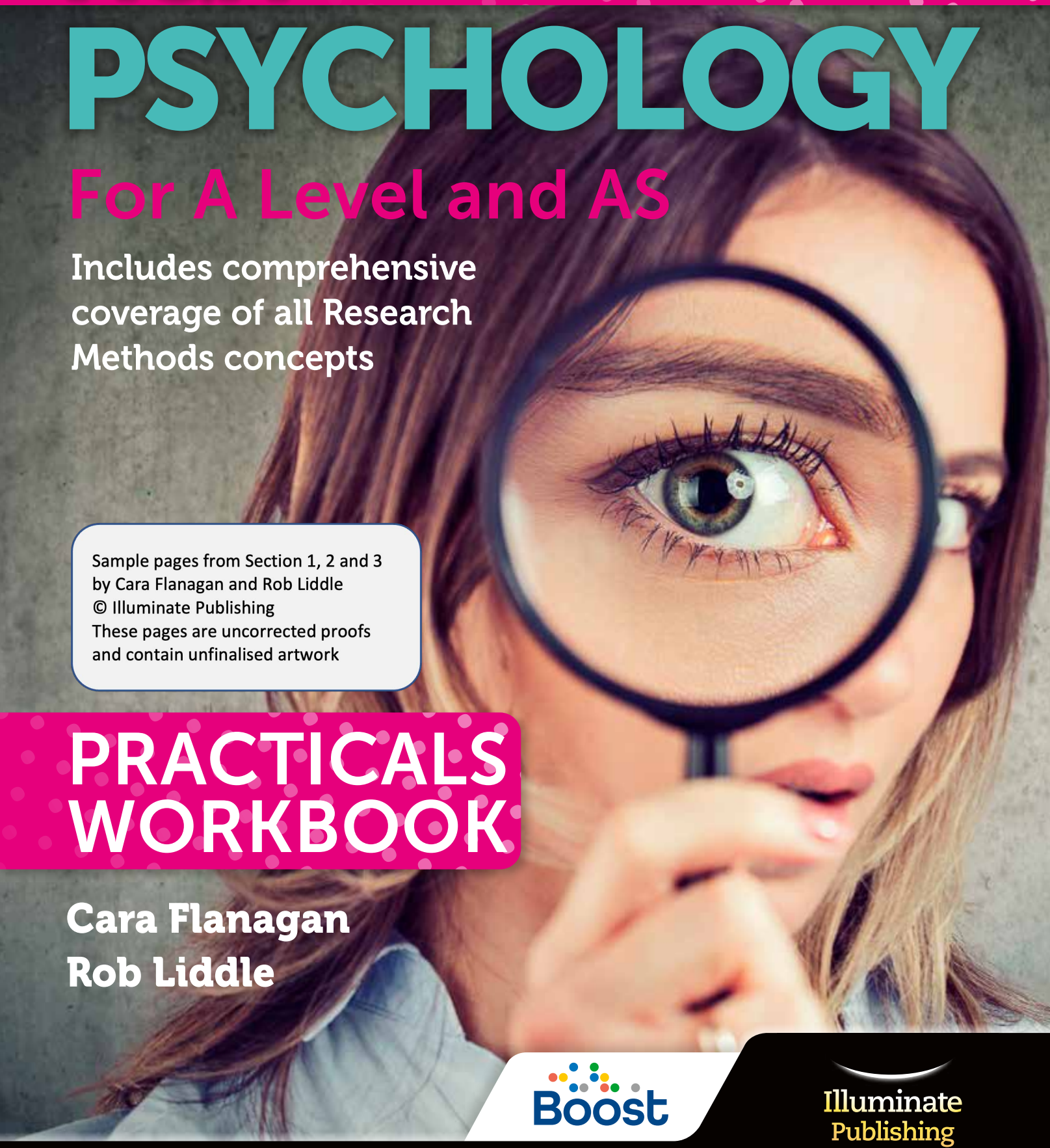
AQA PSYCHOLOGY

For A Level and AS

Includes comprehensive coverage of all Research Methods concepts



Sample pages from Section 1, 2 and 3
by Cara Flanagan and Rob Liddle
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PRACTICALS WORKBOOK

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Boost
Illuminate Publishing

Introduction

How to increase your A-level grade

At least 25% of your exam marks come from research methods (RM). You could pass the exam if you only answered the RM questions (25% is usually enough for a Grade E)!

Any other exam topic (e.g. memory, psychopathology) is worth just 8% of your final mark at A-level or 17% of your final mark at AS level.

This means that 25% of your lessons and homework should be spent on research methods practicals.

- Students often get full marks on RM questions – this is rare in other topic areas, especially essays. Focus on improving RM.
- Students find it difficult to get evaluation marks. So, focus less on evaluation and more on RM.
- Students love making and doing things. Focus on doing RM.

To understand it you have to do it

Most students KNOW research methods concepts.

But they don't fully UNDERSTAND them. To understand them you have to use the concepts.

And that's what this book is all about.

I hear and I forget,
I see and I remember,
I do, and I UNDERSTAND.

Confucius,
Chinese Philosopher,
500 BCE

How this book works

1. This book works on the principle of the spiral curriculum – the best way to understand challenging topics is to keep revisiting them, picking up a deeper understanding each time. Therefore, it is important to complete every spread and every practical.
2. This book also works on the principle of doing ... so... each Knowledge spread is always followed by a Practical spread (except in Section 3).
3. This book also works by giving you frequent exam-style questions to check your understanding. These questions are very important because they give you a clear idea of your main aim – being able to answer exam questions on research methods *effectively*. Suggested answers can be found here: www.illuminatepublishing.com/aqapsychpracticalsanswers. There are also quick multiple-choice questions.

In class/for homework

We have suggested possible practicals 'in class' or 'for homework' but there is no clear distinction.

- The 'in class' ones are practicals that could be done within your classroom or possibly within your school/college.
- The ones for homework are those which might lend themselves more to having a varied selection of participants.

We provide two or more ideas each time to give you more choice.

FEATURES IN THE BOOK

Links to text in this workbook and the Illuminate AQA Psychology Student books for Year 1 or Year 2, referred to as our 'Y1 book' and 'Y2 book'.

Definitions of key terms

Pink arrows contain guidance for planning and reporting practicals.

Notes or reminders

Top marks
Advice on how to maximise your marks in exam answers.

Text in BLUE refers to A-level content only,
whereas text in black covers AS and A-level content.

DRAFT

Contents

Science = knowledge
('scientia' is Latin for 'knowledge').

Research methods are the tools of science.

These methods have been invented as ways to collect objective, reliable and valid data on which to base theories and decisions.

Contact us
If you find some sections of this book hard to understand, we'd like to know so we can improve our text. Please write to us at admin@illuminatepublishing.com

Section 1
STARTING OUT

DRAFT

Research methods 1: The basics

THE KNOWLEDGE

Ethical issues are covered in detail on pages 38–39 in this workbook.

Ethical issues Concerns about what is right or wrong, acceptable or unacceptable. In research these issues arise when there are conflicts between the rights of participants in research studies and the goals of research to produce authentic, valid and worthwhile data (benefits to participants or wider society).

Everyday language

Many research methods terms are words we use in everyday speech, for example:

- What are you *aiming* to do today?
- I think I'll do some *research* on the best beach holiday.
- I would like to *experiment* with those spices.

So be ready to learn the specialist meanings of these everyday terms.

This book is all about your understanding of research methods.

Our aim is to help you understand this research methods content by carrying out your own practicals.

At the beginning we need to mention one key issue: ETHICS

- The people you study must agree to take part before the practical begins.
- In order to obtain their agreement, you must tell them what participation will involve. Only then are they able to provide **informed consent**.
- There is one exception to this. It is regarded as acceptable to **observe people in public**, i.e. in places where they assume that others may be watching/listening to their behaviour.
- There are two final points to make – you are not a qualified psychologist and therefore you must never:
  - Conduct research with children under the age of 16.
  - Do anything that may have a potentially harmful effect on participants, e.g. asking them to drink coffee.

There is a detailed section on ethical issues and how to deal with them on pages 38–39.

Psychologists want to find out what people think and feel and do. They can do this by either:

- *Observing* people doing things.
- *Questioning* people to see what they think/feel/do. This can be done in writing (questionnaire) or conversation (interview). Later on, we will look at the differences between a questionnaire and interview. But, for now, we will just say 'questionnaire' even if it seems more like an interview.

We are going to begin with two very simple practicals:

- Practical 1a on observing (pages 8–9).
- Practical 1b on questioning (pages 10–11).

EXAMPLES

Aim A general statement of what a researcher intends to investigate, the purpose of the study. Sometimes stated as a **research question.**

Participants The individuals who take part in a research study.

Procedures The steps taken when a research study is conducted. The term **standardised procedure** is more specific and refers to an agreed set of procedures that will be identical for all participants.

Research Conducting a systematic investigation, with the intention of eventually drawing a conclusion.

Researcher The person who designs and/or conducts the study.

An example of planning an observation

Identify your aim

The aims for this observation are to identify the non-verbal behaviours (facial expressions, hand/body movements) made when a person is giving a talk.

Sometimes the aim of a study is stated as a research question – the question (or questions) that you wish to answer (e.g. What non-verbal behaviours are shown when a person is giving a talk?).

Identify your procedures

Who? Observe five students.

Where? Ask classmates to deliver a talk in front of the class (alternatively you could watch videos on YouTube of one or more people giving a talk).

What procedures?

- Participants talk for two minutes about a topic (e.g. what they like to watch on TV).
- Researcher identifies different kinds of hand and body movements.
- Video the talk to allow for closer analysis of hand and body movements.
- If you are using YouTube videos, select a two-minute segment from each person's video.

Dealing with ethical issues?

Explain beforehand that participants' behaviour will be noted down for a practical investigation as part of your A-level Psychology course.

(Watching YouTube videos of people giving a talk is ethically acceptable as the individuals know their behaviour is being observed.)

An example of planning a questionnaire

Identify your aim

The aim for this questionnaire will be the same as for the observation.

Procedures

The procedures will be different when using a different method.

Who? Use a questionnaire to ask five students.

Where? Somewhere convenient with no distractions.

What procedures?

- Ask participants to tell you what different gestures/movements they make with their hands and/or body when giving a talk to a group of people.
- Or, ask participants to think of watching someone giving a talk (e.g. school assembly). What different hand and body movements are likely?

Dealing with ethical issues?

Explain beforehand that participants' answers will be used in a practical investigation as part of your A-level Psychology course.

Nigel was known for going the 'extra mile' during his talks but sticking himself to the wall was something of a first...

EXAM-STYLE QUESTIONS

A psychologist is conducting research about how people use their hands when they are talking. He is planning to design his study as an observation.

1. Why would it be better for the psychologist to use observation rather than a questionnaire as a method of data collection? **[3 marks]**

2. Identify a situation where a questionnaire might be a more suitable technique to use than observation. Justify your answer. **[2 marks]**

3. Another psychologist wished to see how politicians communicate by using their body movements (facial expressions, hand movements etc.). The psychologist viewed films of politicians speaking to the public.

   Describe **two** specific facial expressions and/or body movements the psychologist might look for in her observation of non-verbal behaviour. **[4 marks]**

Top marks

The space provided on the exam paper indicates how much you should write. In general there are about 1–2 lines per mark.

Don't just write whatever comes into your head – think about the mark scheme and target the marks specifically.

For example, the mark scheme for question 2 (on the left) might say:

- 1 mark for identifying an appropriate situation where a questionnaire would be more appropriate.
- 1 mark for justifying *why* it would be better.

The two command terms in the question tell you that you must 'identify' and 'explain'. Don't lose that second mark!

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Practical 1a: Trying out an observation

PLAN

How long will each practical take?

All the practicals in this workbook take as long as you wish to spend! The main thing is just to give it a try. You need time to plan, time to collect data and time to summarise your data in some way. The minimum might be three hours a week on practicals.

Remember that research methods content is 25% of your final A-level mark so you should spend 25% of your lesson time and homework time each week on practicals.

Why spend time on practicals? Because doing them (designing, conducting and analysing them) will give a big boost to your understanding of the research methods concepts you need to know.

You might work with a small group on the initial design of this study but then collect your own data. Afterwards, discuss the pitfalls with your group.

DECIDE ...

State the **AIM** of your study.

WHAT behaviours are you going to observe? List a number of likely behaviours (at least four).

HOW will you record your observations? List each behaviour and count each time it occurs.

WHO will you observe?

Write your **STANDARDISED PROCEDURES**.

What **ETHICAL ISSUES** do you need to consider? How will you **DEAL WITH** them? Read about ethical issues on pages 38–39. Make sure you obtain **INFORMED CONSENT** from your participants.

Make sure you have approval from your teacher before you conduct your study.

DO the observation.

Where possible **DEBRIEF** participants afterwards, telling them the actual aim of the study and how you will use their data.

Debrief A post-research interview designed to inform the participants of the true nature of the research and to restore them to the state they were in at the start of the study.

SUGGESTED IDEAS for an OBSERVATION

Aim: To look at non-verbal behaviours (behaviour that doesn't involve words, e.g. hand gestures, body posture, facial expression).

In class

- Observe the non-verbal behaviours of one person talking to a friend or playing a game (you can find some games at tinyurl.com/39mx2hxr).

For homework

- Watch a video of people, e.g. an episode of *Gogglebox* or *Friends* or *Bake Off*. Record the non-verbal behaviours of one person.
- Record the behaviour of a pet or a wild bird.

There are a number of decisions to be made. These are listed in the pink arrow below left. Describe each decision in the write-in space below. We have only provided one prompt so that you can divide the space according to how much you have to say!

Try to be as detailed as possible.

The aim of my research is... _____

DRAFT

RESULTS

PRESENT ...

How will you present your **RESULTS**? Identify at least two key results.

Try to draw a **CONCLUSION**. Useful phrases are: *'In general ...', 'Overall ...', 'The results suggest that...'.*

Conclusion The implications drawn from the results (findings) of a study, what the results tell us about people in general rather than about the particular participants in a study.

Observational research can involve just listening instead of watching. In fact, it could involve any of the five senses!

REFLECT

1. Identify and explain **two** aspects of your observation that you found difficult to do or that didn't work. **[2 marks + 2 marks]**

Top marks

These REFLECT questions are an opportunity to think about aspects of your study. These are not exam-style questions but we have included marks to guide you in deciding how much to write – not too much and not too little.

2. Suggest a way to improve **one** of the problems identified above. **[2 marks]**

Practical 1b: Trying out a questionnaire

PLAN

KISS

Keep it super simple.

You may be tempted to design something fancy but the fancier it is, the more likely it is to go wrong. So, rein in your desire to include lots of ideas.

DECIDE ...

State the **AIM** of your study.

WHAT questions will you ask? Have at least four questions and try different question types: (1) questions with YES/NO/DON'T KNOW answers, (2) questions with a choice of possible answers, (3) open-ended questions (i.e. everyone could give a different answer– there are no obvious answers).

What **ETHICAL ISSUES** do you need to consider? How will you **DEAL WITH** them? Do tell all participants you are doing the study as part of your A-level Psychology course, and also tell participants what participation will involve so they can make a decision about whether to take part.

Identify the **STANDARDISED PROCEDURES** and write the **STANDARDISED INSTRUCTIONS** (see below). Make sure you obtain **INFORMED CONSENT** from your participants.

Make sure you have approval from your teacher before you conduct your study.

GIVE the QUESTIONNAIRE to participants.

DEBRIEF participants afterwards, telling them the actual aim of the study and how you will use their data.

SUGGESTED IDEAS for a QUESTIONNAIRE

Aim: To ask people what they think about a topic.

In class

- Write a questionnaire to find out what people think about a particular topic such as social media, psychology, belief in the paranormal or beliefs about how criminals should be punished.

For homework

- Give your questionnaire out to five people.

Standardised instructions

The word 'standardised' means you need to ensure you always give the same instructions to each participant. Otherwise differences in behaviour could be due to having been given different instructions.

Writing instructions is not as easy as you think…

TRY THIS

Working with a partner, write down the instructions for an easy task, such as making a jam sandwich. Your partner should try to follow your instructions exactly.

DRAFT

RESULTS

PRESENT ...

How will you present your **RESULTS**? Present at least one result for each question.

Try to draw a **CONCLUSION**. Start with '*These results suggest that...*'.

Presenting results

There are a number of ways to present results – but the key is to find a way to summarise the data. For example, identify what was the most common behaviour/answer.

'Descriptive statistics' is the term used to refer to different ways to summarise data (these statistics are explained on pages 148–151).

You may feel that these early practicals are rather simple – but that's the plan. Start simple and gradually add more research methods concepts.

We will look at questionnaire design again in Practical 3.

REFLECT

1. Identify **one** question in your questionnaire that you found didn't work and explain why you think it didn't work. **[1 mark + 2 marks]**

2. Consider the overall aims of your questionnaire. Describe **at least one** new question that might also have been useful to include. **[2 marks]**

Top marks

On A-level papers you may be asked to design a study. Such exam questions can be worth as much as 12 marks!

To help you with these questions, it is really important to practise the skills of research design and reflect on what you did.

Research methods 2: Observational design

THE KNOWLEDGE

Observational techniques are discussed on pages 182–183 in our Y1 book.

In this workbook, you can also read about types of observation (pages 104–105) and inter-observer reliability (pages 122 and 126).

Pilot studies are covered on page 180 in our Y1 book and page 62 in this workbook.

Behavioural categories (on a **behaviour checklist**) A target behaviour is broken up into components that are observable, measurable and self-evident (this is called **operationalisation**).

Continuous sampling Every behaviour is recorded.

Event sampling A target behaviour or event is first established then the researcher records this event every time it occurs.

Observational sampling Refers to the method used to select which observations to record. This is different from the sampling techniques discussed on pages 30 and 96.

Observational techniques A set of systems to increase the objectivity and validity of data collected when a researcher watches or listens to participants engaging in the behaviour being studied. Observational techniques may be used in an experiment as a method of assessing the dependent or independent variables in an experiment.

Observer bias The observer's expectations affect what they see or hear.

Operationalisation Clearly defining categories in terms of how they can be measured.

Structured observational techniques The researcher uses various 'systems' to organise observations, such as behavioural categories and sampling techniques.

Time sampling A target individual or group is first established then the researcher records the behaviour of the participant(s) in a fixed time frame, e.g. every 60 seconds.

Unstructured observational techniques Every instance of behaviour is recorded in as much detail as possible.

When working on practical 1a you probably realised that observing behaviour is not that straightforward. Researchers have devised observational *techniques* to improve the way observations are conducted.

1. Unstructured or structured

Unstructured observational techniques

+ Useful as a starting point, when a behaviour has not been studied before.
+ Produces lots of detailed information (often qualitative data).
– Researchers might only record behaviours that 'catch their eye' or those that they are expecting (observer bias).
– Observations tend to be qualitative (not counting instances) and more difficult to analyse.

Structured observational techniques

+ Avoids observer bias.
+ Makes data easier to collect and analyse (because it's quantitative).
– Behaviours may be missed if they aren't on the predetermined checklist.
– The process of structuring observations is time-consuming.

2. Behavioural categories

Categories must be clearly defined (operationalised) so all observers will recognise the behaviour to be included in any category.

+ Makes data collection more structured and objective.
+ Ensures that all target behaviours can be recorded.
– Categories may overlap, thus different observers may not agree.
– 'Dustbin' categories may have been created which combine a number of different behaviours (reduces internal validity, see page 128).

3. Observational sampling: Event or time

Methods that enable objective selection of observations from the many things that are going on.

Event sampling

+ Useful when behaviours are infrequent because these would be missed with time sampling.
– Complex behaviour is oversimplified because not all events are included.

Time sampling

+ Reduces the number of observations to be made, therefore works better with complex situations.
– May be unrepresentative because important behaviours outside the timeframe are missed.

Note that there is a difference between structured/unstructured observational *techniques* and structured/unstructured observational *types* (covered on page 104).

PILOT STUDY

A pilot study is a small-scale version of an investigation that takes place before the 'real' investigation is conducted.

The aims of piloting are to check that procedures, materials, measuring scales, etc., work.

The aims of piloting are also to allow the researcher to make changes or modifications if necessary.

You can use a pilot study in your observational study (next spread) to design the behavioural categories.

Jessica definitely took the pilot study a step too far.

EXAMPLES

Here are some studies in our Y1 book that used observation as a method of collecting data:

Conformity to social roles

Philip Zimbardo *et al.* (page 20 in our Y1 book) observed the reaction of participants to the social roles they were given. Observation was unstructured and the data was focused on the most eye-catching behaviours. This data was supplemented by photographs to illustrate the observations.

Case study of amnesia

Clive Wearing (page 51 in our Y1 book) experienced amnesia. Observations of the effects of his amnesia in his everyday life were recorded.

The Strange Situation

Mary Ainsworth and Silvia Bell (page 86 in our Y1 book) measured babies' attachment using five behavioural categories such as proximity-seeking and stranger anxiety. Observations were made every 15 seconds (time sampling).

Social learning theory

Albert Bandura *et al.* (page 110 of our Y1 book) investigated whether children who watched an adult behave aggressively towards a Bobo doll were later more aggressive than children who did not watch aggressive behaviour with the doll. Aggression was measured by watching each child through a one-way mirror while they played. There were three behavioural categories: imitative, partially imitative and non-imitative aggression.

It's not always easy to record observations when there is a lot going on.

EXAM-STYLE QUESTIONS

A researcher was interested in the different ways that people express themselves. As a starting point she planned to conduct a pilot study to work out the best way to observe and record facial expressions.

1. Give **two** behavioural categories the researcher could use to record her observations of facial expressions. Explain why each of your chosen categories are appropriate. **[2 marks + 2 marks]**

2. Explain how the researcher could use event sampling to record her observations. **[2 marks]**

3. Explain **one** strength of using event sampling in this observation. **[2 marks]**

4. Explain how a pilot study would be used in this study. **[2 marks]**

Top marks

Most research methods questions are AO2 (application).

Note that all four of the questions here require you to *apply* your knowledge of observational techniques to the stem of the question. You may get zero marks if you fail to apply.

Top marks

2 marks means you should do **two** things, e.g. state a strength and give a reason why it would be useful.

DRAFT

Practical 2: Using observational techniques

PLAN

This is your second observational study.

This time you need to try out the new techniques outlined on the previous spread.

If you are short of time, you could use ready-made behavioural categories. Search online for 'behaviour checklists' or 'psychology coding systems'.

SUGGESTED IDEAS for an extended OBSERVATION

Aim: To compare the behaviour of one or more individuals.

In class

- Design and pilot an observational study of student behaviour in communal areas around your school/college (outside or in the corridor between lessons). You could work in a group and each observe a different student and pool your data. Remember that only students over 16 should be observed.

For homework

- Adapt your observational design to observe people at a shopping centre.

In our Y1 book there is a suggested observation of synchronous interactions in adult conversation (page 96) and one on the media coverage of mental health (page 159).

DECIDE ...

State the **AIM** of your study.

INITIAL PLAN Who or what are you going to observe? Where will you do this?

DO a PRELIMINARY INVESTIGATION. Conduct an unstructured observation. Spend some time (10–20 minutes) observing your target (or a similar target) and note down the different types of behaviour.

Now you are ready to design your structured observation. **WHAT** behavioural categories will you use, based on your pilot study? Aim for at least four categories. Write an **OPERATIONAL DEFINITION** for each behavioural category.

WHERE will you sit/stand during the observation?

WHO will you observe? Describe your participant (one participant is sufficient but you can repeat the study with other participants if you wish).

Note that a preliminary investigation (above) is different from a pilot study (on the facing page). In the preliminary investigation you are doing a research study to identify categories. In the pilot study you are doing a dry run of your investigation to see if there are any design issues that need to be fixed.

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DECIDE ...

HOW will you record your observations? Decide on whether to use time or event sampling. Create an **OBSERVATION GRID** to count the observations in each of your categories.

What **ETHICAL ISSUES** do you need to consider? You will not be able to ask for informed consent before your observation because then the participant(s) will be aware of being watched which might alter their behaviour. You must contact participants afterwards and ask permission to use the data from the observation. If they object, then you must destroy the data and just complete the observation with made up data.

Make sure you have approval from your teacher before you conduct your study.

Write **STANDARDISED INSTRUCTIONS** – even if you are not working as a group, these are useful to have.

DO a PILOT STUDY. Test your behavioural categories. Do some categories overlap? Were there behaviours that didn't fit in any category?

FINALISE the design.

CONDUCT the OBSERVATION.

REFLECT

1. Identify **two** things that you changed after doing the pilot study and explain why you changed them. **[2 marks + 2 marks]**

2. After conducting the study, do you think there were ethical issues you had overlooked? Identify **at least one**. **[2 marks]**

Practical 2: Using observational techniques (continued)

RESULTS

Make the results more interesting by combining your data with other students who used the same design.

If you decide to use a bar chart to present your results you can glue a piece of graph paper on this page.

PRESENT ...

How will you present your **RESULTS**?

You might describe in words some of your most important observations. You might also comment on the differences between participants.

You could use a **BAR CHART** to display the frequency of each behavioural category for one or more participant(s). Make sure you add an informative title to the bar chart and label both axes.

Coursework sections

In the 1980s, A-level Psychology students had to conduct and write up 12 pieces of coursework. This was 20% of their final exam mark.

The mark scheme for this coursework listed the following sections:

- Abstract
- Introduction (psychological literature, aims/hypothesis)
- Reporting of method (sufficient for replication)
- Implementation (design, data collection, design decisions)
- Results (appropriate techniques, fully justified)
- Discussion (explanation of results, background research, limitations and modifications, implications and suggestions)
- References
- Report style

A-level students may be examined on the way a scientific report is organised. The sections are similar to the list above, see pages 62–63.

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DISCUSSION

Look at what other classmates found in their study, and use this to help you consider the limitations of your own study.

But don't feel you did it 'wrong'. You are learning.

CONCLUDE and EVALUATE ...

What **CONCLUSIONS** can you draw? Start with *'This observation suggests that ...'*.

What went wrong? Identify one **LIMITATION** of your observation.

Consider a possible **MODIFICATION** you could make to your design. For example:

- How would you change the behavioural categories?
- Would you add some more categories? Give some examples.
- Would you have two observers? Why might this be better?

REFLECT

1. How could you investigate the same aims as this study using a questionnaire instead of an observation? **[2 marks]**

2. Explain **one** strength of using a questionnaire to investigate your original aims compared to an observation. **[2 marks]**

3. Explain **one** strength of using observational techniques to investigate your original aims compared to using a questionnaire. **[2 marks]**

Section 2
REFINING YOUR UNDERSTANDING

DRAFT

Research methods 11: Experimental design

THE KNOWLEDGE

Experimental design is covered on pages 172–173 in our Y1 book.

The experimental method was covered on pages 24–25 in this workbook, and there is more later, on experimental controls (pages 78–79) and types of experiment (pages 90–91).

Experimental design The different ways in which participants can be organised in relation to the experimental conditions.

Independent groups Participants are allocated to different groups, where each group represents one condition of the IV.

Matched pairs Participant pairs are matched on one or more variable(s) that may affect the DV. One member of the pair is assigned to condition A and the other to condition B.

Order effect A confounding variable arising from the order in which conditions of the IV are presented, e.g. a practice or boredom effect.

Participant variables Characteristics of individual participants (such as age, intelligence, etc.) that might influence the outcome of a study.

Practice effect A kind of order effect. In a repeated measures design, participants may do better on one condition rather than another because they have completed it second and therefore may have improved their ability to perform the task.

Repeated measures All participants take part in all conditions.

What is a 'condition'?

The term 'conditions' refers to the different levels of the IV.

- Repeated measures design – each participant experiences all levels of the IV (i.e. all of the experimental conditions).
- Independent groups design – each participant experiences only one condition of the IV (i.e. experiences only one experimental condition).

Special cases

***Cross-sectional study**: One section/group of participants represent one group in society (e.g. young people or NHS workers) and are compared with participants from another group (e.g. older people or bankers). This is an independent groups design.*

***Longitudinal study**: One group of people is studied over a long period of time and tested on two or more occasions as the participants get older or as time passes. This is a repeated measures design where the IV is, for example, participants' age and the DV might be IQ score or attitudes. Note that some longitudinal designs are not experimental.*

Experimental *method* refers to any study with independent and dependent variables (IV and DV).

Experimental *design* refers to the way participants are allocated to conditions (levels) of the IV.

Independent groups design

Participants do condition A. <u>Different</u> participants do condition B.

+ No order effects because participants are only tested once so, for example, there can't be a practice effect or chance to become bored (boredom effect).
+ Participants are less likely to guess the aims of the study if doing the task only once, compared with repeated measures.
− Participants in one group may be quite different from those in the other group, therefore this (and not the IV) explains differences in the DV.
− Less economical because twice as many participants are needed than for repeated measures to get the same amount of scores/data.

Repeated measures design

Participants do condition A. <u>Same</u> participants do condition B.

+ Participant variables are controlled because the same participants are compared.
+ Fewer participants are needed than for independent groups or matched pairs in order to get the same amount of scores/data.
− Order effects are a problem because participants do the two experimental conditions and may do better the second time due to a practice effect. On the other hand, they may do less well the second time due to boredom, fatigue etc.
− Participants are more likely to guess the aims of the experiment.

Matched pairs design

Participants do condition A. <u>Different</u> participants do condition B.

<u>BUT</u> each participant in condition A is matched with a participant in condition B on one or more key characteristics.

+ Participant variables are controlled because participants are matched on variable(s) that are relevant to the experiment.
+ No order effects because each participant only experiences one condition of the IV.
− Matching is time-consuming and not perfect (can't control all possible relevant participant variables).
− Less economical because twice as many participants are needed as for repeated measures to get the same amount of scores/data.

Here is a list of different experimental designs mentioned in our Y1 book:

Independent groups: Minority influence

Serge Moscovici *et al.* (page 32 in our Y1 book) conducted an experiment where participants in small groups (which each included two confederates) were asked to name a slide colour as blue or green. In some groups the two confederates always gave the same wrong answer of green (consistent minority). In other groups they gave different answers (inconsistent minority), sometimes incorrectly saying 'green', sometimes correctly saying 'blue'. The DV was the participants' answers, either blue or green.

- Condition A: Consistent minority (confederates always said 'green').
- Condition B: Inconsistent minority (confederates sometimes said 'green' and sometimes said 'blue').

Repeated measures: Social support

Susan Albrecht *et al.* (page 31 in our Y1 book) looked at a programme to help pregnant adolescents resist peer pressure to smoke. Social support (IV) was provided by an older mentor. Smoking (DV) was assessed before and after the eight-week programme (longitudinal design).

- Condition A: No mentor (tested before start of programme).
- Condition B: After being mentored (tested at end of programme).

Matched pairs: Social learning theory

Albert Bandura *et al.*'s study of social learning (page 110 in our Y1 book and page 13 in this book) had three conditions/groups of child participants:

- Condition A: 'Model' behaved aggressively towards a Bobo doll.
- Condition B: 'Model' behaved non-aggressively towards a Bobo doll.
- Condition C: Control group, no 'model' present.

The participants were all rated for aggressiveness by a teacher who knew them well. On the basis of these ratings, the participants were matched by arranging them in threes (children with similar aggressiveness rating) and then the children were assigned at random to one of the three groups.

EXAMPLES

Control condition

In some experiments the second condition is a 'control'. Participants in the control condition don't get any 'treatment' – they are just a standard against which we measure the effects of the experimental treatment.

In a repeated measures design we use the term 'control condition'. In an independent groups design we use the term 'control group' or 'control condition'.

For example:

- In John McGeoch and William McDonald's study of retroactive interference (page 54 of our Y1 book), there was a control group – in this group participants were given no new list whereas other participants had one new list to learn which interfered with the original learning.
- In John Bowlby's 44 thieves study (page 90 of our Y1 book), there was a group of 'thieves' and a control group of non-criminal but emotionally-disturbed young people.

EXAM-STYLE QUESTIONS

A forensic psychologist conducted an experiment to compare the cognitive interview (CI) with the standard police interview (SPI). All participants watched a five-minute video of an armed robbery. Half of the participants then took part in the CI and the other half took part in the SPI. The participants tried to correctly recall the answers to 15 questions about the robbery.

1. Identify the experimental design and explain **one** strength of using this design in this study. **[1 mark + 2 marks]**

A colleague wondered why the psychologist had not used a matched pairs design instead.

2. What is a matched pairs design? **[1 mark]**

3. Explain **one** way in which the study might have been improved if the psychologist had used a matched pairs design. **[2 marks]**

Top marks

Students often get confused between experimental design and the experimental method. If you are asked to identify the design, the answer must be either independent groups, repeated measures or matched pairs. Find some way to remember that ... Design = IRM or RIM or MRI...).

Top marks

Doing practicals means less revision of research methods topics – you start to just know the answers.

DRAFT

Practical 11: Using a repeated measures design

PLAN

Order effects

Order effects are a problem in repeated measures.

One way to deal with such effects is for half of the participants to do task A first (swearing) and half to do task B first (no swearing). This is a form of *counterbalancing* (see page 78).

Alternatively, a second way to deal with order effects is to *randomly allocate* A and B conditions on the questionnaire – for example, put all the shallow questions (condition A) and all the deep questions (condition B) in a 'hat' and select the questions randomly to determine their order on the questionnaire. This counterbalances the conditions across the questionnaire.

SUGGESTED IDEAS for an EXPERIMENT

Aim: To try using a repeated measures design.

In class

- Does swearing have any benefit? Richard Stephens *et al.* (2009) tested this by asking participants to immerse their arm in icy water (very painful*) to see if swearing or not (the independent variable) made a difference. The effect was measured using heart rate (the dependent variable). (*If you feel that immersion in ice cold water is unethical then ask participants to complete an unsolvable puzzle instead.)

For homework

- What makes memories more lasting? Look at shallow and deep processing as investigated by Fergus Craik and Endel Tulving (1975). Their study is described at the bottom left of this page.

DECIDE ...

State the **AIM** of your study. Write a **RESEARCH QUESTION**.

OPERATIONALISE the IV. Identify the two conditions.

OPERATIONALISE the DV. How will you measure the DV?

State your **HYPOTHESIS**.

What **ETHICAL ISSUES** do you need to consider? How will you **DEAL WITH** them? (If you do the ice cold water task, make sure participants know they can stop at any time.)

Create the **MATERIALS** (if required) and write the **STANDARDISED PROCEDURES**.

Write **STANDARDISED INSTRUCTIONS** for all participants, including a consent form.

Shallow and deep processing

One criticism of the multi-store model of memory is that lasting memories are due to elaboration and not to rehearsal (see page 49 in our Y1 book). Elaboration is deep processing whereas rehearsal is shallow.

Craik and Tulving gave participants a list of 60 words each followed by a question which involved rehearsal/shallow processing (e.g. Does the word rhyme with DOG? YES or NO) or elaboration/deep processing (Does the word fit in this sentence: 'I am going to the PARK'? YES or NO).

Afterwards the participants were asked to list any of the 60 words. They remembered more of those words that were deeply processed.

The Ig® Noble awards

You've heard of the Nobel prizes but may not have heard of the Ig® Nobles, awarded every year for ten unusual or trivial scientific studies, including psychological research. The 'swearing study' on the facing page won an award in 2010, not for Psychology but for Peace (see tinyurl.com/bdfscd48)!

DO a PILOT STUDY. Test your procedure with one or two people. The people you use should be similar to your intended participants.

DECIDE ...

Do you need to change any of your **DESIGN** decisions?

WHO will take part? What sampling technique will you use?

WHERE will you conduct the study?

Make sure you have approval from your teacher before you conduct the study.

DO the EXPERIMENT.

DEBRIEF participants afterwards.

REFLECT

1. How could you conduct a similar study but this time using an independent groups design? Your answer should include information on what the two groups of participants would do in such a study. **[3 marks]**

2. Would an independent groups design be better than repeated measures for the aims of your study? Explain your answer. **[2 marks]**

DRAFT

Practical 11 Using a repeated measures design (continued)

RESULTS

PRESENT ...

How will you present your **RESULTS**?

Give a **SUMMARY** of the key results in words. Or organise the results in a table.

Select one or two appropriate **DESCRIPTIVE STATISTICS**. These are outlined on pages 148–151.

For example, you could calculate mean scores (or another measure of central tendency) for each condition of the IV and display this in a bar chart. Remember to avoid producing participant bar charts – see page 34).

You could also calculate dispersion using the range or standard deviation (use an online calculator, e.g. tinyurl.com/yc2baes5).

EXPLAIN what the descriptive statistics tell us (for guidance on what, for example, standard deviation tells us, read page 148).

OPTIONAL ...

If you want to know if your result is meaningful (significant), use a **STATISTICAL TEST**. You could use the sign test (see page 152) or the Wilcoxon test or the related *t*-test (see page 158 to decide which of these tests you should use and see page 163 for websites which will calculate the test statistic for you).

For the exam, you are only required to be able to calculate one statistical test – the sign test (even at A-level). For all other statistical tests, you just need to be able to select the right test and report whether your results were significant or not.

Therefore, it is a good idea to start using the sign test and also to start looking at the criteria for different tests (see page 158).

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DISCUSSION

CONCLUDE and EVALUATE ...

State a final **CONCLUSION** for your study. A conclusion should be related to the original aims of the study. You might begin with '*These results show/suggest that ...*'.

Discuss one or two **LIMITATIONS** of your procedures, e.g. was your memory test too short? Did participants follow the instructions?

For each limitation, consider possible **MODIFICATIONS** you could make.

How might you apply your results to a **REAL-WORLD** context?

REFLECT

1. Consider alternative explanations for your results. For example, if you did the swearing experiment, could the observed effects be due to the stress of swearing in public?! If you did the shallow/deep processing experiment, could the observed effects be due to the order of the questions? **[3 marks]**

2. Outline **one** strength of doing this study as a repeated measures design. **[2 marks]**

Section 3 MATHEMATICAL REQUIREMENTS AND STATISTICS

Don't panic

Maths requirements overlap with the research methods content, so we have covered a lot already.

This section looks at what remains for you to cover.

There are lots and lots of websites where you can check your knowledge, e.g. BBC Bitesize.

DRAFT

Maths 1: Parts of a whole

THE KNOWLEDGE

Decimal form The digits to the left of the dot (decimal point) represent whole items. The first digit to the left is units, then 10s, 100s etc. The digits to the right represent fractional parts. The first digit to the right is $^1/_{10}$, then $^1/_{100}$, $^1/_{1000}$ etc.

Fraction A number that results from dividing one whole number by another whole number. That same number can also be represented as a decimal, a percentage, or a number with a negative exponent.

Percentage 'Per cent' (%) means 'out of one hundred'. Therefore, all percentages are actually fractions where the denominator is 100.

Ratio The relationship between two (or more) amounts, expressing how much bigger one part is compared to the other(s) (part-to-part ratio) or showing the relationship between a particular group and the whole population (part-to-whole ratio).

Odds of 10:1 means that, if the race was run 11 times, we would expect this horse to win 10 times and lose once.

EXAMPLES

Rule for rounding up or down

Consider the digits to be removed. If these digits are equal to or greater than 5, then round up. Otherwise round down.

You know it all!

Everything in Section 3 in this workbook comes from Ofqual (The Office of Qualifications and Examinations Regulation for England). They listed the mathematical skills required (with examples from psychology), and this is shown on pages 33–37 in the AS and A-level Psychology specification.

The good news is that you should be familiar with all of the content on the next four spreads as it is all included in the higher tier GCSE Mathematics.

Parts of a whole

All four of the following are ways to express the parts of a whole.

Fraction

If you divide a whole cake into six slices, each slice is $^1/_6$ of the cake.

A fraction consists of two numbers: the top (numerator) and bottom (denominator).

Decimal form

Numbers to the right of a decimal point are fractions.

E.g. 0.4 means $^4/_{10}$, 0.04 means $^4/_{100}$, 0.45 means $^{45}/_{100}$

Decimal places = number of digits to the right of the decimal point.

Ratio

A ratio is given in the form a:b.

Part-to-whole ratio gives the part (a) in relation to the whole (b).

E.g. ratio of 3:5 means 3 parts out of a whole that has 5 parts.

Part-to-part ratio gives the part (a) in relation to the other part (b).

E.g. a ratio of 3:2 means one share of 3 parts and another share of 2 parts out of a total of 5 parts.

Percentage (%)

A fraction of 100.

E.g. 43% means $^{43}/_{100}$

Fraction

Work out a fraction: If there are 30 participants in a study and 12 are men, what fraction of the total participants are men? Answer = $^{12}/_{30}$

Simplify a fraction: The answer above can be simplified, making it easier to understand. To simplify a fraction, identify the largest common factor that will divide exactly into both the numerator and the denominator.

In our example the greatest common factor is 6. We can reduce $^{12}/_{30}$ to $^2/_5$ (by dividing both numerator and denominator by 6). The simplified fraction is easier to understand ($^2/_5$ is clearer than $^{12}/_{30}$).

Calculate the number in each group: Stratified sampling (see page 96) requires a fraction calculation.

For example, if $^2/_5$ of a target population are men and the total sample is going to be 40 people, then how many men do we need? We divide the total sample size (40) by the denominator (5) and multiply by the numerator (2) = 16 men.

More complex calculations:

- If the sample is going to be 72 people, then we need 72 divided by 5 multiplied by 2 = 28.8 men.
- If the sample is going to be 68 people, then we need 68 divided by 5 multiplied by 2 = 27.2 men.

In the first example we round up to 29 men, in the second example we round down to 27 men.

Decimal form

Work out a decimal fraction: If there are 30 participants in a study and 12 are men, the decimal fraction of the total participants who are men = 12 divided by 30 = 0.4

Calculate the number in each group: If there are going to be 75 participants in a sample, and 0.4 should be men, we multiply the decimal fraction (0.4) by the sample size (75) = 30 men.

Give your answer to required number of decimal places: When reporting a calculation the answer may result in a long string of digits, e.g. 0.2857038

- 2 decimal places = 0.29 (next digit was 5 so we round up).
- 4 decimal places = 0.2857 (next digit was 0 so we don't round up).
- 5 decimal places = 0.28570 (next digit was 3 so we don't round up but we keep the zero to show we have 5 decimal places).

Ratio

Work out a part-to-whole relationship: If there are 30 participants in a study and 13 are men, the ratio of men to the whole group is 13:30.

Work out a part-to-part relationship: If there are 30 participants in a study and 13 are men and 17 are women, the ratio of men to women is 13:17 (adds up to 30).

Using three categories (12 men, 14 women, 4 non-binary), the ratio is 12:14:4

Using ratios in calculations: For a stratified sample, we could use the ratio:

If the sample size is going to be 50 and the ratio is 12:14:4 then:

- Men: 12 ÷ 30 × 50 = 20 men.
- Women: 14 ÷ 30 × 50 = 23.333, round down to 23 women.
- Non-binary: 4 ÷ 30 × 50 = 6.6667, round up to 7 non-binary.

Percentage (%)

Work out a percentage: If there are 30 participants in a study and 13 are men, the % of men in the study is 13 ÷ 30 × 100 = 43.3% (to 1 decimal place).

Using a percentage to calculate an answer: If 48% of a sample should be men and the sample size is 70, the number of men is 48 ÷ 100 × 70 = 33.6 (round up to 34 men because we can't have 33.6 men).

Don't lose unnecessary marks

You can take a calculator into the exam.

But remember to always show your calculations – they may earn you marks.

The golden ratio is a special number that often appears in maths, art and nature. It is shown in the spiral below. The ratio between each adjoining segment is 1:1.618.

EXAM-STYLE QUESTIONS

A clinical psychologist investigated the incidence of spider phobias in older and younger people. There were 60 participants. Of these, 40% were under the age of 26. The psychologist selected half of the sample (30 participants) to undergo a new therapy for spider phobia. Each participant completed a questionnaire rating their fear of spiders, before and after therapy. The mean score before therapy was 18. The mean score after therapy was 14.5.

1. How many participants were older than 26 years of age? Show your workings. **[2 marks]**

2. Calculate the percentage decrease in mean fear scores after therapy. Show your workings. Give your answer to 2 decimal places. **[4 marks]**

Top marks

There are 4 marks for question 2 so it makes sense to identify four steps in your workings, including the answer. Students often miss the last bit of the question, losing an easy mark.

The remaining 30 participants did not receive the therapy, but were given written advice instead. The results for the therapy and written groups are shown in Table 1.

3. Calculate the ratio of participants who had therapy and improved to those who were given written advice and improved. Show your workings. **[2 marks]**

Table 1 Number of people whose symptoms improved or did not improve in each group

	Improved	Did not improve
Therapy group	24	6
Written group	10	20

4. Calculate the percentage of participants in the written group who did not improve. Show your workings. **[2 marks]**

DRAFT

Maths 2: Ways to present long numbers

THE KNOWLEDGE

The content of this spread is covered on pages 198–199 in our Y1 book.

Decimal places Number of digits to the right of the decimal point, including any zeros.

Estimate results Performing a rough calculation to produce a ballpark figure to represent the answer.

Order of magnitude calculations Comparing numbers in terms of magnitude (size) by using the exponent created in standard form.

Significant figures The number of digits in a number that are important and necessary to represent the quantity of something.

Standard form A way of expressing numbers that are too large or too small to be conveniently written in decimal form.

Significant figures.

All four of the methods below help to present numbers in ways that improve clarity.

Estimate results

It is often helpful to have a rough idea of the answer to an arithmetic calculation, to check against the final calculation. There are no fixed rules for doing this.

You might round all figures to multiples of 10 for a rough estimate of a sum, e.g. 23 + 56 + 29 + 12 + 33 + 124 becomes 20 + 60 + 30 + 10 + 30 + 120 = 270 (precise answer is 277).

Standard form

Very large and very small numbers are difficult to comprehend when written out in full, e.g. 57,300,000,000,000 or 0.0000000000573

It is clearer if they are expressed in terms of their magnitude, i.e. identifying the exponent (powers of 10). The two numbers above can be expressed as 5.73×10^{13} and 5.73×10^{-11}

The standard form is: mantissa (number between 1 and 10) × exponent ($10^{\text{(to the power of x)}}$)

The mantissa can be rounded off, e.g. 57,543,378,000 could be expressed as 5.75×10^{10} or 5.8×10^{10} or 6×10^{10} (note that the exponent remains the same).

The exponent is calculated by counting how many times the decimal point is moved to the left or right in order to produce the mantissa.

Order of magnitude calculations

We can compare the size of two numbers by comparing exponents, e.g. 10^5 is two orders of magnitude greater than 10^3 (subtract 3 from 5).

Significant figures (sf)

Significant figures are like decimal places (see previous page) because they provide a rule for simplifying longer numbers.

Significant figures differ from decimal places because they concern the digits to both the left and right of the decimal point rather than just the right.

- The first significant figure is the first non-zero digit.
- Once the first significant figure is identified, all remaining digits to the right are counted, including zeros and including digits to the right of the decimal point.
- Trailing zeros in the decimal portion are significant if they remain after rounding off, e.g. 3.1200 is 5 sf.

Algebraic symbols

You need to know:

Symbol	Symbol name	Meaning/definition	Example
=	equals	equality	5 + 4 = 9
>	strict inequality	greater than	9 > 5
<	strict inequality	less than	5 < 9
>>	inequality	much greater than	9000 >> 5
<<	inequality	much less than	5 << 9000
∝	proportional to	proportional to	$f(x) \propto g(x)$
≈	approximately equal	weak approximation	11 ≈ 10

Algebraic equations

You are required to be able to:

- Substitute values into an equation and solve a simple equation.

  For example, $x + y = 52$

  If $y = 34$, what is x?

- Substitute the value 34 in the equation

  $x + 34 = 52$

- Solve the equation

  $x = 52 - 34 = 18$

Standard form

Changing a very large number to standard form

6,734,000,000: mantissa = 6.734, exponent = 9 (decimal point moved 9 places left)

- Using two digits in the mantissa: 6.7×10^9
- Using one digit then we must round up: 7×10^9

Changing a very small number to standard form

0.0006734: mantissa = 6.734, exponent = −4 (decimal point moved 4 places right)

- Using two digits in the mantissa: 6.7×10^{-4}
- Using one digit then we must round up: 7×10^{-4}

Changing standard form back to a very large or very small number

- $8.01 \times 10^6 = 8{,}010{,}000$ (decimal point moves 6 places right)
- $8.01 \times 10^{-6} = 0.00000801$ (decimal point moves 6 places left)

Estimate results

Divide 289 by 13, e.g. 300 ÷ 15 = 20 (precise answer is 22.23 to 2 dp)

Multiply 4,660 by 234, e.g. 5000 × 200 = 1,000,000 (precise answer is 1,090,440)

Order of magnitude calculations

Consider: 119,345 (1.2×10^5) and 167,981,421 (1.7×10^8)

The second number is 3 times 'bigger' (in terms of its magnitude) than the first number because the difference between exponents is 3.

Consider: 0.23 (2.3×10^{-1}) and 0.0000023 (2.3×10^{-6})

The first number is 5 times 'bigger' (in terms of its magnitude) than the second number because the difference between exponents is 5 (ignore the signs to work out the difference).

Significant figures

604.5 First sf is 6, altogether there are 4 sf.
15930 First sf is 1, altogether there are 5 sf
2.34 First sf is 2, altogether there are 3 sf.
0.005304 First sf is 5, altogether there are 4 sf.

EXAMPLES

Test your understanding of standard form here: tinyurl.com/2aez946u

dp versus sf

It is easy to get confused between these.

The table below compares decimal places (dp) and significant figures (sf).

209.2019 rounded to:	Decimal places (dp)	Significant figures (sf)
0	209	–
1	209.2	200
2	209.20	210
3	209.202	209
4	209.2019	209.2
5	209.20190	209.20
6	209.201900	209.202

Test your understanding of significant figures here: tinyurl.com/ye3893nk or here: tinyurl.com/3pp2jr7t

EXAM-STYLE QUESTIONS

A psychologist investigated the time it took (in seconds) for babies to reunite with their caregivers in an episode of the Strange Situation. The psychologist compared babies from two different cultures and got the following results:

Babies from an individualist culture: 18 49 31 91 43 24 12 52 138 74 106 67

Babies from a collectivist culture: 32 16 7 71 47 58 19

Top marks

If you have to estimate a calculation, you don't have to do it entirely in your head. Round the numbers up and down as necessary and write them down as part of your workings.

1. Estimate the total times for each group. **[1 mark + 1 mark]**

2. Estimate the mean time for the collectivist group. Give your answer to 1 significant figure. **[1 mark + 1 mark]**

3. The mean time for the individualist group is greater than for the collectivist group. Identify the appropriate algebraic symbol to express the relationship between the two estimated mean times. **[1 mark]**

Hamsa recalls that the number of synapses in the human brain is about 1,350,000,000,000,000. He also recalls that the mass of a single dust particle is about 0.000000000753 kg.

4. Express both of these numbers in standard form. **[1 mark + 1 mark]**

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