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

GCE A LEVEL

A290U20-1

S25-A290U20-1

WEDNESDAY, 21 MAY 2025 – MORNING

PSYCHOLOGY – A level component 2
Psychology: Investigating Behaviour

2 hours 15 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**4**	
2.	**4**	
3.	**6**	
4.	**6**	
5.	**2**	
6.	**4**	
7.	**6**	
8.	**14**	
9.	**15**	
10.	**15**	
11.	**8**	
12.	**16**	
Total	**100**	

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01

ADDITIONAL MATERIALS

In addition to this paper 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. Additional space is provided for some questions within the booklet (if required). 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 – Principles of Research

Answer **all** questions.

1. (a) Explain what is meant by the term 'confounding variable'. [2]

A confounding variable is an extraneous variable that is not being measured or manipulated by the researcher but varies systematically with the IV, so it affects some participants' behaviour (their scores on the DV) but not others. This means the researcher cannot be sure that the IV caused the change in the DV, which reduces internal validity.

(b) Explain what is meant by the term 'co-variables'. [2]

Co-variables are the two (or more) variables that are measured by the researcher in a correlational study, e.g. hours of revision and exam score, to see whether and how they vary together (a positive, negative or zero correlation). Neither variable is manipulated, so they are not an IV and a DV.

2. Using appropriate symbols, express the following:

(a) equal to [1]

=

(b) greater than [1]

>

(c) probability of less than 10% [2]

$p < 0.10$

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3. Explain **two** advantages of using longitudinal research. [6]

Longitudinal research studies the same participants repeatedly over a long period of time, e.g. several months or years.

One advantage is that it controls for participant variables. Because the same people are tested on each occasion and their later scores are compared with their own earlier scores, each participant acts as their own control. Individual differences such as personality or intelligence therefore cannot explain the changes found, unlike a cross-sectional study comparing different age groups, which is also affected by cohort effects. This increases the internal validity of conclusions about development over time.

A second advantage is that it reduces recall bias. Experiences are recorded as participants' lives happen, rather than asking them to think back to childhood events many years later, which memory may have distorted, so the data is more accurate and valid. It also shows the order in which events occur, so researchers can establish links between early life circumstances (e.g. early attachment) and later outcomes (e.g. adult relationships), which a one-off snapshot study cannot do.

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4. (a) Describe how you would use a stratified sampling technique to select a sample of participants. [2]

First identify the subgroups (strata) in the target population, e.g. age groups 18-30, 31-50 and 51+, and work out what proportion of the population each stratum makes up. Then randomly select participants from each stratum (e.g. drawing names from a hat) in the same proportions, so if 20% of the population is aged 51+, 20% of the sample is too.

(b) Explain **one** advantage and **one** disadvantage of using stratified sampling in psychological research. [2 + 2]

Advantage: the sample is highly representative because every important subgroup of the target population is included in proportion to its size, so no group is over- or under-represented. This means the findings can be generalised to the whole target population with more confidence. Also, as participants within each stratum are selected randomly, there is less researcher bias in who is chosen.

Disadvantage: it is difficult and time-consuming, because the researcher needs detailed knowledge of the population to identify the strata and their exact proportions, and it may be hard to access members of some subgroups. If selected participants refuse or drop out (attrition), the proportions are no longer accurate, so the sample becomes less representative and the main advantage is lost.

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5. Explain how you would calculate the mean value of a set of data. [2]

Add all of the values in the data set together to get a total, then divide this total by the number of values in the set. For example, for 4, 6 and 8 the total is 18, and 18 ÷ 3 = 6, so the mean is 6.

6. (a) Explain the difference between $p<0.01$ and $p<0.05$. [2]

$p<0.01$ means there is less than a 1% probability that the results are due to chance, whereas $p<0.05$ means there is less than a 5% probability that the results are due to chance. So $p<0.01$ is a more stringent level of significance, which reduces the risk of a Type I error.

(b) Explain the difference between 'interval data' and 'ratio data'. [2]

Both are measured on a scale with equal intervals between units, but ratio data has a true (absolute) zero point, e.g. time in seconds, whereas interval data does not, e.g. temperature in °C, where 0 does not mean no temperature. So statements such as 'twice as much' are only meaningful for ratio data.

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7. Evaluate the use of conducting research on-line. [6]

One strength of online research is that participants all over the world can be accessed comparatively easily, which increases the cultural diversity of the sample. Very large samples can also be recruited far more quickly than with face-to-face methods or postal questionnaires, improving the representativeness and generalisability of the findings.

Online research is also cost effective. Online questionnaires can be constructed quickly, distributed for free and the results analysed automatically by software, whereas traditional 'pen and paper' research had printing and postage costs and required paying people to input and analyse the data. Participants can also respond anonymously from home, which may reduce social desirability bias.

However, there are ethical problems. The researcher cannot verify who is taking part, so anyone could complete the study, including children or vulnerable people who cannot give valid informed consent. Also, if sensitive topics are researched online, the researcher is not present to notice distress, so participants cannot be protected from harm at the time or properly debriefed.

There is also a lack of control: the researcher cannot control the environment people take part in (e.g. distractions) or check that answers are genuine, which reduces validity, and samples are biased towards people with internet

Additional space for Question **7** only:

access who choose to volunteer.

Overall, online research is efficient and cheap, but researchers must build in safeguards such as age checks, a 'withdraw' button and an online debrief.

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8. (a) Describe the sample used in Milgram's (1963) research '*Behavioural study of Obedience*'. [4]

Milgram's sample consisted of 40 males aged between 20 and 50 years who lived in the New Haven area (Connecticut, USA).

They were a volunteer (self-selecting) sample: they responded to a newspaper advertisement and direct mail requests asking for people to take part in a study of memory and learning at Yale University. They were paid $4.50 for taking part, which they were told was simply for coming to the laboratory.

The sample was chosen to cover a range of ages: 20% were aged 20-29, 40% were 30-39 and 40% were 40-50.

They came from a wide range of occupations and backgrounds, e.g. postal clerks, high school teachers, salesmen, engineers and labourers (15 skilled and unskilled workers, 16 white-collar sales and business workers and 9 professionals). Their educational level ranged from one man who had not finished elementary school to those with doctorate and other professional degrees.

Additional space for Question **8**(a) only:

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(b) Briefly evaluate the sample used in Milgram's (1963) research '*Behavioural study of Obedience*'. [5]

The sample was all male, so the study is prone to beta bias: it assumes women would behave in the same way, so the findings cannot confidently be generalised to females. However, this was accepted scientific practice at the time, and Milgram's later variation with women found the same 65% obedience rate.

A strength is that the sample included a range of ages (20-50), occupations and educational levels, so it was fairly representative of American men, and individual differences such as social class are unlikely to explain the high obedience rate.

However, all the participants came from one location, New Haven in the USA, an individualist culture, so the findings may not generalise to other cultures; cross-cultural replications have produced mixed findings, e.g. lower obedience in Australia (Kilham and Mann, 1974).

The sample was self-selecting, so participants may have been more motivated and taken the research seriously. However, only certain types of people

Additional space for Question **8**(b) only:

volunteer for research, and they may be more compliant or keen to please (volunteer bias), which could have inflated obedience. Also, Milgram selected who to use from the pool of volunteers, which may have introduced researcher bias.

Finally, 40 is a fairly small sample, although the standardised procedure has been replicated (e.g. Burger, 2009) with similar results.

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(c) Briefly evaluate the ethical issues in Milgram's (1963) research '*Behavioural study of Obedience*'. [5]

Deception was a major ethical issue. Participants were told the study was about the effect of punishment on memory and learning, the 'learner' (Mr Wallace) was a confederate, the draw was rigged, no real shocks were given and the learner's protests were pre-recorded. So participants could not give fully informed consent. However, Milgram argued deception was necessary, as knowing the true aim would have produced demand characteristics and invalid results, and in a follow-up survey 84% said they were glad to have taken part and only 1.3% were sorry.

Participants were also not protected from harm, as they experienced extreme stress: they were observed to 'sweat, tremble, stutter, bite their lips, groan, and dig their fingernails into their flesh', and three had full-blown, uncontrollable seizures. The right to withdraw was undermined by the prods, e.g. 'You have no other choice, you must go on'. In defence, Milgram did not expect this level of obedience (Yale students predicted only 0-3% would go to 450 volts), all participants were debriefed and reunited with the unharmed

Additional space for Question **8**(c) only:

learner, and a psychiatrist who interviewed 40 participants a year later found no long-term harm.

There was also a risk to participants' values and self-esteem, as they may have left with a negative view of themselves as capable of hurting someone.

Overall, the study would breach the BPS Code of Ethics today, but Milgram argued that the importance of its findings justified the costs.

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SECTION B – Personal Investigations

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

INVESTIGATION ONE: A quasi-experiment on age and sleep.

9. (a) State a fully operationalised hypothesis for your quasi-experiment. [2]

Participants aged 60 and over will sleep fewer hours per night, measured as the mean number of hours recorded in a sleep diary over five nights, than participants aged 18 to 30.

(b) Justify **one** reason why a quasi-experiment was the most suitable method for this investigation. [2]

A quasi-experiment was the most suitable method because my IV, age (18-30 or 60+), is a naturally occurring characteristic of the participants. I could not manipulate age or randomly allocate participants to the age groups, so a true laboratory experiment was not possible; I could only compare the hours slept by the existing age groups.

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(c) Explain **one** issue of reliability which you considered in your quasi-experiment and how you dealt with the issue. [4]

One issue of reliability was that a person's sleep varies from night to night, e.g. a participant might sleep badly one night because of stress, illness or a late night out. If I had measured only one night, the number of hours recorded would not be consistent if the study were repeated, so my data would be unreliable.

I dealt with this by asking every participant to complete a standardised sleep diary for five consecutive weeknights, recording the time they fell asleep and woke up, and I calculated each person's mean hours slept, so one unusual night had less effect. I also gave all participants the same standardised written instructions, so the procedure could be replicated consistently.

Additional space for Question **9**(c) only:

(d) Explain **one** ethical issue which you considered in your quasi-experiment and how you managed this ethical issue. [4]

One ethical issue was psychological harm: older participants might have been offended or embarrassed at being labelled 'old' or at being asked personal questions about their age and sleep, and some might have felt anxious if they thought their sleep was 'poor'.

I managed this by asking participants to tick an age band (18-30 or 60+) rather than describing them in words, and keeping all data anonymous by using participant numbers instead of names. In the brief I reminded them of

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their right to withdraw and to leave out any question, and in the debrief I explained that sleep naturally changes with age, that there were no right or wrong answers, and gave them my contact details if they had any concerns.

Additional space for Question **9**(d) only:

(e) Identify and justify the descriptive statistic you used to describe the data in your quasi-experiment. [1 + 2]

I used the mean.

This was appropriate because my DV, the number of hours slept per night, was measured on a scale with equal intervals (ratio data), and the mean uses every score, so it is the most sensitive measure of central tendency. There were no extreme anomalies in either age group to distort it, and it allowed me to compare the average hours slept by the 18-30 group and the 60+ group directly.

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INVESTIGATION TWO: A correlational study using a Stroop test.

10. (a) (i) State the aim of your correlational study. [2]

To investigate whether there is a relationship between the number of hours of sleep participants had the night before and the time taken (in seconds) to complete an incongruent Stroop test.

(ii) State the operationalised co-variables that you used in your investigation. [1 + 1]

Co-variable 1: the number of hours of sleep the participant reported having the night before the test.

Co-variable 2: the time taken, in seconds, to correctly name the ink colours of 20 incongruent colour words on the Stroop test.

(b) Identify the sampling technique you used to recruit participants for your correlational study and justify your choice of sampling technique. [1 + 2]

I used opportunity sampling, asking sixth form students who were available in the common room during their free periods.

I chose this because it was the quickest and most practical way to recruit the 20 participants I needed in my limited time: the students were already on site and the Stroop test only took a few minutes each, whereas putting up an advert for volunteers and waiting for responses would have taken much longer.

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(c) (i) Identify an appropriate graphical representation which could be drawn from the data you collected in your correlational study. [1]

A scattergram (scatter graph).

(ii) Identify the inferential statistic you used to analyse the data you collected for your correlational study. [1]

Spearman's rank order correlation coefficient (Spearman's rho).

(iii) Explain **two** reasons why the inferential statistic identified in **10**(c)(ii) was appropriate. [2]

1. I was testing for a correlation (relationship) between hours of sleep and Stroop time, not a difference between conditions.

2. My data was at least ordinal (hours of sleep were self-reported estimates and the times could be ranked), and the data was related, as each participant gave a score for both co-variables.

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(d) Explain **one** issue of validity which you considered in your correlational study and explain how you dealt with this issue. [4]

One issue of validity was that some participants could have been colour blind, so they would not be able to name the ink colours accurately. Their slow or incorrect Stroop times would then be caused by their colour vision rather than by their amount of sleep, so the test would not be measuring what it intended to (interference in selective attention) and the correlation would lack internal validity.

I dealt with this by asking all participants in the briefing to disclose whether they knew they were colour blind, and I also gave everyone a simple colour-naming check of the four ink colours used (red, blue, green and yellow) before the test. Anyone who could not name them correctly was thanked for taking part, but their data was not used in the analysis.

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SECTION C – Application of research methods to a novel scenario

Answer **all** questions.

11. A researcher wanted to test the hypothesis that left-handed people are more creative than right-handed people. A quota sample of 100 students at university were asked to take part in an online investigation. The participants stated whether they were left-handed or right-handed and also which subjects they had chosen to study for their degree. Subjects such as Art and Photography were classified as 'creative' and subjects such as Mathematics and Science were classified as 'non-creative' by the researcher.

(a) State an operationalised null hypothesis for this investigation. [2]

There will be no significant difference between left-handed and right-handed university students in whether they study a creative subject (e.g. Art, Photography) or a non-creative subject (e.g. Mathematics, Science); any difference will be due to chance.

The findings are shown below (**Figure 1**).

Figure 1: The number of students studying each subject type.

Handedness	Creative	Non-creative
Left	8	2
Right	34	56

(b) Identify an appropriate measure of central tendency for this data and explain why this measure is suitable for the data in **Figure 1**. [3]

The mode.

This is because the data in Figure 1 is nominal (frequency) data: it shows the number of students falling into separate categories (left/right-handed, creative/non-creative subject), so the scores cannot be added or ranked and a mean or median cannot be calculated. The mode shows the most frequent category, e.g. for left-handed students the modal category is creative (8) and

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for right-handed students it is non-creative (S6).

(c) The researcher carried out a Chi Square test and found an observed (calculated) value of 6.54. The degrees of freedom (df) was 2. Identify the appropriate critical value from **Figure 2** and explain why the psychologist should accept or reject the null hypothesis at $p<0.05$. [3]

Figure 2: Level of significance for a two-tailed test (non-directional hypothesis).

df	0.10	0.05	0.025	0.01
1	2.71	3.84	5.02	6.64
2	4.61	5.99	7.38	9.21
3	6.25	7.82	9.35	11.35
4	7.78	9.49	11.14	13.28
5	9.24	11.07	12.83	15.09
6	10.65	12.59	14.45	16.81
7	12.02	14.07	16.01	18.48
8	13.36	15.51	17.54	20.09
9	14.68	16.92	19.02	21.67
10	15.99	18.31	20.48	23.21

The critical value is 5.99 (df = 2, p<0.05, two-tailed).

The calculated value of 6.54 is greater than the critical value of 5.99, so the result is significant at p<0.05. Therefore the psychologist should reject the null hypothesis and accept the alternative hypothesis that there is a difference in the type of subject (creative or non-creative) studied by left- and right-handed students. Figure 1 shows that 8 out of 10 left-handed students studied creative subjects compared with 34 out of 90 right-handed students.

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12. A group of researchers wanted to investigate if adverts aimed at children promoted active or non-active play. They selected 50 adverts shown during children's TV programmes. Each researcher counted the main type of play seen in the advert. The data is displayed in **Figure 3** below:

Figure 3: Main types of play seen in the adverts.

Type of play	Number of times the type of play was seen
Running	14
Computer/screen-based	26
Cycling	6
Art and Craft	4

(a) Identify the level of measurement of the data in this research. [1]

Nominal data (frequency counts of categories of play).

(b) Explain **one** issue of reliability with this investigation and how the researcher could have assessed the issue. [4]

One issue of reliability is that several researchers each counted the main type of play in the adverts, and they may have interpreted the behaviour differently, e.g. one researcher may class children playing a chasing video game as 'running' while another records 'computer/screen-based', or they may disagree about which type of play is the 'main' one in an advert. This means the tallies may not be consistent between observers (low inter-rater reliability). The researchers could assess this by having two or more researchers independently watch and tally the same sample of adverts using the same operationalised behavioural categories, then correlating their tallies. A strong positive correlation (+0.8 or above) would show good inter-rater reliability.

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(c) (i) Calculate the percentage of adverts that contained computer/screen-based activity. Show your workings. [2]

Computer/screen-based = 26 out of 50 adverts

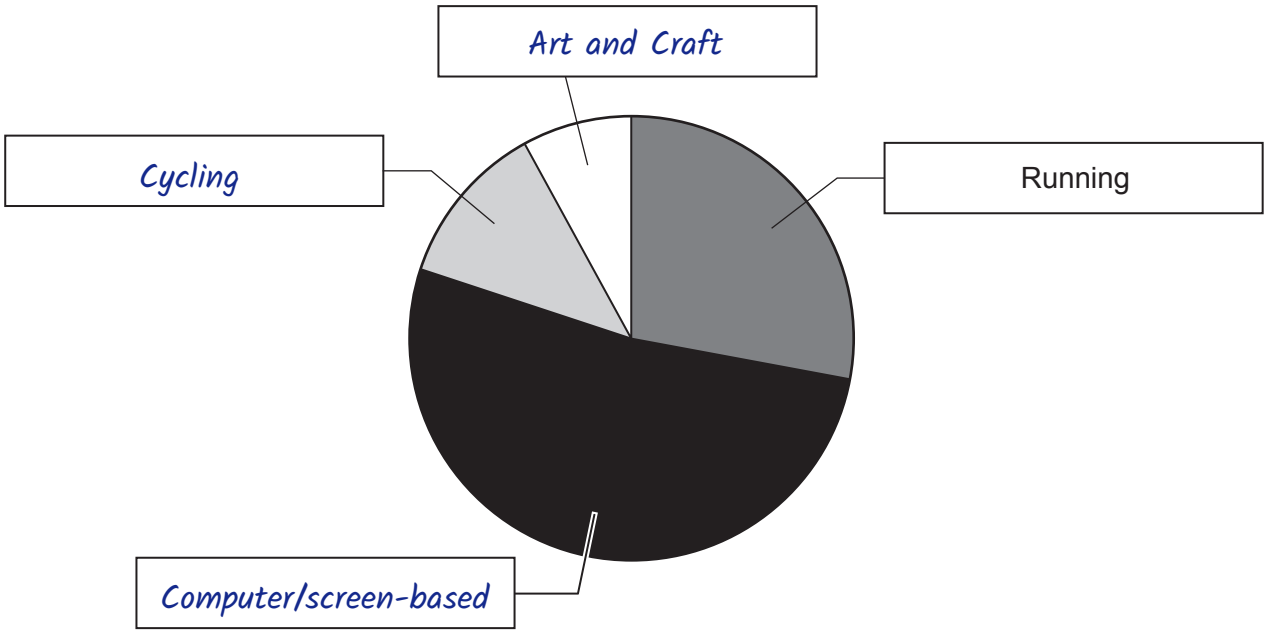
26 ÷ 50 = 0.52

0.52 × 100 = 52%

(ii) Identify the type of graphical representation used in **Figure 4** below and then complete the labels of the three blank segments on **Figure 4**. [4]

Pie chart.

Figure 4: Graphical representation of the proportion of adverts containing each type of play seen.



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(iii) Apart from the type of graphical representation used in **Figure 4**, identify an alternative appropriate graphical representation that could be used to display the data in this research. [1]

A bar chart (type of play on the x-axis and frequency on the y-axis).

(d) Evaluate **two** disadvantages of using qualitative data in psychological research. [2 + 2]

1. Qualitative data is difficult and time-consuming to analyse, as it usually consists of words, e.g. interview transcripts or diary entries, which must be read many times and coded into themes (thematic analysis). This makes it hard to summarise, compare between participants or analyse statistically, so it is less practical than quantitative data.

2. Qualitative data may lack validity and objectivity because it has to be interpreted by the researcher, and different researchers may interpret the same transcript differently, so their own expectations can bias the conclusions. It may also be less reliable, as opinions recorded at one time may change if the participant were re-tested later, so findings are hard to replicate.

END OF PAPER

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