



Activity description

Pupils experience collecting primary data from a local graveyard or cemetery and then set their own questions; these are based on their preliminary observations, and can be answered from the available data. The cemetery visit allows pupils to explore the real issue of missing data for themselves.

Suitability

Pupils working at all levels; pairs or groups

Time

1+ days; 1½ hours upwards for preparation (see Teacher guidance on the next page for details)

AMP resources

Pupil stimulus

Equipment

Map of the graveyard or cemetery
Clipboard

Key mathematical language

Sample, data, graph, average, mean, median, mode, range, hypothesis, predict, conjecture

Key processes


Representing Identifying the mathematical aspects of their question to research further; selecting methods and tools to use.

Analysing Classifying the data, choosing appropriate representation of data, and calculating accurately.


Interpreting and evaluating Interpreting raw and summary data, looking for similarities and differences, patterns and exceptions; relating findings to hypotheses being researched.

Communicating and reflecting Communicating findings and engaging in discussion of results.

Cemetery mathematics



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Thought bubbles include: Oldest people, Common first names, Type of grave, Styles of headstones, Are people living longer than they used to?, Month of death, Age at death, Do women or men live longer?

Nuffield Applying Mathematical Processes (AMP) Practical exploration 'Cemetery mathematics'
Supported by the Clothworkers' Foundation © Nuffield Foundation 2010

Teacher guidance

The activity can take over one day, with upwards of 1½ hours for preparation – checking with local cemetery, risk assessment forms, letters home. Allow 30 minutes to discuss data collection and looking at a small data sample to decide what questions to pose. Allow approximately half a day for the visit, and as much time afterwards as is needed to analyse and present findings, some of which may be completed for homework.

This is a sensitive topic since there may be religious / superstitious objections or worries about visiting a graveyard. Pupils may need advance warning of the topic to give them time to get used to the idea.

Whilst making your preliminary visit to satisfy your school's health and safety arrangements, check whether you need to get permission for the visit from the caretakers of the graveyard. You could also pick up information about opening times, maps, permission to take photographs, and so on.

During the activity

Discuss what data pupils think may be available, and different ways to record the data.

Discuss sampling, and the idea of looking at a small sample of data to help formulate clear hypotheses such as:

- More people die in the winter than in the summer
- Women live longer than men
- People live longer nowadays than 50 years ago
- The most common surnames / first names are ...

Discuss situations which may be encountered at the graveyard, and ways to behave and to deal with this, such as:

- possible funerals
- relatives or friends visiting graves
- new graves being dug

Encourage pupils to think about collecting data that is relevant to their question, rather than just collecting data for the sake of it.

Encourage pupils to prepare data capture sheets which will allow them to analyse their data through calculating measures (such as mean, median, mode and range) and drawing graphs.

Probing questions and feedback

AMP activities are well suited to formative assessment, enabling pupils to discuss their understanding and decide how to move forward. See www.nuffieldfoundation.org/whyAMP for related reading.

- How did you decide on your question / hypothesis?
- What data do you need to collect to answer your question / hypothesis?
- How are you going to summarise your data?
- What mathematical tools can help you summarise your data?
- Do you think your findings will always be true?
- What would make your research more reliable?
- Have you answered your original question / hypothesis?
- What would you do differently if you were starting again?

Extensions

Use secondary data from newspapers, libraries, databases and the internet to collect and analyse data to make comparisons with the local primary data.

Websites such as www.freebmd.org.uk have General Register Office (GRO) data on births, marriages and deaths going back to 1837 which can be accessed free of charge.

The Office for National Statistics (ONS) has an interactive *population pyramid* that can be helpful in analysing the age structure of the UK population

www.statistics.gov.uk/populationestimates/flash_pyramid/default.htm

Other relevant websites include

www.statistics.gov.uk/hub/population/

www.ons.gov.uk/census/get-data/index.html

www.nationalarchives.gov.uk/

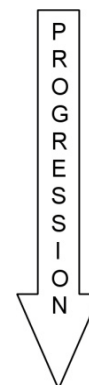
Progression table

The table below can be used for:

- sharing with pupils the aims of their work
- self- and peer-assessment
- helping pupils review their work and improve on it.

The table supports formative assessment but does not provide a procedure for summative assessment. It also does not address the rich overlap between the processes, nor the interplay of processes and activity-specific content. Please edit the table as necessary.

Representing <i>Identification of information and how to record results</i>	Analysing <i>Selects methods to summarise and represent the data</i>	Interpreting and evaluating <i>Makes sense of summary results and justifies conclusions</i>	Communicating and reflecting <i>Clearly communicates and reflects on findings from the task</i>
Identifies and collects some information, even if no question/hypothesis is posed Pupil A	Summarises some of the data, e.g. in a diagram, table or summary measure Pupils A, C	Makes some attempt at interpreting the data	Uses data to state a simple observation
Has a clear focus to the research even if not explicitly stated, and collects relevant data Pupil B	Summarises the data using an appropriate measure or diagram to address focus of research Pupil B	Uses summarised data to provide simple justification of an observation Pupil C	Uses summarised data to state an observation relevant to the focus of research Pupils B,C, Group D
Forms a clear focus to research, even if simple Collects and records relevant data Pupil C, Group D	Addresses the research focus through summary of data using more than one appropriate measure or diagram, or summarises more than one set of data using the same summary statistic Group D	Uses summarised data to make comparisons between different measures or diagrams and to justify results Group D	Uses summarised data to state observations relevant to the focus of research, and/or begins to discuss if the data is representative
Forms a clear focus to research, possibly involving more than one category of data Collects and records relevant data efficiently	Linked analyses of more than one category of data relevant to the research, to include measures and diagrams as appropriate	Justifies all conclusions with reference to relevant data and diagrams, giving reasons to support/interpret findings	Provides clear accurate conclusions based on evidence and reflects on techniques used for data collection

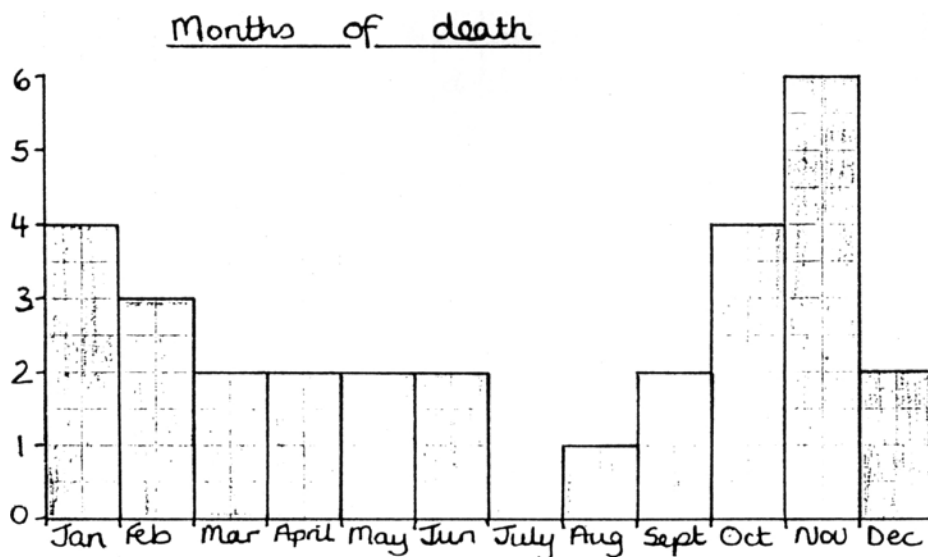


Sample responses

Pupil A

No.	First name of person	Age	Year of Death	Month	State of Gravestone NEBLY POOR FAIR
1.	Anna	—	1831	May	Fair.
2.	Rud. Cem.	32	1867	—	Fair.
3.	Maria	73	1905	January	Fair.
4.	George.	85	1882	January	Fair.
5.	William	72	1894	January	Fair.
			1882	November	Fair.
			142	October	Good.
				April	Good.
				June	Good.
				August	Good.
				st	poor.
					poor.

Pupil A collects information but does not have a clear research focus. One data set is represented graphically.



Probing questions

- Why did you decide to use this chart to show the months of death?
- Can you make any observations from looking at your chart?
What are they?
- What other questions could you answer using your data?
- What other diagrams would you use to represent the other data you collected?

Pupil B

Pupil B investigated age and month of death. The data has been summarised using different averages.

Most frequent month of Death is April
Most frequent age of Death is 72
Average age of Death is 60

Probing questions

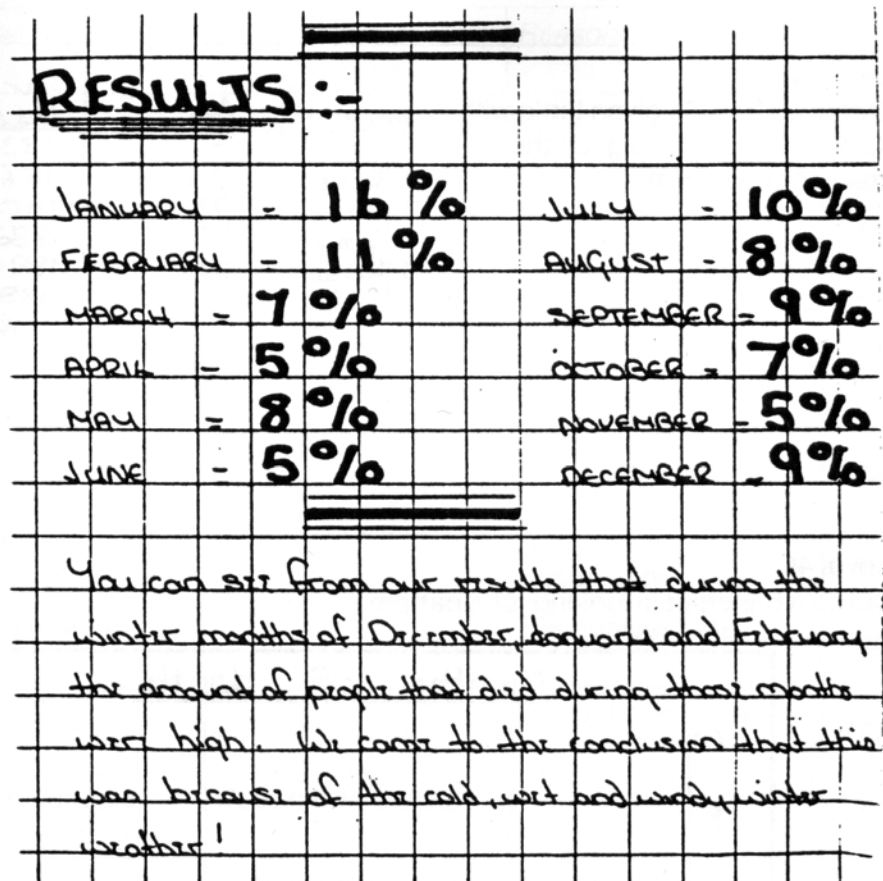
- The mean age of death is 60. The mode is 72. Why are these two averages different?
- You have summarised the age of death using two measures of average – mode and mean. What are their relative advantages? Why?
- You say that the most frequent month of death is April. This does not match other pupils' work. How can we verify the result?

Pupil C

Pupil C has processed data, rounding percentages to the nearest integer. Simple observations of the results are given.

Probing questions

- Has the most frequent month of death changed over the years? What other data would you need to collect to explore this?
- July and September also have a high percentage of deaths. Can you think of a reason for this?
- What additional research could you do in support of your conclusion?



Group D

Group D has processed data to address the question 'Are people living longer?' The data is summarised using the same measure – mean – giving the average over three time periods. A simple conclusion is given.

Probing questions

- You chose to use the mean rather than the median or mode. Why?
- Is the mean age of death typical for the years indicated? How could you check? If atypical, what could be the reasons for this?
- How would choosing smaller time intervals affect your results?

We have found out that people died younger in the older days

We worked out:
from the year 1851 to 1900
the average age of death was
60 years old.

From the year 1901 to 1950
the average age of death was
60.06 years old.

From the year 1951 to 1988
the average death age is
83.75 years old.