Surname	StemUp Model Solution	Centre Number	Candidate Number
First name(s)			2

GCE A LEVEL

S25-1290U40-1

1290U40-1

MONDAY, 9 JUNE 2025 – MORNING

PSYCHOLOGY – A2 unit 4
Applied Research Methods

1 hour 30 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**16**	
2.	**14**	
3.	**17**	
4.	**13**	
Total	**60**	

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01

ADDITIONAL MATERIALS

You may require a calculator and a ruler.

INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen. Do not use gel pen or correction fluid.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet. If further space is required for any question, you should use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

Assessment will take into account the quality of written communication used in your answers.

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SECTION A – Personal Investigations

You should answer **all** the questions in this section with reference to the personal investigations carried out in your study of psychology.

INVESTIGATION ONE:

A quasi-experiment on age and sleep.

1. (a) (i) Explain how the independent variable was operationalised in your quasi-experiment. [2]

The IV was age, a naturally occurring variable that we could not manipulate. It was operationalised as two age groups: one group of 10 participants aged 17 to 18 years (sixth form students) and one group of 10 participants aged 45 to 55 years (parents and relatives), with age checked on the consent form.

(ii) Explain how the dependent variable was operationalised in your quasi-experiment. [2]

The DV was sleep. It was operationalised as the mean number of hours of sleep per night over 7 consecutive nights, recorded by a sleep-monitor wristband worn in bed, together with the number of sleep disturbances (times awake) per night that the wristband logged.

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(b) Explain **one** ethical issue you faced during your quasi-experiment and explain how you dealt with it. [4]

One ethical issue was valid consent. Participants in both age groups needed to be fully informed that we were measuring how age relates to their sleep, that they would wear a sleep-monitor wristband every night for a week, and that seeing a record of their own sleep disturbances could cause some anxiety, especially for the 45 to 55 group if they discovered they slept poorly. Without this information their consent would not be valid.

We dealt with this by giving every participant a written consent form before the study which explained the aim, what wearing the wristband for 7 nights involved and that the sleep data could potentially trigger some anxiety. They signed it before taking part and were told of their right to withdraw at any time, including withdrawing their sleep data. All 17 to 18-year-olds were over 16 so could consent for themselves.

(c) (i) Explain **one** issue of validity you considered before conducting your quasi-experiment. [2]

One issue of validity we considered was social desirability bias. Some participants, such as the sixth form students, might have wanted to appear sensible and over-report their hours of sleep per night if asked to self-report, which would mean we were not measuring their true sleep. This is why we chose the wristband sleep monitor.

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(ii) Explain **one** way validity could be assessed in your quasi-experiment. [2]

Face validity could be assessed by asking a non-expert, such as a teacher, to look at our measure of sleep (hours of sleep and disturbances recorded by the wristband) and judge whether, on the surface, it appears to measure sleep. If they agree that it does, the measure of the DV has face validity.

(d) Evaluate **one** strength and **one** weakness of using a quasi-experiment. [2+2]

Strength: a quasi-experiment allows research where the IV cannot be manipulated for practical or ethical reasons. We could not randomly assign people to be 17 or 50 years old, but we could still compare naturally occurring age groups, so a wider range of behaviour, such as the effect of ageing on sleep, can be investigated. It also lets researchers study real problems, e.g. the effects of a disaster on health.

Weakness: because the IV is not manipulated directly by the researcher and participants are not randomly allocated to conditions, cause and effect cannot be firmly established. There is less control over extraneous variables, for example the older group may have more stress or caring responsibilities, so these participant variables, rather than age, may affect the DV. This threatens the internal validity of the research.

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INVESTIGATION TWO:

A correlational study involving a Stroop test.

2. (a) State the operationalised alternative hypothesis for your correlational study. [2]

There will be a negative correlation between age in years and the number of colour words correctly named in 60 seconds on the incongruent Stroop test.

(b) (i) Identify the graphical representation you used to represent the data for your correlational study. [1]

A scatter diagram (scattergram).

(ii) Justify your choice of the graphical representation identified in **2**(b)(i). [2]

Our study was a correlation between two co-variables, age in years and the number of words correctly named on the Stroop test. A scatter diagram was most appropriate because each participant's pair of scores is plotted as one point, so it shows the direction and strength of the relationship between these two co-variables.

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(c) (i) Identify the inferential statistical test you used when analysing the data collected in your correlational study. [1]

Spearman's rank order correlation coefficient (r_s).

(ii) Fully justify your choice of the inferential statistical test identified in **2**(c)(i) for your investigation. [3]

It is a test of correlation, and we were looking for a relationship between age and Stroop performance rather than a difference between conditions.

The level of measurement of both co-variables was ratio: age in years and the number of words correctly identified both have equal units of measurement and a true zero. Ratio is at least ordinal, so the scores could be put into rank order.

The data was related, as each participant provided a score for both co-variables (their age and their Stroop score).

(iii) With reference to your observed (calculated) value and critical value, explain which hypothesis you accepted. [2]

Our observed value was $r_s = -0.52$ ($N = 20$). The critical value for a one-tailed test at $p \leq 0.05$ was 0.380. Ignoring the sign, the observed value (0.52) was greater than the critical value (0.380), so the result was significant and we accepted the alternative hypothesis and rejected the null hypothesis.

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(d) Discuss how **one** change to your correlational study could improve the investigation. [3]

One change would be to the sample. We used an opportunity sample of 20 friends and family, mostly aged 16 to 20 or 40 to 55, so there were few people in between and the sample was small. A larger stratified sample, e.g. 60 participants with equal numbers from each decade of age from 20 to 79, would make the sample more representative of the target population and increase population validity, so the negative correlation between age and Stroop score could be generalised with more confidence. It would also show whether the relationship is linear across all ages, although it would take more time to recruit.

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SECTION B – Application of research methods to novel scenarios

Answer **all** questions.

3. Research has shown that colour can affect mood.

To investigate this, an experiment was conducted in a laboratory using two groups of participants. The hypothesis was 'participants exposed to the colour blue will have a higher mood rating on a scale of 1–5 than participants exposed to the colour red'.

There were 10 participants in Group 1 and 10 participants in Group 2. Group 1 were taken to a room painted blue and were shown 10 images with a blue theme, for example, a picture of the sea. Group 2 were taken to a room painted red and were shown 10 images with a red theme, for example, a picture of a fire engine.

After the participants were shown the images, they were asked to rate their mood on a scale of 1–5 (1 = very bad mood and 5 = very good mood). The results are shown in the table below.

Figure 1: Table of results to show the mood rating of participants.

Participant	Group 1 (blue condition)	Participant	Group 2 (red condition)
A	4	K	2
B	5	L	2
C	4	M	3
D	3	N	1
E	3	O	3
F	5	P	4
G	2	Q	2
H	5	R	2
I	4	S	1
J	3	T	3

(a) The following definition can be used to describe the data collected:

'Data can be placed into ascending or descending order, but the intervals between data are not necessarily equal.'

Identify this level of measurement. [1]

Ordinal data.

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(b) Evaluate independent groups experimental design. [3]

A strength is that there are no order effects, such as practice or fatigue, because each participant only takes part in one condition (blue room or red room). There is also less chance of demand characteristics, since participants do not see both colours and so are less likely to guess the aim. This improves internal validity.

However, participant variables may differ between the groups, e.g. Group 1 may happen to contain people who were already in a better mood, so differences in mood rating may be due to this rather than the colour (IV), which threatens internal validity. It also needs twice as many participants (20 rather than 10) for the same amount of data.

(c) (i) Calculate the mean mood rating for the participants in Group 1 (blue condition). Show your workings. [2]

$$\frac{\sum x}{n}$$

$\Sigma x = 4 + 5 + 4 + 3 + 3 + 5 + 2 + 5 + 4 + 3 = 38$

$n = 10$ mean $= 38 \div 10 = 3.8$

(ii) Explain why the mean would be an appropriate measure of central tendency of the data in this research. [2]

There are no extreme values (outliers) in Group 1, as the ratings only range from 2 to 5, so the mean is not distorted, and it is the most sensitive measure as it uses all ten values (Group 1 has three modes: 3, 4 and 5).

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(d) The researcher analysed the data using the Mann Whitney U test using a 0.05 probability value. The observed (calculated) value of U was 15. The critical value of U was 27.

Explain which hypothesis the researcher should accept and which hypothesis the researcher should reject. [3]

For the Mann Whitney U test, the observed (calculated) value must be equal to or less than the critical value for the result to be significant. The observed value of U (15) is lower than the critical value (27), so the result is significant at $p \leq 0.05$.

Therefore the researcher should accept the experimental (alternative) hypothesis: participants exposed to the colour blue will have a higher mood rating on a scale of 1 to 5 than participants exposed to the colour red. The researcher should reject the null hypothesis that there will be no difference in mood rating between the blue and red conditions.

(e) Explain how **one** confounding variable could affect this investigation. [2]

One confounding variable is illness. A participant in the red condition, e.g. participant N, might be feeling unwell and so be in a bad mood and give a low rating of 1. This would skew the data, as it is the individual's health and wellbeing rather than the red colour of the room that is lowering their mood rating, making the difference between the groups look larger than it really is.

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(f) Evaluate **one** strength and **one** weakness of conducting research in a laboratory environment. [2+2]

Strength: the laboratory gives a high level of control over extraneous variables. In this study the researcher could keep lighting, noise, temperature and the 10 images standardised for both groups, so only the colour (blue or red) differed. This improves internal validity and allows a stronger conclusion that colour caused the difference in mood, and the standardised procedure can be replicated to check reliability.

Weakness: research in a laboratory can lack ecological validity because the setting is artificial. Sitting in a room painted entirely blue or red while looking at 10 themed images is not how people experience colour in everyday life, so the findings may not generalise to real settings. Participants may also guess the aim in a lab, leading to demand characteristics, which threatens internal validity.

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4. Researchers conducted a questionnaire study to investigate happiness in A Level students. They used a random sample of 50 A Level students from a local Sixth Form College.

An example of one of the questions from the questionnaire study was:
'Describe how studying A Levels affects your happiness levels'.

(a) (i) State whether the example question would generate qualitative or quantitative data. [1]

Qualitative data.

(ii) Explain why the example question would produce quantitative or qualitative data. [2]

It asks students to describe in their own words how studying A Levels affects their happiness, so the answers would be thoughts and feelings in words rather than numbers, and could not be analysed numerically without first being coded, e.g. with thematic analysis.

(b) Explain how the reliability of this research could be assessed. [2]

A split-half technique could be used: split the happiness questionnaire into two halves (e.g. odd and even questions) and correlate students' scores on the two halves. If there is a strong positive correlation (e.g. +0.8 or above) the questionnaire has internal reliability. Test-retest could also be used by giving the same 50 students the questionnaire again a month later and correlating the two sets of answers.

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(c) Explain how social desirability could affect the validity of this research. [2]

The A Level students may not answer honestly about how happy they feel because they want to be seen in a socially desirable way, e.g. reporting that they are happier and coping better than they really are so it appears they are enjoying their A Levels. The questionnaire would then not measure their true happiness, which threatens the internal validity of the research.

(d) One of the students, when answering the questionnaire, asked the researchers why they hadn't used an interview to collect the information.

Explain **one** advantage of using an interview rather than a questionnaire. [2]

In an interview the researcher can clarify questions if a student does not understand them and ask follow-up questions, e.g. asking why A Levels make them less happy. The interviewer can also read body language, so more in-depth, richer qualitative data about happiness is gathered than from a written questionnaire.

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(e) Evaluate **one** strength and **one** weakness of using random sampling. [2+2]

Strength: random sampling is fair and free from researcher bias, because every A Level student in the target population (the Sixth Form College) has an equal chance of being selected, e.g. by drawing names from a hat or using a random number generator on the student list. The researchers cannot choose students who they think are happier, so the sample of 50 is more likely to be representative.

Weakness: a random sample may still be unrepresentative by chance, as certain subgroups may be over or under-represented, e.g. the 50 students might be mostly Year 13 or mostly studying sciences, which limits generalisability. It is also more time-consuming than opportunity sampling, as a full list of the target population is needed and selected students may refuse to take part.

END OF PAPER

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