Flying Start 2018

Psychology

Contents:

Introduction to the course:

Welcome to Psychology. Psychology A Level is a 2 year course that offers a broad introduction to the study of Psychology. There are 3 key components:

1. Research methods:

This component is intended to introduce and develop a knowledge and understanding of the process of planning, conducting, analysing and reporting psychological research across a range of experimental and non-experimental methodologies and techniques. Students are required to conduct their own practical work, they are provided with the opportunity to understand what's involved in a range of different research methods and techniques. An awareness of associated strengths and weaknesses is also developed. Students are encouraged to reflect on their research journeys as they develop vital investigative skills and develop an appreciation of the principles of empirical scientific enquiry.

2. Psychological themes through core studies:

This component introduces key themes and core studies in psychology. The selection of classic and contemporary studies enables students to appreciate how psychological knowledge and understanding develop over time and enables students to place research in its historical context. The contemporary studies are more 'up-to-date' pieces of research that engage in some way with the issues being explored in the classic studies they are paired. By the end of the component, students will have built up a varied knowledge of exemplar studies, a sound understanding of key themes and areas, and strong critical evaluation skills.

3. Applied psychology:

This component introduces a new and engaging compulsory section on issues in mental health and an exciting range of options as students discover how psychology is used in applied areas, choosing two options:

- Child psychology
- Criminal psychology

Through this component, students explore applications of psychology and gain an insight into how theory can be applied to real-world situations. The assessment provides the opportunity for students to demonstrate their learning through extended writing. Methodological issues and debates also run throughout components 2 and 3 and include:

- Nature/nurture
- Freewill/determinism
- Reductionism/holism
- Individual/situational explanations
- Usefulness of research
- Ethical considerations
- Conducting socially sensitive research
- Psychology as a science

The A Level comprises all the content above being examined across three 2 hour papers.

Preparation for the course:

1. Read the summary of the Milgram study on the following pages and complete the following questions. Bring these with you in your first lesson in September.

    a. Why was it necessary to deceive the participants in this study?

    b. What evidence is there that the participants genuinely believed they were giving electric shocks to the learner?

    c. Define what is meant by the 'agentic state'.

    d. What problems are there with the sample used in the study?

    e. What are the problems with drawing conclusions about obedience using this study alone?

Milgram, S. (1963): The behavioural study of obedience – Behavioural study of obedience. *Journal of Abnormal and Social Psychology, 67, 371-378.*

Introduction / Background

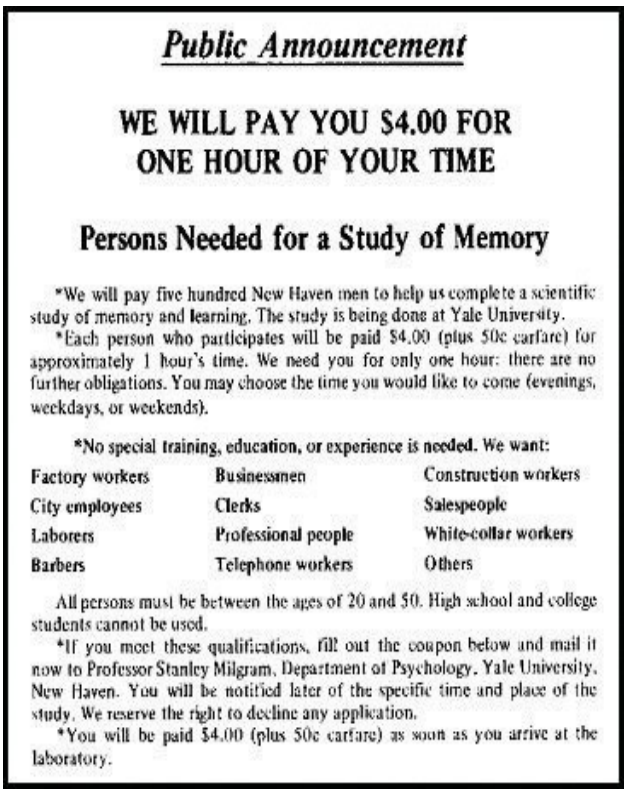
Social psychology focuses on the study of behaviour within a social context, such as family, institutions, and political systems. Social behaviour may involve activity within a group, or between groups, and the Milgram study looks at the influence people have on each other.

Obedience is often linked with desirable behaviour, but Milgram starts his article with reference to the behaviour of German SS officers in the Second World War. He points out that the officers displayed inhumanity in issuing orders but that those who obeyed were equally guilty.

The Research Questions:

- Why do people obey authority?
- What are the conditions that foster obedient behaviour?
- What are the conditions that foster independent behaviour?

Hypothesis: That American men will not follow an order, if by doing so they cause harm to another person.
Milgram set out to test this hypothesis in a number of extraordinary studies including this one



Public Announcement

WE WILL PAY YOU $4.00 FOR ONE HOUR OF YOUR TIME

Persons Needed for a Study of Memory

*We will pay five hundred New Haven men to help us complete a scientific study of memory and learning. The study is being done at Yale University.

*Each person who participates will be paid $4.00 (plus 50c carfare) for approximately 1 hour's time. We need you for only one hour: there are no further obligations. You may choose the time you would like to come (evenings, weekdays, or weekends).

*No special training, education, or experience is needed. We want:

Factory workers	Businessmen	Construction workers
City employees	Clerks	Salespeople
Laborers	Professional people	White-collar workers
Barbers	Telephone workers	Others

All persons must be between the ages of 20 and 50. High school and college students cannot be used.

*If you meet these qualifications, fill out the coupon below and mail it now to Professor Stanley Milgram, Department of Psychology, Yale University, New Haven. You will be notified later of the specific time and place of the study. We reserve the right to decline any application.

*You will be paid $4.00 (plus 50c carfare) as soon as you arrive at the laboratory.

Method

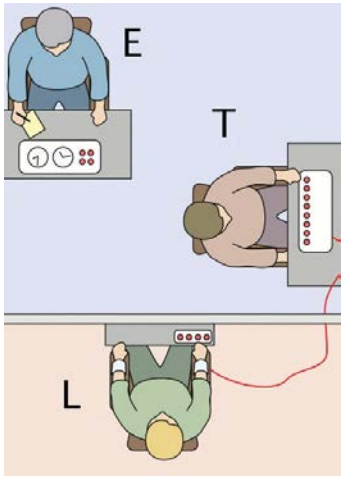
A controlled observation in a laboratory.

Participants: Milgram advertised, using a newspaper and direct mailing, for 500 hundred New Haven men to take part in a scientific study of memory and learning at Yale University. Everyone was paid $4 simply for coming to the laboratory. The payment did not depend on remaining in the study. The final group of participants consisted of 40 men aged between 20 and 50, who came from various occupational backgrounds. There were two further participants: the part of the experimenter was played by a biology teacher, and the part of the learner or victim was a 47-year-old accountant (Mr Wallace). Both of these men were accomplices of Milgram.

Procedure

The participants were deceived about the true purpose of the research. When each participant arrived, they were told that the purpose of the experiment was to see how punishment affected learning. The 'naïve' participant was introduced to the other participant and both were asked to draw lots to see who would play the part of the teacher and who would be the learner. The confederate always got the part of the learner. The learner was strapped into a chair in the next

door room and an electrode attached to his wrist. The learner was given the following task: He would hear a list of word pairs and later be given one word and a choice of four possible partners. He must identify which of the four was correct. Every time the learner got a question wrong, he would receive an electric shock administered by the teacher and the shocks increased in intensity with each mistake. The teacher did this using a shock generator, a machine with switches labelled for each level of electric shock.



The 'teacher' was given a sample shock of 45 volts to demonstrate that the machine was working, though in fact that was the only time it did work. For the rest of the experiment the learner only pretended to be receiving shocks.
The experiment began. The learner gave mainly wrong answers and for each of these the teacher gave him an electric shock which was received in silence until they got to shock level 300. At this point the learner pounded on the wall and then gave no response to the next question. When the 'teacher' turned to the experimenter for guidance, he was given the standard instruction, 'an absence of response should be treated as a wrong answer'. After the 315 volt shock the learner pounded on the wall again but after that there was no further response from the learner – no answers and no pounding on the wall. If the teacher felt unsure about continuing, the experimenter used a sequence of 4 standard 'prods', which were repeated if necessary:

- Prod 1: Please continue.
- Prod 2: The experiment requires that you continue.
- Prod 3: It is absolutely essential that you continue.
- Prod 4: You have no other choice, you must go on.

If the teacher asked whether the learner might suffer permanent physical injury, the experimenter said: "Although the shocks may be painful, there is no permanent tissue damage, so please go on."

Results

Over half of the participants (26/40 or 65%) went all the way with the electric shocks. Only nine of the participants (22.5%) stopped at 315 volts.

The participants showed signs of extreme tension: most of them were seen to 'sweat, tremble, stutter, bite their lips' and quite a few laughed nervously and smiled in a bizarre fashion. Three even had 'full-blown seizures'. At the end of the experiment all participants were debriefed. They were reunited with the victim, assured there had been no shocks, and told that their behaviour was entirely normal and that their feelings of conflict were shared by the others. They were also sent a follow-up questionnaire, which showed that 84% felt glad to have participated, and 74% felt they had learned something of personal importance. Only one person reported that he felt sorry to have participated.

Prior to the experiment Milgram had conducted a survey asking a range of people to predict the participants' behaviour. The responses estimated that no more than 1% of the participants would continue to 450 volts. People who observed the experiment through one-way mirrors also expressed astonishment at the participants' behaviour.

Conclusion

Milgram proposed the concept of an agentic state to explain this high level of obedience, in which, in this situation, the participant acts as the 'tool' of the experimenter, passing the responsibility for the consequences of his actions to the experimenter… "I was only following orders".

2. Within A Level Psychology, 10% of the marks available within written examinations will be for assessment of mathematics (in the context of psychology) at GCSE standard, or higher. Lower level mathematical skills may still be assessed within examination papers but will not count within the 10% weighting for psychology. All assessment of mathematical skills will be in Paper 1 examination. To prepare for this, please complete the activity sheets that follow. We will go through this in your lessons in September.

Descriptive Statistics workbook

This workbook will help you become familiar with some of the mathematical content that you need to know for the research method part of the specification.

Raw Data

Data Recording

Design and use of raw data recording tables

What is raw data? Data that psychologists have collected from an investigation, but has not been processed or analysed, so for example would simply be number of yes responses or time taken.

In order to record the data, psychologists would put this into a data table.

Checklist for a raw data table:

- A title outlining what the table is about.
- Rows and columns are clearly labelled.
- Unit measurements such as percentages should be labelled in the heading, not put next to every score.

Examples of raw data tables

Table 1 – Number of hours spent on revision before the 'psychology class test'.

Student	Number of hours revised the night before the test	Number of hours revised for the test in total
1	2	2
2	0	30
3	11	12
4	5	6
5	5	5
6	1	1
7	2	3
8	0	0

1. Analysis of raw data table – What does this raw data table tell us about revision habits? How else could you display this data?

Data tables can give an overview of the results from an investigated. Data can then be analysed by putting it into graphs and charts, and through measures of central tendency and dispersion, or even inferential statistics.

Standard and Decimal Form

Standard Form

Sometimes psychologists will come across very large or very small numbers. Because of the nature of very large numbers, it is often necessary to simplify these using shorthand, this is known as standard form.

For example:

5,000,000 would be 5×10^6 - this means 5 x (10 x 10 x 10 x 10 x 10 x 10)

65,000 would be 6.5×10^4 – this means 6.5 x (10 x 10 x 10 x 10)

0.000001 would be 1×10^{-6} this means 1 x (-10 x -10 x -10 x -10 x -10 x -10)

http://www.mathsrevision.net/gcse-maths-revision/number/standard-form explains this further

2. **Some more examples for you to simplify:**

- 8,000,000
- 33,000
- 44,000,000
- 0.0006

Decimal Form

Once analysis of data starts to take place, decimal form is often used. It allows portions of whole numbers to be represented. Each digit after the decimal point is 1/10 the size of the one before.

For example:

0.9 = 9/10

0.09 = 9/100

0.009 = 9/1000

0.0009 = 9/10000

Significant Figures

π

One of the things you may remember from your study of maths at school is Pi, although you may not remember that Pi is the ratio of the circumference of a circle to its diameter. Pi is always the same number, no matter which circle you use to compute it.

3. How much of Pi do you remember?
4. How many significant figures do you think are needed?

Pi information

A significant figure is a meaningful figure, so for example Pi is 3 to one significant figure, 3.1 to two significant figures and 3.14 to three significant figures and so on.

The same idea applies when looking at correlation co-efficients (which range from -1 to +1). In a study by Holmes and Rahe, they found a correlation of +0.118 between amount of life events and amount stress. 0.118 has been simplified to three significant figures. This can be simplified further to 0.12 (two significant figures) and even further to 0.1, which is one significant figure.

In order to reduce the number of significant figures, rounding is required. However, depending on the value of the digit after the one you want to keep you may either have to round up or down. If the next digit is 5 or above, we round up. If it is below 5, we round down.

For example, when considering Pi to four significant figures we must consider the next digit after 3.141, this is 3141**5**. We therefore round up to 3.142, as we always round up with a 5. To work out Pi to five significant figures is we must look at 3.14159, as 9 is greater than 5, we round up to 3.1416.

To give an approximated answer, we round off using significant figures.

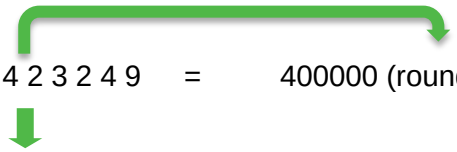
When we round off, we do so using a certain number of significant figures. The most common are 1, 2 or 3 significant figures.

Rules:

- The first non-zero digit reading from left to right is the first significant figure.
- For numbers 5 and above we round up.
- For numbers 4 and below we round down.

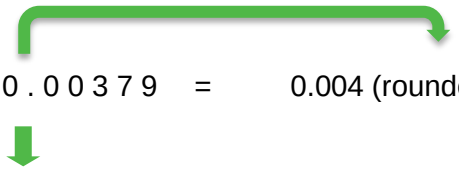
Worked examples:

1 significant figure: 4 2 3 2 4 9 = 400000 (rounded down)



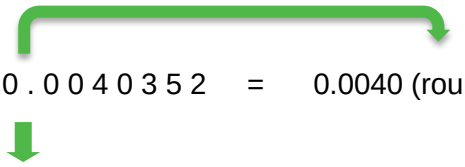
1st sig figure

1 significant figure 0 . 0 0 3 7 9 = 0.004 (rounded up)



1st sig figure (1st number after zeros)

2 significant figures 0 . 0 0 4 0 3 5 2 = 0.0040 (rounded down)



1st & 2nd sig figures (ignoring zeros)

- The world's oldest living plant is the Tasmanian King's Holly at 43,600 years old. – 2 significant figures = 44,000
- 1,143,552 paper bags are used in the USA every hour – 3 significant figures = 1.14 million
- There are 635,013,559,599 possible hands in a game of bridge. – 2 significant figures = 640 million

Activity

Work out the following:

5. 56982 to 1 and 2 significant figures
6. 0.0030490 to 1 and 2 significant figures
7. 0.008237 to 1 and 2 significant figures
8. 566064 to 3 significant figures

Make estimations from data collected

When making estimations, you may want to round figures to one digit (one significant figure). For example, with the sum 234 x 39.78 you might just want to know “very roughly” what sort of value you are expecting rather than knowing the precise answer. So we do an “order of magnitude” calculation which means rounding the numbers to 1 digit (1 significant figure), so we get: 200 x 40 = 8000.

Activity

Estimate the following (remember the rounding rules):

9. 574 x 29
10. 333 x 14
11. 88 x 9
12. 969 x 1001

Order of Magnitude Calculations

If we had two numbers – for example: Players in a football team – 11 and Population of the UK 64,596,800, in order to be able to make order of magnitude calculations we would round the football team down to 10 and the population down to 60,000,000. The second figure has 6 more 0s and we can say it therefore 6,000,000 (6 MILLION) times bigger:

13. Activity

Using the internet as a research tool, ask a member of your family to finds five small numbers relating to real life and the other finds five large numbers. Then compare pairs of numbers and make order of magnitude calculations as above.

Small number	Larger number	Order of magnitude
UK population 65.14 million (2015)	Global Population 7. 5 billion (2017)	
Number of people under 18 in UK 13,111,023	65.14 million	
25.8 million licenced cars in UK 2015	1.2 billion	

Percentages (%)

Percent comes from the word ‘per centum’ meaning 100 - so percent literally means per 100. So, 1% is 1 in 100, 5% is 5 in 100 and so on. 100% means all.

To calculate percentages you need to divide by 100. So to find 32%, you divide 32 by 100 (32/100)

Here are some more examples.

To calculate 18% of 40 → 18/100 = 0.18

0.18 x 40 = 7.2

To calculate 45% of 70 → 45/100 = 0.45

0.45 x 70 = 31.50

Exercise

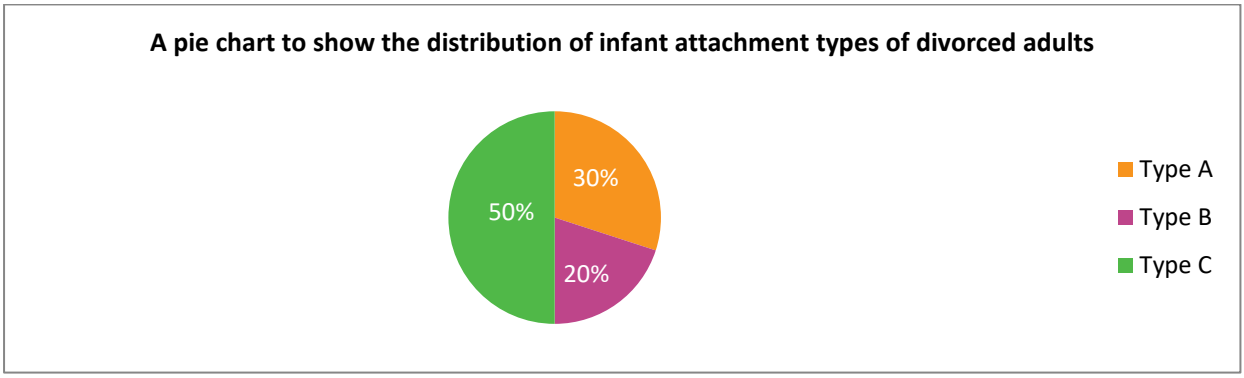
Calculate the following percentages:

14. 16% of 30
15. 24% of 90
16. 40% of 72
17. 8% of 50

18. A psychologist found that from his sample of 50 participants, 12% showed an increase in score when using his new revision aid. How many participants showed an improvement in total? Show your workings.

MCQ from sample question paper

Look at the pie chart below



What fraction of divorced adults had a type B attachment?

A. 1/5 **B.** 3/10 **C.** 2/5 **D.** 1/2

Answer – A

In order to convert a decimal to a percentage, you divide the top number by the bottom and then times by 100. In this case 1 divided by 5 = 0.2 x 100 = 20, therefore in the pie chart this is 20%. Don't worry, calculators can be used to work this out!

A percentage can also be expressed as a Decimal or Fraction.

For example, 25% can also be expressed as:

- A quarter
- 0.25
- ¼

Converting percentages to decimals and vice versa (*the left and right rule*)

To convert from a percentage to a decimal	**To convert a decimal to a percentage**
The easiest way to convert a percentage to a decimal is to follow this formula: Remove the % sign and divide the number by 100 and then move the decimal two places to the ***left***. So, 75% = 0 . 7 5	The opposite applies when converting from decimal to a percentage. So the decimal is moved two places to the ***right***. Add percentage sign. 0.125 = 1 2 . 5 %

Converting a decimal to a fraction

Work out how many decimal places you have (for example 0.75 has two decimal places and 0.125 has three decimal places) For two decimal places, divide by 100 For three decimal places divide by 1000   Find the lowest common denominator (the biggest number that can be divided equally into both parts of the fraction)

Learner Resource

Calculating percentages	**Converting percentages to decimals**
Find 32% of 50 Divide by 100 (32 / 100) Multiply by the number wanted (x50) = 16	Remove % sign Divide by 100 Move the decimal 2 place to the LEFT

Converting decimals to percentages	**Significant figures**
Move the decimal 2 places to the RIGHT Add % sign	The first non-zero is the 1st significant figure 5 or more, round up 4 or less, round down

Converting decimal to fraction	
For 2 decimal places divide by 100 For 3 decimal places divide by 1000 Find the lowest common denominator	

Ratio

A ratio is how much of one thing there is compared to another thing. For example 8:10 means a ratio of 8 to 10. So, if there are 10 pieces of cake one person gets 8 and the other gets 2. Ratios can be simplified like fractions, so in this case both can by divided by 2 and is therefore simplified to 4:5

Question from A Level sample paper

The findings from the study are presented below:

A table to show the number of participants who perceived the ambiguous image as a monkey or as a teapot from both conditions: image presented with animals and image presented with kitchen items.

	Perceived as a monkey	**Perceived as a teapot**
Presented with animals	15	10
Presented with kitchen items	5	12

a) Identify and simplify the ratio of the number of participants who perceived a monkey in the first condition and the number who perceived a monkey in the second condition. [2]

b) Identify and simplify the ratio of the number of participants who perceived a teapot in the first condition and the number who perceived a teapot in the second condition. [2]

Answer – a) 15:5 and 3:1 b) 10:12 and 5:6

Explaining the Answer

The question asks for two ratios, one for identifying and one for simplifying, one mark is achieved for each. In condition one 15 perceive the image as a monkey compared to 5 in condition two, therefore the ratio is identified as 15:5.

In order to simplify a ratio, you divide the numbers by the greatest common factor, this the largest number that both can be divided by. In this case by 15 and 5 can be divided by 5. 15/5 = 3 and 5/5 = 1, therefore the ratio is 3:1.

The same principle applies to question b. The questions asks for the ratio of number who perceive a teapot in the first condition, which is 10 and the number who perceive a teapot in the set condition which is 12, therefore the answer is 10:12. Simples!

Simplifying 10:12 is again done by finding the highest common factor, which is 2. Therefore you divide both numbers by 2. 10/2 =5 and 12/2 =6, so your answer is 5:6

Measures of Central Tendency

When analysing data, descriptive statistics are used to ***describe*** the basic features of the data, they provide a ***summary*** of the results and are the first step in any data analysis.

There are two types of descriptive statistics; measures of central tendency and measures of dispersion as shown below.

Descriptive Statistics	
Measures of central tendency	**Measures of dispersion**
Mean	Range
Median	Variance
Mode	Standard Deviation

Measures of central tendency

The **MEAN** is the average of the numbers. It is calculated by adding up all the scores and dividing by the total number of scores.

For example,
6 + 9 + 9 + 13 + 15 + 21 + 24 + 24 + 28 + 32 = 181
181/10 (as there are 10 scores) = 18.1

The **MEDIAN** is the middle number. It is calculated by finding the middle score after placing all the scores in numerical order.
If there is an odd number the median is the middle number.

For example,

~~4~~, ~~7~~, ~~8~~, ~~9~~, 14 ~~21~~, ~~28~~, ~~29~~, ~~34~~

If there is an even number of results, the median is the mean of the two central numbers.

~~4~~, ~~7~~, ~~8~~, ~~9~~, 14, 21 ~~23~~, ~~28~~, ~~29~~, ~~34~~ = 14+21= 35/2 Median = 17.5

The **MODE** is the value that appears most frequently in a set of data.
When there is more than one number that appears the most frequently, we call this bimodal.

For example,

6, 9 , 9 , 13, 15, 21, 24 , 24 , 28, 32 The mode is 9 and 24

19. Activity

A Psychologist investigated whether recall was affected by the way the material was presented. One group was given pictures to recall, the other group were given words.

Calculate the measures of central tendency for the following set of raw data.

Number of Pictures Recalled	Number of Words Recalled
7	4
5	6
10	7
8	5
7	6
5	5
7	9
9	3

	Mean	Median	Mode
Condition 1 Pictures			
Condition 2 Words			

20. Extension

Can you describe what these results show? What conclusions can be drawn from the measures of central tendency?

Question from A Level sample paper

Outline how a median is calculated. [2]

Answer – To achieve 2 marks, 1 mark is given for stating that data in ordered numerically and a second mark is achieved by stating that the middle value is then chosen. The sample mark schemes states that the second point can achieve 1 mark alone, but the first point cannot.

This question is an example whereby students must understand what the three measures of central tendency are, and hence how they are calculated. The specification also states that knowledge of how the measures of dispersion (range, variance and standard deviation) may also be assessed. Furthermore, a novel situation may be presented and the most appropriate measure must be chosen and explained.

Additional Information

Measure of Central Tendency	Definition/how to calculate	When it is appropriate to use	When it is not appropriate to use
Mean	All values in the data set are added together and divided by the number of values.	It uses all of the values in the data set, so is the most sensitive value.	When there are extreme values or outliers, the mean can be skewed.
Median	Data is ordered numerically and the middle value is selected.	When there are extreme values the median is less affected than the mean.	It is less sensitive to variations in the data, so may not present a true picture.
Mode	The most frequently occurring value in the data set.	When there is frequency/categorical data, as the others are not appropriate.	There may be no modal value or several.

21. Activity

To test your understanding of when it is appropriate to use each of the measures of central tendency look at the following:

EXPERIMENT 1: In a rather unethical experiment three groups of eight lab rats were given a maze to complete and times were recorded in seconds.

GROUP 1 – Rats given brain lesions – 35, 27, 26, 27, 28, 79, 27, 30
GROUP 2 – Rats with tails cut off – 15, 10, 18, 22, 8, 49, 16, 22
GROUP 3 – Rats with eyes damaged – 33, 33, 32, 28, 67, 45, 24, 29

Which is the most appropriate measure of central tendency? Explain your reasons. Calculate the score for this measure of central tendency.

EXPERIMENT 2: Researchers were investigating A Level students' preferences for music to listen to while revising. It was found that there was a strong preference for Justin Bieber. In order to investigate this further, a follow up questionnaire was conducted where students were asked which their favourite Justin Bieber revision song was. The following results were found:

Baby - 19
Boyfriend - 11
As Long As You Love Me - 8
Confident - 4
Beauty and a Beat – 2

Which is the most appropriate measure of central tendency? Explain your reasons. Calculate the score for this measure of central tendency.

EXPERIMENT 3: OCR conducted an investigation into who is the best psychology teacher in the country. Your teacher scored the following scores out of 10 for being brilliant: 10,9,10,10,10,10,9,10,9,10

Which is the most appropriate measure of central tendency? Explain your reasons. Calculate the score for this measure of central tendency.

Measures of Dispersion

Measures of dispersion measure how **spread out** a set of data is and include the range, variance and standard deviation.

The **RANGE** is the difference between the lowest and highest values. It is calculated by subtracting the lowest score from the highest score in a data set.

For example:

3, 6, 8, 11, 14, 17, 18, 22, 23

23 is the highest score

3 is the lowest score

So the range is 20 (23-3)

Or

Number of seconds that it took Formula One drivers to complete a lap:

Lewis Hamilton – 75

Sebastian Vettel – 76

Nico Rosberg - 77

Felipe Massa – 77

Jenson Button –79

Pastor Maldonado – 133

133 – 75 + 1 = 59

The addition of +1 is a convention adopted to account for ‘measurement error’. +1 is only really necessary when dealing with data that are not 'absolutes' - i.e. not complete or whole figures, such as when recording reaction times and there may be error in stopping a timing device precisely on a second interval.

In the exam either method of calculating the range would be accepted.

The **VARIANCE** tells us about the spread of scores around the mean. So a small variance would imply that the scores are all similar and close to the mean. A large variance would indicate that the scores are at a larger distance from the mean.

The **STANDARD DEVIATION** is the square root of the variance, so it tells us the average amount a number differs from the mean.

Example

If we calculated the mean weather temperature throughout the summer in the UK, the mean may be 15 degrees. If we then calculated the standard deviation as being small, this would show that the temperature remained very consistent throughout the period. If, however, the standard deviation was very large, this would tell us that the weather varied greatly from very cold to very hot on some days.

22. Activity

Table 1: The mean number of aggressive acts displayed by children in two different nursery's and the standard deviations for nursery one and nursery two.

	Nursery one	**Nursery Two**
Mean	4	3
Standard Deviation	1.6	0.21

What do the standard deviations tell us about the results?

The Standard Deviation is a measure of how spreads out numbers are. Its symbol is σ (the Greek letter sigma) the formula is easy: It is the square root of the Variance.

http://www.mathsisfun.com/data/standard-deviation.html

Formulas

You need to learn a formula for the variance and for the standard deviation for exam. They do vary slightly depending on whether your data relates to a whole population or just a sample of the population. Either is acceptable for the exam.

Population Variance $= \sigma^2 = \frac{\Sigma(X - \mu)^2}{N}$

Sample Variance $= \sigma^2 = \frac{\Sigma(X - \overline{X})^2}{n - 1}$

Population Standard Deviation $= \sigma = \sqrt{\sigma^2} = \sqrt{\frac{\Sigma(X - \mu)^2}{N}}$

Sample Standard Deviation $= \sigma = \sqrt{\sigma^2} = \sqrt{\frac{\Sigma(X - \overline{X})^2}{n - 1}}$

23. Activity: Calculating the Sample Variance and Standard Deviation

Step by step guide to calculating the variance and standard deviation.

Step 1: Calculate the mean $(\bar{x})$ for your scores.

Step 2: Find the variance by subtracting the mean from each number in your sample. $(x - \bar{x})$

Step 3: Square the result of these calculations.

Step 4: Add the squared numbers together to find the sum of squares (sigma)

Step 5: Divide the sum of squares by $(n - 1)$ n = how many numbers you have in the sample

You now have the sample variance

Step 6: To find the standard deviation you just add this step - square root of the variance

Data	Difference from the Mean	Difference squared
10	2	4
10	2	4
8	0	0
8	0	0
8	0	0
4	-4	16
Mean 48/6 = 8		Total 24

Variance = 24 / n – 1(6-1) = 4.8

To find the standard deviation, find the square root of the variance.

SD = 2.19

Try it yourself – Now using the formulas above, calculate the population variance and the population standard deviation.

24. MCQ from A Level sample paper

What is a weakness of using a mode as a measure of central tendency?

A. It can generate a number not in the data set
B. It is easily affected by outliers
C. It is not suitable for nominal data
D. It relies on a score occurring more than once

Summary

Measure of Dispersion	Definition/how to calculate (including formula)	When it is appropriate to use	When it is not appropriate to use
Range			
Variance			
Standard deviation			

Levels of Measurement

The type of data analysis will depend on what level the measurement is. In psychology, there are 4 levels of measurement known as Nominal, Ordinal, Interval and Ratio data.

Level of Measurement	Used with	For example
Nominal	Frequencies or categories	Number of left handers – right handers, blue team – red team
Ordinal	Data that occurs in ranks or that can be placed in order from highest to lowest	Number of A, B and C grades achieved, Number of correctly recalled items from a list. Intervals are not fixed.
Interval	Units of equal size, but with no absolute zero point	Temperature (each degree is the same distance apart but there is no true zero point). Intervals are fixed.

25. Activity

Identify the level of measurement for the following data.

Data	Level of measurement
Age	
Being happy / unhappy	
Times of day on a 24 hour clock	
Grand national order of finishers	

Data analysis and levels of measurement

Data	Measure of central tendency / Dispersion
Nominal	Mode
Ordinal	Median (Mode can also be used)
Interval / Ratio	Mean Median and Mode can also be used) Standard deviation

26. Measures of Central Tendency – Summary Table

Complete the table to check your understanding.

Measure	What is it?	When should it be used?	Advantages	Disadvantages
Mean				
Median				
Mode				

27. Measures of Dispersion

Complete the table to check your understanding.

Measure	What is it?	When should it be used?	Advantages	Disadvantages
Range				
Variance				
Standard deviation				

Charts and Graphs

Graphs, charts and tables are all used to describe data and make it easier for the data to be understood.

There are a number of graphs and charts that you need to be able to draw and interpret, they include:

- Tally chart (frequency table)
- Line graph
- Pie chart
- Bar chart
- Histogram
- Scatter diagram

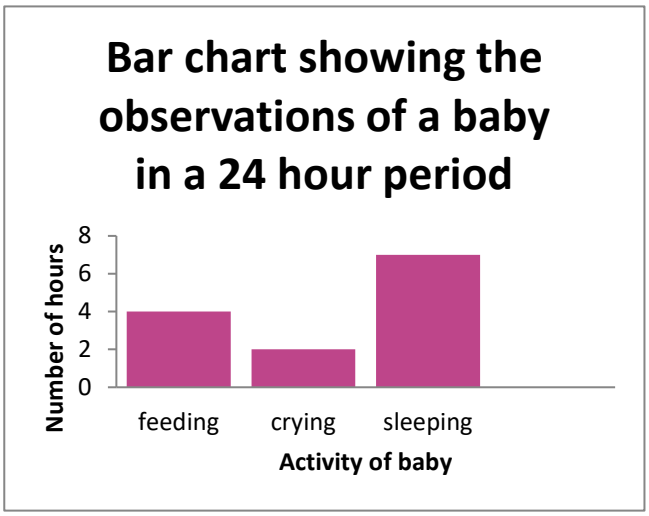
Drawing graphs and tables

Frequency tables (tally charts)

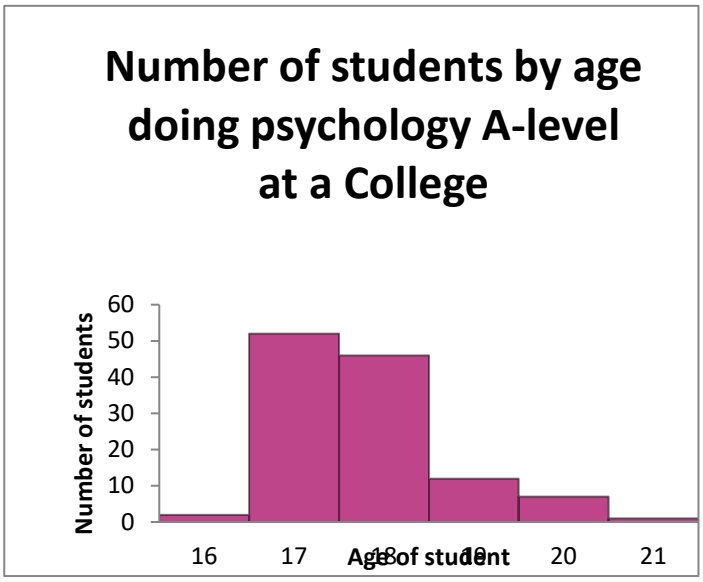
Tally marks are used for counting things. These are used in content analyses and observations. They record the number of times something is seen.

Observation of baby…	Tally	Total
Feeding	IIII	4
Crying	II	2
Sleeping	𝍸 II	7

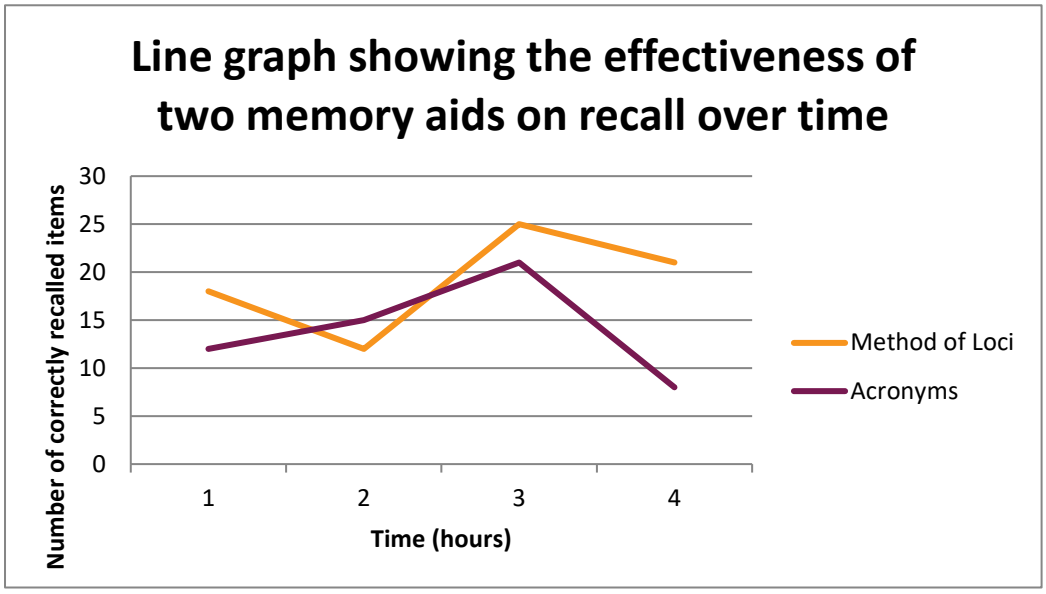
Bar charts can be used to represent the data from frequency tables, mean scores or the totals. They are used with nominal or ordinal levels of measurement. The bars are kept separate from each other, for example using the data from the frequency table:



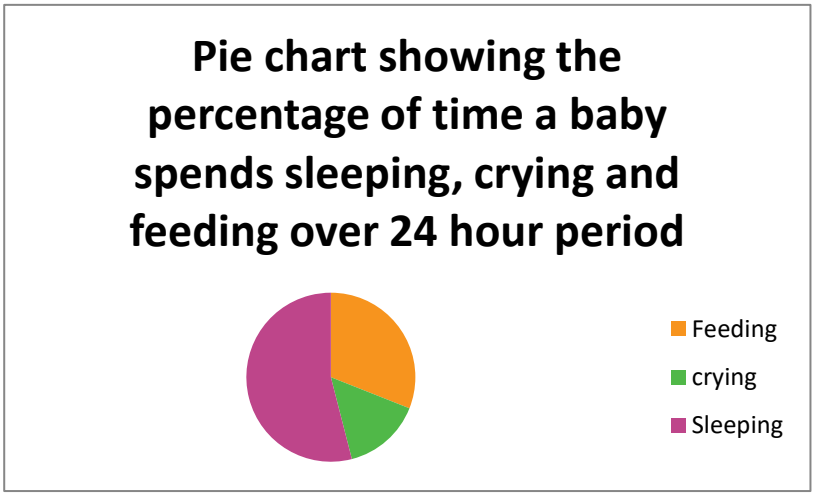
Histograms are used with interval or ratio data. There are no gaps between the columns to represent a continuous data set.



Line graphs can be used as an alternative to histograms. These are used to show the results from two or more conditions at the same time.

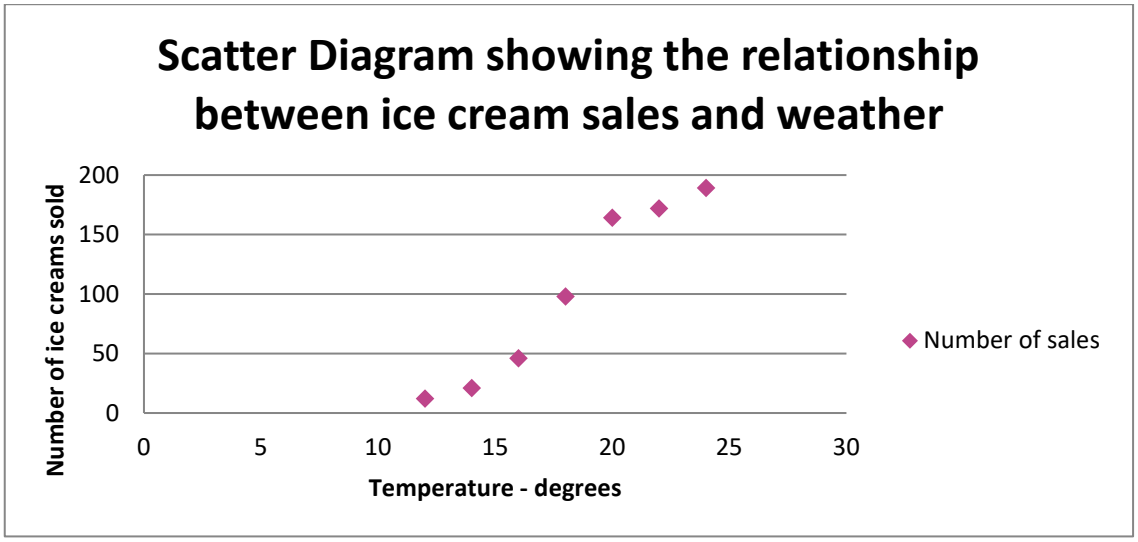


Pie charts are used when we have percentages. Each segment represents a percentage of the total.



Scatter diagrams are used with correlations where the relationship of two variables is summarised. They illustrate the direction of the relationship (positive, negative or zero correlation) and can indicate the potential strength of the relationship.

For example, this scatter graph shows a positive correlation between ice cream sales and weather.



28. Activity

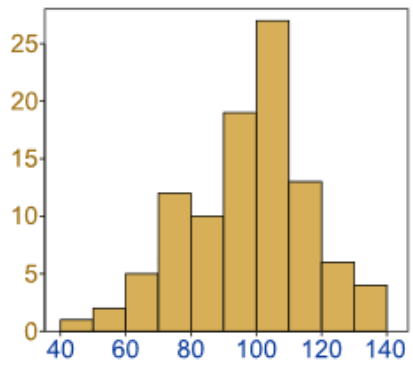
A teacher analysed the performance of her students who had sat A level Psychology, by the grade they achieved.

Plot the following data onto a bar chart in the space provided on the next page . Remember to give the graph a title, label both axes and use a ruler!

Grade	Number of students
A	3
B	12
C	5
D	2
E	3
U	0

Histograms

Bar charts should be used with categorical data, however with continuous data such as weight, height and temperature, a histogram should be used. Histograms unlike bar charts also have no gaps between the bars.



You may be interested to know how much time students spend on their homework. As an activity, you could ask other members of your class to reveal this for their last homework (although there may be some social desirability bias!) Hopefully the majority of your class spend around 100 minutes on their psychology homework!

29. **Extension task**: Come up with your own examples where histograms could be used.

Interpreting graphs

When we interpret the graph or chart, we are just making sense of the information.

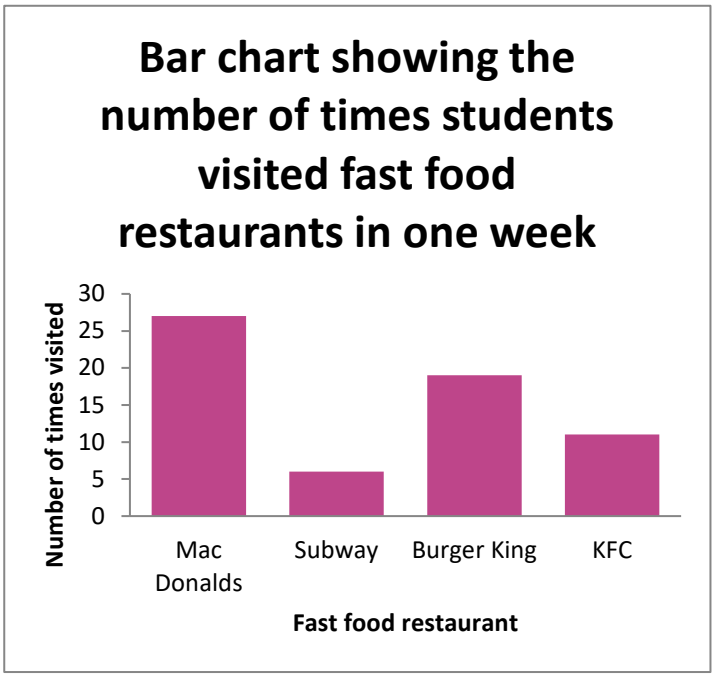
The first and crucial step in interpreting graphs is to make sure that you read all of the parts, including the title, axis and the direction the results are moving in.

The title tells us what the graph is about.

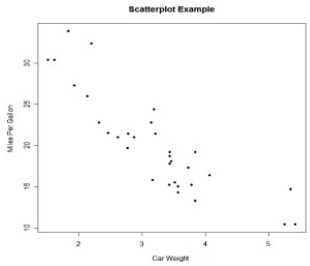
The axes tell us what the variables are.

30. Exercise

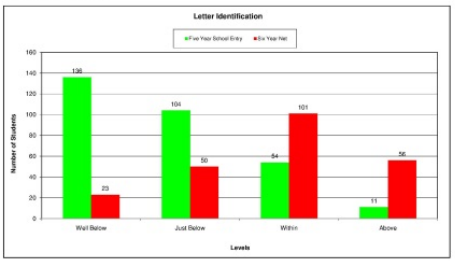
Write a statement describing what the results in the bar chart show. Make reference to the title, both axes and the direction of the results in your answer.



31. Identify the type of graph and suggest when the graph might be best used.

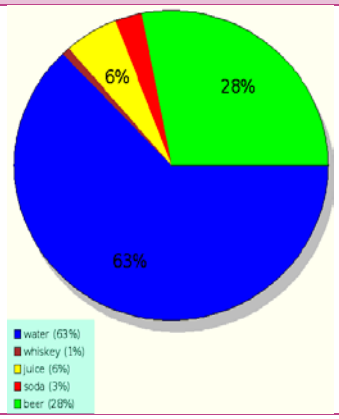


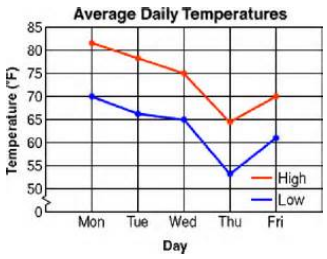
Bar Graph Template



colour of car	tally	frequency
red	𝍸 𝍸 I	11
blue	𝍸	5
green	𝍸 III	8
black	𝍸	4
white	I	1
other	𝍸 II	7
total		36

31. Identify the type of graph and suggest when the graph might be best used.





Types of Data

Quantitative and Qualitative Data

Some methods of data collection produce quantitative data and some qualitative.

Quantitative data

This is data in the numerical form. Experiments produce quantitative data as do closed ended questions in questionnaires or interviews.

Data analysis takes the form of making numerical comparisons or through statistical analyses and inferences or visually through graphs, charts and tables.

Qualitative Data

Is data that is non-numerical and descriptive. Diary accounts, open ended questions on a questionnaire and unstructured interviews all produce qualitative data.

Data analysis takes the form of looking for themes or patterns in the descriptions.

Tip for remembering them:

Qua**n**titative data = **n**umbers and Qua**l**itative data = **l**anguage

32. Exercise

Complete the following table with the advantages and limitations of each type of data.

Data type	**Advantages**	**Limitations**
Quantitative		
Qualitative		

33. Assessment Exercise

Which of the following would produce quantitative data and which qualitative data?

1. A questionnaire using closed questions.
2. A questionnaire using open questions.
3. Interviews.
4. Psychometric tests such as an IQ test.

Primary and Secondary Data

When a researcher collects data either by witnessing an event or by carrying out an experiment or questionnaire, this is known as PRIMARY data. It can be quantitative or qualitative; the key to it being primary data is that it is collected **first hand** by the researcher.

By contrast, when data is collected **second hand**, which is through the analysis of pre-existing data, we call this secondary data. When we use statistics or refer to existing research to develop our own theories, this is secondary data.

Tip for remembering them:

Primary = first **(so first hand)** and Secondary = second **(so second hand).**

1. Assessment exercise

Which of the following are examples of primary data and which are secondary data?

1. Using statistics to identify patterns and trends in crime data.
2. A questionnaire asking people to rate their liking for a new TV show.
3. Interviewing patients on their experiences of being part of a drug trial.
4. Using diaries and journals to look at how the role of childhood has changed.
5. An observation of gender differences in body language usage.

PRIMARY ⟵ DATA ⟶ SECONDARY

Data that is …..

It takes two forms:

Quantitative data:

Qualitative data:

Data that is…

Examples include:

Strengths

Strengths

Weaknesses

Weaknesses

Book List

The recommended textbook for Y1 is

OCR Psychology for A Level Book 1 (OCR A Level) Paperback – 31 Jul 2015

Authors: Louise Ellerby-Jones, Sandra Latham, Nigel Wooldridge

Publisher: Hodder Education; UK ed. edition (31 July 2015)

ISBN-10: 1471835901

ISBN-13: 978-1471835902

RRP: £25.99