A-level Psychology: Summer work Mathematical skills student booklet

The aims of this booklet are:

- to provide you with an introduction to some of the maths skills required at A-level Psychology
- to support your transition from GCSE to A-level Psychology by outlining and explaining the role played by mathematics in the study of the subject
- to provide you with opportunities to practise applying some of your GCSE Mathematics skills to a psychology context. You will do this by completing a range of past paper questions from GCSE, AS and A-level Psychology.
- to increase your confidence and readiness to successfully undertake your studies of Psychology.

Why are mathematical skills important in Psychology?

The *British Psychological Society* defines Psychology as 'the science of mind and behaviour.' As a science, Psychology requires research to test hypotheses so that researchers can come to come to evidence-based conclusions. For many studies, mathematics and statistics play a key role. For example, in a laboratory experiment the researcher(s) will collect data and then use maths to identify patterns and trends.

You will most likely already be familiar with practical research activities through your studies of subjects such as the GCSE Sciences, and you will know that such studies collect data which requires analysis. Similarly, when you carry out quantitative research in Psychology, you will collect, handle and interpret data to test your hypotheses, and report your results. This will support the detection of patterns and trends in the data you have collected.

Your mathematical knowledge will enable you to understand and interpret the data found in your psychological research. Furthermore, it will also make a significant contribution to your analytical and critical skills in all the topics you study in A-level Psychology.

Mathematical Requirements in A-level Psychology

At least **10%** of the marks in assessments for Psychology require mathematical skills.

At least 10% of the overall assessment of Psychology will contain mathematical skills equivalent to Level 2 or above.

What mathematical skills will I cover in A-level Psychology?

You can read the full AQA A-level Psychology specification on the AQA website here. We will focus on *some* of the mathematical skills required at A-level Psychology, focusing on a particular part of the specification, namely *4.2.3.2 Data handling and analysis* (page 20). This section is part of the compulsory *Research Methods* section of the specification and you can read the detail in the table (Data handling and analysis) on the following page.

Assessment criteria for mathematics in A-level Psychology

At least 10% of the overall assessment of A-level Psychology will contain mathematical skills equivalent to Level 2 or above.

The mathematical skills required in the specification will be assessed specifically in the research methods topic (Paper 2) and more broadly in Paper 1 and Paper 3 (see the specification for further information). You will develop your skills through both the study of the specification content and ethical practical research activities, involving:

- designing research
- conducting research
- analysing and interpreting data.

You will also find some of the skills developed in your study of GCSE Science helpful when designing and conducting research, eg hypothesis, experiments and variables.

Other Useful Resources and Documents

You can find a range of resources to support your learning at the AQA A-level Psychology website.

Command words

Command words are used in questions to tell you what is required when answering the question. You can find definitions of the command words used in Psychology assessments on the website.

They are very similar to the command words used at GCSE.

Subject-specific vocabulary

You can find a list of some of the subject specific vocabulary used in our AS and A- level specification on the website: https://www.aqa.org.uk/resources/psychology/as-and-a-level/psychology/teach/subject-specific-vocabulary

You will become familiar with, and gain understanding of, these terms as you work through the course.

Question 1

A 16 year old psychology student decided to carry out a study on age stereotyping for her GCSE coursework. She did this in the following way:

- she wrote a list of four hobbies
- she found a photograph of her 20 year old sister and of her 70 year old grandmother
- she selected 10 participants by making a list of all the girls in her year and choosing every third name. She did this because she wanted all her participants to be females of the same age.
- she showed all the participants the picture of her sister and asked them to choose the hobby which they thought she would most enjoy
- she then showed all the participants the picture of her grandmother and asked them to choose the hobby which they thought she would most enjoy.

She put her findings into a table. Her findings are in the table below.

The number of participants choosing hobbies for a 20 year old and for a 70 year old

Hobby	**Number of participants choosing the hobby for the 20 year old**	**Number of participants choosing the hobby for the 70 year old**
Knitting	0	8
Ballroom dancing	0	2
Going to the gym	7	0
Playing computer games	3	0

(a) (i) Calculate the percentage of participants who chose knitting as a hobby for the 70 year old.

[1 mark]

_____

(ii) Calculate the percentage of participants who chose going to the gym as a hobby for the 20 year old.

[1 mark]

_____

Question 2

In 1987, a survey of 1000 young people found that 540 said they smoked cigarettes, whilst 460 said they did not. In 2017, a similar survey of another 1000 young people found that 125 said they smoked cigarettes, whilst 875 said they did not.

Calculate the ratio of smokers to non-smokers in 2017. Give your answer in the simplest form.

Show your workings.

[2 marks]

Question 3

A psychologist used a set of negative images to assess violent attitudes before and after participants played a 30-minute computer game. In a repeated measures design, 15 participants were tested before and after playing the game using a single set of images.

Each participant had a different total score in the before condition, where the maximum score was 40 and the median score was 23.

How many of the participants had a score < the median in the before condition?

[4 marks]

Question 4

Look at the table below which contains some examples of ways to analyse data.

Description	Term
Calculated by looking at the middle score in a set of data after the data has been put into ascending order.	
Calculated by finding the most frequently occurring score.	
Calculated by adding up all of the scores and dividing the total by the number of participants.	

From the following list of terms, choose the one that matches each description and write **A**, **B**, **C** or **D** in the box next to the correct description.

[3 marks]

A Mean

B Mode

C Median

D Range

Question 5

A psychologist was interested in the effects of violent computer games on aggression in young boys. Following appropriate ethical procedures, she set up a study in which she identified ten boys who played violent computer games for at least two hours a day (Group A), and another group of ten boys who did not play violent computer games (Group B). The boys were systematically observed in their school playground on five separate occasions and the total number of aggressive behaviours they demonstrated was recorded. The data are given in the table below:

The effects of playing violent computer games on aggressive behaviour in boys.

Group A	Number of aggressive acts	Group B	Number of aggressive acts
1	19	1	8
2	9	2	7
3	3	3	11
4	18	4	7
5	13	5	6
6	16	6	24
7	5	7	9
8	3	8	10
9	7	9	5
10	35	10	10
Median		**Median**	

Complete the table by calculating the median for the two groups.

[2 marks]

Question 6 (a)

Researchers wanted to evaluate the effectiveness of using cognitive behaviour therapy (CBT) to treat unipolar depression. They put up posters in a Doctors' surgery asking for volunteers who had been diagnosed with depression to complete a questionnaire. The researchers chose 10 people who had only received medication for depression, and 10 people who had received both CBT and medication.

The participants were asked to rate the effectiveness of their treatment on a scale of 0-10 where 0 is not at all effective and 10 is very effective. The results are shown in the table below.

Ratings of effectiveness for types of treatment for depression.

Participant	Medication	Participant	Medication and CBT
1	3	11	10
2	6	12	5
3	5	13	7
4	4	14	8
5	6	15	8
6	8	16	9
7	9	17	6
8	4	18	8
9	7	18	8
10	8	20	9

Calculate the median rating of effectiveness for the group that was treated with both medication and CBT. Show your workings.

[2 marks]

Workings:

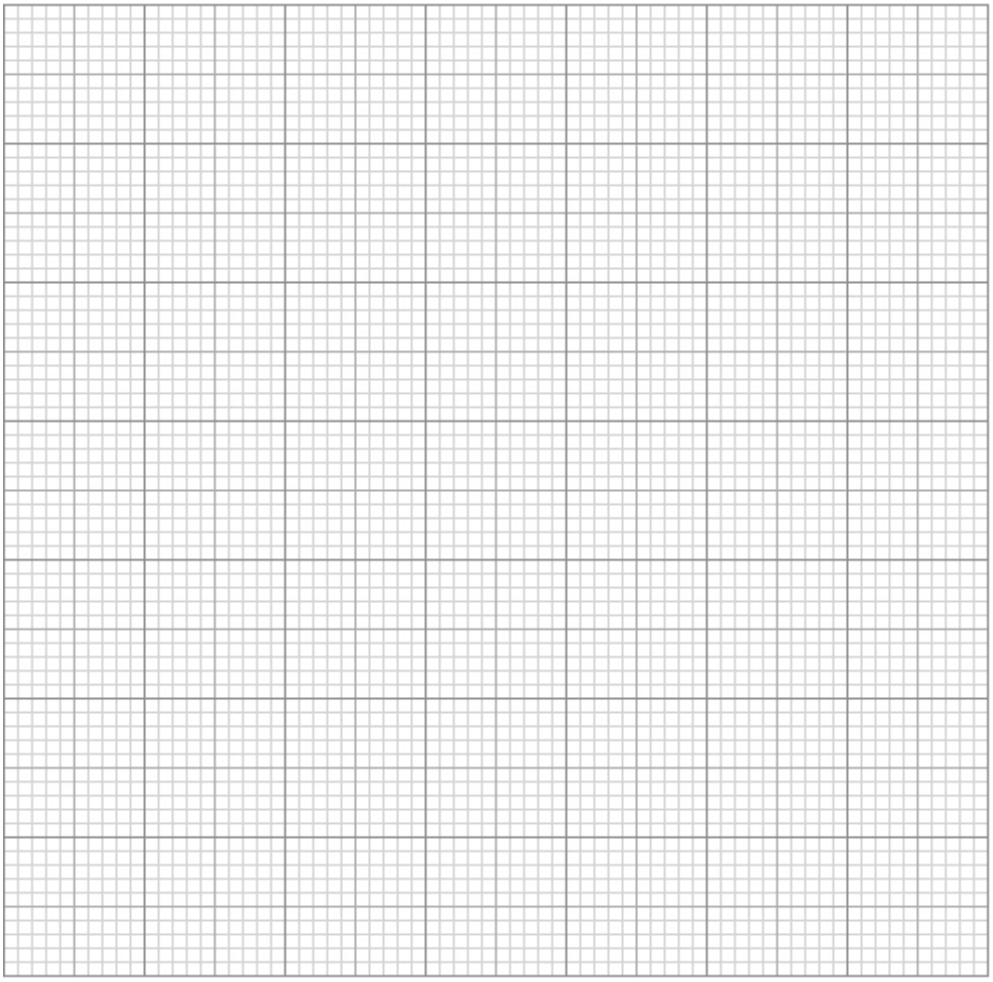
Answer _____

Question 6 (b)

The median rating of effectiveness for the medication group was 6. Use your answer from **part (a)** to sketch a suitable diagram of the median ratings for effectiveness of treatment on the graph paper below.

Provide a suitable title and labels for your diagram.

[4 marks]



Question 7

A teacher showed her Year 12 Psychology class a video clip of a girl shopping in a busy high street with her boyfriend. Near the end of the clip, the girl had her handbag stolen by a man in a black jacket. Later, 10 of the students were interviewed about the events in the video clip using a cognitive interview. The remaining 9 students were interviewed using a standard interview.

Each student was assigned a score based on the accuracy of their answers to the questions in the interview. The results can be seen in the table below.

Accuracy scores for students in the standard and cognitive interview conditions

Standard interview condition		**Cognitive interview condition**	
Student	**Accuracy score**	**Student**	**Accuracy score**
1	8	10	13
2	8	11	13
3	6	12	11
4	9	13	8
5	10	14	11
6	7	15	14
7	9	16	11
8	8	17	13
9	8	18	15
		19	18

Calculate the mean accuracy score for the cognitive interview condition.
Give your answer to **two** significant figures.

[3 marks]

Question 8

Read the text below and then answer the questions that follow.

Two researchers obtained a sample of ten people whose ages ranged from 20 to 60 years old.

Each participant was asked to take part in a discussion of social care issues. This included discussion about who should pay for social care for elderly people and how to deal with people struggling with mental health problems. A confederate of the researchers was given a script to follow in which a series of discussion points was written for the confederate to introduce.

Each participant then came into a room individually and the discussion with the confederate took place. The maximum time allowed for a discussion was 30-minutes.

The researchers observed the discussions between the confederate and participants and rated the active engagement of the participants in the discussion. The ratings were between 1, (not at all interested) and 20, (extremely interested.) The researchers believed that the rating provided a measurement of the participants' attitudes towards social care issues.

The following data were obtained in the study:

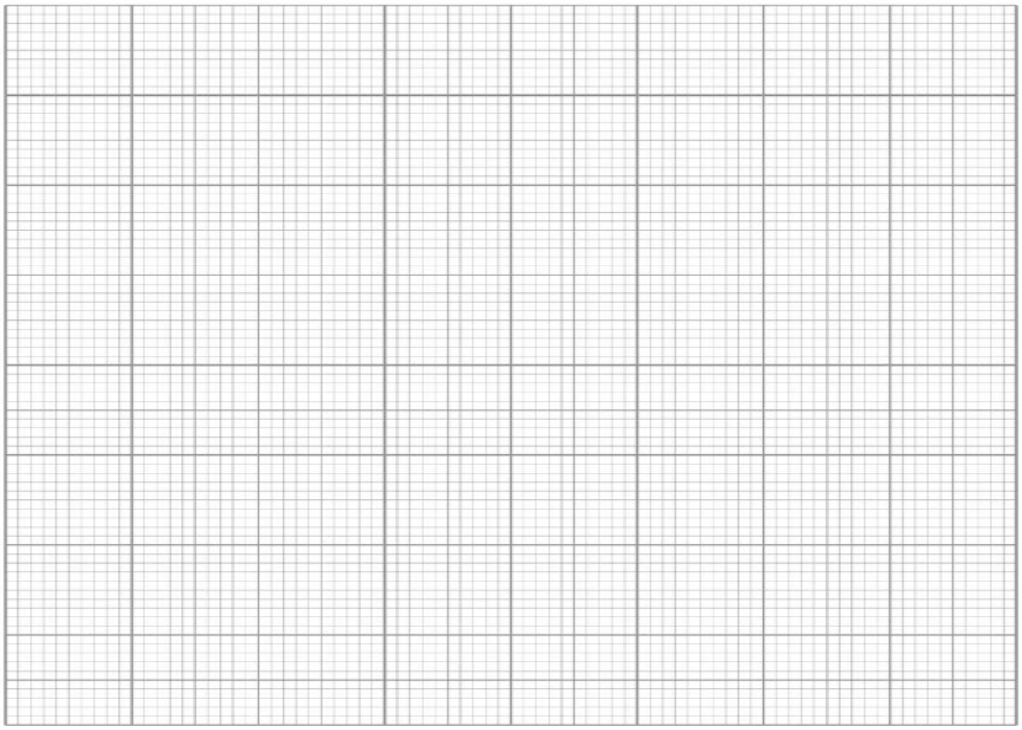
The relationship between age and attitude to social care.

Age of participant	Attitude to social care issues rating
21	5
23	3
34	8
36	12
40	10
47	13
52	17
53	15
58	18
60	20

Question 8 (continued)

(a) Use the graph paper below to sketch a display of the data given in the table above. You do not need to give your display a title.

[3 marks]



Question 9

A recent study recorded the amount of time that children spent in day care from birth to four years, and asked each child's mother to rate her child for aggression and disobedience. The study found that, as the time spent in day care went up, the mothers' rating of aggression and disobedience also went up.

(a) What kind of correlation is this research showing?

[1 mark]

_____

Question 10

A researcher studying depression wanted to see whether or not there was a relationship between level of self-esteem and negative schema score. She constructed two questionnaires and asked ten people who had been diagnosed with depression to complete them.

One questionnaire measured the participant's level of self-esteem. A low score (out of 50) indicated low self-esteem.

The other questionnaire measured whether the participant showed evidence of negative schema. A low score (out of 50) indicated evidence of negative schema.
The two sets of results for each participant are shown in the table below.

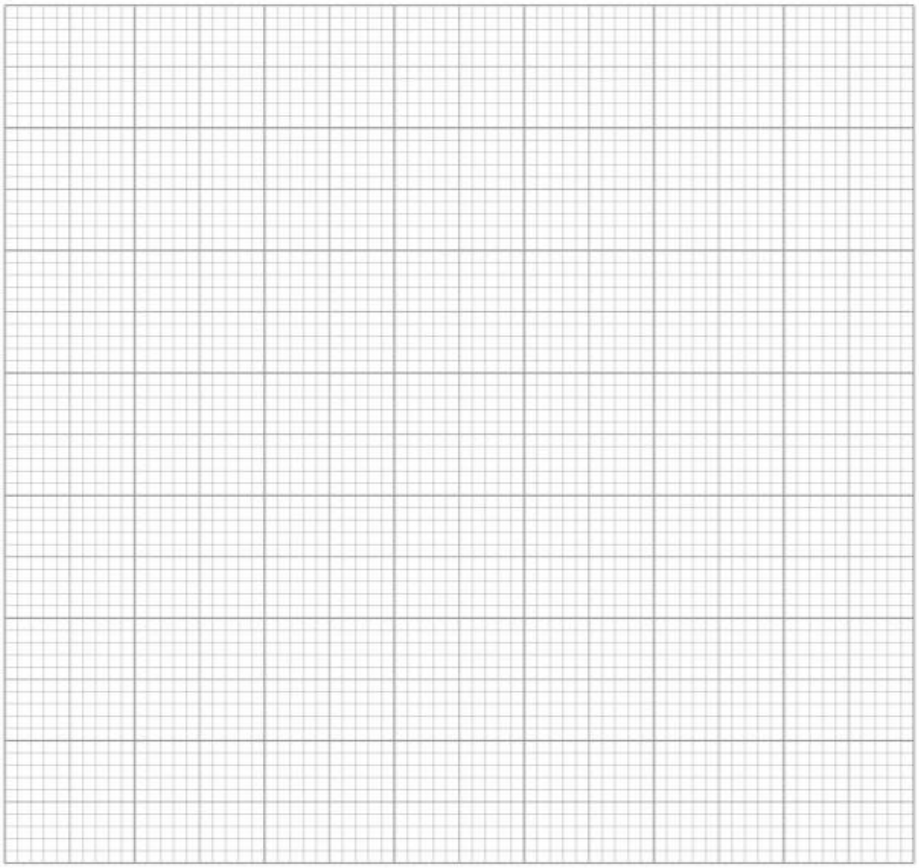
Table 1 Self-esteem score and negative schema score for each patient

Participant	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Self-esteem score	8	9	9	11	13	17	18	18	20	22
Negative schema score	11	15	13	18	12	14	20	16	17	19

Draw a suitable graphical display to represent the data in **Table 1**. Label your graph appropriately.

[4 marks]

Title: _____



Question 11

Research findings indicate an improvement in memory if the locations of learning and recall are the same. To test these findings, an experiment was conducted under the following conditions:

Condition 1: 20 people learned and recalled **Word list A** in the same location.

Condition 2: The same 20 people learned **Word list B** in one location and recalled **Word list B** in a different location.

The experiment was counterbalanced and the two conditions were completed in a single day.

Mean number of words recalled in the two conditions and the standard deviation for both conditions

	Condition 1 (same location)	**Condition 2 (different locations)**
Mean number of words recalled	19.3	14.6
Standard deviation	2.43	2.41

(i) Name an appropriate graph that could be used to display the means shown in the table above.

Suggest appropriate X and Y axis labels for your choice of graph.

[3 marks]

Name of graph:

_____

X axis:

_____

_____

Y axis:

_____

_____

Question 12

A psychologist wanted to test whether listening to music improves running performance. The psychologist conducted a study using 10 volunteers from a local gym. The psychologist used a repeated measures design. Half of the participants were assigned to condition A (without music) and half to condition B (with music). All participants were asked to run 400 metres as fast as they could on a treadmill in the psychology department. All participants were given standardised instructions. All participants wore headphones in both conditions. The psychologist recorded their running times in seconds. The participants returned to the psychology department the following week and repeated the test in the other condition.

The results of the study are given in **Table 1** below.

Table 1 Mean number of seconds taken to complete the 400m run and the standard deviation for both conditions

	Condition A (without music)	**Condition B** (with music)
Mean 400m time (s)	123	117
Standard deviation	9.97	14.5

Explain why a histogram would not be an appropriate way of displaying the means shown in Table 1.

[2 marks]

Extra space