GCE A LEVEL MARKING SCHEME

SUMMER 2023

A LEVEL
PSYCHOLOGY – COMPONENT 2
A290U20-1

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INTRODUCTION

This marking scheme was used by WJEC for the 2023 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

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GCE A LEVEL PSYCHOLOGY – COMPONENT 2

SUMMER 2023 MARK SCHEME

Question	AO1	AO2	AO3
1. (a)	1		
(b)	1		
(c)	1		
2. (a)	2		
(b)	2		
(c)	2		
(d)	1		
3. (a)	2		
(b)			5
4. (a)	2		
(b)	2		
5.			4
6.	4		
7.			5
8.			12
9. (a)		2	
(b)		6	
(c) (i)		2	
(ii)		2	
(d) (i)		2	
(ii)		2	
10. (a)		2	
(b) (i)		2	
(ii)		2	
(iii)		4	
(c)		4	
11. (a)		2	
(b) (i)		1	
(ii)		2	
(iii)		2	
(c)		4	

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Question	AO1	AO2	AO3
12. (a) (i)		1	
(ii)		4	
(b)		1	
(c) (i)		1	
(ii)		2	
(d)			4
TOTALS	**20**	**50**	**30**

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SECTION A – Principles of Research

1. Identify which type of variable is being described in the following statements:

(a) Variables in a study that are not being measured or manipulated by the researcher but affect the results of all participants' behaviour equally. [1]

Credit **will** be given for: • Extraneous variable. • Any other appropriate content.	
Marks	**AO1**
1	• Correct term identified.
0	• Inappropriate answer given. • No response attempted.

(b) Variables in a study that are not being measured or manipulated by the researcher, that affect some participants' behaviours but not others. [1]

Credit **will** be given for: • Confounding variable. • Any other appropriate content.	
Marks	**AO1**
1	• Correct term identified.
0	• Inappropriate answer given. • No response attempted.

(c) The variable the psychologist manipulates and controls to see how it affects behaviour. [1]

Credit **will** be given for: • Independent variable. • Any other appropriate content.	
Marks	**AO1**
1	• Correct term identified.
0	• Inappropriate answer given. • No response attempted.

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2. (a) Explain what is meant by the term ‘significance level’. [2]

Exemplar answers: A numerical value that is usually expressed in value including two decimal places. This level tells you the margin of error that could occur in your results and shows the probability of rejecting the null hypothesis. [2 marks] The probability of the results being down to chance [1 mark] • Any other appropriate content.	
Marks	**AO1**
2	• Reasonable explanation of significance level.
1	• Basic explanation of significance level.
0	• Inappropriate answer given. • No response attempted.

(b) Explain what is meant by ‘p≤0.01’. [2]

Exemplar answers: The probability that the results will be down to chance is 1% or less. [2 marks] The confidence level that the results are due to a real difference or correlation and not down to chance is 99% or higher. [2 marks] p is less than or equal to 1% [1 mark]. • Any other appropriate content.	
Marks	**AO1**
2	• Reasonable explanation of the term.
1	• Basic explanation of the term.
0	• Inappropriate answer given. • No response attempted.

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(c) Explain why a psychological researcher might use a *p* value of $p \leq 0.01$ rather than $p \leq 0.05$. [2]

Exemplar answers:

A 'stricter' or more stringent level of measurement, such as $p \leq 0.01$ may be used in research to reduce the margin for error, as $p \leq 0.05$ has more probability that the findings are due to chance, which may not be acceptable in some research, e.g. clinical trials.

Because $p \leq 0.05$ is not as strict as $p \leq 0.01$ [1mark]

- Any other appropriate content.

Marks	AO1
2	• Reasonable explanation.
1	• Basic explanation.
0	• Inappropriate answer given. • No response attempted.

(d) Explain the difference between the meaning of the symbols ≤ and < . [1]

Exemplar answers:

≤ means less than or equal to whereas < only means less than. [1 mark]

- Any other appropriate content.

Marks	AO1
1	• Appropriate explanation.
0	• Inappropriate answer given. • No response attempted.

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3. (a) Briefly explain how a psychologist would select a random sample for research. [2]

Exemplar answers:

The names of everyone in the target population is listed and then the required number of participants are selected through a random system, such as a computer-generated list or selected from a hat. [2 marks]

Selecting names from a hat [1 mark]

- Any other appropriate content.

Marks	AO1
2	• Reasonable explanation.
1	• Basic explanation.
0	• Inappropriate answer given. • No response attempted.

(b) Evaluate the use of random sampling in psychological research. [5]

Exemplar answers:

The sample is more likely to represent the target population because there will be less chance of bias when selecting the participants, as the researcher does not choose who takes part. However, the process can be more time consuming because it may be difficult to gain access to a full and accurate list of the target population and the randomly selected participants may not agree to take part, meaning the researcher would need to start again. [5 marks]

There is less chance of bias as the researcher does not choose the participants, but it could be difficult to access everyone who is randomly selected, making it more time consuming [3 marks]

The names are selected randomly so the researcher is less likely to influence who takes part in the study [1 mark]

- Any other appropriate content.

N.B. The evaluation does not need to include strengths and weaknesses; 5 marks could be achieved by an in-depth examination of only strengths or weaknesses.

Marks	AO3
5	• Thorough evaluation. • Structure is logical. • Depth and range included.
3-4	• Reasonable evaluation. • Structure is reasonable. • Depth or range included.
1–2	• Superficial evaluation. • Answer lacks structure.
0	• Inappropriate answer given. • No response attempted.

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4. Explain the following ways of assessing reliability in psychological research:

(a) 'Test-retest reliability'. [2]

Exemplar answers:

This involves testing and retesting the same participants over time, with the same test, and comparing their scores. If the scores are the same the test has external reliability. [2 marks]

Comparing the scores on the same test which is repeated [1 mark].

- Any other appropriate content.

Marks	AO1
2	• Reasonable explanation.
1	• Basic explanation.
0	• Inappropriate answer given. • No response attempted.

(b) 'Split-half reliability'. [2]

Exemplar answers:

This involves splitting a participant's test answers in half and seeing whether the participant got the same or similar scores on the two halves. If so, internal reliability is high. [2 marks]

Comparing the results from one half of the test to the other. [1 mark]

- Any other appropriate content.

Marks	AO1
2	• Reasonable explanation.
1	• Basic explanation.
0	• Inappropriate answer given. • No response attempted.

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5. Explain **two** advantages of conducting psychological research in the field compared to a laboratory environment. [2 + 2]

Exemplar answers:

Research conducted in the field may be more ecologically valid as the participants are in their natural environment and will behave more naturally than in the controlled setting of a laboratory. [2 marks]

In the field there is less risk of demand characteristics. [1 mark]

In the field, there is a wider range of potential locations to study the participants. [1 mark]

- Any other appropriate content.

Marks	AO3
2	• Reasonable explanation of an appropriate advantage of research conducted in the field compared to a laboratory environment.
1	• Basic explanation of an appropriate advantage of research conducted in the field, but not compared to a laboratory environment.
0	• Inappropriate answer given. • No response attempted.

6. Briefly explain the process of peer review in psychological research. [4]

Credit will be given for:

- The researcher's report/article is submitted to a panel of peers for review.
- The reviewers scrutinise the methodology, data analysis and conclusions and submit their comments to the editor.
- The editor may reject the article or submit it to the author to make revisions.
- The revised article is re-submitted to the editor for publication.

- Any other appropriate content.

Marks	AO1
3-4	• Reasonable explanation of the process of peer review.
1-2	• Basic explanation of the process of peer review.
0	• Inappropriate answer given. • No response attempted.

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7. Discuss the benefits of using quantitative data compared to qualitative data in psychological research. [5]

Credit will be given for:

- Quantitative data can be easier to analyse compared to qualitative data because statistical tests can be carried out on quantitative data which may be quicker than analysing detailed qualitative data, such as interview transcripts.
- Qualitative data may provide more insight into the reasons behind the behaviour which might make it more valid than quantitative data which might only tell us what is happening rather than why it is happening.

- Any other appropriate content.

Marks	AO3
5	• Thorough discussion. • Structure is logical. • Depth and range included.
3-4	• Reasonable discussion. • Structure is reasonable. • Depth or range.
1-2	• Superficial discussion. • Answer lacks structure.
0	• Inappropriate answer given. • No response attempted.

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8. Evaluate methodological and ethical issues that may arise in developmental psychological research, such as Kohlberg's (1968) research '*The child as a moral philosopher*'. [12]

Credit **will** be given for:

Methodological issues, such as validity or reliability

Use of interviews with children:
- Allows supplementary questions to be asked if necessary, such as the questionnaires used by Kohlberg.
- Often research is investigating children, so they may be less able to complete written self-reports methods.
- Children and young people may be more susceptible to researcher bias.

Use of hypothetical scenarios:
- Investigating what children say they would do not what they actually would do.
- May not be relevant to the participant's life, e.g. can a child relate to the Heinz scenario in Kohlberg's study?
- Studying children of different ages may not be reliable as the same scenarios or questions may not be appropriate for all ages.

Use of longitudinal method:
- Allows the researcher to track the development of children over time.
- More likely to suffer from sample attrition over time.

Use of cross-cultural comparison:
- Allows the researcher to ask if development is universal or culturally specific.
- The same questions may not be appropriate for different cultures.

Any other appropriate evaluation.

Ethical issues

- Risk of stress, anxiety, humiliation or pain: procedures may elicit high levels of anxiety in children.
- Children may not understand the debrief that is offered and therefore the risk is not alleviated.
- Lack of valid consent from children or elderly participants.

- Any other appropriate content.

N.B. Other developmental psychological research, not just Kohlberg's research, can be referred to and receive credit where relevant.

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Marks	AO3
10-12	• Thorough discussion of the methodological and ethical issues raised by Kohlberg's 1968 research. • Critical comments are evidently relevant to the context. • Structure is logical throughout. • Depth and range included. • An appropriate conclusion is reached based on evidence presented
7-9	• Reasonable discussion of the methodological and ethical issues raised by Kohlberg's 1968 research. • Critical comments show some relevance to the context. • Structure is mostly logical. • Depth and range, but not in equal measure. • A reasonable conclusion is reached based on evidence presented.
4-6	• Basic discussion of the methodological and ethical issues raised by Kohlberg' 1968 research. • Critical comments are generic and not appropriately contextualised. • Structure is reasonable. • Depth or range. • A basic conclusion is reached. OR • Thorough discussion of the methodological OR ethical issues raised by Kohlberg's 1968 research. • Critical comments are evidently relevant to the context. • Structure is logical throughout. • Depth and range included. • An appropriate conclusion is reached based on evidence presented.
1-3	• Superficial discussion of the methodological and ethical issues raised by Kohlberg's 1968 research. • Evaluative comments are superficial. • Answer lacks structure. • No conclusion OR • Reasonable discussion of the methodological OR ethical issues raised by Kohlberg's 1968 research. • Critical comments show some relevance to the context. • Structure is mostly logical. • Depth and range, but not in equal measure. • A reasonable conclusion is reached based on evidence presented.
0	• Inappropriate answer given. • No response attempted.

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SECTION B – Personal Investigations

INVESTIGATION ONE: A content analysis of anti-social behaviour in the media

9. (a) State the aim of your content analysis. [2]

Exemplar answers:

To find out if anti-social behaviour, such as noise in the street, was reported differently according to gender in newspapers. [2 marks]

To investigate if there was more anti-social behaviour reported in the papers, such as car racing at night, in cities than in rural areas. [2 marks]

To assess the extent of anti-social behaviour, such as trolling, on social media sites such as Instagram. [1 mark]

- Any other appropriate content.

NB. No credit for description of a hypothesis (e.g. There will be more anti-social behaviour from girls than boys in the media).

Marks	AO2
2	• Appropriate aim is stated with clear links to the research.
1	• Basic aim is stated with limited links to the research.
0	• Inappropriate answer given. • No response attempted.

(b) Describe the procedures you followed when you carried out your content analysis. [6]

Exemplar answers:

I collected a range of newspaper articles which featured reports of anti-social behaviour. I read through them first to familiarise myself with the content. I looked for examples of anti-social behaviour and categorised and identified categories, such as 'music' and 'time of day' which I then categorised as 'loud music played at night'. I then looked through the articles again looking specifically for content that fitted into this category. I made a tally of how many times that category appeared in the article [6 marks]

I watched a range of TV programmes and identified anti-social behaviour. I produced codes and then watched the programmes again, counting how many times each instance of anti-social behaviour appeared. [3 marks]

I counted the number times anti-social behaviour was displayed in a range of social media sites. [1 mark]

- Any other appropriate content.

Marks	AO2
4–6	• Thorough description clearly linked to the investigation.
3–4	• Reasonable description with some links to the investigation.
1–2	• Superficial description with limited links to the investigation.
0	• Inappropriate answer given. • No response attempted.

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(c) (i) Explain **one** issue of validity in your content analysis. [2]

Exemplar answers:

There may be researcher bias which could have affected the internal validity. I may have chosen media articles that I am familiar with which would mean that a full range of media has not been selected and therefore the findings do not truly represent the anti-social behaviour across a wider range of media. [2 marks]

I only used material that I had on my phone and therefore it was not fully representative of all material which meant that there would be researcher bias. [1 mark]

I only looked at social media which I like, which could be biased and only applicable to young people. [1 mark]

- Any other appropriate content.

Marks	AO2
2	• Reasonable explanation of one issue of validity clearly linked to this investigation.
1	• Basic explanation of one issue of validity linked to this investigation. OR • Reasonable explanation of an appropriate issue of validity not clearly linked to this investigation.
0	• Inappropriate answer given. • No response attempted.

(ii) Explain how you dealt with the issue with validity identified in (c)(i). [2]

Exemplar answers:

I used a range of media articles which are more representative of wider audiences, such as printed newspapers and magazines as well as online articles and social media. This reduces the researcher effect. [2 marks]

I used a wider range of media articles. [1 mark]

- Any other appropriate content.

Marks	AO2
2	• Reasonable explanation of the way of dealing with one issue of validity clearly linked to this investigation.
1	• Basic explanation of the way of dealing with one issue of validity linked to this investigation. OR • Reasonable explanation of the way of dealing with one issue of validity not clearly linked to this investigation.
0	• Inappropriate answer given. • No response attempted.

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(d) (i) Explain **one** issue of reliability in your content analysis. [2]

Exemplar answers:

I may have used coding units that are subject to interpretation, such as 'noise'. This would make it difficult for another researcher to analyse the data in the same way as me, reducing the reliability of the findings. [2 marks]

I may have categorised the variable in a way that is open to interpretation, meaning another researcher would analyse the data differently, reducing the reliability. [1 mark]

I used vague categories for my coding units which may have made the assessment of anti-social behaviour unreliable. [1 mark]

- Any other appropriate content.

Marks	AO2
2	• Reasonable explanation of one issue of reliability clearly linked to this investigation.
1	• Basic explanation of one issue of reliability linked to this investigation. OR • Reasonable explanation of one issue of reliability not clearly linked to this investigation.
0	• Inappropriate answer given. • No response attempted.

(ii) Explain how you dealt with the issue with reliability identified in (d)(i). [2]

Exemplar answers:

I asked another student and my teacher to look at my categories and check that they were specific and not vague; for example, I changed 'noise' to 'music' or 'shouting' to make the categories clearer for another researcher to use. [2 marks]

I asked another student to check my categories to establish that they were consistent. [1 mark]

- Any other appropriate content.

Marks	AO2
2	• Reasonable explanation of a way of dealing with one issue of reliability clearly linked to this investigation.
1	• Basic explanation of a way of dealing with one issue of reliability linked to this investigation. OR • Reasonable explanation of a way of dealing with one issue of reliability not clearly linked to this investigation.
0	• Inappropriate answer given. • No response attempted.

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INVESTIGATION TWO: A questionnaire on pet ownership and stress

10. (a) Explain how you operationalised 'stress' in your investigation. [2]

Exemplar answers:

I used the Perceived Stress Scale in my questionnaire which asked the participant to report their feelings of stress in the last month, such as if they had feelings of not being able to cope. The response was graded from 0–5 with 0 being never to 5 being every day. The total score on the scale gave a measurement of stress. [2 marks]

I asked the participants to rate their stress levels on a scale of 1–10 with 1 being 'not felling stressed at all' and 10 being 'feeling extremely stressed'. [2 marks]

I asked pet owners and the non-pet owner to rate their stress levels on scale of 1–10. [1 mark]

- Any other appropriate content.

Marks	AO2
2	• Reasonable explanation of the variable clearly linked to this investigation.
1	• Basic explanation of the variable linked to this investigation. OR • Reasonable explanation of the variable not clearly linked to this investigation.
0	• Inappropriate answer given. • No response attempted.

(b) (i) Explain **one** ethical issue which you considered in your investigation. [2]

Exemplar answers:

One ethical issue was the risk of stress or anxiety when completing the questionnaire. The participant could have recently lost a pet and the questions in the questionnaire could upset them. [2 marks]

The participants could have got upset when thinking about the questions, which means I did not protect them from harm. [1 mark]

Questions about their stress levels could have made them anxious. [1 mark]

- Any other appropriate content.

Marks	AO2
2	• Reasonable explanation of the ethical issue clearly linked to this investigation.
1	• Basic explanation of the ethical issue linked to this investigation. OR • Reasonable explanation of the ethical issue not clearly linked to this investigation.
0	• Inappropriate answer given. • No response attempted.

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(ii) Explain how you managed the ethical issue identified in (b)(i). [2]

Exemplar answers:

I told the participants before the study that I would be asking them about their pets and that they could withdraw from the study at any time. This meant that if they started to feel upset about a lost dog, they could stop answering the questions. [2 marks]

I told the participants that they could withdraw from my investigation at any time if they were upset. [1 mark]

At the end of the questionnaire, I provided the email for the school counsellor. [1 mark]

- Any other appropriate content.

Marks	AO2
2	• Reasonable explanation of one way of managing the ethical issue identified in (b)(i) clearly linked to this investigation.
1	• Basic explanation of one way of managing the ethical issue identified in (b)(i) linked to this investigation. OR • Reasonable explanation of one way of managing the ethical issue identified in (b)(i) not clearly linked to this investigation.
0	• Inappropriate answer given. • No response attempted.

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(iii) Apart from ethical issues, explain **one** strength and **one** weakness of using a questionnaire in this investigation. [2+2]

Exemplar answers:

Strengths

One strength is that the participants in my study might have been more honest because the questionnaire was anonymous. They might not have wanted to talk to me face to face about their stress levels as they might be embarrassed but in an anonymous questionnaire, they can tell me how they feel which will improve the validity of my research. [2 marks]

The students could be more honest in my questionnaire because I didn't record their names. [1 mark]

Weaknesses

Some of the questions in the questionnaire may have been ambiguous or subjective, such as 'in the last month, have you felt overwhelmed'. The participants may have different interpretations of being overwhelmed and this would reduce the validity of my findings. [2 marks]

The students might not understand the question and lie about their stress. [1 mark]

- Any other appropriate content.

NB. Do not credit strength or weaknesses relating to ethical issues or considerations.

Marks	**AO2**
2	• Reasonable explanation of the strength/weakness clearly linked to this investigation.
1	• Basic explanation of the strength/weakness linked to this investigation. OR • Reasonable explanation of the strength/weakness not clearly linked to this investigation.
0	• Inappropriate answer given. • No response attempted.

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(c) Identify and justify the choice of inferential statistic used to analyse the data in this investigation. [4]

Exemplar answers:

I used a Mann Whitney test to analyse my data as I was testing for a difference between two independent groups (participants had a pet or didn't have a pet) and the level of measurement was ordinal (score on a stress scale). [4 marks]

I used a Mann Whitney test to analyse my data as I was testing for a difference between two independent groups (participants had a pet or didn't have a pet) and the level of measurement was ordinal. [3 marks]

I used a Mann Whitney test because it was testing the relationship between two groups and the stress scale was ordinal data. [2 marks]

Mann Whitney because the data was ordinal and I was testing the difference between two independent groups. [1 mark]

- Any other appropriate content.

N.B. There will potentially be differences that reflect the research choices made by each candidate; credit the inferential statistical test choice if it is potentially an appropriate way of analysing the data collected in their questionnaire on stress and pet ownership.

Marks	AO2
4	• Appropriate inferential statistical test identified. **All of the following conditions included in the justification:** • Type of test (difference or relationship) noted and linked to research. • Level of measurement noted and linked to research. • Independent or related data noted and linked to research.
3	• Appropriate inferential statistical test identified. **Two of the following conditions included in the justification:** • Type of test (difference or relationship) noted and linked to research. • Level of measurement noted and linked to research. • Independent or related data noted and linked to research.
2	• Appropriate inferential statistical test identified. **One of the following conditions included in the justification:** • Type of test (difference or relationship) noted and linked to research. • Level of measurement noted and linked to research. • Independent or related data noted and linked to research.
1	• Appropriate inferential statistical test identified. • Justification is missing, inaccurate or has not been linked to research.
0	• Inappropriate answer given. • No response attempted.

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SECTION C – Application of research methods to a novel scenario

11. Psychological research has shown that a memory of an event can be influenced by information received after the event.

Two days after visiting a museum, 40 people went to a laboratory, where they were randomly allocated into one of two groups. Participants in Group A answered questions in a room with a picture of Queen Victoria wearing a white dress and participants in Group B answered questions in a room without any pictures. One question was, "What was the colour of Queen Victoria's dress in the museum?". The correct answer was blue.

Figure 1. Responses to the question "What was the colour of Queen Victoria's dress in the museum?"

	Number of participants who stated this colour	
Response	Group A: room with a picture of Queen Victoria wearing a white dress	Group B: room without any pictures.
Blue	6	10
White	11	6
Another colour	3	4
Total	20	20

(a) State **one** appropriate conclusion that can be drawn from the findings in this research (displayed in Figure 1). [2]

Exemplar answer:

More participants correctly identified the dress in the museum as blue (10) when the room did not have a picture of Queen Victoria than when in the room with the picture of a white dress. (6). [2 marks]

More participants incorrectly stated the colour of Queen Victoria's dress in the museum, if the dress worn in the picture was white [1 mark]

- Any other appropriate content.

Marks	**AO2**
2	• Detailed appropriate conclusion clearly linked to the research.
1	• Basic appropriate conclusion linked to the research.
0	• Inappropriate answer given. • No response attempted.

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(b) (i) Identify which measure of central tendency would be appropriate to describe this data (as displayed in Figure 1). [1]

Exemplar answers: The mode. [1 mark] • Any other appropriate content.	
Marks	**AO2**
1	• Accurate identification of the measurement of central tendency.
0	• Inappropriate answer given. • No response attempted.

(ii) Explain why this is the most appropriate measure of central tendency for this data. [2]

Exemplar answers: Because the colour of the dress is nominal / category data [2 marks] Because the data is nominal. [1 mark] • Any other appropriate content.	
Marks	**AO2**
2	• Accurate explanation clearly linked to the research.
1	• Accurate explanation not clearly linked to the research.
0	• Inappropriate answer given • No response attempted.

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(iii) Analyse the data in Group B using the measure of central tendency identified in (b)(i). [2]

Exemplar answers:

Blue is the mode because it is the most commonly occurring answer, selected by 10 people. [2 marks]

Blue is the mode. [1 mark]

- Any other appropriate content.

N.B. Credit can be given to analysis of measures of central tendency identified in (b) (i), even if not the mode, i.e. the mean is 6.66 because 10 + 6 + 4 /3 = 6.66 or the median is 6 because it is the middle value when the scores are ranked in order from lowest to highest 4, 6, 10.

Marks	AO2
2	• Accurate analysis of the measure of central tendency identified in (i) clearly linked to the research.
1	• Accurate analysis of the measure of central tendency identified in (i) not clearly linked to the research.
0	• Inappropriate answer given. • No response attempted.

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(c) A Chi Square test was carried out and the calculated value was 5.78. The degrees of freedom are 2. Using an appropriate critical value from the table below **(Figure 2)**, justify whether the researcher should accept or reject the null hypothesis. [4]

Figure 2: Critical values for Chi Square test

Degrees of freedom (df)	0.05
1	3.84
2	5.99
3	7.81
4	9.49
5	11.07
6	12.59

Credit **will** be given for:

- Identification of the correct critical value = 5.99
- Accurately accepting the null hypothesis

- Reasonable justification of why the null should be accepted.

OR

- Basic justification of why the null should be accepted.

Exemplar answer:

We should accept the null hypothesis because the observed value of 5.78 is lower than the critical value in the table for 2 degrees of freedom (5.99) for a significant finding at $p \leq 0.05$. [4 marks]

We should accept the null hypothesis because the observed value of 5.78 is lower than the critical value in the table at $p < 0.05$. [3 marks]

We should accept the null because the critical value is 5.99. [2 marks]

We should accept the null hypothesis because the observed value is lower than the critical value in the table. [2 marks]

Because the observed value is lower than the critical value of 5.99. [1 mark]

Critical value is 5.99 [1 mark]

We should accept the null hypothesis [0 marks]

- Any other appropriate content.

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Marks	AO2
4	• The correct critical value is identified. • The null hypothesis has been accepted. • BOTH of the above features AND appropriate justification with clear links to the research.
3	• The correct critical value is identified. • The null hypothesis has been accepted. • ONE of the above features AND appropriate justification with clear links to the research. OR • BOTH of the above features AND appropriate justification without clear links to the research.
2	• The correct critical value is identified. • The null hypothesis has been accepted. • ONE of the above features AND appropriate justification without clear links to the research. OR • BOTH of the above features without justification without clear links to the research.
1	• The correct critical value is identified. • The null hypothesis has been accepted. • ONE of the above features without justification without clear links to the research.
0	• Inappropriate answer given. • No response attempted.

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12. A researcher was asked to report on the effectiveness of a campaign to reduce harmful emissions into the environment. A sample was selected from students aged 13 to 16 years who lived within a safe walking distance of the school and currently travelled by car.

The students were asked to watch the campaign video and then given a questionnaire to measure their attitude towards environmental change. They were then asked to walk to school for a month. The score on the attitude scale and the number of days out of the month in which they walked to school are shown in the table below.

Figure 3: Students' scores on the attitude scale and the number of days they walked to school.

Student	Score on a scale of 1–20 measuring positive attitudes to environmental change.	Number of days walked to school out of the 20 school days in the month.
1	7	9
2	7	12
3	5	2
4	8	9
5	12	14
6	9	12
7	18	20
8	12	16
9	11	12
10	16	18

(a) (i) Identify **one** appropriate graphical representation that could be used to display the data in this research. [1]

Exemplar answers:

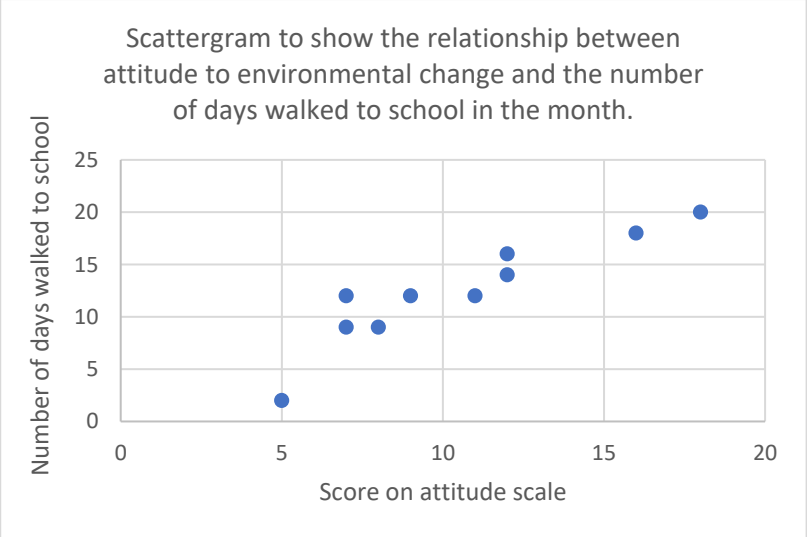
Scattergram [1 mark]
Scatterplot [1 mark]

- Any other appropriate content.

Marks	AO2
1	• Accurate identification of an appropriate graphical representation.
0	• Inappropriate answer given. • No response attempted.

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(ii) Using the graphical representation that you identified in (a)(i), display the data in this research. [4]

AO2
Credit **will** be given for: Features (1 mark per feature up to a maximum of 4 marks) • Appropriate title for graphical representation. • Appropriate label and scale of x axis. • Appropriate label and scale of y axis. • Appropriate and accurate plotting of the data in Fig. 2. • Any other appropriate content. N.B. The graphical representation must be the one identified in (a)(i) so if a graphical representation is not identified in (a)(i), credit cannot be given in (a)(ii). 

(b) Identify the level of measurement of the 'scores on attitude scale' in this research. [1]

Exemplar answers:

Ordinal data. [1 mark]
The scores on the attitude scale were ordinal level data. [1 mark]

• Any other appropriate content.

Marks	AO2
1	• Accurate identification of an appropriate level of measurement.
0	• Inappropriate answer given. • No response attempted.

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(c) (i) Identify **one** appropriate measure of dispersion for the data 'number of days walked to school' in this research. [1]

Exemplar answers: Standard deviation. [1 mark] Range [1 mark] • Any other appropriate content.	
Marks	**AO2**
1	• Accurate identification of an appropriate measure of dispersion.
0	• Inappropriate answer given. • No response attempted.

(ii) Justify why the measure of dispersion identified in (c) (i) is appropriate for 'number of days walked to school'. [2]

Exemplar answers: The standard deviation is a better measure because the outlier of 2 will not skew the data. [2 marks] The range is appropriate because it is less time consuming to calculate than the standard deviation, because the researcher can simply subtract the lowest value of 2 away from the highest value of 20 [2 marks] It is appropriate because it is interval data. [1 mark] • Any other appropriate content. N.B. Do not credit an advantage of the standard deviation which also applies to the range (e.g. takes all of the data in account).	
Marks	**AO2**
2	• Reasonable justification clearly linked to the research.
1	• Reasonable justification not clearly linked to the research.
0	• Inappropriate answer given. • No response attempted.

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(d) Explain **one** advantage and **one** disadvantage of using a self-selecting sampling technique. [2+2]

Exemplar answers:

Advantage:

The researcher can be confident that the selected participant will definitely want to take part, unlike randomly selected participants, which means they are less likely to drop out of the study. [2 marks]

Participants are less likely to drop out. [1 mark]

Disadvantage:

Self-selected volunteers are more likely to be unrepresentative than randomly selected participants, as people who volunteer for research may be more confident than those who are less willing to take part. [2 marks]

The sample will be less representative. [1 mark]

- Any other appropriate content.

Marks	AO3
2	• Reasonable explanation of an appropriate advantage / disadvantage.
1	• Basic explanation of an appropriate advantage / disadvantage.
0	• Inappropriate answer given. • No response attempted.

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