

2017 VCE Psychology examination report

General comments

The 2017 Psychology examination was a two-and-a-half hour examination that assessed Units 3 and 4 of the *VCE Psychology Study Design 2017–2021* (Units 3 and 4). The examination consisted of two sections (A and B) and was scored out of a total of 120 marks. Section A comprised 50 multiple-choice questions worth 1 mark each. Section B comprised 7 short-answer questions worth 60 marks, and one extended-response question worth 10 marks.

The examination reflected changes to the study design, particularly in relation to a greater focus on scientific literacy and on experimental design. Examination questions also reflected the interconnectedness of different Areas of Study as well as the relationship between key knowledge and key science skills in the study design.

Most students provided a response to every multiple-choice question. Students should be aware that it is impossible to achieve a mark if no response is given. It is always possible to change a response by carefully erasing and re-shading.

As marking is completed online using scanned images of the examination, it is emphasised that students should write within the marked boundaries on the examination for each question and clearly indicate if a question is to be continued in the extra pages provided at the end of the question and answer book. If students continue a response in the extra space, they must number the response clearly.

Students should ensure that they address the questions asked and that any examples given are specific to the question. Where questions assess the application of knowledge to a scenario it is particularly important that students make clear and relevant references to the scenario in their responses. Generic responses to questions eliciting applied knowledge cannot be awarded full marks. Students should also ensure that they attempt to answer all parts of each question.

Students are reminded that, although spelling errors are not penalised, the meaning of the response must be clear and unambiguous. Students should take care to spell scientific terms correctly.

Specific information

Note: Student responses reproduced in this report have not been corrected for grammar, spelling or factual information.

This report provides sample answers or an indication of what answers may have included. Unless otherwise stated, these are not intended to be exemplary or complete responses.

The statistics in this report may be subject to rounding resulting in a total more or less than 100 per cent.

Section A – Multiple-choice questions

The table below indicates the percentage of students who chose each option. The correct answer is indicated by shading.

Question	% A	% B	% C	% D	Comments
1	90	4	1	5	
2	5	6	81	8	
3	0	2	87	11	
4	2	4	9	85	
5	53	26	14	6	
6	11	5	8	75	
7	5	93	2	1	
8	79	5	12	3	
9	89	2	5	4	
10	4	3	16	77	
11	14	3	2	81	
12	11	79	8	2	
13	1	0	98	1	
14	3	85	7	5	
15	7	10	4	79	
16	5	6	11	78	
17	1	1	98	0	
18	79	4	2	15	
19	84	4	7	5	
20	3	90	2	5	
21	1	95	3	1	
22	92	0	2	6	
23	3	5	2	91	
24	2	95	1	2	
25	5	5	38	51	
26	3	1	92	4	
27	20	16	46	18	The motor skills involved in playing basketball are an example of a form of implicit memory called procedural memory. Procedural memories are encoded and stored via connections between the basal ganglia (especially the striatum) and the cerebellum. Therefore, option C, cerebellum, was the best answer. Option B, hippocampus and option D, amygdala, were incorrect as the hippocampus is involved in the consolidation of explicit episodic and semantic memories, and the amygdala is primarily involved in the consolidation of emotional memories (and neither is typically considered a place of storage). Option A, cerebral cortex, was also incorrect as the cerebral cortex is the site of storage for explicit episodic and semantic memories, not implicit procedural memories.
28	6	4	16	74	
29	1	87	1	11	
30	9	24	64	4	
31	56	22	15	6	

Question	% A	% B	% C	% D	Comments
32	15	5	76	4	
33	1	1	1	97	
34	3	62	22	14	
35	86	3	9	2	
36	4	8	19	69	
37	84	10	3	3	
38	65	7	5	23	
39	1	0	23	76	
40	74	9	5	12	
41	2	73	13	12	
42	83	8	2	7	
43	7	10	79	3	
44	7	6	10	77	
45	79	10	7	3	
46	6	8	77	9	
47	7	17	73	2	
48	3	7	75	15	
49	0	2	86	11	
50	3	93	2	2	

Overall, students responded very well to the multiple-choice questions.

Section B

Question 1

Marks	0	1	2	3	Average
%	13	22	14	51	2

Role of cortisol	Name of stage
Sustained levels of cortisol mobilise the body and increase arousal to respond to the stressor.	resistance
The release of cortisol mobilises the body and increases arousal to respond to the stressor.	alarm (or alarm reaction, or alarm counter shock)
Depleted levels of cortisol reduce the ability of the body to respond to further stressors.	exhaustion

This question addressed content from Unit 3, Area of Study 1: Stress as an example of a psychobiological process.

Some reference material suggests that cortisol is first released in the resistance stage. For this reason, full marks were also awarded to students who responded with resistance, resistance, exhaustion.

It was not acceptable to write counter shock, shock or shock-counter-shock in the second box if alarm was not also mentioned.

Question 2

Marks	0	1	2	3	Average
%	15	17	33	35	1.9

This question addressed content from Unit 3, Area of Study 2: Reliability of memory, relating to Elizabeth Loftus's research into the effect of leading questions on eyewitness testimonies.

High-scoring responses demonstrated knowledge that, according to Loftus's research, eyewitness memory is particularly susceptible to being reconstructed (updated/reconsolidated) during retrieval to include false information that may be introduced during questioning, especially if the questions include leading information regarding details that were not actually witnessed. To gain full marks, students needed to link this knowledge to the scenario and describe how the reporters' questions included potentially misleading information, for example, by suggesting that the masked intruders were boys and that they were armed. The lawyers could quite rightly question whether Nixon actually remembered this information, or whether his memory may have been reconstructed to include the information suggested by the reporters' leading questions.

Question 3

The question comprised three parts addressing Unit 3, Area of Study 2 and Unit 4, Area of Study 2. Specifically, students were required to synthesise and apply knowledge across the neural basis of learning and memory, models to explain learning and long-term potentiation as a biological factor contributing to the development of specific phobia, and apply this to Watson and Rayner's 'Little Albert' experiment.

Question 3a.

Marks	0	1	2	3	4	Average
%	17	17	21	32	13	2.1

Students gained one mark for correctly identifying adrenaline (epinephrine) as the neurohormone, and another for stating its role in activating the fight/flight, or arousal, response. Alternatively, students could state that adrenaline stimulates the release of noradrenaline (norepinephrine), which activates the amygdala. Two further marks were allocated for identifying the amygdala as the relevant brain region, with its role being the consolidation of emotional memories. Students could include reference to the hippocampus working with the amygdala, but it needed to be clear that it is the amygdala that is responsible for processing/consolidating/'involved in storing' emotional memories, not the hippocampus on its own.

Question 3b.

Marks	0	1	2	Average
%	25	38	37	1.1

Students needed to demonstrate basic knowledge of long-term potentiation (LTP) as a form of (experience dependent) neural plasticity that underlies the learning and memory of associations between stimuli, and to apply this knowledge accurately to Little Albert learning to associate the presence of the white rat with a fear response. Students could describe LTP as a form of neural plasticity that causes the strengthening of connections between neurons that are repeatedly co-activated ('cells that fire together wire together'). In the case of Little Albert, LTP causes the neural signals representing the perception of the white rat and those representing the fear response to the loud noise to become associated and strengthened through repeated pairings (i.e. the repeated co-

occurrence of the two neural responses leads to their connection/association being 'potentiated'). A generic response that was not linked to the scenario could gain no more than one mark.

Question 3c.

Marks	0	1	2	Average
%	54	23	23	0.7

High-scoring responses suggested presenting the conditioned stimulus (CS), the white rat, over repeated trials without the unconditioned stimulus (UCS), the loud noise, until Albert was no longer afraid of the white rat. An alternative acceptable response was to suggest repeatedly pairing the CS of the white rat with a UCS that naturally produces a positive emotional response, e.g. sweets, until the conditioned fear response to the white rat is no longer evident, and/or until a new, pleasant conditioned response is learned.

It was not sufficient to explain extinction without accurately applying the terminology of classical conditioning to the relevant stimulus-response elements of the Little Albert scenario, as the question explicitly required the language of classical conditioning to be used. It is important to be clear that the conditioned fear response in the Little Albert scenario is not fear of the loud noise (the fear of the loud noise is the unconditioned response [UCR] to the unconditioned stimulus of the loud noise). Rather, the target of the extinction process is the learned (conditioned) fear response to the white rat (through repeated association with the UCS-UCR). The fear response to sudden loud noises would remain an unconditioned fear response after extinction of fear of the white rat.

Question 4

This question comprised four parts and drew on knowledge from Unit 3, Area of Study 1, in relation to the role of the nervous system in conscious and unconscious responses to stimuli, and Unit 4, Area of Study 2, in relation to the role of operant conditioning as a psychological factor contributing to the development and maintenance of specific phobia, and evidence-based interventions for specific phobia.

Question 4a.

Marks	0	1	2	Average
%	38	19	43	1.1

Given that Serena brushing away the bee was a voluntary action, the correct response identified the somatic nervous system as the division of the nervous system and a voluntary/conscious/controlled response. Students needed to read the scenario carefully to ensure they did not confuse the event in question with Serena's later action of kicking out her leg.

Question 4b.

Marks	0	1	2	3	Average
%	23	16	19	42	1.8

One mark was awarded for correctly naming the spinal reflex (or reflex/reflex arc/reflexive response). The additional two marks were awarded if the response demonstrated knowledge of the fundamental elements of the spinal reflex as applied to the scenario, including that it is governed by a spinal sensory-motor circuit involving the sensation of the sting being detected by sensory neurons that relay to the spinal cord, which then (via interneurons) sends a signal via motor neurons to initiate an automatic/unconscious motor response (kicking out the leg), prior to

registration of the conscious awareness of pain/danger (response bypasses/precedes consciousness).

Question 4c.

Marks	0	1	Average
%	28	72	0.7

The correct answer was stimulus generalisation. No other response was accepted.

Question 4d.

Marks	0	1	Average
%	58	42	0.4

The correct answer was negative reinforcement. No other response was accepted.

Question 4e.

Marks	0	1	2	3	4	Average
%	27	23	17	16	17	1.8

The explanation needed to demonstrate knowledge of the following core components of systematic desensitisation:

- learning a relaxation technique
- development of a fear hierarchy
- gradual/systematic exposure to increasingly fearful stimuli paired with practising the relaxation technique
- continuation of process until the most feared stimulus can be exposed without producing the fear response

Question 5

The question comprised five parts related to a number of areas of the study design, including key science skills relating to experimental design and drawing evidence-based conclusions; Unit 3, Area of Study 1, relating to the role of neurotransmitters in the transmission of neural information, especially the lock-and-key process and excitatory and inhibitory responses; Unit 4, Area of Study 1, relating to changes in levels of alertness as indicated by brain-wave patterns due to stimulant drugs, and Unit 4, Area of Study 2, relating to the action of drugs as agonists (and antagonists) for neurotransmitters. The questions required students to apply their knowledge of content from the study design to a research scenario.

Question 5a.

Marks	0	1	2	Average
%	35	13	52	1.2

One mark was awarded for stating that the amplitude of brain waves would decrease (become smaller/lower/reduced). The second mark was gained for stating that the frequency of brain waves would increase (become faster/quicker/higher). Students who did not indicate change by stating 'low' and 'high' did not receive any marks.

Question 5b.

Marks	0	1	2	3	Average
%	38	31	19	12	1.1

Students needed to draw on knowledge from Unit 3, Area of Study 1 regarding the role of neurotransmitters as either excitatory or inhibitory in the transmission of neural information via the lock-and-key process, and to extrapolate from basic knowledge of agonist mechanisms addressed under Unit 4, Area of Study 2 to apply to the antagonist mechanism referred to in the scenario. The question assumed that knowledge of the opposing actions of agonists and antagonists is foundational for developing the understanding of the specific role of benzodiazepines as GABA agonists that is referred to in the study design.

Students needed to explain the lock-and-key mechanism in terms of neurotransmitters acting as 'keys' (with a unique molecular structure) that fit into the matching receptor sites, or 'locks' on the post-synaptic neuron, causing the neurotransmitter to have its effect (inhibitory or excitatory) on the cell. High-scoring responses drew on the information provided in the scenario regarding the stated inhibitory role of adenosine in lowering mood and memory, and suggested that caffeine could act as an antagonist for adenosine by blocking its receptor sites (through the caffeine molecule sharing a similar 'key' structure to adenosine), thereby preventing the uptake of adenosine at the receptor 'lock' sites, and/or blocking adenosine's inhibitory effects on mood and memory.

Some students referred to caffeine as having the ability to mimic the effects of adenosine. However, this would make caffeine an agonist rather than an antagonist. There was enough information given in the scenario to suggest that caffeine prevented the effects of adenosine.

Question 5ci.

Marks	0	1	2	Average
%	20	40	40	1.2

The correct answer was matched participants (matched groups was also accepted, but not matched pairs). Independent groups was also accepted, given that little detail was provided in the scenario regarding matching of the mice.

Acceptable advantages of the matched participant (or matched groups) design included:

- the ability to control/minimise (not 'eliminate') extraneous participant variables between groups
- to avoid order effects that would be present in repeated measures
- to reduce the amount of time participants spend in testing compared to repeated measures, in which participants are required to complete all conditions

Acceptable advantages for the independent groups design included:

- to avoid order effects that would be present in repeated measures
- to reduce the amount of time participants spend in testing compared to repeated measures
- less time required than matching participants

Question 5cii.

Marks	0	1	Average
%	30	70	0.7

The correct response was that Dr Cunha should provide the caution that the results obtained with mice may not generalise to humans. Students who only wrote 'because the experiment was conducted on mice' did not receive a mark.

Question 5ciii.

Marks	0	1	2	3	4	5	Average
%	24	11	16	18	17	14	2.4

To gain full marks for this question, students needed to explain the comparisons required to build the line of causal reasoning that allowed the conclusion to be drawn. Students could express this knowledge in a variety of ways, including in terms of experimental design and hypotheses, and/or in terms of the results that were observed for particular comparisons. Given the variety of potential responses, broad advice is provided below regarding the crucial information that needed to be conveyed, rather than providing a model response.

- The comparison between mice given a placebo substance with no stress (P–S) and those given a placebo plus stress (P+S) would enable the experimenter to measure the effect of stress on mood and memory (i.e. without the treatment condition of caffeine). That is, the two placebo groups provide a means to determine a baseline level of performance on the mood and memory tests without stress (P–S), and under stress (P+S).
- The comparison between caffeine plus stress (C+S) and caffeine without stress (C–S) groups enabled the experimenter to determine the effect of stress with and without caffeine.
- Students could not gain full marks without going further to link the two basic comparisons described above to explain how comparing the results of the placebo and experimental groups enabled the experimenter to conclude that caffeine prevents the negative effects of stress. To establish that caffeine prevents (inhibits) the negative effects of stress on mood and memory, it was first necessary to establish the negative effects of stress on mood and memory through the comparison of the P+S and P–S groups. Then, it was necessary to show that the mice given caffeine plus stress (C+S) **not only** showed better mood and memory performance than mice given a placebo and exposed to stress (P+S), **but also that they** performed similarly to (i.e. not better than) mice given caffeine without stress (C–S) and mice given a placebo without stress (P–S). Thus, the results indicated that caffeine has effects on mood and memory indirectly by preventing the negative effects of stress (through inhibiting the uptake of adenosine), rather than by enhancing mood and memory directly.

Students needed to be very careful not to simply impose their knowledge of caffeine as a stimulant onto the information given in the scenario. There was no evidence from the results of the study described in the scenario that caffeine enhanced or had an excitatory effect on mood and memory of mice (despite caffeine's reputation as a stimulant). In fact, the results showed that the performance of mice given caffeine without stress (C–S) **did not** differ from mice given a placebo without stress (P–S). Thus, students who reasoned that the results showed that caffeine prevented the negative effects on mood and memory by enhancing/stimulating mood and memory could not gain full marks.

Although this was a challenging question for some, many students answered this question well.

Question 6

The question comprised four parts, requiring students to apply knowledge from Unit 3, Area of Study 1 (stress and coping), and from Unit 4, Area of Study 2 (factors that contribute to the development and progression of mental health disorders, and maintenance of mental health).

Question 6a.

Marks	0	1	2	3	4	Average
%	14	20	30	21	14	2.1

One mark each was awarded for correct identification of a biological and psychological risk factor from the scenario. Substance abuse was the only biological risk factor accepted as present in the scenario. Potential psychological risk factors present in the scenario included stress, poor self-efficacy and impaired reasoning. Rumination was not accepted as it was not clearly present in the scenario.

A further two marks could be gained for giving an appropriate reason for how each risk factor could contribute to the development and/or progression of Zac's mental health disorder. For substance abuse as a biological risk factor, this included the potential impairment of Zac's brain/mental/emotional functioning (as a precipitating or perpetuating factor). For the psychological risk factors:

- stress could contribute to/precipitate the development of mental illness through poor coping strategies and/or through the development of anxious thought patterns
- impaired reasoning could precipitate or perpetuate negative beliefs and thought patterns that are associated with mental illness (through cognitive biases)
- lack of self-efficacy could contribute to thoughts/feelings of hopelessness/helplessness that could precipitate or perpetuate the development of depression.

Many students found it difficult to explain how their chosen factor might have contributed to the mental health disorder and simply suggested that it was either precipitating or perpetuating.

Question 6b.

Marks	0	1	Average
%	41	59	0.6

To be awarded one mark, students needed to name a type of coping strategy, which could have included approach strategy, emotion-focused or problem-focused. No mark was awarded for responses such as, 'Zac could seek assistance from an employment agency to find more work', unless reference to this being an approach or problem-focused coping strategy was included.

Question 6c.

Marks	0	1	2	Average
%	9	28	63	1.6

High-scoring responses referred to a recommendation for a social strategy and a reason for how this would increase resilience. For example:

- the psychologist could suggest that Zac join a club or interest group, which would be protective against his growing isolation and/or increase his sense of self-efficacy
- the psychologist could recommend that Zac attempt to re-establish connections with friends and family he had been avoiding, which would increase resilience through re-establishing connections and social support (as protective factors)

- the psychologist could recommend Zac seek help from social and/or employment services to help him adapt positively to his financial stressors.

Exercise on its own was not accepted as a social strategy, unless it was clear that Zac was to exercise with others to increase his sense of belonging/social network.

Question 6d.

Marks	0	1	2	Average
%	21	17	62	1.4

High-scoring responses identified a possible source of stigma and gave a reason why this could prevent Zac from seeking help. For example, Zac could feel ashamed about seeing a psychologist because people may see this as a sign of weakness, which could prevent him from continuing his sessions.

Many students referenced Zac 'being male' and not wanting to appear to be 'weak'. Answers similar to this often did not receive both marks as it was not possible to identify the 'source' of the stigma. A response that suggested 'Society has certain views about males being strong and not needing to seek help for problems, therefore Zac is embarrassed about seeking treatment' was awarded full marks.

Question 7

This question comprised six parts, drawing on students' knowledge of key science skills relating to experimental design and Unit 3, Area of Study 2: processes and reliability of memory.

Question 7a.

Marks	0	1	2	Average
%	14	21	66	1.5

One mark was awarded for stating that the dependent variable (list of 20 words) was incorrect, with the second mark awarded for stating what the correct dependent variable should have been (i.e. recall of the list of 20 words, percentage of [20] words correctly recalled or memory for list of 20 words).

Alternatively, students could have justified their response by stating the role of the dependent variable. For example, 'No, because the dependent variable must provide an outcome measure of the effect of the independent variable, whereas the list of 20 words is just the materials that were used in the experiment'.

A number of students stated incorrectly that the dependent variable should be both recall of 20 words and recall of 10 word pairs. In fact, the dependent variable was the same for both the single-word presentation and paired-word presentation conditions (i.e. the dependent variable measured recall of the same set of 20 words in both conditions). The single presentation of 20 words or the presentation of 10 pairs was part of what defined the independent variable (maintenance rehearsal or elaborative rehearsal).

Question 7b.

Marks	0	1	2	Average
%	20	19	61	1.4

The scenario described convenience sampling, with Jaime using only two of the five Year 10 classes because those two classes were available at times when Jaime was available.

Convenience sampling was the only response that was accepted. 'Convenient sampling' was not accepted as this did not demonstrate knowledge of the appropriate terminology.

Acceptable responses for the limitation of convenience sampling included that it reduces the ability to generalise the results to the wider population, that the sample may not be representative of the population or that the sample may be biased.

Some students noted that the convenience sampling of two separate classes resulted in allocation of whole classes to conditions, resulting in a confound between the day/time of testing and encoding technique. This response was acceptable if a clear distinction was made between the method of sampling as distinct from the consequence it had on the method of allocation to groups.

Question 7c.

Marks	0	1	2	Average
%	20	23	57	1.4

Acceptable alternative sampling procedures Jaime could have used included random sampling, random-stratified sampling or stratified sampling.

Acceptable justifications for how the alternative sampling procedure would improve the validity of the conclusion included:

- random sampling would provide a sample that is more representative of the population (e.g. by sampling randomly across all Year 10 classes, or across all year levels at the school)
- random sampling would enable the results to be generalised to the population
- random sampling would improve the internal validity of the study by reducing the likelihood of participant variables influencing the results
- random sampling would improve the external validity of the results by making them more generalisable to the population.

Stratified and random-stratified sampling have similar benefits to random sampling and so the justifications did not need to be more specific than the responses noted for random sampling, given only one mark was allocated to the justification.

As the scenario did not explicitly specify the target population, responses that focused on students at Sundown High School as the population, students in Year 10 as the population or people in general (other than just students at the school) as the population, were all accepted.

Question 7d.

Marks	0	1	2	Average
%	25	23	51	1.3

A number of valid graphical interpretations of the data were accepted, including:

- a serial position curve. One mark could be obtained for correct labelling of the x (horizontal) and y (vertical) axes respectively as 'order of list presentation' (or equivalent) and 'proportion (or percentage) recalled' (or equivalent, including 'number of students who recalled'). It was not necessary to include a scale on the axes to gain this mark. The second mark was awarded for an appropriate representation of the serial position curve, showing near-perfect recall for the first items, poor performance for the middle items and near-perfect recall for the last items. If students included a scale on the y-axis, then the curve needed to be congruent with the scale. For example, it was not acceptable to show the curve starting at only 50% correct (maximum of one mark). Some students drew a serial position curve using a series of bars,

one for each word in the list, rather than as a line graph. This was acceptable if the tops of the bars formed a plausible serial position curve and the axes were labelled appropriately

- a single bar graph of results of the maintenance rehearsal group. One mark was given for the bar graph and the second for labelling 'average/mean/number of words recalled' on the y-axis and the name of the group on the x-axis. It was not necessary to provide a scale on the y-axis, but if it was included, the data needed to be plausible and congruent with what is known about the limits of free recall (otherwise a maximum of one mark was awarded). For example, only one mark was awarded if the bar graph was significantly higher than 7 words recalled (plus or minus 2) (even if the axes were otherwise labelled correctly)
- a bar graph for each of the groups. One mark was given for the two bars being of appropriate relative height (maintenance rehearsal showing lower recall than elaborative rehearsal). The second mark was obtained for correctly labelling the groups on the x-axis and for labelling the y-axis with 'average/mean/number of words recalled'. If a scale was used on the y-axis, the bars needed to be congruent with the capacity limit on short-term memory of 7 plus or minus 2 items for the maintenance rehearsal group to be awarded the mark for the axes. Showing both groups was accepted because, in the absence of actual data, it was considered reasonable for students to attempt to represent the performance of the maintenance rehearsal group by comparison to the elaborative rehearsal group
- a scatterplot showing the range of potential scores for participants in the maintenance rehearsal group. One mark was obtained for a plausible set of dots representing the scores. The second mark was given for clearly labelling the axes with 'participant number/participant ID number' on the x-axis and 'score out of 20' (or equivalent) on the y-axis. If a scale was given on the y-axis, then the range of scores for the maintenance rehearsal group should have been depicted as varying around 7 ± 2 . The dots in the plot should not have been connected as this implied connection between the data points. Some students drew a series of bars, one for each participant (varying around 7 ± 2), which was also accepted
- a normal distribution of scores. This was accepted if the x-axis was clearly labelled as 'number of words recalled using maintenance rehearsal' (or equivalent) and the y-axis was labelled 'number/proportion/percentage of students (who recalled words)'. These responses tended to include a scale on the x-axis, with the distribution being clearly centred on 7, and indicating variance around the mean (i.e. standard deviation) consistent with 7 ± 2 . Others drew a frequency histogram having the shape of a normal distribution centred on 7. This was also acceptable if labelled as described for the normal distribution curve

Question 7e.

Marks	0	1	2	Average
%	49	29	21	0.7

Responses to this question were somewhat dependent on the interpretation of the previous question. As such, a range of valid interpretations were accepted.

For responses that interpreted the question to be about the serial position curve, one mark was awarded for noting that recall would be high/near perfect for the first words on the list (primacy effect), providing evidence that these words had been transferred to long-term memory, and the second mark was given for noting that recall would be high/near perfect for the last words in the list (recency effect), consistent with the model's proposal that these words would still be active/rehearsed in short-term (and sensory) memory.

No marks were awarded for merely describing the shape of the serial position curve, as the question required an explanation for how the results provided support for multiple forms of memory.

There were alternative ways of expressing the same basic knowledge, for example including information about interference affecting items in the middle of the list, but the essential information for full marks related to the evidence for short-term and long-term memory stores from the enhanced performance for the initial and last items. Students did not have to use the terms primacy effect and recency effect to get two marks if they clearly described the expected enhanced performance for the first and last items (relative to the middle items), and how these observations relate to the proposed memory stores.

Students who interpreted the question in terms of the limited capacity of short-term memory being 7 ± 2 items (units of information) tended to receive only one mark as they did not refer to evidence for more than one memory store of the multi-store model.

Reference to sensory memory was somewhat peripheral to this question and was not awarded marks on its own as there is no direct evidence provided for sensory memory in the data (i.e. the demonstration of sensory memory requires something like the Sperling task).

Question 7f.

Marks	0	1	2	3	Average
%	30	33	30	7	1.2

To score up to two marks students could have provided any two of the following reasons as to why elaborative rehearsal enhances recall (i.e. one mark per reason), linked to the scenario:

- creating meaningful links, either between items in the list, as with the rhyming pairs, or between the studied items and information stored in long-term memory, as with the word pairs rhyming with the ordered sequence of numbers one to ten
- the reduction of memory load created through 'chunking' 20 individual words into 10 rhyming pairs could also be noted as an advantage of elaborative rehearsal
- the rhyming pairs provided a retrieval cue to enhance recall

The third mark was obtained through explaining the relative limitation of maintenance rehearsal of individual/unrelated items in constraining recall performance to 7 ± 2 items.

An alternative valid response was to explain that there would be an expected advantage for the elaborative rehearsal condition (for same reasons as stated above), but that this could not be separated in Jaime's experiment from the potential confounding effects of the time/day of testing. Thus, it is possible that (at least some) of the observed advantage for the elaborative rehearsal group was due to the fact that the participants in this condition did the task on a Monday morning, as opposed to the Friday afternoon session for the maintenance rehearsal group.

Students who stated that the elaborative rehearsal group had longer to study the 20 words were not correct; the maintenance rehearsal group studied 20 individual words for 2 seconds each, whereas the elaborative rehearsal group studied 10 pairs of words for 4 seconds each. As such, both groups had 40 seconds of study time in total. It was also incorrect to state that 2 seconds of presentation each was not long enough to encode the words into short-term memory.

Question 8

Marks	0	1	2	3	4	5	6	7	8	9	10	Average
%	5	4	8	12	17	19	15	11	6	3	1	4.7

The question required students to write a detailed and clearly organised set of notes regarding the effects that shift work can have on a person's mental health and wellbeing, addressing five key elements specified in the scenario:

- potential changes to the regular sleep-wake cycle of night shift workers
- potential consequences on a person's physiological functioning if they were to regularly experience partial sleep deprivation
- potential consequences on a person's psychological functioning if they were to regularly experience partial sleep deprivation
- one protective factor
- one intervention that employees could use to adjust to changes in their sleep-wake cycle.

The question required students to synthesise knowledge across several components from Unit 4, namely:

- Unit 4, Area of Study 1: effects of sleep disturbances and possible treatments
- Unit 4, Area of Study 2: factors that contribute to the development and progression of mental health disorders, including protective factors and the influence of biological risk factors, including poor sleep; maintenance of mental health; resilience as a positive adaption to adversity, including protective factors such as adequate sleep

Responses were marked holistically, taking into account the clarity and organisation of the content, the degree of sophistication with which the relevant psychological concepts and terminology were integrated into the response, how well psychological concepts and terms were applied to relevant aspects of the scenario, and the extent and depth to which the five key elements were addressed.

High-scoring responses gave detail relating to expected changes in the sleep-wake cycle of night shift-workers, appropriate to the scenario, which could have included:

- a cycling pattern of night shift work, with four days on and four days off, and 11-hour shifts beginning at 7 pm and ending at 6 am, as described in the scenario, is likely to lead to a circadian phase disorder (or circadian rhythm disorder) known as Shift Work Sleep Disorder
- regular night shift work causes the body's circadian clock (biological clock), or circadian rhythms, to be disrupted
- the circadian rhythm is a 24-hour biological cycle, which controls many bodily rhythms, including the sleep-wake cycle
- the circadian rhythm is driven by environmental signals (or zeitgebers, 'time-givers'), especially changes in the level of light during the 24-hour day-night cycle
- light signals are detected by the retina and transferred to the internal body clock, known as the suprachiasmatic nucleus (SCN) in the hypothalamus
- the SCN regulates the release of melatonin, a neurohormone produced in the pineal gland, that initiates sleepiness when its levels increase every evening
- working night shifts requires workers to catch up on sleep during the day when environmental light signals are telling the body it is time to be awake, and to work at night when the signals are telling the body to sleep
- as it is so difficult to sleep during the day, night shift workers are likely to become chronically partially sleep deprived, missing out on the recommended 7–9 hours of sleep per night that adults require to stay healthy
- night shift workers may experience insomnia, may have difficulty falling asleep when required and may experience excessive sleepiness when required to stay awake at night, resulting in increased risk of microsleeps

Potential physiological consequences included (not limited to) lack of energy, drooping eyelids, hand tremors, headaches, slowed reflexes, etc. It might have been noted that these physiological consequences may affect the ability to work effectively/safely. Students may also have noted the long-term consequences of partial sleep deprivation on physiological functioning, especially increased risk of cardiovascular disease.

The psychological consequences of partial sleep deprivation included (but were not limited to):

- slowed reaction times
- reduced ability to maintain attention/concentration
- increased error rates on tasks requiring attention to detail
- irritability (reduced ability to regulate emotions)
- reduced ability to cope with and make decisions under stress
- difficulty with logical reasoning and problem-solving
- reduced spatial awareness
- reduced motor control (clumsiness).

High-scoring responses applied the identified deficits to the scenario, noting how they could be dangerous for aircraft engineers who need to attend to details to ensure their own safety while working, as well as reducing errors in maintaining the aircraft, which has consequences for the safety of others.

It could be noted that partial sleep deprivation resulting from 17 hours without sleep is equivalent to a blood alcohol concentration of 0.05. Students may have organised this part of their response using the affective behavioural cognitive (ABC) approach, noting psychological consequences under each category.

Protective factors included:

- ensuring adequate exercise and healthy diet (biological)
- developing and practising good sleep hygiene routines (examples of regular bedtime routine during days off, no screens before bed, etc.) (psychological)
- having friends, colleagues and family that are supportive/understanding of your sleep requirements and the impacts of shift work on your functioning (social)

Suggested interventions could have included either cognitive behaviour therapy (CBT) or bright light therapy (BLT). High-scoring responses provided detailed, accurate and scenario-relevant explanations of these treatments and how they might help.

For BLT, high-scoring responses noted that:

- BLT involves the use of a light therapy 'box' or lamp that emits very bright levels of light, or special glasses can also be worn.
- BLT lamps emit light that is much stronger than normal indoor ambient light (lamps vary from 2500 to 12 000 lux (5–20 times stronger than normal indoor light), with brighter lamps requiring shorter sessions of exposure.
- BLT is used to influence the timing of the release of melatonin.
- BLT should be used a couple of hours prior to the shift work to attempt to offset the release of melatonin.
- The workplace could assist employees by maintaining high levels of bright light in the work environment during night shifts.
- Similarly, light should be kept to a minimum when returning home from the night shift, with the bedroom kept as dark as possible to assist with the release of melatonin to encourage the onset of sleep.

For CBT, high-scoring responses noted that:

- Night shift workers should work with a psychologist to establish effective sleep hygiene routines and to develop other behavioural methods to protect against the negative psychological impacts of chronic partial sleep deprivation (e.g. reducing stressors, strategies for managing moods, etc.)

Students could have noted that these therapies are likely to be only partially successful as the pattern of rotating night shifts is very difficult for people to adapt to.