Cambridge Assessment International Education

Cambridge International AS & A Level

CANDIDATE NAME: StemUp Model Solution

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PSYCHOLOGY **9990/21**

Paper 2 Research Methods **May/June 2024**

1 hour 30 minutes

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
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INFORMATION

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- The number of marks for each question or part question is shown in brackets [ ].

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Section A

Answer **all** questions.

1 **(a)** Identify the sampling technique used in the study by Milgram (obedience).

Volunteer (self-selecting) sampling. [1]

(b) Outline how the sample was obtained in this study.

Milgram placed an advertisement in a New Haven newspaper and also used direct mail, asking for men aged 20 to 50 from a range of occupations to take part in a study of memory and learning at Yale University. The men who replied were used and were paid $4.50. [2]

2 Explain what is meant by the ethical guideline of 'species' in relation to animals in psychological research.

Researchers should use the species that will suffer the least while still being able to fulfil the aim of the research. For example, if mice can answer the question they should be used rather than chimpanzees, which are more sentient and may suffer more; but the species must suit the aim, e.g. monkeys if the behaviour must be similar to humans. [2]

3 Dement and Kleitman (sleep and dreams) asked participants to record their dream narratives. The words in each narrative were counted.

(a) Identify the type of data provided by counting the words in the narratives. Justify your answer.

Quantitative data, because counting the words gives a numerical score (the number of words in each narrative) rather than a description of the dream. [2]

(b) Explain **one** strength of collecting this type of data in this study.

Counting words is objective; researchers are unlikely to make mistakes or disagree when counting words, unlike judging how "detailed" a dream is. So the number of words after 5 minutes and after 15 minutes of REM sleep can be reliably compared and analysed statistically. [2]

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4 Glyn is conducting an experiment with an independent measures design. He is testing the effect of background noise on social learning (learning by imitation). Glyn shows each participant how to build a tower from blocks. Each participant then builds this tower, with either singing or silence in the background.

(a) Explain what is meant by an 'independent measures design', including an example from Glyn's study.

Different participants take part in each level of the IV, so each person does only one condition. In Glyn's study one group of participants builds the tower with singing in the background and a different group builds it in silence.

..... [2]

(b) Explain what is meant by a 'control condition', including an example from Glyn's study.

A control condition is the level of the IV in which the IV is absent, giving a baseline to compare the experimental condition with. In Glyn's study it is the silence condition, where there is no background noise.

..... [2]

(c) Suggest how Glyn could measure social learning (learning by imitation) in his study.

He could count how many blocks each participant places in the same position as in Glyn's demonstration tower, so more correctly placed blocks means more imitation, and also time how long (in seconds) it takes them to build the tower.

..... [2]

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5 In the study by Pozzulo et al. (line-ups), children were interviewed.

(a) Explain why it was necessary to gain consent from both the children and the children's parents/guardians.

Informed consent means agreeing to take part after being told the aim and what will happen. The parents/guardians had to consent because children may not fully understand the information or the possible risks of the study, so a responsible adult must decide on their behalf. The children also had to give their own consent because they have feelings and rights too; they must be willing to take part and know they can stop at any time. [3]

(b) To test correct identification of the cartoon characters, many 'foils' were needed that were similar to the target cartoons.

Explain **one** way in which the foils needed to be similar to the targets.

The foils needed the same hair colour and hair length as the target cartoon, so the target did not stand out. [1]

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(c) Fig. 5.1 shows some of the data from this study. Use this graph to produce a table of the data. You **must** write full headings on your table.

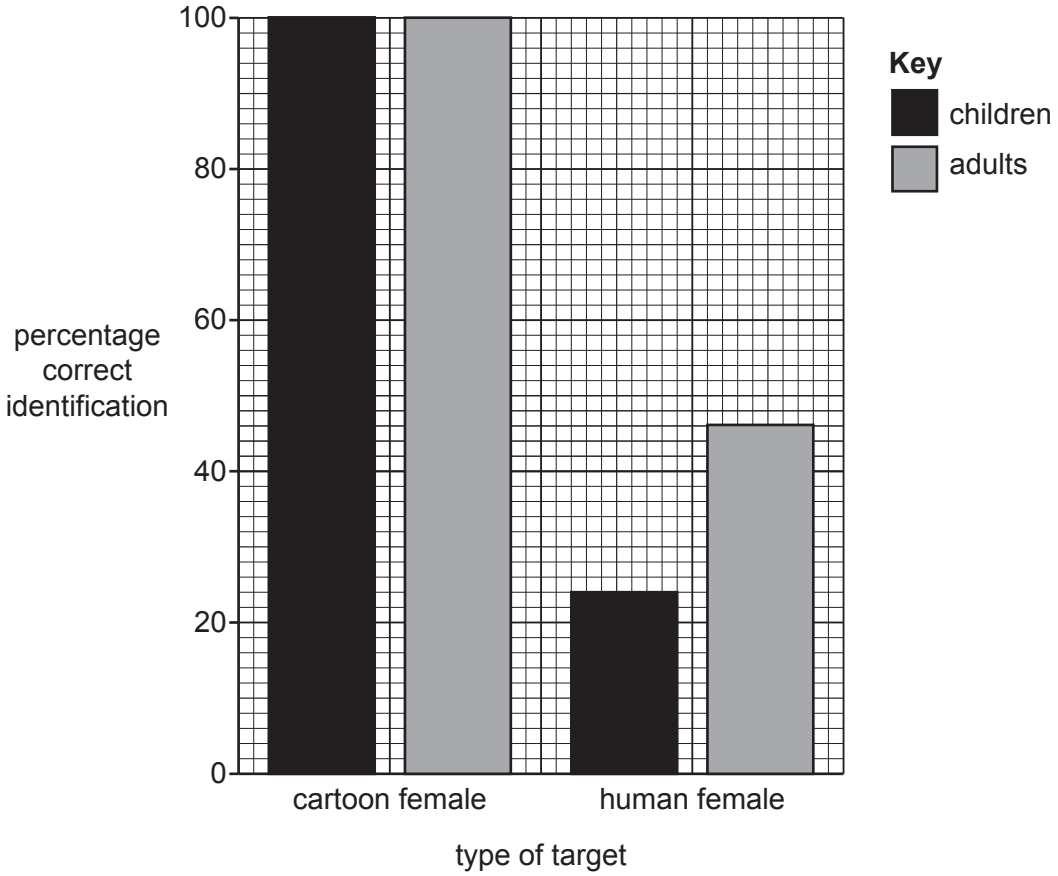


Fig. 5.1

Results from the study by Pozzulo et al.
for the correct identification of target individuals in a line-up.

Percentage correct identification of the target in a line-up, by age

Type of target	*Children: % correct identification*	*Adults: % correct identification*
Cartoon female	*100*	*100*
Human female	*24*	*46*

[4]

6 Describe participant observation and non-participant observation, using any example(s).

In a participant observation the researcher joins in with the group or activity being studied, so they appear to be one of the participants and have a social role in the situation. For example, in Piliavin et al, the observers sat in the subway carriage looking like ordinary passengers while recording who helped the victim. Being involved can give greater insight into why people behave as they do. In a non-participant observation the observer is not involved in the situation and watches from a distance, e.g. through a one-way mirror or using a camera. For example, Bandura et al. observed the children's aggression from behind a one-way mirror and did not interact with them. Because the observer is not involved, they can be more objective and are less likely to change the behaviour. Either type can be overt or covert.

[6]

7 Ranya is collecting data about study habits after school. She is asking students in her school two questions:

- Question 1 How long do you spend studying per week after school?
- Question 2 Which subject do you prefer to study after school: arts, languages, maths or science?

(a) Ranya will use two different measures of central tendency on her data, the mode and the mean.

Explain which measure of central tendency would be **most** appropriate for each of Ranya's questions.

Measure of central tendency for Question 1 ..Mean.....

Explanation ..the time spent studying is numerical data on a scale (ratio data), so the..

..mean can use every score to give the most representative average.....

Measure of central tendency for Question 2 ..Mode.....

Explanation ..the subjects are categories (nominal data), so a mean cannot be.....

..calculated; the mode shows the subject with the highest frequency.....

[2]

(b) **(i)** Explain how Ranya would calculate the range of hours spent studying per week after school.

..Subtract the smallest number of hours studied per week from the largest number..

..of hours given by any student..... [1]

(ii) Ranya's colleague says she should use the standard deviation instead of the range for the data from Question 1.

Explain why the standard deviation would provide more information than the range.

..The standard deviation measures the average spread of all the scores around the..

..mean, so it uses every student's study time. The range only uses the two.....

..extreme values, so it can be distorted by one outlier (e.g. one student who.....

..studies 30 hours) and does not show how the scores are clustered..... [2]

(c) Ranya will use a non-directional (two-tailed) hypothesis about study habits.

Explain which hypothesis Ranya will use:

X Students who prefer maths will spend more time studying.

Y There will be a difference in the time spent studying by students who prefer maths and students who do not prefer maths.

Hypothesis X or Y: ..Y.....

..Y only predicts that there will be a difference in time spent studying; it does not say..

..whether maths students will study more or less..... [1]

8 Simon is conducting a study about children learning to read. He is comparing how well they understand a story when reading from a book which has pages with images that are either:

- coloured shapes
- pictures that are not related to the text
- pictures that are related to the text.

(a) Identify the independent variable (IV) in Simon's study.

The type of image on the pages: coloured shapes, pictures not related to the text, or pictures related to the text. [1]

(b) Identify the dependent variable (DV) in Simon's study.

How well the children understand the story.

..... [1]

(c) All the pictures and shapes are brightly coloured.

Explain **one** reason why this is important.

It is a control: keeping the colour equally bright in all three conditions stops colour being a confounding variable. If, for example, the related pictures were more brightly coloured than the shapes, they might attract more attention and keep the children more interested, so they could understand more because of the colour rather than the content of the image. Controlling colour means any difference in understanding is due to the IV (the type of image). [3]

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9 Heng is conducting a study to investigate the job satisfaction of male and female employees at a factory.

She has identified two problems with uncontrolled variables. One is a situational variable and the other is a participant variable:

- variable X: female employees have more responsibilities at home
- variable Y: the factory promotes male employees faster than females.

(a) Explain which **one** of these problems is a participant variable.

X, because home responsibilities are a characteristic of each individual woman's personal life, not a feature of the factory setting. [1]

(b) Explain which **one** of these problems is a situational variable.

Y, because the speed of promotion is an external feature of the work environment (the factory's practices) that acts on the employees. [1]

(c) **(i)** Suggest how Heng could limit the problem of **one** of these uncontrolled variables.

For variable X, Heng could first give all employees a questionnaire about their home and family responsibilities, then match each male employee with a female employee who has similar responsibilities at home. This means any difference in job satisfaction is more likely to be due to gender rather than to home responsibilities. [2]

(ii) Trying to limit a problem in a study can create further issues.

Suggest **one** issue that your answer to part **(c)(i)** could create for Heng.

It would reduce generalisability; most female employees have more responsibilities at home, so the women matched with men would be unusual and not representative of the female workers in the factory. [2]

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Section B

Answer **all** questions.

10 Mary is conducting a case study on a boy diagnosed with an autistic spectrum disorder. He produces many detailed doodles and Mary wants to learn about him and his doodling.

(a) Describe how Mary could conduct a case study of doodling in a boy diagnosed with an autistic spectrum disorder.

Do **not** describe sampling technique or ethical issues/guidelines in your answer.

The participant is a boy (e.g. aged 10) diagnosed with an autistic spectrum disorder who doodles a lot. Mary would first collect background information from his records, parents and teachers, e.g. his age at diagnosis, his family and when the doodling began. The case study would last 6 weeks to give in-depth, detailed data, using several techniques.

1) Observation: a covert, non-participant, naturalistic observation at school and at home using video. Mary would use time sampling (every 30 seconds for one hour a day) with behavioural categories such as "doodling shapes", "doodling people/objects", "doodling words" and "not doodling", and note what is happening at the time (e.g. a noisy lesson, being alone).

2) His doodles would be collected, dated and coded for content, size and number of details (e.g. number of separate objects drawn).

3) A semi-structured interview with the boy using simple open questions, e.g. "What did you draw here?" and "How do you feel when you doodle?", plus a rating scale (1 = very calm, 5 = very upset).

4) Questionnaires for his parents and teacher rating his mood and concentration each day on a 1 to 10 scale, with open questions about when he doodles most.

Analysis: quantitative data (frequency of doodling in each category, ratings) would be shown in bar charts and the mean number of doodles per hour compared across settings and moods. Qualitative data from the interview and open questions would be analysed for themes, e.g. "doodling to calm down". Mary would triangulate the sources, checking that the observations, doodles, interview and questionnaires agree, so she

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can be confident in her conclusions about how and why he doodles.

[10]

(b) (i) Explain how **one** feature of the procedure you described in part **(a)** helps to make the study valid.

Do **not** refer to sampling or ethics in your answer.

Using operationalised behavioural categories (e.g. "doodling people/objects") with time sampling helps validity, because Mary records exactly the behaviour she intends to measure rather than a vague impression of how much he "doodles".

[2]

(ii) Suggest **one** way to improve the reliability of the procedure you described in part **(a)**. Justify your answer.

Do **not** refer to sampling or ethics in your answer.

Mary could use a second trained observer who codes the same videos independently, then correlate their tallies. A high correlation shows inter-rater reliability, so the coding is consistent and does not depend on one person's judgement. [2]

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Section A

Answer **all** questions.

1 **(a)** **(i)** State the **two** main features of a case study.

1 *A single unit (one person or a small group) is studied.*

2 *It is studied in depth, in great detail.*

[2]

(ii) Explain why the study by Saavedra and Silverman (button phobia) was a case study, in relation to these **two** main features.

1 *It studied just one individual: a boy with a phobia of buttons (and his mother).*

2 *In depth: the history of his phobia was recorded and his distress ratings were measured repeatedly through therapy and follow-up.*

[2]

(b) Explain **one** way to improve validity in a case study.

Triangulation: collect data from several different sources and methods, e.g. interviewing the participant and their family, using standardised questionnaires and observing behaviour. If the different sources support the same findings, the researcher can be more confident the conclusions are true, because people may do things that can be observed which they would not say in an interview, so bias from any one method is reduced. [3]

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2 Kanav wanted to recruit participants from his town for his study. He put an advertisement into the window of every shop in his town and used all the people who responded as his sample.

(a) (i) Explain the sampling technique Kanav used.

Volunteer (self-selecting) sampling; participants choose to take part themselves by responding to a request, here Kanav's advertisement in the shop windows, and everyone who responded was used.

..... [2]

(ii) Suggest **one** weakness of using this sampling technique in Kanav's study.

The sample may not be representative of people in his town, so it is less generalisable, because only people who visit shops, read the advert and are willing to volunteer would respond, and some may be visitors who are not from his town.

..... [2]

3 **(a)** A study has the hypothesis 'Four-year-old children make more language mistakes than eight-year-old children.'

State whether this hypothesis is a:
- directional hypothesis
- non-directional hypothesis
- null hypothesis.

directional hypothesis

..... [1]

(b) Explain the reason for your choice in part **(a)**.

It predicts which group will score higher; four-year-olds are expected to make more language mistakes than eight-year-olds, so it states the direction of the difference rather than just predicting that there will be a difference.

..... [2]

4 The study by Hassett et al. (monkey toy preferences) used animals.

Outline **two** named ethical guidelines in relation to the use of animals in this study.

Ethical guideline 1 *Pain, suffering and distress (minimising harm)*

Outline *The monkeys should not be harmed physically or psychologically. In Hassett et al, the monkeys stayed with their social group in their familiar enclosure and were free to play with or ignore the toys, so they were not caused distress.*

Ethical guideline 2 *Housing*

Outline *Animals need enough space and to live with others of their species. Rhesus monkeys are large, active and social, so Hassett's monkeys lived in a large outdoor enclosure in a social troop.*

[4]

5 In the study by Baron-Cohen et al. (eyes test), a control task was used to be certain that the AS/HFA participants could use information from pictures of eyes to make simple judgements.

(a) Identify this control task.

The gender recognition task.

[1]

(b) Outline what participants were required to do in this control task.

They looked at each photograph of a pair of eyes and judged whether the person in the photograph was male or female. [1]

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6 Describe how variables in correlations can be measured, using any example(s).

In a correlation both co-variables must be measured on a numerical scale, so that each participant has a pair of scores that can be plotted on a scatter graph. Variables can be measured by self-report, e.g. a questionnaire with rating scales or a Likert scale, with the ratings turned into numbers and added to give a total score. For example, Baron-Cohen et al. used the Autism-Spectrum Quotient (AQ) questionnaire to give each participant a score, which was correlated with their score out of 36 on the Eyes Test. Variables can also be measured using tests or tasks that give totals, percentages or times, or by observation, tallying how often a behaviour occurs or timing how long it lasts. For example, Dement and Kleitman measured how long participants had been in REM sleep before waking (5 or 15 minutes) and counted the number of words in each dream narrative.

..... [6]

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7 Chyou is conducting a self-report about students' subject choices. Four of her questions are:

A	Describe how much you like maths.
B	How much do you enjoy studying science? 0 = do not enjoy it at all, 5 = enjoy it a lot.
C	"I have always known what subjects I want to study." To what extent do you agree with this statement? strongly agree / agree / neither agree nor disagree / disagree / strongly disagree.
D	Write about whether you would like to be a doctor.

(a) Identify **one** closed question from A to D.

B .....

..... [1]

(b) Identify **one** open question from A to D.

A .....

..... [1]

(c) Chyou has written two questions to investigate the process of students choosing their subjects.

E	How old were you when you decided you did or did not like science?
F	Describe how you felt when you made your final decision about subject choices.

(i) State **one** strength of question E.

E gives quantitative data (an age in years), so answers can easily be compared between students and analysed statistically. ..... [1]

(ii) State **one** strength of question F.

F gives qualitative data, so it gives rich detail about how each student really felt when choosing. ..... [1]

(d) Suggest **two** questions Chyou could ask to investigate factors affecting students' subject choices.

1 Explain how your parents or teachers influenced your choice of subjects. .....

.....

2 Did your future career plans affect your subject choices? Yes / No / Not sure .....

.....

[2]

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8 Daku is observing the obedience of boys and girls to teachers and older pupils when they are waiting for their lunch. Fig. 8.1 is a graph of Daku's results.



Fig. 8.1

(a) Daku's conclusion is that girls are more obedient than boys. Daku's colleague, Jedda, has looked at Daku's graph and disagrees with Daku's conclusion.

Explain **one** reason why Daku's conclusion from his graph may be incorrect.

Do **not** refer to sample size in your answer.

The difference between boys and girls is very small (boys 14, girls 16 for obedience to teachers, and both 15 for older pupils, which is no difference at all). So the difference may be due to chance and not significant, meaning girls are not clearly more obedient. [2]

(b) Jedda suggests that Daku needs a bigger sample.

Explain **one** benefit of increasing the sample size in this study.

A larger sample would be more generalisable, because it would include a wider variety of boys and girls with different levels of obedience, so any gender difference found is more likely to apply to children in general, not just a few unusual children.

..... [2]

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(c) Daku has identified a problem caused by an uncontrolled variable. The boys had to wait longer for their lunch than the girls.

(i) Explain whether this problem is caused by a situational variable or a participant variable.

Situational, because waiting time is an external factor in the environment (the lunch queue), not a characteristic of the boys. [1]

(ii) Explain how this problem would have affected Daku's results.

Boys kept waiting would be hungrier and more frustrated, so more likely to disobey, making boys seem less obedient for a reason other than gender. [1]

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9 Carol is investigating how music in a sports centre affects the amount that people exercise. On each visit she listens to the music that is playing. She measures the music by counting the number of musical beats per minute (faster music has more musical beats per minute than slower music).

(a) Suggest **one** problem with Carol's measure of the music.

Carol may not count the beats per minute accurately just by listening, especially with the noise in a sports centre, so the same song could be given different values on different visits, making her measure of the music unreliable.

..... [2]

(b) Carol records the time each person in the sports centre starts and stops exercising. All of the sports centre members have given permission for this to happen.

Explain **two** reasons why Carol obtained permission to gather her data, in relation to ethical guidelines.

1 *Informed consent: the members have a right to know that they are being observed and what data is recorded about their exercise, and to agree to this before their start and stop times are noted.*

.....

2 *Privacy: people may not want to be watched and timed while exercising, as they may be embarrassed about their fitness, so asking permission respects their privacy and avoids psychological harm.*

..... [4]

(c) Explain **one** reason why it is important that Carol visits the sports centre at different times of day.

Different types of people visit at different times, e.g. older people in the morning may be less fit and exercise for shorter times whatever the music. Visiting at only one time would confuse the effect of the music with the type of person, so different times make the results more representative. ..... [2]

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Section B

Answer **all** questions.

10 Chloë is studying behaviour in the workplace. She wants to investigate how people behave during mealtimes at work. A range of food is available to the workers, which can be eaten in different ways. The workers also vary in how sociable they are during meals. Chloë intends to produce a detailed description of the variety of behaviours during meals at work.

(a) Describe how Chloë could conduct an observational study using participant observation to record the variety of behaviours during meals at work.

Do **not** describe sample/sampling technique or ethical issues/guidelines in your answer.

Chloë would carry out a naturalistic participant observation in the staff canteen of a large workplace during the normal lunch break (12:00 to 14:00), so the workers eat in their natural setting and nothing is manipulated. To be a participant observer she would take a job as one of the canteen servers, so she is part of the social situation of the meals and can watch closely and hear conversations as people choose and eat food.

The observation would be covert: the workers would not know she is a researcher, so they behave naturally and do not show demand characteristics. As she cannot write notes openly, she would make brief notes in her breaks and write full notes immediately after each lunch period.

Because she wants a detailed description of the variety of behaviours, the observation would be partly unstructured, describing everything that happens in a narrative record, and partly structured, using behavioural categories so behaviours can be counted:

- type of food chosen (hot meal, sandwich, salad, snack)

- way of eating (cutlery, fingers, eating while walking or at a desk, sharing food)

- sociability (eating alone, talking in a pair, in a group of 3 or more, using a phone).

She would use event sampling, tallying each time a category occurs, at the same tables every day for 4 weeks so that different days and menus are included. A second server, trained in the same categories, would also record so their tallies can be compared for inter-rater reliability. The tallies would be shown as bar charts of how often each behaviour occurs, and the narrative notes would be used to describe the

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variety of mealtime behaviours, e.g. the typical ways groups share food.

..... [10]

(b) (i) Describe **one** practical/methodological strength of the procedure you have described in your answer to part **(a)**.

Do **not** refer to sampling or ethics in your answer.

Because the observation is covert and naturalistic, the workers do not know they are being studied, so there are no demand characteristics and their mealtime behaviour is genuine, which increases the ecological validity of the findings.

..... [2]

(ii) Describe **one** practical/methodological weakness of the procedure you have described in your answer to part **(a)**.

Do **not** refer to sampling or ethics in your answer.

As a server Chloë has to do her job at the same time, so she may miss behaviours or forget details before writing her notes later. She may also become friendly with some workers and record their behaviour with bias, reducing validity.

..... [2]

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Cambridge International AS & A Level

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PSYCHOLOGY **9990/23**

Paper 2 Research Methods **May/June 2024**

1 hour 30 minutes

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Section A

Answer **all** questions.

1 Explain what is meant by a covert observation, using any example.

In a covert observation the participants are unaware that they are being observed, or of the observer's role, because the observer is hidden or disguised. For example, in Bandura et al. the children were watched through a one-way mirror, so they did not know they were being observed. [2]

2 The results from the study by Andrade (doodling) included the following data about the shading of shapes by participants in the doodling group:

- the mean number per participant was 36.3
- the range was 3–110.

Outline what these **two** results show about doodling by this group of participants.

The mean of 36.3 shows that on average each participant shaded about 36 shapes, which is in the bottom half of the range, so most shaded fairly few while a few shaded many. The range of 3 to 110 shows that every participant shaded some shapes and that the amount of doodling varied very widely. [2]

3 Describe how **one** feature of the study by Milgram (obedience) helped to make the study valid.

The shock generator looked real, with labelled switches from 15 V to 450 V, and each participant was given a real 45 V sample shock. This made participants believe the shocks were real, so their obedience was genuine rather than a response to demand characteristics. [2]

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4 One group of participants in the study by Hölzel et al. (mindfulness and brain scans) was a sample of 16 right-handed adults: 6 males and 10 females.

Explain **two** reasons why this sample may **not** be representative.

1 *There were more females (10) than males (6), so the sample has a gender bias and the findings may not represent how mindfulness affects the brains of males.*

2 *All 16 participants were right-handed, so the sample does not represent left-handed people, whose brain organisation may differ; 16 is also a small sample with little variety.*

[4]

5 Memory research is often conducted using eyewitnesses who have witnessed a real crime. Alternatively, researchers can use a simulated crime in a laboratory and ask participants what they remember.

(a) One strength of using a simulated crime in a laboratory is that it can improve objectivity.

Outline what is meant by the term 'objectivity', including an example about eyewitnesses.

Objectivity means data are recorded without personal bias or interpretation, so another researcher would record the same. With real eyewitnesses, researchers may be swayed by the witness's distress and do not know what really happened; in a simulated crime they know what was shown, so recall is scored right or wrong. [2]

(b) Describe how **one** feature of the study by Pozzulo et al. (line-ups) helped to make the study objective.

Responses to each line-up were limited to choosing a face or choosing the silhouette (target not there), so each response was simply a correct or incorrect identification. This is quantitative, so the researchers did not have to interpret what participants meant. [2]

6 Describe the following experimental designs, using any example(s):
- matched pairs design
- repeated measures design.

In a repeated measures design the same participants take part in every level of the IV, so each person is compared with themselves and participant variables are controlled. For example, in Dement and Kleitman each participant was woken both 5 minutes and 15 minutes into REM sleep. A risk is order effects such as practice or fatigue, and participants may guess the aim, so counterbalancing is used: half do condition A then B, the other half B then A. In a matched pairs design different participants are in each level of the IV, but they are first matched on variables relevant to the study, such as age, IQ or gender, and one of each pair goes into each condition. For example, Bandura et al. matched the children in threes on their existing aggression ratings before putting one into each condition. This reduces the effect of individual differences without causing order effects.

..... [6]

7 Yashal is planning an experiment about the effect music has on students doing their homework. She is choosing the conditions she will use.

(a) Outline what is meant by the term 'experimental condition'.

A level of the IV that the researcher actively manipulates, e.g. doing homework with music playing. [1]

(b) **(i)** Outline what is meant by the term 'control condition'.

A condition in which the IV is absent, used as a baseline for comparison.

..... [1]

(ii) Suggest a control condition that Yashal could use in her experiment.

Students do their homework in silence, with no music playing.

..... [1]

(c) Yashal is planning to use students working at home as participants.

Explain the type of experiment Yashal would be conducting.

A field experiment, because the students are doing homework at home, their normal setting for homework, rather than in a controlled laboratory, while Yashal still manipulates the IV (whether music is played).

..... [2]

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8 A parrot rescue centre has some new parrots which need to learn to enter a cage. Their trainer is planning a procedure using operant conditioning to teach the parrots to enter the cage.

(a) Suggest **one** way that the parrots could be taught to enter the cage.

Positive reinforcement with shaping: each time a parrot moves closer to the cage it is given a reward such as a favourite seed or piece of fruit. The reward is then only given for getting even closer, then for reaching the door, until the parrot is only rewarded for fully entering the cage. Because entering the cage is followed by a pleasant consequence, the parrot becomes more likely to repeat it.

..... [3]

(b) The success of the procedure can be measured by counting the number of days it takes each parrot to learn to enter the cage.

(i) Suggest **two** practical problems with this measurement of success.

1 *Days are too large a unit: a parrot that learns in one minute and one that learns after a whole day of training both score "1 day", so the measure cannot detect differences in learning speed.*

.....

2 *A parrot might enter the cage once and come straight back out, so it would be counted as having learned even though it has not really learned to go into and stay in the cage.*

.....

[4]

(ii) For **one** of the problems you suggested in part **(b)(i)**:

Suggest **one** way this problem could be solved.

Problem 1 or 2: *1*.....

Measure the time in minutes (or the number of training trials) until each parrot first enters the cage, so smaller differences in learning speed can be detected.

.....

..... [2]

(c) There are many members of staff at the rescue centre. The trainer cannot decide whether the parrots will learn better if the other staff are present or absent while the parrots are being trained.

(i) Explain **one** reason why the parrots may learn better if the other staff are present during the parrots' training.

If the parrots are used to people, familiar staff being present may make them feel secure and less afraid, so they relax, pay more attention to the trainer and the reward, and learn faster.

..... [2]

(ii) Explain **one** reason why the parrots may learn better if the other staff are absent during the parrots' training.

Parrots need to focus on the trainer and the reward to learn. Other staff moving about and talking might distract or frighten them, so they would take longer to learn.

..... [2]

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9 Faiza is planning to investigate the effect of air pollution on emotion. She had planned to conduct a laboratory experiment, but rejected this for ethical reasons.

(a) Suggest **one** reason why conducting a laboratory experiment for Faiza's investigation could have been unethical.

Deliberately exposing participants to polluted air in a laboratory would risk physical harm, e.g. breathing problems or headaches, so it breaks the guideline of protecting participants from harm.

..... [2]

(b) Faiza decides to use geography students as participants. They are visiting a rural environment and a polluted city as part of their geography course. She will collect data in both places.

Explain **one** reason why Faiza's new plan is more ethical.

The students will visit the rural area and the polluted city anyway as part of their course, so Faiza is not causing their exposure to pollution. They face no more risk of harm than in their normal lives.

..... [2]

(c) Faiza is concerned about uncontrolled variables in her study.

Suggest how **two** uncontrolled variables could affect the measurement of emotion.

1 *Noise in the city: traffic noise could make students stressed or irritable, so they report more negative emotion even if the pollution itself has no effect.*

.....

.....

2 *Time of day: if the city visit is in the morning when students are tired and the rural visit in the afternoon, tiredness rather than pollution could lower their mood ratings.*

.....

[4]

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Section B

Answer **all** questions.

10 Bhaavik is interested in the relationship between shyness and happiness. He says to his friend Jim that the shy people he knows are really happy, but Jim says he knows lots of happy people who are not shy.

(a) Describe how Bhaavik could conduct a correlational study to investigate the relationship between shyness and happiness.

Do **not** describe sample/sampling technique or ethical issues/guidelines in your answer.

This is a correlation between two co-variables: shyness, defined as feeling anxious in and avoiding social situations with unfamiliar people, and happiness, defined as how often a person feels positive emotions and is satisfied with life. Nothing is manipulated; both variables are measured for each participant.

Shyness would be measured with a self-report questionnaire of 10 closed statements, e.g. "I feel nervous talking to people I do not know" and "I avoid parties", each rated on a Likert scale from 1 (strongly disagree) to 5 (strongly agree). The ratings are added to give a shyness score from 10 to 50, where a higher score means more shy.

Happiness would be measured with a separate set of 10 statements, e.g. "I feel cheerful most days" and "I am satisfied with my life", also rated 1 to 5 to give a happiness score from 10 to 50. Some items would be reverse-scored (e.g. "I often feel sad") to avoid response bias, and filler questions would be included so participants do not guess the aim.

Each participant would complete the questionnaires alone in a quiet room with the same standardised written instructions, and be told the answers are anonymous to reduce social desirability.

Each participant's pair of scores would be plotted on a scatter graph, with shyness on the x-axis and happiness on the y-axis. If the points slope upwards there is a positive correlation (shyer people are happier, as Bhaavik thinks); if they slope downwards there is a negative correlation (less shy people are happier, as Jim suggests); a random spread shows no correlation. A correlation coefficient (from −1 to +1) would show how strong the relationship is.

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..... [10]

(b) (i) Describe **one** practical/methodological strength of the procedure you have described in your answer to part **(a)**.

Do **not** refer to sampling or ethics in your answer.

Both variables are measured as numerical scores from 10 to 50 using the same standardised questionnaires and instructions, so the procedure is easy to replicate and its reliability can be checked, e.g. by test-retest.

..... [2]

(ii) Describe one practical/methodological weakness of the procedure you have described in your answer to part **(a)**.

Do **not** refer to sampling or ethics in your answer.

Self-reports may be affected by social desirability: people may claim to be happier and less shy than they really are, so the scores may not be valid measures of their true shyness and happiness.

..... [2]

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