OCR
Oxford Cambridge and RSA

Sample Question Paper

A Level Psychology

H569/01 Research methods

Time allowed: 2 hours

You must have:
- a scientific or graphical calculator

Please write clearly in black ink. **Do not write in the barcodes.**

Centre number | | | | | | Candidate number | | | | |

First name(s) _____

Last name _____

INSTRUCTIONS
- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Answer **all** the questions.

INFORMATION
- The total mark for this paper is **80**.
- The marks for each question are shown in brackets **[ ]**.
- This document has **24** pages.

ADVICE
- Read each question carefully before you start your answer.

Section A

Multiple Choice

For each question write the letter in the box.

A company wanted to find out whether employees' wellbeing would improve if the company introduced a four day working week. A wellbeing questionnaire was given to employees at the end of a usual five day working week which was scored out of 75. The company then implemented a four day working week and after one month asked the employees to complete the same questionnaire.

The data collected from some employees is shown in the table.

	Wellbeing scores (max. 75)	
Participant	**Working 5 days per week**	**Working 4 days per week**
A	45	52
B	66	68
C	43	59
D	55	55
E	42	14
F	57	60
G	32	56
H	44	54

Use this scenario to answer questions **1**, **2** and **3**.

1 The employees were unaware their scores on the wellbeing questionnaire were being used for research purposes and so could not give informed consent. Which BPS ethical principle does this relate to?

A Competence

B Integrity

C Respect

D Responsibility

Your answer ☐ **[1]**

2 Which participant's data is anomalous in the 'working four days per week' condition?

A Participant B

B Participant D

C Participant E

D Participant H

Your answer ☐ **[1]**

3 The researchers assessed the reliability of the wellbeing questionnaire by correlating the scores on the odd-numbered items with scores on the even-numbered items. What type of reliability were they assessing?

A External reliability

B Inter-rater reliability

C Split-half reliability

D Test-retest reliability

Your answer ☐ **[1]**

Schizophrenia is a type of mental illness known as a psychotic disorder. It is characterised by symptoms that indicate a loss of contact with reality, such as hallucinations.

Use this scenario to answer questions **4**, **5** and **6**.

4 Which of these is an example of interval level data that could be collected in a study of schizophrenia?

A The mass (in grams) of the brain of an individual with schizophrenia

B Categorising the patients' symptoms as 'severe', 'moderate' or 'mild'

C Psychiatrist ratings of the severity of the hallucinations experienced

D Patient self-ratings of the severity of the hallucinations experienced

Your answer ☐ **[1]**

5 Which of these is an example of qualitative data that could be collected in a study of schizophrenia?

A Diary entries of six patients who have a diagnosis of schizophrenia

B Number of symptoms of schizophrenia from the DSM-5 that the patient has

C Percentage of participants reporting symptoms of hallucinations

D Time taken in months for a patient with schizophrenia to visit a doctor

Your answer ☐ **[1]**

6 Which of these is an example of secondary data that could be collected in a case study of an individual admitted to hospital with schizophrenia?

A Hospital records from when the patient was first admitted

B Interview responses given by the patient whilst in hospital

C Questionnaire responses given by the patient once discharged from hospital

D Observations made by the researcher whilst the patient was in hospital

Your answer ☐ **[1]**

The table below displays the data from an experiment investigating the difference in memory ability between a group of young people and a group of old people where they were given a list of 30 words to read and memorise.

Scores in a memory test where participants were asked to recall 30 words.			
Young people (age 16–25)		**Old people (age 65–75)**	
Participant	**Score**	**Participant**	**Score**
A	26	G	7
B	28	H	25
C	22	I	12
D	30	J	22
E	25	K	12
F	28	L	12

Use this scenario to answer questions **7** and **8**.

7 What is the value of $\bar{x}$ in the formula below when calculating the standard deviation of the memory scores for the group of **old** people in this study?

$$\sqrt{\frac{\Sigma(X-\bar{X})^2}{n-1}}$$

A 12

B 15

C 18

D 90

Your answer ☐ **[1]**

8 Which of the following could be a participant variable in this experiment?

A Age

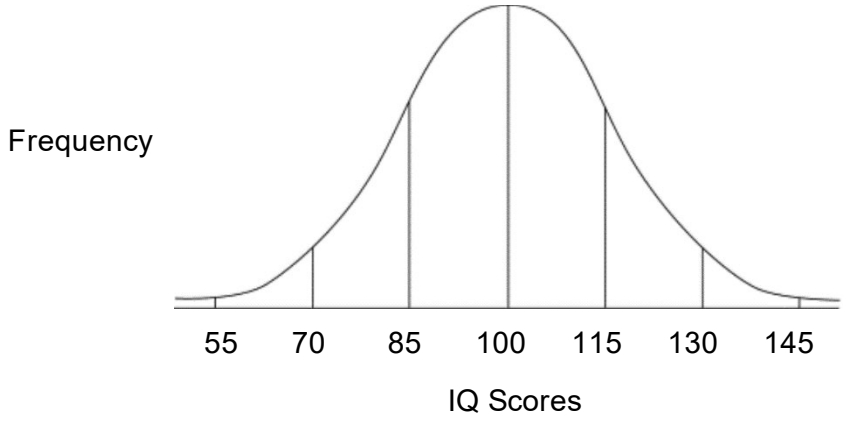
B Eyesight

C Height

D Income

Your answer ☐ **[1]**

The graph shows the distribution of IQ scores in a research study of intelligence.



Use this graph to answer questions **9** and **10**.

9 How are the IQ scores distributed?

A Bimodal distribution

B Negatively skewed distribution

C Normal distribution

D Positively skewed distribution

Your answer ☐ **[1]**

10 The mean IQ score shown on the graph is 100. What is the median IQ score?

A 70

B 85

C 90

D 100

Your answer ☐ **[1]**

A psychologist was interested in whether artificial intelligence (AI) software programmes can effectively support people with mental health problems such as depression. They did this by obtaining 100 participants who currently had a diagnosis of clinical depression. The participants rated their mood on a 1-10 scale (1 = very low mood, 10 = very high mood) immediately before and after undertaking a one hour online therapy session online with an AI software programme. The data from 5 of the participants is presented in the table.

Participant	Mood rating before AI therapy session	Mood rating after AI therapy session
A	3	8
B	2	6
C	4	7
D	5	9
E	4	7

Use this scenario to answer questions **11** and **12**.

11 Which level of data was collected for the mood ratings in this study?

A Interval

B Nominal

C Ordinal

D Secondary

Your answer ☐ **[1]**

12 Which non-parametric inferential statistical test would be appropriate to use with this data?

A Binomial Sign test

B Chi-square test

C Mann-Whitney U test

D Wilcoxon Signed Ranks test

Your answer ☐ **[1]**

13 Which method of data presentation would be appropriate to display data on the relationship between helpfulness and generosity where each variable is measured on a 1-10 rating scale?

A Histogram

B Line graph

C Pie chart

D Scatter diagram

Your answer ☐ **[1]**

14 Which of these methods would produce the **least** biased sample in a study of intelligence in primary school children?

A An opportunity sample of 50 children from 3 local primary schools

B A random sample of 50 children from 5 local primary schools

C A self-selected sample of 50 children from 2 local primary schools

D A snowball sample of 50 children from 1 local primary school

Your answer ☐ **[1]**

15 In a research study, a calculated value on a Mann Whitney U test was 39. The relevant critical value for the study was 15. Which action would the researcher take?

A Accept the alternative hypothesis

B Accept the null hypothesis

C Accept both the alternative hypothesis and the null hypothesis

D Reject the null hypothesis

Your answer ☐ **[1]**

Section B

Research design and response

A researcher wants to investigate if there is a relationship between how artistic a person is and the tattoos they have on their body. They decided to use the correlation method to investigate this.

16 Write a null hypothesis for this correlational investigation.

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. .....**[3]**

17 Design a correlation study to investigate if there is a relationship between how artistic a person is and the tattoos they have on their body.

You **must** refer to the following required features in your answer:

- the data collection method for the variable 'how artistic a person is'
- how you would attempt to reduce the influence of one extraneous variable
- details of how one ethical consideration would be addressed.

Justify the decisions you have made for each required feature. **[12]**

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18 Explain **one** weakness of using the correlation method to investigate if there is a relationship between how artistic a person is and the tattoos they have on their body.

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..... **[3]**

The researcher wanted to find out more about people's tattoo choices. They decided to use the self-report method. The researcher gave an opportunity sample of 30 participants, recruited in a local shopping centre, a questionnaire that contained 8 fixed-choice questions. The participants completed the questionnaire immediately and handed it back to the researcher.

19 Explain **one** strength of using the opportunity sampling method to investigate people's tattoo choices.

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20 Discuss ways the researcher could improve the **validity** of this self-report investigation if they were to carry it out again.

In your answer you should consider the implications of your suggested improvements.

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21 One of the questions asked on the questionnaire was 'Do you regret any of your tattoo choices? Yes ☐ No ☐'

(a) Identify the level of data collected in this question.

..... **[1]**

(b) Identify the appropriate measure of central tendency that would be used to summarise the results for this question.

..... **[1]**

22 You have carried out your own practical investigation using the **observation method**.

Evaluate **two** features of that practical investigation.

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Section C

Data analysis and interpretation

A psychologist wanted to investigate the effects of expectations on people's perception. To investigate this, she needed an image that was ambiguous and could be perceived in more than one way. The psychologist created a black-and-white image which was purposefully drawn so that it could be perceived as either a crocodile or a laptop computer. To check that the image could genuinely be perceived in these two ways, the psychologist showed it to participants for one second and instructed them to say what they saw. The participants were all students at the same university. The results are presented in the table.

Number of times the ambiguous image was perceived as a crocodile	Number of times the ambiguous image was perceived as a laptop computer	Number of times the ambiguous image was perceived as neither a crocodile nor a laptop computer
37	37	2

23

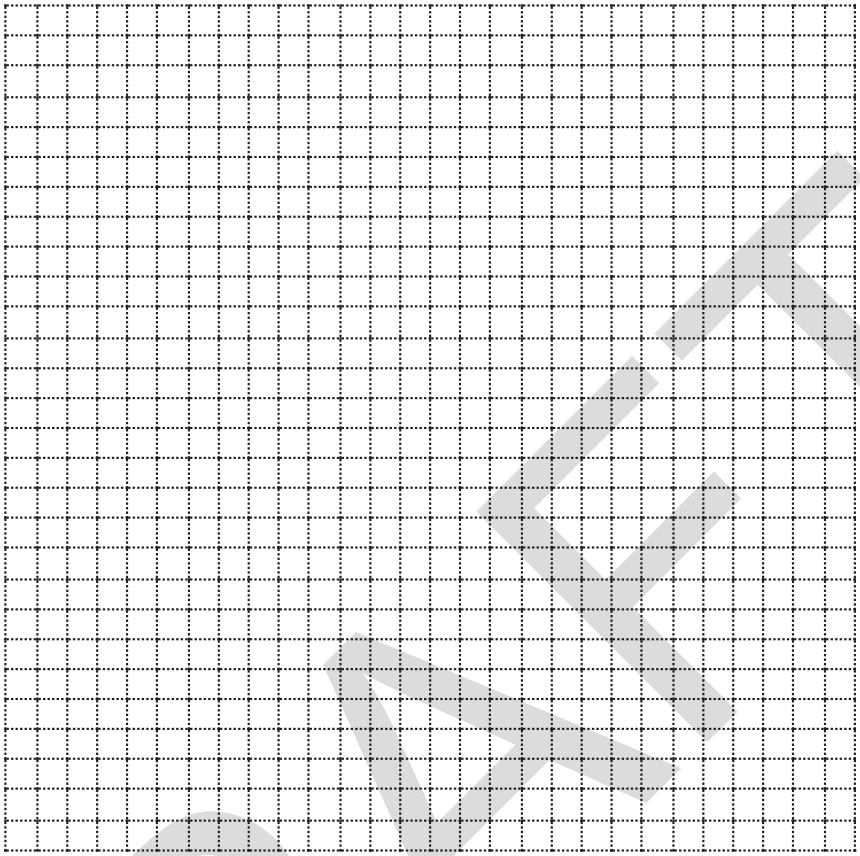
(a) Calculate the percentage number of times the ambiguous image was identified as neither a crocodile nor a laptop computer.

Show your working.

Write your answer to **2** significant figures.

= ..... % **[2]**

(b) Sketch a fully labelled bar chart showing the data collected in this investigation.



[3]

(c) Analyse the data to reach a conclusion that could be made in this investigation.

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For the second stage of this investigation, new participants were obtained from the same university as the participants in the first stage of the investigation. However, none of these participants had taken part in the first stage of the investigation.

The participants were split into two separate conditions. In one condition, participants were shown five images of animals, one after the other, and were then shown the ambiguous image. In the other condition, participants were shown five images of electronic devices, one after the other, and were then shown the ambiguous image. All images were in black-and-white. For each image they were shown, participants had to say what they saw.

The results for what they said the ambiguous image represented are shown in the table.

	Number of times the ambiguous image was perceived as a crocodile	**Number of times the ambiguous image was perceived as a laptop computer**
The ambiguous image was presented after images of animals	15	10
The ambiguous image was presented after images of electronic devices	5	12

24

(a) Calculate the ratio of the number of participants who perceived a crocodile in the first condition to the number who perceived a crocodile in the second condition.

Express your answer in its simplest form.

= ..... **[1]**

(b) State **three** reasons why the Chi-square test is the most appropriate non-parametric inferential statistical test to analyse the data in this investigation.

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(c) Calculate the degrees of freedom (df) for use with the Chi-square test in this investigation.

Show your working.

= ..... df **[2]**

(d) The calculated Chi-square value is 3.80.

Below is an extract from the table of critical values for the Chi-square test that shows the critical value for this study.

Levels of significance for a one-tailed test

Significance Level	0.05
Critical Value	2.71

Write a significance statement for the results of this study.

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(e) Explain how this investigation demonstrates **one** principle of scientific enquiry.

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(f) Evaluate **two** aspects of validity in the second stage of this investigation.

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(g) Explain how the researcher could have obtained a random sample from the target population of university students for this study.

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END OF QUESTION PAPER

EXTRA ANSWER SPACE

If extra space is required, you should use the following lined page(s). The question number(s) must be clearly shown in the margin(s).

BLANK PAGE

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Sample Mark Scheme

A Level Psychology

H569/01 Research methods

MARK SCHEME

Duration: 2 hours

MAXIMUM MARK 80

Version: **Sample**

This document has 20 pages

MARKING INSTRUCTIONS

PREPARATION FOR MARKING

MARKING

1. Mark strictly to the mark scheme.

2. Marks awarded must relate directly to the marking criteria.

3. **Crossed Out Responses**
Where a candidate has crossed out a response and provided a clear alternative then the crossed-out response is not marked. Where no alternative response has been provided, examiners may give candidates the benefit of the doubt and mark the crossed-out response where legible.

Rubric Error Responses – Optional Questions
Where candidates have a choice of question across a whole paper or a whole section and have provided more answers than required, then all responses are marked and the highest mark allowable within the rubric is given. Select the highest mark from those awarded. *(The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.)*

Multiple Choice Question Responses
When a multiple choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate).

Contradictory Responses
When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

Short Answer Questions (requiring only a list by way of a response, usually worth only **one mark per response**)
Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. *(The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.)*

Short Answer Questions (requiring a more developed response, worth **two or more marks**)
If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space.)

Longer Answer Questions (requiring a developed response)
Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.

4. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there, then add a tick to confirm that the work has been seen.

5. Award No Response (NR) if:
   - there is nothing written in the answer space

   Award Zero '0' if:
   - anything is written in the answer space and is not worthy of credit (this includes text and symbols).

6. For answers marked by levels of response:
   a. **To determine the level** – start at the highest level and work down until you reach the level that matches the answer
   b. **To determine the mark within the level**, consider the following

Descriptor	Award mark
On the borderline of this level and the one below	At bottom of level
Just enough achievement on balance for this level	Above bottom and either below middle or at middle of level (depending on number of marks available)
Meets the criteria but with some slight inconsistency	Above middle and either below top of level or at middle of level (depending on number of marks available)
Consistently meets the criteria for this level	At top of level

7. Subject Specific Marking Instructions

Section A: Multiple choice

Question	Marking Criteria	AO	Answer
1	C	**AO1**	Respect
2	C	**AO2**	Participant E
3	C	**AO2**	Split-half reliability
4	A	**AO2**	The mass (in grams) of the brain of an individual with schizophrenia
5	A	**AO2**	Diary entries of six patients who have a diagnosis of schizophrenia
6	A	**AO2**	Hospital records from when the patient was first admitted
7	B	**AO2**	15
8	B	**AO2**	Eyesight
9	C	**AO2**	Normal distribution
10	D	**AO2**	100
11	C	**AO2**	Ordinal
12	D	**AO2**	Wilcoxon Signed Ranks test
13	D	**AO2**	Scatter diagram
14	B	**AO2**	A random sample of 50 children from 5 local primary schools
15	B	**AO2**	Accept the null hypothesis

Section B: Research design and response

Q16 Write a null hypothesis for this correlational investigation. **[3]**

Marking Criteria [1+1+1]	AO/ Marks	Indicative Content
1 mark: Correctly cited null hypothesis (reference to no relationship or no correlation).	**AO2 x3**	Example answer: There will be no relationship [1] between artistic ability measured on a 1-10 scale (where 1 is not at all artistic and 10 is very artistic) [1] and the number of tattoos a person has on their body. [1] **NB.** Must refer to 'no relationship' or 'no correlation' - zero marks for citing an alternative hypothesis or a null hypothesis for an experiment (i.e. do not award credit if there is any reference to difference/cause/effect). Artistic ability could be operationalised in many different ways – e.g. rated on a scale from 1 (not at all artistic) to 10 (very artistic), number of pieces of art they create in a year, etc. Tattoos could be operationalised in different ways – e.g. number of tattoos they have on their body, how many tattoos they had in the last year, etc. Each variable must be operationalised to produce ordinal or interval data to be creditworthy (as can't produce a correlation with nominal data).
1 mark: Co-variable 1 (artistic ability) is referred to **and** operationalised.		
1 mark: Co-variable 2 (tattoos) is referred to **and** operationalised.		
0 marks: No creditworthy response.		

Q17 Design a correlation study to investigate if there is a relationship between how artistic a person is and the tattoos they have on their body. You **must** refer to the following required features in your answer:

- the data collection method for the variable 'how artistic a person is'
- how you would attempt to reduce the influence of one extraneous variable
- details of how one ethical consideration would be addressed.

Justify the decisions you have made for each required feature. **[12]**

Marking Criteria			Indicative Content
	AO2 x 6	**AO3 x 6**	Suggestions for Required Features could include (AO2): **RF1:** Any data collection method that would generate quantitative (ordinal/interval) data in this context – e.g. rating scales completed by self or others, etc. Any appropriate response should be credited. **RF2:** There are many extraneous variables that could be controlled in this context, including skin conditions people might have (that prevent them from being able to have tattoos), disposable income (to be able to pay for tattoos), availability of tattoo parlours, age of participants (assuming different attitudes towards tattoos among people from different generations), etc. Any appropriate response should be credited. **RF3:** Relevant ethical considerations in this context could include gaining informed consent (addressed by briefing participants/informing them of the study aims), withdrawal (addressed by informing participants of their right to withdraw before, during and after the study), reducing any possible affects such as embarrassment over poor artistic ability (addressed via debrief), etc. Any appropriate response should be credited. Justification for Decisions (AO3): The justification provided will depend on the suggestion made. Examples include: **RF1:** If a self-rating scale is used, this could be justified by the fact that participants have a greater level of insight into their own artistic ability than an external observer might, so this could yield more valid data. **RF2:** Many suggestions could be justified by the fact that there would be the same experience for all participants in both conditions, increasing validity but also standardisation/replicability if the suggestion is procedural. **RF3:** Most suggestions could be justified by the fact that by making the study more ethical, the reputation of psychology will be maintained/improved or that participants would be more likely to participate in future studies. For all required features, any appropriate justification should be credited.
Level	**The candidate applies knowledge and understanding of scientific ideas, processes, techniques and procedures for the theoretical design of a practical study by:**	**The candidate analyses, interprets and evaluates scientific information, ideas and evidence to develop and refine practical design through the justification of decisions made by:**	
Level 3 **(5–6 marks)**	Addressing **all three** Required Features (RFs) accurately, in context, and with sufficient clarity and detail to enable replication.	Providing accurate **and** detailed justification, in context, for **all three** design decisions.	
Level 2 **(3–4 marks)**	Addressing **two** of the Required Features (RFs) accurately, in context, and with sufficient clarity and detail to enable replication.	Providing accurate justification with reasonable detail, in context, for **at least two** of the design decisions.	
Level 1 **(1–2 marks)**	Addressing **one** or more of the Required Features (RFs) accurately, in context, and with sufficient clarity and detail to enable replication.	Providing accurate justification **for at least one** of the design decisions.	
0 marks	No creditworthy response.		

<table>
<tr><td colspan="3">Q18 Explain one weakness of using the correlation method to investigate if there is a relationship between how artistic a person is and the tattoos they have on their body. [3]</td></tr>
<tr><th>Marking Criteria [1+1+1]</th><th>AO/ Marks</th><th>Indicative Content</th></tr>
<tr><td>1 mark: Relevant weakness of the use of the correlation method identified. (AO1)</td><td rowspan="4">AO1 x2

AO2 x1</td><td rowspan="4">Possible weaknesses:
▪ Inability to infer causation [1] due to the problems of reverse causation [1]. For example, can't determine whether being artistic causes increased number of tattoos, or whether having more tattoos makes you more artistic. [1]

▪ Inability to infer causation [1] due to the influence of 'third variables' [1]. For example, whether an unmeasured variable such as upbringing is responsible for the correlation between number of tattoos and artistic ability. [1]

▪ Lack of qualitative data [1] which means there is an inability to understand reasons for any relationships found. [1] For example, even if a relationship between number of tattoos and artistic ability is found, there is no ability to understand participants' experiences of why this relationship exists. [1]

▪ Any other appropriate point.</td></tr>
<tr><td>1 mark: The identified weakness is further explained/elaborated. (AO1)</td></tr>
<tr><td>1 mark: The weakness is either identified or explained within the context of the investigation. (AO2)</td></tr>
<tr><td>0 marks: No creditworthy response.</td></tr>
</table>

Q19 Explain **one** strength of using the opportunity sampling method to investigate people's tattoo choices. **[3]**

Marking Criteria [1+1+1]	AO/ Marks	Indicative Content
1 mark: Relevant strength of the use of opportunity sampling identified. (AO1)	**AO1 x2** **AO2 x1**	Possible strengths: ▪ It is quick to find participants [1] which may result in a larger sample which would likely make the sample more representative [1]. If a larger sample was recruited it would be more representative as there would likely be people with different types of tattoos or different amount of tattoos. [1] ▪ It is convenient for the researcher to find participants as they are in the same location [1] which may mean they are able to find participants with tattoos more easily or quickly [1]. This can lead to a larger (and therefore theoretically more representative) sample of people with tattoos. [1] ▪ Any other appropriate point.
1 mark: The identified strength is further explained/elaborated. (AO1)		
1 mark: The strength is either identified or explained within the context of the investigation. (AO2)		
0 marks: No creditworthy response.		

Q20 Discuss ways the researcher could improve the **validity** of this self-report investigation if they were to carry it out again.
In your answer you should consider the implications of your suggested improvements. **[6]**

Level	Marking Criteria	AO/ Marks	Indicative Content
Level 3 **(5–6 marks)**	Relevant ways that the validity could be improved are identified. (AO1) These are discussed in terms **the extent to which** they would develop the investigation by considering their implications. The points raised are made clearly and in detail. (AO3)	**AO1 x2** **AO3 x4**	<u>Possible improvements that could be discussed:</u> ▪ Anonymous responses. (AO1) This would improve the validity by reducing social desirability, however, there will still not be a guarantee that all responses are fully accurate or free from bias as the participant knows they cannot be checked or 'found out'. (AO3) ▪ Allow participants to complete the questionnaire at home. (AO1) This would improve the validity as participants are more likely to give a good amount of thought to responses which reflect their true opinions/behaviours. However, the response rate may be lower as participants need to find time at home to complete the questionnaire rather than being given the time and space to complete it with the researcher which may reduce population validity. (AO3) ▪ Using a larger sample size. (AO1) This would likely improve the population validity as a larger sample will often be more representative of the target population. However, a larger sample does not always guarantee that it will be representative of all possible participant characteristics, for example the age range may be skewed towards younger people. (AO3) ▪ Any other appropriate point.
Level 2 **(3–4 marks)**	Relevant way(s) that the validity could be improved are identified. (AO1) The way(s) are discussed in terms of **how** they would develop the investigation to improve its validity. The point(s) raised are made clearly with some detail. (AO3)		
Level 1 **(1–2 marks)**	Relevant way(s) that the validity could be improved are identified. The point(s) may lack clarity and detail. (AO1)		
0 marks: No creditworthy response.			

Q21 (a) One of the questions asked on the questionnaire was 'Do you regret any of your tattoo choices? Yes ☐ No ☐' Identify the level of data collected in this question. **[1]**		
Marking Criteria	**AO/ Marks**	**Indicative Content**
1 mark: Stating 'nominal data'.	**AO2 x1**	Nominal. [1]
0 marks: No creditworthy response.		

Q21 (b) Identify the appropriate measure of central tendency that would be used to summarise the results for this question. **[1]**		
Marking Criteria	**AO/ Marks**	**Indicative Content**
1 mark: Stating 'mode'.	**AO2 x1**	Mode. [1]
0 marks: No creditworthy response.		

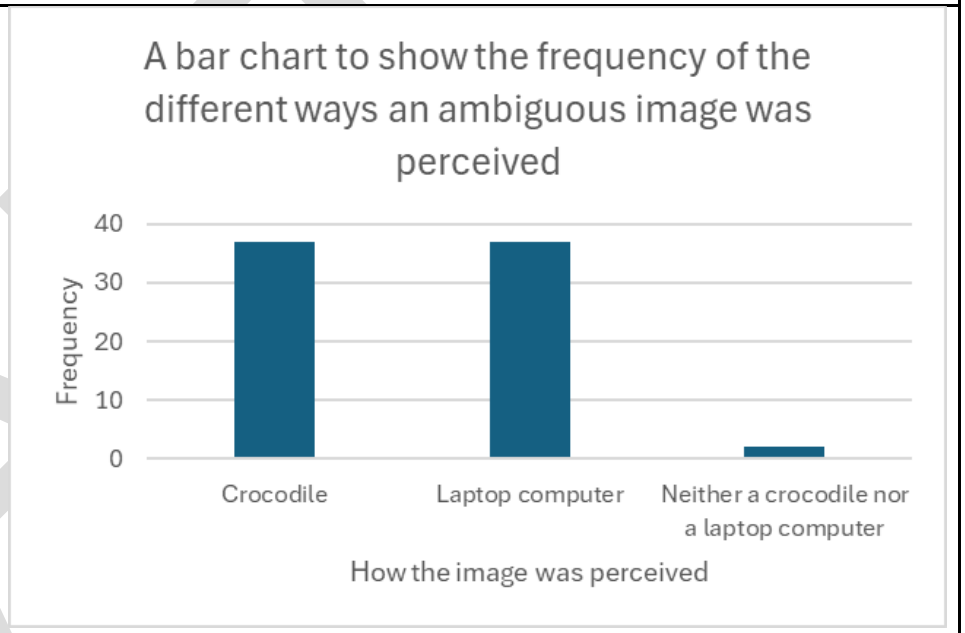
Q22 You have carried out your own practical investigation using the **observation method**.
Evaluate **two** features of that practical investigation. **[6]**

Level	Marking Criteria [3+3]	AO/ Marks	Indicative Content
	For each feature:	**AO3 x6**	Possible features that could be evaluated: ▪ Data collected – e.g. collecting quantitative data in the form of tallying the behaviours people showed on a bus meant that easy comparisons between the number of behaviours shown could be made, but didn't allow a full understanding of the reasons why people behaved in that way when on the bus. ▪ How the observation was conducted – e.g. conducting the observation covertly on the bus by pretending to be a passenger was somewhat unethical as participants didn't consent to be observed. However, as they were in a public space and no information that personally identified participants was collected, it remains ethical. ▪ Any other appropriate point.
Level 3 (3 marks)	Clear and developed evaluation of a relevant feature of the student's own practical investigation.		
Level 2 (2 marks)	Clear but brief evaluation of a relevant feature of the student's own practical investigation.		
Level 1 (1 marks)	An attempted evaluation, that is unclear in places, of a relevant feature of the student's own practical investigation.		
0 marks: No creditworthy response.			

Section C: Data analysis and interpretation

Q23 (a) Calculate the percentage number of times the ambiguous image was identified as neither a crocodile nor a laptop computer. Show your working. Write your answer to **2** significant figures. **[2]**		
Marking Criteria [1+1]	**AO/ Marks**	**Indicative Content**
1 mark: Accurate percentage calculated and presented to 2 significant figures (2.6%).	**AO2 x2**	Example 2-mark answer: 2 ÷ 76 = 0.0263 0.0263 x 100 = 2.632 [1] Answer to 2 sig fig = **2.6%** [1]
1 mark: Some workings shown (it is not necessary for every step in the indicative content to be shown to achieve this mark).		
0 marks: No creditworthy response.		

Q23 (b) Sketch a fully labelled bar chart showing the data collected in this investigation. **[3]**

Marking Criteria [1+1+1]	AO/ Marks	Indicative Content
1 mark: For accurately plotted data (e.g. bars in correct proportions to data).	**AO2 x3**	
1 mark: For including an appropriate scale/unit of measurement on the y axis.		
1 mark: For including an appropriate title and labelling of the X and Y axes to make it clear what the graph is displaying.		
0 marks: No creditworthy response.		

Q23 (c) Analyse the data to reach a conclusion that could be made in this investigation. **[3]**

Marking Criteria [1+1+1]	AO/ Marks	Indicative Content
1 mark: Relevant conclusion stated.	**AO3 x3**	Example answer: Participants were just as likely to see the ambiguous image as a crocodile as they were to see it as a laptop computer [1]. 37 participants perceived it as a crocodile and 37 perceived it as a laptop computer. [1] This could be because the image was in black-and-white, and this could have helped make it more ambiguous than if it had been in colour [1]. ▪ Any other appropriate conclusion.
1 mark: Stated conclusion is supported by reference to relevant findings.		
1 mark: A plausible explanation is given for the conclusion.		
0 marks: No creditworthy response.		

Q24 (a) Calculate the ratio of the number of participants who perceived a crocodile in the first condition to the number who perceived a crocodile in the second condition. Express your answer in its simplest form. **[1]**

Marking Criteria	AO/ Marks	Indicative Content
1 mark: Accurate ratio identified **and** simplified (3:1).	**AO2 x1**	3:1 [1] The ratio must be presented the correct way round to be credited, e.g. 3:1 is correct, but 1:3 is not.
0 marks: No creditworthy response.		

Q24 (b) State **three** reasons why the Chi-square test is the most appropriate non-parametric inferential statistical test to analyse the data in this investigation. **[3]**

Marking Criteria [1+1+1]	AO/ Marks	Indicative Content
For each reason: **1 mark:** A reason that the Chi-square test is the most appropriate test to use for this investigation is clearly stated in the context of this study. **0 marks**: No creditworthy response.	**AO2 x3**	Possible reasons for using a Chi-square test: ▪ The study used an independent measures design / different participants in the animals and electronic devices conditions. [1] ▪ The study was testing a difference / aiming to see if there was a difference in how the ambiguous image was perceived depending on whether they had seen images of animals or electronic devices. [1] ▪ The study used nominal data / the data was recorded in categories in terms of the number of times the ambiguous image was perceived as either a crocodile or as a laptop. [1]

Q24 (c) Calculate the degrees of freedom for use with the Chi-square test in this investigation. Show your workings. **[2]**

Marking Criteria [1+1]	AO/ Marks	Indicative Content
1 mark: Accurate calculation of degrees of freedom, i.e. df = 1. **1 mark:** Accurate workings shown, i.e. (2-1) x (2-1). **0 marks**: No creditworthy response.	**AO2 x2**	(2-1) x (2-1) [1] df = 1 [1] **NB.** Degrees of freedom are calculated as: (Number of rows –1) x (Number of columns – 1)

Q24 (d) Write a significance statement for the results of this study. **[4]**

Marking Criteria [1+1+1+1]	AO/ Marks	Indicative Content
1 mark: The results are significant at the p<0.05 level.	**AO2 x4**	The elements of the significance statement may be written in any order (not necessarily as shown in the marking criteria). Accept alternative wording where appropriate, e.g. the critical value (2.71) is less than the calculated value (3.80). Context: Refers to significant difference in how many people saw the ambiguous image as either a crocodile or a laptop computer, depending on whether they saw the image after seeing images of either animals or electronic devices.
1 mark: Stating that the calculated value (3.80) is greater than the critical value (2.71).		
1 mark: Therefore, the null hypothesis is rejected.		
1 mark: For contextualising the statement.		
0 marks: No creditworthy response.		

Q24 (e) Explain how this investigation demonstrates **one** principle of scientific enquiry. **[3]**

Marking Criteria [1+1+1]	AO/ Marks	Indicative Content
1 mark: Relevant scientific principle identified. (AO1) **1 mark:** The identified scientific principle is further explained/elaborated. (AO1) **1 mark:** The scientific principle is either identified or explained within the context of the investigation. (AO2) **0 marks:** No creditworthy response.	**AO1 x2** **AO2 x1**	<u>Possible scientific principles:</u> ▪ Hypothesis testing [1] – This investigation could test the hypothesis that participants who were shown the images of animals would be more likely [1] to perceive the ambiguous image as a crocodile than those who were shown the images of devices. [1] ▪ Falsification [1] – it is possible to prove the tested hypothesis wrong [1]. For example, if those who were shown the images of animals were not more likely to perceive the ambiguous image as a crocodile. [1] ▪ Standardisation [1]– All participants were tested in a similar way which allows the study to be replicated [1]. For example, the number of images was the same and they were all black and white. [1] ▪ Replicability [1] – This investigation could be replicated with another group of participants to check the test-retest reliability of the results [1] to see if the findings about the perception of the ambiguous image were robust. [1] ▪ Any other appropriate point.

Q24 (f) Evaluate **two** aspects of validity in the second stage of this investigation. **[6]**

Level	Marking Criteria [3+3]	AO/ Marks	Indicative Content
	For each aspect of validity:	**AO3 x6**	Possible aspects of validity that could be evaluated: ▪ Ecological validity – This is low because the task of being shown a series of images and then asked to report on what you see in an ambiguous image is not representative of a real-life situation or everyday task. However, completing this task in a controlled way like this does mean it can help to show cause and effect of prior experience on perception as the effect of extraneous variables is reduced. ▪ Population validity – This is low for this investigation as only 42 participants took part which is a small sample and likely has low representativeness of the population. The sample is also taken from one university and the students may share certain characteristics such as age or intelligence. This further leads to the sample being biased and not representative of what other people from different age and background might see when presented with the same images. ▪ Any other appropriate point.
Level 3 (3 marks)	Clear and developed evaluation of a relevant aspect of validity in this investigation.		
Level 2 (2 marks)	Clear but brief evaluation of a relevant aspect of validity in this investigation.		
Level 1 (1 marks)	An attempted evaluation, that is unclear in places, of a relevant aspect of validity in this investigation.		
0 marks: No creditworthy response.			

Q24(g) Explain how the researcher could have obtained a random sample from the target population of university students for this study. **[3]**		
Marking Criteria [1+1+1]	**AO/ Marks**	**Indicative Content**
1 mark: Reference to every person in the target population having an equal chance of being selected. (AO1)	**AO1 x2** **AO2 x1**	Example answer: A random sample could be obtained by getting a list of the names of all of the students registered [1] at a university [1] and putting their names into a random number generator and drawing out a sample of 100 names. [1] **NB.** Accept alternative wording for 'having an equal chance of being selected', e.g. selected / ensuring all members of the target population are chosen from. Accept any way that a sample would be drawn randomly, e.g. names out of a hat, random number generator, etc. To achieve the AO2 context mark the answer must make reference to the target population all being students at a university / all university students in the UK, etc.
1 mark: Reference to how the sample would be drawn randomly (e.g. random computer generator or names out of a 'hat'). (AO1)		
1 mark: The answer is in the context of the scenario given in the question. (AO2)		
0 marks: No creditworthy response.		

H569/01 Assessment Objectives Grid

Q	Assessment Objectives														Total mark	Maths	Maths Skill	Recall
	AO1		AO2								AO3							
	AO1.1a	AO1.1b	AO2.1a	AO2.1b	AO2.1c	AO2.1d	AO2.1e	AO2.1f	AO2.1g	AO2.1h	AO3.1a	AO3.1b	AO3.2a	AO3.2b				
1	1														**1**			
2						1									**1**			
3					1										**1**			
4								1							**1**	1	D.1.15	
5							1								**1**	1	D.1.15	
6							1								**1**	1	D.1.16	
7										1					**1**	1	D.1.6	
8					1										**1**			
9				1											**1**	1	D.1.11	
10				1											**1**	1	D.1.11	
11						1									**1**	1	D.1.10	
12										1					**1**	1	D.1.12	
13								1							**1**			
14							1								**1**			
15								1							**1**	1	D.1.13	
16									3						**3**			
17									4	2			3	3	**12**			
18		2							1						**3**			
19		2							1						**3**			
20		2											2	2	**6**			
21a						1									**1**	1	D.1.10	
21b						1									**1**	1	D.1.6	
22											2	4			**6**			
23a										2					**2**	2	D.0.2 D.1.1	
23b										3					**3**	2	D.1.3	
23c											2	1			**3**			
24a										1					**1**	1	D.0.2	
24b					2	1									**3**	3	D.1.12	
24c										2					**2**	2	D.1.13	
24d									2	2					**4**	3	D.1.13	
24e	2				1										**3**			
24f											2	4			**6**			
24g		2							1						**3**	2	D.1.5	
	2	**8**	**0**	**2**	**6**	**5**	**3**	**3**	**12**	**14**	**6**	**9**	**5**	**5**	**80**	**26**		**0**
	10		**45**								**25**							