The origins of psychology (page 8)

1. C

2. • One limitation of the scientific approach in psychology is its use of artificial laboratory settings. This means that the methods can lack ecological validity, so tell us little about behaviour in real-world settings.
   • Another limitation is that most of the subject matter in psychology is unobservable. This means that we cannot know much about the causes of, and processes underlying, our behaviour and attitudes.

3. • One other limitation of introspection is that it is not particularly accurate.
   • For example, Nisbett and Wilson found that participants were remarkably unaware of factors that had been influential in their choice of a consumer item.
   • They found that this problem was particularly acute in the study of implicit attitudes (i.e. attitudes or stereotypes that are unknown to us).
   • This suggests that introspection cannot tell us much about the causes of, and processes underlying, our behaviour and attitudes.

The behaviourist approach (pages 9–11)

1. D

2. Positive reinforcement: B
   Negative reinforcement: D

3. • Pavlov found that animals can learn by association.
   • The sound of a bell is initially a neutral stimulus that does not ordinarily produce a response.
• The sight of food is an unconditioned stimulus, which produces an unconditioned response of salivation.
• If the sound of the bell and the sight of food are repeatedly paired, then the dog will learn an association between the bell and the food, and the bell will become the conditioned stimulus, leading to a conditioned response of salivation.

4.
• Skinner studied rats using apparatus called a Skinner box. This consists of a box with a lever in it which, if pressed, delivers a food pellet.
• At first the rat’s behaviour of pressing the lever was accidental.
• However, it eventually learned that its behaviour of pressing the lever led to the consequence of food being delivered.

5.
• One limitation of the behaviourist approach is that most experiments supporting it involve non-human animals. Skinner’s reliance on rats and pigeons means that we are unable to draw conclusions about human behaviour.
• However, humans have free will, and our behaviour is not shaped by classical or operant conditioning.
• This means that psychologists may be unable to generalise the findings from non-human animals to humans.

6.
• Rona: operant conditioning. ‘The consequences of a behaviour are important in learning.’
• Charlie: classical conditioning. ‘How associations between things are learned.’

7.
a. Random allocation could have been achieved by giving each rat a number. These numbers would then be written on equal-sized pieces of paper and placed in a hat. The first number to be drawn would go into the first group, the second into the second group, and so on.
b. Independent variable: type of reinforcement (continuous versus fixed ratio). Dependent variable: number of trials taken to learn the maze.
c. Median or mode

8. **Possible AO1 content:**
• The behaviourist approach says that behaviour is the result of learning.
• In classical conditioning, learning occurs through association. For example, an unconditioned stimulus causes an unconditioned response. If a neutral stimulus is repeatedly paired with the unconditioned stimulus, then we will learn to associate the neutral stimulus with the unconditioned stimulus. This means that the neutral stimulus will become the conditioned stimulus, leading to a conditioned response.
• In operant conditioning, learning occurs through consequence.
• Behaviours that are reinforced are more likely to be repeated. Positive reinforcement is when a behaviour produces a consequence that is pleasant for the individual. Negative reinforcement is when a behaviour produces a consequence that is unpleasant to the individual.
• Behaviours that are punished are less likely to be repeated.

**Possible AO3 content:**
• One strength of the behaviourist approach is that classical conditioning has practical applications. For example, it has led to therapies such as systematic desensitisation and flooding, to help reduce the anxiety associated with phobias.
• A second strength of the behaviourist approach is that it is scientific. For example, Skinner’s research uses controlled conditions to discover the causal relationship between two or more variables.
• However, there are some limitations to classical conditioning explanations. For example, Seligman proposed the concept of preparedness to explain why some relationships between the conditioned stimulus and unconditioned stimulus are easier to establish than others.
• There are also limitations to operant conditioning explanations. For example, most supportive experiments involve non-humans. Skinner’s reliance on rats and pigeons means that we should be more careful when making conclusions in relation to human behaviour.
• A general weakness of the behaviourist approach is that it offers a limited perspective on behaviour. For example, it ignores cognitive and emotional factors. This means that the behaviourist approach may not provide a complete explanation of complex human behaviours.

Social learning theory (pages 12–13)

1. B

2. Imitation: D
   Identification: A
   Vicarious reinforcement: B

3. One strength of social learning theory is that it can be applied to criminal behaviour. For example, Akers suggests that the probability of someone engaging in criminal behaviour increases when they are exposed to models who commit crime.
   Therefore, if an individual identifies with a criminal model, and develops an expectation of positive consequences for their own criminal behaviour, they are likely to copy this behaviour.
   This means we can use this knowledge to understand and identify factors that lead to criminal behaviour and to suggest strategies to reduce crime.

4. a. Independent groups design
   b. Truth distortion. Respondents may want to conceal the truth for some reason, perhaps because they might find it embarrassing to admit they were worried about acne in case they sounded vain.
   c. Because the results suggest that those who saw the advert had been influenced by it in terms of their concerns about blemishes and the likelihood of them buying the product.

5. The person whose behaviour illustrates social learning theory best is Jane.
   This is because social learning theory says that if we watch someone else being reinforced for a behaviour, we are more likely to do that behaviour ourselves.
   So when Jane told Jim he could watch her have a check-up with no negative consequences, he would experience vicarious reinforcement.

6. Possible AO1 content:
   Social learning theory states that if we watch someone else being reinforced for a behaviour, we are more likely to do that behaviour ourselves.
   The three key determinants of whether a behaviour is imitated are the characteristics of the model, the observer’s perceived ability to perform the behaviour, and the observed consequences of the behaviour.
   Bandura conducted studies that showed that children who observe a model receiving reinforcement are much more likely to imitate their behaviour.
   In vicarious reinforcement, individuals learn about the likely consequences of an action and then adjust their subsequent behaviour accordingly.
   Mediational processes play an important role in learning. These are mental representations of the behaviour, which weigh up the probable consequences of the behaviour. An individual will only display the learned behaviour if the positive rewards outweigh the negative consequences.
Possible AO3 content:
- One strength of social learning theory is that it is supported by research findings. For example, Fox and Bailenson found that humans are more likely to imitate computer-generated ‘virtual’ humans who were similar to the real participant, compared with ‘virtual’ humans who were dissimilar to them. This shows the importance of identification in social learning theory.
- Another strength of social learning theory is that it has useful applications. For example, Andsager et al. found that the perceived similarity to a model in an anti-alcohol campaign was positively related to the message’s effectiveness. This suggests that social learning theory has a positive impact on health promotion campaigns.
- A third strength of social learning theory is that learning may be more likely when people can identify with a given model. For example, Akers found that the probability of someone engaging in criminal behaviour increases when they are exposed to models who commit crime. This means that we can use this knowledge to suggest strategies to reduce crime.
- However, one limitation of social learning theory is that it does not adequately explain deviant behaviour. For example, Siegel and McCormick argue that young people who possess deviant attitudes and values are more likely to seek out peers with similar attitudes. This suggests that social learning theory may not be the cause of delinquent behaviour and that other explanations may account for the learning of negative behaviours (e.g. crime).
- A second limitation of social learning theory is that it ignores other potential influences on behaviour. For example, it explains the development of gender-specific behaviour as a result of gender-specific role models. However, there are many different influences (e.g. genetic predisposition, etc.), so it is difficult to separate the effect of social learning theory from the many other factors that also influence behaviour.

The cognitive approach (pages 14–15)

1. D

2. Schema: D
   Inference: B

3.
   A theoretical model is a simplified, usually pictorial, representation of a particular mental process based on current research evidence.
   - For example, the working memory model.
   - A computer model is the use of computer analogies as ways of representing human cognition.
     - For example, long-term memory is likened to information stored on a hard drive of a computer.

4.
   - A schema is a cognitive framework that helps us to organise and interpret information.
   - Schemas allow us to make shortcuts when interpreting a large amount of information, by filling in the gaps based on prior knowledge and expectations.
     - So the reason participants didn’t remember seeing the picnic basket was because we see largely what we expect to see, and participants would not expect to see a picnic basket in an office.
     - The reason they remembered seeing books, even though there weren’t any, was because we would expect to see books in an office, so their schemas made an assumption about them being there.

5. Possible AO1 content:
   - The cognitive approach says that behaviour is the result of internal mental processes, and focuses on how people perceive, store, manipulate, and interpret information.
   - The approach acknowledges that internal mental processes cannot be studied directly. Instead, it studies them by inferring what goes on as a result of measuring behaviour.
   - Schemas are an important concept in cognitive psychology. A schema is a cognitive framework that helps organise and interpret information in the brain. They allow us to make shortcuts when
interpreting large amounts of information, but can lead to stereotypes as we make assumptions about people based on incomplete information.

- The cognitive approach also uses theoretical and computer models. These are ways to learn about internal mental processes. A theoretical model is a simplified, usually pictorial, representation of a particular mental process based on current research evidence (e.g. the working memory model). A computer model refers to the process of using computer analogies as a representation of human cognition (e.g. long-term memory is likened to information stored on a hard drive of a computer).

Possible AO3 content:

- One strength of the cognitive approach is that it uses the scientific method. For example, evidence is collected using laboratory experiments and conclusions about the mind are valid.
- A second strength of the cognitive approach is that it has useful practical applications. For example, it has been used to explain how faulty thinking processes can cause disorders such as depression, which has led to the development of therapies such as CBT.
- However, one limitation of the cognitive approach is that it ignores the role played by motivation and emotion in behaviour. For example, it can tell us how different cognitive processes take place but it cannot explain why they do.
- A second limitation is that computer models may not be accurate representations of human cognition. For example, computers do not make mistakes, like humans do, nor do they forget information, so computer models are not an accurate representation of the human mind, and should be treated with caution.
- A final limitation is that many cognitive psychological research studies, which used to provide support for the cognitive approach, lack ecological validity. For example, many of the tasks used tend to have little in common with participants’ everyday experiences, so the research fails to reflect real-life behaviour.

The biological approach (pages 16–17)

1. C

2. C

3. A genotype is a person’s genetic make-up, which is inherited from their parents. It determines things such as how tall a person will be.
- However, a phenotype is a person’s observable structure and behaviour. It is determined by the interaction between the genotype and the environment.
- The reason why different phenotypes can arise from the same genotype is that the environment can influence the genotype. For example, if one twin is fed a healthy diet, they will reach their genotypically determined height. However, if the other twin is fed a poorer diet, they will not.

4. Darwin proposed that individuals must compete with each other for access to resources, such as mates or food.
- He said that those who survive this competition are more likely to reproduce, passing on their genes.
- Behaviours that are more likely to lead to reproductive success will be passed onto the next generation.
- Consequently, successive generations will develop behaviours that are even more likely to lead to survival and reproductive success, and will become more widespread in the population.

5. a. One strength of the matched pairs design is that it makes some attempt to control participant variables. The independent groups design does not do this.
   b. The speed at which people perform decision-making tasks is affected by the neurotransmitter serotonin.
The biological approach says that all of our thinking and behaviours are a result of biological factors. Biological psychologists believe that genes can influence behaviour. For example, genes carry the instructions for a particular characteristic (e.g. intelligence or temperament), and these behaviours are inherited from our biological parents. Biological psychologists also believe that brain structures can influence behaviour. For example, the parietal lobes process sensory information, such as touch, temperature, and pain, and the occipital lobes process visual information. A third biological influence on behaviour is neurochemistry. For example, neurotransmitters are chemicals that transmit messages from one neuron to the next, by travelling across the synapse. Some neurotransmitters trigger an impulse (excitatory neurotransmitters) and some prevent an impulse from firing (inhibitory neurotransmitters).

Possible AO3 content:

- One strength of the biological approach is that it uses the scientific method. For example, its main method of investigation is the experiment, which takes place in a highly controlled environment, allowing cause and effect to be inferred.
- A second strength of the biological approach is that it has useful practical applications. For example, research into the role of neurochemical imbalances in depression has led to the development of antidepressant drugs.
- However, one limitation of the biological approach is that it is reductionist. Biological explanations of depression, for example, suggest that depression is caused by low levels of serotonin, which ignores the role of cognitive and emotional factors.
- A second limitation is that it ignores the role of cultural factors. For example, many human behaviours can be transmitted by both genetic and cultural routes, and many patterns of human behaviour have purely cultural origins. This means that the biological approach cannot provide a complete explanation for human behaviour.
- A final limitation of the biological approach is that some of its applications are controversial. For example, recent research has found a genetic basis for criminal behaviour, and critics are concerned that this may lead to things like genetic screening, which might lead to discrimination against those people.

The psychodynamic approach (pages 18–19)

1. C

2. Repression: C Denial: E Displacement: A

3. One limitation of the psychodynamic approach is that it has little relevance to people outside of Western cultures. In Western cultures, it is believed that open discussion and insight are always helpful in therapy. However, in cultures such as China, a person who is depressed or anxious avoids distressing thoughts rather than discussing them openly. This means that psychoanalysis has limited applications outside of the Western middle-class culture it originated from.

4. The id is a structure that operates solely in the unconscious. It contains the libido and operates on the pleasure principle (immediate gratification).
• This is the structure of the mind that meant Abdul initially thought that the £50 note meant he could buy the computer game he wanted.
• The superego is a structure that includes the conscience, which produces feelings of guilt when internalised social rules are broken.
• This is the structure of the mind that meant Abdul then thought that he should hand the money into the police station.
• The ego attempts to balance the impulsive demands of the id and the reality of the external world. It compromises between the id and the superego.
• This is the structure of the mind that meant Abdul walked straight past the shop and handed the wallet into the police.

5. Possible AO1 content:
• One important concept in the psychodynamic approach is the unconscious. This is the part of the human mind that contains repressed ideas and memories, and is inaccessible to conscious thought.
• Freud believed that the mind consisted of an id, an ego, and a superego. These are often in conflict. The id operates according to the pleasure principle, and demands instant gratification, regardless of the circumstances. The ego mediates between the impulsive demands of the id, and the reality of the external world. It must also compromise between the impulsive demands of the id and the moralistic demands of the superego. The superego is divided into the conscience, which determines which behaviours are permissible, and causes feelings of guilt when rules are broken, and the ego ideal, which is what a person strives towards.
• The psychodynamic approach says that the ego uses defence mechanisms to protect the conscious mind from anxiety. Examples include repression, which is the unconscious blocking of unacceptable thoughts and impulses, and denial, which is the refusal to accept reality so as to avoid having to deal with any painful feelings that might be associated with that event.
• Freud saw personality as developing through five psychosexual stages. These are necessary for healthy psychic development. At each stage, sexual energy (the libido) is expressed in different ways and in different parts of the body. For example, in the oral stage, the libido is focused on the mouth, and the infant gains pleasure from sucking or biting. In the phallic stage, the libido is focused on the genitals and boys go through the Oedipus Complex, which is where the male child unconsciously wishes to possess their mother and get rid of the father. In the latent stage, the child develops their mastery of the world around them. The genital stage is the culmination of psychosexual development, and the fixing of sexual energy in the genitals.

Possible AO3 content:
• One strength of the psychodynamic approach is that it is a comprehensive theory. For example, it can be used to explain human behaviour in many fields outside of psychology, such as in literary criticism, in which characters can be explored in terms of their unconscious motivations.
• A second strength of the psychodynamic approach is that it is supported by some research studies. For example, Fisher and Greenberg summarised 2500 studies, concluding that experimental studies of psychoanalysis compare well with studies in other major areas of psychology.
• A third strength of the psychodynamic approach is that it has led to treatments for mental disorders. For example, de Maat et al.’s large-scale review of psychotherapy studies concluded that psychoanalysis produced significant improvements in symptoms that were maintained in the years after treatment.
• However, one limitation of the psychodynamic approach is that it is gender-biased. For example, Freud based his theories on male sexual development as the norm, and did not take into account the differences in female sexuality.
• A second limitation of the psychodynamic approach is that it is culture biased. For example, in Western cultures it is believed that open discussion and insight are always helpful in therapy. However, in cultures such as China, a person who is depressed or anxious avoids distressing thoughts, rather than discussing them openly.
1. C

2. Safety needs: C
   Physiological needs: E
   Self-actualisation needs: A

3. • One limitation of the humanistic approach is that it has an idealised and unrealistic view of human nature. Critics argue that the approach does not adequately recognise that people are not inherently good and ‘growth oriented’ as humanistic theorists suggest, and the approach does not adequately recognise people’s capacity for pessimism and self-destructive behaviour.
   • The assumption that problems arise from a blocked self-actualisation is seen as an oversimplification.
   • This means that it may not be appropriate to encourage people to focus on their own self-development, rather than on situational forces.

4. a. One limitation of using self-report techniques in psychology is that respondents may not supply truthful answers, and may simply answer in a socially desirable way.
   b. The researcher proposed a directional hypothesis because she believed that the two questionnaires measured the same thing. Therefore, there would be a positive correlation between the scores on the two questionnaires.

5. • Conditions of worth are conditions people believe significant others put upon them and which they believe have to be in place if they are to be accepted and see themselves positively.
   • For example, Harry is not experiencing unconditional positive regard, but instead feels he has conditions of worth.
   • The humanistic approach says that, to reach self-actualisation, we need unconditional positive regard.
   • Harry is unlikely to reach self-actualisation because his parents will only reward him when he does well.

6. Possible AO1 content:
   • The humanistic approach says that we have free will, and emphasises the importance of the individual striving towards personal growth and fulfilment.
   • One important humanistic psychologist is Maslow. His theory says that there is a hierarchy of needs, and people must fulfil each level before moving up to the next one. If all of these needs have been achieved, people can aim for self-actualisation. This includes creativity and acceptance of the world as it is.
   • Another important humanistic psychologist is Rogers. His theory says that people have two basic needs: the need for self-worth, and the need for unconditional positive regard. Both of these come from good relationships with the people around us.
   • Congruence and conditions of worth are important concepts in Rogers’ theory. Congruence refers to when your self-concept and your ideal-self match. This comes from unconditional positive regard from others. However, if a person is only accepted if they do what others want them to do, then they experience conditional positive regard, and develop conditions of worth. These are the conditions that they perceive others put upon them and which they believe have to be in place if they are to be accepted by others and see themselves positively.
Possible AO3 content:

- One strength of the humanistic approach is that there is research support for conditions of worth. For example, Harter et al. discovered that teenagers who feel they have to fulfil certain conditions in order to gain their parents’ approval frequently end up not liking themselves. This supports the idea that unconditional positive regard from parents is essential for developing self-worth.
- Another strength is that Maslow’s approach may have relevance on a much larger scale than individual growth. For example, Hagerty found that countries in the early stages of economic development prioritised physiological and safety needs, but once these needs have been met, they focus on esteem needs (e.g. women’s rights) and self-actualisation (e.g. access to education).
- However, one limitation of humanistic psychology is that it has an overly idealised and unrealistic view of human nature. For example, it assumes people are good and ‘growth-oriented’, but the approach does not adequately recognise people’s capacity for pessimism and self-destructive behaviour. This means that it may not be appropriate to encourage people to focus on their own self-development rather than on situational forces.
- Another limitation of the humanistic approach is that cross-cultural research has shown that needs may not be the same in other cultures. For example, Nevis found that, in China, belonging took priority over physiological needs, and self-actualisation rather than individual development related to contributions to the community. This suggests that needs may appear in a different order, or may be absent altogether.
- A final limitation of the humanistic approach is that most of the supporting evidence doesn’t use scientific methods. This is because Rogers was an advocate of non-experimental methods. Although studies have shown personal growth as a result of humanistic counselling, they have not shown that the therapy caused the changes. This means that it is difficult to evaluate humanistic theories and therapies scientifically.

**Comparison of approaches (pages 22–23)**

1. D

2. Appropriate: A and C  
   Inappropriate: B

3. 
   - One similarity between the behaviourist approach and the psychodynamic approach concerns the role of nurture in learning.
   - The approaches are similar because both consider behaviour to be largely the result of experience. For example, the behaviourist approach states that all behaviour is the result of learning (e.g. classical conditioning and operant conditioning), and the psychodynamic approach states that all behaviour is the result of early childhood experience.
   - However, one difference between these approaches concerns the methods they use to test their claims.
   - The approaches are different because the behaviourist approach uses the scientific method, which is highly objective and experimentally based. However, the psychodynamic approach tends to use non-experimental methods, such as case studies.

4. 
   - One approach is the biological approach.
   - This says behaviour is due to genetics, brain biochemistry, brain structure, and/or evolution.
   - However, another approach is the psychodynamic approach.
   - This is different because it says that behaviour is due to unconscious drives.
Possible AO1 content:

- The biological approach says that all of our thinking and behaviours are a result of biological factors.
- Biological psychologists study the influence of genetics, brain biochemistry, and brain structure.
- The behaviourist approach says that behaviour is the result of learning.
- In classical conditioning, learning occurs through association. For example, an unconditioned stimulus causes an unconditioned response. If a neutral stimulus is repeatedly paired with the unconditioned stimulus, then we learn to associate the neutral stimulus with the unconditioned stimulus. This means that the neutral stimulus will become the conditioned stimulus, leading to a conditioned response.
- In operant conditioning, learning occurs through consequences. Behaviours that are reinforced are more likely to be repeated. Positive reinforcement happens when a behaviour produces a consequence that is pleasant for the individual. Negative reinforcement happens when a behaviour produces a consequence that removes something that is unpleasant to the individual. Behaviours that are punished are less likely to be repeated.

Possible AO3 content:

- One way in which the biological and behaviourist approaches are similar is in their use of the scientific method. For example, the main method of investigation for the biological approach is the experimental method, which takes place in highly controlled environments, so cause and effect can be established. Skinner's research uses controlled conditions to discover the causal relationship between two or more variables.
- A second way in which the two approaches are similar is that they are both deterministic. For example, the biological approach says that our behaviour is determined by our physiological make-up, such as our genes. The behaviourist approach says the consequences of our behaviour determine the likelihood of a behaviour reoccurring.
- A third way in which the two approaches are similar is that they both have useful practical applications. For example, biological research into the role of neurochemical imbalances in depression has led to the development of antidepressant drugs. The behaviourist approach has led to therapies, such as systematic desensitisation and flooding, to help reduce the anxiety associated with phobias.
- However, the two approaches differ in terms of the role played by nature in causing behaviour. For example, the biological approach considers the origins of behaviour to be the result of nature, such as the central nervous system. However, the behaviourist approach ignores the role of nature in behaviour.
- The two approaches also differ in terms of the role played by nurture in causing behaviour. For example, the behaviourist approach considers the origins of behaviour to be the result of nurture, such as learning from the consequences of our behaviour within the environment. However, the biological approach considers nurture to play a role in modifying innate factors, such as brain structure.
Chapter 2: Biopsychology

The nervous system (pages 24–25)

1. B

2. B

3. A: Central nervous system
   B: Autonomic nervous system
   C: Sympathetic branch

4. • The peripheral nervous system’s main role is to relay nerve impulses from the central nervous system (CNS) to the rest of the body and from the body back to the CNS.
   • The somatic nervous system is made up of sensory neurons and motor neurons, and is involved in reflex actions without the involvement of the CNS.
   • The somatic nervous system controls involuntary bodily functions, such as heartbeat and digestion.
   • The sympathetic branch of the autonomic nervous system is responsible for responses that help us to deal with emergencies, such as fight-or-flight.
   • The parasympathetic branch of the autonomic nervous system is responsible for energy conservation and digestion, and is sometimes called the ‘rest and digest’ system.

5. a. As the researcher used a volunteer sample, it was likely to be biased. For example, people who volunteer for studies might be more motivated to be helpful and/or have extra time on their hands to enable them to participate. Volunteers may be psychologically different from non-volunteers.
   b. The researcher used a repeated measures design. One strength of this design is that the effects of participant variables are controlled, because the same participants are used in all the study’s conditions.

Neurons and synaptic transmission (pages 26–27)

1. Sensory neuron: A
   Motor neuron: C
   Relay neuron: B

2. C

3. B

4. D

5. Cell body: B
   Dendrites: A
   Myelin sheath: E
   Cell nucleus: F
6. Synaptic transmission is the process by which a nerve impulse passes across the synaptic gap from a pre-synaptic neuron to a post-synaptic neuron.
   - When an action potential reaches the synaptic vesicle of the pre-synaptic neuron, it causes them to release a neurotransmitter through a process called exocytosis.
   - The neurotransmitters diffuse across the gap between the pre- and post-synaptic neurons and bind to specialised receptors on the surface of the post-synaptic neuron.
   - ‘Excitation’ refers to a neurotransmitter increasing the likelihood of a post-synaptic neuron ‘firing’.
   - ‘Inhibition’ refers to a neurotransmitter decreasing the likelihood of a post-synaptic neuron ‘firing’.
   - Whether a cell fires or not depends on ‘summation’. This is the ‘adding up’ of the excitatory and inhibitory synaptic input. The net result of this calculation determines whether or not the cell fires.

The endocrine system (pages 28–29)

1. C

2. B

3. The role of the endocrine glands is to produce and secrete chemical messengers called hormones.
   - Each gland in the endocrine system produces hormones that circulate in the bloodstream and are carried to target sites throughout the body.

4. The role of hormones is to ‘excite’ or stimulate a part of the body.
   - When too much or too little of a hormone is produced, it can result in dysfunction of bodily systems, as in Cushing’s syndrome.

5. a. The study is not an experiment because an independent variable has not been manipulated by the researchers. The researchers are looking for a relationship between two variables rather than a difference between two conditions.
   b. One reason is that the researchers were looking for a correlation between two variables (testosterone levels and number of tellings off). A second reason is that the data the researchers collected was at least at the ordinal level.
   c. The study is correlational. Because there has been no systematic manipulation of an independent variable, a causal relationship between the two variables cannot be inferred.

6. A gland of the endocrine system is the adrenal gland.
   - A hormone it produces is adrenaline.
A physiological effect of this hormone is to increase heart rate and blood flow to the muscles and brain.
This affects behaviour by helping the body respond to a stressful situation.

The fight-or-flight response (pages 30–31)

1. B

2. D

3. Adrenaline is released by the adrenal glands in response to threat.
   - As it circulates throughout the body, adrenaline causes physiological changes, such as increased heart rate, breathing, and blood pressure, so more oxygen reaches the heart and muscles. Additionally, glucose is released into the blood to supply energy.
   - These changes prepare the body to react quickly to life-threatening situations.

4. a. The aim was to investigate the suggestion that adrenaline slows the speed at which certain wounds heal.
   b. A directional hypothesis was proposed because of the belief that adrenaline slows the speed at which certain wounds heal.
   c. Independent groups design or matched pairs design

5. Possible AO1 content:
   - The fight-or-flight response enables us to react quickly to life-threatening situations.
   - The hypothalamus activates the sympathetic nervous system.
   - This sends a signal to the adrenal medulla.
   - This releases adrenaline into the bloodstream. Adrenaline causes the body to respond to the threat. For example, heart rate, breathing, and blood pressure increase, so more oxygen reaches the heart and muscles. Additionally, glucose is released into the blood to supply energy.
   - When the threat has passed, the parasympathetic nervous system restores heart rate and blood pressure to normal.

   Possible AO3 content:
   - One issue with the fight-or-flight response is that long-term stressors can have negative effects on the body. For example, long-term increase in blood pressure can damage the blood vessels and lead to heart disease. Additionally, too much cortisol suppresses the immune response.
   - A second issue with the fight-or-flight response is that it may not be the only response to a stressor. For example, von Dawans et al. found that people often cooperate during times of acute stress (e.g. after terrorist attacks), rather than fight or flee.
   - A third issue with the fight-or-flight response is that men and women may have different biological responses to a stressor. For example, Ley and Harley found that the SRY gene, which is on the male Y chromosome, promotes the development of male aggression. This might prime males to release more adrenaline than women when threatened.
   - A fourth issue is that it may be more relevant to men. For example, Taylor et al. suggest that the ‘tend-and-befriend’ response may be a more characteristic coping mechanism for women.
   - A final issue with the fight-or-flight response is that most animals, and humans, initially ‘freeze’ in response to a threat. This enables them to assess the threat before responding.
Localisation of function (pages 32–33)

1. Somatosensory area: Parietal lobe
   Motor area: Frontal lobe
   Visual area: Occipital lobe

2. Broca’s area: A
   Wernicke’s area: E
   Auditory area: F

3. One limitation of localisation theory is that not all researchers believe that functions are localised in the brain. There is research to suggest that some functions in the brain are localised. For example, basic motor and sensory functions appear to be localised in the frontal and parietal lobes, respectively.
   However, other functions do not appear to be localised. For example, higher mental functions such as memory are not just found in one area of the cortex.
   This suggests that, although some functions are localised in the brain, others appear not to be.

4. Localisation of function refers to the principle that specific functions have specific locations within the brain.
   The somatosensory area of the cortex is responsible for bodily sensations.
   If this part was stimulated, the patient would feel sensations, such as feeling like he was being tickled.
   The auditory area of the cortex is responsible for hearing sounds.
   If this part was stimulated, the patient would start hearing things, such as a doorbell ringing.

5. **Possible AO1 content:**
   - Localisation of function refers to the principle that specific functions have specific locations within the brain.
   - The motor and somatosensory areas are involved in movement and bodily sensation, respectively. The motor area is located in the frontal lobe, while the somatosensory area is located in the parietal lobe.
   - The auditory and visual areas are involved in hearing and seeing, respectively. The auditory area is located primarily in the temporal lobe, and the primary visual centre is located in the occipital lobe.
   - Broca’s and Wernicke’s areas are involved in language. Broca’s area is critical for speech production, and is in the posterior portion of the frontal lobe of the left hemisphere. Wernicke’s area is involved in understanding language, and is in the posterior portion of the left temporal lobe.

**Possible AO3 content:**
- One strength of localisation of function is that it is supported by research evidence. For example, studies of aphasics show that difficulties in language production are associated with damage to Broca’s area, while difficulties in language comprehension are associated with damage to Wernicke’s area.
- However, one weakness of localisation of function is that there are individual differences in language areas. For example, Harasty et al. found that women have proportionally larger Broca’s and Wernicke’s areas than men, which might be a result of women’s greater use of language.
- A second weakness of localisation of function is that language production is not confined to Broca’s area. Research shows that in two of Broca’s patients, other areas were damaged, not just Broca’s area, suggesting that language involves networks of brain regions rather than a few specific areas.
- A third weakness of localisation of function comes from equipotentiality theory. This claims that,
while some functions are localised (e.g. basic motor and sensory functions), others are not. This means that if a brain area was damaged, then other intact areas of the cortex could take over its function.

- A final weakness of localisation of function is that communication may be more important than localisation. For example, if the connecting neurons between different brain areas are damaged, this can result in a loss of function. This suggests that complex behaviours involve impulses being passed around the brain through a network of neurons.

### Lateralisation and split-brain research (pages 34–35)

1. D
2. B

3. • One limitation of using split-brain patients is that they are rare. Many studies only included a few participants, or perhaps even only one.
   • The patients may also have had underlying physical disorders, or there may have been some intact nerve fibres remaining following their operations.
   • This means that the results of studies are not always replicated, so it may be unwise to draw general conclusions from them.

4. • Left hemisphere strokes are associated with language deficits, as language is located only in the left hemisphere in the vast majority of people.
   • However, the patient can still respond perfectly well to the questions that the doctors asked him.
   • This suggests that his language structures are in the right hemisphere, which makes him unusual compared with the vast majority of people.

5. **Possible AO1 content:**
   • Hemispheric lateralisation refers to the fact that the two halves of the human brain are not exactly alike. Each hemisphere has functional specialisations that are located primarily in one half of the brain.
   • Sperry and Gazzaniga studied hemispheric lateralisation in epileptics who had undergone surgery, in which the nerve fibres of the corpus callosum were cut.
   • One example of hemispheric lateralisation found by Sperry and Gazzaniga is that language appears to be primarily a left hemisphere function.
   • Another example is spatial ability, which appears to be primarily a right hemisphere function.
   • These findings indicate that the two cerebral hemispheres appear to be specialised in different ways.

**Possible AO3 content:**

- However, one limitation of research in this area concerns sample size. For example, many studies only included a few participants, or perhaps even only one, as very few people have had their corpus callosum cut. This means that it may be unwise to draw general conclusions from them.
- One challenge to the idea of lateralisation is that language does not seem to be restricted to the left hemisphere. For example, right-handed people generally develop their language centres in the left hemisphere, but left-handed people may have them on either side, or both sides.
- A second challenge to the idea of lateralisation is that lateralisation appears to change with age. For example, Szaflarski et al. found language lateralisation increased during childhood and adolescence, but decreased steadily after the age of 25.
- A third challenge is that there does not appear to be an advantage to having a lateralised brain.
For example, Rogers et al. found that, in the domestic chicken, brain lateralisation is associated with an enhanced ability to perform two tasks at once, such as finding food and being vigilant for predators. However, very little empirical evidence has been provided to show that lateralisation confers any advantage to the functioning of the brain in humans.

- A final challenge is that there might actually be disadvantages to having a lateralised brain. For example, Tonnessen et al. found a small, but significant, relationship between handedness and immune disorders, suggesting that the same genetic processes that lead to lateralisation may also affect the development of the immune system.

Plasticity and functional recovery of the brain (pages 36–37)

1. B

2. • There is research support for the idea of plasticity from studies conducted on humans.
   • For example, Maguire et al. measured brain changes in London taxi drivers who had spent varying lengths of time using their spatial navigation skills.
   • They found that compared with control participants who were not taxi drivers, posterior hippocampal volume was positively correlated with how long they had been taxi drivers.
   • This supports the idea that the brain is able to alter its own structure and function as a result of experience.

3. • Functional recovery refers to the finding that there is a recovery of abilities and mental processes that have been compromised as a result of trauma.
   • In Philip’s case, the somatosensory part responsible for receiving input from the missing finger no longer receives stimulation from the outside world.
   • As a result, the other fingers on his right hand have become more sensitive, because the somatosensory part responsible for his missing finger has reorganised itself and is responding to stimulation to the other fingers.
   • As there has been no loss of fingers on Philip’s left hand, there is no reason for his somatosensory cortex to reorganise itself.

4. a. It is possible that serious medical conditions and mental-health disorders may be a cause of or be caused by variations in cortical thickness. This would act as an extraneous variable, and threaten the study’s validity.
   b. Participants might not, for example, want the researchers to know that they spend a lot of time playing video games, and so they may have responded to the question in a socially desirable way.
   c. They could have told participants about the aims of the study, what they would be required to do in it, and what the likely benefits or risks of participation would be.

5. Possible AO1 content:
   • ‘Plasticity’ refers to the brain’s ability to modify its own structure and function as a result of experience. For example, as people have new experiences, nerve pathways that are used frequently develop stronger connections, whereas neurons that are rarely or never used eventually die.
   • Research shows that plasticity occurs through many different types of experience. For example, playing video games, or through meditation.
   • ‘Functional recovery’ refers to the brain’s ability to recover abilities and mental processes that have been compromised as a result of brain injury.
   • For example, when a stroke damages brain cells, other parts sometimes take over their functions.
   • Several mechanisms are involved in functional recovery. For example, neuronal unmasking is where dormant synapses can be reactivated when they receive more neural input than before.
The idea of brain plasticity is supported by findings from non-human studies. For example, Kempermann et al. found that rats kept in complex environments developed more neurons than rats kept in lab cages. This supports the idea that the number of new neurons can change in adult animals in response to environmental stimulation.

The idea of brain plasticity is also supported by findings from human studies. For example, Maguire et al. used MRI to measure the grey matter in taxi drivers’ and non-taxi drivers’ brains. They found a positive correlation between the size of their posterior hippocampus and how long they had worked as a taxi driver.

There is also research support for functional recovery after trauma. For example, rats with traumatic brain injury were either given transplants of stem cells into their brains or a solution containing no stem cells. Those given the transplants developed more neuron-like cells in the area of injury.

However, research suggests that functional recovery depends on a person’s age. For example, Huttenlocher found that adults may need to develop compensatory behavioural strategies to deal with cognitive deficits (e.g. writing lists), as functional recovery appears to reduce with age.

Research also suggests that there are individual differences in functional recovery after moderate to severe traumatic brain injury. For example, Schneider et al. found that patients with college level education achieved disability-free recovery after a year, compared with fewer than 10 per cent of patients who left school early.

Ways of studying the brain (pages 38–39)

1. Functional magnetic resonance imaging (fMRI): D
   Post-mortem examinations: C
   Event-related potentials (ERPs): A

2. One strength of post-mortem examinations is that they allow for a detailed examination of the brain.
   For example, they enable researchers to examine deeper regions of the brain, such as the hypothalamus and the hippocampus.
   One limitation of post-mortem examinations is that they are retrospective, as the person is already dead.
   This means that the researcher cannot follow up on anything that arises from the post-mortem concerning a possible relationship between brain abnormalities and cognitive functioning.

3. A better method might be fMRI.
   This measures changes in brain activity in a particular area of the brain when a person performs a task.
   For example, if a person is asked to do a visual task, a particular part of the occipital lobe will show more activity.
   This can give us a better understanding of what is happening in the brain when a behaviour occurs because it allows us to identify the particular brain areas that are active during the behaviour.

4. Possible AO1 content:
   fMRI is a way of studying the brain that measures changes in blood flow in particular areas of the brain, indicating increased neural activity in those areas.
   This technique involves measuring changes in blood flow and producing a ‘map’ showing which brain areas are involved in a particular mental activity.
• ERPs is a way of studying the brain that measures very small voltage changes in the brain that are triggered by specific events.
• It does this by presenting a stimulus multiple times, and averaging the readings in order to filter out all the brain activity that is not related to the stimulus, leaving only the activity that is.

Possible AO3 content:
• One strength of fMRI is that it is non-invasive. This is a strength because it does not involve the insertion of instruments into the brain, which some techniques do.
• However, one limitation of fMRI is that it is not a direct measure of neural activity. This is a limitation because it means that it is not a truly quantitative measure of mental activity in brain areas.
• One strength of ERPs is that it is possible to determine how processing is affected by a specific experimental manipulation. This is a strength because it enables researchers to focus on how particular stimuli are cognitively processed.
• One limitation of ERPs is that important electrical activities occurring deep in the brain are not recorded. This is a limitation because those activities may be important in understanding how the brain processes particular information.
• One strength of both fMRI and ERPs is that they both give more detailed information than any other ways of studying the brain, such as post-mortems, and have given us great insights into the underlying foundations of our behaviour and mental processes.

Circadian rhythms (pages 40–41)

1. C

2. • Siffre spent six months in a cave with no external cues (such as daylight, clocks, or a radio) to guide his rhythms.
• The only thing influencing his behaviour was his own internal body clock, that is, his ‘free-running’ circadian rhythm.
• His circadian rhythm settled into a ‘day’ that was just over 24 hours in length.
• This shows that the circadian rhythm is not dependent on light or social cues and continues to occur even in the absence of these cues.

3. • Circadian rhythms are a pattern of behaviour that occurs, or recurs, approximately every 24 hours, and which is set and reset by environmental light levels.
• For example, the sleep-wake cycle is around a day (24 hours) in length.
• However, ultradian rhythms are cycles that last less than 24 hours.
• For example, the 90-minute Basic Rest Activity Cycle that characterises both our waking and sleeping hours.

4. • Body temperature is an example of a circadian rhythm.
• Research shows that body temperature is at its lowest around 4 am, and sleep normally occurs when the core temperature begins to drop.
• This would explain why Rajan was really sleepy around this time and felt that the heating had been turned off.
• Rajan and Scott’s body temperature then started to increase. This would explain why Scott started to feel awake again, as an increase in body temperature promotes a feeling of alertness in the morning.
5. **Possible AO1 content:**

- Research has shown that some biological systems vary in a circadian way. For example, body temperature, hormone production, and the sleep–wake cycle are around 24 hours in length.
- Studies suggest that circadian rhythms are driven by our body clocks, which are found in all of the cells of the body.
- This is evident in the sleep–wake cycle in which the body clock that controls when we are awake and when we are asleep must constantly be reset, so that our bodies are in synchrony with the outside world.
- Research shows that the sleep–wake cycle is controlled by a master circadian pacemaker. This is a structure in the hypothalamus called the suprachiasmatic nucleus (SCN).

**Possible AO3 content:**

- One strength of research into circadian rhythms is that it has shown that light influences circadian rhythms. For example, Hughes found that extremes of daylight found in polar regions of the world may be responsible for variations in circadian hormone release.
- A second strength is that it has shown that temperature is also an important factor in circadian rhythms. For example, Buhr *et al.* found that fluctuations in temperature on a 24-hour circadian rhythm set the timing of cells in the body, and therefore cause tissues and organs to become active or inactive.
- A third strength is that research has highlighted the fact that there are individual differences in circadian rhythms. For example, the cycle length can vary from 13 to 65 hours, and ‘morning people’ prefer to rise early and go to bed early, whereas ‘evening people’ prefer to wake later and go to bed later.
- A fourth strength is that research findings have real-world applications. For example, chronotherapeutics involves timing drug treatments so that they have a maximum effect. This had led to the development of novel drug delivery systems, so that a drug is released into the bloodstream at the optimal time of day.
- However, one limitation of research into circadian rhythms is that some of it is flawed. For example, early studies assumed that dim, artificial light would not affect circadian rhythms, but more recent research has shown this is incorrect, weakening the evidence of earlier studies.

**Ultradian and infradian rhythms (pages 42–43)**

1. C

2.  
   - The rhythm shown by the first mythical creature is an infradian rhythm.
   - This is because they only transform ‘under the influence of a monthly full moon’, which is a rhythm longer than a day in length.
   - The rhythm shown by the second mythical creature is an ultradian rhythm.
   - This is because they ‘alternate between a human and non-human form every eight hours or so’, which is a rhythm shorter than a day in length.

3.  
   a. It was directional because the psychologists specified the direction of the effect. They predicted that people would spend longer in ‘deep’ sleep following a period of lengthy physical activity.
   b. 22.9 hours. (229 hours / 10 participants.)
   c. 3/10. (3 participants who spent 22, 24, and 24 per cent of their total sleep time in ‘deep’ sleep / 10 participants in total.)
   d. A Type 2 error is when the null hypothesis is accepted when it should have been rejected. As the Wilcoxon test has shown that the difference is significant, the researcher who used the Sign test has made a Type 2 error (because the Sign test is less powerful than the Wilcoxon test at detecting a difference when a difference exists).
4. Possible AO1 content:

- An ultradian rhythm is one that has a duration shorter than 24 hours.
- An example of a human ultradian rhythm is the sleep cycle.
- An infradian rhythm is a rhythm that has a duration longer than 24 hours.
- An example of a human infradian rhythm is the female menstrual cycle.

Possible AO3 content:

- There is research to support the idea that some ultradian rhythms are biologically determined. For example, Tucker et al. found large differences between individuals’ sleep patterns, which were consistent over 11 nights in a controlled sleep laboratory. This suggests that sleep patterns may be at least partially determined by genes.
- There is also evidence that a 90-minute rhythm seen while we are asleep also occurs when we are awake. For example, Ericsson found that elite violinists generally practise for 90 minutes, and often nap between practice sessions. This supports the existence of a 90-minute ultradian cycle of alertness and fatigue.
- There is research evidence that suggests infradian rhythms can affect mate choice. For example, around ovulation women prefer more ‘masculinised’ faces, but when picking a partner for a long-term relationship, women generally prefer a ‘slightly feminised’ male. This shows how a hormonally controlled rhythm may also impact behaviour.
- However, although the infradian rhythm of the menstrual cycle is hormonally governed, research suggests that it can be influenced by exogenous cues. For example, when several women of childbearing age live together, without taking oral contraceptives, their menstrual cycles tend to synchronise.
- Some people believe that lunar rhythms affect behaviour. However, there is no evidence that this is the case, showing that perceptions of infradian rhythms may be purely subjective.

Endogenous pacemakers and exogenous zeitgebers (pages 44–45)

1. B

2. Exogenous zeitgebers are environmental cues that help to regulate the biological clock.
- The most important zeitgeber for most animals is light, although social stimuli such as mealtimes and social activities may also have a role as zeitgebers.
- Receptors in the suprachiasmatic nucleus are sensitive to changes in light levels during the day.
- They use this information to synchronise the activity of the body’s organs and glands.
- Every day, this zeitgeber resets the internal biological clock, keeping it on a 24-hour cycle.

3. Endogenous pacemakers are mechanisms within the body that govern the internal, biological bodily rhythms.
- An example is the suprachiasmatic nucleus, which is in the hypothalamus.
- However, exogenous zeitgebers are environmental cues that help to regulate the biological clock.
- An example is light, which is the most important zeitgeber for most animals.

4. Although the woman’s day lengthened slightly, she still showed a circadian rhythm. This suggests that sleep–waking is determined by an endogenous pacemaker, but is modified by an exogenous zeitgeber.
- Although the woman’s menstrual cycle shortened slightly, she still showed an infradian rhythm. This suggests that the menstrual cycle is determined by an endogenous pacemaker, too.
- Because these rhythms persisted despite the absence of exogenous zeitgebers, this also supports the idea that the endogenous pacemaker needs time to reset.
5. **Possible AO1 content:**

- The sleep–wake cycle is an example of a circadian rhythm, as it is around 24-hours in length.
- The main endogenous pacemaker in this rhythm is the suprachiasmatic nucleus (SCN). Endogenous pacemakers are mechanisms within the body that govern the internal, biological bodily rhythms.
- The main exogenous zeitgeber in this rhythm is light. Exogenous zeitgebers are environmental cues that help to regulate the biological clock.
- Other biological structures and environmental cues in this rhythm are the pineal gland, and social stimuli such as mealtimes and social activities. The protein melanopsin from the pineal gland is sensitive to natural light. A small number of retinal cells contain melanopsin and carry signals to the SCN to set the daily body cycle.

**Possible AO3 content:**

- The role of the suprachiasmatic nucleus (SCN) in the sleep–wake cycle is supported by studies on non-humans. For example, SCN neurons from hamsters bred to have abnormally short circadian rhythms were transplanted into normal hamsters, who then displayed the abnormal rhythm too. This supports the importance of the SCN in regulating the 24-hour circadian rhythm.
- The role of the SCN is also supported by studies on humans. For example, Folkard studied a student who spent 25 days in a laboratory without daylight. Her sleep–wake cycle extended to 30 hours, showing the importance of exogenous zeitgebers in regulating sleep patterns.
- Research supports the claim that melanopsin is involved in setting this circadian rhythm. For example, blind people who totally lack visual perception, and have no functioning rods and cones, still entrain their circadian rhythm to daylight. This suggests that the pathway from retinal cells containing melanopsin to the SCN is still intact in these individuals.
- However, some research has shown that artificial light plays a role in the sleep–wake cycle. For example, Vetter et al. found that volunteers who lived in ‘warm’ light shifted their sleep patterns with sunrise, whereas those in the ‘blue-enriched’ condition stayed synchronised to office hours.
- Artificial light can also be used to avoid jet lag. For example, Burgess et al. found that participants who had been exposed to bright light felt sleepy two hours earlier in the evening, and woke two hours earlier in the morning. This shows that circadian rhythms can be shifted by the exogenous zeitgeber of light.
Chapter 3: Research methods

The experimental method (1) (pages 46–47)

1.  
   a. An experiment is a study of cause and effect that allows conclusions to be drawn about causal relationships between variables. However, non-experimental methods are essentially descriptive, and do not allow all conclusions to be drawn about causal relationships between variables.
   
   b. The aim was to try to resolve the issue of whether being watched by others improves or impairs task performance.
   
   c. The independent variable is the presence or absence of an audience (i.e. being watched by four others versus being watched by no others). The dependent variable is the number of correct calculations out of ten.
   
   d. Operationalisation involves defining variables in a way that allows them to be measured. Operationalisation is important because a hypothesis can only be made testable if it has taken place.
   
   e. There is a difference in how many calculations participants get correct when they are watched by others compared with when they are alone.
   
   f. Standardised procedures are important because they ensure that each participant does exactly the same thing in each condition. Otherwise, the results might vary because of changes in the procedure rather than because of the independent variable.
   
   g. Informed consent means giving participants comprehensive information about the nature and purpose of the research and their role in it. This will enable them to make an informed decision about whether to participate.
   
   h. This can partly be dealt with by debriefing participants at the end of the study. This could involve a post-research interview designed to tell the participants about the true nature of the study (to investigate the effects of being observed on performance) and to restore them to the state they were in before the study began.
   
   i. One reason is that the researcher was looking for a difference in the number of correct calculations made when participants are watched by others and not watched by others. A second is that an independent groups design was used. A third is that the data was at least at the ordinal level of measurement.
   
   j. The unrelated t-test (Note: other appropriate tests are acceptable)
   
   k. Objectivity is important because it ensures that the data is not affected by the expectations of the researcher. Systematic collection of measurable data is at the heart of the scientific method. Empirical methods are important because, while people can make claims about anything (such as the benefits of a therapy), the only way we can know if the claims are true is through direct testing (i.e. empirical evidence).

The experimental method (2) (pages 48–49)

1.  
   a. A control condition is one in which the participants do not receive the independent variable. However, in an experimental condition, participants do receive the independent variable.
   
   b. A control condition acts as a baseline against which the experimental condition can be compared. A control condition was necessary in the experiment in order to see the extent to which participants’ moods changed when they were given no treatment. Only then could a judgement be made about the effectiveness of the drug.
   
   c. A confounding variable is a variable that varies systematically with the independent variable. Changes in the dependent variable may be due to the confounding variable rather than to the independent variable reducing a study’s validity. An extraneous variable, however, does not vary systematically with the independent variable but may have an effect on the dependent variable, also reducing a study’s validity.
d. A potential extraneous variable might be an alternative, but unknown to the psychiatric institution, medication being taken by one or more of the participants. This might have been responsible for producing any changes in mood rather than medication or placebo.

e. A directional hypothesis states the direction of the predicted difference (or correlation) in a study. However, a non-directional hypothesis states only that there will be a difference (or correlation) and says nothing about the direction it will take.

f. A directional hypothesis was appropriate because the researcher’s study was based on the findings of previous research that pointed to an effect in a particular direction (i.e. the effectiveness of the drug compared with other drugs).

g. The purpose of a pilot study, which is a small-scale run of the actual study, is to test aspects of the design with a view to making improvements to the actual study, if necessary.

h. One other ethical issue that might have arisen is deception. Participants were told that some of them would be receiving a placebo drug. This might have influenced their willingness to participate.

i. Findings obtained at one time might not hold true at another time with different researchers or different participants. Therefore, research must be replicated before a finding can be accepted as well established.

j. One reason is that the researchers were looking for a difference between a control group (placebo) and an experimental group (drug). A second reason is that a repeated measures design was used in the study.

k. Sign test or related t-test (Note: tests not on the specification such as the Walsh test, but which would be appropriate, are acceptable)

l. This means that the likelihood of the results being due to change was less than 5 per cent.

m. The probability is 5 per cent.

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**The experimental method (3) (pages 50–51)**

1. a. Repeated measures design. The researcher can control for the effects of participant variables, since each participant acts as his/her own control. This cannot be done with the independent groups design, and only partially done with the matched pairs design.

   b. Counterbalancing is used to allow order effects to be distributed evenly across both conditions. It reduces the possibility of the confounding variable of order of performance reducing a study’s validity when a repeated measures design is used.

   c. Demand characteristics might have occurred if participants were made aware that the study was concerned with whether anagrams are easier to solve in silence or with music playing. The experimenter could have minimised this by keeping participants in ignorance as to the real purpose of the study.

2. a. Independent groups design. One strength of this design is that because different participants appear in the different conditions, exactly the same stimulus material can be used. This is not possible with the repeated measures design.

   b. Randomisation is the process of using chance to decide the order in which participants undertake the control or experimental condition when a repeated measures design is being used. However, random allocation is the process of using chance to allocate participants to the control or experimental condition when an independent groups design has been used.

   c. Random allocation of participants to conditions is important because its intention is to distribute participant variables (which cannot be controlled for when an independent groups design is used) evenly across the experiment’s conditions.

   d. Random allocation can be done by putting the participants’ names into a hat and drawing out names so that, for example, every other drawn name goes into one of the conditions.
3.  
   a. Matched pairs design. One strength of this design is that the same stimulus material can be used in both conditions, since the participants in one condition are different from the participants in the other condition. This cannot be done with the repeated measures design.  
   b. One limitation of this design is that it is very time-consuming and difficult to match participants on key variables. In the study described in the item, the researcher would probably need a large number of children before the study began in order to ensure that there were pairs of participants with the same intelligence test score.  
   c. Investigator effects could have occurred because the educational psychologist might have had some sort of interest in showing that one of the teaching methods was better than the other. The researcher might have biased her observations so that they were more favourable towards the teaching method she believed to be better. This could have been minimised by using a person who was completely unfamiliar with the purpose of the study to assess the children’s performance.

Types of experiment and features of science (pages 52–53)

1.  
   a. Jones uses the natural experiment. Bonham uses the field experiment. A field experiment involves the investigator deliberately manipulating an independent variable. A natural experiment does not involve the investigator deliberately manipulating an independent variable. Instead, the investigator takes advantage of a naturally occurring difference.  
   b. One strength of Bonham’s method (field experiment) compared with Jones’ method (natural experiment) is that causal relationships can be demonstrated. With natural experiments, because the independent variable cannot be directly manipulated, causal relationships cannot be demonstrated.  
   c. Page uses the quasi-experiment. Plant uses the laboratory experiment. The two differ in terms of the deliberate manipulation of an independent variable. The independent variable is deliberately manipulated in laboratory experiments but not in quasi-experiments.  
   d. One limitation of Page’s method (quasi-experiment) compared with Plant’s method (laboratory experiment) is that causal relationships cannot be demonstrated with natural experiments, because the independent variable is not directly manipulated. With laboratory experiments, the independent variable is directly manipulated so causal relationships can be demonstrated.  
   e. One strength of Bonham’s method (field experiment) compared with Page’s method (quasi-experiment) is that Bonham’s experiments are conducted in the ‘real world’, whereas Page’s are conducted in the laboratory. Bonham’s experiments therefore have greater mundane realism than Page’s.  
   f. One advantage that Plant’s method (laboratory experiment) has over all of the others is that only with Plant’s method can cause and effect be inferred. None of the other methods has the same degree of control as the laboratory experiment, so cause and effect is more difficult (if not impossible) to infer.  
   g. Explanations or theories must be constructed in order to make sense of facts. Theories help us to understand and predict the natural phenomena around us. A good theory must be able to generate hypotheses that can then be tested using objective empirical methods. If a hypothesis is tested and not supported, this means that the theory from which it was derived is incorrect, and must either be modified or be replaced by another theory.  
   h. Falsifiability means being able to prove a hypothesis wrong. In any study it is necessary to be able to make a statement (a hypothesis) that can be proved wrong; that is, a hypothesis that is falsifiable. Theories that lack the ability to be disproved do not allow scientific progress to be made since they explain everything and therefore nothing. A popular example of an apparently non-falsifiable theory is Freudian psychoanalysis.
Sampling (pages 54–55)

1. A population is the group of people that the researcher is interested in, namely school children, and about whom generalisations can be made. However, a sample is a selection of people drawn from the population that the researcher is interested in, namely school children at one local secondary school.

b. Volunteers for the study could have been obtained by advertising on a notice board in the school or on the school’s website, and asking the students to come to a certain room at a certain time if they are interested. A disadvantage of using volunteers in psychological research is that volunteers are known to be psychologically different from non-volunteers. For example, they are typically more motivated to please an investigator in a research study.

c. The sampling technique is known as opportunity sampling. It can create sampling bias because the sample is drawn from a small part of the population. The sample is therefore likely to be biased, meaning that it would be difficult to generalise the findings from that sample to the population from which it has been drawn.

d. Systematic sampling involves using a predetermined system to select participants, such as selecting every third person from a list of people. In this investigation, the researcher could have obtained a systematic sample by finding a list of all the pupils who attended the school and then selecting every nth person on the list to participate in her study.

e. A random sample is one in which every member of the target population has an equal chance of being selected as a participant. The researcher could have given each pupil in the school a number and then used a computer to generate random numbers. A pupil whose number was selected by the random number generator would then be selected as a participant.

f. A limitation of using a random sample is that it may not be representative of the population from which it has been drawn. For example, the school might be composed of 50 per cent boys and 50 per cent girls, but the randomly selected sample might not reflect this.

g. A stratified sample is a sample produced by identifying subgroups according to their frequency in the defined population, and then selecting participants randomly from the subgroups. For example, the research assistant could have identified different year groups, the percentage of boys and girls within each year group, and so on. Having identified the different subgroups, she could then assign each child in a subgroup a number, and use her random number generator to select participants from each subgroup.

Observational techniques and design (pages 56–57)

1. One strength of conducting naturalistic observation is that it gives a realistic picture of natural, spontaneous behaviour. Provided that participants do not know they are being observed, it is likely to be high in ecological validity. One limitation is that there is little control over what is being observed. Something unknown to the observer might account for the behaviour that is being observed.

b. Non-participant observation involves the observer observing from a distance and does not involve interaction with the people being observed. However, in participant observation, the observer becomes a part of the activity being observed.

c. Time sampling involves recording behaviours in a given time frame; for example, noting what a target individual is doing every 30 seconds or some other time interval. The observer might record one or more categories of behaviour from a checklist.

d. Covert observation involves observing people without their knowledge that they are being observed. However, overt observation is where the participants are aware that their behaviour is being observed. One limitation of overt observation is that participants might behave differently simply because they know they are being observed.
2.

a. One strength of unstructured observations is the richness of the data they potentially provide. When used as a kind of pilot study, unstructured observations provide researchers with ideas about what behaviours could be recorded in a more structured way. A limitation of unstructured observations is that the behaviours recorded are likely to be those most visible or eye-catching to the observer. However, these may not necessarily be the most important or relevant behaviours.

b. It is an example of controlled observation because the researchers regulated the brief periods of separation experienced by the infants. In a naturalistic observation, the researchers would not have interfered in any way with what happened during the study.

c. One reason why they might have used covert observation is to minimise the chances of the infants being distracted by the observers' presence in the laboratory.

d. One behavioural category might be how the infants reacted to being separated from the caregiver. A second behavioural category might be how the infants reacted when the caregiver returned following the brief period of separation.

e. One way in which observer bias could be reduced is by using observers who have little or no knowledge of either psychology in general or research into attachment in particular. Knowledgeable observers might expect to see certain kinds of behaviour occurring, and bias their observations. By using naive observers, this possibility would be reduced.

Self-report techniques and design (pages 58–59)

1.

a. A questionnaire that uses 'open' questions gives respondents freedom of response. This means they can write down as much or as little as they want in response to a question. However, 'closed' questionnaires give respondents a range of possible answers from which, typically, one is chosen.

b. One strength of using a 'closed' questionnaire in psychological research is that because they produce quantitative data the responses are easier to analyse, as compared with the qualitative data produced by 'open' questionnaires.

c. One weakness of constructing the questionnaire in the way described is that it can produce acquiescence bias, that is, a tendency to agree with all the questions when the first few have been agreed with, irrespective of their content. This is sometimes called 'yea-saying'.

d. This could be overcome by rewriting the scale so that sometimes 'strongly disagreeing', rather than 'strongly agreeing', indicated an Authoritarian Personality. Constructing the scale like this would reduce the possibility of an acquiescence bias occurring.

e. Participants might show social desirability when responding. This is the tendency for participants to answer questions in such a way that they present themselves in a better light. For example, on the original California F-scale, participants are required to agree or disagree with questions about alternative sexuality.

f. One way of overcoming this is to provide participants with a wider range of possible answers. For example, instead of using categories of response, participants could be asked to give a numerical indication of the extent to which they agree with something, such as 0 = disagree completely, 50 = neither disagree nor agree, and 100 = agree completely.

2.

a. One strength of conducting a structured interview is that it can easily be repeated because the questions are standardised. This means that answers from different people can be compared.

b. One strength of conducting an unstructured interview is that more detailed information can generally be obtained from each respondent than in a structured interview.

c. One way in which an interviewer can influence an interviewee's response is through 'non-verbal leakage'. An interviewer who smiles after a response has been given might obtain more information from an interviewee than an interviewer who frowns after a response has been given.

d. One other limitation of using open questions is that they can lead to a lot more 'noise' than closed questions. This 'noise' can make it difficult to develop a deep understanding of an interviewee's response.
e. One way the researcher could have recorded the data from her interviews is to make some sort of audio recording (e.g. using a mobile phone). An audio recording would enable the researcher to refer back to the interview. Although taking notes and writing down responses is useful, it is likely that a researcher doing this will miss out on some details. This is much less likely if there is a permanent record of the interview.

Correlations (pages 60–62)

1. a. An experiment is a research method where causal conclusions can be drawn because an independent variable has been deliberately manipulated to observe the causal effect on a dependent variable. However, a correlation measures the extent to which two variables share a relationship, and does not allow causal conclusions to be drawn.
   b. A positive correlation is one in which an increase in scores on one variable is accompanied by an increase in scores on the other variable.
   c. One strength of using correlations is that they enable researchers to investigate trends in data. If a correlation is significant, then further investigation is justified. However, if a correlation is not significant, then a causal relationship between variables can almost certainly be excluded.
   d. One reason is that the researcher was looking for a correlation between the estimated number of units of alcohol typically drunk per week and scores on an intelligence test. A second reason is that her data was at least at the ordinal level of measurement.
   e. The correlation is not significant. For a non-directional (two-tailed) test at the 0.05 significance level when $N = 20$, the critical (tabled) value is 0.447. Since the calculated value of 0.402 is not equal to or greater than the critical value, the null hypothesis cannot be rejected.
   f. Pearson’s test

2. a. In a positive correlation, as scores on one variable increase, they increase on the other. However, in a negative correlation, as scores on one variable increase, they decrease on the other.
   b. The researchers found a negative correlation, so the sketched scattergram should indicate that high scores on one variable are associated with low scores on the other, and vice versa.
   c. The researchers have claimed a causal connection between social media use and poor examination performance. However, all they have shown is that the two variables are correlated. Just because two variables are correlated, it does not necessarily mean that a change in one causes a change in the other.
   d. Number of degrees of freedom is $20 - 2 = 18$.
   e. The correlation is not significant. For a directional (one-tailed) test at the 0.05 significance level when $df = 18$, the critical (tabled) value is 0.378. Since the calculated value of −0.367 is not equal to or greater than the critical value, the null hypothesis cannot be rejected.
   f. Both Pearson’s and Spearman’s tests only measure the strength of linear (i.e. positive or negative) correlations. In the study described, the correlation is of a non-linear form (it takes the form of an inverted ‘U’). The tests would therefore not be appropriate to analyse such a relationship.

Meta-analysis, content and thematic analysis, and case studies (pages 63–65)

1. a. Meta-analysis is a mechanism for synthesising data across studies. A decision about whether one variable has an effect on another cannot be based on the results of a single study because results typically vary from one study to another. Synthesising data across studies enables researchers to make a decision about how one variable affects another.
   b. The researcher looks at the findings from a number of different studies that are all concerned with the same topic. A meta-analysis produces a statistic, called the effect size, which is used to assess the overall effect of an independent variable on a dependent variable.
c. One strength of meta-analysis is that reviewing the results from a number of studies rather than just one study can increase the validity of the conclusions drawn. This is because a meta-analysis is based on a wider sample of participants. One limitation is that the designs used in the different studies may vary in their quality, which means they are not truly comparable and any conclusions drawn about an effect might not be valid.

2.
   a. Content analysis is a kind of observational study in which the behaviour is observed indirectly in written or verbal material such as interviews, conversations, diaries, or television programmes. The content of the material is then typically analysed by placing it in predetermined behavioural categories.
   b. One behaviour might be the types of gifts that family members purchased for each other (e.g. stereotypical male and female gifts). Another behaviour might be how family members were depicted when food was being prepared (e.g. preparing meals or washing-up).
   c. One advantage of content analysis is that it tends to have high ecological validity because it is based on observations of what people actually do: real communications that are current and relevant, such as recent newspapers or the books that people read. One disadvantage is that investigator effects (in the form of observer bias) reduce the objectivity and validity of findings, because different observers might interpret the meaning of the behavioural categories differently.
   d. Thematic analysis is a technique used when analysing qualitative data. Themes or categories are identified and then data is organised according to these themes.
   e. The researcher would first identify themes she is interested in and then develop codes with which to label data. For example, she might be interested in how the interviewees felt about the meaning of Christmas. After thorough analysis, the themes will be categorised, and meaning and patterns within themes may be identified.
   f. Thematic analysis carries an inherent risk of subjectivity and therefore researcher bias. The identification of themes and patterns requires a degree of interpretation, and it is possible that researchers’ beliefs may cause differences in how qualitative data is analysed. This drawback, though, is balanced by the richness of data provided by this form of analysis.

3.
   a. A suitable example would be the case of the amnesiac H.M. (see page 47 of the Year 1 Student Book), although any other example would be acceptable. H.M., for example, showed no changes in his personality following surgery to remove his hippocampi, but was unable to form new long-term memories, although he could remember things from before the surgery.
   b. Case studies are idiographic. This is because the idiographic approach focuses on individuals and emphasises uniqueness. The nomothetic approach, by contrast, seeks to formulate general laws of behaviour based on the study of groups.
   c. One strength of the case study method is that it offers rich, in-depth data information. In the research described, valuable information about how motion is perceived has been gained from the case studied. Such data can provide insights into the complex interaction of many factors, in contrast to experiments, where variables are held constant. One limitation is that it is difficult to generalise from individual cases, since each one has unique characteristics. The 70-year-old man who was studied might not be representative of people in general.

Measures of central tendency and dispersion, and mathematical skills (pages 66–67)

1.
   a. The mean score for the ‘organised’ list is $7148/10 = 14.8$. To two significant figures, this is 15. The mean score for the ‘randomised’ list is $74/10 = 7.4$. To two significant figures, this is 7.4.
   b. Scores on the ‘randomised’ list placed in ascending order are: 4, 5, 5, 6, 6, 7, 7, 8, 9, 17. The two middle values are 6 and 7, and so the median score is the average of these two values, i.e. $6 + 7 / 2 = 6.5$. The disadvantage of using the median as a measure here is that the value is not one of the values that any participant actually scored on the randomised list, so the median is not a ‘typical’ value.
c. The mode would not be a useful measure of central tendency on the ‘randomised’ list because there is not a single descriptive statistic that can be used to summarise average performance. There are three modes in this data set (5, 6, and 7).

d. The part-to-part ratio is 3:1.

e. Four participants out of ten scored fewer than fifteen on the ‘organised’ list, so the percentage is \( \frac{4}{10} \times 100 = 40\% \).

f. Two participants out of ten scored more than eight on the ‘randomised’ list, so the fraction is \( \frac{2}{10} \), which can be reduced to \( \frac{1}{5} \).

g. The range for the ‘organised’ list is \( 17 - 12 + 1 = 6 \). The range for the ‘randomised’ list is \( 17 - 4 + 1 = 14 \).

h. The mean score on the ‘organised’ list was greater than that on the ‘randomised’ list, indicating that participants were typically better able to recall the countries if they were presented in an organised way rather than a randomised way. The larger standard deviation on the ‘randomised’ list suggests that there was more variation in recall by participants. This is supported by the fact that the best participant scored 17 and the worst 4. By contrast, there was less variation in recall by participants on the ‘organised’ list. This is supported by the fact that the best participants scored 17 and the worst 12.

i. \( 2.43 \times 10^{18} \)

### Displays of data, types of data, and levels of measurement (pages 68–70)

1. a. The primary data is that obtained from the computerised test measuring whether the students were predominantly ‘left-brained’ or ‘right-brained’. The secondary data is the school records used to identify the subjects the students were studying.

b. ![Bar chart](image)

c. Bar chart

d. The graph suggests that students studying science subjects are more than twice as likely to be ‘left-brained’ than those studying arts subjects. Those studying arts subjects are slightly more likely to be ‘right-brained’ than those studying science subjects.

2. a. ![Graph](image)

b. Positively skewed

c. One reason is that the biopsychology examination was too difficult for the students. Alternatively, it was a fair examination, but most students did not revise sufficiently for it!
d. With an ordinal level of measurement, people have obtained some kind of score or rating, but we can’t be sure that the difference between, say, a rating of 1 and 2 is the same as the difference between a rating of 9 and 10. However, with an interval level of measurement, the difference between, say, a rating of 1 and 2 is the same as a difference between a rating of 9 and 10.

3. a. The quantitative data is the numbers of students naming each of the musicians as their favourite. The qualitative data is the explanatory sentences written by the students.

b. 

<table>
<thead>
<tr>
<th>Musician</th>
<th>Number of students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drake</td>
<td>14</td>
</tr>
<tr>
<td>George Ezra</td>
<td>12</td>
</tr>
<tr>
<td>Rudimental</td>
<td>10</td>
</tr>
<tr>
<td>Justin</td>
<td>8</td>
</tr>
<tr>
<td>Timberlake</td>
<td>6</td>
</tr>
</tbody>
</table>

c. Bar chart

d. The fraction is 10 / 12 or 5 / 6, which is about 16.7 per cent.

e. Nominal

**Introduction to statistical testing (pages 71–73)**

1. a. Reason 1: The teacher is looking at whether there is a difference in examination performance before and after students had been given a revision guide. Reason 2: The teacher has used a repeated measures design. Reason 3: The original data (students’ marks) is an ordinal or interval level of measurement. It has been reduced to the nominal level, with the categories ‘better’ or ‘worse’.

b. $s = 1$. The $s$ value is the least frequently occurring sign (the $-$ sign occurs only once for student 2).

c. The predicted hypothesis was supported at the 0.05 significance level. This is because for a directional (one-tailed) test at the 0.05 level when $N = 8$, the critical (tabled) value is 1. Since the calculated value (1) is equal to the tabled value, the null hypothesis can be rejected.

2. a. $s = 8$. The $s$ value is the least frequently occurring sign (eight people thought that England’s chances were worse).

b. The findings are not significant. This is because for a non-directional (two-tailed) test at the 0.05 level when $N = 26$, the critical (tabled) value is 7. Since the calculated value (8) is not equal to or less than the relevant tabled value, the null hypothesis cannot be rejected.

c. The researcher’s prediction was supported. This is because for a directional (one-tailed) test at the 0.05 level when $N = 30$, the critical (tabled) value is 10. Since the calculated value (10) is equal to the relevant tabled value, the null hypothesis can be rejected.

3. a. $s = 8$. The $s$ value is the least frequently occurring sign (the number of participants who were in favour of car sharing before the film, but opposed to car sharing after the film).

b. The film’s effects are not significant at $p<0.05$. This is because for a non-directional (two-tailed) test at the 0.05 level when $N = 27$, the critical (tabled) value is 7. Since the calculated value (8) is not equal to or less than the relevant tabled value, the null hypothesis cannot be rejected.
c. The findings are that 19 people who were opposed to car sharing before the film were in favour of it after watching the film, whereas 8 people who were in favour of car sharing before the film were opposed to it after watching the film. The conclusion would be that, although the film appears to have had an effect in encouraging people to ‘car share’ on their way to work, the effect is not statistically significant.

Reliability and validity (pages 74–75)

1. a. Reliability refers to the consistency of a measurement. If a measurement is reliable, it produces the same result each time the measurement is taken.
   
   b. He could have checked for inter-observer reliability by comparing the number of times each assistant recorded the number of times ‘like’ was used in a quotative way. If the assistants were reliable, then there would be a high degree of agreement between them in terms of the number of times ‘like’ was used in a quotative way.
   
   c. This could have been done by asking the assistants to listen to the conversations again. If their observations were reliable, then we would see a strong correlation between the number of times the word ‘like’ was used the first and second times they made their recordings.
   
   d. One reason for low inter-observer reliability is that the assistants might differ in their understanding of what a ‘quotative’ way is. This is supported by one assistant telling the other that he wasn’t quite sure what ‘quotative’ meant. Low test–retest reliability could occur if one or both of the assistants did not consistently apply the definition of ‘quotative’ when making their observations.
   
   e. One way in which the study’s reliability could be improved is to reduce any ambiguities in what is meant by using the word ‘like’ in a quotative way. The assistants could be trained before the study to recognise when ‘like’ is being used in quotative and non-quotative ways, so that they are clear on when an instance should be recorded.
   
   f. Spearman’s rho test. A correlation between the two assistants’ ratings and between the ratings of each assistant on several occasions is being looked for. The level of measurement is at least at the ordinal level. An alternative test would be Pearson’s, although several assumptions would need to be met before this test could be used appropriately.

2. a. Face validity is the extent to which a test or the items on it look like what the test or its items claim to measure. Participants might have refused because blowing up a balloon and tying a knot in it might have been seen as lacking face validity as a test of timidity.
   
   b. She could have given her participants a previously validated test of timidity. If her test has concurrent validity, then there would be a significant positive correlation between the scores obtained on both tests.
   
   c. If a test is judged to have poor face validity, then the questions on it should be revised so that they relate more obviously to what the test is measuring. If concurrent validity is low, the questions that seem to be irrelevant should be removed and the concurrent validity reassessed.

3. a. The first type of validity is temporal validity, because it concerns the ability to generalise a research effect beyond the particular time period of the study. In the item, the first student talks about later attempts to replicate Asch’s findings from the 1950s. The second type of validity is ecological validity, which refers to the ability to generalise a research effect beyond the particular setting in which it is demonstrated to other settings. The second student talks about Asch only doing his studies under laboratory conditions.
   
   b. One weakness of using university students is that they may not be representative of the ordinary population. This is a weakness because if they are not representative, then results obtained from them may not generalise to the ‘ordinary’ population.
Research Methods exam-practice 1 (pages 76–78)

01
1.1 The researcher’s aims were to investigate naturalistic decision-making by looking at whether people are more likely to select a ‘representative’ than a ‘non-representative’ set of numbers on a lottery ticket when given the choice between the two.
1.2 The independent variable is the set of numbers (‘representative’ and ‘non-representative’). The dependent variable is which set of numbers is chosen.
1.3 The researcher’s hypothesis was directional. This is because she specified that participants would be more likely to select a ‘representative’ ticket than a ‘non-representative’ ticket.
1.4 The researcher used opportunity sampling, selecting people who were available at the time she conducted her study. One limitation of this technique in this study is that her sample will be biased because it has been drawn from a small part of the population (her study was done only in a ‘busy supermarket’). Volunteer sampling is also creditable.
1.5 One possible confounding variable might be how the participants were shown the two sets of numbers. If, for example, they were presented side-by-side, there might be some sort of bias for participants to naturally select things presented on their left rather than their right side. This would seriously threaten the validity of the researcher’s results.
1.6 Chi-squared. The researcher has collected data at the nominal level of measurement and her categories are independent.

02
For full marks on this question, students must make reference to a type of interview (e.g. structured or unstructured), a method of data recording (e.g. audio recording using a mobile phone), an appropriate method of data analysis (e.g. descriptive statistics and/or an inferential statistical test), and reference to one or more relevant ethical considerations (e.g. informed consent and debriefing).

Research Methods exam-practice 2 (pages 79–81)

01
1.1 When given an unexpected recall test about a questionnaire they had completed, participants are more likely to remember nouns that were appropriate in sentences on the questionnaire than nouns that were written in capital or non-capital letters on the questionnaire.
1.2 Repeated measures design. One advantage of this design is that the researcher can control for the effects of participant variables, since each participant acts as his/her own control. This cannot be done with the independent groups design, and only partially done with the matched pairs design.
1.3 The median and the mode. The median is calculated by finding the middle value of a data set when the data is placed in rank order. The mode is calculated by finding the most frequently occurring value in the data set.
1.4 The range (or standard deviation)
1.5 Bar chart. This is because the data is not continuous. The height of the bar indicates the mean score and a space is left between each bar to indicate the lack of continuity.
1.6 Wilcoxon test. Other tests (e.g. sign test, related t-test) are acceptable.
1.7 The researcher is looking for a difference, and a repeated measures design has been used. Reference to level of measurement is also acceptable.
1.8 This means that there is a less than 5 per cent chance that this difference would occur if there is no real difference between the conditions. Alternatively, the researcher can be 95 per cent confident that the difference is real rather than one that has arisen as a result of chance factors operating.

02
2.1 Reliability refers to the consistency of a measurement. If a measurement is reliable, it produces the same finding each time it is taken. Validity refers to whether an observed effect is a genuine one.
2.3 A paradigm is a shared set of assumptions about the subject matter of a discipline and the methods appropriate to its study. A paradigm shift occurs when disconfirming evidence relating to a paradigm leads to the paradigm being overthrown and replaced by a new paradigm.

Research Methods exam-practice 3 (pages 82–84)

01
1.1 The student proposed a directional hypothesis because there was previous research which suggested that there are various correlations between religiosity and aspects of personality.
1.2 The student could have identified all of the students studying GCSE Religious Studies at her school and given each of them a number. Numbers could then have been selected using a random number generator, with the first ten numbers forming the sample in her study.
1.3 Counterbalancing in this example refers to ensuring that half of the participants complete the measure of religiosity test first followed by the personality questionnaire, whilst the other half complete the personality questionnaire first followed by the measure of religiosity. The student needed to do this to ensure that the order of presentation of the questionnaires did not act as a confounding variable.
1.4 One strength of using a closed questionnaire in psychological research is that because they produce quantitative data the responses are easier to analyse as compared to the qualitative data produced by open questionnaires. One limitation of closed questionnaires is that they lack freedom of response. This means that participants are forced into giving a response that might not be an accurate reflection of their own views.
1.5 One ethical issue that could have arisen is the right to withdraw from the study. Participants might have felt uncomfortable when completing the questionnaires because of the nature of the questions on them. This could have been dealt with by telling participants that they do not have to complete the questionnaires if they do not want to, and that they have the right to withdraw their data after the questionnaires have been completed if they are distressed or uncomfortable about the study.
1.6 The scores on the questionnaire probably represent an ordinal (at least) or interval (at best) level of measurement.
1.7 Spearman’s rho test or Pearson’s test
1.8 She could have used the test–retest method. This would involve giving the same participants the questionnaires again. Reliability would be indicated by a strong correlation between the results they obtained on the two occasions the questionnaires were completed.
1.9 Concurrent validity is a means of establishing validity by comparing an existing test or questionnaire with the one you are interested in. Here, the student could have compared scores on the Francis Scale of Attitudes towards Christianity with an established test of attitudes towards Christianity. If the two tests were measuring the same thing, scores on them would be significantly positively correlated.

Research Methods exam-practice 4 (pages 85–87)

01
1.1 Operationalisation involves defining variables in a way that allows them to be measured. Operationalisation is important because a hypothesis can only be tested if the variables being studied can be measured.
1.2 Independent groups design. One disadvantage is that the effects of participant variables cannot be controlled for (e.g. the different abilities or characteristics of each participant).
1.3 One extraneous variable is that some of the participants who had not received formal training on a musical instrument may have received some kind of informal training (such as a friend teaching them to play guitar). This could have been avoided by ensuring that the participants had not received any kind of training at all on a musical instrument.
1.4 If the researchers knew which of the participants had and had not received formal training on a musical instrument, they might have biased their scoring of the standard verbal memory test in line with their expectations about the study’s outcome. This could have been avoided by having other researchers who were ‘blind’ to the study’s purpose score the memory tests.
1.5 At least ordinal level

1.6 The value of U is significant. For a directional (one-tailed) test at the 0.05 significance level when
U1 = 10 and U2 = 10, the critical (tabled) value is 27. Since the calculated value of 26 is less than the
critical value, the null hypothesis can be rejected.

1.7 Findings obtained at one time might not hold true at another time with different researchers or
different participants. Therefore, research must be replicated before a finding can be accepted as
well established.

1.8 For full marks on this question, students must make reference to a way of assessing visual memory
(e.g. some form of visual memory test), an appropriate graphical representation of the results
(a scattergram in this instance), the selection of an appropriate statistical test with justification
(acceptable tests are Spearman’s rho or Pearson’s tests), and a suitable debrief (making reference
to, for example, the true nature of the study, concerns participants may have, and the participants’
right to withdraw their data from the study).