

1.

Um, erm and ah

Disfluencies are disruptions in the flow of spoken language, including stuttering and hesitations, such as 'um', 'erm' and 'ah'. These often indicate emotions, such as feelings of anxiety and distress. A psychologist wants to investigate this further by conducting a correlation study to see if there is a relationship between the disfluencies a person makes and how anxious they feel while making a public speech.

(a) Write a null hypothesis for this study. (3)

Mark Scheme

Answer	Marks	Guidance
For example... <i>There will be no significant correlation between the number of disfluencies a person makes and how anxious they feel on a rating scale 1-10.</i>	Max 3	Context = disfluencies, uh, erm and ah, public speech, anxiety etc Can be written in future or present tense. Use of the word 'significant' is not necessary for full marks. For full marks both the variables must be operationalised (there are many ways to operationalise each variable but each one must be on a continuous quantitative scale to allow for a correlation to be carried out, e.g. disfluencies = number of disfluencies, anxiety = score out of 10).
Correctly cited null hypothesis with both variables operationalised.	3	
Correctly cited null hypothesis with reference to both variables, but only one operationalised .	2	
Correctly cited null hypothesis with reference to both variables, but neither operationalised OR unclear wording.	1	Zero marks for use of the word 'difference' or referring to cause/effect.
The candidate has not provided any creditworthy information.	0	Zero marks for an alternative hypothesis or muddled attempt like "there will be no positive correlation".

(b) Explain how you would conduct a correlation study to investigate if there is a relationship between the disfluencies a person makes and how anxious they feel while making a public speech. Justify your decisions as part of your explanation. (15)

You must refer to:

- how you would use self-selected sampling to obtain participants for the study
- how you would operationalise the variable 'disfluencies'
- how you would operationalise the variable 'anxiety'
- the control of one extraneous variable. You should use your own experience of practical activities to inform your response.

Mark Scheme

	Answer	Marks	Guidance
		Max = 15	
Level of response	Details of required features (RFs) included	Justification of decisions made	Reference to own practical work
Good 12-15 marks	All 4 required features (RFs) addressed in context. Accurate and detailed knowledge and understanding of each feature in context. Good evidence of application of required features in context.	Appropriate justification of all decisions and some is contextualised. Well developed line of reasoning that is clear and logically structured.	Explicit reference to own practical work and clear links between own work and the planned research for each required feature, e.g. specific mention of aim or procedural features. For top band (good) 12 marks if just one RF linked, 13 marks if two, 14 marks if three and 15 if all four are linked If there is no explicit clear link between own practical work and any of the 4 required features caps the mark at 11 maximum.
Reasonable 8-11 marks	At least 3 required features in context. Reasonably accurate and detailed knowledge and understanding of each feature.	Some appropriate justification of decision related to required features (if no justification in context award 8 marks). There was a line of reasoning evident with some structure.	Overall mark Look at RF first: L4 Good – all 4 good (L4) in context L3 Reasonable – min 3 reasonable (L3) in context L2 Limited – min 2 limited (L2) in context or 3- 4 limited (L2) with no context L1 Basic – 1 basic (L1) (no context needed).
Limited 4-7 marks	At least two of the required features addressed in context Limited application of required features OR three or all four required features referred to but in a limited way If one required feature addressed in detail and justified in context and explicit links made to own practical work award 4 marks.	Attempt to justify decision(s) but weak. Evidence of some structure, but weak.	THEN look at justifications: L4 Good – at least 2 reasonable (L3) AND at least 2 of the justifications are in context (does not have to be the reasonable ones) L3 Reasonable – at least 2 limited (L2) AND at least 1 of the justifications is in context. L2 Limited – at least 1 limited (L1) (no need for context) L1 Basic – no justification or basic justification
Basic 1-3 marks	At least one of the required features addressed. Weak application of required features. OR more than one of the required features referred to but in a very brief and/or basic way.	None, or if present very weak.	NB. References to experiment in justification (e.g. helps to establish cause and effect) = basic justification.

RF		Details of RF
1	How to use self-selected sampling to obtain participants for the study	<ul style="list-style-type: none"> Good - Clearly explained how self-selected sampling method has been carried out in their study in terms of procedural details (e.g. newspaper advert, contact details, how ended up with the final sample, e.g. the first 30 participants to contact the researcher would be included in the study) Reasonable – Shown reasonable attempt to explain how this has been carried out in their study (e.g. use of newspaper advert). Limited - Possibly defined (e.g. use of volunteers) OR unclear attempt to explain how this has been carried out in the study. Basic - Confuses sampling methods (i.e. alludes to some features of self-selected sampling however also includes features of other methods).
2	How you would operationalise the variable 'disfluencies'	<ul style="list-style-type: none"> Good - Clear details on how 'disfluencies' will be operationalised with an outline of how data is quantified to clearly give a continuous numerical value suitable for use in a correlation. It is clear how this data is collected/measured. E.g. 'Counting the number of disfluencies such as 'erm' made in 5 minutes whilst giving a public speech'. NB. For Good, candidates can specify time frame OR what the speech was about. Reasonable - Reasonable details on how 'disfluencies' will be operationalised that lead to continuous numerical value suitable for use in a correlation. It may not be completely clear how the data is collected/measured. E.g. 'Counting the number of disfluencies made whilst giving a public speech'. Limited - The way 'disfluencies' is operationalised is addressed in an unclear way, e.g. doesn't refer to a public speech, doesn't make clear what a disfluency is or more than one measure indicated (e.g. two researchers/observers noting down the number of disfluencies). NB. No reference to public speaking cannot go above limited level. Basic – Vague indication of how 'disfluencies' will be measured (e.g. noting disfluencies) or data not suitable for a correlation (i.e. reference to tallies in categories), e.g. 'Counting whether the participants made disfluencies or not whilst giving a public speech'.
3	How you would operationalise the variable 'anxiety'	<ul style="list-style-type: none"> Good - Clear details on how 'anxiety' will be operationalised. Outline of how data is quantified to clearly give a continuous numerical value suitable for use in a correlation. It is clear how this data is collected/measured, e.g. if a rating scale is used, the ends of the scale are labelled. E.g. 'Asking people to rate on a scale of 1-10 (1 = not at all anxious and 10 = very anxious) how they felt whilst giving the public speech'. Reasonable - Reasonable details on how 'anxiety' will be operationalised that lead to continuous numerical value suitable for use in a correlation. It may not be completely clear how the data is collected/measured. E.g. 'Asking people to rate on a scale of 1-10 how anxious they felt whilst giving the public speech'. NB. Naming the scale incorrectly (e.g. semantic differential scale of 1-10) limits the RF to max reasonable. Limited - The way 'anxiety' is operationalised is addressed in an unclear way, e.g. general measure of anxiety unrelated to public speaking/'Asking people to rate on a scale of 1-10 how anxious they feel' or more than one measure indicated. NB. No reference to public speaking cannot go above limited level. Basic – Vague indication of how 'anxiety' will be measured (e.g. asking about anxiety), scale is too small to be suitable for a correlation (i.e. it should span at least from 1 to 5) or data not suitable for a correlation (e.g. 'Asking the participants whether they felt anxious or not whilst giving a public speech').
4	The control of one extraneous variable	<ul style="list-style-type: none"> Good - Clear and detailed outline of how an identified (explicit or implicit) extraneous variable. Reasonable - Clear outline of how an identified (explicit or implicit) extraneous variable. Limited - Attempts to explain how an identified (explicit or implicit) extraneous variable can be controlled. Basic - Identifies an extraneous variable that can be controlled. <p>If more than one control, credit the first one.</p> <p>NB. Personal characteristics (e.g. being extroverted, confident, very anxious, occupation) are not creditworthy.</p>
	Annotations	<p>Context = disfluencies, uh, erm and ah, (public) speech, anxiety, etc.</p> <p>RF on the left with: L4=Good; L3=Reasonable; L2= Limited; L1= Basic.</p> <p>Context with CONT.</p> <p>Justification within the response on the right with a TICK. Do not annotate the level, note the level of justification to decide on the mark given within the band.</p>

- (c) **Outline** one strength and one weakness of conducting this study using the correlation technique. (6)

Mark Scheme

Answer	Marks	Guidance
<p><u>Possible strengths:</u></p> <ul style="list-style-type: none"> ▪ Collection of quantifiable data. ▪ Can provide ideas for experimental work in future. ▪ Easy to see patterns / trends (scatter diagram) in data. ▪ More ethical as there is no manipulation of variables. ▪ Can investigate difficult to manipulate variables ▪ Often higher in ecological validity ▪ Any other appropriate point. <p><u>Possible weaknesses:</u></p> <ul style="list-style-type: none"> ▪ Not possible to establish cause and effect. ▪ No details on why participants reacted / felt as they did. ▪ Often lack construct validity due to use of quantitative data ▪ Influence of third/extraneous variables ▪ Any other appropriate point. 	Max 6 [3+3]	Context = disfluencies, uh, erm and ah, (public) speech, anxiety etc. NB: Only first strength and first weakness is marked.
For each strength and each weakness...		
Clear outline of strength/weakness in context.	3	
Clear outline of strength/weakness but not in context.	2	OR attempted outline of strength/weakness in context.
Brief and/or weak attempt to outline strength/weakness (whether in context or not).	1	
The candidate has not provided any creditworthy information.	0	

- (d) **Outline** one weakness of using self-selected sampling in this study. (3)

Mark Scheme

Answer	Marks	Guidance
<p><u>Possible weaknesses:</u></p> <ul style="list-style-type: none"> ▪ Lack of control over composition of sample. ▪ Potential biased sample – volunteers more outspoken so maybe less likely to be anxious/better at public speaking, access to advert may be limited to a particular group of people etc. ▪ Participant bias/<u>increased</u> risk of demand characteristics ▪ Can be time consuming ▪ Any other appropriate point. 	Max 3	Context = disfluencies, uh, erm and ah, (public) speech, anxiety etc. NB. Accept context from Q21. NB: Only first response is marked.
Clear outline of appropriate weakness in context.	3	
Clear outline of weakness but not in context.	2	OR attempted outline of weakness in context.
Brief and/or weak attempt to outline strength/weakness (whether in context or not).	1	
The candidate has not provided any creditworthy information.	0	

2.

Slipping up can be good

Psychologists have investigated many ways that could improve how children learn. However, most of these have concentrated on studying the effect of different teaching styles, rather than focusing on the child themselves. A psychologist taking a more child-focused approach wants to study if being more relaxed affects concentration levels. They want to investigate if young children can concentrate better when wearing comfortable slippers on their feet compared to wearing shoes. The study is to be conducted in one large primary school with 240 children on the register.

(a) Write a one-tailed alternative hypothesis for this study. (3)

Mark Scheme

Answer	Marks	Guidance
For example ... Children will have better concentration (measured by spot the difference puzzle out of 20) when wearing slippers compared to wearing shoes.	Max 3	Context = concentration, slippers, shoes, learning, primary school children etc. Tail can be in either direction (predicting better concentration when wearing slippers, or predicting worse concentration when wearing slippers)
Correctly cited one-tailed alternative hypothesis with both variables operationalised.	3	
Correctly cited one-tailed alternative hypothesis with reference to both variables, but only one operationalised.	2	Zero marks for two-tailed, null or correlational hypotheses.
Correctly cited one-tailed alternative hypothesis with reference to both variables, but neither operationalised.	1	
The candidate has not provided any creditworthy information.	0	Can be written in future or present tense. Use of the word 'significant' is not necessary for full marks. For full marks both the variables must be operationalised. IV – both levels/conditions must be given (slippers vs shoes) DV – need to specify how concentration will be measured, e.g. spot the difference puzzle <u>score</u> /spot the difference score <u>out of 20</u> . 'Level of concentration' is not operationalised.

(b) Explain how you would conduct a study using the laboratory experimental method to investigate if wearing slippers affects a child's ability to concentrate. Justify your decisions as part of your explanation. (15)

You must refer to:

- how you would use random sampling to obtain 30 participants for the study
- the experimental design you would use in this study
- how you would operationalise the dependent variable to obtain quantitative data
- the control of one extraneous variable. You should use your own experience of practical activities to inform your response.

Mark Scheme

Answer	Marks	Guidance
	Max = 15	
Details of required features (RFs) included	Justification of decisions made	Reference to own practical work
<p>All 4 required features (RFs) addressed in context.</p> <p>Accurate and detailed knowledge and understanding of each feature in context.</p> <p>Good evidence of application of required features in context.</p> <p>At least 3 required features in context.</p> <p>Reasonably accurate and detailed knowledge and understanding of each feature.</p>	<p>Appropriate justification of all decisions and <i>some</i> is contextualised.</p> <p>Well-developed line of reasoning that is clear and logically structured.</p>	<p>Explicit reference to own practical work and clear links between own work and the planned research for each required feature, e.g. specific mention of aim or procedural features. For top band (good) 12 marks if just one RF linked, 13 marks if two, 14 marks if three and 15 if all four are linked.</p> <p>If there is no explicit clear link between own practical work and <i>any</i> of the 4 required features caps the mark at 11 maximum.</p> <p>Maximum 11 marks (reasonable) if clearly done as a field experiment. If no justification in context award 8 marks.</p> <p>Overall mark Look at RF first: L4 Good – all 4 good (L4) in context L3 Reasonable – min 3 reasonable (L3) in context L2 Limited – min 2 limited (L2) in context or 3- 4 limited (L2) with no context L1 Basic – 1 basic (L1) (no context needed).</p> <p>THEN look at justifications: L4 Good – at least 2 reasonable (L3) AND at least 2 of the justifications are in context (does not have to be the reasonable ones) L3 Reasonable – at least 2 limited (L2) AND at least 1 of the justifications is in context. L2 Limited – at least 1 limited (L1) (no need for context) L1 Basic – no justification or basic justification</p>
<p>At least two of the required features addressed in context.</p> <p>Limited application of required features. OR three or all four required features referred to but in a limited way.</p> <p>If one required feature addressed in detail and justified in context and explicit links made to own practical work award 4 marks.</p>	<p>Some appropriate justification of decision related to required features (if no justification in context award 8 marks).</p> <p>There was a line of reasoning evident with some structure.</p> <p>Attempt to justify decision(s) but weak.</p> <p>Evidence of some structure, but weak.</p>	
<p>At least one of the required features addressed.</p> <p>Weak application of required features. OR more than one of the required features referred to but in a very brief and/or basic way.</p>	<p>None, or if present very weak.</p>	

RF	Details of RF
1	<p>Use of random sampling to obtain 30 participants</p> <ul style="list-style-type: none"> Good – Clearly explained how this has been carried out in their study in terms of procedural details (e.g. register + the use of random number generator + how contacted after the selection/hat). Reasonable – Shown reasonable attempt to explain how this has been carried out in their study (e.g. register + the use of the random number generator/hat). Limited – possibly defined OR unclear attempt to explain how this has been carried out in their study. Basic – Confuses sampling methods (i.e. alludes to some features of random sampling however also includes features of other methods)
2	<p>Experimental design</p> <ul style="list-style-type: none"> Good – Identified the experimental design and clearly explained how this has been implemented/carried out in their study (IMD should include reference as to how they were allocated to conditions; RMD should include reference to the order of conditions/counterbalancing; MPD should include reference to variables that participants were matched on). Reasonable – Identified the experimental design, possibly defined AND reasonable attempt to explain how this has been carried out in their study. Limited – Experimental design identified and defined OR unclear attempt to explain how this has been carried out in their study. Basic – Just identifying the experimental design or confuses experimental designs (e.g. identified IMD but described RMD).
3	<p>Operationalise the dependent variable to obtain quantitative data</p> <ul style="list-style-type: none"> Good – Clear details on how dependent variable will be operationalised. Outline how data is quantified and how/when the concentration is measured (e.g. teacher or self-rating of concentration on a scale of 1-10 (1 being poor concentration and 10 being very good concentration), number of letter 'I' crossed out, score on the spot the difference puzzle, etc.) Reasonable – Reasonable details on how dependent variable will be operationalised that does lead to quantitative data. Limited – the way DV is operationalised is quantitative and addressed in a limited/unclear way, e.g. more than one measure indicated. Basic – Vague indication of how DV would be measured (e.g. level of concentration).
4	<p>Control of one extraneous variable</p> <ul style="list-style-type: none"> Good – Clear and somewhat detailed description of how EV can be controlled. Reasonable – Reasonable outline of how EV can be controlled. Limited – Limited/brief outline of how EV can be controlled. NB. References to sample characteristics being controlled cannot be credited above limited level. Basic – Identified how EV can be controlled/muddled description. If more than one control, credit the first one.
Annotations	<p>Context = concentration, slippers, shoes, learning, (primary school/young) children etc.</p> <p>Annotate: RF on the left with: L4=Good; L3=Reasonable; L2= Limited; L1= Basic. Context with CONT. Justification within the response on the right with a TICK. Do not annotate the level, note the level of justification to decide on the mark given within the band.</p>

(c) **Outline** one strength of the use of open questions in this study. **(3)**

Mark Scheme

Answer	Marks	Guidance
Likely answers: more detail acquired; allows elaboration on responses, could lead to useful applications in education due to greater understanding etc.	Max 3	Context = concentration, slippers, shoes, learning, primary school children etc.
Clear outline of strength in context.	3	Context can be from the question that they ask in 21(a) unless their question has achieved 1 mark as open but not in context.
Clear outline of strength but not in context. OR attempted outline of strength in context.	2	
Identification of or attempt to outline strength (whether in context or not).	1	No credit for just identifying that it is qualitative data (with no indication of why this is a strength or what the strength is). NB: Only first response is marked.
The candidate has not provided any creditworthy information.	0	

(d) **Outline** one strength of conducting this study as a laboratory experiment. **(3)**

Mark Scheme

Answer	Marks	Guidance
Likely answers: high levels of control over extraneous variables, ability to establish cause and effect, more able to replicate than field experiments, standardisation allowing replication.	Max 3	Context = concentration, slippers, shoes, learning, primary school children etc.
Clear outline of strength in context.	3	Do not accept comments related to the choice of experimental design as this is not the experimental method.
Clear outline of strength but not in context. OR attempted outline of strength in context.	2	
Identification of or attempt to outline strength (whether in context or not).	1	NB: Only first response is marked.
The candidate has not provided any creditworthy information	0	

(e) **Explain** two factors that could affect the external validity of this study. **(6)**

Mark Scheme

Answer	Marks	Guidance
Likely answers: size/diversity/representativeness of sample; ecological validity of task set to assess concentration, ecological validity of the setting, etc.	Max 6 [3+3]	Context = concentration, slippers, shoes, learning, primary school children etc.
3 marks for each factor outlined ...		
Clear explanation of how external validity could be affected in context.	3	NB. If candidates refer to types of external validity that are not listed on the specification these can be credited, e.g. temporal validity (teaching methods change over time)
Clear explanation of how external validity could be affected, but not in context. OR attempted explanation of how external validity could be affected in context.	2	
Identification of relevant factor/type of external validity or weak attempt to explain how external validity could be affected (whether in context or not).	1	
The candidate has not provided any creditworthy information	0	

3.

Sounds familiar

Memory can be influenced by many different things. However, there are techniques which we can use to improve our memory. One such technique involves reading aloud the information we want to remember. A psychologist investigated this by giving participants a set of 30 words to try and remember. Six participants studied the words in silence. A different group of six participants were instructed to read the words aloud when trying to learn them. The data collected is presented in the table below.

Number of words correctly recalled (max. 30)					
Reading aloud group			Silent study group		
Participant	Score	Rank	Participant	Score	Rank
a	24	9.5	a	14	2
b	27	11	b	16	3
c	21	6	c	12	1
d	20	5	d	29	12
e	23	8	e	17	4
f	22	7	f	24	9.5
$n_1 = 6$			$n_2 = 6$		

(a) **Outline** one conclusion that can be made from the raw data presented in this table. (3)

Mark Scheme

Answer	Marks	Guidance
Conclusions could include: <ul style="list-style-type: none"> Reading aloud seems to facilitate memory, perhaps because the act of reading enables the words to be practiced more and processed at a deeper level There are some individual differences, so reading aloud does not improve memory for everyone, indicating cognitive processes work differently for different people. Accept any other appropriate conclusions here.	3	Context = reading aloud, silence, recall, memory, etc. A conclusion must be an interpretation/application of the findings / data (not simply a statement of the result(s) obtained). Max 1 mark for presentation of a finding (involving comparison of data) with no interpretation/explanation of it.
Clear, detailed conclusion in context (or supported by data).	3	
Clear, detailed conclusion but not in context. OR attempt in context.	2	Zero marks if just data is given.
Brief and/or weak attempt (whether in context or not)	1	NB: Only first response is marked.
The candidate has not provided any creditworthy information	0	

- (b) Give one reason why the Mann-Whitney U test is the appropriate inferential test to use to analyse the data from this study. (2)

Mark Scheme

Answer	Marks	Guidance
Any one reason (in bold) in context from: <ul style="list-style-type: none"> ▪ It is a test for independent measures design, and this study had different participants in the reading aloud condition compared to the silent condition. ▪ It is a test that uses at least ordinal data and this study had ordinal data as it was scores out of 30 in a memory test. ▪ It is a test that assesses differences between conditions, and this study assessed differences in memory between the reading aloud and silent conditions. 	Max 2	Context = reading aloud, silence, <u>recall of words</u> , memory, etc. '6 participants' not enough for context. NB: Only first response is marked.
One appropriate reason in context.	2	
One appropriate reason but not in context.	1	OR attempt to give one appropriate reason in context.
The candidate has not provided any creditworthy information.	0	

- (c) Before using the formula for the Mann-Whitney U test, the data obtained must be ranked. In the results, two participants have the same score of 24. Explain how this is dealt with when ranking the data. (3)

Mark Scheme

Answer	Marks	Guidance
As the two scores of 24 were the same, so they receive the same rank of 9.5 as the ranks 9 and 10 have been shared, i.e. $9 + 10 / 2 = 9.5$	Max 3	Context = reading aloud, silence, recall, memory, etc.
Clear explanation in context of how having the same scores is dealt with including references to the same rank and a way of finding the same rank.	3	NB. Specific scores could be credited as context.
Clear explanation of how having the same scores is dealt with including references to the same rank (or simply 9 and 10) and a way of finding the same rank (no context).	2	
OR Explanation of why two ranks are the same in context.		
Attempt to explain why two ranks are the same (whether in context or not).	1	
The candidate has not provided any creditworthy information	0	

- (d) Calculate the U value for the Mann-Whitney U test for the data collected in this study. Show your workings. You may use the formula presented below. U = the smaller of U₁ and U₂. (5)

Where U₁ is ...

$$U_1 = R_1 - \frac{n_1(n_1 + 1)}{2}$$

and U₂ is ...

$$U_2 = R_2 - \frac{n_2(n_2 + 1)}{2}$$

Mark Scheme

Answer	Marks	Guidance
1 mark for each of the following correct / evident in answer ...	Max 5 [1+1+1+1+1]	U ₁ : = 46.5 - $\frac{6(6+1)}{2}$ = 46.5 - $\frac{6 \times 7}{2}$ = 46.5 - $\frac{42}{2}$ = 46.5 - 21 = 25.5
1 mark for sum of ranks for reading aloud condition calculated correctly (46.5)		U ₂ : = 31.5 - $\frac{6(6+1)}{2}$ = 31.5 - $\frac{6 \times 7}{2}$ = 31.5 - $\frac{42}{2}$ = 31.5 - 21 = 10.5
1 mark for sum of ranks for silent study group calculated correctly (31.5).		
1 mark for correct calculation of U ₁ (25.5) value OR correct calculation of U ₂ value (10.5).		
1 mark for all workings of U ₂ value shown.		
1 mark for choosing the final U value.		U ₂ is the smaller of the two scores so U = 10.5 (candidates may indicate this by circling the correct U value)
The candidate has not provided any creditworthy information.	0	NB. Accept alternative workings for U ₁ and U ₂ if the correct answer is calculated.

- (e) How is the critical value used to determine if the findings are statistically significant? (1)

Mark Scheme

Answer	Marks	Guidance
For one mark this must refer to comparison with calculated value. It is compared to the appropriate/correct calculated/observed value.	1	Accept answers related directly to the Mann-Whitney test.

4.

Steps to increase bin use

Research suggests that, when trying to encourage people to change their behaviour in some way, 'telling people what to do' is not always effective and a more subtle approach may be better ('nudge theory'). To investigate this, a psychologist conducted an observation study monitoring people's use of two different types of litter bin situated close to each other in the pedestrian area of one large town centre – one that had steps printed on the pavement leading up to it and another without the steps. Recordings were made each time any item was deposited in the bin throughout a continuous period from 10am to 2pm. The data on how many people used the bins is presented in the table below.

Table showing the number of times each bin was used by males and females		
	Males	Females
Bin with steps	9	14
Bin without steps	5	12

- (a) Calculate the percentage of people who used the bin with steps leading up to it. Show your workings and present your finding to two significant figures. (3)

Mark Scheme

Answer	Marks	Guidance
23/40 x 100 = 58%	Max 3	23/40 x 100 = 57.5 = 58 – 3 marks 23/40x100 = 57.5 – 2 marks
Correct answer with full workings shown	3	
57.5 calculated with full workings shown	2	23/40=0.58 – 1 mark 58 – 1 mark
OR correct answer (58) but some of the workings are missing.		
Correct answer shown to 2 or 3 significant figures with no or incorrect workings	1	57.5 – 1 mark % sign not required.
Some of the correct workings are given. (e.g. 23/40=.58 or .575)		
The candidate has not provided any creditworthy information	0	

(b) **Outline** two conclusions that can be obtained from the data collected in this study. (6)

Mark Scheme

Answer	Marks	Guidance
Conclusions could include: the bin with the steps leading up to it was used more often, suggesting that the steps encouraged people to use the bin more, perhaps because of the novelty value that this afforded etc; Perhaps the bin with steps was used more as people were curious where the steps led to and followed them, then deposited their litter in the bin; Could be a conformity effect of more people using the bin with steps leading other people to copy this behaviour and also use the bin, woman may be more likely to care about the environment as they used the bins more than men, etc. Accept any other appropriate conclusions here.	6	-Context = bin/bins, litter, steps -Clear (explicit) interpretation of findings (not simply stating a finding) is required for top band 3 marks could be obtained by justifying their conclusion For information - 57.5% use of bin with steps 42.5% use of bin without steps 65% overall use of bin by females 35% overall use of bin by males
3 marks for each conclusion		
Clear, detailed response in context	3	
Clear, detailed response but not in context	2	OR attempt in context
Brief and/or weak outline of a conclusion (whether in context or not)	1	OR simply stating a finding
The candidate has not provided any creditworthy information	0	

(c) The psychologist used the Chi-square test to analyse the data from this study. **Give** one reason why this would be the appropriate non-parametric inferential test to use. (2)

Mark Scheme

Answer	Marks	Guidance
Any one reason in context from: nominal (categorical) data obtained; looking for a difference; independent groups (unrelated)	Max 2	-Context = bin/bins, litter, steps, male/female
One appropriate reason in context	2	
One appropriate reason but not in context	1	
The candidate has not provided any creditworthy information	0	

(d) **Calculate** the degrees of freedom for use with the Chi-square test in this study. **Show your workings.** (2)

Mark Scheme

Answer	Marks	Guidance
df = 1 Workings ... (R-1) x (C-1) (2-1) x (2-1) = 1	Max 2	(2-1) x (2-1) = 1 – 2 marks (R-1) x (C-1) = 1 – 2 marks
Correct answer with workings	2	
Correct answer but not workings (or workings incomplete/unclear/incorrect)	1	
The candidate has not provided any creditworthy information	0	

- (e) Using the extract from the table of critical values presented below, what is the critical value for use with the Chi-square test in this study at the 5% level of probability? (1)

df	Probability level					
	0.5	0.10	0.05	0.02	0.01	0.001
1	0.455	2.706	3.841	5.412	6.635	10.827
2	1.386	4.605	5.991	7.824	9.210	13.815
3	2.366	6.251	7.815	9.837	11.345	16.268
4	3.357	7.779	9.488	11.668	13.277	18.465
5	4.351	9.236	11.070	13.388	15.086	20.517

Mark Scheme

Answer	Marks	Guidance
3.841	Max 1	If nothing written but correct answer identified in the table – this is creditworthy.
Correct answer provided	1	
The candidate has not provided any creditworthy information	0	

- (f) The psychologist obtained a calculated value of 0.4058 after analysing the data with the Chi-square test. Write a significance statement presenting this finding showing if the results are significant at the 5% level of probability or not. (3)

Mark Scheme

Answer	Marks	Guidance
$X^2 = 0.4058$, $df = 1$, $p > 0.05$	Max 3	Written out version can receive full credit. Eg The Chi Square calculated value is less than the critical value of 3.841. Therefore the difference is not significant at the 5% probability level.
1 mark for each correct feature included ... -calculated value -df -correct indication of significance (i.e. '>')	3	
3 correct features	3	1 mark for comparing the calculated and critical value. 1 mark for identifying the probability is greater than 5% or is not significant at the 5% level of significance. (95% or 1 in 20 is also acceptable) OR state the results are not significant 1 mark for 3.841 or $df = 1$
2 correct features	2	
1 correct feature	1	
The candidate has not provided any creditworthy information	0	

(g) **What** does the analysis from the Chi-square test inform us regarding the use of the two different types of bin from this study? **(3)**

Mark Scheme

Answer	Marks	Guidance
It informs us that there is no difference in the usage of the two different types of bins. People are not more likely to use the bin with steps leading up to it compared to the one without steps.	Max 3	-Context = bin/bins, steps For full marks the candidate must refer to the bin with steps and the bin without steps.
Clear response in context	3	
Clear response but not in context Attempt in context	2	
Brief and/or weak attempt (whether in context or not)	1	
The candidate has not provided any creditworthy information	0	The null hypothesis is accepted and/or alternative hypothesis rejected - 1 mark

5.

(a) If the variance is 36, **what** is the standard deviation? **(1)**

- A 3
- B 6
- C 18
- D 1296

Mark Scheme

B = 6

(b) **What** type of data is used to calculate the Chi-square test? **(1)**

- A interval
- B nominal
- C ordinal
- D ordinal and interval

Mark Scheme

B = Nominal

(c) Which is the simplest form of the ratio 12:8? (1)

- A 2:3
- B 3:1
- C 3:2
- D 6:4

Mark Scheme

C = 3:2

(d) What decimal is represented by the fraction $1/25$? (1)

- A 0.25
- B 0.04
- C 0.02
- D 0.05

Mark Scheme

B = 0.04

(e) Which inferential statistical test simply involves counting the number of times the values in one condition are higher or lower than those in the other? (1)

- A Chi-square
- B Binomial Sign
- C Spearman's Rho
- D Wilcoxon Signed Ranks

Mark Scheme

B = Binomial Sign

(f) What type of question or scale allows respondents to express how much they agree or disagree with a statement? (1)

- A leading
- B likert
- C open
- D semantic differential

Mark Scheme

B = Likert

