

Believe it or not?



UNIT 12

This unit helps students to learn about methods of collecting data and the impact that different approaches can have on the results. At the same time, they will reflect on their own beliefs and learn more about their peers' beliefs.

Using this unit

This unit could be used with students of any tier at GCSE as an introduction to different methods of collecting data. It could be particularly helpful as preparation for GCSE coursework which involves handling data. The unit lasts between 2 and 4 hours depending on the time given over to the students' own research.

In the unit, students are surveyed about their beliefs, using three different methods of data collection. Once the data has been processed, the students examine the impact that the different methods have on the results produced.

A second activity allows them to analyse and interpret the results of a national survey in this field. They also compare the national figures with those of their class. In the final activity, students carry out an independent piece of statistical research thus developing their data handling and report writing skills.

Throughout the unit, it is important to encourage respect for the beliefs of others and sensitivity to the possibility of their reluctance to talk about them.

- ◆ Students need a calculator, protractor and ruler.
- ◆ Students would also benefit from using a computer spreadsheet package such as Excel.

Mathematical content

Number (AT2)

- ◆ Finding one number as a percentage of another

Handling Data (AT4)

- ◆ Designing, using and evaluating methods of collecting data including straw polls, interviews and questionnaires
- ◆ Representing data using appropriate diagrams, including bar charts, pie charts and scatter diagrams
- ◆ Interpreting data including comparing sets of data and evaluating the reliability of results

Spiritual and moral development

The aim of this unit is to help students to become more aware of both their own and others' beliefs. At the same time, it is hoped they will become more sensitive to other students' views.

Background

Statistical research is regularly carried out into the beliefs and opinions of the population. Sometimes the results produced can be surprising, particularly in the area of religious belief. This can raise questions as to how the results were produced and particularly how the data was collected.

The unit allows students to make comparisons with national figures for England and Wales produced by the Francis and Kay research at Trinity College, Camarthen. In the course of their work, just over 13,000 year 9 and 10 students were surveyed in 1994. The students were given a substantial questionnaire and invited to complete it anonymously and confidentially during school time. The survey did not deal with faiths other than Christianity.

Additional sources

L. J. Francis and W. K. Kay, *Teenage Religion and Values* (Gracewing, 1995)

Notes on the activities

Throughout the unit, there are opportunities for students to discuss their beliefs formally and informally. As this is one of the objectives of the unit, such discussion must not be seen as a distraction from the mathematics.

Tell me what you believe

There are two stages to this activity and they need to take place in different lessons to allow time for the data to be processed.

Preliminary stage (30 minutes)

In the preliminary stage, students are asked to respond to three different data collection methods all addressing the same issues. It is important to explain to students that they may be surprised by some of the questions in the survey, but that they are essential for the work that follows. Some may feel that the questions are personal, but explain to them that this sort of difficulty is one of the issues addressed by the unit. The first method is the anonymous questionnaire (worksheet provided). This questionnaire sheet is all that the students should have at this stage and it should be completed in exam conditions. As the sheet is given out, it is important to stress to students both the confidentiality and anonymity of this first approach.

After collection of the completed questionnaires, the students need to get into pairs for the second method, the one-to-one interviews. It is important to stress that these are private and only the interviewer and yourself will know their responses. Initially, it is best to give out just one copy of the interview sheet (worksheet provided) to each pair. When one of them has finished an interview then a second sheet can be issued.

The final method is a straw poll. You should ask the students to respond to the 10 statements. A straw poll record sheet is provided. In each case they should say whether they agree, are not certain or disagree. Here you should insist that they do respond and that you have the correct total for each statement. This should be done as a whole class activity with the students putting up their hands appropriately.

Note that until the data has been processed (a class results *pro forma* is provided), it is not possible to continue with 'Tell me what you believe'. It is possible, however, to start students thinking about task 3, their personal research projects.

Stage 2

In the second stage, the students should receive a copy

of the class results and the student sheets. They should read the introduction and then do the questions in task 1 which can be done individually or as a group. However, all students should record their answers so they can be referred to during a whole class discussion.

Class discussion

When students have completed the questions it would then be appropriate for the whole class to discuss the following:



- ◆ the differences which they noticed resulting from the three different methods;
- ◆ why they think those differences occurred;
- ◆ what they think are the advantages and disadvantages of each method;
- ◆ why people are sometimes reluctant to talk about their beliefs.

What does everyone else believe?

In this activity, students analyse and interpret the data provided by the Francis and Kay survey of teenage religion and values and compare it with their class results. In task 2 the students practise data representation and interpretation skills including working with pie charts, bar charts and scatter diagrams. Some students may need some revision on these prior to beginning the task. The activity also has the potential to be supported by the use of a spreadsheet in analysing and presenting the data.

Class discussion

Once students have completed task 2, it would then be appropriate for the class to discuss:



- ◆ the key differences which they noticed between the national and class surveys;
- ◆ how they account for these differences;
- ◆ why any national results particularly surprised them.

Personal research project

In this final activity, the students carry out their own survey and write a report on the results. This can be an individual or group activity and could be used to assess AT1 criteria. Guidance is offered in the student's sheet, but there may well be need to offer more structure to some students. In particular, the

practicalities of collecting the data may need to be discussed with the class.

Once the reports are finished, there is scope for them to be presented to the whole class and for discussion on the reliability of the research.

Answers

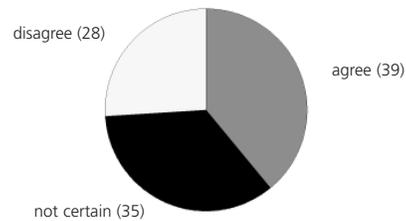
Task 1:

2. Differences may occur because of mistakes made in the data collection process or because of the reluctance of people to reveal personal beliefs.
3. a) Anonymous questionnaire:
advantages - anonymity;
disadvantages - possible misunderstanding of the information required.
- b) Interview:
advantages - confidentiality, questions can be clarified;
disadvantages - cost.
- c) Straw poll:
advantages - speed of gathering information;
disadvantages - no confidentiality.

Task 2:

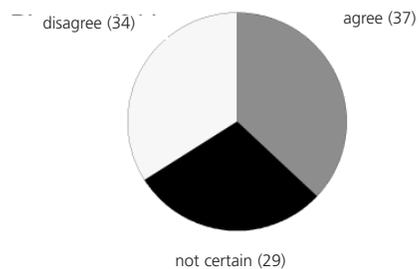
2. a)

I believe in God - % nationally



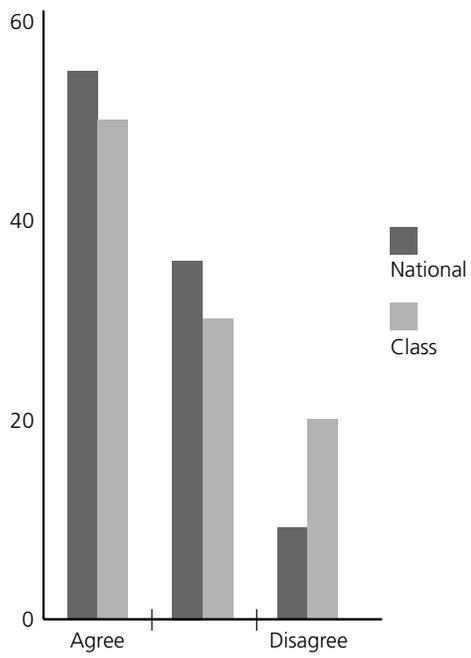
b)

I believe in ghosts - % nationally



4. Possible example

I feel my life has a sense of purpose



7. This is a large sample for a national survey and so results can be generalised with some confidence.

Believe it or not?



UNIT 12

Do you know what your beliefs are?

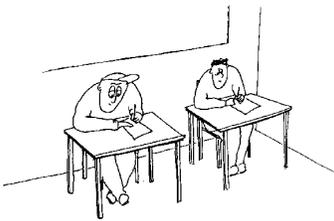
Do you know what your friends believe?
Do they know what you believe?
Would you want them to?

Is it difficult to talk to other people about what you believe?
If so, why?

During this unit, you will be learning some statistical techniques, but also spending time thinking about some of the issues above.

Tell me what you believe

There are many ways to collect information about people's beliefs and opinions. You have already used three of the most important approaches. They are:



Anonymous questionnaires

First you filled in the questionnaire. This was confidential so nobody knows what your responses were.



Private interviews

For this method, you worked in pairs. You each used an interview sheet. You took it in turns to be an interviewer. The results of the interview should only be known by the pair of you and your teacher.



Straw Polls

In this case, your teacher read you the 10 statements. For each one you had to say if you agreed, were not certain or disagreed. You had to do this publicly and at the same time as everyone else.

1

Now you can analyse the results as your teacher has processed the data. Using your class results, answer the following questions.

1. Write down any differences you notice between the results given by the three different methods.
2. Write down why you think there are these differences.
3. Write down the advantages and disadvantages of each of the three data collection methods.
4. Which method do you think is most reliable for collecting the data in this particular case? Explain why.
5. Are there any class results from the anonymous questionnaire which are different from what you would have expected? Write down which ones.

What does everyone else believe?

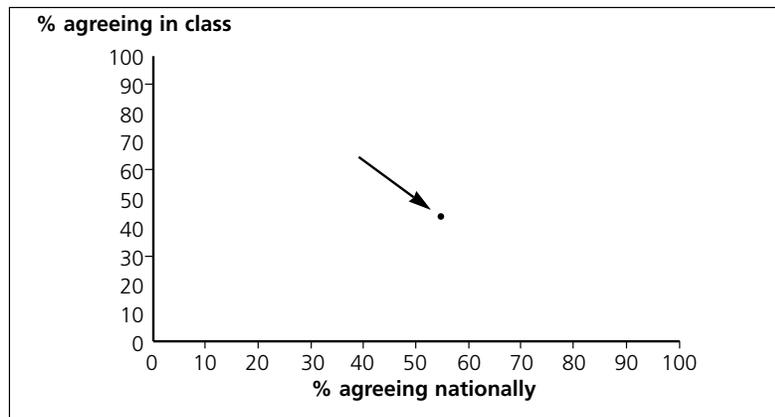
In 1994 researchers carried out a major survey into teenage religion and values. Over 13,000 year 9 and 10 students in England and Wales completed anonymous questionnaires. As well as covering topics including religious beliefs and the supernatural, the survey also addressed issues of right and wrong, sexual morality and substance use. The results for the statements that you have already been working on are shown below.

The national picture

Statement	Agree	Not certain	Disagree
I believe in God	39%	35%	26%
I feel my life has a sense of purpose	55%	36%	9%
I believe in life after death	41%	41%	18%
I believe God punishes people who do wrong	19%	39%	42%
I believe in my horoscope	35%	31%	34%
The bible seems irrelevant to life today	30%	43%	27%
I believe Jesus Christ really rose from the dead	30%	43%	27%
I believe in ghosts	37%	29%	34%
I often feel depressed	53%	18%	29%
The church seems irrelevant to life today	27%	46%	27%

2

1. Complete a table like the one for the national survey, but this time for your class results. You only need to do this for your class' anonymous questionnaire results - agree, not certain, disagree. You will need to convert the numbers of students to percentages (given to the nearest whole number).
2. For each of the statements below, draw two pie charts, one illustrating the national picture and the other illustrating your class results. The pie charts should have three sections, agree, not certain and disagree.
 - a) I believe in God
 - b) I believe in ghosts
3. For each of the statements in question 2, look at the national pie charts and the class pie charts. What differences do you notice between the national picture and the class picture.
4. For each of the statements below, draw a single bar chart that allows the national and class picture to be compared. In each case the bar chart should include the percentage agreeing, not certain and disagreeing.
 - a) I feel my life has a sense of purpose
 - b) I often feel depressed
 - c) I believe in life after death
5. For each of the statements in question 4, point out any important differences between your class results and the country as a whole.
6. For this question you only need to use the percentages that agreed with the statements in the national and class surveys. Draw a scatter diagram as shown in the example. In the case shown, 55% in the national survey agreed with the statement "I believe my life has a sense of purpose" while only 45% agreed in the class. You have to plot points in this way for each of the statements.



Describe the correlation, if any, between the two sets of data.

7. Over 13,000 students were surveyed to produce the national picture results. That is only about 1.5% of all the year 9 and 10 students in the country during that year. Do you think this was a big enough sample of students to get a reliable idea of the national picture?
8. Write down any results in the national survey which were particularly different from what you would have expected. Explain why.

**3****Personal research project**

In this activity, you will carry out your own research into beliefs or opinions. You will then write a report describing what you did and what you found out.

Stage 1

You must first decide what beliefs you are going to investigate and predict what results you think you might get. (In your report, make clear any hypothesis you had at this stage before you started the research.)

Stage 2

You must then decide how you will collect the data and how large a sample you will survey. You must then collect the data. (In your report, explain why you decided on your particular collection method and include an example of it.)

Stage 3

Having collected the data, you must process it and represent it using tables and appropriate diagrams. (In your report, only use diagrams that you think are relevant.)

Stage 4

Finally, you must interpret the results and compare them with what you originally predicted. (In your report, make clear whether you think your research has proved or disproved your hypothesis or has left you needing to do more research.)

Teacher's record sheet for use during straw poll

Statement	Agree	Not certain	Disagree
I believe in God			
I feel my life has a sense of purpose			
I believe in life after death			
I believe God punishes people who do wrong			
I believe in my horoscope			
The bible seems irrelevant to life today			
I believe Jesus Christ really rose from the dead			
I believe in ghosts			
I often feel depressed			
The church seems irrelevant to life today			

**Class Results Pro Forma for collating the results from the three methods**

Statement	Agreed			Not certain			Disagreed		
	A.Q.	P.I.	S.P.	A.Q.	P.I.	S.P.	A.Q.	P.I.	S.P.
I believe in God									
I feel my life has a sense of purpose									
I believe in life after death									
I believe God punishes people who do wrong									
I believe in my horoscope									
The bible seems irrelevant to life today									
I believe Jesus Christ really rose from the dead									
I believe in ghosts									
I often feel depressed									
The church seems irrelevant to life today									

Interview sheet

Instructions for the interviewer:

1. Make sure you interview the person privately.
2. You must not tell other people what you find out during the interview.
3. You are the one who records the results. Do this by ticking the appropriate box.
4. You may need to repeat the statements.
5. Remember to record the person's name.
6. When you have finished give the sheet to the teacher.

The interview

Begin the interview by saying "I am going to read some statements. For each one, I want you to say whether you agree with, are not certain about, or disagree with the statement from your own point of view. Do you understand?"

Name: _____

Statement	Agree	Not certain	Disagree
I believe in God			
I feel my life has a sense of purpose			
I believe in life after death			
I believe God punishes people who do wrong			
I believe in my horoscope			
The bible seems irrelevant to life today			
I believe Jesus Christ really rose from the dead			
I believe in ghosts			
I often feel depressed			
The church seems irrelevant to life today			



Anonymous questionnaire

Instructions :

1. Make sure you fill in the questionnaire without anyone seeing.
2. You must not write your name on the sheet.
3. Read each of the statements. In each case, say whether you agree with, are not certain about or disagree with the statement. You are answering from your own point of view.
4. When you have finished, fold the sheet once and give it to the teacher.

Statement	Agree	Not certain	Disagree
I believe in God			
I feel my life has a sense of purpose			
I believe in life after death			
I believe God punishes people who do wrong			
I believe in my horoscope			
The bible seems irrelevant to life today			
I believe Jesus Christ really rose from the dead			
I believe in ghosts			
I often feel depressed			
The church seems irrelevant to life today			