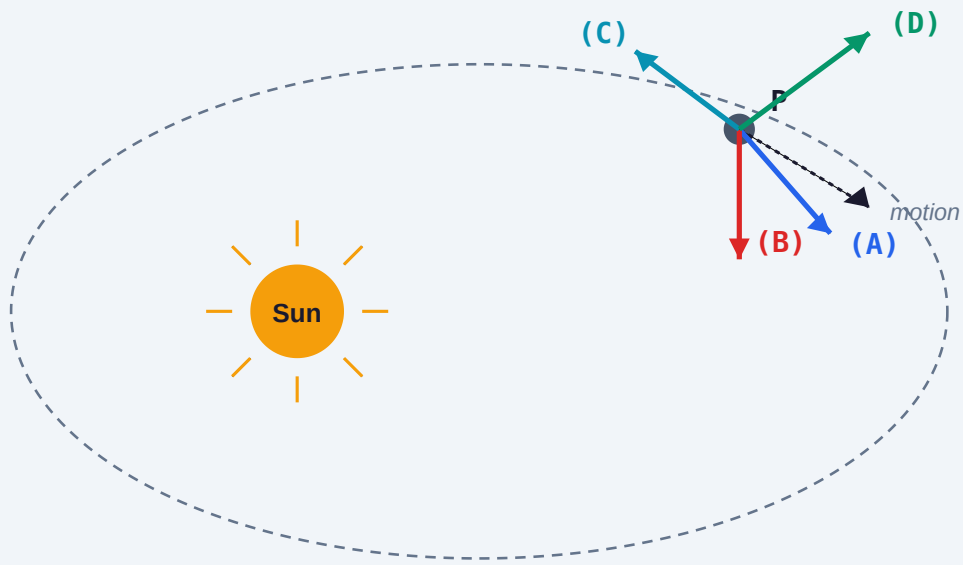
- A** Yes, because trial 1 showed an increase.
- B** Yes, because the total number of patients is over 100.
- C** No, because the three trials give inconsistent results.
- D** No, because herbal supplements never affect sleep.

7

REASONING — SPATIAL REASONING (ASTRONOMY)

A constant stream of particles flows outward from the Sun in all directions. This stream, called the *solar wind*, pushes the gas and dust of a comet's tail, so the tail always points directly away from the Sun — no matter which direction the comet is moving. The diagram shows a comet in an elliptical orbit around the Sun. At point P, four possible directions for the tail have been marked.

COMET AT POINT P



Which arrow shows the direction of the comet's tail at point P?

☐ A arrow (A)

☐ B arrow (B)

☐ C arrow (C)

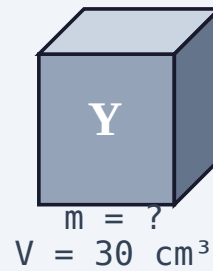
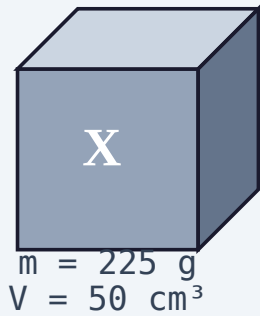
☐ D arrow (D)

8

REASONING — DENSITY AND FLOAT/SINK

The density of an object is given by $\text{density} = \text{mass} \div \text{volume}$. An object floats on water if its density is less than the density of water (1 g/cm^3), and sinks if its density is greater. Two cubes, X and Y, are made of the same metal. Cube X has a volume of 50 cm^3 and a mass of 225 g . Cube Y has a volume of 30 cm^3 .

CUBES X AND Y (NOT TO SCALE)



What is the mass of cube Y, and what would happen if it were placed in water?

- ☐ A mass 135 g , and it would sink
- ☐ B mass 375 g , and it would sink
- ☐ C mass 27 g , and it would float
- ☐ D mass 4.5 g , and it would float

INVESTIGATING — PROCEDURAL SEQUENCING

A student wants to investigate how temperature affects the speed of a reaction involving an enzyme. She has five test tubes, an enzyme solution, a substrate (the chemical the enzyme acts on), and water baths at five different temperatures. She writes down four steps, but not in order.

FOUR STEPS (NOT IN ORDER)

STEP	ACTION
K	Pour an equal volume of enzyme solution into each of the five test tubes.
L	Time how long the reaction takes in each tube and record the result.
M	Place each tube into a water bath at a different temperature and leave it to reach that temperature.
N	Add an equal volume of substrate to each tube.

Which is the correct order of the steps?

A K, L, M, N

B K, M, N, L

C M, K, N, L

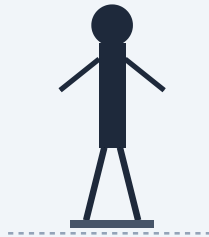
D N, K, M, L

10

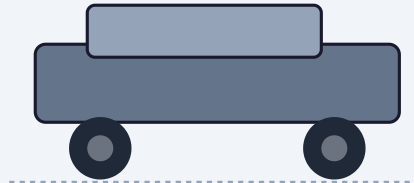
REASONING — PRESSURE FORMULA

Pressure is given by $\text{pressure} = \text{force} \div \text{area}$. A figure skater's total weight pushes down on the ice with a force of 600 N, through two skate blades whose total contact area is 5 cm². A parked car's total weight pushes down on the road with a force of 12 000 N, through four tyres whose total contact area is 400 cm².

SKATER VS. CAR



$$F = 600 \text{ N}$$
$$A = 5 \text{ cm}^2$$



$$F = 12\,000 \text{ N}$$
$$A = 400 \text{ cm}^2$$

Which of the following is correct?

- ☐ A The car exerts greater pressure on the ground, because its total force is greater.
- ☐ B The skater exerts greater pressure on the ground, because her force is spread over a much smaller area.
- ☐ C Both exert exactly the same pressure.
- ☐ D The skater exerts less pressure, because her total force is smaller.



Mathematics

Practice · 12 questions · ~18 minutes · No calculator

12

QUESTIONS

18

MINUTES

Paper F is the first level where algebra appears as a proper topic — not patterns with shapes, but letters standing in for numbers, linear equations to solve, and graphs matched to tables of values. Coordinates extend into all four quadrants, and geometry expects you to know angle rules by name: co-interior, alternate, exterior angle of a triangle. When a question gives you a figure, mark the given angles on it before you reason.



MATHS STRATEGY FOR PAPER F

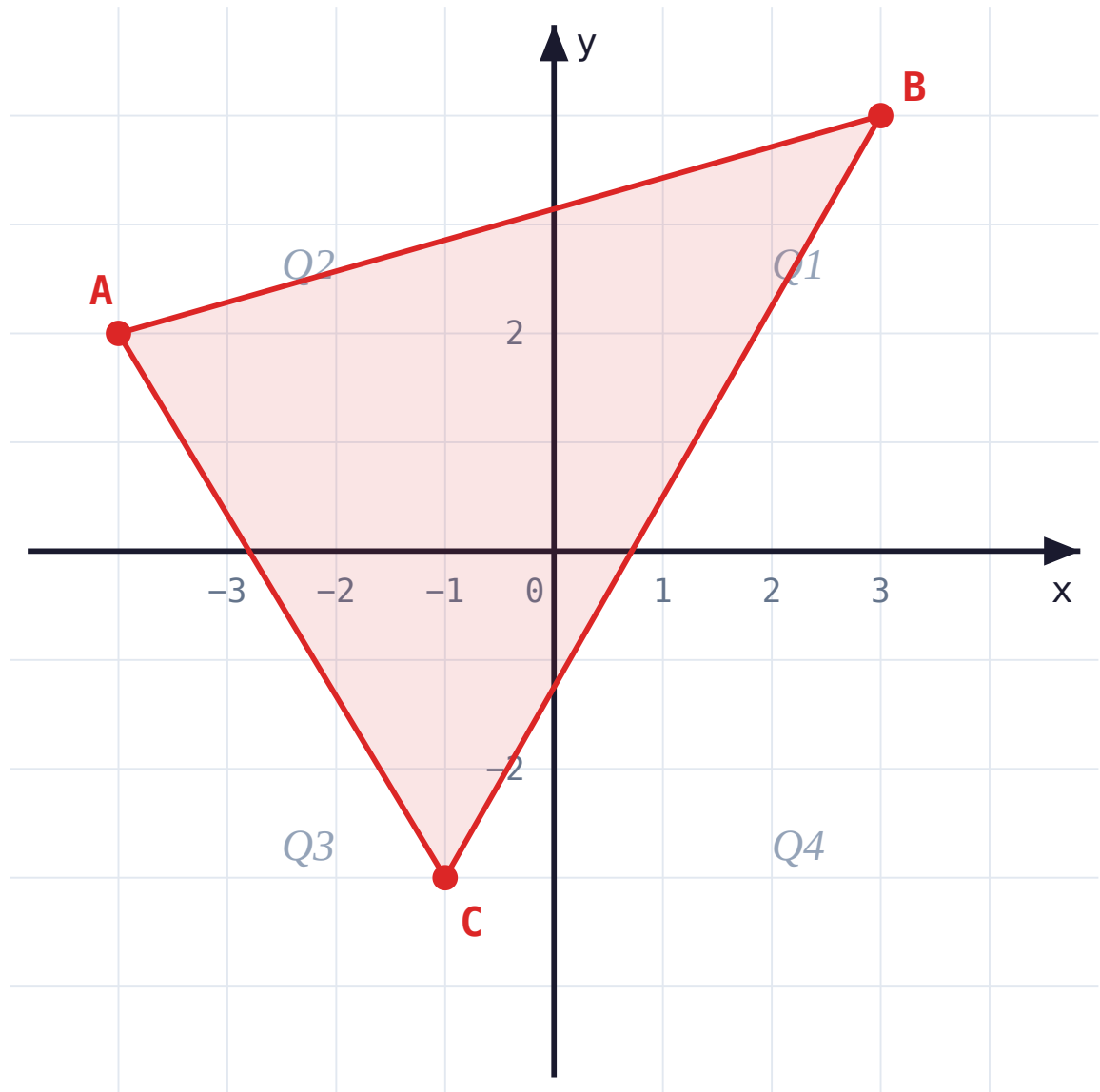
Every linear equation follows the same pattern: (1) expand brackets; (2) collect variable terms on one side, numbers on the other; (3) divide to isolate the variable; (4) substitute back to check. The most common Paper F error is distributing only to the first term — $3(x + 3)$ is $3x + 9$, not $3x + 3$. If your answer matches an option instantly, don't celebrate — double-check.

1

SPACE & GEOMETRY — COORDINATES IN 4 QUADRANTS

A triangle has vertices at $A(-5, 2)$, $B(3, 4)$, and $C(-1, -3)$. The *centroid* of a triangle is the point whose coordinates are the average of the coordinates of the three vertices.

COORDINATE GRID



In which quadrant does the centroid of this triangle lie?

☐ A quadrant 1

☐ B quadrant 2

☐ C quadrant 3

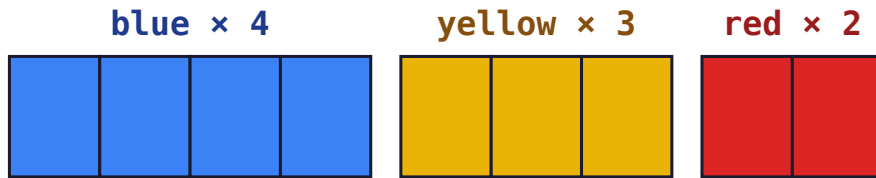
☐ D quadrant 4

2

NUMBER & ARITHMETIC — RATIO

A paint factory mixes coloured pigments in the ratio 4 : 3 : 2 (blue : yellow : red). In one batch of paint, the total mass of pigment is 1.8 kg.

PIGMENT MIX



total pigment in one batch = 1.8 kg

How many grams of red pigment are in one batch?

A 200 g

B 400 g

C 600 g

D 800 g

3

ALGEBRA — SOLVE LINEAR EQUATION WITH BRACKETS

Solve the following equation for x:

$$3x + 5 = 2(x + 7)$$

A $x = 2$

B $x = 7$

C $x = 9$

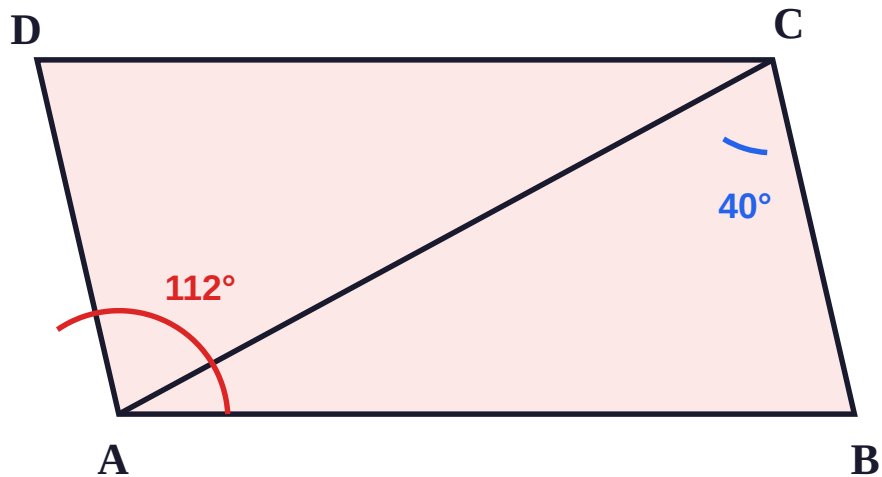
D $x = 12$

4

SPACE & GEOMETRY — MULTI-STEP ANGLE REASONING

In parallelogram ABCD, the diagonal AC has been drawn. $\angle DAB = 112^\circ$ and $\angle BCA = 40^\circ$.

PARALLELOGRAM ABCD (NOT TO SCALE)



What is the size of $\angle BAC$?

A 40°

B 68°

C 72°

D 140°

5

ALGEBRA & PATTERNS — NON-LINEAR SEQUENCE

The first five terms of a number sequence are shown below.

3	6	11	18	27
1st	2nd	3rd	4th	5th

If the pattern continues in the same way, what is the 7th term?

A 36

B 38

C 51

D 63

6

CHANCE & DATA — STEM-AND-LEAF MEDIAN/RANGE

A teacher records the test scores for class A on the stem-and-leaf plot below. Stems represent tens, leaves represent units. "6 | 1 4 4 5 8 9" means 61, 64, 64, 65, 68, 69.

CLASS A TEST SCORES

STEM	LEAVES
5	2 3 7
6	1 4 4 5 8 9
7	0 2 5 6 8 8
8	1 3 5

Which row gives the correct median and range of class A's scores?

A Median 69, Range 33

B Median 69.5, Range 33

C Median 70, Range 33

D Median 69.5, Range 35

7

MEASURES & UNITS — SPEED × TIME, UNIT CONVERSION

A survey drone flies in a straight line at a constant speed of 18 metres per second.



18 m/s

*time in flight = 45 min*

How far does the drone travel in 45 minutes, in kilometres?

A 8.1 km

B 13.5 km

C 48.6 km

D 810 km

8

ALGEBRA — BUILD-AND-SOLVE FROM CONTEXT

Aisha and Ben split the bill at a café. Aisha pays \$6 more than twice the amount Ben pays. Together, their total bill is \$33. If Ben pays b dollars:

$$b + (2b + 6) = 33$$

How many dollars does Ben pay?

A \$6

B \$9

C \$12

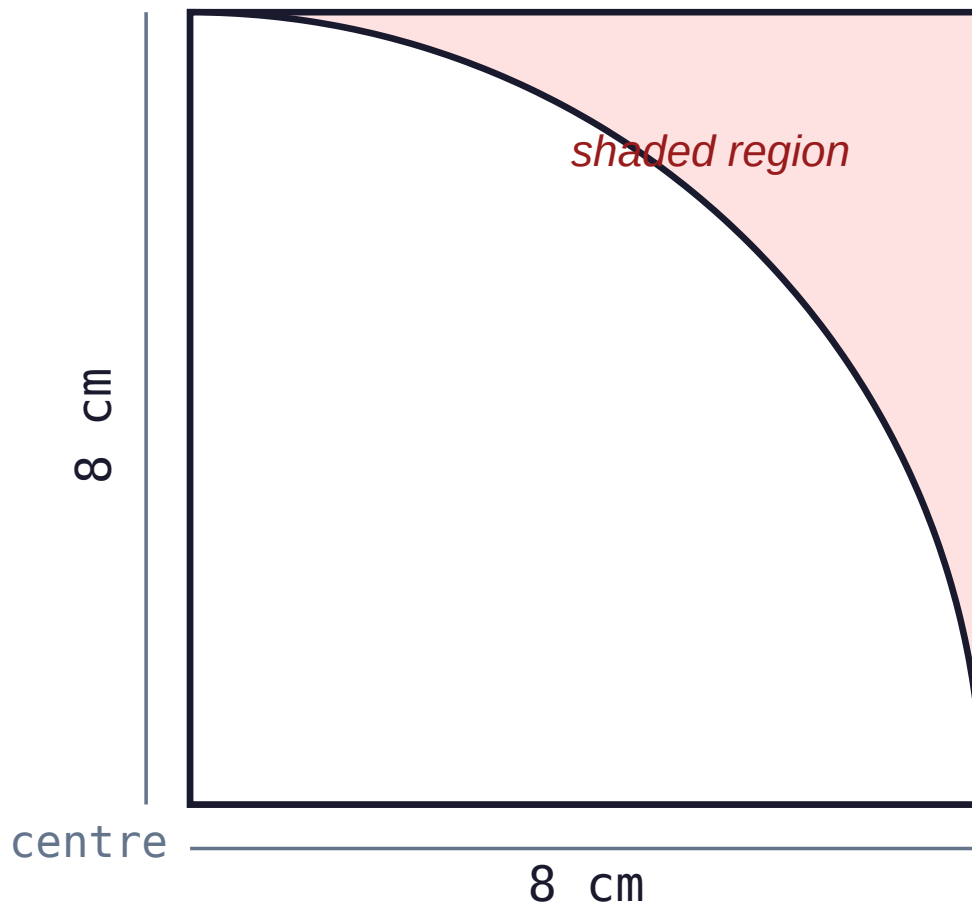
D \$24

9

SPACE & GEOMETRY — COMPOSITE AREA WITH π

The diagram shows a square with side length 8 cm. A quarter circle of radius 8 cm is drawn inside the square, with its centre at one corner.

SQUARE WITH QUARTER-CIRCLE REMOVED



What is the area of the shaded region, in cm^2 , in terms of π ?

A $64 - 16\pi$

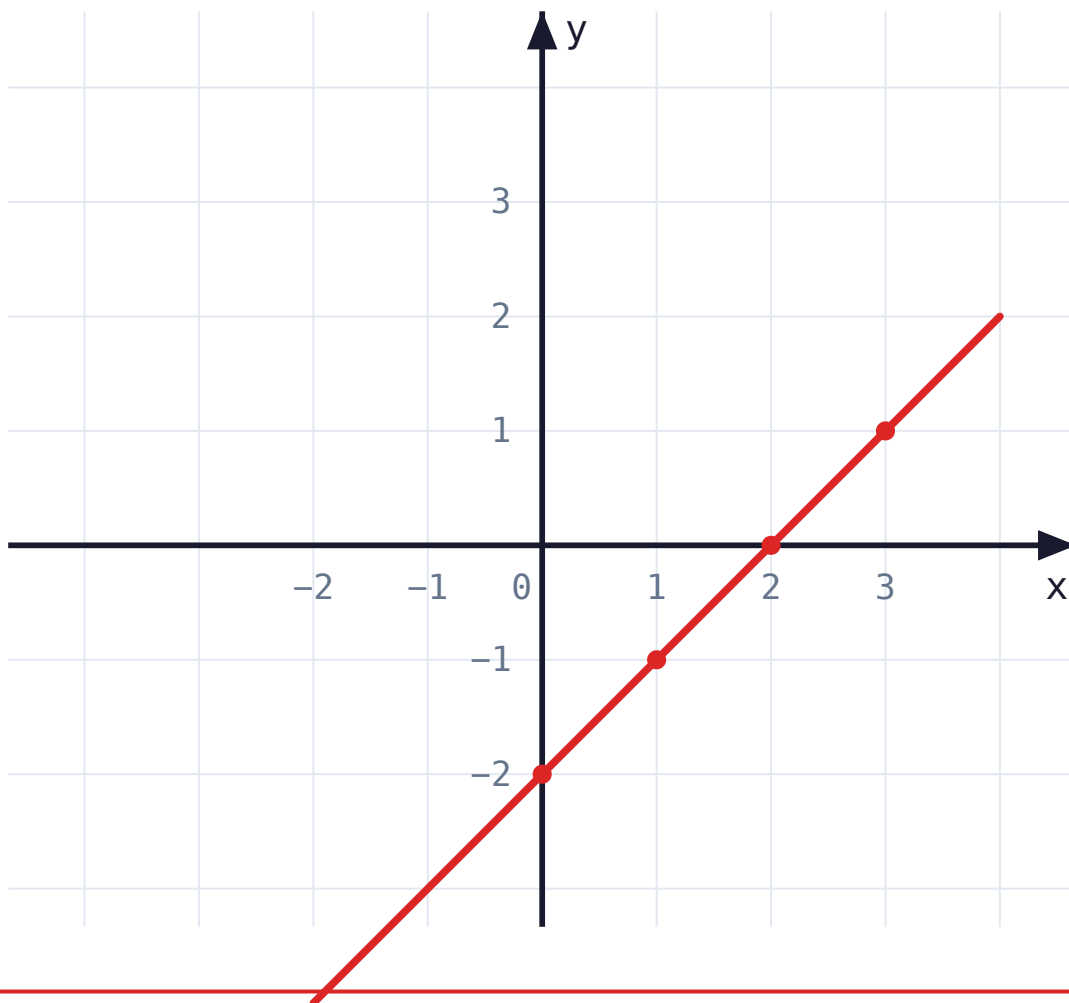
B $64 - 8\pi$

C $32 - 16\pi$

D $16\pi - 64$

The graph below shows a straight line.

STRAIGHT-LINE GRAPH



Which could be the table of values for this line?

A	x	-1	0	1	2	3
	y	-3	-2	-1	0	1

B	x	-1	0	1	2	3
	y	1	0	-1	-2	-3

C	x	-1	0	1	2	3
	y	3	2	1	0	-1

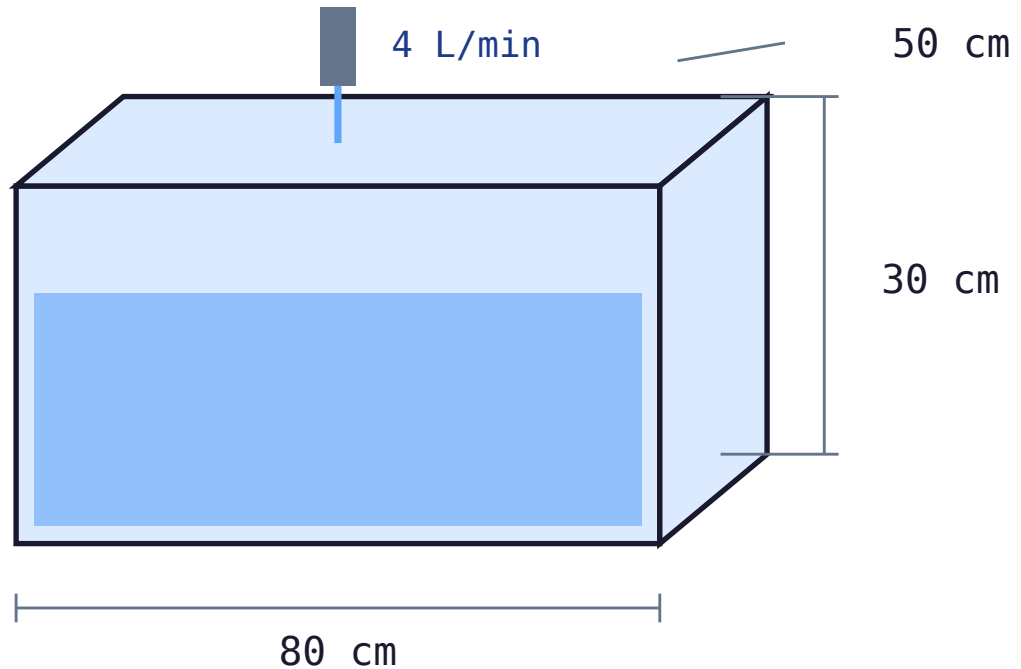
D	x	-1	0	1	2	3
	y	-1	0	1	2	3

11

MEASURES & UNITS — VOLUME AND RATE

A rectangular fish tank has internal dimensions $80\text{ cm} \times 50\text{ cm} \times 30\text{ cm}$. Water flows in at 4 litres per minute. (1 litre = 1000 cm^3)

FISH TANK



How long does it take to fill the tank completely?

A 20 minutes

B 30 minutes

C 40 minutes

D 3 hours

12

ALGEBRA — SIMPLIFY / EQUIVALENT EXPRESSIONS

Which expression below is equivalent to

$$3(a + b) - a$$

for all values of a and b ?

A $2a + 3b$

B $3a + 2b$

C $3(a + b - a)$

D $2(a + b)$

Answers & Explanations

Each answer explains not only *why* the correct option is right, but also what specific error each wrong option represents. Use this section after you have attempted the questions — read carefully the ones you got wrong, and think about the error you made, not just the right answer.

English (Q1–28)

1 Writer's craft — opening strategy.

✓ **Correct answer: C — inviting readers to recall a shared everyday experience**

The opening sentence asks the reader to imagine walking from a park into a city — a common, familiar experience. This shared sensory moment is the hook.

WHY THE OTHERS ARE WRONG

- A** No specialist vocabulary appears before the reader is drawn in; "urban heat island" is introduced afterwards.
- B** No expert is quoted in the opening.
- D** The writer is describing a real phenomenon, not overturning a belief.

2 Effect of a small green space according to Figure 1.

✓ **Correct answer: B — creates a noticeable dip in the temperature curve**

The text and Figure 1 both describe "measurable dips" in the temperature curve where green spaces exist — a noticeable drop at that point.

WHY THE OTHERS ARE WRONG

- A** The text explicitly says the effect is measurable.
- C** The effect is cooling, not warming.
- D** Green spaces shrink the warm band, not extend it.

3

Meaning of *transpiration*.

✓ Correct answer: A — the movement of water through a plant and its release as vapour

The text defines transpiration in context: plants "breathe out water vapour" — the release of water from leaves.

WHY THE OTHERS ARE WRONG

- B** Tempting because both involve sun and leaves, but no "breakdown" of sunlight is mentioned.
- C** Confuses transpiration with seasonal growth.
- D** Confuses transpiration with leaf fall.

4

Main purpose of the 'Cooling strategies old and new' section.

✓ Correct answer: B — outline practical measures and give examples of where they are used

The section lists measures (trees, cool roofs, green walls) and names cities where they're required. It's informative, not argumentative.

WHY THE OTHERS ARE WRONG

- A** The heading is "old and new" and the text says the best solutions are sometimes the oldest — no hierarchy claimed.
- C** No criticism of any city is made.
- D** No predictions about popularity.

5

Why air conditioners contribute to the urban heat island.

✓ Correct answer: C — they release heat from inside buildings into the outside air

The text states directly: "Millions of air conditioners pump heat out of buildings and into the air around them."

WHY THE OTHERS ARE WRONG

- A** "Too efficient" is a value judgement not in the text.
- B** Electricity use is not discussed in this context.
- D** Reflection is associated with glass towers, not air conditioners.

6

Image-to-purpose match.

✓ **Correct answer: B — 'breathe out water vapour' describes how plants cool the air**

The vivid image of plants "breathing out water vapour" is the writer's way of describing transpiration and its cooling effect.

WHY THE OTHERS ARE WRONG

- A** 'Bounce sunlight' describes cool roofs, not air conditioners.
- C** 'Cooks itself' is the title metaphor for the city's self-generated heat — not a building material.
- D** 'Trapping warm air' describes what glass towers do, not what trees do.

7

Meaning of 'the modern cult of feeling found no purchase'.

✓ **Correct answer: C — emotion had no place and was not welcomed**

"Found no purchase" means couldn't get a grip or take hold. So feelings couldn't get a foothold in the schoolroom.

WHY THE OTHERS ARE WRONG

- A** The opposite of what the passage shows.
- B** "Cult" is figurative for "modern emphasis on feelings" — not literal worship.
- D** The schoolroom is old-fashioned — nothing is said about modern methods being abandoned.

8

Symbolic detail — dust on the inscription.

✓ **Correct answer: B — the principles on the inscription are no longer genuinely lived out**

The inscription proclaims "What is Useful, What Endures" — but it is itself gathering dust. The image is ironic: the principles are hollow.

WHY THE OTHERS ARE WRONG

- A** Dust signals the opposite of cleanliness.
- C** Dust signals age, not newness.
- D** Fear is associated with Mr Crane, not the inscription.

9

Characterisation of Mr Crane.

✓ Correct answer: B — cold and rigidly logical

Mr Crane replaces Susannah's name with a number, argues names must match what they describe, and smiles only in the smallest possible way. He treats people as specimens.

WHY THE OTHERS ARE WRONG

- A Nothing warm; his temperament is "compressed".
- C He is entirely sure of his authority.
- D He is neither impatient nor forgetful.

10

Overall mood.

✓ Correct answer: B — oppressive

The imagery (headstones, moths, specimen on a pin, frozen lawn, rook whose tracks fill in behind it) is consistently cold, confining, and slightly sinister. "Oppressive" captures the weight.

WHY THE OTHERS ARE WRONG

- A No playfulness; even Crane's smile is a "twitching of the cheek".
- C No humour.
- D Sentimental suggests warmth; the text is coldly critical.

11

Function of the long dashes.

✓ Correct answer: C — enclose an explanatory comment within the sentence

The dashes enclose the phrase "which, in a man of his compressed temperament, answered to..." — an inserted explanation within the main sentence.

WHY THE OTHERS ARE WRONG

- A No dialogue appears in that paragraph.
- B No list.
- D No speaker change.

12 Best near-synonym for how the children "watched".

✓ Correct answer: B — wary

Their stillness is "indistinguishable from fear" — cautious, self-protective watching. "Wary" captures that exact shade.

WHY THE OTHERS ARE WRONG

- A "Inquisitive" suggests curious interest; the mood is fear.
- C "Bored" contradicts stillness "indistinguishable from fear".
- D "Restive" means restless; the children are motionless.

13 Meaning of 'a small misunderstanding usually follows'.

✓ Correct answer: B — people underestimate what the writer's work actually involves

The writer explains people imagine translators "replace one word with another" — an underestimation. The misunderstanding is about skill and scope.

WHY THE OTHERS ARE WRONG

- A The language is always Portuguese; no confusion about that.
- C Nothing suggests misidentification.
- D Non-fiction is not mentioned.

14 Purpose of the potter analogy.

✓ Correct answer: C — show that translation reshapes an existing work rather than creating one from nothing

The potter receives clay already shaped and reshapes it — exactly what a translator does with an existing text in another language.

WHY THE OTHERS ARE WRONG

- A The writer is careful, not chaotic.
- B Figurative — not a recommendation for pottery.
- D No preference for clay expressed.

15 Purpose of 'the presence of an absence'.

✓ Correct answer: C — capture a paradoxical feeling that resists any single-word translation

The paradox demonstrates exactly the problem: *saudade* is the kind of feeling no single English word captures.

WHY THE OTHERS ARE WRONG

- A Writer explicitly says English has no single equivalent.
- B The writer never ranks the languages.
- D No claim about Portuguese writers being more poetic.

16 Meaning of *workmanlike*.

✓ Correct answer: B — competent but uninspired

The writer contrasts the real craft of translation with the flat word-swapping machines can do. Workmanlike here means functionally adequate but without artistry.

WHY THE OTHERS ARE WRONG

- A "Enthusiastic" is the opposite of the flat, mechanical sense.
- C "Exhausting" doesn't fit the word.
- D Not about honesty.

17 Point of the violin–piano comparison.

✓ Correct answer: B — each language has its own nature, which should be honoured rather than disguised

A violin isn't a "failed" piano; each has its own nature. Her task is to play her song natively on her instrument.

WHY THE OTHERS ARE WRONG

- A She explicitly says neither instrument is "failed".
- C She never suggests choosing similar-sounding languages.
- D She *is* comparing them — the comparison is the point.

18 Meaning of the title 'The quiet map of you'.

✓ Correct answer: B — the accumulated profile of an individual built from small, often invisible sources

The article argues invisible fragments (what you scroll past, which app you open first) add up to a detailed profile of you — a "quiet" map because you didn't know you were drawing it.

WHY THE OTHERS ARE WRONG

- A No physical map is described.
- C Fitness apps aren't the subject; data brokers are.
- D The office is quiet, but that's not what the title refers to.

19 NOT a purpose of the Utrecht statistic.

✓ Correct answer: D — to promote the University of Utrecht's research programmes

This is a NOT question. The writer uses the statistic for A, B, and C — to quantify scale, support invisibility, and add authority. Nothing promotes the university itself.

WHY THE OTHERS ARE WRONG

- A IS a purpose — 78 companies quantifies scale.
- B IS a purpose — users have never heard of most.
- C IS a purpose — naming a respected university lends weight.

20 Significance of Dr Vargas's pause.

✓ Correct answer: C — she is weighing how honest to be

Her eventual answer — "Mostly at night" — is a partial admission. She has thought about it, but she's deciding how much to reveal.

WHY THE OTHERS ARE WRONG

- A Her answer shows she HAS thought about it.
- B She does answer — it's not refusal.
- D She accepts the premise by answering in the first person.

21 Arc of the writer's attitude.

✓ Correct answer: A — friendly curiosity to quiet unease

Opens curious and friendly ("friendliest voice imaginable"). By the end, walking into sunshine, the writer hesitates before checking his phone — small unease has landed.

WHY THE OTHERS ARE WRONG

- B Never suspicious at start, never admiring at end.
- C No anger; the piece is reflective throughout.
- D Not about understanding facts; the movement is emotional.

22 Meaning of *stitch together*.

✓ Correct answer: B — assemble

To stitch together is to put pieces into a whole — to assemble. Vargas is saying the company compiles scattered public information into a profile.

WHY THE OTHERS ARE WRONG

- A "Fabricate" implies inventing falsely; the data is real.
- C "Embroider" means add decorative detail or exaggerate; neither fits.
- D "Repair" implies fixing; nothing is being mended.

23 Function of the closing image.

✓ Correct answer: C — show that the interview has left a small but lasting change in the writer's own behaviour

The hesitation is a small but concrete behavioural change. The article closes on it to show the interview has shifted something.

WHY THE OTHERS ARE WRONG

- A Weather is scenery, not the point.
- B The phone isn't broken.
- D Tiredness isn't suggested; hesitation is deliberate.

24 Cloze (24) — possessive relative.

✓ **Correct answer: A — whose global extent has shrunk**

"Whose" is the possessive relative pronoun. Verb "has shrunk" agrees with the singular "extent".

WHY THE OTHERS ARE WRONG

- B** "Which" cannot take a noun directly after it possessively.
- C** Correct pronoun but wrong agreement ("have" with singular "extent").
- D** Wrong on both counts.

25 Cloze (25) — causal connector.

✓ **Correct answer: A — mainly owing to**

"Mainly owing to" introduces the cause of the loss — the three named factors.

WHY THE OTHERS ARE WRONG

- B** "Despite being" introduces contrast, not cause.
- C** "Resulted from" is a full verb phrase, not fitting here.
- D** "In contrast with" makes the three items opposites of the loss.

26 Cloze (26) — substitutive connector.

✓ **Correct answer: A — Rather than**

The sentence contrasts the old method (replanting seeds one by one) with the new one (protecting existing meadows). "Rather than" signals substitution.

WHY THE OTHERS ARE WRONG

- B** "Because of" would make the old method the cause.
- C** "In addition to" adds rather than substitutes.
- D** "Regardless of" implies the old method doesn't matter.

27

Cloze (27) — additive connector.

✓ Correct answer: A — as well as in

Two locations are being named together — Baltic and Mediterranean. "As well as in" adds, keeping the "in parts of" parallel structure.

WHY THE OTHERS ARE WRONG

- B "Rather than in" substitutes, but both places are recovering.
- C "Despite the" is contrastive and ungrammatical here.
- D "Instead of in" substitutes rather than adds.

28

Cloze (28) — contrastive connector.

✓ Correct answer: B — however

"Recovery is slow; however, it is real." Slowness is a drawback; realness is the positive counterweight. "However" is the natural contrastive connector.

WHY THE OTHERS ARE WRONG

- A "Therefore" is causal — produces nonsense.
- C "Because" would answer *why* recovery is slow.
- D "For example" introduces illustrations; "real" is not an example of "slow".

Writing (Tasks 1 & 2) — Self-assessment Rubric

There is no single correct answer for writing tasks. Use the rubric below to check your own work against ICAS Paper F expectations. The three columns mirror the official *Writing Assessment Framework*: Genre, Textual Grammar, and Syntax & Punctuation.

GENRE

- **Persuasive:** Clear opening position. Uses modals (should, must). Gives reasons with examples. Explicitly acknowledges and refutes counter-view. Closes with a persuasive final line — not just summary.
- **Narrative:** Stays in scene, not exposition. Opens in a specific moment. Uses sensory detail (sight, sound, touch). Shows the complication unfolding through character perspective. Ends on a moment that leaves the reader wanting more.

TEXTUAL GRAMMAR

- Paragraphs have clear purpose — one idea per paragraph.
- Cohesion through linking words (however, therefore, meanwhile, nevertheless), pronouns, and repetition of key nouns.
- Sentence variety — short emphatic sentences mixed with longer complex ones.
- Consistent tense (past for narrative, present/future for persuasive).
- Vocabulary fits register — formal for opinion piece, evocative for narrative.

SYNTAX & PUNCTUATION

- Commas used correctly in complex sentences and lists.
- Apostrophes used correctly for possession and contraction.
- Speech marks (if used) punctuated correctly.
- Some use of semicolons or dashes for effect.
- No run-ons or unintended fragments.
- Capitalisation consistent; proper nouns always capitalised.

Science (S1–S10)

S1 Which species is the mushroom?

✓ **Correct answer: C — Species D**

All four features must match simultaneously. Only Species D has a domed cap, white spores, smooth stem, AND flesh that turns yellow in KOH. Species A matches the first three features but fails the KOH test.

WHY THE OTHERS ARE WRONG

- A** Species A fails the KOH test (no change).
- B** Species C has the wrong cap (flat) and wrong stem (fibrous).
- D** Species E reacts in KOH but has a convex cap, not domed.

S2 Youngest rock in the diagram.

✓ **Correct answer: D — dolerite**

By superposition: limestone → shale → sandstone. The granite sill intruded after the sandstone formed. The dolerite dyke cuts through everything, including the granite — so it must be the youngest.

WHY THE OTHERS ARE WRONG

- A** Limestone is the oldest (bottom layer).
- B** Sandstone is older than both intrusive rocks.
- C** Granite is younger than sandstone but older than the dyke that cuts it.

S3 Effect on fungus when orchids die.

✓ **Correct answer: B — decrease, because the fungus depends on the orchid for sugars**

In mutualism, both species benefit — and both depend on the other. Lose the orchids and the fungus loses its food source.

WHY THE OTHERS ARE WRONG

- A** Assumes competition, but the orchid supplies resources, not competes.
- C** The question establishes this fungus does depend on this orchid.
- D** Species don't switch symbiosis categories on demand.

S4 Circuit topology.

✓ **Correct answer: D — all three resistors are in series with one another**

The circuit forms one single loop with no branch points. Trace the current from the battery: it passes through R_1 , then R_2 , then R_3 , and back to the battery — every component carries the same current on one continuous path. That is the definition of a series connection.

WHY THE OTHERS ARE WRONG

- A** R_3 is not on a separate path — it sits on the same single loop as R_1 and R_2 , so it is not in parallel with anything.
- B** Parallel connection needs separate paths between the same two points; this circuit has only one path.
- C** There is no separate branch — the diagram shows a single unbroken loop.

S5 Who wrote a pure observation?

✓ **Correct answer: C — Chen**

Chen describes only what is directly seen: bubbles rising. An observation reports what the senses detect, without interpretation.

WHY THE OTHERS ARE WRONG

- A** Ajay makes an inference — that bubbles mean a reaction. Plausible, but still interpretation.
- B** Bea infers the gas's identity — requires chemistry knowledge.
- D** Dimo makes a comparative claim about copper; no copper was tested.

S6 Does the supplement trial give definitive evidence?

✓ **Correct answer: C — No, because the three trials give inconsistent results**

One trial showed a small increase, one showed a decrease, one showed no change. Inconsistent results don't support a definitive claim.

WHY THE OTHERS ARE WRONG

- A** Cherry-picking one trial ignores the others.
- B** Large sample size doesn't rescue inconsistent results.
- D** A sweeping claim that herbal supplements "never" affect sleep cannot be drawn from three small trials, and it isn't what these results show.

S7 Comet tail direction.

✓ **Correct answer: D — arrow (D)**

The tail always points directly away from the Sun, regardless of motion. At P (upper right), directly away from the Sun is up and to the right — arrow (D).

WHY THE OTHERS ARE WRONG

- A** Points along the motion — a common wrong intuition.
- B** Points straight down, not radially away from the Sun.
- C** Points toward the Sun — the solar wind pushes the tail the opposite way.

S8 Mass of cube Y and its behaviour in water.

✓ **Correct answer: A — mass 135 g, and it would sink**

Both cubes are the same metal, so they share the same density. Density of the metal = $225 \div 50 = 4.5$ g/cm³. Mass of Y = density $\times$ volume = $4.5 \times 30 = 135$ g. Since 4.5 g/cm³ is greater than the density of water (1 g/cm³), cube Y sinks.

WHY THE OTHERS ARE WRONG

- B** 375 g comes from multiplying by 50 and dividing by 30 — the volume ratio used upside down.
- C** 27 g would give a density of 0.9 g/cm³, which is why this option says "float" — but the mass is wrong, so the option is wrong overall.
- D** 4.5 g confuses the density value (4.5 g/cm³) with the mass. A 4.5 g cube of this size would float, but 4.5 g is not Y's mass.

S9 Correct order of enzyme experiment steps.

✓ **Correct answer: B — K, M, N, L**

(K) Put enzyme into each tube → (M) heat each to test temperature → (N) add substrate so the reaction begins only at that temperature → (L) time the reaction. Adding substrate before reaching temperature means the early reaction happens at the wrong temperature.

WHY THE OTHERS ARE WRONG

- A** Places timing before heating — can't time what hasn't started.
- C** Heats empty tubes first.
- D** Adds substrate before there's enzyme in the tube.

S10 Pressure comparison — skater vs car.

✓ **Correct answer: B — the skater exerts greater pressure, because her force is spread over a much smaller area**

Skater: $600 \div 5 = 120$ N/cm². Car: $12\,000 \div 400 = 30$ N/cm². The skater exerts four times the pressure. Small area concentrates force into high pressure.

WHY THE OTHERS ARE WRONG

- A** Confuses force with pressure. Force is larger for the car, but pressure depends on area too.
- C** The pressures are very different.
- D** Reverses the relationship — small area INCREASES pressure.



M1 Quadrant of the centroid.

✓ Correct answer: B — quadrant 2

Centroid $x = (-5 + 3 + (-1)) \div 3 = -1$. Centroid $y = (2 + 4 + (-3)) \div 3 = 1$. So $(-1, 1)$ — negative x , positive y — quadrant 2.

WHY THE OTHERS ARE WRONG

- A Q1 requires both positive — x is negative.
- C Q3 is both negative; only x is.
- D Q4 is opposite sign pattern.

M2 Red pigment mass in a batch.

✓ Correct answer: B — 400 g

Total parts = $4 + 3 + 2 = 9$. Each part = $1.8 \text{ kg} \div 9 = 0.2 \text{ kg} = 200 \text{ g}$. Red = 2 parts = 400 g.

WHY THE OTHERS ARE WRONG

- A 200 g is one part only, not two.
- C 600 g is yellow (3 parts), not red.
- D 800 g is blue (4 parts), not red.

M3 Solving $3x + 5 = 2(x + 7)$.

✓ Correct answer: C — $x = 9$

Expand: $3x + 5 = 2x + 14$. Subtract $2x$: $x + 5 = 14$. Subtract 5: $x = 9$. Check: $3(9) + 5 = 32$; $2(9+7) = 32$. ✓

WHY THE OTHERS ARE WRONG

- A $x = 2$ comes from failing to distribute: $3x + 5 = 2x + 7$ gives $x = 2$. Classic Paper F distributive error.
- B $x = 7$ from partial distribution: $3x + 5 = 2x + 12$.
- D $x = 12$ from sign error: $14 - 2 = 12$.

M4 Size of $\angle BAC$ in the parallelogram.

✓ **Correct answer: C — 72°**

$AD \parallel BC$, and AC is a transversal. $\angle DAC$ and $\angle BCA$ are alternate interior angles, so $\angle DAC = 40^\circ$.
Therefore $\angle BAC = \angle DAB - \angle DAC = 112^\circ - 40^\circ = 72^\circ$.

WHY THE OTHERS ARE WRONG

- A** 40° confuses $\angle BAC$ with $\angle BCA$.
- B** 68° treats parallelogram angles wrongly: $180 - 112 = 68$ is $\angle ABC$, not $\angle BAC$.
- D** 140° uses $180 - 40$, ignoring the given $\angle DAB$.

M5 7th term of the sequence 3, 6, 11, 18, 27.

✓ **Correct answer: C — 51**

Differences are +3, +5, +7, +9 (increasing by 2 each). Next differences: +11, +13. 6th term = $27 + 11 = 38$.
7th = $38 + 13 = 51$.

WHY THE OTHERS ARE WRONG

- A** 36 assumes constant difference of +9.
- B** 38 is the 6th term, not the 7th. Off-by-one.
- D** 63 from assuming differences grow by +3 each step.

M6 Median and range of the stem-and-leaf.

✓ **Correct answer: B — median 69.5, range 33**

18 scores in order. Median = average of 9th and 10th = $(69 + 70) \div 2 = 69.5$. Range = $85 - 52 = 33$.

WHY THE OTHERS ARE WRONG

- A** Took only the lower of the two middle values.
- C** Took only the upper of the two middle values.
- D** Miscalculated the highest or lowest score.

M7**Drone distance in 45 minutes.****✓ Correct answer: C — 48.6 km**

45 min = $45 \times 60 = 2700$ s. Distance = $18 \times 2700 = 48\,600$ m = 48.6 km.

WHY THE OTHERS ARE WRONG

- A** 8.1 km from applying conversion wrong.
- B** 13.5 km treats 18 m/s as 18 m/min.
- D** 810 km forgets to convert metres to kilometres.

M8**How much Ben pays.****✓ Correct answer: B — \$9**

$b + (2b + 6) = 33 \rightarrow 3b + 6 = 33 \rightarrow 3b = 27 \rightarrow b = 9$. Check: Ben \$9, Aisha \$24, total \$33. ✓

WHY THE OTHERS ARE WRONG

- A** \$6 confuses the constant with Ben's share.
- C** \$12 comes from sign error: $2b - 6$ instead of $2b + 6$.
- D** \$24 is Aisha's share, not Ben's. Classic trap.

M9**Area of the shaded region.****✓ Correct answer: A — $64 - 16\pi$**

Square area = $8 \times 8 = 64$. Quarter circle area = $\pi r^2 \div 4 = \pi(64) \div 4 = 16\pi$. Shaded = $64 - 16\pi$ cm².

WHY THE OTHERS ARE WRONG

- B** $64 - 8\pi$ uses half instead of quarter of the full circle.
- C** $32 - 16\pi$ halves the square's side or area wrongly.
- D** $16\pi - 64$ reverses the subtraction — quarter circle doesn't fit inside a smaller square.

M10 Table of values matching the graph.

✓ **Correct answer: A**

The line passes through $(0, -2)$ with positive gradient 1, so $y = x - 2$. When $x = -1$, $y = -3$; $x = 0$, $y = -2$; $x = 1$, $y = -1$; $x = 2$, $y = 0$; $x = 3$, $y = 1$. Table A matches.

WHY THE OTHERS ARE WRONG

- B** y -values negated — this is a line with gradient -1 .
- C** $y = -x + 2$ — wrong gradient and y -intercept.
- D** $y = x$ — correct gradient but missing the -2 shift.

M11 Time to fill the tank.

✓ **Correct answer: B — 30 minutes**

Volume = $80 \times 50 \times 30 = 120\,000 \text{ cm}^3 = 120 \text{ L}$. At 4 L/min : $120 \div 4 = 30 \text{ min}$.

WHY THE OTHERS ARE WRONG

- A** 20 min from an arithmetic slip on the volume.
- C** 40 min from a factor-of-something-else error.
- D** 3 hours forgets to convert cm^3 to litres.

M12 Expression equivalent to $3(a + b) - a$.

✓ **Correct answer: A — $2a + 3b$**

$3(a + b) = 3a + 3b$. Then $3a + 3b - a = 2a + 3b$.

WHY THE OTHERS ARE WRONG

- B** Subtracts from the wrong coefficient.
- C** $3(a + b - a) = 3b$; distributing wasn't cancelled properly.
- D** $2(a + b) = 2a + 2b$; missing a b from the expansion.



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