

Units 3&4 Trial Exam 2023 (Trial 2) – Assessment Guide

Section A

VCAA Key Knowledge

Question

Answer Guide

the role of neurotransmitters in the transmission of neural information across a neural synapse to produce excitatory effects (as with glutamate) or inhibitory effects (as with gamma-amino butyric acid [GABA]) as compared to neuromodulators (such as dopamine and serotonin) that have a range of effects on brain activity

Question 1

Which of the following statements is true about GABA?

- A. the inhibitory neurotransmitter makes the pre-synaptic neuron less likely to fire
- B. the excitatory neurotransmitter makes the post-synaptic neuron less likely to fire
- C. too much GABA is a contributing factor to developing a specific phobia
- D. it plays a key role in regulating neural activity, making the post-synaptic neuron less likely to fire

D *GABA is the primary inhibitory neurotransmitter in the central nervous system which reduces the likelihood of post-synaptic neurons to fire/generate an action potential.*

the role of neurotransmitters in the transmission of neural information across a neural synapse to produce excitatory effects (as with glutamate) or inhibitory effects (as with gamma-amino butyric acid [GABA]) as compared to neuromodulators (such as dopamine and serotonin) that have a range of effects on brain activity

Question 2

Which of the following is most correct regarding serotonin and dopamine?

	Serotonin	Dopamine
A.	involved in reward behaviours	important in regulating mood
B.	always inhibitory	always excitatory
C.	can influence multiple synapses at one time	only influences one synapse at a time
D.	involved in emotional processing	involved in coordinating smooth voluntary movement

D *Both of these are correct. All other options contain incorrect information: for A, the reverse is true; for B, both may be excitatory and inhibitory depending on the receptor site it binds to; and for C, both are neuromodulators and can, therefore, influence multiple synapses at one time.*

Use the following information to answer Questions 3 and 4.

Bert is rummaging around his pencil case looking for his calculator when he is pricked with his compass. His hand jerks back from the pencil case before he even realises what has happened.

the roles of different subdivisions of the central and peripheral nervous systems in responding to, and processing and coordinating with, sensory stimuli received by the body to enable conscious and unconscious responses, including spinal reflexes

Question 3

The response that Bert experienced is

- A. involuntary and involves the autonomic nervous system.
- B. conscious and involves the central nervous system.
- C. voluntary and involves the enteric nervous system.
- D. unconscious and involves the peripheral nervous system.

D Bert has experienced a spinal reflex, which occurs due to the activity of the peripheral and central nervous systems.

the roles of different subdivisions of the central and peripheral nervous systems in responding to, and processing and coordinating with, sensory stimuli received by the body to enable conscious and unconscious responses, including spinal reflexes

Question 4

The reason that Bert's hand jerks back before he realises what has happened is that

- A. the message about the pain in his finger never reaches the brain.
- B. the message about the pain in his finger reaches his brain after the action has taken place.
- C. he goes into the shock stage due to the frightening stimulus.
- D. the central nervous system is slower at processing information than the autonomic nervous system.

B Because this action is a spinal reflex, this means that a message travels to the skeletal muscles in the hand to withdraw before the message about the pain stimuli reaches the brain.

synaptic plasticity – resulting from long-term potentiation and long-term depression, which together act to modify connections between neurons (sprouting, rerouting and pruning) – as the fundamental mechanism of memory formation that leads to learning

Question 5

Sandy has started to learn the guitar and has had to learn a lot of new movements. Which of the following neural processes is likely to be involved in learning this new skill?

- A. retention
- B. long-term depression
- C. sprouting
- D. pruning

C Establishing new neural pathways during the learning of a new skill is most likely to involve sprouting, which refers to the growth of new extensions from neurons to form synapses.

Use the following information to answer Questions 6 – 9.

Toby has had a very demanding six months, having moved overseas to start an exchange program with his university. Adjusting to cultural differences and the demands of the course has been challenging. He has noticed he often experiences stomach cramps and has been getting a sore throat frequently. Despite this, he has done well in all his assignments and met a lot of new and interesting people.

the explanatory power of Hans Selye's General Adaptation Syndrome as a biological model of stress, including alarm reaction (shock/counter shock), resistance and exhaustion

Question 6

In terms of Selye's General Adaptation Syndrome, Toby is most likely to be in the

- A. alarm shock phase as he is struggling to adjust.
- B. alarm countershock phase as he is showing increased resistance.
- C. resistance phase as he is showing increased resistance to the stressor despite some increased susceptibility to illness.
- D. exhaustion phase as he is tired and has a sore throat.

C He is doing well academically and socially, showing increased resistance, but some increased susceptibility to minor illnesses, suggesting a sustained period in the resistance stage.

the gut-brain axis (GBA) as an area of emerging research, with reference to the interaction of gut microbiota with stress and the nervous system in the control of psychological processes and behaviour

Question 7

Toby's stomach cramps may be related to his stress as

- A. increased stress can impact the health of the enteric nervous system.
- B. increased stress can increase digestion, causing fatigue in the enteric nervous system.
- C. stress can increase the diversity of the gut microbiota.
- D. stress will decrease the desire for unhealthy food.

A Stress can impact the health of the enteric nervous system, including decreasing the diversity of gut microbiota.

internal and external stressors causing psychological and physiological stress responses, including the flight-or-fight-or-freeze response in acute stress and the role of cortisol in chronic stress

Question 8

The stress that is being experienced by Toby due to the move could best be described as

- A. chronic stress due to internal stressors.
- B. acute stress due to external stressors.
- C. chronic stress due to external stressors.
- D. acute stress due to internal stressors.

C The stress has extended over several months and is mainly in response to the external factors of his new environment.

use of strategies (approach and avoidance) for coping with stress and improving mental wellbeing, including context-specific effectiveness and coping flexibility

Question 9

Which of the following correctly categorises coping strategies that Toby might use?

	Approach	Avoidance
A.	having a study schedule	asking new friends for advice
B.	wishful thinking about results	emailing lecturers with questions
C.	making a plan for the week with study and social time	oversleeping instead of going to class
D.	watching 10 episodes of his favourite show	complaining to his friends

C Making a plan for social and study time is an approach strategy as it is directed towards the stressor of study pressure. Oversleeping and missing class is an avoidance strategy as it is directed away from the stressor.

Use the following information to answer Questions 10 and 11.

Tanja and Sue are close friends who live in the same retirement village. Tanja has Alzheimer's disease while Sue does not have the condition.

the role of episodic and semantic memory in retrieving autobiographical events and in constructing possible imagined futures, including evidence from brain imaging and post-mortem studies of brain lesions in people with Alzheimer's disease and aphantasia as an example of individual differences in the experience of mental imagery

Question 10

Tanja and Sue are looking forward to visiting a new exhibition at an art gallery. When talking separately with another friend, they describe what they think the day will be like. Which of the following is most likely to be true?

- A. Tanja's description will be more varied from past experience than Sue's
- B. Tanja's description is likely to include more visual imagery than Sue's
- C. Tanja's description is likely to be less vivid and detailed than Sue's
- D. both descriptions will likely be similar

C Studies in patients with Alzheimer's disease indicate problems imagining the future, so Tanja's description is likely to be less varied from past experience, less likely to include visual imagery and less vivid than Sue's.

the roles of the hippocampus, amygdala, neocortex, basal ganglia and cerebellum in long-term implicit and explicit memories

Question 11

Tanja is having trouble remembering what happened the day before but can still recall the details of her earlier life and complete everyday tasks; for example, she remembers how to knit. She also remembers her family but does not remember that they visited her yesterday. Which of the following best describes the memory problems that Tanja is experiencing?

- A. difficulty consolidating emotional memories
- B. difficulty consolidating procedural memory
- C. difficulty consolidating episodic memory
- D. difficulty storing implicit memory

C The problem that is described in the stimulus is with forming new explicit memories; hence, C is correct. There is no evidence from the scenario that emotional or procedural memories are impacted too.

Use the following information to answer Questions 12 – 17.

A Year 12 Psychology class wanted to test whether using acrostics improves the retention of information. They had a list of common, five-letter words and asked two nearby classes to participate.

At the beginning of a class, participants were asked to memorise the list of words and were then tested on the list at the end of the class. One class (of Year 8s) received just the list of words; the second class (of Year 11s) received the words and an acrostic related to the words.

the use of mnemonics (acronyms, acrostics and the method of loci) by written cultures to increase the encoding, storage and retrieval of information as compared with the use of mnemonics such as sung narrative used by oral cultures, including Aboriginal peoples' use of Songlines

Question 12

Which of the following describes the nature of the acrostic that was given to the participants?

- A. a pronounceable word made up of the first letter of each word on the list
- B. a sentence that includes a word that starts with the same letter of each word on the list
- C. a story that includes each word on the list
- D. a link between each word on the list and a familiar location

B An acrostic is a phrase where the first letter of each word in the phrase functions as a cue to remember information.

determine appropriate investigation methodology: case study; classification and identification; controlled experiment (within subjects, between subjects, mixed design); correlational study; fieldwork; literature review; modelling; product, process or system development; simulation

Question 13

Which of the following most closely matches the design that the students used?

- A. mixed design
- B. within-subjects design
- C. between-subjects design
- D. repeated-participants design

C The students used two separate classes that completed one condition of the experiment each; therefore, this most closely resembles a between-subjects design.

identify and analyse experimental data qualitatively, applying where appropriate concepts of accuracy, precision, repeatability, reproducibility and validity; errors; and certainty in data, including effects of sample size on the quality of data obtained

Question 14

Which of the following is most likely to be a confounding variable in this study?

- A. the use of a control group
- B. the age differences between the two groups
- C. the repeatability of the findings
- D. the words on the list

B As Group A was from Year 8 and Group B was from Year 11, there is a systematic difference between the two groups that is not the independent variable; therefore, it is difficult to know to what degree the percentage of words that were remembered is affected by the age and experience of the two participant groups and how much is due to the acrostic method.

identify and analyse experimental data qualitatively, applying where appropriate concepts of: accuracy, precision, repeatability, reproducibility and validity; errors; and certainty in data, including effects of sample size on the quality of data obtained

Question 15

If the class was hoping to test for reproducibility, they should

- A. replicate the experiment keeping everything the same, including using the same classrooms and experimenters.
- B. replicate the experiment using the same set of instructions and lists of words with a different sample.
- C. replicate the experiment using the same set of instructions and lists of words with the same sample.
- D. replicate the experiment by choosing a different mnemonic device.

B Reproducibility refers to an agreement between the results of measurements of the same quantity being measured and being carried out under changed conditions of measurement. Therefore, there is no need to keep everything the same, as in A and C, and the change to a different mnemonic device would not meet the aim of the experiment which was to investigate the effect of acrostics on memory.

identify and analyse experimental data qualitatively, applying where appropriate concepts of: accuracy, precision, repeatability, reproducibility and validity; errors; and certainty in data, including effects of sample size on the quality of data obtained

Question 16

As this was a small sample size and not a random sample, there may be problems with the _____ of this study.

- A. uncertainty
- B. internal validity
- C. external validity
- D. non-maleficence

- C** *A non-representative sample is most relevant to the external validity of the study as this may limit the ability to generalise the results of the study to similar individuals.*

process quantitative data using appropriate mathematical relationships and units, including calculations of percentages, percentage change and measures of central tendencies (mean, median, mode), and demonstrate an understanding of standard deviation as a measure of variability

Question 17

The students calculate mean, median and standard deviation values for their data. Which of the below correctly summarises what this information indicates?

	Mean	Median	Standard Deviation
A.	the average score	the middle number	the variability within the data
B.	the middle number	the average score	the difference between the lowest and highest score
C.	the most commonly occurring number	the middle number	the average score
D.	the range of data	the most commonly occurring number	accuracy of the data

- A** *Option A correctly summarises the information provided by the mean, median and standard deviation.*

the role of episodic and semantic memory in retrieving autobiographical events and in constructing possible imagined futures, including evidence from brain imaging and post-mortem studies of brain lesions in people with Alzheimer's disease and aphantasia as an example of individual differences in the experience of mental imagery

Question 18

Which of the following is not true about someone with aphantasia?

- A. they cannot describe physical features when asked to describe something from memory
- B. they cannot bring visual imagery to mind
- C. they may see visual imagery when dreaming
- D. their spatial imagery abilities (in representing the size, location and position of objects in relation to each other) may be intact

- A** *People with aphantasia may be able to list the physical features of objects, but they cannot mentally picture them. People with aphantasia often have intact spatial imagery abilities.*

the use of mnemonics (acronyms, acrostics and the method of loci) by written cultures to increase the encoding, storage and retrieval of information as compared with the use of mnemonics such as sung narrative used by oral cultures, including Aboriginal peoples' use of Songlines

Question 19

Which of the following is an acronym that could be used for remembering musical notes?

- A. FACE
- B. All Cows Eat Grass
- C. EGBDF
- D. associating each musical note with familiar locations around your home

A Acronyms compromise the initial letters (and sometimes syllables) of the words in a term and are pronounced as a word, as with 'FACE.'

Use the following information to answer Questions 20 and 21.

Gerard is 70 years old and has a new grandson, Lenny, who is one month old.

differences in, and explanations for, the demands for sleep across the life span, with reference to total amount of sleep and changes in a typical pattern of sleep (proportion of REM and NREM)

Question 20

Which of the following is not an accurate comparison of Lenny and Gerard's sleep?

- A. Lenny is likely to have more sleep episodes than Gerard
- B. Gerard is likely to have a lower proportion of REM sleep than Lenny
- C. Lenny and Gerard will have a similar proportion of NREM 3 sleep
- D. Lenny is likely to sleep at least twice as much as Gerard

C Older adults are likely to have a lower proportion of NREM 3 sleep than younger people.

changes to a person's sleep-wake cycle that cause circadian rhythm sleep disorders (Delayed Sleep Phase Syndrome [DSPS], Advanced Sleep Phase Disorder [ASPD] and shift work) and the treatments of circadian rhythm sleep disorders through bright light therapy

Question 21

Gerard finds that he always feels sleepy earlier than desired and often wakes up at 2am, unable to get back to sleep. The sleep disorder that Gerard may be experiencing is

- A. advanced sleep phase disorder.
- B. delayed sleep phase syndrome.
- C. shift work disorder.
- D. adolescent sleep-wake cycle shift.

A Advanced sleep phase disorder is often characterised by feeling sleepy and waking earlier than desired.

Use the following information to answer Questions 22 and 23.

Hana has been at a party and consumed several alcoholic drinks; her blood alcohol concentration is likely to be over 0.05. Kamila has been working the late shift and has been awake for 18 hours.

the effects of partial sleep deprivation (inadequate sleep either in quantity or quality) on a person's affective, behavioural and cognitive functioning, and the affective and cognitive effects of one night of full sleep deprivation as a comparison to blood alcohol concentration readings of 0.05 and 0.10

Question 22

Which of the following is true regarding Hana and Kamila's abilities to drive?

- A. Hana and Kamila both have a BAC of 0.05 or more
- B. Hana and Kamila may both have a similar impairment in cognition that may affect their driving
- C. Kamila will be significantly more impaired than Hana in her concentration and ability to drive
- D. Hana will be significantly more impaired than Kamila in her concentration and ability to drive

B As the impairment to consciousness after being awake for 17 hours is similar to that of a BAC of 0.05, both people are over these levels and likely to be similarly impaired.

the effects of partial sleep deprivation (inadequate sleep either in quantity or quality) on a person's affective, behavioural and cognitive functioning, and the affective and cognitive effects of one night of full sleep deprivation as a comparison to blood alcohol concentration readings of 0.05 and 0.10

Question 23

Which of the following correctly identifies and categorises the symptoms that Kamila may experience?

	Affective	Behavioural	Cognitive
A.	forgetful	risk-taking behaviour	difficulty problem solving
B.	droopy eyelids	low mood	improved memory
C.	microsleeps	clumsiness	decreased concentration
D.	increased irritability	slowed reaction times	difficulty making decisions

D All of the options in row D are characteristic of sleep deprivation and correctly categorised. In row A, 'forgetful' is cognitive, not affective. In row B, 'droopy eyelids' are physiological and improved memory is incorrect. In row C, microsleeps are physiological.

Use the following information to answer Questions 24 – 26.

Heather has experienced a variety of personal challenges over the past year, including changing jobs and breaking up with her partner. During this time, she had sessions with a psychologist who taught her some strategies to use when her worries feel overwhelming.

the application of a biopsychosocial approach to maintaining mental wellbeing, with reference to protective factors including adequate nutritional intake and hydration and sleep (biological), cognitive behavioural strategies and mindfulness meditation (psychological) and support from family, friends and community that is authentic and energising (social)

Question 24

Heather has learnt to change her thinking. Now, when she is not able to complete work as she worries that she always makes errors and is incompetent, she questions the truth of that thought. She can now reflect that, most of the time, she does not make errors and instead replaces the worrying thought with the more realistic thought that she is competent in her work and only makes errors sometimes. This supports her to complete her work with greater confidence. This technique is called

- A. positive thinking
- B. cognitive behavioural strategies
- C. resilience
- D. mindfulness

B Heather is recognising an unhelpful and unrealistic thought and changing this with a more realistic and healthy thought, which is characteristic of cognitive behavioural strategies derived from CBT. This then enables her to change her behaviour by completing her work with greater confidence.

mental wellbeing as a continuum, with an individual's mental wellbeing influenced by the interaction of internal and external factors and fluctuating over time, as illustrated by variations for individuals experiencing stress, anxiety and phobia

Question 25

External factors that might influence Heather's wellbeing are:

- A. the break-up with her partner, work demands, and social support from her family.
- B. financial pressures, breaking up with her partner, and worries about her competence.
- C. genetic predisposition for poor mental health, poor sleep, and financial pressures.
- D. poor nutrition, support from family and friends, and breaking up with her partner.

A Option A lists external factors; worries, poor sleep, poor nutrition and genetic predispositions are internal factors.

the application of a biopsychosocial approach to maintaining mental wellbeing, with reference to protective factors including adequate nutritional intake and hydration and sleep (biological), cognitive behavioural strategies and mindfulness meditation (psychological) and support from family, friends and community that is authentic and energising (social)

Question 26

Which of the following is not a biological factor that may influence Heather's wellbeing?

- A. adequate nutrition
- B. eight hours of sleep each night
- C. staying hydrated
- D. spending time with family

D *Spending time with family is a social factor.*

ways of considering mental wellbeing, including levels of functioning; resilience, as the ability to cope with and manage change and uncertainty; and social and emotional wellbeing (SEWB), as a multidimensional and holistic framework for wellbeing that encapsulates all elements of being (body, mind and emotions, family and kinship, community, culture, country, spirituality and ancestors) for Aboriginal and Torres Strait Islander people

Question 27

Which of the following is not an element from the social and emotional wellbeing (SEWB) framework?

- A. ancestors
- B. Country
- C. community
- D. technology

D *The elements include body, mind and emotions, family and kinship, community, culture, Country, spirituality and ancestors.*

ways of considering mental wellbeing, including levels of functioning; resilience, as the ability to cope with and manage change and uncertainty; and social and emotional wellbeing (SEWB), as a multidimensional and holistic framework for wellbeing that encapsulates all elements of being (body, mind and emotions, family and kinship, community, culture, country, spirituality and ancestors) for Aboriginal and Torres Strait Islander people

Question 28

Which of the following is not a characteristic of the social and emotional wellbeing (SEWB) framework?

- A. holistic
- B. informed by cultural ways of knowing
- C. made in consultation with one community group
- D. recognises the importance of culture and history

C *The SEWB model was endorsed by 457 Aboriginal and/or Torres Strait Islander community members in 11 communities across Australia that were involved in the consultations.*

cultural determinants, including cultural continuity and self-determination, as integral for the maintenance of wellbeing in Aboriginal and Torres Strait Islander peoples

Question 29

Which of the following does not support self-determination?

- A. community-driven designing of services
- B. imposing an existing model on a community
- C. prioritising culture
- D. addressing trauma and supporting healing

B *Imposing an existing model on a community without consultation does not support self-determination.*

Use the following information to answer Questions 30 – 35.

Danh has a phobia of escalators. When he was a child, his shoelace became stuck in one and he was very frightened; since then, he has avoided using an escalator. This has often been very difficult as Danh works in fashion and often needs to be in shopping centres and airports. This means that he has frequently taken longer than expected to get to meetings and make flights and has had to allow extra time. He has not told any colleagues or his boss as he is worried that they will think it is silly. He has spoken with his doctor about various treatments, including the short-term use of benzodiazepines.

the relative influences of factors that contribute to the development of specific phobia, with reference to gamma-amino butyric acid (GABA) dysfunction and long-term potentiation (biological); behavioural models involving precipitation by classical conditioning and perpetuation by operant conditioning, and cognitive biases including memory bias and catastrophic thinking (psychological); and specific environmental triggers and stigma around seeking treatment (social)

Question 30

In terms of his behaviour perpetuating his phobia, Danh's avoidance of the escalator is

- A. positively reinforced through classical conditioning.
- B. negatively reinforced through operant conditioning.
- C. positively punished through classical conditioning.
- D. negatively punished through operant conditioning.

B *Negatively reinforcing the avoidance behaviour can perpetuate phobias, and is a mechanism of operant conditioning.*

the relative influences of factors that contribute to the development of specific phobia, with reference to gamma-aminobutyric acid (GABA) dysfunction and long-term potentiation (biological); behavioural models involving precipitation by classical conditioning and perpetuation by operant conditioning, and cognitive biases including memory bias and catastrophic thinking (psychological); and specific environmental triggers and stigma around seeking treatment (social)

Question 31

Which of the following correctly lists factors that may have contributed to the development of Danh's phobia?

	Biological	Psychological	Social
A.	GABA dysfunction	memory bias	stigma
B.	cognitive bias	long-term potentiation	psychoeducation
C.	classical conditioning	operant conditioning	catastrophic thinking
D.	benzodiazepines	cognitive behavioural therapy	a specific environmental trigger

A GABA dysfunction, memory bias and stigma are all possible contributing factors that are correctly categorised.

In B, cognitive bias should be a psychological factor. In C, classical conditioning should be psychological. In D, benzodiazepines and cognitive behavioural therapy are interventions, not contributing factors.

the relative influences of factors that contribute to the development of specific phobia, with reference to gamma-aminobutyric acid (GABA) dysfunction and long-term potentiation (biological); behavioural models involving precipitation by classical conditioning and perpetuation by operant conditioning, and cognitive biases including memory bias and catastrophic thinking (psychological); and specific environmental triggers and stigma around seeking treatment (social)

Question 32

When he thinks about having to use an escalator, Danh thinks that, if he uses one, he will become caught and probably fall and injure himself severely. This is called

- A. catastrophic thinking.
- B. memory bias.
- C. negative thinking.
- D. precipitation.

A Predicting the worst possible outcome and exaggerating the dangers is characteristic of catastrophic thinking.

evidence-based interventions and their use for specific phobia, with reference to the use of short-acting anti-anxiety benzodiazepine agents (GABA agonists) in the management of phobic anxiety and breathing retraining (biological); the use of cognitive behavioural therapy (CBT) and systematic desensitisation as psychotherapeutic treatments of phobia (psychological); and psychoeducation for families/supporters with reference to challenging unrealistic or anxious thoughts and not encouraging avoidance behaviours (social)

Question 33

Benzodiazepines work by

- A. being a GABA antagonist, increasing the effect of GABA.
- B. increasing the supply of GABA in the body.
- C. increasing the efficiency of GABA.
- D. decreasing the supply of glutamate in the body.

C Benzodiazepines are GABA agonists that work by increasing the efficiency of GABA without increasing the supply of GABA.

evidence-based interventions and their use for specific phobia, with reference to the use of short-acting anti-anxiety benzodiazepine agents (GABA agonists) in the management of phobic anxiety and breathing retraining (biological); the use of cognitive behavioural therapy (CBT) and systematic desensitisation as psychotherapeutic treatments of phobia (psychological); and psychoeducation for families/supporters with reference to challenging unrealistic or anxious thoughts and not encouraging avoidance behaviours (social)

Question 34

Which of the following is evidence that Danh is suffering from a phobia rather than stress?

- A. he is experiencing an increase in physiological arousal
- B. he experiences both negative and positive emotions in relation to escalators
- C. his functioning is significantly impacted
- D. he has a rational response to the escalator

C *Phobias are characterised by a severe, persistent and irrational fear of a specific object, activity or situation. Both stress and anxiety increase physiological arousal. Stress may involve rational responses and positive emotions, but phobias will not.*

evidence-based interventions and their use for specific phobia, with reference to the use of short-acting anti-anxiety benzodiazepine agents (GABA agonists) in the management of phobic anxiety and breathing retraining (biological); the use of cognitive behavioural therapy (CBT) and systematic desensitisation as psychotherapeutic treatments of phobia (psychological); and psychoeducation for families/supporters with reference to challenging unrealistic or anxious thoughts and not encouraging avoidance behaviours (social)

Question 35

Danh's family agreed to participate in learning about his phobia and how to support him. Which of the following would not be part of this?

- A. supporting Danh in questioning his unrealistic thoughts about escalators
- B. learning about phobias and contributing factors
- C. supporting Danh in finding routes that do not involve escalators
- D. learning how to gently challenge Danh's cognitive biases

C *As part of psychoeducation, family and friends are taught to discourage avoidance behaviours.*

determine appropriate investigation methodology: case study; classification and identification; controlled experiment (within subjects, between subjects, mixed design); correlational study; fieldwork; literature review; modelling; product, process or system development; simulation

Question 36

A pilot training program is proposing to use virtual reality technology as part of their research to practise situations that would be too risky to practise in the air. Such a study would be considered a

- A. mixed design.
- B. simulation study.
- C. controlled experiment.
- D. correlational study.

B *Simulations involve a process of using a model (such as virtual reality technology) to study the behaviour of a real or theoretical system.*

Use the following information to answer Questions 37 and 38.

Denika's university class is conducting a study on how stressful situations affect nervous system activation. They are using heart rate monitors to measure the nervous system response. At the end of the study, they discovered that three of the heart rate monitors had flat batteries and were only giving accurate readings 20% of the time.

identify independent, dependent and controlled variables in controlled experiments

Question 37

The dependent variable in this study is

- A. nervous system activation.
- B. stressful situations.
- C. cardiovascular fitness.
- D. resting heart rate.

A The dependent variable is nervous system activation as measured by proxy through a change in heart rate.

identify and analyse experimental data qualitatively, applying where appropriate concepts of: accuracy, precision, repeatability, reproducibility and validity; errors; and certainty in data, including effects of sample size on the quality of data obtained

Question 38

The error with some of the heart rate monitors working and others not working consistently is considered a

- A. personal error.
- B. random error.
- C. systematic error.
- D. controlled variable.

B As the problem will have resulted in inconsistent inaccuracy in the data collection, this is best considered a random error.

determine appropriate investigation methodology: case study; classification and identification; controlled experiment (within subjects, between subjects, mixed design); correlational study; fieldwork; literature review; modelling; product, process or system development; simulation

Question 39

Samara is preparing to investigate the role of using the method of loci to improve memory. Before beginning her own investigation, she collates and completes an analysis of data that are related to other people's scientific findings. This is called

- A. a controlled experiment.
- B. a case study.
- C. a literature review.
- D. modelling.

C A literature review involves the collation and analysis of secondary data related to other people's scientific findings to provide background information as preparation for an investigation to generate primary data.

ways of considering mental wellbeing, including levels of functioning; resilience, as the ability to cope with and manage change and uncertainty; and social and emotional wellbeing (SEWB), as a multidimensional and holistic framework for wellbeing that encapsulates all elements of being (body, mind and emotions, family and kinship, community, culture, country, spirituality and ancestors) for Aboriginal and Torres Strait Islander people

Question 40

Levels of functioning may be used to consider a person's mental wellbeing. Which of the following does not indicate a high level of functioning?

- A. experiencing a range of emotions, including mild distress
- B. the ability to manage household responsibilities
- C. understanding others and communicating clearly
- D. worrying to the extent that it is difficult to attend work

D Worrying to the extent that it is difficult to attend work indicates trouble functioning. Option A does not indicate poor functioning as all individuals experience distress at some time and it also states that a range of emotions are experienced. B and C indicate high levels of functioning.

Section B

VCAA Key
Knowledge

Question

Answer Guide

When Jo was younger, there was a neighbourhood cat that would painfully scratch her. Every time she went near the cat, the cat would scratch her, and since these incidents, Jo has avoided cats wherever possible. If a cat appears on the street when she is out walking, she starts to sweat and can feel her heart racing. Even watching a television advertisement for cat food makes her have butterflies in her stomach.

behaviourist approaches to learning, as illustrated by classical conditioning as a three-phase process (before conditioning, during conditioning and after conditioning) that results in the involuntary association between a neutral stimulus and unconditioned stimulus to produce a conditioned response, and operant conditioning as a three-phase process (antecedent, behaviour and consequence) involving reinforcement (positive and negative) and punishment (positive and negative)

Question 1a (6 marks)

Using the three-phase process of classical conditioning, explain how Jo acquired a fear response to cats.

Answer:

- *Before conditioning, cats were a neutral stimulus (NS) that elicited no predictable response.*
- *During conditioning, the repeated pairing of the NS immediately before...*
- *...the feeling of being scratched as the unconditioned stimulus (UCS)...*
- *...led to the unconditioned response (UCR) of fear to the scratch.*
- *After conditioning, the conditioned stimulus (CS) of cats led to...*
- *...a conditioned response (CR) of fear of cats.*

Marking Protocol:

One mark for each of the above points.

internal and external stressors causing psychological and physiological stress responses, including the flight-or-fight-or-freeze response in acute stress and the role of cortisol in chronic stress

Question 1b (1 mark)

Name the most specific subdivision of the nervous system that is responsible for Jo's sweating and her increased heart rate when she sees a cat.

Answer:

- *Sympathetic nervous system.*

Marking Protocol:

One mark for the above point.

evidence-based interventions and their use for specific phobia, with reference to the use of short-acting anti-anxiety benzodiazepine agents (GABA agonists) in the management of phobic anxiety and breathing retraining (biological); the use of cognitive behavioural therapy (CBT) and systematic desensitisation as psychotherapeutic treatments of phobia (psychological); and psychoeducation for families/supporters with reference to challenging unrealistic or anxious thoughts and not encouraging avoidance behaviours (social)

Question 1c (4 marks)

Describe how systematic desensitisation could be used to help Jo overcome her phobia of cats.

Answer:

- Jo can be taught a relaxation technique that she can use to decrease the physiological symptoms of anxiety when confronted by a stimulus that is related to cats.
- Jo can work with a therapist to break down the cat-related stimuli into a hierarchy from least to most fear/anxiety-producing. For example: a picture of a cat, a video of a cat, watching a cat from a distance, patting a kitten, then holding a cat.
- Jo will then gradually pair each level of the hierarchy with the relaxation technique until she can effectively elicit relaxation to one level of the hierarchy before moving to the next.
- This will continue until Jo can elicit relaxation/remain calm while holding a cat (or reaches the highest level of her fear hierarchy).

Marking Protocol:

One mark for each of the above points.

the roles of the hippocampus, amygdala, neocortex, basal ganglia and cerebellum in long-term implicit and explicit memories

Question 1d (2 marks)

Jo remembers the incidents of being repeatedly scratched by the cat very vividly. With reference to the brain areas involved in processing fear and episodic memory, explain why she remembers these events so well.

Answer:

- The amygdala is primarily responsible for processing Jo's fear, which then sends signals to the hippocampus.
- The hippocampus, which is responsible for encoding episodic memory, then consolidates the memory thoroughly, resulting in the vivid memory of being scratched.

Marking Protocol:

One mark for each of the above points.

Johan is conducting a research investigation on the capacity of short-term memory. He asks his psychology class to participate. He conducts three trials, with all participants completing a task at the beginning, middle and end of the lesson. During each trial, he shows his class a random set of letters for 30 seconds, then takes the letters away and immediately asks the class to write down all the letters they can remember. The number of letters to be remembered in each trial is as follows:

- **Trial 1:** 6 letters (V, T, S, L, W, A)
- **Trial 2:** 10 letters (T, G, D, Y, E, V, N, P, B, C)
- **Trial 3:** 14 letters (Q, E, T, U, O, S, F, H, K, X, V, N, W, R)

The results are summarised in the table below:

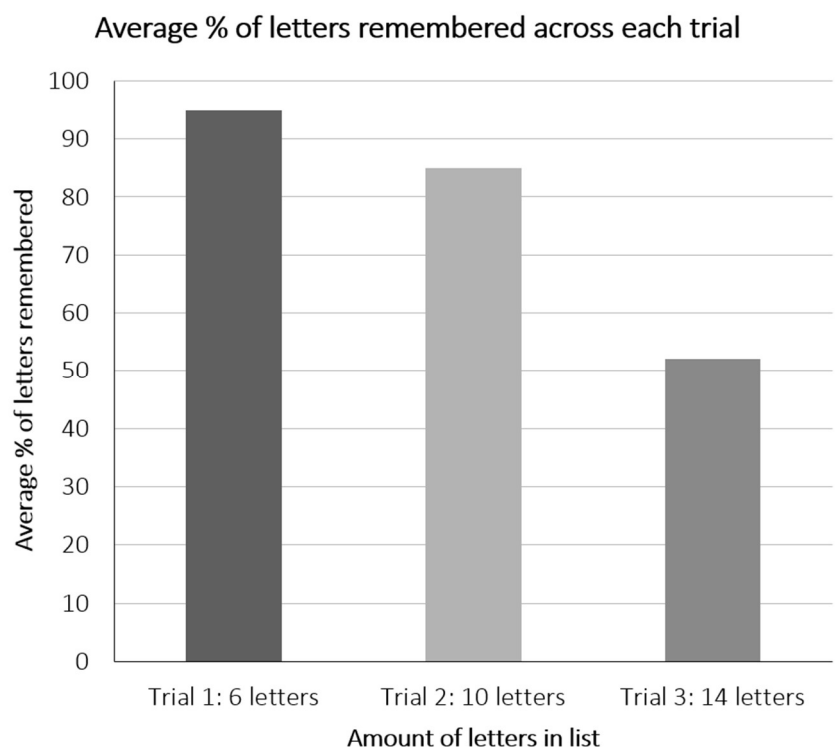
Trial	Average percentage of letters remembered
1	95%
2	85%
3	52%

use appropriate psychological terminology, representations and conventions, including standard abbreviations, graphing conventions and units of measurement

Question 2a (3 marks)

Using the axes below, draw and label a graph summarising the data from this experiment. Include a title for your graph.

Sample Answer:



Marking Protocol:

One mark for each of the following:

- An appropriate title that refers to the number of letters remembered and either the trial or the number of letters in each list.
- Correctly labelled axes, with the IV on the horizontal axis and the DV on the vertical axis.
- Correctly represented data.

identify and analyse experimental data qualitatively, applying where appropriate concepts of: accuracy, precision, repeatability, reproducibility and validity; errors; and certainty in data, including effects of sample size on the quality of data obtained

Question 2b (3 marks)

Identify and describe the experimental design that Johan has used, and provide one advantage of this design.

Answer:

- *Within-subjects design.*
- *This design was used as each participant undertook all of the conditions of the experiment (Trial 1, Trial 2 and Trial 3).*

One advantage of the within-subjects design is that...

- *...it helps to control for participant variables that may otherwise act as extraneous variables.*
- *...not as many participants are required in the sample, as all participants can take part in all conditions (and contribute data for all conditions) of the experiment.*

Marking Protocol:

One mark for each of the first two points, and one mark for any valid advantage of this design.

identify and analyse experimental data qualitatively, applying where appropriate concepts of: accuracy, precision, repeatability, reproducibility and validity; errors; and certainty in data, including effects of sample size on the quality of data obtained

Question 2c (3 marks)

There was quite a lot of noise outside the classroom during the third trial. Identify and describe the type of variable this noise could be and explain how this may affect the internal validity of the experiment.

Answer:

- *A confounding variable.*
- *This is because the noise level during the third trial may have also led to fewer letters being remembered during this trial; therefore, it is not possible to know how much the change in the dependent variable (the percentage of information remembered) is due to the number of letters in each trial (the independent variable).*
- *This could affect internal validity as it may affect how accurately the study is measuring the effect of the number of items to be remembered on the amount remembered.*

Marking Protocol:

One mark for each of the above points.

the explanatory power of the Atkinson-Shiffrin multi-store model of memory in the encoding, storage and retrieval of stored information in sensory, short-term and long-term memory stores

Question 2d (3 marks)

With reference to the capacity of short-term memory, explain why the results for Trial 3 were considerably lower than for Trial 1.

Answer:

- *The capacity of short-term memory (STM) is approximately 7 ± 2 items.*
- *Where participants are required to memorise 14 letters (in Trial 3), this exceeds the capacity of STM (by at least five items), whereas the six letters that were memorised in Trial 1 were within STM's capacity.*
- *In Trial 3, some letters may have been displaced by other letters due to STM's limited capacity which explains the relatively low proportion of letters that were remembered in Trial 3 compared to Trial 1.*

Marking Protocol:

One mark for each of the above points.

The explanatory power of the Atkinson-Shiffrin multi-store model of memory in the encoding, storage and retrieval of stored information in sensory, short-term and long-term memory stores

Question 2e (3 marks)
Outline how the letters may pass through each of the memory stores of the Atkinson-Shiffrin multi-store model in Trial 1.

Answer:

- *As participants see the letters, they enter (iconic) sensory memory.*
- *When they pay attention to the letters, they transfer the information to their short-term memory (where they can be held for a short time).*
- *With sufficient rehearsal/further encoding, the letters may enter long-term memory (however, the letters in the list may not have entered this store).*

Marking Protocol:

One mark for each of the above points.

Sunny Hills Horse Riding School uses various learning methods for riders and horses.

Incentives are used for horses. When the horses are learning new skills, they are rewarded with half an apple when they achieve the new skill. For example, Spirit, a new pony, stops on command and is rewarded with half an apple. He then receives half an apple each time he stops on command over the next week. Very soon, he is very good at stopping on command.

New riders learn how to approach horses, how to lead horses and how to safely get on and off the horse. This is done through a demonstration with a qualified instructor. The instructors arrange the riders in a semicircle, to ensure that they can all see, and then they demonstrate the process of approaching the horse and moving around it carefully. They have some good memory tricks to help the riders remember the steps. The riders applaud at the end of the demonstration and eagerly await their turn.

behaviourist approaches to learning, as illustrated by classical conditioning as a three-phase process (before conditioning, during conditioning and after conditioning) that results in the involuntary association between a neutral stimulus and unconditioned stimulus to produce a conditioned response, and operant conditioning as a three-phase process (antecedent, behaviour and consequence) involving reinforcement (positive and negative) and punishment (positive and negative)

Question 3a (5 marks)
Identify the learning model that Spirit engages in as he learns to stop on command, and describe the learning as a three-phase process.

Answer:

- *Spirit learns to stop on command through operant conditioning.*
- *Antecedent: being commanded to stop.*
- *Behaviour: stopping.*
- *Consequence: getting half an apple.*
- *This consequence is a form of positive reinforcement as the apple is the addition of a desirable/pleasant stimulus which increases the likelihood of Spirit stopping on command in future.*

Marking Protocol:

One mark for each of the above points.

social-cognitive approaches to learning, as illustrated by observational learning as a process involving attention, retention, reproduction, motivation and reinforcement

Question 3b (5 marks)

Apply each stage of observational learning to how new riders may learn to approach horses.

Answer:

- *Attention: riders will need to closely watch the model that demonstrates the correct way to approach the horse (having a semi-circle so that all participants can see is helpful with this).*
- *Retention: riders will need to store a mental representation of the correct technique for approaching the horse and store this in memory (the 'memory tricks' that are used by the school can assist with this step).*
- *Reproduction: riders will need to have the ability to approach the horse in the correct way.*
- *Motivation: riders need to have the desire to go about correctly approaching the horse.*
- *Reinforcement: riders may have satisfaction in approaching the horse correctly (in order to safely get on the horse).*

Marking Protocol:

One mark for each of the above points. Note: Each step must contain a reference to the scenario.

synaptic plasticity – resulting from long-term potentiation and long-term depression, which together act to modify connections between neurons (sprouting, rerouting and pruning) – as the fundamental mechanism of memory formation that leads to learning

Question 3c (2 marks)

Outline the role of long-term potentiation in riders increasing their skills in getting on and off the horse.

Answer:

- *As they practise getting on the horse, the neural pathways that are related to this skill will have a high frequency of stimulation (where one neuron consistently fires an adjacent neuron within the neural pathway).*
- *This will strengthen the synaptic connections that are related to getting on and off the horse, resulting in their increasing skill.*

Marking Protocol:

One mark for each of the above points.

approaches to learning that situate the learner within a system, as illustrated by Aboriginal and Torres Strait Islander ways of knowing where learning is viewed as being embedded in relationships where the learner is part of a multimodal system of knowledge patterned on Country

Question 4a (3 marks)

As part of Aboriginal and Torres Strait Islander ways of knowing, learning is viewed as being embedded in relationships where the learner is part of a multimodal system of knowledge patterned on Country.

Explain the term 'multimodal' and identify two ways in which Aboriginal and Torres Strait Islander ways of knowing may be multimodal.

Answer:

- 'Multimodal' describes when ways of knowing occur through several modes or types of activities or occurrences or methods.

Examples of this include ways of knowing occurring:

- *through song and dance/story, song and dance/art, making and doing.*
- *through stories from Elders and being on Country.*
- *through Songlines involving stories linked to locations as well as through song and dance.*
- *through learning from all entities on Country.*

Marking Protocol:

One mark for the first point then one mark for each of the following points to a maximum of two. Note: Any culturally appropriate response that demonstrates the multimodal nature of knowing may be awarded marks.

the use of mnemonics (acronyms, acrostics and the method of loci) by written cultures to increase the encoding, storage and retrieval of information as compared with the use of mnemonics such as sung narrative used by oral cultures, including Aboriginal peoples' use of Songlines

Question 4b (4 marks)

Songlines are not only an important cultural practice; they are also used by Aboriginal peoples as a method for encoding and transmitting cultural knowledge over generations of learners.

Identify two characteristics of Songlines and describe how these enable the effective encoding of this knowledge.

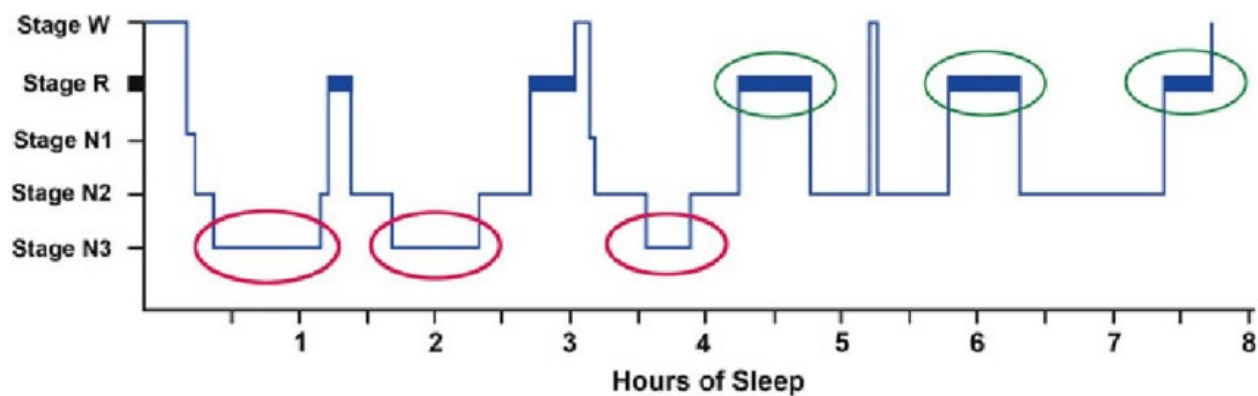
Answer:

- *During Songlines, the encoding may occur through listening, repeating and practising.*
- *Using multiple modes of rehearsal allows for more effective encoding of knowledge in memory.*
- *Songlines may involve the navigation of a journey on Country.*
- *They may provide a spatial scaffold that links with other information which provides cues for future retrieval.*
- *Songlines may include stories with a narrative structure.*
- *They may provide a story or series of events to provide a structure for meaningful encoding and cues for later retrieval.*
- *Songlines may involve vivid narrative imagery and emotional story content.*
- *They may strengthen memorability through enhancing encoding due to emotional activation/due to increased meaningfulness of information.*
- *Songlines may include encoding through dance.*
- *They may provide an embodied procedural scaffold, increasing the structure for encoding and providing cues for future retrieval.*

Marking Protocol:

Two marks for any of the above pairs of points, to a maximum of four. Note: Any culturally appropriate response may be awarded marks.

The hypnogram below shows a typical night's sleep for a healthy adult.



Source: https://www.researchgate.net/publication/265834978_Polysomnography_An_Overview Pandi-Perumal, Seithikurippu R. & Spence, D. & Bahammam, Ahmed. (2014). Polysomnography: An Overview. 10.1007/978-1-4939-1185-1_4.

regulation of sleep-wake patterns by internal biological mechanisms, with reference to circadian rhythm, ultradian rhythms of REM and NREM Stages 1–3, the suprachiasmatic nucleus and melatonin

Question 5a (2 marks)

Outline two differences between NREM Stage 3 and REM sleep evident in the graph.

Answer:

- NREM Stage 3 occurs only in the early sleep cycles, whereas REM sleep occurs in all sleep cycles.
- Periods of NREM Stage 3 reduce as sleep progresses, whereas REM sleep periods increase as sleep progresses.
- NREM Stage 3 occurs in the middle of (some) sleep cycles, whereas REM occurs at the end of each sleep cycle.

Marking Protocol:

One mark for any of the above points, to a maximum of two.

regulation of sleep-wake patterns by internal biological mechanisms, with reference to circadian rhythm, ultradian rhythms of REM and NREM Stages 1–3, the suprachiasmatic nucleus and melatonin

Question 5b (4 marks)

Contrast the terms circadian rhythm and ultradian rhythm, and provide an example of each in the context of sleep.

Answer:

- A circadian rhythm refers to a biological cycle of around 24 hours in duration.
- The sleep-wake cycle is an example of a circadian rhythm.
- On the other hand, ultradian rhythms are those occurring in less than a 24-hour duration.
- The (approximately 90-minute) sleep cycles through a period of NREM and REM sleep are examples of ultradian rhythms.

Marking Protocol:

One mark for each of the above points.

sleep is a psychological construct that is broadly categorised as a naturally occurring altered state of consciousness and is further categorised into REM and NREM sleep, and the measurement of physiological responses associated with sleep, through electroencephalography (EEG), electromyography (EMG), electro-oculography (EOG), sleep diaries and video monitoring

Question 5c (2 marks)
Describe a physiological feature of NREM Stage 3 sleep and explain how it can be measured in a sleep laboratory.

Answer:

- During NREM Stage 3 sleep, there is a lower level of electrical activity in the brain.
- This would be evident on an EEG, which will detect, amplify and record low frequency, high amplitude waves during NREM Stage 3.
- During NREM Stage 3 sleep, there is a low level of electrical activity in skeletal muscles.
- This would be evident on an EMG, which would detect, amplify and record a low level of electrical activity in these muscles.
- During NREM Stage 3 sleep, there is a low level of movement of the eyes.
- An EOG will detect, amplify and record a low level of electrical activity in the muscles surrounding the eyes.
- During NREM Stage 3 sleep, there is likely to be a lower heart rate/breathing rate.
- A heart rate monitor/breathing monitor will detect a lower heart rate/breathing rate.

Marking Protocol:

Two marks for any of the above pairs of points, to a maximum of two.

A university studies the effect of mindfulness meditation on managing stress. They recruit 100 first-year university students by advertising for volunteers.

All students complete a saliva test to measure cortisol levels before the semester begins. At the beginning of the semester, half of the students (Group A) are taught mindfulness meditation techniques and asked to complete these regularly while the other half of the students (Group B) are not taught any techniques. Both groups then repeat the saliva cortisol test during the middle of the semester as well as during and after the end-of-semester exams.

The results indicate a lower increase in cortisol levels in Group A during the exam period and a greater decrease in cortisol levels following the exam period when compared to Group B.

internal and external stressors causing psychological and physiological stress responses, including the flight-or-fight-or-freeze response in acute stress and the role of cortisol in chronic stress

Question 6a (2 marks)
With reference to the stress response, explain how cortisol levels may be an indicator of stress levels.

Answer:

- When there is a sustained stress response, cortisol is released.
- Therefore, higher cortisol levels may indicate a higher level of stress (and lower cortisol levels may indicate a lower level of stress).

Marking Protocol:

One mark for each of the above points.

internal and external stressors causing psychological and physiological stress responses, including the flight-or-fight-or-freeze response in acute stress and the role of cortisol in chronic stress

Question 6b (2 marks)

Explain how cortisol may both help and hinder (i.e. not help) a student during a busy semester.

Answer:

- *Cortisol increases alertness and energy levels, enabling increased resistance to a stressor of university, such as studying.*
- *However, prolonged exposure to high levels of cortisol will decrease the effectiveness of the immune system, making students more susceptible to illness.*

Marking Protocol:

One mark for each of the above points. Note: The answer must include reference to the scenario for full marks.

the application of a biopsychosocial approach to maintaining mental wellbeing, with reference to protective factors including adequate nutritional intake and hydration and sleep (biological), cognitive behavioural strategies and mindfulness meditation (psychological) and support from family, friends and community that is authentic and energising (social)

Question 6c (2 marks)

Describe what mindfulness meditation involves, and explain one reason why it may help to reduce stress for students in Group A.

Answer:

- *Mindfulness meditation involves focusing attention on the present moment, in a non-judgemental way.*
- *Mindfulness meditation may boost resilience by helping a student to improve their attentional abilities, which can help to reduce stress.*
- *Mindfulness meditation may help students to be accepting and non-judgemental about any stressors or negative thoughts, which may help to reduce stress.*
- *Mindfulness meditation can help students to reduce wandering thoughts, which may help to reduce stress.*

Marking Protocol:

One mark for the first point, and one mark for any of the following points, or any other valid explanation of how mindfulness may reduce stress.

formulate hypotheses to focus investigations

Question 6d (3 marks)

Write a hypothesis for this study.

Answer:

- *It is hypothesised that university students who practise mindfulness meditation will have a lower increase in stress levels (measured through a lower increase in cortisol levels) during the exam period than students who do not practise mindfulness meditation.*

Marking Protocol:

One mark for each of the following points:

- correctly identifying both levels of the IV (practising mindfulness and not practising mindfulness);
- correctly identifying the DV (the change in stress/cortisol levels); and
- correctly indicating the direction/prediction of changes (e.g. lower/reduced).

analyse and evaluate psychological issues using relevant ethical concepts and guidelines, including the influence of social, economic, legal and political factors relevant to the selected issue

Question 6e (2 marks)

At the end of the study, participants in Group B were offered the opportunity to learn mindfulness techniques. With reference to beneficence, explain why this was done.

Answer:

- *Beneficence requires that researchers maximise the benefits and minimise the harm to all participants.*
- *By providing the benefit of the mindfulness meditation techniques, the benefits of the research were extended to all participants (which maximises the benefits for the study as a whole).*

Marking Protocol:

One mark for each of the above points.

the explanatory power of Richard Lazarus and Susan Folkman's Transactional Model of Stress and Coping to explain stress as a psychological process (primary and secondary appraisal only)

Question 6f (4 marks)

Jacob is a student who is feeling very anxious about his approaching exams, worrying that he will fail. He worries that he does not have enough time to balance the demands of his part-time job with time to study.

With reference to the Transactional Model of Stress and Coping, outline the appraisals that Jacob is likely to have made.

Answer:

- *Jacob's primary appraisal is stressful as his exam is relevant/significant to him...*
- *...and a threat as he is worried that he will fail, which indicates a concern about problems in the future.*
- *Jacob's secondary appraisal is likely to be that he does not have adequate resources to cope...*
- *... as he does not feel that he has enough time to meet all the demands, and will likely experience stress as a result.*

Marking Protocol:

One mark for each of the above points.

Read the two extracts and the scenario below to help you answer Question 7.

Extract 1:

Excessive Gaming Associated With Poor Sleep Hygiene And Increased Sleepiness

By the American Academy of Sleep Medicine

Computer/console gamers who play for more than seven hours a week and who identify their gaming as an addiction (called 'excessive gamers') sleep less during the weekdays and experience greater daytime sleepiness than casual or non-gamers, according to a research abstract.

Results of the study indicate that 'excessive gamers' have significantly poorer sleep hygiene and sleep less on weekdays than other gamers; a significant positive correlation was found between the hours of gameplay and sleepiness. 'Excessive gamers' reported that they slept for 1.6 hours less on average than casual gamers.

Adapted from: <https://www.sciencedaily.com/releases/2009/06/090608071802.htm>, American Academy of Sleep Medicine. (2009, June 8). Excessive Gaming Associated with Poor Sleep Hygiene and Increased Sleepiness. *ScienceDaily*. Retrieved May 19, 2023, from www.sciencedaily.com/releases/2009/06/090608071802.htm

Extract 2:

What Adult Gamers Should Know About Their Sleep

By Michael J. Breus Ph.D.

Gaming at night leads to physical and mental arousal. A 2005 study conducted in a group of young adult men found that gaming at night increased heart rate, reduced feelings of sleepiness and reduced the likelihood of brain wave activity that occurs in the transition to sleep. Researchers also found that night-time gamers took longer to fall asleep and spent less time in REM sleep.

The takeaway? Gaming late at night and/or close to bedtime is likely to be mentally and physically stimulating and counterproductive to sleep. Keep games out of your wind-down time before bed.

Researchers found that the amount of time spent gaming was a predictor of several changes to sleep and sleep problems, including reduced sleep quality, increased fatigue, symptoms of insomnia and delayed bedtimes and wake times.

Adapted from: <https://www.psychologytoday.com/au/blog/sleep-newzzz/202108/5-things-adult-gamers-should-know-about-their-sleep>

Scenario

Raph is 15 years old and enjoys gaming each night. Recently, his parents read the above articles about how gaming can affect sleep and have become very concerned about whether Raph is getting enough sleep.

Raph plays after dinner each night, sitting on his bed. He plays until around 10:30pm, then has a snack and gets things ready for the next day; however, recently, he has been asking to play until later as he says that he cannot fall asleep until around midnight anyway and, so, he would like to be doing something enjoyable.

Raph is often sleepy in the morning and has trouble getting up. His parents have also received an email from his school saying that he is falling asleep in class.

changes to a person's sleep-wake cycle that cause circadian rhythm sleep disorders (Delayed Sleep Phase Syndrome [DSPS], Advanced Sleep Phase Disorder [ASPD] and shift work) and the treatments of circadian rhythm sleep disorders through bright light therapy

improving sleep hygiene and adaptation to zeitgebers to improve sleep-wake patterns and mental wellbeing, with reference to daylight and blue light, temperature, and eating and drinking patterns

Question 7 (10 marks)

With reference to the influence of zeitgebers on his sleep-wake cycle, explain why gaming might affect Raph's sleep, and describe a sleep disorder that Raph may be affected by.

In addition, apply the findings that were mentioned in the extracts to Raph by explaining how two of his behaviours should be changed to improve his sleep.

Sample Answer:

- *Zeitgebers are external time cues in the environment that help to regulate our circadian rhythms, including our sleep-wake cycle. Light is the most influential zeitgeber for the human sleep-wake cycle. Light stimulates the light-sensitive receptors that make up the retinas which then send neural messages to the part of the hypothalamus known as the suprachiasmatic nucleus (SCN), which regulates the release of melatonin from the pineal gland. When daylight in the morning is detected, the SCN sends inhibitory messages to the pineal gland, and when no light is detected in the evening, the SCN sends excitatory neural messages to the pineal gland which produces and releases melatonin through the bloodstream to promote sleepiness. In this way, zeitgebers help to entrain our sleep-wake cycle to the desired time.*
- *The use of electronic devices like computers/tablets/phones for gaming may involve exposure to blue light which may disrupt the entrainment of Raph's circadian rhythm and may act in a similar way to a natural zeitgeber; this blue light may signal to Raph's body that it is daytime, even if it is nighttime. If he plays games in the evening, melatonin release may be delayed and he is likely to feel awake and alert in the evening as a result. This seems to be what is occurring as he plays until around 10:30pm and then feels too awake to go to bed.*
- *Furthermore, the findings from the extracts suggest that increased gaming increases arousal, as indicated by a higher heart rate, brain wave activity (which is likely to indicate higher frequency and lower amplitude waves than what is normally found in the transition to sleep) and decreased sleepiness as stated by the study. This arousal is likely to make it harder for Raph's body to naturally slow down for sleep and is likely to lead to delayed sleep onset.*
- *Delayed sleep phase syndrome (DSPS) involves a tendency to feel sleepy later than desired and the need to sleep later in later than desired, in order to achieve an adequate amount of sleep. Due to various life demands, people are often unable to sleep later into the morning which may lead to partial sleep deprivation, or an inadequate quantity and/or quality of sleep.*
- *Several factors may make Raph susceptible to DSPS; as a 15-year-old, he is likely to have a delayed melatonin release due to the hormonal changes in adolescence, meaning that he is likely to feel sleepy later in the evening than his parents. In addition, his evening gaming and potential exposure to blue light may delay his melatonin release further. These two factors combined make him susceptible to DSPS. Moreover, he is exhibiting some of the symptoms of this syndrome as he is struggling to wake up in the morning and is experiencing daytime sleepiness, as indicated by the concerns of his school.*
- *Extract 1 shows that 'excessive gamers' were getting significantly less sleep and experiencing more daytime sleepiness than casual or non-gamers. It suggests that a larger amount of time spent gaming*

correlates with greater sleepiness. Whilst we do not know if Raph fits the definition of being an 'excessive gamer' in having an addition to gaming, Extract 1 suggests that as little as seven hours of gaming a week could be considered significant enough to have an effect and, therefore, these findings may be relevant to Raph. However, it is important to note that the correlational nature of the research brings a level of uncertainty to its conclusions; it must be noted that correlation does not necessarily indicate causation, so the link between hours of gameplay and sleepiness should be cautiously applied to Raph. Future research should be carried out utilising a controlled experiment methodology to ascertain cause-and-effect relationships between hours of gameplay and sleepiness, which may lead to greater confidence in applying these findings to Raph.

- *Although Raph is a bit younger than the participants in the second extract, the factors that are influencing sleep are likely to be similarly relevant; hence, it may be useful for Raph to reduce his hours spent gaming and to ensure that gaming occurs well before sleep. Good sleep hygiene involves a calming pre-sleep routine that allows winding down time, amongst other techniques aimed at improving sleep patterns (such as avoiding heavy or sugary snacks just before bed which Raph may be engaged in). So, shifting his gaming time to before dinner and completing activities that do not involve screen time and exposure to blue light after dinner (such as calming activities like reading a book, listening to relaxing music, having a warm bath, or meditating) will support him to feel sleepy earlier.*
- *Furthermore, Raph does his gaming while sitting on his bed, which does not help to promote sleep. As gaming is exciting and stimulating as stated by Extract 2, doing this on his bed may create classically conditioned associations between his bedroom (an initially neutral stimulus) and excitement from the games (an unconditioned stimulus) which may lead to wakefulness (as an unconditioned response). Repeated associations of the bedroom and stimulating gaming may eventually lead the bedroom to become a conditioned stimulus that elicits wakefulness as a conditioned response. It may be helpful to move Raph's gaming to a separate location outside of his bedroom and reserve his bedroom for winding down and sleep. His bed may then act as a cue to sleep, promoting an earlier sleep time and quicker sleep onset.*

Marking Protocol:

Note: The answer may also refer to other additional sleep hygiene measures; however, there should be a specific link to a behaviour that is mentioned in the scenario and a link to the findings in the extracts to achieve a score of seven or above. This answer is globally marked (i.e. an overall mark is awarded for the entire answer). The following criteria could be used to assess a response:

9 – 10 Outstanding	• All elements of the question are addressed to an outstanding standard. • An insightful, well-structured and comprehensive explanation of the role of light and darkness as zeitgebers in regulating the sleep-wake cycle, as well as reference to the SCN, melatonin, and sleepiness, applied to Raph's gaming/sleep habits. • A thorough explanation of DSPS in relation to Raph. • A critical application of the findings in both extracts to Raph's gaming/sleep habits. • Well-justified recommendations are made to improve Raph's sleep hygiene. • Precise and effective use of appropriate psychological terminology is sustained throughout the response. Key terms/concepts could include: retina, light-sensitive receptors/neurons, inhibitory/excitatory messages, frequency/amplitude of brain waves, circadian rhythm, blue light, sleep onset, entrainment, partial sleep deprivation, correlation/causation, investigation methodology, sleep hygiene, classical conditioning terminology.
7 – 8 High	• All elements of the question are addressed to a high standard. • A clear explanation of the role of light and darkness as zeitgebers in regulating the sleep-wake cycle, as well as reference to the SCN, melatonin, and sleepiness, applied to Raph's gaming/sleep habits. • A description of DSPS in relation to Raph. • An application of the findings in both extracts to Raph's gaming/sleep habits. • Appropriate recommendations are made to improve Raph's sleep hygiene. • Formal and appropriate psychological terminology is used throughout the response.
5 – 6 Medium	• All elements of the question are addressed to a satisfactory standard. • A relevant explanation of the role of zeitgebers in regulating the sleep-wake cycle. • Some reference to DSPS. • Some reference to the findings in one or both extracts. • At least two recommendations to improve Raph's sleep hygiene are identified. • Formal and appropriate psychological terminology is mostly used.
3 – 4 Low	• Not all elements of the question are addressed or addressed correctly; for example, there are no recommendations about sleep hygiene, no clear reference to the findings in one or both extracts, or no reference to DSPS. • A superficial application of some of the factors influencing Raph's sleep. • Limited formal and appropriate psychological terminology is used throughout the response. • Few links are made between psychological theory and the scenario.
1 – 2 Very Low	• A superficial attempt at the question. • An incomplete or inaccurate application of theories to explain Raph's sleep. • Little formal and appropriate psychological terminology is used throughout the response.
0 marks	• The question has not been meaningfully attempted.

Student
name:

Use a **PENCIL** for **ALL** entries. For each question, shade the box which indicates your answer.

Marks will **NOT** be deducted for incorrect answers.

NO MARK will be given if more than **ONE** answer is completed for any question.

If you make a mistake, **ERASE** the incorrect answer – **DO NOT** cross it out.

1	☐ A	☐ B	☐ C	☒ D
2	☐ A	☐ B	☐ C	☒ D
3	☐ A	☐ B	☐ C	☒ D
4	☐ A	☒ B	☐ C	☐ D
5	☐ A	☐ B	☒ C	☐ D
6	☐ A	☐ B	☒ C	☐ D
7	☒ A	☐ B	☐ C	☐ D
8	☐ A	☐ B	☒ C	☐ D
9	☐ A	☐ B	☒ C	☐ D
10	☐ A	☐ B	☒ C	☐ D
11	☐ A	☐ B	☒ C	☐ D
12	☐ A	☒ B	☐ C	☐ D
13	☐ A	☐ B	☒ C	☐ D
14	☐ A	☒ B	☐ C	☐ D

15	☐ A	☒ B	☐ C	☐ D
16	☐ A	☐ B	☒ C	☐ D
17	☒ A	☐ B	☐ C	☐ D
18	☒ A	☐ B	☐ C	☐ D
19	☒ A	☐ B	☐ C	☐ D
20	☐ A	☐ B	☒ C	☐ D
21	☒ A	☐ B	☐ C	☐ D
22	☐ A	☒ B	☐ C	☐ D
23	☐ A	☐ B	☐ C	☒ D
24	☐ A	☒ B	☐ C	☐ D
25	☒ A	☐ B	☐ C	☐ D
26	☐ A	☐ B	☐ C	☒ D
27	☐ A	☐ B	☐ C	☒ D
28	☐ A	☐ B	☒ C	☐ D

29	☐ A	☒ B	☐ C	☐ D
30	☐ A	☒ B	☐ C	☐ D
31	☒ A	☐ B	☐ C	☐ D
32	☒ A	☐ B	☐ C	☐ D
33	☐ A	☐ B	☒ C	☐ D
34	☐ A	☐ B	☒ C	☐ D
35	☐ A	☐ B	☒ C	☐ D
36	☐ A	☒ B	☐ C	☐ D
37	☒ A	☐ B	☐ C	☐ D
38	☐ A	☒ B	☐ C	☐ D
39	☐ A	☐ B	☒ C	☐ D
40	☐ A	☐ B	☐ C	☒ D