Please check the examination details below before entering your candidate information

Candidate surname: StemUp Model Solution

Other names:

Centre Number | Candidate Number

# Pearson Edexcel International Advanced Level

## Monday 13 January 2025

Afternoon (Time: 2 hours)

Paper reference **WPS02/01**

# Psychology

## International Advanced Subsidiary
## UNIT 2: Biological Psychology, Learning Theories and Development

**You do not need any other materials.**

Total Marks

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided – *there may be more space than you need.*

### Information

- The total mark for this paper is 96.
- The marks for **each** question are shown in brackets – *use this as a guide as to how much time to spend on each question.*
- The list of formulae and statistical tables are printed at the start of this paper
- Candidates may use a calculator.

### Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

*Turn over* ▶

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## FORMULAE AND STATISTICAL TABLES

**Standard deviation (sample estimate)**

$$\sqrt{\left(\frac{\sum(x-\bar{x})^2}{n-1}\right)}$$

**Spearman's rank correlation coefficient**

$$1-\frac{6\sum d^2}{n(n^2-1)}$$

**Critical values for Spearman's rank**

| | Level of significance for a one-tailed test | | | | |
|---|---|---|---|---|---|
| | **0.05** | **0.025** | **0.01** | **0.005** | **0.0025** |
| | **Level of significance for a two-tailed test** | | | | |
| *N* | **0.10** | **0.05** | **0.025** | **0.01** | **0.005** |
| **5** | 0.900 | 1.000 | 1.000 | 1.000 | 1.000 |
| **6** | 0.829 | 0.886 | 0.943 | 1.000 | 1.000 |
| **7** | 0.714 | 0.786 | 0.893 | 0.929 | 0.964 |
| **8** | 0.643 | 0.738 | 0.833 | 0.881 | 0.905 |
| **9** | 0.600 | 0.700 | 0.783 | 0.833 | 0.867 |
| **10** | 0.564 | 0.648 | 0.745 | 0.794 | 0.830 |
| **11** | 0.536 | 0.618 | 0.709 | 0.755 | 0.800 |
| **12** | 0.503 | 0.587 | 0.678 | 0.727 | 0.769 |
| **13** | 0.484 | 0.560 | 0.648 | 0.703 | 0.747 |
| **14** | 0.464 | 0.538 | 0.626 | 0.679 | 0.723 |
| **15** | 0.446 | 0.521 | 0.604 | 0.654 | 0.700 |
| **16** | 0.429 | 0.503 | 0.582 | 0.635 | 0.679 |
| **17** | 0.414 | 0.485 | 0.566 | 0.615 | 0.662 |
| **18** | 0.401 | 0.472 | 0.550 | 0.600 | 0.643 |
| **19** | 0.391 | 0.460 | 0.535 | 0.584 | 0.628 |
| **20** | 0.380 | 0.447 | 0.520 | 0.570 | 0.612 |
| **21** | 0.370 | 0.435 | 0.508 | 0.556 | 0.599 |
| **22** | 0.361 | 0.425 | 0.496 | 0.544 | 0.586 |
| **23** | 0.353 | 0.415 | 0.486 | 0.532 | 0.573 |
| **24** | 0.344 | 0.406 | 0.476 | 0.521 | 0.562 |
| **25** | 0.337 | 0.398 | 0.466 | 0.511 | 0.551 |
| **26** | 0.331 | 0.390 | 0.457 | 0.501 | 0.541 |
| **27** | 0.324 | 0.382 | 0.448 | 0.491 | 0.531 |
| **28** | 0.317 | 0.375 | 0.440 | 0.483 | 0.522 |
| **29** | 0.312 | 0.368 | 0.433 | 0.475 | 0.513 |
| **30** | 0.306 | 0.362 | 0.425 | 0.467 | 0.504 |

**The calculated value must be equal to or exceed the critical value in this table for significance to be shown.**

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## Chi-squared distribution formula

$$X^2 = \sum \frac{(O-E)^2}{E} \qquad df = (r-1)(c-1)$$

## Critical values for chi-squared distribution

| | Level of significance for a one-tailed test | | | | | |
|---|---|---|---|---|---|---|
| | **0.10** | **0.05** | **0.025** | **0.01** | **0.005** | **0.0005** |
| | **Level of significance for a two-tailed test** | | | | | |
| **df** | **0.20** | **0.10** | **0.05** | **0.025** | **0.01** | **0.001** |
| **1** | 1.64 | 2.71 | 3.84 | 5.02 | 6.64 | 10.83 |
| **2** | 3.22 | 4.61 | 5.99 | 7.38 | 9.21 | 13.82 |
| **3** | 4.64 | 6.25 | 7.82 | 9.35 | 11.35 | 16.27 |
| **4** | 5.99 | 7.78 | 9.49 | 11.14 | 13.28 | 18.47 |
| **5** | 7.29 | 9.24 | 11.07 | 12.83 | 15.09 | 20.52 |
| **6** | 8.56 | 10.65 | 12.59 | 14.45 | 16.81 | 22.46 |
| **7** | 9.80 | 12.02 | 14.07 | 16.01 | 18.48 | 24.32 |
| **8** | 11.03 | 13.36 | 15.51 | 17.54 | 20.09 | 26.12 |
| **9** | 12.24 | 14.68 | 16.92 | 19.02 | 21.67 | 27.88 |
| **10** | 13.44 | 15.99 | 18.31 | 20.48 | 23.21 | 29.59 |
| **11** | 14.63 | 17.28 | 19.68 | 21.92 | 24.73 | 31.26 |
| **12** | 15.81 | 18.55 | 21.03 | 23.34 | 26.22 | 32.91 |
| **13** | 16.99 | 19.81 | 22.36 | 24.74 | 27.69 | 34.53 |
| **14** | 18.15 | 21.06 | 23.69 | 26.12 | 29.14 | 36.12 |
| **15** | 19.31 | 22.31 | 25.00 | 27.49 | 30.58 | 37.70 |
| **16** | 20.47 | 23.54 | 26.30 | 28.85 | 32.00 | 39.25 |
| **17** | 21.62 | 24.77 | 27.59 | 30.19 | 33.41 | 40.79 |
| **18** | 22.76 | 25.99 | 28.87 | 31.53 | 34.81 | 42.31 |
| **19** | 23.90 | 27.20 | 30.14 | 32.85 | 36.19 | 43.82 |
| **20** | 25.04 | 28.41 | 31.41 | 34.17 | 37.57 | 45.32 |
| **21** | 26.17 | 29.62 | 32.67 | 35.48 | 38.93 | 46.80 |
| **22** | 27.30 | 30.81 | 33.92 | 36.78 | 40.29 | 48.27 |
| **23** | 28.43 | 32.01 | 35.17 | 38.08 | 41.64 | 49.73 |
| **24** | 29.55 | 33.20 | 36.42 | 39.36 | 42.98 | 51.18 |
| **25** | 30.68 | 34.38 | 37.65 | 40.65 | 44.31 | 52.62 |
| **26** | 31.80 | 35.56 | 38.89 | 41.92 | 45.64 | 54.05 |
| **27** | 32.91 | 36.74 | 40.11 | 43.20 | 46.96 | 55.48 |
| **28** | 34.03 | 37.92 | 41.34 | 44.46 | 48.28 | 56.89 |
| **29** | 35.14 | 39.09 | 42.56 | 45.72 | 49.59 | 58.30 |
| **30** | 36.25 | 40.26 | 43.77 | 46.98 | 50.89 | 59.70 |
| **40** | 47.27 | 51.81 | 55.76 | 59.34 | 63.69 | 73.40 |
| **50** | 58.16 | 63.17 | 67.51 | 71.42 | 76.15 | 86.66 |
| **60** | 68.97 | 74.40 | 79.08 | 83.30 | 88.38 | 99.61 |
| **70** | 79.72 | 85.53 | 90.53 | 95.02 | 100.43 | 112.32 |

**The calculated value must be equal to or exceed the critical value in this table for significance to be shown.**

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**Wilcoxon Signed Ranks test process**

- Calculate the difference between two scores by taking one from the other
- Rank the differences giving the smallest difference Rank 1

  Note: do not rank any differences of 0 and when adding the number of scores, do not count those with a difference of 0, and ignore the signs when calculating the difference
- Add up the ranks for positive differences
- Add up the ranks for negative differences
- T is the figure that is the smallest when the ranks are totalled (may be positive or negative)
- N is the number of scores left, ignore those with 0 difference

**Critical values for the Wilcoxon Signed Ranks test**

| | **Level of significance for a one-tailed test** | | |
|---|---|---|---|
| | 0.05 | 0.025 | 0.01 |
| | **Level of significance for a two-tailed test** | | |
| ***n*** | 0.1 | 0.05 | 0.02 |
| N=5 | 0 | – | – |
| 6 | 2 | 0 | – |
| 7 | 3 | 2 | 0 |
| 8 | 5 | 3 | 1 |
| 9 | 8 | 5 | 3 |
| 10 | 11 | 8 | 5 |
| 11 | 13 | 10 | 7 |
| 12 | 17 | 13 | 9 |

**The calculated value must be equal to or less than the critical value in this table for significance to be shown.**

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## SECTION A

## Biological Psychology

**Answer ALL questions in this section. Write your answers in the spaces provided.**

**1** In your studies on biological psychology, you will have learned about brain functioning as an explanation of aggression.

(a) State **two** areas of the brain that play a role in human aggression.

**(2)**

1 *Prefrontal cortex*

2 *Amygdala*

(b) Explain **one** strength of brain functioning as an explanation of aggression.

**(2)**

*Brain functioning is supported by scientific evidence, which gives it credibility. Zhu et al. (2019) found that proactive aggression was positively correlated with the density of grey matter in the prefrontal cortex, so people who are more aggressive do have measurably different brains.*

**(Total for Question 1 = 4 marks)**

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**2** Loreen conducted an investigation to see if there was a relationship between the amount of exercise people did on average in a week and the amount of sleep they had on average each night.

Loreen used an opportunity sampling technique and handed her participants a questionnaire.

The questionnaire consisted of two questions. The first question was "How many hours on average per week do you spend on exercise?" The second question was "What is the average number of hours you sleep per night?"

(a) Give a fully operationalised, non-directional (two-tailed) hypothesis for Loreen's investigation.

**(2)**

*There will be a relationship between the average number of hours a person spends exercising per week and the average number of hours they sleep per night.*

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Loreen calculated a Spearman's rank test on her data.

(b) Calculate Spearman's rank test to **three** decimal places for the data gathered by Loreen by completing **Table 1**.

The formulae and statistical tables can be found at the front of the paper.

You **must** show your working out.

**(4)**

| Average number of hours spent on exercise per week | Rank 1 | Average number of hours slept per night | Rank 2 | $d$ | $d^2$ |
|---|---|---|---|---|---|
| 7 | 4 | 9 | 5 | $-1$ | 1 |
| 3 | 2 | 7 | 3 | $-1$ | 1 |
| 10 | 5 | 8 | 4 | 1 | 1 |
| 5 | 3 | 6 | 1.5 | 1.5 | 2.25 |
| 1 | 1 | 6 | 1.5 | $-0.5$ | 0.25 |
| | | | | **Total for $d^2$** | 5.5 |

**Table 1**

**Space for calculations**

$\Sigma d^2 = 1 + 1 + 1 + 2.25 + 0.25 = 5.5$

$6\Sigma d^2 = 6 \times 5.5 = 33$

$n(n^2 - 1) = 5 \times (25 - 1) = 5 \times 24 = 120$

$r_s = 1 - \frac{6\Sigma d^2}{n(n^2 - 1)} = 1 - \frac{33}{120} = 1 - 0.275 = 0.725$

Spearman's rank ..... 0.725 .....

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(c) Loreen compared her calculated value to the critical value for a two-tailed (non-directional) hypothesis at $p \leqslant 0.05$.

Identify the critical value Loreen would have used.

**(1)**

*1.000*

(d) Explain **one** weakness of Loreen's investigation.

**(2)**

*Loreen's participants answered a questionnaire about their own exercise and sleep, so they may have given socially desirable answers, such as saying they exercise more than they really do. This reduces the validity of her findings, as she may not be accurately measuring the relationship between exercise and sleep.*

**(Total for Question 2 = 9 marks)**

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**3** In your studies on biological psychology, you will have learned about the contemporary study by Brendgen et al. (2005).

(a) Describe the procedure of the study by Brendgen et al. (2005).

**(4)**

*Brendgen et al. (2005) used 234 pairs of six-year-old twins, both monozygotic (MZ) and same-sex dizygotic (DZ), from the Quebec twin register in Canada. Teachers rated each twin using the Preschool Social Behaviour Scale and Direct and Indirect Aggression Scales to measure social and physical aggression. The twins' classmates (peers) were given a booklet of photographs of the children in their class and had to circle the three children who best fitted each descriptor, such as "tells others not to play with a child" for social aggression or "hits, bites or kicks other children" for physical aggression. The similarity in aggression of MZ and DZ twins was then compared to estimate the role of genes and environment.*

(b) Explain **one** strength of the study by Brendgen et al. (2005).

**(2)**

*The data were collected in the spring of the school year, so teachers and peers had known the twins for several months. This increases validity, as their ratings of social and physical aggression were based on real knowledge of each child rather than guesses.*

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(c) Explain **one** improvement that could be made to the study by Brendgen et al. (2005).

**(2)**

*Brendgen et al. (2005) could have used an older sample, for example children up to ten years old, as social aggression may not be fully developed by age six. This would make the findings about the genetic and environmental causes of social aggression more valid.*

**(Total for Question 3 = 8 marks)**

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**4** PET scans are one brain scanning technique used in biological psychology.

(a) Describe PET scans as they are used in biological psychology.

**(3)**

*Before the scan the participant is injected with glucose containing a radioactive tracer. While the tracer is taken up by the brain, the participant carries out a task, such as the continuous performance task (CPT) used by Raine et al. (1997). The participant then lies in the scanner, which detects the gamma rays from the tracer, and the most active areas, which use the most glucose, show up as brighter colours on a computer image of the brain.*

(b) Explain **one** weakness of PET scans as they are used in biological psychology.

**(2)**

*The coloured image has to be interpreted by the researcher, who must judge which differences in colour show more active areas of the brain, for example when a person is aggressive. This can lead to subjectivity and researcher bias, reducing reliability.*

**(Total for Question 4 = 5 marks)**

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**QUESTION 5 BEGINS ON THE NEXT PAGE.**

**5** Remo is 19 years old. He has been working at his local shop but recently lost his job because he became aggressive and shouted at a customer. Remo has also been banned from watching his local football team because he and his friends were in a fight with supporters of the opposing team after a match.

Remo's partner has threatened to leave him due to an incident at a restaurant where Remo threw his drink at the waiter because he was not satisfied with his food. Remo's parents have tried to talk to him about his aggressive behaviour but he just shouted at them.

Discuss hormones as an explanation of Remo's aggressive behaviour.

**(8)**

*Hormones are chemical messengers released into the blood by glands. Testosterone, produced mainly by the testes, is linked to aggression. Exposure to high levels of testosterone in the womb can affect the development of the brain, for example the amygdala, making a person more prone to aggression. Remo may have been exposed to excess prenatal testosterone, giving him a more reactive amygdala, which would explain why he became aggressive and shouted at a customer, losing his job.*

*Testosterone also rises sharply in males during puberty and early adulthood and is linked to dominance and competitive aggression. Remo is 19, so his testosterone levels are likely to be high, which could explain why he and his friends fought supporters of the opposing team after a football match, as this is a competitive, status-related situation. Dabbs et al. (1987) found that prisoners convicted of violent crimes had higher testosterone than those convicted of non-violent crimes, supporting this.*

*Cortisol, the stress hormone, is also involved. Low cortisol means the autonomic nervous system is under-aroused, so aggression may be a way of raising arousal. Cortisol also regulates testosterone, so low cortisol allows testosterone to have a stronger effect. Popma et al. (2007) found that testosterone was linked to overt aggression in delinquent boys mainly when their cortisol was low. This could explain why Remo threw his drink at the waiter over something minor, and why he shouts at his parents when they try to talk to him, as he is*

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quickly provoked.

However, the evidence is mostly correlational, so high testosterone may be a result of aggression and winning dominance contests rather than its cause. Hormones also ignore social factors: Remo may have learned to be aggressive by observing his friends or football supporters being rewarded for it, as social learning theory suggests. As not all young men with high testosterone are aggressive, hormones are best seen as making Remo more likely to be aggressive when provoked, together with his environment.

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**(Total for Question 5 = 8 marks)**

**TOTAL FOR SECTION A = 34 MARKS**

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**SECTION B BEGINS ON THE NEXT PAGE.**

## SECTION B

### Learning Theories and Development

**Answer ALL questions in this section. Write your answers in the spaces provided.**

**6** In your studies about learning theories and development, you will have learned about social learning theory.

(a) Define what is meant by the term 'vicarious reinforcement' as used in social learning theory.

**(1)**

*Vicarious reinforcement is when we see a model rewarded for a behaviour, so we are more likely to imitate that behaviour ourselves.*

(b) Explain **one** strength and **one** weakness of social learning theory as an explanation of human behaviour.

**(4)**

Strength

*Bandura, Ross and Ross (1961) found that children who watched an adult behave aggressively towards a Bobo doll imitated much more of that physical and verbal aggression than children who saw a non-aggressive model. This supports the idea that behaviour is learned by observing and imitating role models.*

Weakness

*Social learning theory ignores biological factors such as brain functioning, for example the role of the amygdala in aggression, or genes such as MAOA. This means it is not a complete explanation of human behaviour, as it cannot explain why people who see the same model behave differently.*

**(Total for Question 6 = 5 marks)**

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**7** Anya wants to conduct a covert observation to investigate the differences in the behaviour of boys and girls when playing in a park. The park has a variety of equipment including slides, swings and a climbing frame.

(a) Describe how Anya could conduct her covert observation.

**(4)**

*Anya should first operationalise the behaviours she will observe, such as the number of times boys and girls play on the slides, the swings and the climbing frame, and whether play is rough or co-operative. She should make a tally chart with these categories for boys and girls and use time sampling, for example recording what she sees every 30 seconds for an hour. To keep the observation covert, she should sit on a park bench away from the play area, as if she were a parent, so the children cannot see she is observing them. She could also write down qualitative data, such as what the boys and girls say to each other while playing.*

(b) Explain **one** strength of Anya conducting a covert observation for her investigation.

**(2)**

*The children in the park will not know they are being observed, so they will play naturally on the slides, swings and climbing frame. This avoids demand characteristics, which increases the validity of Anya's findings on gender differences in play.*

**(Total for Question 7 = 6 marks)**

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**8** In your studies about learning theories and development, you will have conducted a practical investigation that collected quantitative and qualitative data.

(a) State **one** conclusion you made from the quantitative data you collected for your learning theories and development practical investigation.

**(1)**

*We concluded that females were more likely than males to help a person who had dropped a pile of books in the library.*

(b) Describe how you analysed the qualitative data from your learning theories and development practical investigation.

**(2)**

*We read through our notes on what the males and females said to the person who dropped the books several times. We then used thematic analysis, creating themes such as "checking the person was alright", and counted how often each theme appeared for males and for females.*

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(c) Explain **two** improvements you could make to your learning theories and development practical investigation

**(4)**

1 *We could have observed in several different libraries at different times of day, so our sample of males and females would be more representative of the target population and the findings about gender and helping more generalisable.*

2 *We could have had both a male and a female confederate drop the books, so we could be sure the gender of the person needing help was not an extraneous variable affecting whether males or females helped, improving validity.*

**(Total for Question 8 = 7 marks)**

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**9** Floella conducted an investigation to see if giving dogs a treat would teach them how to identify drugs hidden in bags.

- Condition A: the dogs were given a treat when they found drugs in a bag
- Condition B: the dogs were not given a treat when they found drugs in a bag.

Her results are shown on **Table 2**.

| **Condition A: Number of times each dog given a treat found drugs in a bag** | **Condition B: Number of times each dog not given a treat found drugs in a bag** |
|---|---|
| 9 | 1 |
| 7 | 0 |
| 10 | 2 |
| 9 | 0 |
| 12 | 1 |
| 1 | 3 |

**Table 2**

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(a) Calculate the mean number of times the dogs who were given a treat found drugs in a bag (Condition A).

**(1)**

**Space for calculations**

$9 + 7 + 10 + 9 + 12 + 1 = 48$

$48 \div 6 = 8$

Mean for Condition A ..... 8 .....

(b) Calculate the median number of times the dogs who were not given a treat found drugs in a bag (Condition B).

**(1)**

**Space for calculations**

In order: 0, 0, 1, 1, 2, 3

Middle two scores are 1 and 1, so $(1 + 1) \div 2 = 1$

Median for Condition B ..... 1 .....

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(c) Explain **one** strength and **one** weakness of Floella using the mean as a measure of central tendency.

**(4)**

Strength

*The mean uses every score from all six dogs in each condition, such as the 12 times one rewarded dog found drugs, so it is the most sensitive measure of central tendency for comparing the dogs given a treat with those not given a treat.*

Weakness

*The mean is affected by extreme scores, such as the dog in Condition A that only found drugs once, which pulls the mean down to 8. So the mean may not represent most of the dogs given treats, who found drugs 9 or more times, unlike the median.*

(d) Explain **one** reason Floella used animals in her investigation.

**(2)**

*Dogs are similar enough to humans in how they learn through reinforcement, so Floella can generalise her findings. If dogs learn to find drugs because the behaviour is positively reinforced with a treat, humans may also learn behaviours if they are rewarded.*

**(Total for Question 9 = 8 marks)**

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**QUESTION 10 BEGINS ON THE NEXT PAGE.**

**10** Evaluate the object relations school of thought as a therapy/treatment.

**(8)**

*The object relations school, developed from Freud's ideas by theorists such as Melanie Klein and Donald Winnicott, believes that our current relationships are shaped by our early relationships with significant others (objects), especially our parents. These childhood relationships are internalised and unconsciously determine how we behave in adult relationships and what we accept from others. Object relations therapy aims to give clients insight into their current relationship problems by bringing these unconscious patterns into the conscious mind, often by exploring how the client relates to the therapist, for example through transference. For this to work, the client has to trust the therapist so they feel safe talking about painful past relationships.*

*A strength is that the therapy looks for the root cause of the problem in the client's past relationships, rather than just treating the symptoms as drug therapy does. This should mean the improvement lasts, because once the client understands why they keep repeating a pattern, such as choosing a controlling partner, they can change it. It also has no physical side effects, unlike drugs, so clients may be more willing to complete it.*

*However, the therapy relies on the client being motivated and able to talk openly about their past. A client with severe depression may lack the motivation to engage, so the therapy may not be effective for them. It is also a long process, often lasting months or years, so it is not suitable for clients who need help quickly, such as those with addictions, and it is expensive. Furthermore, concepts such as internalised objects and the unconscious are hard to measure, so it is difficult to test scientifically whether improvement is due to the therapy itself or to factors such as the supportive relationship with the therapist.*

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*In conclusion, object relations therapy can be effective for clients with long-standing relationship problems who are motivated and can commit time to it, because it targets the cause rather than the symptoms. However, its lack of scientific evidence and the time it takes mean it is less suitable than quicker treatments for clients who need immediate help.*

**(Total for Question 10 = 8 marks)**

**TOTAL FOR SECTION B = 34 MARKS**

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## SECTION C

**Answer ALL questions in this section. Write your answers in the spaces provided.**

**11** In your studies on biological psychology, you will have learned about one of the following contemporary studies.

- McDermott (2008)
- Hoefelmann et al. (2006).

Evaluate your chosen contemporary study.

**(12)**

Chosen study *McDermott (2008)*

*McDermott (2008) aimed to see whether the MAOA gene made people more likely to behave aggressively when the aggression had a cost to themselves. 78 male participants were gene tested and split into those with the low activity version of the gene (MAOA-L) and those with the high activity version (MAOA-H). They played a "power to take" game in which they earned money that an unseen opponent in another room could take. The opponent took either 20% (low provocation) or 80% (high provocation) of their earnings, and participants could pay to punish the opponent by making them eat hot sauce, choosing how much to give. Those who had 80% taken gave more hot sauce than those who had 20% taken, and the MAOA-L group gave more hot sauce than the MAOA-H group in both conditions. McDermott concluded that genes play a role in aggression when a person is provoked by the environment.*

*A strength is that the procedure was standardised: every participant played the same game, earned the same total and faced the same amount taken in their condition. This means the study can be replicated to check whether the results are consistent, increasing reliability. The measure of aggression was also objective, as the participant either gave hot sauce or did not, and the amount was measured in grams, so researcher bias in judging what counts as aggressive behaviour was minimised.*

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However, the participants were deceived, as they thought they were playing against another person when the opponent was actually a computer program, which raises ethical issues because they could not give fully informed consent. On the other hand, McDermott could justify the deception, as people behave differently if they know they are playing a computer, so it was needed to produce valid behaviour, and participants were debriefed afterwards.

A further weakness is that the study only used males, so it cannot be said that MAOA-L would increase aggression in females when they are provoked, which limits generalisability. The task also lacks ecological validity: in real life we usually see the person we are aggressive towards and the aggression is often physical, whereas participants never saw their opponent eat the hot sauce. This means the findings may not show how people with MAOA-L behave in everyday situations. Finally, the study was not able to control for other genes or past experiences, so MAOA may only be one of many factors, and the results show a link rather than proof that the gene alone causes aggression.

Overall, McDermott (2008) is a reliable and well-controlled experiment with an objective measure of aggression, which gives credible support for a gene-environment interaction explanation of aggression. However, its artificial task, all-male sample and use of deception mean the conclusions should be generalised to real-life aggression with caution.

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**QUESTION 12 BEGINS ON THE NEXT PAGE.**

**12** Benjamin has just lost his place on the cricket team because he shouted at the captain. Benjamin said the captain was aggressive towards him and said he had no talent for cricket. The captain looks similar to Benjamin's father.

Benjamin's partner has said Benjamin can be very untidy at home, often leaving his belongings lying around and not tidying up after he has eaten. Benjamin can be aggressive at home, shouting at his partner if asked to do household chores. Once he smashed the television because his partner repeatedly asked him if he would help tidy the house.

On a recent trip to the theatre with his friends, Benjamin thought someone had taken his place in a queue and pushed that person out of the way. This meant Benjamin and his friends were told to leave the theatre.

To what extent can genes and Freud's theory of development explain Benjamin's behaviour?

You must refer to the context in your answer.

**(16)**

*Genes may explain Benjamin's aggression. The MAOA gene codes for the enzyme monoamine oxidase A, which breaks down monoamines such as serotonin in the synapse. People with the low activity version, MAOA-L, do not break these down effectively, so neurotransmitter levels are disrupted, which affects mood and impulse control. Benjamin may have MAOA-L, which could explain why he could not control his impulse and pushed someone he thought had taken his place in the theatre queue. Brunner et al. (1993) studied a Dutch family whose males had a mutated MAOA gene and found they could not regulate impulsive aggressive behaviour, which supports this explanation of Benjamin's behaviour.*

*McDermott (2008) also found that MAOA-L males gave more hot sauce, especially when highly provoked. This fits Benjamin, as he shouted at the captain only after the captain was aggressive and said he had no talent, so the gene may make him over-react when provoked. Ouellet-Morin et al. (2016) found that males with MAOA-L were more likely to be antisocial when exposed to violence than males with MAOA-H. The XYY genotype has also been linked to aggression, as these men may lack empathy, which might explain why Benjamin does not seem to understand how smashing the television makes his partner feel.*

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However, genes cannot explain everything about Benjamin. They do not explain why he is untidy at home, leaving his belongings lying around, and they ignore nurture, such as how Benjamin was brought up or whether he copied an aggressive father. Most people with MAOA-L are not violent, so the gene is better seen as a vulnerability that needs an environmental trigger, as McDermott found. Also, without testing we can only speculate whether Benjamin has MAOA-L.

Freud's psychosexual theory says behaviour is driven by unconscious motives that come from unresolved conflicts in childhood. In the phallic stage, a boy experiences the Oedipus complex and sees his father as a rival, fearing castration. If this is not resolved through identification with the father, the boy may carry an unconscious fear and hostility towards his father into adulthood and direct it at other males who remind him of his father. The captain looks similar to Benjamin's father, so Benjamin may have displaced his unconscious anger towards his father onto the captain, which would explain why he shouted at him. Freud's case study of Little Hans (1909), whose fear of horses was interpreted as an unconscious fear of his father, supports the idea that unresolved Oedipal feelings affect behaviour.

Freud also said that a person can become fixated at a stage if it is not successfully resolved. In the anal stage, a child whose potty training was too relaxed may become anally expulsive, which in adulthood shows as being messy, disorganised and rebellious. This explains Benjamin's untidiness, leaving his belongings around and not clearing up after eating, and his explosive reaction when his partner repeatedly asked him to tidy, which he may see as being controlled.

However, Freud's theory lacks credibility because concepts such as the unconscious, the

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Oedipus complex and fixation are abstract and cannot be measured or tested scientifically, so we cannot prove they cause Benjamin's behaviour. Little Hans was a single case study, interpreted by Freud through Hans's father, so it may be biased and cannot be generalised. Freud's stages also end at adolescence, unlike Erikson's, whose stages continue through adulthood, so Freud may not explain why Benjamin's aggression is happening now in adult situations such as the theatre.

To conclude, neither explanation fully explains Benjamin's behaviour on its own. Genes, particularly MAOA-L, explain his impulsive, provoked aggression at the theatre and towards the captain and have stronger scientific support from studies such as Brunner et al. (1993) and McDermott (2008). Freud's theory explains more of the context, such as his reaction to a captain who looks like his father and his untidiness, but it is much harder to test. Overall, a combination is most likely: Benjamin may have a genetic vulnerability to aggression which is triggered by his childhood experiences and current situations.

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