

Paper 2 Research Methods

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The specification

These are the areas of the specification you will be doing with me.

What the spec says:

Students should demonstrate knowledge and understanding of the following research methods, scientific processes and techniques of data handling and analysis, be familiar with their use and be aware of their strengths and limitations:

- Self-report techniques. Questionnaires; interviews, structured and unstructured.
- Correlations. Analysis of the relationship between co-variables. The difference between correlations and experiments.

Research methods and the scientific processes

- Aims: stating aims, the difference between aims and hypotheses.
- Hypotheses: directional and non-directional.
- Sampling: the difference between population and sample; sampling techniques including: random, systematic, stratified, opportunity and volunteer; implications of sampling techniques, including bias and generalisation.
- Pilot studies and the aims of piloting

Data handling and analysis

- Quantitative and qualitative data; the distinction between qualitative and quantitative data collection techniques.
- Primary and secondary data, including meta-analysis.
- Descriptive statistics: measures of central tendency – mean, median, mode; calculation of mean, median and mode; measures of dispersion; range and standard deviation; calculation of range; calculation of percentages; positive, negative and zero correlations.
- Presentation and display of quantitative data: graphs, tables, scattergrams, bar charts.
- Distributions: normal and skewed distributions; characteristics of normal and skewed distributions.
- Introduction to statistical testing; the sign test.



Checklist	Textbook Page no.	Completed work	RAG Date:	RAG Date:
<i>Methods of research</i>				
Self-report techniques: Questionnaires	184			
Self-report techniques: interviews, structured and unstructured	184			
Correlations. Analysis of the relationship between co-variables.	188			
The difference between correlations and experiments.	188			
<i>Scientific Processes</i>				
Aims: stating aims, the difference between aims and hypotheses	166			
Hypotheses: directional and non-directional	166			
Sampling: the difference between population and sample	174			
Sampling techniques including: random, systematic, stratified, opportunity, volunteer	174			
Implications of sampling techniques, including bias and generalisation	175			
Pilot studies and the aims of piloting	178			
The implications of psychological research for the economy	200			
<i>Data analysis and analysis</i>				
Quantitative and qualitative data; the distinction between qualitative and quantitative data collection techniques.	190			
Primary and secondary data, including meta-analysis	191			
Descriptive statistics: measures of central tendency – mean, median, mode; calculation of mean, median and mode;	192			
Measures of dispersion; range and standard deviation; calculation of range	193			
Calculation of percentages	188			
Positive, negative and zero correlations	192			
Presentation and display of quantitative data: graphs, tables, scatter grams, bar charts	194			
Presentation and display of quantitative data: histograms	194			
Distributions: normal and skewed distributions; characteristics of normal and skewed distributions.	195			
Analysis and interpretation of correlation, including correlation coefficients.	195			

Levels of measurement: nominal, ordinal and interval	198			
Inferential testing				
Introduction to statistical testing; the sign test.	198			
Probability and significance: use of statistical tables and critical values in interpretation of significance	197			
Type I and Type II errors	Yr2			
Factors affecting the choice of statistical test, including level of measurement and experimental design	Yr2			
When to use the following tests: Spearman's rho, Pearson's r, Wilcoxon, Mann-Whitney, related t-test, unrelated t-test and Chi-Squared test	199			

Key terms (part 1) - Fill in the definitions of the key terms as you work through the research methods unit

Self-report techniques	
Questionnaire	
Interview	
Open questions	
Closed questions	
Correlation	
Co-variables	
Positive correlation	
Negative correlation	

Zero correlation	
Experimental method	
Aim	
Hypothesis	
Directional hypothesis	
Non-directional hypothesis	
Qualitative data	
Quantitative data	
Primary data	
Secondary data	
Meta-analysis	
Descriptive statistics	
Measures of central tendency	
Mean	
Median	

Mode	
Measures of dispersion	
Range	
Standard deviation	
Scattergram	
Bar chart	
Normal distribution	
Skewed distribution	
Positive skew	
Negative skew	
Statistical testing	
Sign test	

1) Self-report techniques and design

Surveys and self-report studies involve asking participants questions. These can be written in the form of a questionnaire or asked, orally, an interview.



Any survey is only ever as good as the questions asked. It is very difficult to write good questions and all surveys need a pilot study (a practice run) to check that the questions are unambiguous and easy for participants to understand. This increases the reliability and validity of the data collected. The main problem with surveys is that participants may lie (demand characteristics). Surveys can also be affected by researcher or investigator effects. This is when the researcher influences the participants, often unconsciously. For example, body language such as nodding or smiling could encourage the participants to answer in a particular way. However, surveys are a very efficient and ethical manner of collecting data.

A screenshot of a questionnaire titled "Think Click Questionnaire". The form contains several questions with checkboxes for responses. The questions are:
Question 1. Gender of your child?
Male Female
Question 2. Age of your child?
5-7 8-10 11-13 14
Question 3. At home, does your child use the internet at home?
Yes No
If Yes, in which room do they usually use it? Choose one:
Living Room Bedroom Dining Room
Other (Please specify) _____
Question 4. Does your child own a mobile phone with internet access available?
Yes No
Question 5. How often does your child use social networking sites? Choose one:
Every Day More than once a week Once a week
Once a month Less than once a month Never
Question 6. In your opinion, what are your child's five favorite online activities? (Please rate them from 1 to 5 where 1 is your child's favorite to the least favorite activity.)
Chat Rooms Shopping Music Instant Messaging
File sharing Social networking Web surfing
Other (Please specify) _____
Question 7. Does your child use the internet for playing games?
Yes No
Question 8. Does your child watch videos on the internet?
Yes No
At the bottom, it says "Thank you for taking the time to fill in this questionnaire."

Self-report- questionnaires

These involve a pre-set list of written questions to which the participant responds. Psychologists use questionnaires to assess thoughts and/or feelings. They may be used as part of an experiment to assess the dependent variable

Task- Colour code the strengths and weaknesses of a questionnaire

Can gather large amounts of data quickly

Can produce response bias, e.g. always ticking yes or agreeing for everything

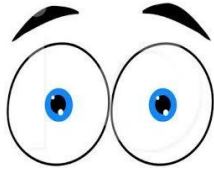
Can be completed without the researcher being present

Responses may not always be truthful as people are keen to make themselves be seen in a positive light (demand characteristics/social desirability)

Participants may misunderstand the question or not read it properly

Cost effective

There are different types of questions in a questionnaire- complete the table below to show what these are



Eyes on the exam- remember you have to evaluate to get AO3 marks

Designing a questionnaire

Question Type	Advantages	Disadvantages	Example
Open Question Questions for which there is no fixed choice of response and respondents can answer in any way they wish.			
Closed Question Questions for which there is a fixed choice of responses determined by the question setter.			

As you already know, questionnaires can include two types of questions; open questions and closed questions.

It is also the case that closed questions can be further divided into different types. It makes sense that to refer to the following examples as 'items' as these are not really questions in the traditional sense.

Likert scales- A likert scale is one in which a respondent indicates their agreement (or otherwise) with a statement using a scale of usually 5 points. The scales range from strongly agree to strongly disagree.

For example...

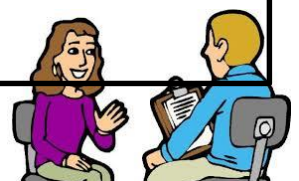
Rating scales- A rating scale works in a similar way to a likert scale but gets respondents to identify a value that represents their strength of feeling about a particular topic.

For example...

Fixed choice option- A fixed choice option item includes a list of possible options and respondents are to indicate those that apply to them.

For example...

Self-Report (Interviews)



This is a live encounter (face to face or over the phone) where one person (the interviewer) asks a set of questions to assess an interviewees thoughts and/or experiences. The questions

may be pre-set (structured interview) or develop as the interview goes along (unstructured interview)

There are 3 different types of interview: structured, semi-structured and unstructured. There are also different types of questions: fixed-choice (yes/no) and open-ended.



TASK: Demonstrate your understanding of the different types of interview and questions by matching the correct term to the correct definition.

Structured

There is a list of questions that have been worked out in advance but interviewers are also free to ask follow up questions when they feel it is appropriate.

Unstructured

Made up of pre-determined questions and are asked in a fixed order. This is basically like a questionnaire but conducted face to face

Semi-structured

Works a lot like a conversation. There are no set questions. There is a general aim that a certain topic will be discussed and interaction tends to be free flowing. The interview is encouraged to expand and elaborate their answers.

It is important you know how to evaluate the use of each type of interview.
Have a go at completing the table.

	Strengths	Weaknesses
Structured interview		
Unstructured interview		
Semi-structured interview		

Designing an interview

Most interviews involve an **interview schedule**, which is the list of questions that the interviewer intends to cover. This should be standardised for each participant to reduce the contaminating effects of **interviewer bias**. Typically the interviewer will take notes throughout the interview, or alternatively, the interview may be recorded and analysed later. Interviews usually involve an interviewer and a single participant, though **group interviews** may be appropriate especially in a **clinical** setting. In the case of a one-to-one interview, the interviewer should conduct the interview in a quiet room, away from other people, as this will increase the likelihood that the interviewee will open up. It is good practice to begin the interview with some neutral questions to make the participant feel relaxed and comfortable, and as a way of establishing a rapport. Of course, interviewees should be reminded on several occasions that their answers will be treated in the strictest confidence. This is especially important if the interview includes topics that may be personal or sensitive.

Key word	Definition
Interview schedule	
Interview bias	
Group interviews	
Clinical setting	

Create a go to guide in no more than 5 bullet points on how to design an interview.

-
-
-
-
-

'Have a go tasks'

Ask a silly question...

Fakedata & Fraud have put together a questionnaire to find out about attitudes to drinking alcohol and underage drinking amongst a sample of 14 to 15 year-old school pupils. They did it in a hurry, however, and weren't really thinking properly. Consequently, it is unlikely to elicit valid data. Have a careful look at their questionnaire design and highlight the problem areas.

Self-Report (Survey)

Underage Drinking Questionnaire

Name _____

Address _____

Age _____ Sex _____

How often do you drink alcohol?

How many units do you drink a week? _____

Do you binge drink? Yes No

Why do you drink alcohol? (1) because it's fun to get drunk
 (2) because all my friends do it
 (3) because it makes me confident
 (4) other

Do you understand the health risks of drinking and why do you still do it?

- Identify some flaws with the questionnaire and explain how they might affect the validity of the data.
- How could the questionnaire be redesigned to avoid the problems you have identified?
- How might a pilot study have helped Fakedata and Fraud to improve the design of their questionnaire?



TASK: Identify the problem with each question and rephrase each with your improvements

1. Do you drink coffee often?

2. Do you think crime is due to bad housing or poor education?
3. Would you not trust a second hand car sales person?
4. Don't you think abortion should be legal?
5. On average how many times a month do you engage in sexual relations?
6. Please rate the importance of the following characteristics in choosing a partner for a romantic relationship (1 to 5)

Kind Funny Good-looking Honest Independent

7. Are you in a monogamous sexual relationship?
8. People who interrupt the teacher when they are speaking should be given a detention (tick)

Strongly Agree Agree Disagree Strongly disagree

9. How frequently do you drink alcohol?

Occasionally Sometimes Often A lot



Writing good questions: *Things to Avoid*



Designing questions is quite an art. In general they should be clear, simple and mean the same thing to all respondents. Importantly – this may seem obvious – they should

provide the information that the researcher is looking for. Below are some things to avoid.

Leading questions The question encourages respondents to give a particular answer. For example: *Any sensible person would want to ban the sport of fox hunting, do you agree?* Some respondents may agree simply to appear sensible.

Ambiguity Questions which can be interpreted in various ways should be avoided. For example *'Do you drink coffee often?'* can mean different things to different people. How often is often? Questions should be clear and precise. For example *'How many cups of coffee do you drink a day?'*

Loaded questions These are questions which contain emotive language, i.e., language which is likely to produce an emotional reaction in the respondent. For example *'Do you think right wing extremists should be allowed to stand for parliament?'* Emotive language can encourage respondents to give particular answers.

Jargon Technical jargon should be avoided, simply because most respondents will not know what it means. For example, psychological terms like *'role conflict'* and *'role ambiguity'* are likely to confuse many people.

Double-barrelled questions These contain two options within a single question. For example *'Do you think crime is due to bad housing and poor education?'* A respondent who blames bad housing but not poor education would have difficulty answering this question. It should be rewritten as two separate questions.

Negatives The use of negatives can often confuse respondents. For example *'Would you not trust a second-hand car salesman?'*

Complex questions Respondents can get lost with long, complicated questions. For example *'While equal opportunity legislation may reduce discrimination against minority groups, it may have the reverse effect by antagonising those who are responsible for discrimination, so reinforcing the very behaviour it was designed to eradicate. Do you agree?'*

Impossible questions Some questions are just impossible to answer accurately. For example *'How many Mars bars have you eaten in the last five years?'* Probably, the only people who can answer this question accurately are those who can't stand Mars bars and never eat them!



Thinking about Past Questions

- 1) A psychologist investigated the effect of different forms of day care on children's later social development. She selected two different types of day care: • child minders • day nurseries. The children had been in one of these types of day care full-time for at least a year before they started primary school. Each child's mother was asked to complete a questionnaire. (a) Write one suitable question which could be used in the questionnaire to produce quantitative data. (2 marks) (b) Write one suitable question which could be

2)

3)

2) Pilot studies

A pilot study is a small-scale trial of a study run to test any aspects of the design, with a view to making improvements. It is always advisable to pilot a questionnaire, using people drawn from the same target population as the respondents. This can highlight any problems with the questions, such as whether or not they can be answered, whether or not participants will refuse to answer them (which may happen if they are too personal or sensitive), and whether or not they mean the same thing to all respondents.



In addition, the pilot study may indicate whether or not respondents will answer truthfully. If this leads to a revision of the questionnaire, it is advisable to pilot the new version.



*Eyes on the exam- remember you have to 'apply' to get
AO2 marks*

Apply it

Before the study begins, questionnaires and interviews should always be piloted. Have a go at answering the following questions...

1) Briefly explain what is meant by a pilot study

2) Describe how a pilot study of a questionnaire or interview could be carried out

3) Explain what would be gained from conducting a pilot and what the researcher might do as a result.



Thinking about Past Questions

1) Empathy is the ability to understand the feelings and emotions of other people. Some studies have shown that people high in empathy, are more accurate at recognising facial expressions of emotions such as happy, sad, fearful, angry and surprised. A psychologist wanted to investigate this by presenting participants with a series of faces showing different emotional expressions. The emotions were happy, sad, fearful, angry and surprised. There were 20 examples of each emotion. Each of the 100 faces was presented randomly on a computer screen for 0.5 of a second. After each presentation the participant had to press the appropriate key to identify the emotion expressed. Once the key was pressed the next face was presented. Explain why it would be important for the psychologist to carry out a pilot study in this case (4 marks)

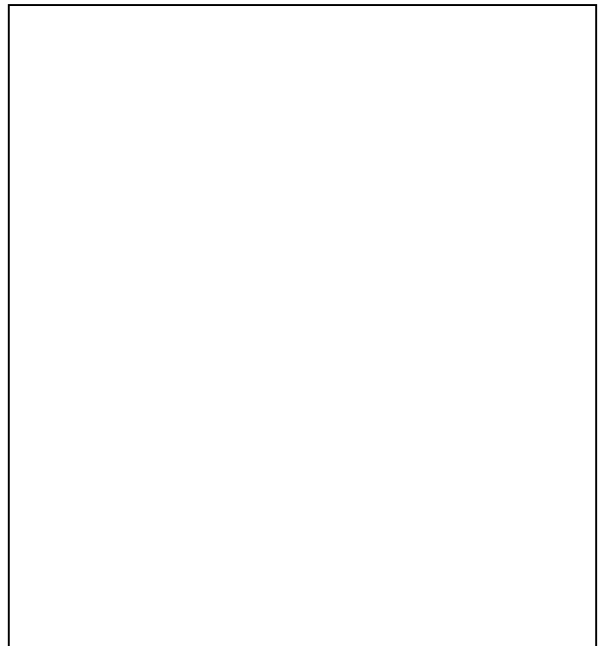
Some other important things to consider...

When conducting experiments psychologists have to be sure that their findings are valid (did the test measure what it intended to measure) and reliable (would the findings be consistent over time.) Psychologists have developed ways to help with this.

Have a read over both procedures and draw a picture to help you remember each one...

Single blind procedure

A type of research design in which a participant is not aware of the research aims and or what condition of the experiment they are in, they may not even know that there is more than one condition. The researcher in this case though will know who is in which condition; it is just the participants that will not. For example, in a study that is looking at the effects of a drug, a participant in one condition may get the real drug and the participant in the other condition may get a placebo (pretend) drug. Only the researcher will know who is getting what however.



Double blind procedure

Neither the participant nor the researcher conducting the study are aware of the research aims or other important details of the study, and thus have no expectations that might alter a participant's behaviour. For example, in a drug experiment, neither the participants nor the researcher will know who has been given the real drug and who has been given the placebo.

Control groups and conditions

In the example of the drug trial above, the group that receives the real drug is the experimental group/condition and the group that receives the placebo is the control group/condition.

We use the word 'control' in research to refer to the control of variables but we also use it to refer to setting a baseline. Control groups are essentially used as a comparison.

If the behaviour in the experimental group is significantly greater than that of the control group, then the researcher can conclude that the cause of this effect was the independent variable, (assuming all other possible confounding variables remain consistent).

Independent variable- The one that is manipulated by the experiment, e.g. the type of drug given.

Confounding variable- Any variable other than the IV that may have affected the DV (the one the researcher measures).

Extension questions



Understanding the difference... and types of question

1. What is the difference between a questionnaire and an interview?
2. What advantage might a questionnaire have over an interview?
3. What advantage might an interview have over a questionnaire?
4. Why might researchers prefer to use mainly closed questions in some studies?
5. Why might researchers prefer to use mainly open questions in some studies?



Task – Interviews

Remember there are three types – structured, unstructured, semi-structured.

Suggest which might be the best type of interview for the collection of the following data. In each case you must:

- a) State which type you would choose.
 - b) Justify your response.
 - c) Suggest a question that could be asked.
1. Finding out the difference in moral attitudes between males and females.
 2. Comparing the weekly average calorie intake for teenagers and over 60s.
 3. Collecting eyewitness testimony following an accident in school.



3) Corelations



Correlations look for a **relationship** between two variables. This is not to say that one thing causes another, simply that one thing varies in accordance with another.

For example there is a relationship between the colour of grass and ice-cream sales. The more yellow the grass gets the more ice cream is sold. However, in this case the causal variable is obviously temperature.

Psychologists have suggested a correlation between watching TV violence and aggressive behaviour, this does not suggest that TV violence causes aggressive behaviour simply that there is a relationship between them.

What other variables might cause aggressive behaviour?

The **cause** is why something happened.

The **effect** is what happened.



cause

The sun was hot,
so my ice cream
melted.

effect

So this is an example of cause and effect then? Yes?

NO!

Rarely in psychological research can we definitely claim a **CAUSAL** (that's causal not casual !!) relationship due to **extraneous, confounding** and **intervening variables**.

In other words, A doesn't always cause B, there may be other factors involved

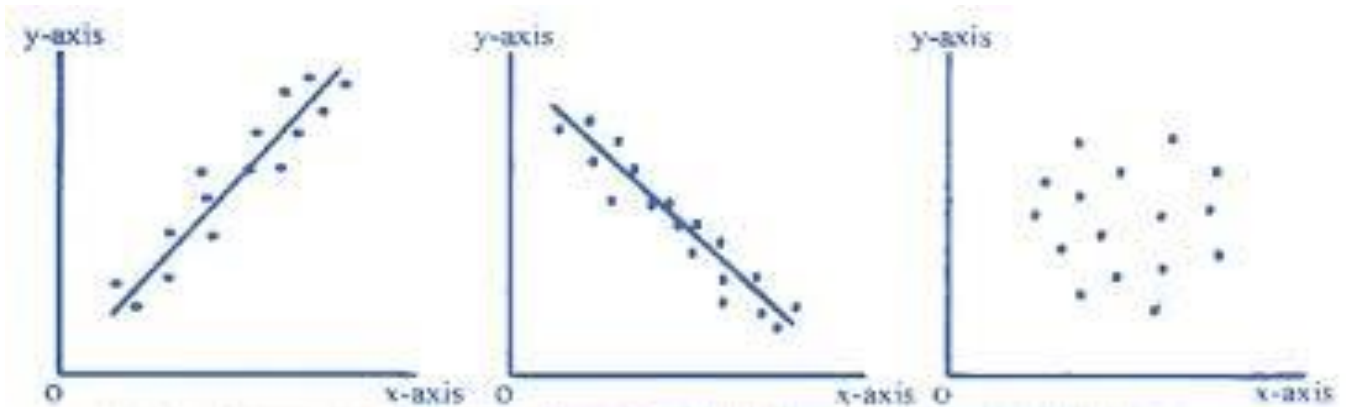
Extraneous variable- Any variable, other than the independent variable (IV) that may have an effect on the dependent variable (DV) if it is not controlled for. EV's are essentially nuisance variables that do not systematically vary with the IV.

Confounding variable- Any variable other than the IV that may have affected the DV (the one the researcher measures). They systematically vary with the IV

Intervening variable- A variable that comes between two variables and can be used to explain the relationship between two variables. For example, if a positive correlation is found between ice cream sales and violence this may be explained by an intervening variable- heat- which causes the increase in ice cream sales and also an increase in violence

There are different types of correlations

A correlation illustrates the strength and direction of an association between two or more co-variables (things that can be measured.) Correlations are plotted on a scattergram. One co-variable forms the x-axis and the other the y-axis. Each point or dot on the graph is the x and y position of each co-variable.





What correlations would you expect to find for the following?

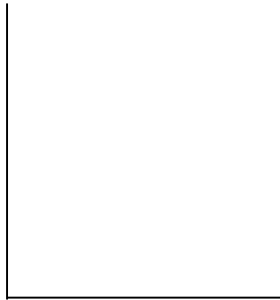


Variables	Expected Correlation
Height and shoe size	
Scores on a French test and scores on an English test	
Eye colour and scores on an IQ test	
Number of red cars on the road and the number of daily newspapers sold	
Amount of revision and exam grades	
Amount of alcohol consumed and scores in a general knowledge quiz	
Amount of rain and sun hats sold	

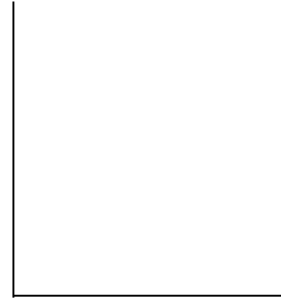
Bodyweight and scores on a video game

As you will know from maths, there can be weak and strong positive and negative correlations too, so it is important we consider these.

Have a go at drawing one of those



Weak positive correlation



Weak negative correlation

Correlation coefficient

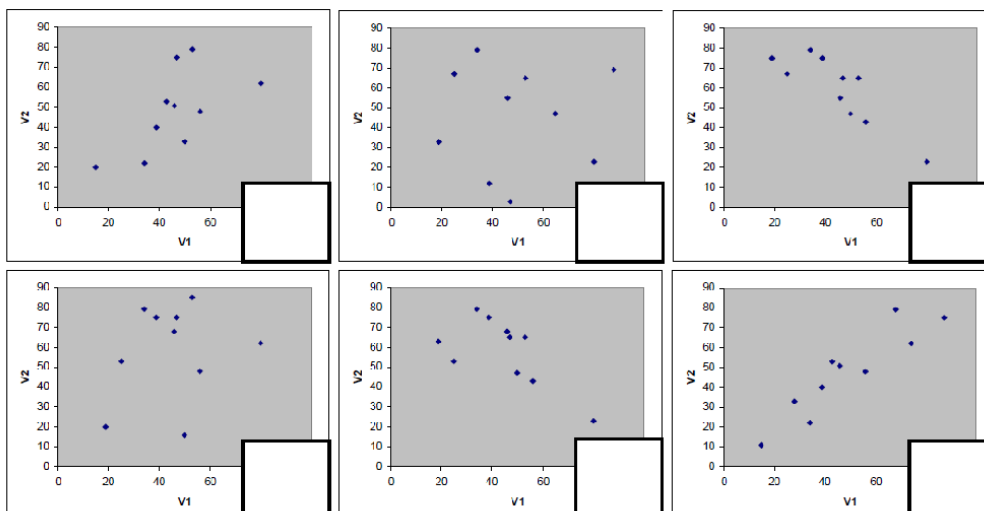
If you were reporting your research you couldn't just say "the line slopes up to the right a bit" or "it looks positive." There is a mathematical value for any correlation. We call this the coefficient of the correlation.

Correlation Coefficient Shows Strength & Direction of Correlation



Task- Match the scatter grams with the correct correlation co-efficient

+0.91 +0.66 -0.61 +0.22 -0.85 +0.01





Evaluation on correlations



Strengths of correlations	Limitations of correlations



Thinking about Past Questions

1) 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) (b) Outline one strength and one weakness of using correlational research to investigate the effects of day care. (2 marks + 2 marks)

2) A researcher studied a group of children who had spent time in an institution before being adopted. Each child was observed by the researcher in their school playground and given a score for aggression. A high score indicated that the child was very aggressive. The research showed that the longer children had spent in the institution the higher their aggressive score. (a) What kind of correlation is this research showing? (1 mark) (b) Explain one limitation of correlational research (2 marks)

Differences between experiments and correlations

Make sure you are aware of the differences

Experiments	Correlations



4) Aims

In Psychology, we generate aims and hypotheses before carrying out any research. In psychological research, aims are developed from theories...

Aim → is a general statement of that the researcher intends to investigate; the purpose of the study.



Aim: To investigate if energy drinks make people more talkative

The aim usually begins- “The aim is to discover/find out/see/investigate ...if/whether” e.g.

The aim is to see if daycare makes children more aggressive.

The aim is to investigate whether young people have better memories than old people.

The aim is to discover whether males are more aggressive than females.



Quick Quiz Write your own aims using the phrase "The aim is to discover/find out/see/investigate if/whether"

A psychologist is interested in studying the effects of playing violent video games on children's aggression. What is the aim of this study?

A psychologist is studying whether having a pet reduces stress or not.

What is the aim of this study?

A psychologist wants to see if girls are better at Maths than boys.

What is the aim of this study?

A psychologist wants to see if mind maps help improve students memories. What is the aim of this study?

5) Hypotheses

Now we have an aim, we need to formulate a hypothesis...

Hypothesis → A clear, precise testable statement that states the relationship between the variables to be investigated. This is stated before you start any study. **Testable** –means the statement can be verified or falsified.

In the case of the aim above, our hypothesis might be 'Drinking energy drinks will causes people to become more talkative'

State your own hypothesis about something else...

However, hypotheses can be directional or non directional...



In a directional hypothesis (or one tailed) the research makes it clear what difference is anticipated between the 2 conditions or 2 groups of people. They include words such as more, less, higher, lower, faster, slower, etc.

Write a directional hypothesis for our energy drink investigation

A non- directional hypothesis (two tailed) simply states that there is a difference but we don't know how.

Write a non- directional hypothesis for our energy drink investigation

Summary

A Non-Directional hypothesis often refers to a “ difference...”, but it does not say what the difference is i.e. it does not say more/less, better/worse, faster/slower *e.g males and females score differently on IQ scores- is a non-directional hypothesis because it doesn't tell us whether boys will score more highly on IQ tests than girls, or whether girls will score more highly on IQ tests than boys.*

A Directional hypothesis does say what the difference will be. *e.g Males will score more highly on IQ scores than females.*



Exam Tip: To remember what kind of hypothesis is one and two-tailed, think of a one-way street for a one-tailed hypothesis i.e. you can only go in one direction. But in a two-

For each of the below hypothesis decide if it is directional (one tailed) or non-directional (two-tailed). The write its oposite, so it its directional, write a non directional version...



Lack of sleep reduces reaction time.

Driving faster affects your chances of crashing.

Girls talk more than boys.

The older we get the worse our memory becomes.

Temperature affects the amount of work that you do.

The amount of violent TV watched affects levels of aggression.

Drinking alcohol has an effect on reaction time.

There is also something known as a 'null hypothesis.' This is saying there won't be any difference. It just means there will be no relationship between the 2 variables

It's a bit like a 'backup' hypothesis in case we don't find anything.

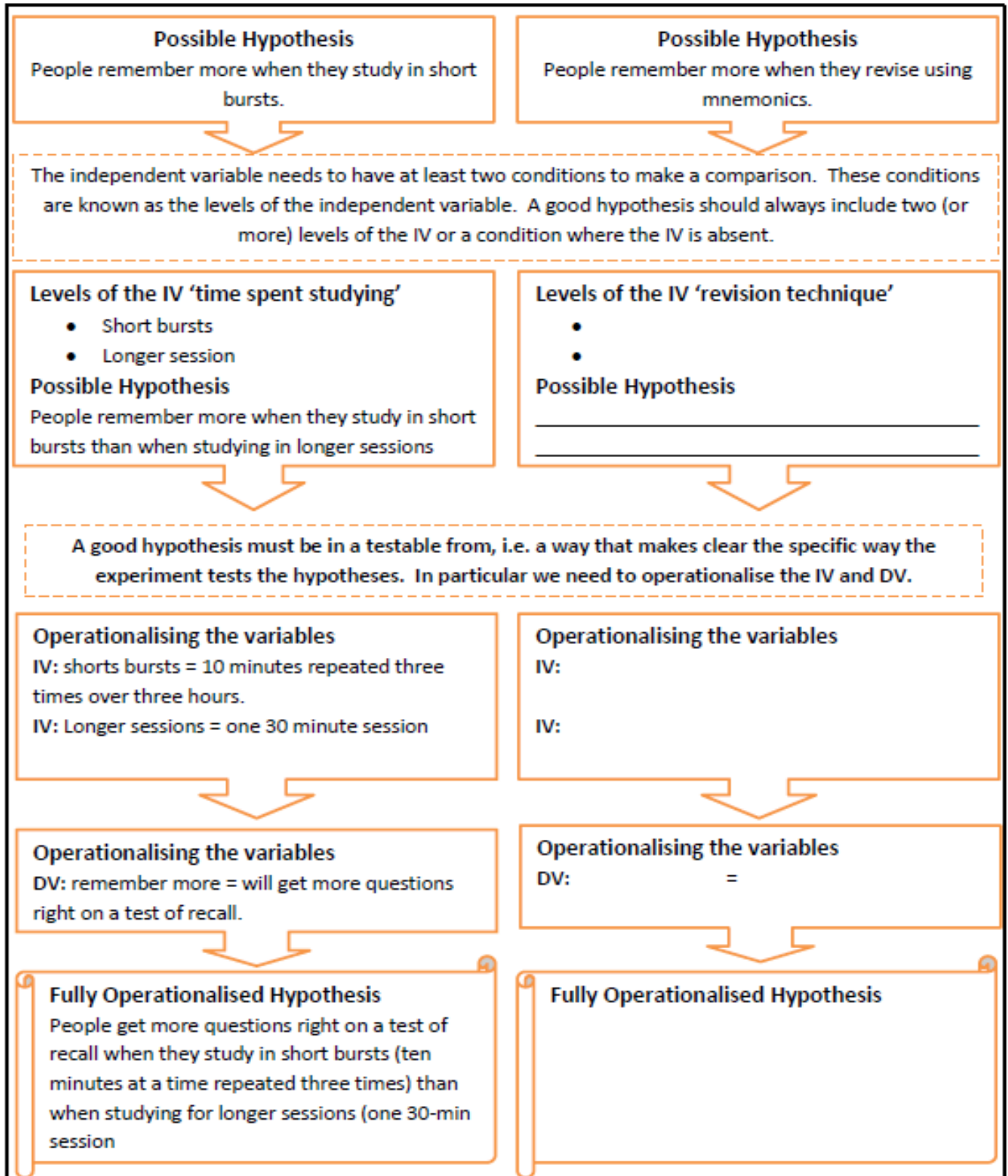
E.g. there will be no difference in the amount of sleep you have and your reaction times

Deciding which type of hypothesis to use.

Psychologists tend to use a directional hypothesis when the findings of previous research studies suggest a particular outcome. When there is no previous research, or findings from earlier studies are contradictory, they will instead decide to use a non-directional hypothesis.

Let's practice writing a fully operationalized testable hypothesis.

A hypothesis states what you believe is true. It is a precise and testable statement of the relationship between two variables. It is a statement, not a question or a prediction. Follow the example on the left to develop the hypothesis on the right into a fully operationalized, testable statement.



Directional hypothesis

“Participants who IV (a) will state how their DV will differ compared to participants who IV (b)”

Now you have a go...

Write a directional hypothesis for the following research questions – remember to operationalise your variables!!!

- Does the attractiveness of an individual effect the level of punishment they receive for a crime?

- Does the time of day effect performance on a word recall task

Non-directional Hypothesis

“There will be a difference in DV performance between IV (a) and IV (b)”

Now you have a go...

Write a non-directional hypothesis for the following research questions – remember to operationalise your variables!!!

- Does the attractiveness of an individual effect the level of punishment they receive for a crime?

- Does the time of day effect performance on a word recall task

Deciding on which type of hypothesis you should use:

Psychologists make the decision about which of these to use based on previous research. If the previous research into a topic all suggests a particular outcome (meaning it all agrees) then a directional hypothesis will be chosen. If, however, the previous research is contradictory or there is limited research already then a non directional hypothesis will be chosen.



Thinking about Past Questions

1) Dave, a middle-aged male researcher, approached an adult in a busy street. He asked the adult for directions to the train station. He repeated this with 29 other adults. Each of the 30 adults was then approached by a second researcher, called Sam, who showed each of them 10 photographs of different middle-aged men, including a photograph of Dave. Sam asked the 30 adults to choose the photograph of the person who had asked them for directions to the train station. Sam estimated the age of each of the 30 adults and recorded whether each one had correctly chosen the photograph of Dave.

Identify one aim of this experiment. (2 marks)

2) It is thought that colours might affect our performance when carrying out certain tasks. Research in this area has been inconclusive. Some studies have shown that red improves performance but others have found the opposite. It could be that these contradictory results have arisen because red is beneficial only for certain kinds of mental processing. Some psychologists tested this hypothesis in a series of independent-groups design experiments using students at a Canadian university. The experiments involved computer tasks, with either a red, blue or neutral background appearing on the monitor. The researchers found that participants were better at a word-recall task and a spell-checking task when the screen background was red rather than blue or neutral. However, participants thought of more creative ideas when the screen was blue rather than red or neutral. The researchers concluded that red is beneficial for tasks that require attention to detail whereas blue aids creativity.

What were the researchers' aims in this study? (2 marks)

3) A psychologist carried out an experiment using an independent groups design. The psychologist wished to investigate the effectiveness of a strategy for memory improvement. In one condition, participants were taught a memory improvement strategy. In the other condition, participants were not taught this memory improvement strategy. All participants were asked to memorise 10 pictures of familiar objects. For example, the first was a doll, the second was an apple. All participants were then given 50 pictures each, and asked to select the original 10. Write a directional hypothesis for this experiment. (2 marks)

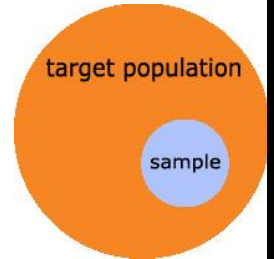
4) A researcher investigated whether memory for words presented with pictures was better than memory for words presented without pictures. The researcher used an independent groups design. In Condition 1, participants were given a limited time to learn a list of 20 words. They were then asked to recall the 20 words in any order. In Condition 2, participants were given the same time to learn the same 20 words, but this time each word was presented with a picture. For example, the word 'apple' was presented alongside a picture of an apple. They were then asked to recall the 20 words in any order. State a non-directional hypothesis for this experiment. (2 marks)

5) A Psychology student carried out a laboratory experiment to investigate encoding in STM. She used an opportunity sample of 20 participants. Two lists of letters were read out to participants. List 1: P V E D B C G T (letters that sound the same). List 2: Y Z O A N F X R (letters that do not sound the same). All 20 participants listened to list 1 and then tried to recall the letters. Next, they all listened to list 2 and then tried to recall these letters. Write a non-directional hypothesis for this experiment. (2 marks)

6) Sampling methods

When we carry out research we need people to take part, these are called participants. It is important to use suitable participants in your study.

One of the most important issues about any type of method is how representative of the population the results are. The population is the group of people from whom the sample is drawn.



Obviously it is not usually possible to test everyone in the target population so therefore psychologists use sampling techniques to choose people who are representative (typical) of the population as a whole.

Sampling Methods and description	Strengths	Weaknesses
Opportunity sample		
Random sample		
Volunteer sample (self-selected)		

Systematic sample		
Stratified sample (quota)		



Task: Suggest which sampling method you would use for each of these investigations and say why.

1. An investigation into whether students will help a teacher pick up a pile of books in the corridor. (2 marks)
2. A lab experiment comparing memory for a set of black and white versus colour pictures. (2 marks)
3. An investigation into the development of children's problem solving abilities as they grow up. (2 marks)



Thinking about Past Questions

1) Dave, a middle-aged male researcher, approached an adult in a busy street. He asked the adult for directions to the train station. He repeated this with 29 other adults. Each of the 30 adults was then approached by a second researcher, called Sam, who showed each of them 10 photographs of different middle-aged men, including a photograph of Dave. Sam asked the 30 adults to choose the photograph of the person who had asked them for directions to the train station. Sam estimated the age of each of the 30 adults and recorded whether each one had correctly chosen the photograph of Dave. Name the sampling technique used in this experiment. Evaluate the choice of this sampling technique in this experiment. (1 mark + 3 marks)

2) Psychologists often need to select participants to take part in research. The descriptions below are all types of sampling method. In the table below, write which description, A, B, C, or D, matches each sampling method. (3 marks)

A The psychologist puts an advert in a newspaper, asking for participants.

B The psychologist uses lists of students in a university and selects every tenth student to take part.

C The psychologist asks some of his psychology students to take part in the research.

D The psychologist gives a number to all students in a university, then selects participants in an unbiased way.

Sampling Method	Description
Random Sample	
Opportunity Sample	
Volunteer Sample	

3) Some psychology students read about an experiment which suggested that organisation is a useful strategy for improving memory. The students carried out an experiment to investigate the effects of organisation on word recall. They made up a list of 50 items that could be bought in a supermarket. The participants were teachers at their school. One group of participants saw the words organised into categories such as fruit, vegetables, dairy products and cleaning materials. The other group saw the same words presented randomly. The results are given in Table 1 below. The psychology students decided to use a volunteer sample. Suggest one way in which this sample could be obtained (2 marks)

7) Ethical issues

ETHICS are standards of conduct that distinguish between right and wrong, good and bad, justices and injustice.

The primary aim of psychology must be to improve the quality of human life and to do this it is necessary to carry out research with human participants. Research psychologists have a duty to respect the rights and dignity of all participants.

This means that they must follow certain moral principles and rules of conduct, which are designed to protect both participants and the reputation of psychology. The professional organisation that governs psychology in Britain is the British Psychological Society (BPS). They have produced a list of ethical guidelines that all practising psychologists must follow.

An ethical issue is any situation that repeatedly gives rise to an ethical dilemma. For example, whether or not to deceive a research participant in a psychological study in order to gain more worthwhile findings is an ethical issue because it creates an ethical dilemma for the researcher .i.e. what should they do? One of the main reasons organisations like the BPS have developed ethical guidelines is that it removes the need for researchers to resolve these dilemmas on their own.



So what are the ethical issues?

There are 4 ethical issues that we are going to consider (there are more than this set by the BPS however, visit their website to find out some others). Informed consent, deception, protection from harm and privacy and confidentiality are the ones we are going to consider.



TASK: Create a mnemonic to help yourself remember these principles.

So how do we deal with ethical issues?



The BPS Code of conduct

The British Psychological society (BPS), like many other professional bodies, has its own BPS code of ethics and this includes a set of ethical guidelines. Researchers have a professional duty to observe these guidelines when conducting research- if they don't follow them they could lose their job.

The guidelines are closely matched to the ethical issues and attempt to ensure that all participants are treated with respect and consideration each phase of research.

Guidelines are implemented by ethics committees in research institutions who often use a cost-benefit approach (making a decision by weighing up the costs (in terms of time, money and harm) against the gains, (in terms of the benefit to society)) to determine whether particular research proposals are ethically acceptable.

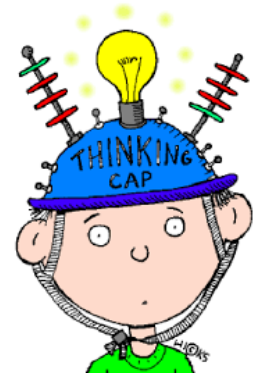
Have a go at identifying the ethical issue and also how this issue can be dealt with.

	Description of the issue	How to deal with this issue
Informed consent		
Deception		
Protection from harm		
Privacy and confidentiality		



Ethics Task:

Look at the following brief descriptions of studies. What are the ethical principles that these studies violate?



1) In a busy subway, a person collapses bleeding from the mouth. The person is a confederate of the experimenter and the event is staged. Bystanders are covertly observed to see if they help and how long they take to help. An investigation into bystander responses to emergency situations.

2) An experimenter in a pick-up truck, with a rifle visible in the back and a sticker on the bumper saying 'Vengeance' stops at red lights. The experimenter does not move when the lights turn green thus blocking traffic. This experiment is testing the impact of aggressive stimuli on 'horn-honking' behaviour.

3) Baby rhesus monkeys reared in complete isolation except for two surrogate 'mothers'; one a wire structure with a plastic face, and the other a wire structure but covered with terry towelling. This study is investigating the nature of mother-child relationships.

4) Rats are given an electric shock to the feet, and soon afterwards a toy rubber hedgehog flies (on wires) across the top edge of their cage. An investigation into the effects of aversive conditioning.

5) Participants are presented with 2,000 sheets of random numbers, asked to add up 224 pairs of numbers on each sheet, and then tear the sheet into 32 pieces before going onto the next. After five hours of this clearly useless task, some of the subjects are still going and have to be stopped by the experimenter. An investigation into the power of the psychology experiment.

6) Rats are given electric shocks to the brain after they have learnt a maze to see how this affects their memory of the maze.

8) Ammonia is used to punish a deaf-blind five year old boy engaging in serious self-injurious behaviour (self mutilation). An investigation based on real life interventions into the relative effects of various types of punishment on self-injurious behaviour.

9) Head banging behaviour is taught to rhesus monkeys, extinguished (got rid of) and then re-established in order to investigate the hypothesis that some forms of self-injurious behaviour are linked to reinforcing features in the environment.

10) Electric shock administered to homosexuals as they view photographs of clothed and naked males. An investigation into the treatment of 'sexual deviations'.

11) A hidden observer in a men's toilet records the time taken before participants begin to urinate and the time they take urinating. A confederate of the experimenter either stands in the next stall to the subject or one stall away. An investigation into the effects of invasion of privacy on arousal.

Debriefs

A debrief is an interview that happens after the research has taken place. It is designed to inform the participants of the true nature of the study and to restore them to the state they were in before the study.

You must include the following information...

- The true aims of the experiment
- Information about the conditions (as remember, the participants may not be aware there was more than the one they participated in)
- Any ethical issues e.g. deception- why they were deceived etc.
- You need to talk in a way as if they have done the experiment. E.g. you were told you had to write a list of words...Remember the debrief comes after they have taken part in the experiment
- Tell them what their information will be used for and that they will remain anonymous
- Remind them they have the right to withdraw
- Thank them for taking part in your study

A psychologist wanted to see if creativity is affected by the presence of other people. To test this he arranged for 30 people to participate in a study that involved generating ideas for raising funds for a local youth club. Participants were randomly allocated to one of two conditions.

Condition A: there were 15 participants in this condition. Each participant was placed separately in a room and was given 40 minutes to think of as many ideas as possible for raising funds for a local youth club. The participant was told to write down his or her ideas and these were collected in by the psychologist at the end of the 40 minutes.

Condition B: there were 15 participants in this condition. The participants were randomly allocated to 5 groups of equal size. Each group was given 40 minutes to think of as many ideas as possible for raising funds for a local youth club. Each group was told to write down their ideas and these were collected by the psychologist at the end of the 40 minutes.

The psychologist counted the number of ideas generated by the participants in both conditions and calculated the total number of ideas for each condition.

Table 2: Total number of ideas generated in Condition A (when working alone) and in Condition B (when working in a group)

	Condition A Working alone	Condition B Working in a group
Total number of ideas generated	110	75

Have a go at writing a debrief that the psychologist could give to people in condition A



Thinking about Past Questions

- 1) A psychologist carried out a research study to investigate the effects of institutional care. To do this, she constructed a questionnaire to use with 100 adults who had spent some time in an institution when they were children. She also carried out interviews with ten of the adults. Identify two ethical issues that the psychologist would need to consider in this research. Explain how the psychologist could deal with one of these issues. (1 mark + 1 mark + 3 marks)
- 2) Psychologists sometimes use case studies to study children. One example was of a boy who was discovered at the age of six. He had been kept in a darkened room and had had almost no social contact with people. (a) How could a psychologist maintain confidentiality when reporting a case study? (2 marks)
- 3) A psychologist used an independent groups design to investigate whether or not a cognitive interview was more effective than a standard interview, in recalling information. For this experiment, participants were recruited from an advertisement placed in a local paper. The advertisement informed the participants that they would be watching a film of a violent crime and that they would be interviewed about the content by a male police officer. The psychologist compared the mean number of items recalled in the cognitive interview with the mean number recalled in the standard interview. Discuss whether or not the psychologist showed an awareness of the British Psychological Society (BPS) Code of Ethics when recruiting participants for this experiment. (3 marks)
- 4) A psychologist wanted to investigate the effects of age of adoption on aggressive behaviour. He compared children who had been adopted before the age of two with children who had been adopted after the age of two. The children were observed in their school playground when they were six years old. Explain one ethical issue the psychologist would have needed to consider when carrying out this research. How could the psychologist have dealt with this issue? (4 marks)

8) Qualitative & Quantitative data

Quantitative data is:

Qualitative data is:

5 word prompts for quantitative	5 word prompts for qualitative
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

Task-Decide whether the following examples would produce qualitative or quantitative data

Participants' reaction times on a driving simulator	
Recollection of a traumatic childhood event	
An unstructured observation of students behaviour in the atrium during lunch break	
An 'attitude to Jeremy Corbin' questionnaire with a series of "yes/no" questions	
An questionnaire on the 2015 rugby world cup using open questions	
A record of a school bullying incident	
A tally chart of how many times Simon Cowell said 'four yes')	
A researcher categorises the social behaviour of CVI students in to three types	
A recovering patient describes his experience of schizophrenia	

Think -How could *self-report* techniques be used to generate both quantitative & qualitative data?

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Decide whether the following are **strengths** or **weaknesses** of **qualitative** or **quantitative** data.

A. can produce graphs from the data	<u>strength/weakness</u> <u>qualitative/quantitative</u>
B. can oversimplify complex behaviour	<u>strength/weakness</u> <u>qualitative/quantitative</u>
C. represents the complexity of human experience	<u>strength/weakness</u> <u>qualitative/quantitative</u>
D. can gain deeper access to thoughts and feelings	<u>strength/weakness</u> <u>qualitative/quantitative</u>
E. more likely to be objective=less biased	<u>strength/weakness</u> <u>qualitative/quantitative</u>
F. participants have freedom of expression	<u>strength/weakness</u> <u>qualitative/quantitative</u>
G. easy to analyse as averages and ranges can be produced	<u>strength/weakness</u> <u>qualitative/quantitative</u>
H. results from different studies can be compared with each other	<u>strength/weakness</u> <u>qualitative/quantitative</u>
I. data is morerich and representative therefore has <i>external validity</i>	<u>strength/weakness</u> <u>qualitative/quantitative</u>
J. Difficult to draw conclusions and detect patterns	<u>strength/weakness</u> <u>qualitative/quantitative</u>
K. Can be affected by subjective analysis =researcher bias	<u>strength/weakness</u> <u>qualitative/quantitative</u>
L. Easier to draw conclusions from data	<u>strength/weakness</u> <u>qualitative/quantitative</u>
M. Phenomena can be forced to fit a set measure	<u>strength/weakness</u> <u>qualitative/quantitative</u>

Data produced by the different methods

- Experiment ➤ Quantitative: DV is measured to establish cause and effect.
- Self Report ➤ Closed Questions: Quantitative. Open questions: Qualitative
- Observation ➤ Structured: Quantitative. Description of observed: Qualitative
- Correlation ➤ Quantitative: two scores correlated.
- Case Study ➤ Qualitative: in-depth, detailed.

9) Primary and secondary data

Use two colours to identify the characteristics of PRIMARY & SECONDARY data

This data is also known as field research.

This data could be found in journal articles, books or websites.

This data has already been subject to statistical testing

Information that has been obtained first hand by the researcher.

In Psychology, this kind of data is gathered directly from Pps using one or more methods.

Information that has already been collected by previous researchers

This is also known as 'desk research'

Information contained in a government census is an example of this data

Can you give some examples of primary and secondary data?

Primary data	Secondary data



Evaluating Primary and Secondary data.



PRIMARY DATA AO3

The main strength of primary data is that it is _____ data
_____ from participants themselves for a particular purpose. Research can be designed in such a way that it specifically targets the information required for the research question.

A problem with primary data is that it requires _____ and effort in
_____ preparing and carrying out the research.

SECONDARY DATA AO3

The main strength of secondary data is that it is _____ to obtain and requires
_____ effort. Findings from previous investigations can mean that current researchers may not need to carry out another experiment and simply use the secondary data.

A problem with secondary data is that it could be _____ and irrelevant despite at first looking useful. Information could vary in _____ and accuracy.

Inexpensive, time, quality, minimal, authentic, outdated, planning, direct.

10) Meta-analysis

A particular form of research method that uses secondary data is meta-analysis

This refers to the process in which the data from a large number of studies, which have involved the same research questions and methods of research, are combined. The researcher(s) may simply discuss the findings/conclusions- which is qualitative analysis

They may also use a quantitative approach and perform a statistical analysis of the combined data. They may involve calculating the effect size- basically, the dependent variable of a Meta-analysis- which gives an overall measure of difference or relationship between variables across a number of studies.

On the plus side, meta-analysis allows us to view data with much more confidence and results can be generalised across much larger populations.

However, meta-analysis may be prone to publication bias, sometimes referred to as the file drawer problem. The researcher may not select all relevant studies, choosing to leave out those studies with negative or non-significant results. Therefore the data from the meta-analysis will be biased because it only represents some of the relevant data and incorrect conclusions are drawn.



Task

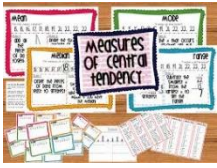
- 1) Find examples of a meta-analysis in this book
- 2) Explain how this study was conducted
- 3) Was there an effect size?



Thinking about Past Questions

- 1) Using examples, explain the difference between primary data and secondary data (4 marks)
- 2) Explain one strength and one limitation of qualitative data (6 marks)
- 3) Explain what is meant by the term meta-analysis, in your answer, refer to one example of a meta-analysis.

11) Descriptive statistics



Measures of Central tendency

A measure of central tendency is the general term for any measure of the average value in a set of data.

Central tendency is very useful in psychology. It lets us know what is normal or 'average' for a set of data. It also condenses the data set down to one representative value, which is useful when you are working with large amounts of data.

The measures of central tendency we look at are...

- a) Mean
- b) Mode
- c) Median

We are going to look at the following...
How do you calculate them?
How do you know which one to use?
What are the advantages and disadvantages of each one?

a) Mean

It's the average

The word 'MEAN' is written in large, bold, block letters. Each letter is a different color: M is blue, E is red, A is orange, and N is green.

How do we calculate the mean?

Apply your knowledge

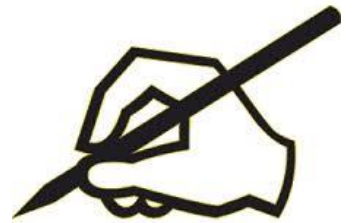
Strengths	Weaknesses



For each one find the mean, show your work.

1) 6,8,8,7,2,5,1,25

2) 9,12,3,4,5,8,9,10



3) 5,7,4,1,2,6,5,15

b) Mode

It's the most frequently occurring value in a set of data.



How do we find the mode?

Strengths	Weaknesses



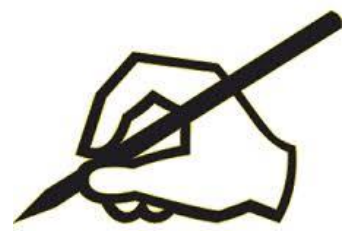
Apply your knowledge

For each one find the mode.

1) 6,8,8,7,2,5,1,25

2) 9,12,3,4,5,8,9,10

3) 5,7,4,1,2,6,5,15



c) Median



How do we find the median?

What do we do if there are 2 numbers in the middle?

Strengths

Weaknesses



Apply your knowledge

For each one find the median.

1) 6,8,8,7,2,5,1,25

2) 9,12,3,4,5,8,9,10

3) 5,7,4,1,2,6,5,15



But how do you know which measure of central tendency to use and when?

Are there any extreme scores? (A score that is significantly lower or higher than the others)

YES

NO

Just follow this simple diagram



Thinking about Past Questions

The table below shows the results of an energy drink experiment. The score for each participant is the number of words said in 5 minutes after consuming their drink (participants were filmed and the number of words spoken was counted).

	P1	P2	P3	P4	P5	P6	P7	P8	P8	P9
Energy drink	110	59	206	89	76	141	152	98	198	57
Water	122	45	135	90	42	87	131	113	129	62

1) Calculate the mean, median and mode for the energy drink condition and the water condition above. Give all answers rounded up to the nearest whole number (3 marks)

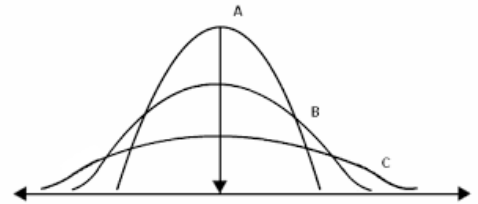
2) What can you conclude from the calculations?

Measures of dispersion

Measures of dispersion are based on the spread of scores; that is, how far scores vary and differ from one another.

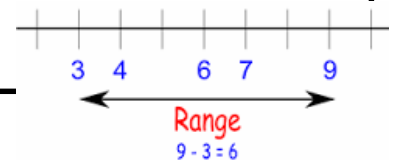
We are going to look at two measures of dispersions

- a) The range
- b) Standard deviation



a) The range

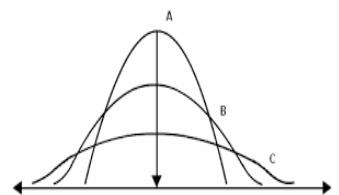
How do you calculate the range?



But why do we add 1?

We add one because it allows for the fact that raw scores are often rounded up or down when they are recorded in research. For instance, someone may complete a simple task in 45 seconds. However, it is unlikely that it took exactly 45 seconds so the addition of 1 account for this margin of error

b) Standard deviation

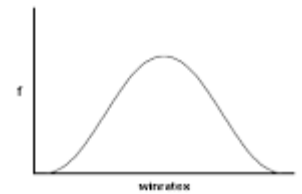


What is it?

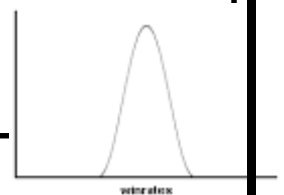
This is a much more sophisticated measure (hence the posh name)

It is a single value that tells us how far the scores deviate (move away from) the mean.

What does a high standard deviation show?



What does a low standard deviation show?



N.B. Remember, if you look at the specification you won't have to calculate the standard deviation, you just have to know what it is and what it shows

Strengths

Weaknesses

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Thinking about Past Questions

The table below includes a summary of the results gained from an experiment. The experiment compared the number of words recalled when words were learned in silence compared to when words were learned whilst music was playing in the background.

	Condition A (learned in silence)	Condition B (learned with music playing)
Mean number of words recalled	21.2	14.6
Standard deviation	1.1	4.6

1) What conclusions can be drawn from the mean values above? (2 marks)

2) What do the standard deviations tell us about the scores in each condition? (2 marks)

12) Data analysis- Graphs and charts



1) Data Analysis, graphs

Presentation and display of quantitative data

Summarising data in a table.

It is important to know that when tables appear in the results section of a report they aren't just raw scores (original data that hasn't been transformed in any way) but have been converted into descriptive statistics (used to identify trends and analyse sets of data).

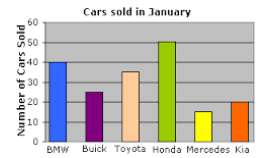
You include a summary paragraph beneath the table that would explain the results in that table. You need to fully explain what we can see in the table. Imagine that you were describing the results in the table to someone who couldn't see it. You also need to say what the information suggests.

Remember, when presenting a table always have a title and clearly labelled columns, you get marks for these.

Put the following data into an appropriate table and provide an appropriate summary paragraph...

'In the energy drink condition the mean was 119 and the standard deviation was 53.8. In the water condition the mean was 96 and the standard deviation was 35.8'

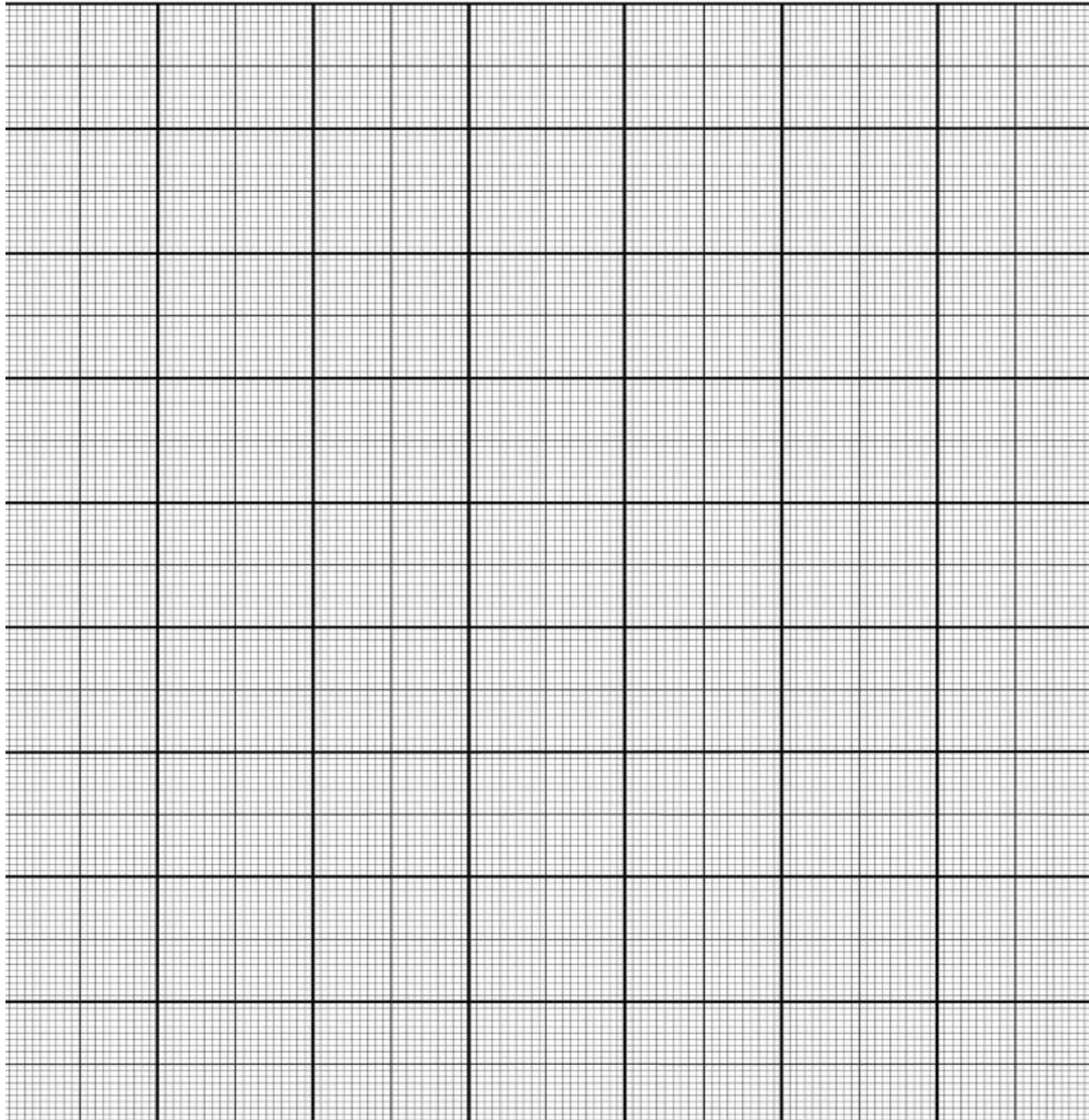
Bar charts.

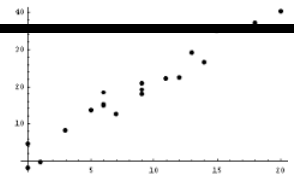


Bar charts are used when the data is divided up into categories, otherwise known as discrete data. Categories can include conditions in an experiment.) Bars are SEPARATED in a bar chart to show that we have SEPARATE categories.

Remember, when presenting a graph always have a title and clearly labelled axis, you get marks for these.

Have a go at drawing a car chart from the above data.





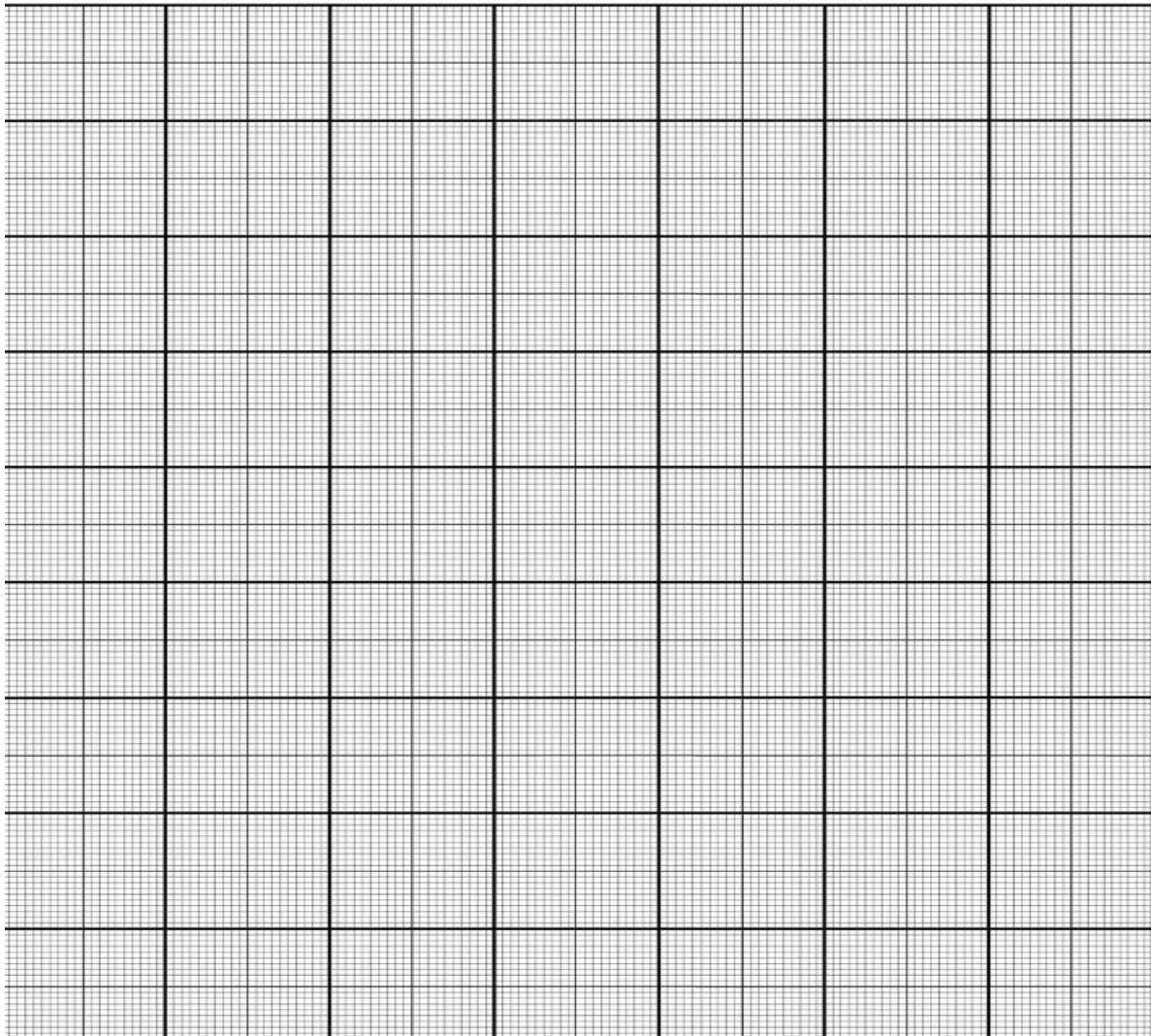
Scattergrams.

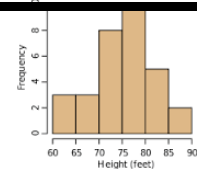
Unlike other forms of graphs, scattergrams don't show differences, they show associations between co-variables (think back to when we did correlations). Either of the co-variables is places on the x-axis and the other on the y-axis (doesn't matter which) and each point on the graph corresponds to the x and y position of the co-variables.

Remember, when presenting a graph always have a title and clearly labelled axis, you get marks for these.

Plot a scatter graph for the following data...

Time (hours) spent revising	2	3	5	7	8	10
Mark on test	30	26	34	38	45	48





Histograms

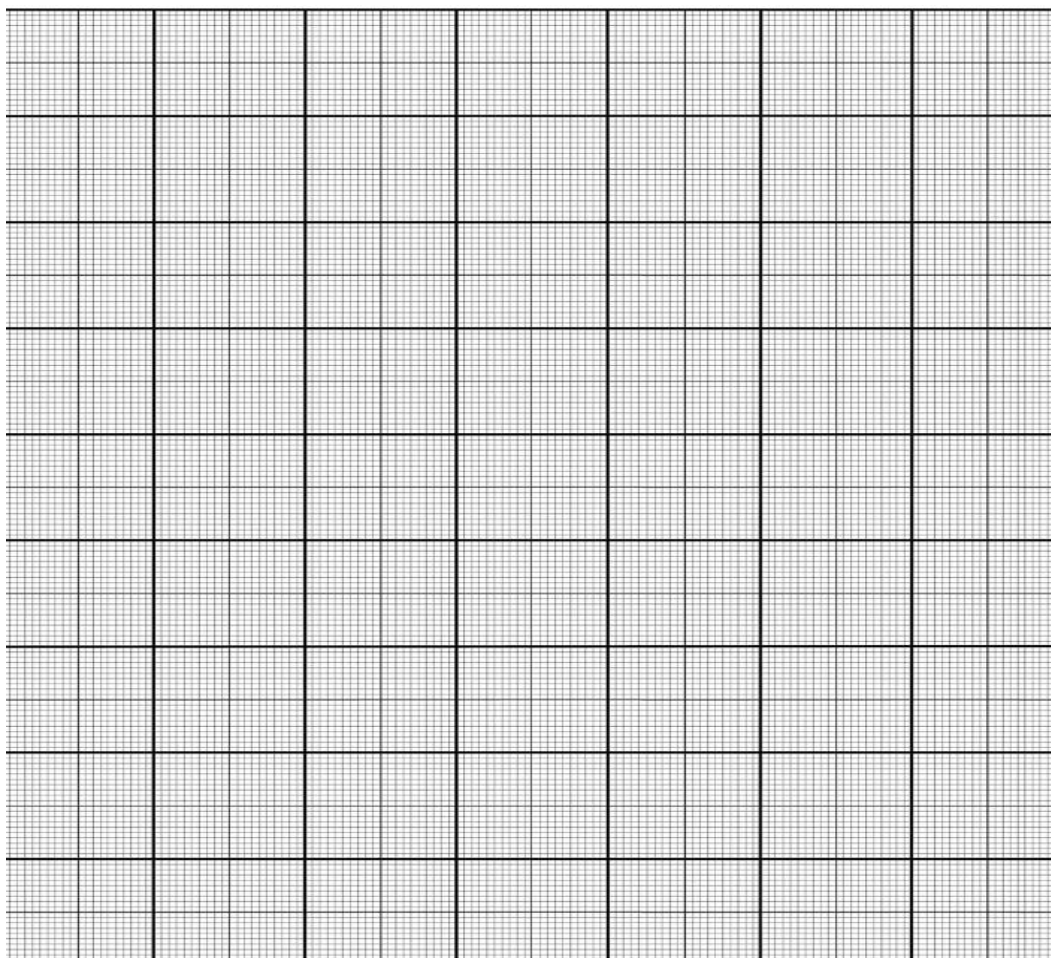
In a histogram, the bars touch each other, this shows that the data is **continuous** rather than discrete (where you would do a bar chart). The x-axis is made up of equal sized intervals of a single category e.g. 0-9, 10-19, 20-29...The Y axis represents the frequency within each interval. If there was a zero frequency for one of the intervals, the interval remains but without a bar, don't just ignore it.

Remember, when presenting a graph always have a title and clearly labelled axis, you get marks for these.

Draw a histogram for the following data...

The table shows the distribution of ages in a health club.

Age, y (years)	Frequency
$0 < y \leq 15$	75
$15 < y \leq 20$	350
$20 < y \leq 25$	850
$25 < y \leq 40$	750
$40 < y \leq 70$	600





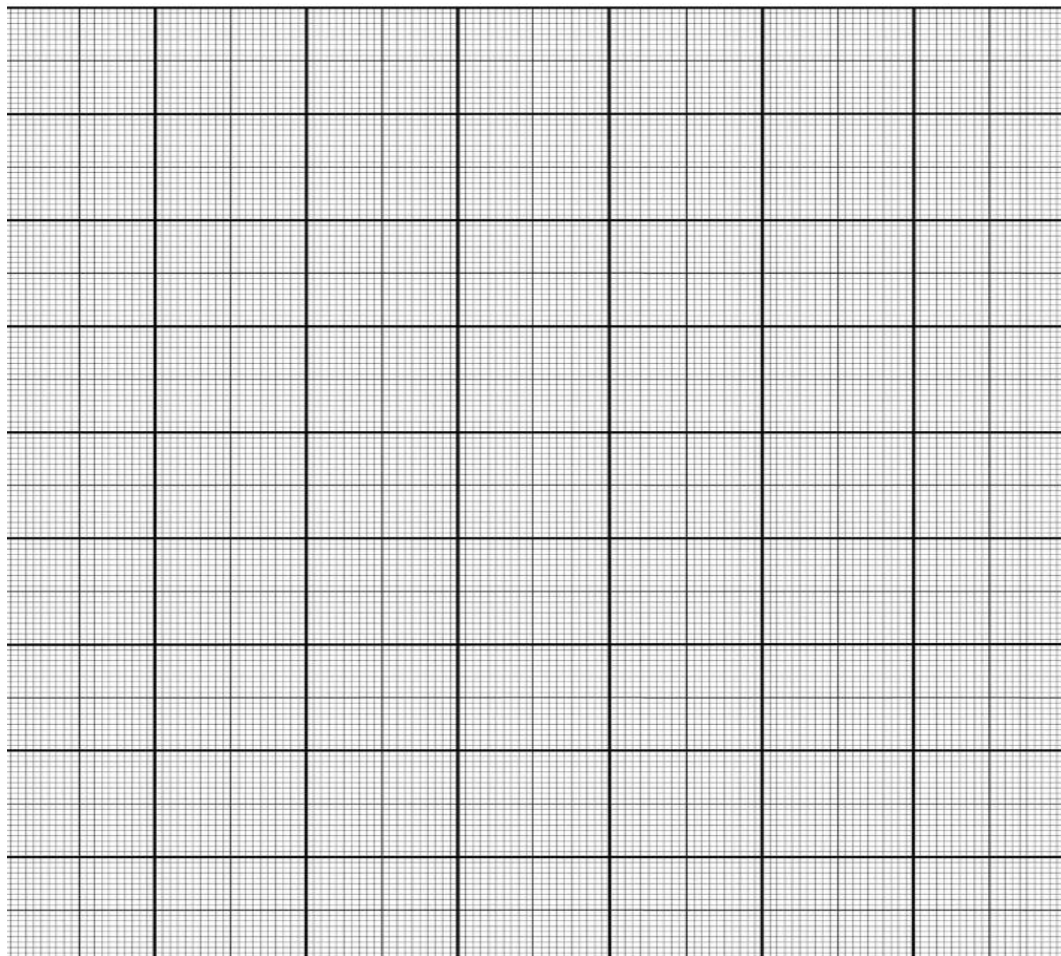
Line graphs

Line graphs also represent continuous data and use points connected by lines to show how something changes in value, for instance, over time. Typically, the IV is plotted on the X axis and the DV on the Y axis. For instance, in an investigation of how the passage of time affects our ability to remember information, the decline in recall would be shown as a continuous line.

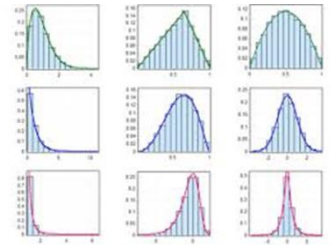
Remember, when presenting a graph always have a title and clearly labelled axis, you get marks for these.

Draw a line graph for the following data...

Time passed	Number of words remembered
5 minutes	30
1 hour	20
1 day	10
2 days	7
3 days	3



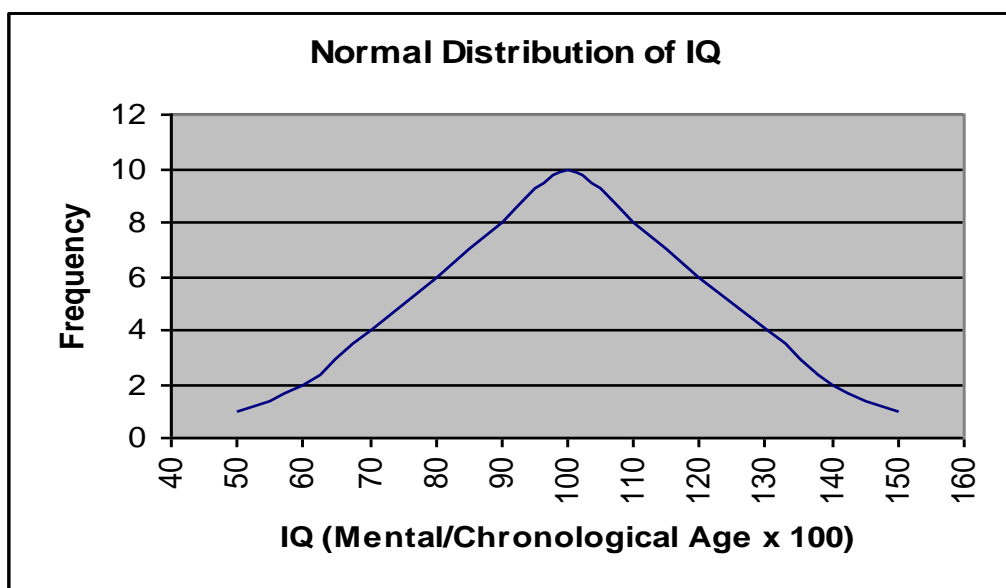
Distributions



Normal Distributions

A normal distribution is when there is a symmetrical spread of frequency data that forms a bell shaped pattern. The mean, mode and median are all located at the highest peak.

Intelligence is said by psychologists to be normally distributed throughout the population. This means that if you plotted everyone's IQ on a graph you would get a bell shaped curve, the average IQ is 100 (Mental age/Chronological age X 100 e.g. $17 \div 17 = 1 \times 100 = 100$), most people's IQ is between 70 and 130. Height and weight can also be said to be normally distributed throughout the population.

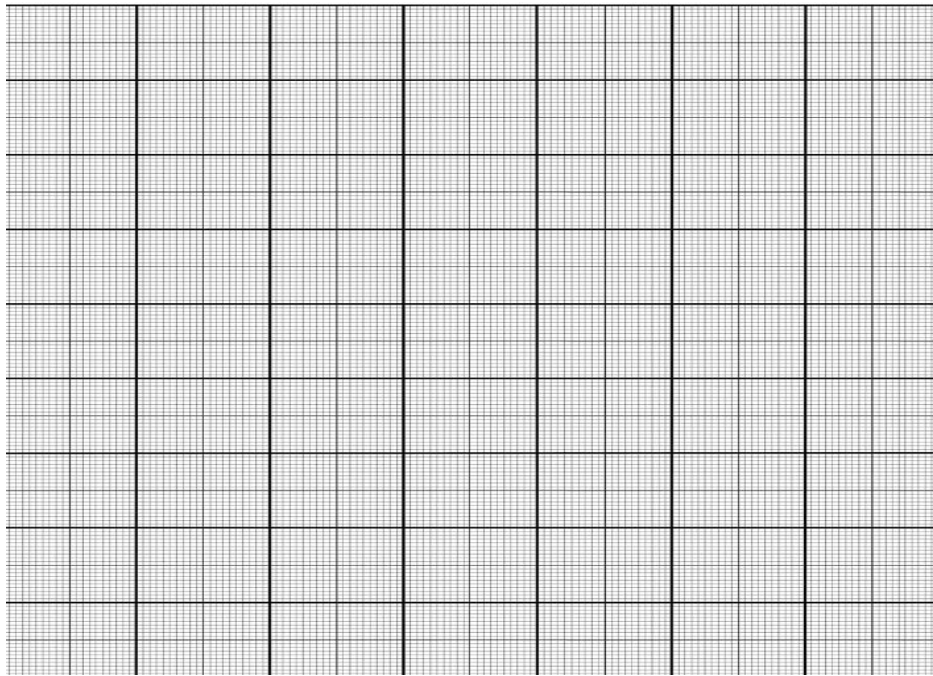
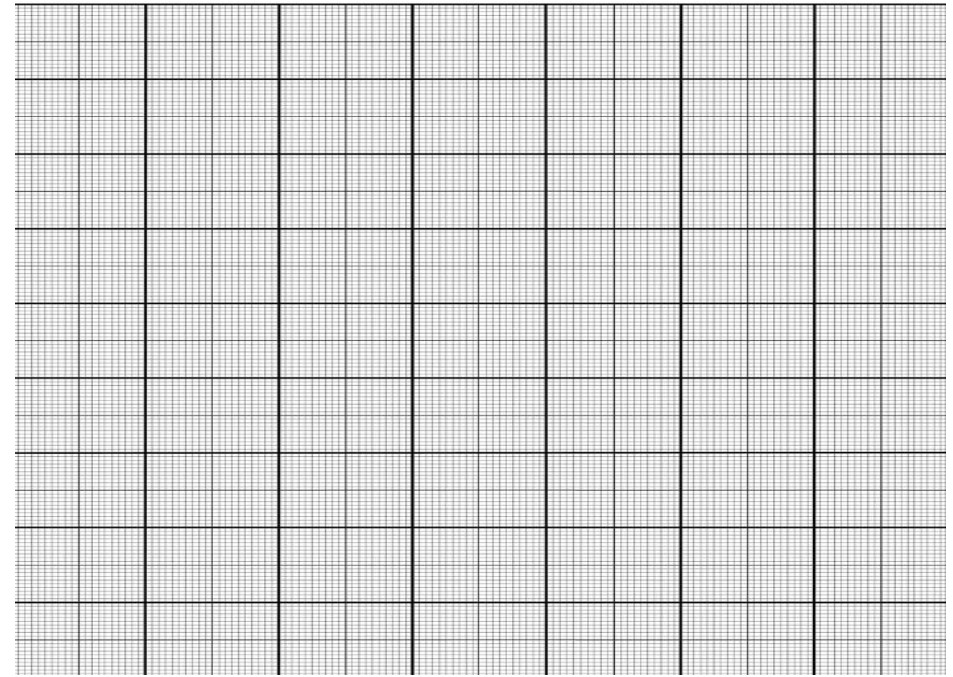
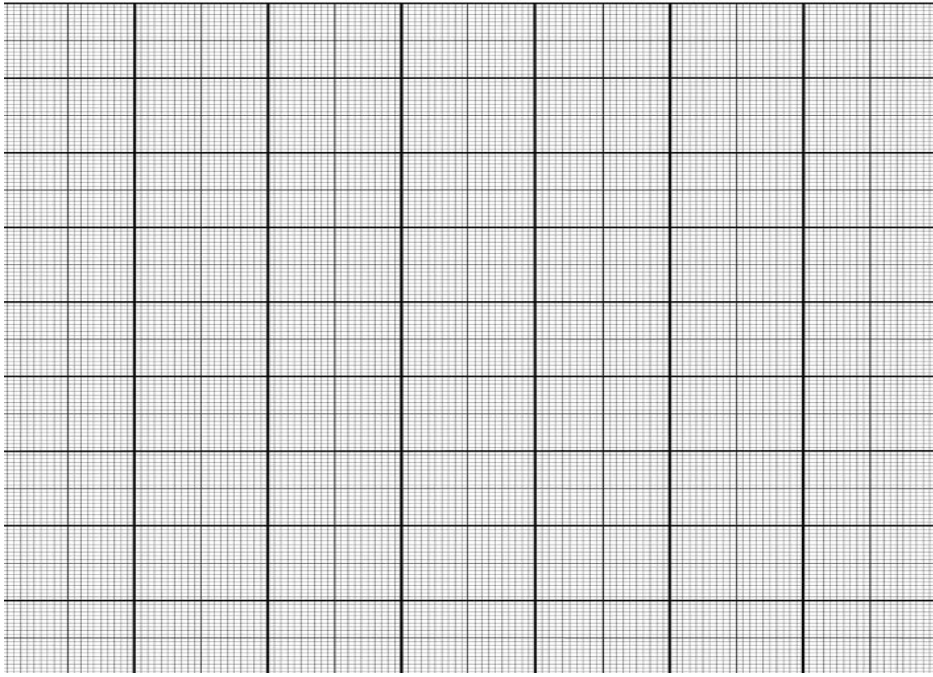


Characteristics of a normal distribution curve, also known as a bell-shaped curve or a Gaussian curve: -

- it is bell-shaped
- it is symmetrical
- the mean, median and mode all fall on the same central point.
- The two tails never touch the horizontal axis.

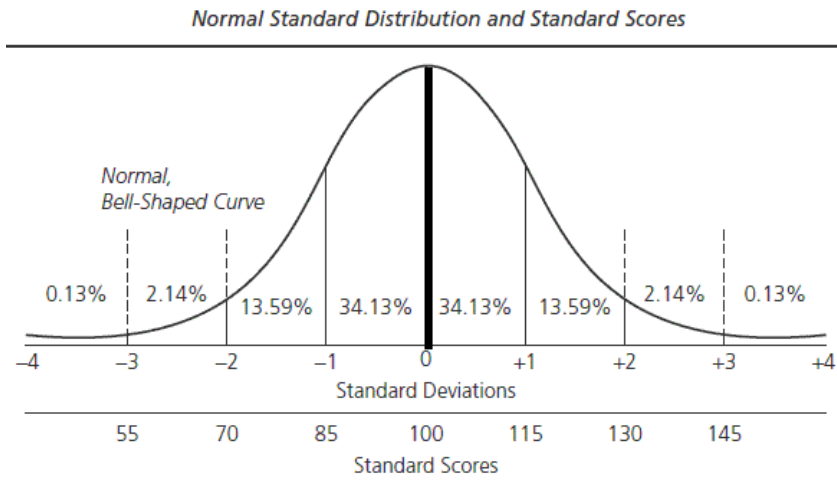
Plot the following four distributions (4 individual graphs), remember to join up points with a smooth curve. Mark the mode, mean and median on each graph.

A		B		C	
Marks x	Students y	Marks x	Students y	Marks x	Students y
20	10	20	20	20	10
40	15	40	35	40	15
60	30	60	60	60	20
80	45	80	40	80	25
100	50	100	30	100	30
120	45	120	20	120	40
140	30	140	15	140	45
160	15	160	10	160	50
180	10	180	5	180	40
				200	30



The most commonly used distribution curve is for IQ scores.

Using the graph – answers these questions:



1. What is the mean IQ score?
2. What percentage of people have an IQ score from 100-115?
3. What percentage of people deviate from the mean by -4 **standard deviation** points?
4. By law you are considered mentally incapable if your IQ is 70 or below, how much must you have deviated from the norm?

Skewed distributions

As well as normal distributions, curves can be skewed, this is when the spread of data is not symmetrical, the data clusters to one end. They can be positively skewed or negatively skewed.

Define each one...

Positively skewed	
Negatively skewed	

In all cases the graphs show an **increase** in the value of the data on the X axis so we say that the data moves in a **positive** direction from left to right across the graph.

When there is very little data represented on one side or other this results in a **skewed** graph.

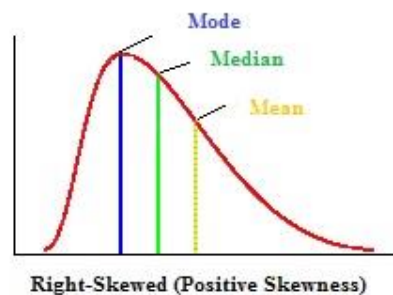
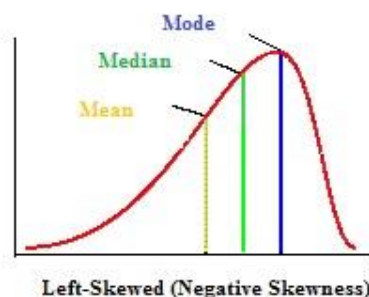
In a skewed distribution, the mode remains at the highest point of the peak, the median comes next, then the mean, the direction differs depending on the type of skew.

Look at the examples and see how they differ for a negative and positive skew.

Examples:

The lack of data in the **negative** zone (left hand side) of the graph causes the curve to be skewed

The lack of data in the **positive** zone (right hand side) of the graph causes the curve to be skewed



	Research information	Distribution result
1)	If 0 - 50 is a normal score for mental health and 50+ represents people with depression, in a sample of 100 participants you would expect to find very few in the 50+ section (the positive zone) compared to the normal zone.	The lack of participant scores in the positive zone would lead to a right-skewed distribution
	If an exam paper was far too easy one year you would expect to see a lot of participant data represented in the positive zone but very little in the negative zone.	The lack of participant scores in the negative zone would lead to a left-skewed distribution

2)

13) Statistical testing- The sign test.

In psychology, we need to know if our results are significant, in other words, are our results strong enough to allow us to reject the null hypothesis and accept the research hypotheses (in other words, we found what we expected).

The difference we found may be due to chance, or coincidence, to find this out; we have to carry out statistical tests.



The sign test

To determine whether what we found is significant, we can use a simple statistical calculation called the sign test.

This test simply involves counting up the number of positive and negative signs.

To use the sign test...

- We need to be looking for a **differences** rather than an association
- We need to have used a repeated measures design
- We need data that is organised into categories, known as **nominal data**.

The concept of probability

All studies employ a significance level in order to check the differences or relationships. The accepted level of probability in psychology is 0.05 (or 5%). This is the level at which the researcher decides to accept the research hypothesis or not.

If the experimental hypothesis is accepted, this means that there is less than 5% probability that the results occurred by chance.

In simple terms, this means that the researcher can be pretty certain that the difference found was because of the manipulation of the IV (though there will always be a 5% doubt even if significance is found.)

In some circumstances, researchers need to be even more confident that results were not due to chance and so employ a stricter, more stringent significance level such as 0.01 (the 1% level). This is in cases when research may involve a human cost. Such as when new drugs are being trailed, or when a particular investigation is a one off and there is no possibility that it can be repeated in the future.

The critical value

When the statistical test has been calculated, the researcher is left with a number- the calculated value. This number then needs to be compared with a critical value to decide whether the results are significant or not. The critical values table will be given to you.

To use the critical values table you need to know the following information...

- 1) The desired significance level (always 0.05 unless in cases stated above)
- 2) The number (N) of participants
- 3) Whether the hypothesis is directional (one tailed) or non-directional (two-tailed)

These pieces of information allow you to locate the critical value for your data.

For the sign test, the calculated value has to be equal to or lower than the critical value for the results to be regarded as significant.



So how do we carry out the sign test?



Hypothesis: Drinking energy drinks will make you more talkative

Step 1

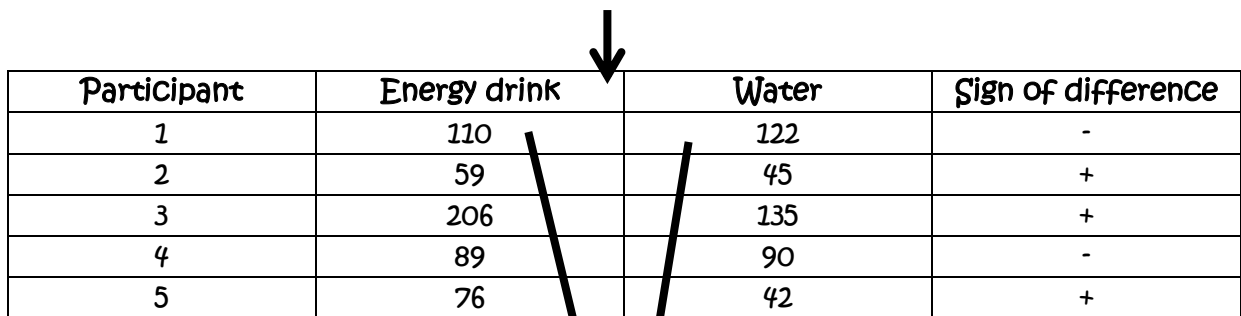
We need to convert data into nominal data, we do this by subtracting one condition away from the other condition

If the number is negative, you put a negative symbol in the sign of difference column

If the number is positive, you put a positive symbol in the sign of difference column

For example...

Imagine there is a '-' here



Participant	Energy drink	Water	Sign of difference
1	110	122	-
2	59	45	+
3	206	135	+
4	89	90	-
5	76	42	+

$$122-110 = -12$$

Step 2

From the completed table, we add up the + and –

Participant	Energy drink	Water	Sign of difference
1	110	122	-
2	59	45	+
3	206	135	+
4	89	90	-
5	76	42	+
6	141	87	+
7	152	131	+
8	98	113	-
9	198	129	+
10	57	62	-
11	267	176	+
12	282	240	+
13	134	157	-
14	167	103	+
15	88	108	-
16	201	121	+
17	267	231	+
18	322	200	+
19	249	207	+
20	90	104	-

So as you can see, there are 13+ and 7-

Note: If there were any participants who got the same score in both conditions, this data would be ignored and we would delete that participant.

Step 3

Take the less frequent sign (in this case, it is the number of minuses) and call this 'S'

Therefore S=7 (this is our calculated value of S)

Step 4

Compare your calculated value with the critical value

Level of significance for a one-tailed test				
	.05	.025	.01	.005
Level of significance for a two-tailed test				
	.10	.05	.02	.01
N				
5	0			
6	0	0		
7	0	0	0	
8	1	0	0	0
9	1	1	0	0
10	1	1	0	0
11	2	1	1	0
12	2	2	1	1
13	3	2	1	1
14	3	2	2	1
15	3	3	2	2
16	4	3	2	2
17	4	4	3	2
18	5	4	3	3
19	5	4	4	3
20	5	5	4	3
25	7	7	6	5
30	10	9	8	7
35	12	11	10	9

- Remember, we want a significance of 0.05, so we use the 0.05 column
- There were 20 participants
- So if we look on the table, our critical value is 5

Note: You will be given this table if required; you wouldn't need to design it.

31

Therefore to be significant the calculated value has to be **less than or equal** to the critical value to be significant

So in this case... the calculated value is 7 and the critical value of 5

7 is not less or equal to 5

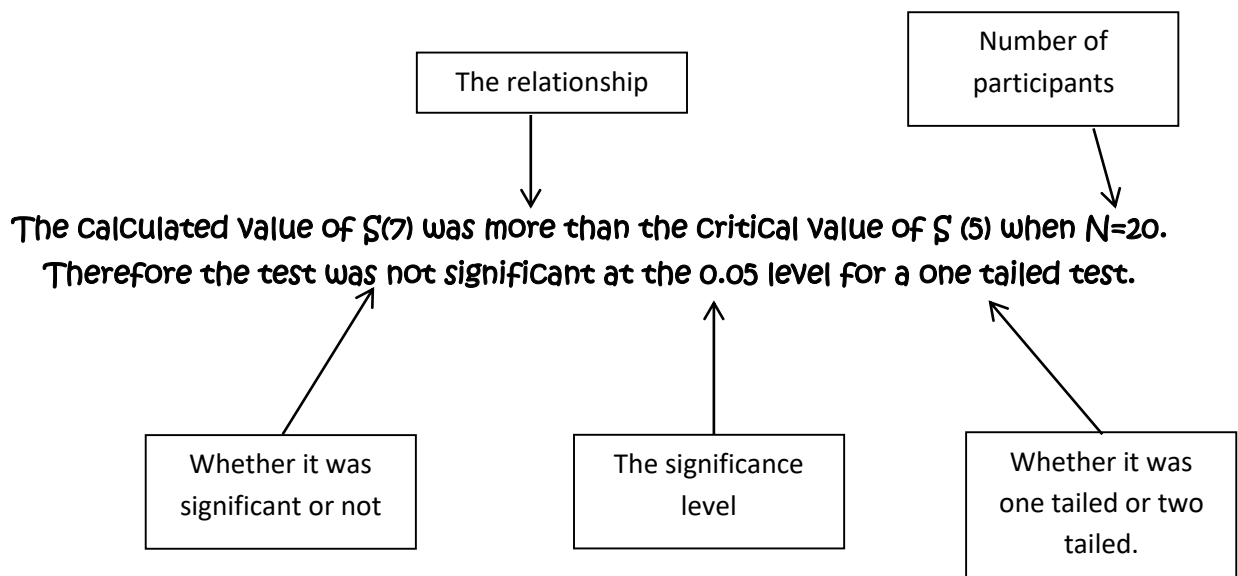
So the test were not significant

Step 5

You need to be able to write this up

- State the relationship between the calculated value and the critical value
- State how many participants there were
- State the significance level
- State whether it was one tailed or two tailed
- Say whether it is significant or not

State this is a paragraph of what we can see...



You need to show the examiner that you know exactly where you got your result from. If in doubt, state everything.



Thinking about Past Questions