VICTORIAN CURRICULUM AND ASSESSMENT AUTHORITY

General Achievement Test 2023

Section B

Thursday 15 June 2023

Reading time: 1.15 pm to 1.30 pm (15 minutes)
Writing time: 1.30 pm to 3.00 pm (1 hour 30 minutes)

QUESTION BOOK

Structure of book

Type of question	*Number of questions to be answered*	*Suggested times (minutes)*
Writing task	1	30
Multiple-choice questions	50	60

- Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners, rulers, an English and/or bilingual dictionary and one scientific calculator.
- Students are NOT permitted to bring into the examination room: blank sheets of paper and/or correction fluid/tape.

Materials supplied
- Question book of 36 pages
- Answer book for the writing task
- Answer page for multiple-choice questions on page 7 of the answer book

Instructions
- Write your **student number** in the space provided on the answer book.
- Write your **name** on the multiple-choice answer page on page 7 of the answer book.
- Follow the times suggested for each type of question.
- All written responses must be in English.

At the end of the test
- You may keep this question book.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.

Writing Task

Consider the following four pieces of information.

Develop a piece of writing presenting your point of view.

Your writing will be judged on your ideas, how well you organise and present your point of view, and how effectively you express yourself.

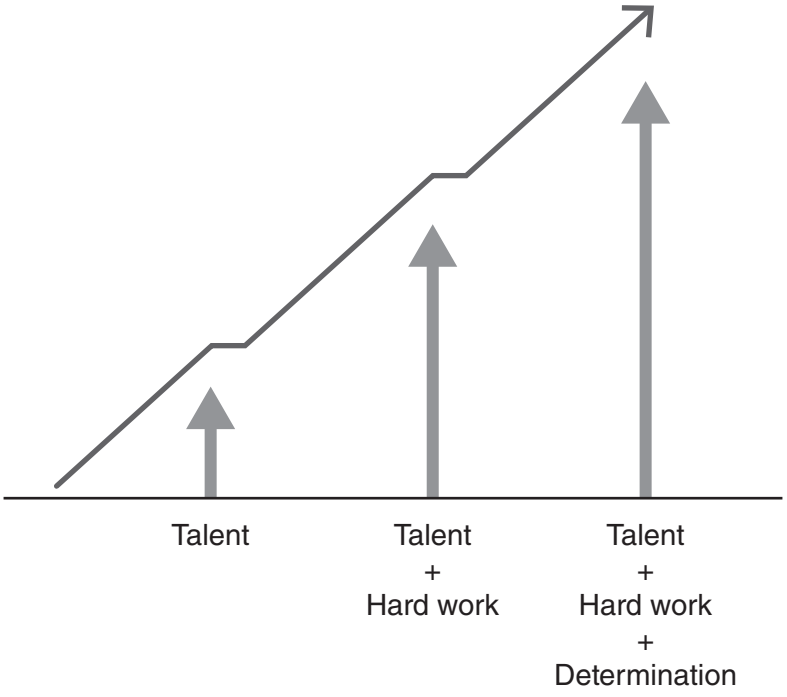
Use one or more of the pieces of information to support your writing.

I

> **Today everyone is expected to be 'good' at something.**

II

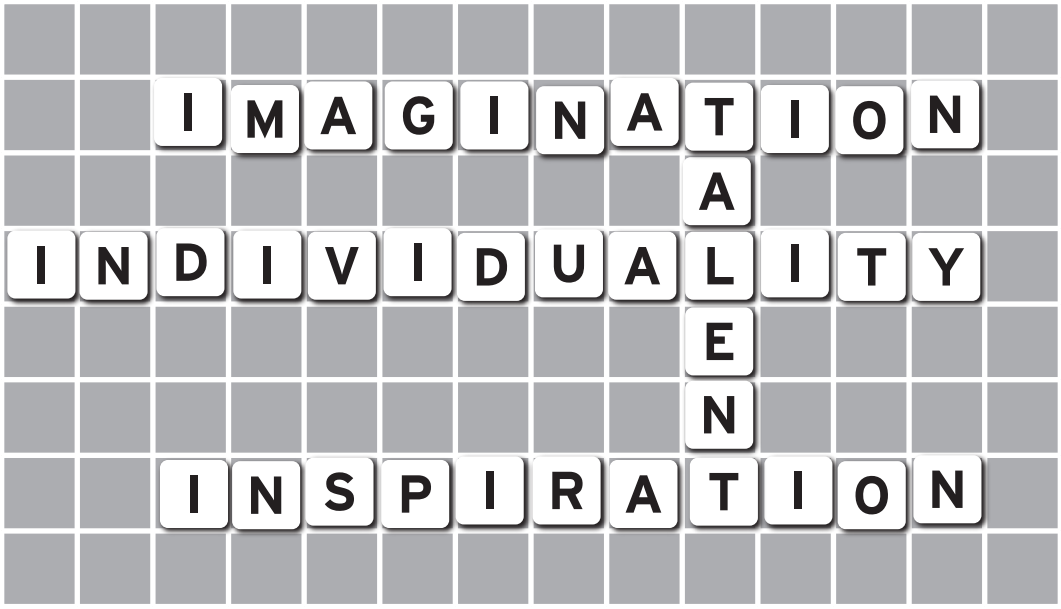
Journey to success



III

Many important abilities are undervalued and go unrecognised.

IV



MULTIPLE-CHOICE QUESTIONS

Answer this section in the GAT ANSWER BOOK.
Mark your answers on the Multiple-Choice Answer Page.
You are advised to allocate 60 minutes to this task.

Answer **all** questions in pencil.
Shade your answers on the multiple-choice answer page (page 7) of the answer book.
Choose the response that is **correct**, or that **best answers the question**.
A correct answer scores 1; an incorrect answer scores 0.
Marks will not be deducted for incorrect answers.
No marks will be given if more than one answer is completed for any question.

Questions 1 and 2

In the following poem, the 'cabbage white' is a common type of butterfly.

The butterfly, the cabbage white,
(His honest idiocy of flight)
Will never now, it is too late,
Master the art of flying straight,
Yet has – who knows so well as I? –
A just sense of how not to fly:
He lurches here and here by guess
And God and hope and hopelessness.
Even the aerobatic swift[1]
Has not his flying-crooked gift.

Robert Graves

[1] *swift*: a kind of bird

1 In context, lines 7 and 8 suggest that the butterfly's movements are

A seemingly calculated and strategic.
B seemingly frantic and chaotic.
C graceful.
D futile.

2 The words 'flying-crooked gift' (line 10) refers to something that

A is to be avoided.
B can be acquired through hard work.
C seems like a skill but is actually a disaster.
D seems like a deficiency but is actually a talent.

Questions 3 – 5

The northern quoll (*Dasyurus hallucatus*) is a small cat-sized mammal that lives in northern Australia. Its numbers have decreased rapidly since the introduction of the highly toxic cane toad (*Bufo marinus*), which quolls eat.

Scientists predicted that feeding a young captive quoll a single small dead cane toad containing a nausea inducing substance would train the quoll to feel sick and make the quoll avoid eating cane toads. These trained quolls would become 'toad-smart'. Young captive quolls that were not fed cane toads were classed as being 'toad-naive'.

To test their prediction, 31 'toad-smart' (TS) and 31 'toad-naive' (TN) quolls were each offered a live toad.

Figure 1 shows the percentage of the quolls that either ignored, rejected (after sniffing the cane toad) or attacked the cane toad.

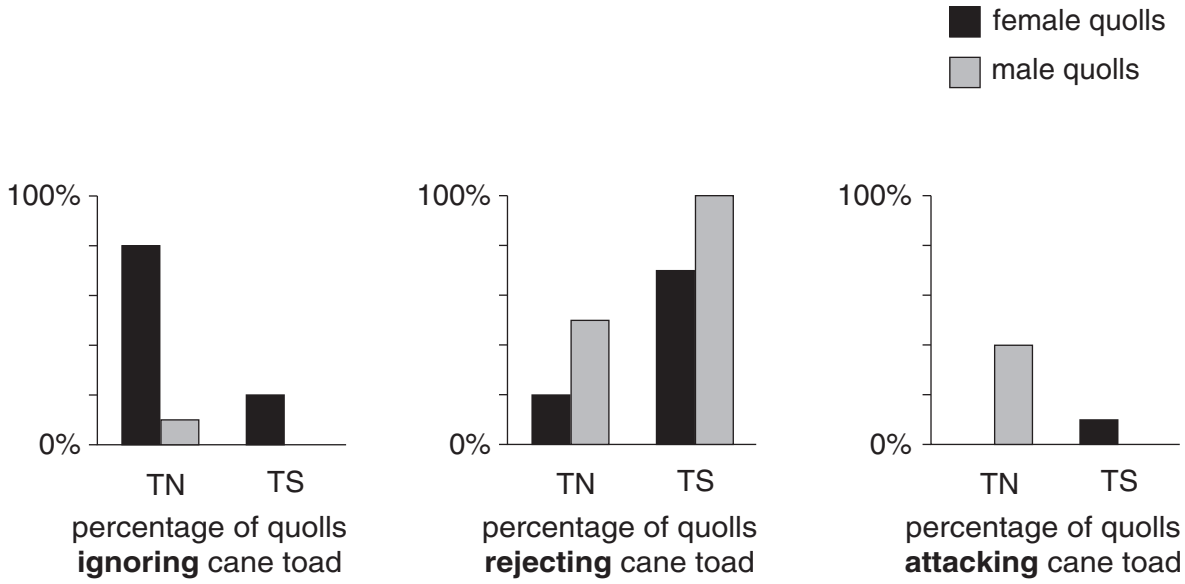


Figure 1

3 Which information presented in Figure 1 supports the idea that young quolls in captivity can be taught to avoid eating cane toads?

A Toad-smart female quolls were less likely to reject cane toads than were toad-smart male quolls.

B Toad-smart male quolls were less likely to attack cane toads than were toad-naive male quolls.

C Toad-smart female quolls were more likely to ignore cane toads than were toad-naive female quolls.

D Toad-smart female quolls were more likely to reject cane toads than were toad-smart male quolls.

4 After testing the prediction, the quolls were fitted with tracking collars and released at five sites.

The scientists observed that toad-smart male and female quolls and toad-naive female quolls had a high survival rate. However, toad-naive male quolls had a poor survival rate.

Which of the observed behaviours, I and II, could be a reason for this difference?

I When they encounter a large cane toad, males are less cautious than females.
II Male quolls are more likely to interact with cane toads than female quolls.

A Both **I** and **II**
B Neither **I** nor **II**
C **I** only
D **II** only

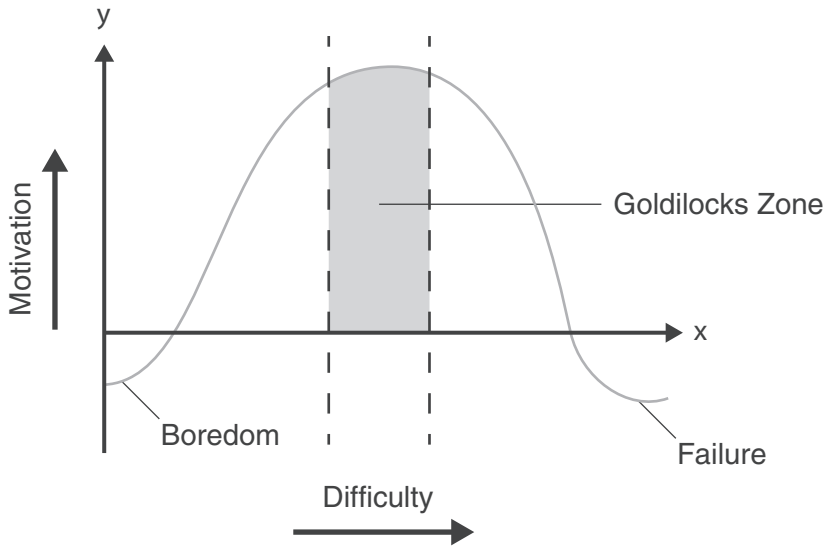
5 Which of the following would best explain why only small cane toads were fed to quolls during training?

A Quolls are small mammals.
B Small cane toads are the main prey of quolls.
C Small cane toads are less toxic than large cane toads.
D Small cane toads are easier prey than large cane toads.

Question 6

The Goldilocks principle of 'not too little, not too much, just right' is used in a wide range of disciplines to explain human preference and response.

In psychology, the concept can be applied to help explain personal motivation to complete tasks, as shown in the diagram below.



The Goldilocks rule of motivation

6 According to the diagram, personal motivation

A is strongest when a task is most difficult.

B is strongest when a person begins a task.

C decreases as a task is closer to completion.

D is strongest when the task is of manageable difficulty.

Questions 7 and 8

CLAIM:

'Society is suffering from a lack of respect for expert knowledge.'

7 Imagine you are part of a team who has to debate the claim above.

Which of the following statements most clearly **supports** the claim?

A People are increasingly unwilling to listen to others' points of view.

B People no longer have sufficient time to research complex issues.

C People now have access to advice from many different experts.

D People are happy to believe whatever anyone tells them.

8 Which of the following statements most clearly **opposes** the claim?

A Experts are in extremely short supply.

B The world functions perfectly well without experts.

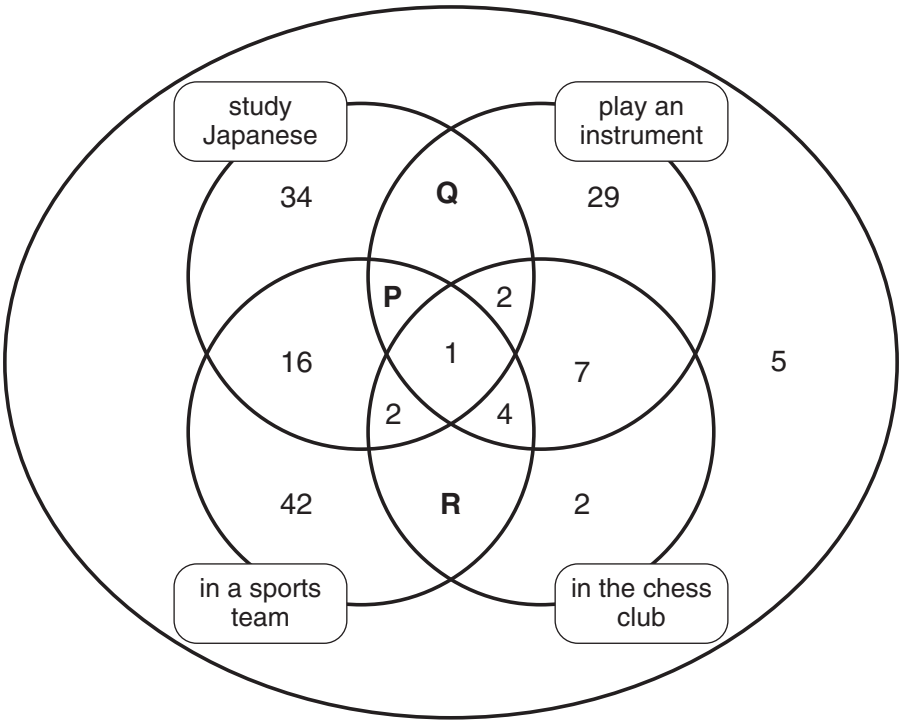
C The world can only be properly comprehended by experts.

D It is difficult to know who is an expert and who is not.

Questions 9 – 11

In a particular school, 150 Year 10 students fall into categories that can be shown in the following Venn diagram.

P, Q and R each represent a whole number of students (0, 1, 2, … etc.).



9 If the total number of students who are in the chess club is known, which of P, Q or R can be calculated?

A R only

B P, Q and R

C P and R only

D Q and R only

10 If the numbers of students in categories P, Q and R are equal to each other, then which statement below is true?

A Students who fit into at least two of the four categories outnumber students who are only in a sports team.

B The students who play an instrument and also study Japanese outnumber the students who are in both a sports team and the chess club.

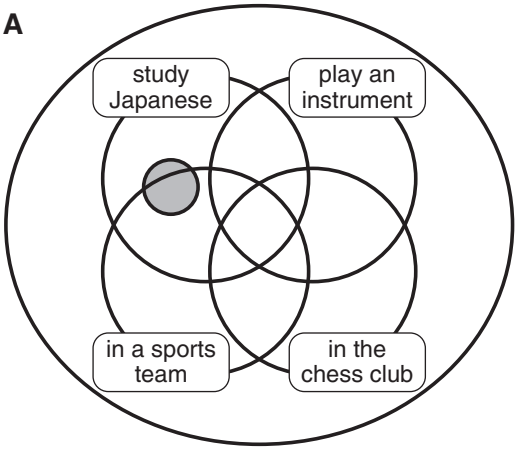
C There are more students who play an instrument and also study Japanese than there are students who fall into none of the four categories shown.

D None of the statements above is true.

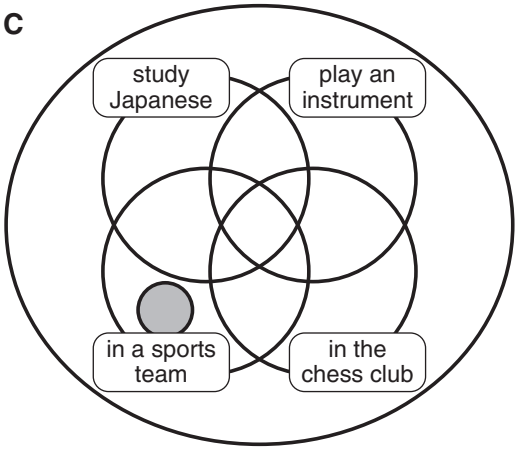
11 Some of the students in the hockey sports team also study Japanese, but none of them play a musical instrument and none of them are in the chess club.

Which of the following diagrams best represent the students in the hockey sports team (shown by the shaded circle)?

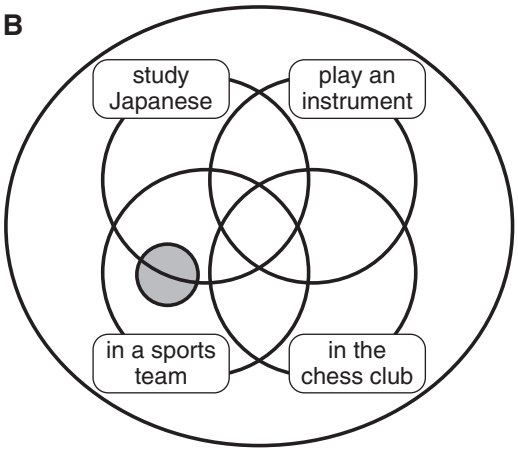
A



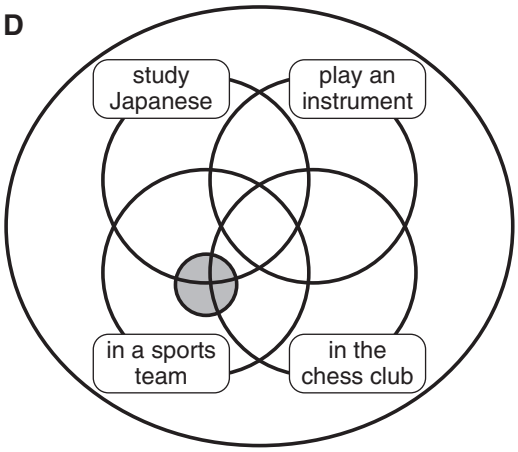
C



B



D



Questions 12 – 16

In the following passage, Ulysses is leaving London to go and live in Italy with his young stepdaughter, known as 'kid'. Peg and Cressy (the 'old fella') are close friends of Ulysses.

He drove around the block, stretching time to its elastic limit, disbelief that the old fella hadn't turned up to wish them well. Peg seemed unconcerned, said maybe he couldn't face it, you know how he is. Peg would check on him later, but still. Ulysses passed the cherry tree again, the unadorned and silent witness to the comings and goings of that small corner of earth. In years to come, it would cower as the wrecking ball swung, would face its own demise as many a tree had done before, with grace and humility at the same old, same old of human disregard.

Ulysses drove away from the pub, the rusty creak of the sign, coronation bunting[1] already loose and falling like lace from a hem. He shifted up a gear, left the terrace where his mum and dad's old place had been and headed towards the canal. A final look about for Cressy before they crossed the bridge and headed south.

There are moments in life, so monumental and still, that the memory can never be retrieved without a catch in the throat or an interruption to the beat of the heart. Can never be retrieved without the rumbling disquiet of how close that moment came to not having happened at all.

And when Cressy appeared in the rear-view mirror, that was one such moment for Ulysses. He stepped on the brake and flung open the door.

Cressy! he shouted.

Cressy! shouted kid.

Cressy running towards them with his suitcases, desert shorts flapping. Wait! He was shouting. Wait! I changed my mind!

[1] *coronation bunting*: small flags hung in celebration when a queen or king is crowned

12 Lines 1 and 2 suggest that when Ulysses drives around the block he is feeling

- **A** nervous and irritable.
- **B** withdrawn and solemn.
- **C** surprised and dismayed.
- **D** bored and uninterested.

13 To Ulysses, the cherry tree (lines 3–5) is

- **A** a trivial distraction.
- **B** a familiar constant.
- **C** an intrusive presence.
- **D** a superficial embellishment.

14 According to the narrator, what will account for the cherry tree's demise? (lines 5–7)

A malice
B confusion
C misfortune
D thoughtlessness

15 Before he leaves the terrace (lines 1–11) Ulysses' mood is best described as

A almost euphoric.
B somewhat wistful.
C obviously miserable.
D quite contemptuous.

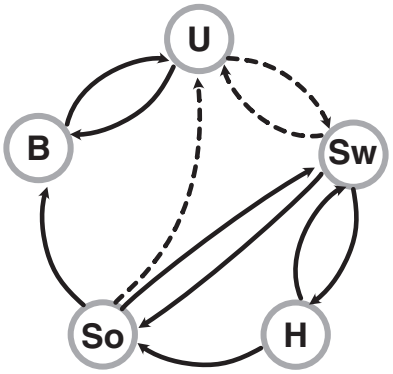
16 The 'rumbling disquiet' referred to in line 14 refers to the

A potential of memories to be disturbing.
B ease with which important events in life are forgotten.
C realisation of the degree to which chance shapes our lives.
D tendency of people to focus on negative rather than positive moments.

Questions 17 and 18

Five of the basic types of flavour are Bitter (B), Sour (So), Hot (H), Sweet (Sw) and Umami (U).

Ricky uses a diagram to help during cooking. The diagram shows which basic flavours can be used to balance another basic flavour that is too strong (solid arrows) or to enhance another basic flavour that is too weak (dotted arrows).



For example, a Bitter flavour balances a Umami flavour, and a Bitter flavour is balanced by either a Sour or Umami flavour.

17 Which of the following can both be balanced by the same flavour?

A Hot and Sour
B Umami and Sour
C Sweet and Hot
D Bitter and Hot

18 Which of Umami, Hot and Bitter can be used to balance the greatest number of other flavours?

A Umami
B Hot
C Bitter
D Umami and Hot equally

Question 19

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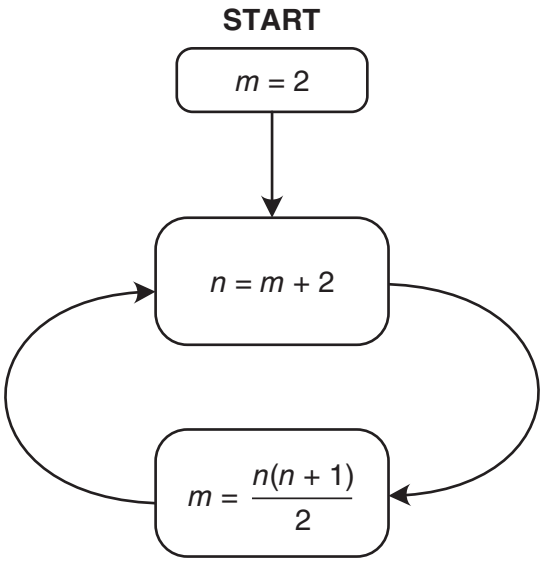
19 The cartoon is primarily a comment on

A power.
B wealth.
C isolation.
D technology.

Questions 20 – 22

The following flowchart shows an algorithm in which the values of n or m calculated in one step are used for the calculation in the next step.

For example, when the starting value of m is 2, the calculated value of n is 4.



20 When the starting value of $m = 2$, what is the next calculated value of m?

A 10 **B** 8 **C** 6 **D** 4

21 If the starting value of m was changed from $m = 2$ to $m = 4$, by how many would the next calculated value of m increase?

A 3 **B** 10 **C** 11 **D** 21

22 The starting value of m is valid only if all **calculated values** of n and m are positive integers (1, 2, 3, ... etc.).

Which of these sets gives the largest number of valid **starting** values of m?

A all positive integers and 0
B all even positive integers
C all positive integers
D all positive integers greater than 1

Questions 23 – 25

Below are six statements about heroes and heroism.

I ‘Heroism is endurance for one moment more.’ *George F. Kennan*

II ‘Unhappy the land that is in need of heroes.’ *Bertolt Brecht*

III ‘It is during the hard times when the hero within us is revealed.’ *Bob Riley*

IV ‘You cannot be a hero without knowing fear.’ *JC Callanan*

V ‘A hero is someone who understands the responsibility that comes with freedom.’ *Bob Dylan*

VI ‘Show me a hero and I’ll write you a tragedy.’ *F. Scott Fitzgerald*

23 Statement I implies that heroism is best defined by

A integrity.
B fortitude.
C composure.
D confidence.

24 Which statement recognises a difference between courage and recklessness?

A Statement I
B Statement III
C Statement IV
D Statement VI

25 Which of the following statements best supports the meaning of Statement VI?

A Heroes are necessary in order to avoid tragedy.
B Survivors of tragedy are often misrepresented as heroes.
C The greater the deed, the more likely heroes are to fall from grace.
D Tragedy is always either a precondition or a consequence of heroism.

Questions 26 – 28

26 The four statements below give possible steps in logic that could verify an argument.

Statement 1: Salad contains balanced nutrients.

Statement 2: Our family loves salad.

Statement 3: Our family eats salad at dinner every night.

Statement 4: Food that contains balanced nutrients is healthy.

How many of the statements above are needed to **verify** the following statement?

Our family eats healthy food at dinner every night.

A Only one statement is needed.
B Only two statements are needed.
C Only three statements are needed.
D All four statements are needed.

27 Which statements together **support** the following statement?

At least one student at this school is a genius.

Statement 1: Celia is a student at this school.

Statement 2: Anyone who can do advanced equations is a genius.

Statement 3: Everyone acknowledges that Celia is a genius.

Statement 4: Celia can do advanced equations.

A Statement 2 and Statement 4
B Statement 1, Statement 2 and Statement 3
C Statement 1, Statement 2 and Statement 4
D Statement 1, Statement 2, Statement 3 and Statement 4

28 Which statements together **support** the following statement?

Janine is a footballer.

Statement 1: If Janine isn't a footballer, then she's a cricket player.

Statement 2: Janine doesn't enjoy cricket.

Statement 3: Janine isn't a cricket player.

Statement 4: Janine's friend claims that Janine is a footballer.

A Statement 1 and Statement 2
B Statement 1 and Statement 3
C Statement 3 and Statement 4
D Statement 1, Statement 2 and Statement 4

Questions 29 and 30

In some types of electronic device, the screen consists of a grid of lights that can be turned on or off to create the pixels of an image.

Figure 1 shows how letters can be displayed on a screen that is a 5 × 7 grid. The number of pixels used for each letter (represented by black squares) is indicated below each letter.

For example, 17 pixels are used to display the letter A.

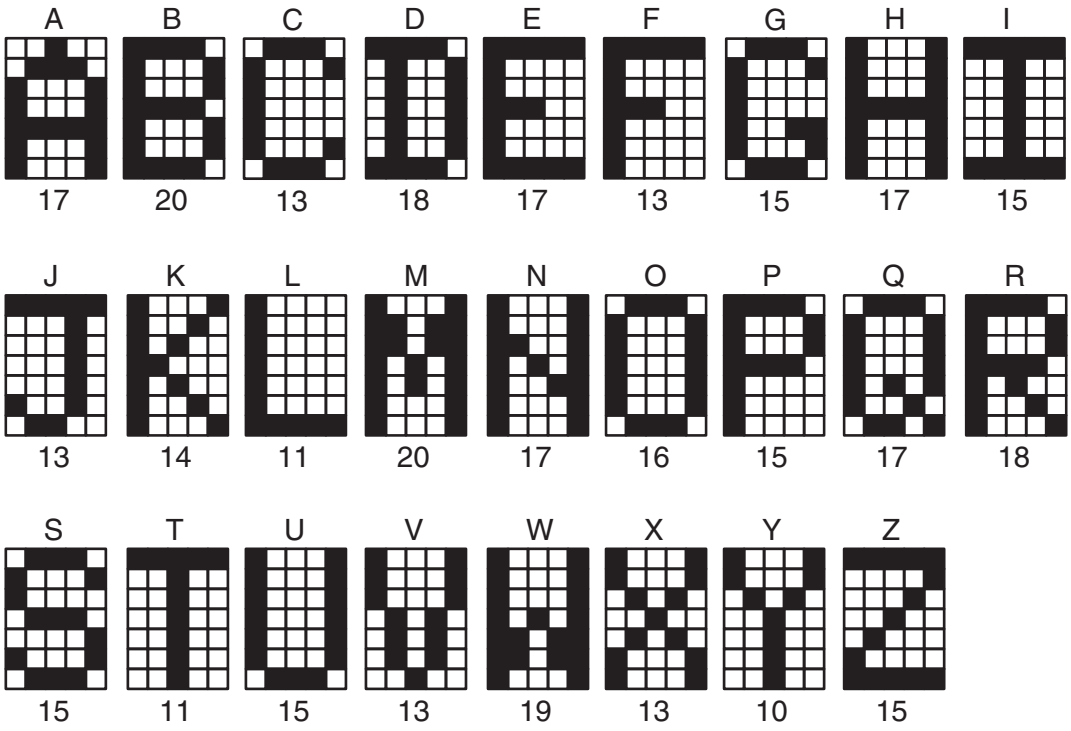


Figure 1

By using an appropriate sequence of display steps, letters can give the appearance of scrolling across the screen from right to left. When a succession of letters scrolls, a single blank (unlit) column is left between each letter.

Figure 2 shows the display steps for the scrolling of an A followed by the entry of the first column of a Z. The first five steps, from the entry of the first column of A (step 1) to the entry of the last column of A (step 5), display a total of 51 pixels.

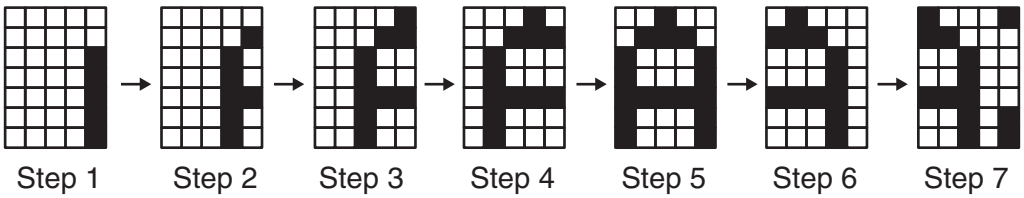


Figure 2

29 When scrolled, which of the following letters, from the entry of its first column to the entry of its last column, has the greatest total number of pixels displayed?

A E
B H
C N
D Q

30 If J is scrolled, from the entry of its first column to the entry of its last column, how many pixels in total are displayed?

A 31
B 33
C 37
D 39

Questions 31 – 34

The following passage is about the Australian magpie.

This spring, whenever I opened the back door, a magpie took off from its nest in a gum tree half a kilometre away and came skimming over the grass, arcing over the fences, zooming beneath the branches down the drive and veering straight at my brow, before braking impossibly late and landing on the porch rail beside me. It all took about five seconds. I've no doubt the magpie was showing me how exhilarating flying is for the creatures that can do it. And then it carolled.

Another magpie with a nest on a higher branch always followed the first, but it did not fly with the same élan[1] or straight at me, and it always pulled up a metre further away. It was a shyer bird and its carol was more guttural. The first took the meat from my hand, the second only when I put it down. Both flew straight back to their nests, fed their pleading young with my mince and came sailing back to the porch again.

The young have now left the nests. In the morning they follow their parents to my back porch and whine for food while the adults warble away in their mezzo-sopranos[2] until I come out. No unprejudiced human being could fail to be improved by the presence of magpies. They are fearless, resourceful, amusing and melodious, and above all – as all birds have to be – stoic. But they also contain complexities of character: not in the multitudes of some humans, perhaps, but not that many less than the average. And, just to go on the sample at my door, between one magpie and another there are differences as pronounced as they are between, say, the Three Tenors[3] or two modern political leaders when there is an election on.

[1] *élan*: style, flair
[2] *mezzo-sopranos*: a type of female singing voice
[3] *the Three Tenors*: an operatic singing group

31 In the first paragraph (lines 1–6), the action of the magpie is presented as

A dynamic.
B lethargic.
C awkward.
D uncontrolled.

32 ‘No unprejudiced human being could fail to be improved by the presence of magpies’. (lines 14–15)

What is the writer suggesting here?

A People should protect magpies.
B Magpies have a special relationship with humans.
C Magpies need to be safeguarded from human interaction.
D People should appreciate that they can learn from the magpies around them.

33 ‘They are fearless, resourceful, amusing and melodious, and above all – as all birds have to be – stoic.’ (lines 15 and 16)

This description of the magpies most strongly conveys the writer’s

A respect for magpies.
B concern for magpies.
C dependence on magpies.
D ambivalence towards magpies.

34 The comparisons made by the writer in lines 18–20 are used to emphasise the

A charisma of magpies.
B individuality of magpies.
C collective behaviour of magpies.
D distinctive appearance of magpies.

Questions 35 – 37

Plaque is a sticky layer that forms on the surface of teeth, consisting mostly of bacteria and water. Plaque causes the decay of teeth. Brushing is a common and effective way to remove plaque from the surface of teeth and prevent dental disease.

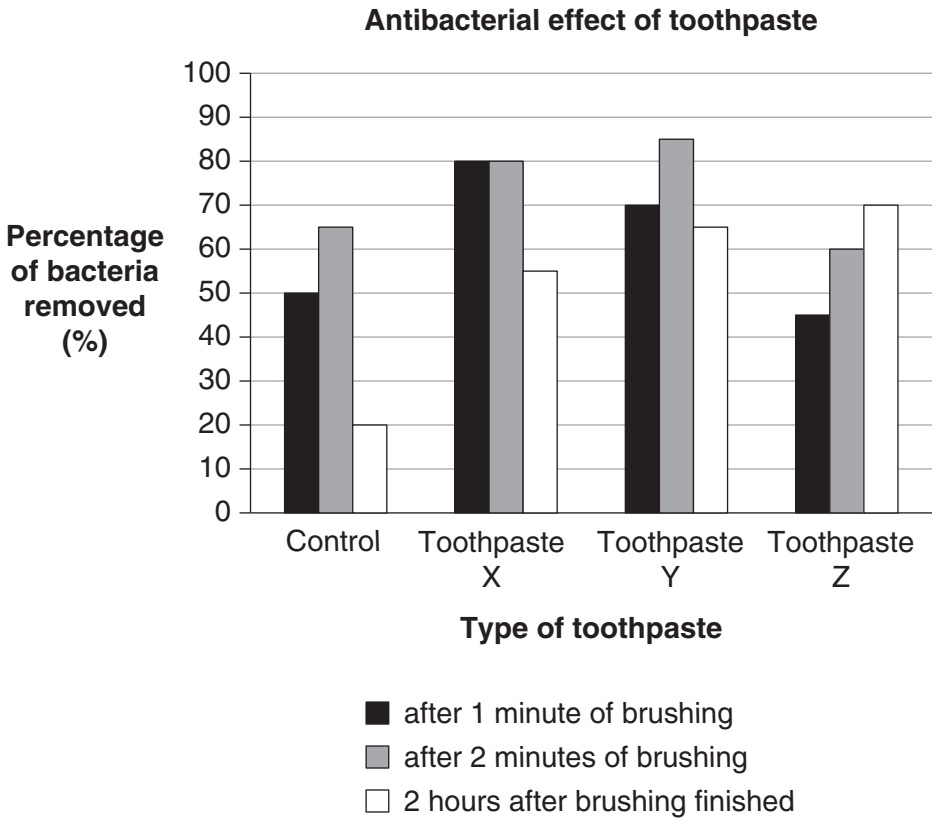
The method below was followed to investigate the bacteria removal effectiveness of different brands of toothpaste.

I The teeth of participants were swabbed at the beginning of the study (before brushing) and the number of bacteria was counted.

II Participants were assigned a brand of toothpaste and were directed to brush their teeth for 2 minutes.

III The teeth of participants were swabbed 1 minute after brushing started, at the end of 2 minutes of brushing and again 2 hours after brushing finished. The number of bacteria was counted at each stage.

The graph shows the results of the study as the percentage (%) of bacteria removed compared with the pre-brush number of bacteria.



35 Comparing toothpaste Z and the control, which statement best describes the number of bacteria present 2 hours after brushing finished?

A There are twice as many bacteria.

B There are 3.5 times the number of bacteria.

C The percentage of bacteria removed is 30-percentage points greater.

D The percentage of bacteria removed is 50-percentage points greater.

36 Which conclusion is supported by the results of this study?

A 2 minutes of teeth brushing was always more effective at reducing the number of bacteria than 1 minute.

B Toothpaste Y was the most effective treatment for reducing the number of bacteria at all stages of this study.

C For each toothpaste the number of bacteria was reduced after 2 minutes of brushing but increased in the 2 hours after brushing finished.

D Toothpaste X was the most effective toothpaste after 1 minute of brushing but was least effective 2 hours after brushing finished.

37 Which of the following is most likely to be the control treatment in this study?

A no teeth brushing

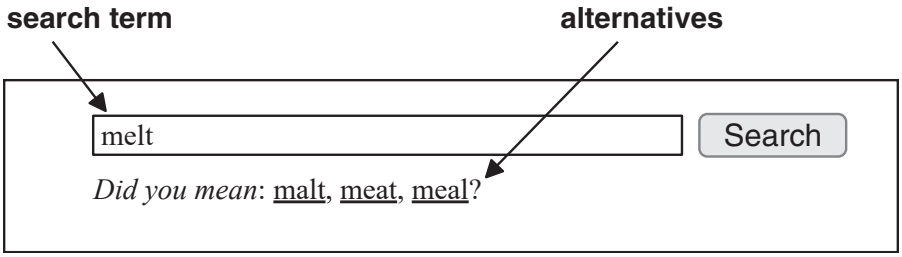
B brushing teeth with no toothpaste

C brushing with an antibacterial paste

D rinsing the mouth with mouthwash

Questions 38 – 40

SuperStore is an online supermarket that sells many types of products. On the SuperStore website, a customer can search for products. After a search, the website shows the products related to the search term. Because customers can misspell a search term, it also shows three alternatives (possible misspellings of the search term):



Alternatives with the three highest scores are shown. The score is calculated by adding points for the alternative meeting different criteria.

Each letter in an alternative is given a score of 0, 1 or 3 points:

- a matching letter in the same position as the search term is given 3 points
- a matching letter in a different position to the search term is given 1 point
- a letter that is not in the search term is given 0 points

If the alternative is the same length as the search term, 2 points are added.

For example, if the search term is 'melt', the alternative 'malt' has a score of 11 points:

- '**m**' is a matching letter in the same position: 3 points
- '**a**' is a letter that is not in search term: 0 points
- '**l**' is a matching letter in the same position: 3 points
- '**t**' is a matching letter in the same position: 3 points
- Because 'melt' and 'malt' are the same length: 2 points

38 After a search, 'sugar' is the first alternative.

What is the highest possible score for 'sugar' if the search term is five letters long?

A 13
B 14
C 15
D 17

39 A search term of four letters gives three alternatives, each of four letters.

Which of the following is not a possible score for one of the alternatives?

A 4
B 6
C 10
D 12

40 Suppose the search term is ‘bagel’.

What is the ranking of the three alternatives, ‘beans’, ‘bacon’ and ‘bran’, from highest to lowest?

A bacon > beans > bran
B bacon = beans > bran
C beans > bran > bacon
D beans > bacon > bran

Questions 41 – 44

The following passage relates to a comparison of two paintings: one by Romanian artist Theodora Capat (1987–present) and one by sixteenth-century artist Annibale Carracci (1560–1609).

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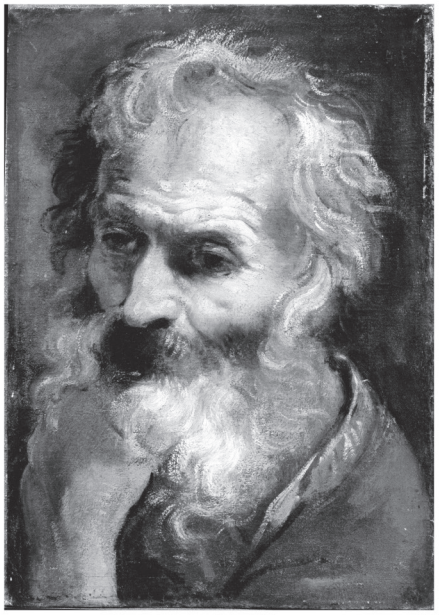
Theodora Capat, Untitled (c. 2020)



Annibale Carracci, 'Head of an Old Man' (c. 1590–1592)

Comparisons of two works are not uncommon in the art world. And why not? In the example above, both paintings feature elements that are decidedly 'modern' in the sense of the natural presentation of each subject.

Carracci, however, would surely have been mortified by this idea. Unlike Capat's painting, Carracci's 'Head of an Old Man' was hurriedly produced on paper, not canvas. It was probably intended for use at the academy he established in Bologna, Italy: an informal institution where works like this were used to inform learning. It is unlikely to represent what Carracci may have ultimately envisioned; he probably would have created a more idealised version, something majestic and in keeping with the traditions of the time. The audience of today, however, has a taste for something else, something more natural, which is why we slip into such comparisons.

A painter usually has a completely different agenda from what we imagine. Maybe they want to emulate the great painters of their time and, if ambition and genius collide, outdo them. This doesn't mean there is not something innovative about a painting like Carracci's, but his innovative intentions (if even intended) were quite different from what we might place upon them, via comparison. And such a comparison does little to help us understand Capat's work, either.

41 Which of the following quotations best relates to the writer's views, as expressed in the passage?

A 'The more I see, the less I know for sure.' *John Lennon*

B 'I never painted dreams. I painted my own reality.' *Frida Kahlo*

C 'What you see and what you hear depends a great deal on where you are standing.' *C.S. Lewis*

D 'Whichever interpretation prevails at a given time is a function of power and not truth.' *Friedrich Nietzsche*

42 According to the passage, Carracci would most likely have been 'mortified' (line 4) because he would not have believed that 'Head of an Old Man' was

A traditional.

B innovative.

C fit for public display.

D fit for educational use.

43 The final paragraph (lines 12–17) suggests that comparing Capat's painting and Carracci's painting ultimately

A obscures Carracci's artistic merit.

B devalues Carracci's artistic talent.

C exaggerates Carracci's artistic influence.

D misrepresents Carracci's artistic purpose.

44 Which of the following is emphasised in the final paragraph (lines 12–17) in relation to understanding an artist's work?

A the nature of talent

B the nature of ambition

C the importance of context

D the importance of method

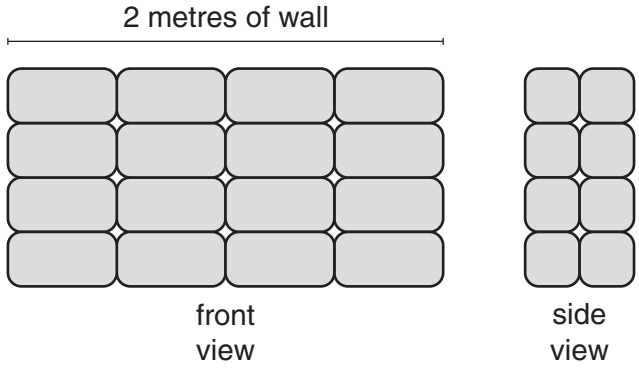
Questions 45 – 47

A person is making plans for a temporary retaining wall in an area of their property that is at risk of erosion.

They plan to build either simple walls or triangular walls, using large concrete blocks. Each block is 0.5 × 0.25 × 0.25 metres in size. They can estimate the total number of concrete blocks needed for each design using the equations shown in the table below.

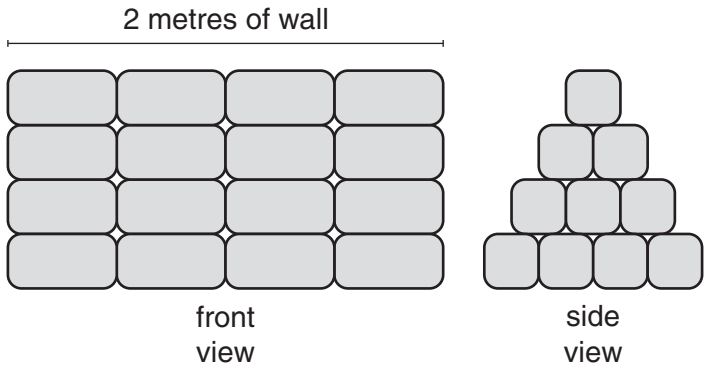
Each equation gives the number of concrete blocks needed for each metre of wall, based on the height of the wall (H, in concrete blocks). For example, one metre of a simple wall that is four concrete blocks high (H = 4) requires 16 concrete blocks.

two metres of simple wall



Number of concrete blocks per metre = 4 × H
= 4 × 4
= 16

two metres of triangular wall



Number of concrete blocks per metre = H(H + 1)
= 4(4 + 1)
= 20

Assume that the long edge of a concrete block is always parallel to the front of the wall.

45 Suppose that there is a triangular wall that is H concrete blocks high and L metres long.

How many more concrete blocks are required to increase the height of this wall by 2 concrete blocks?

A $4H \times L$

B $(2H + 2) \times L$

C $(4H + 6) \times L$

D $(8H + 12) \times L$

46 Suppose there is a simple wall that is 4 concrete blocks high and L metres long.

If these concrete blocks were converted into a triangular wall 4 concrete blocks high, how long would it be?

A $\frac{16L}{17}$ metres

B $\frac{4L}{5}$ metres

C $\frac{3L}{4}$ metres

D L metres

47 How many cubic metres of concrete are in a 1 metre long simple wall that is H concrete blocks high?

A $\frac{32}{H}$ cubic metres

B $\frac{H}{8}$ cubic metres

C $\frac{H}{4}$ cubic metres

D H cubic metres

Questions 48 – 50

The table shows all the sequences of consecutive letters found in the word ‘onion’.

Sequences of one letter are called 1-grams, sequences of two letters are called 2-grams, and so on.

1-grams	‘o’, ‘n’, ‘i’, ‘o’ ‘n’
2-grams	‘on’, ‘ni’, ‘io’, ‘on’
3-grams	‘oni’, ‘nio’, ‘ion’
4-grams	‘onio’, ‘nion’
5-grams	‘onion’

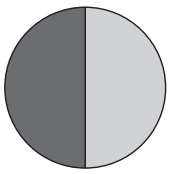
For a given word, there are many different sequences. However, sequences are only unique if they only occur once. For example, in ‘onion’:

- there are four 2-grams (‘on’, ‘ni’, ‘io’ and ‘on’).
- there are only three different 2-grams (‘on’, ‘ni’ and ‘io’).

Note that:

- Uppercase and lowercase letters are considered to be identical. For example, the 2-gram ‘On’ is the same as the 2-gram ‘on’.
- The order of letters matters. For example, ‘no’ is a different 2-gram than ‘on’.

48 The pie chart represents the percentages of the different 3-grams in a word.



Which of the following could be the word?

A ‘access’
B ‘bigwig’
C ‘kayak’
D ‘quiz’

49 Which of the following has the fewest number of different 2-grams?

A ‘aaaba’
B ‘ababa’
C ‘aabba’
D ‘abbaa’

50 Consider all the possible arrangements of the letters ‘s’, ‘s’, ‘s’, ‘o’, ‘o’ and ‘o’.

What is the greatest number of different 3-grams found in any one of these possible arrangements?

A one
B two
C three
D four

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Acknowledgements

Carracci A, https://commons.wikimedia.org/wiki/File:Carracci,_Annibale_-_Head_of_an_Old_Man_-_Google_Art_Project.jpg, viewed December 2020

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