

Cemetery mathematics

Applying Mathematical Processes

In this **practical exploration** pupils can experience collecting primary data from a local graveyard or cemetery and then set and test their own hypotheses.

Suitability Pupils working at all levels; pairs or groups

Time 1+ days; 1½ hours upwards for preparation (see Teacher guidance for details)

Equipment

Clipboard

Map of the graveyard or cemetery

Resources

PUPIL STIMULUS

TEACHER SUMMARY

TEACHER GUIDANCE

PROGRESSION TABLE

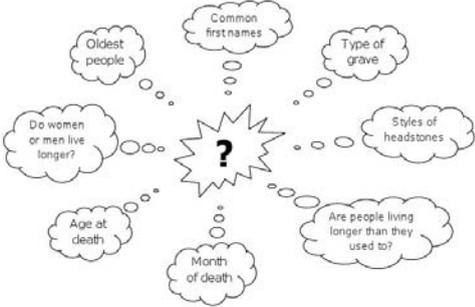
SAMPLE RESPONSES

Cemetery mathematics

You can find out a lot of interesting information from your local graveyard or cemetery.



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Oldest people

Common first names

Type of grave

Styles of headstones

Do women or men live longer?

Age at death

Month of death

Are people living longer than they used to?

?

Nuffield ANF Pupil stimulus 'Cemetery mathematics'
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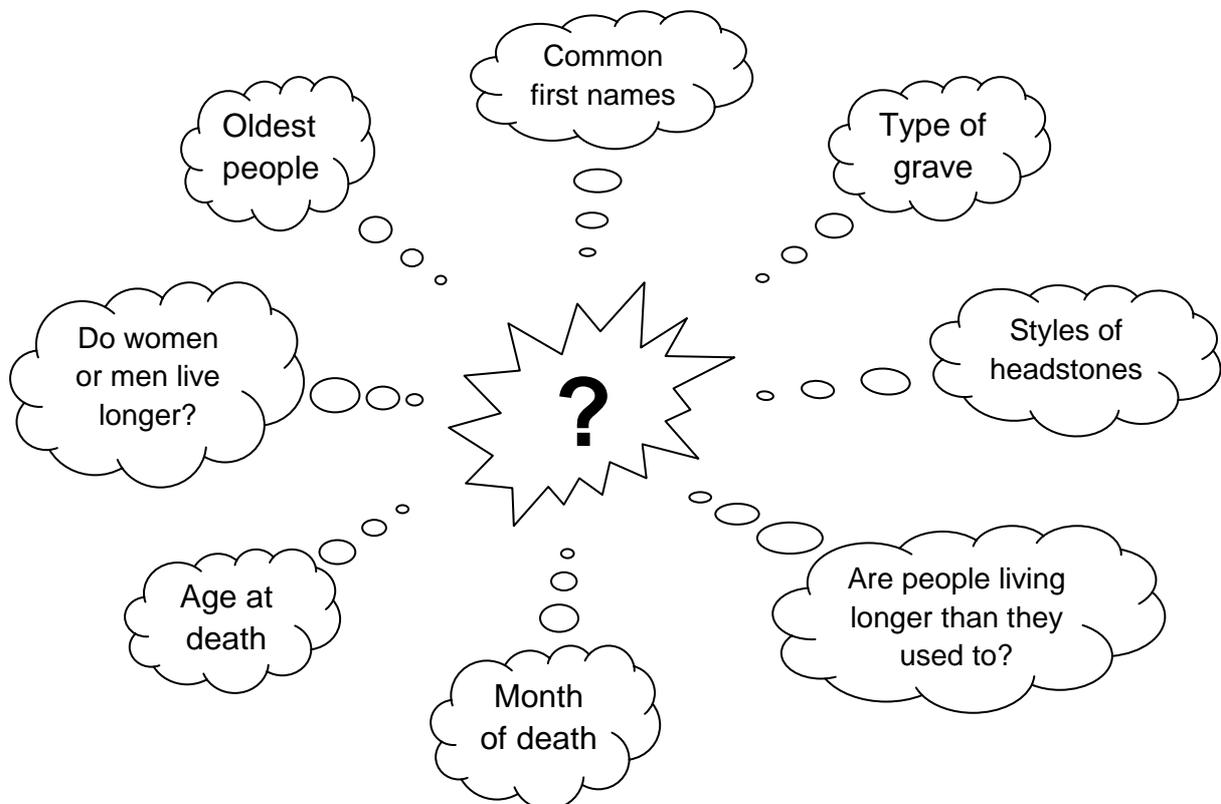


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NUFFIELD APPLYING MATHEMATICAL PROCESSES

TEACHER NOTES Cemetery mathematics

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

Clipboard map of the graveyard or cemetery

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.

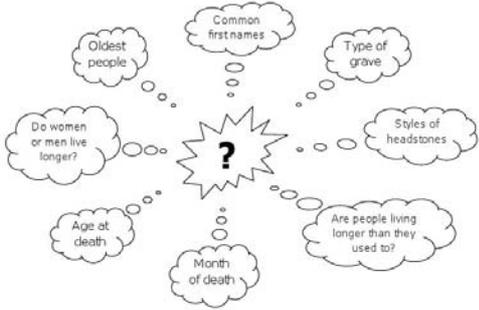
Communicating and reflecting Communicating findings and engaging in discussion of results.

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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

- 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/

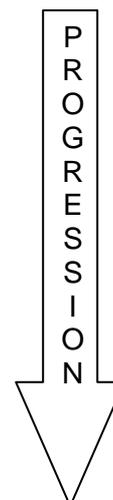
www.ons.gov.uk/census/get-data/index.html

www.nationalarchives.gov.uk/



Progression table

Representing	Analysing	Interpreting and evaluating	Communicating and reflecting
<i>Identification of information and how to record results</i>	<i>Selects methods to summarise and represent the data</i>	<i>Makes sense of summary results and justifies conclusions</i>	<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



Download a Word version of this Progression Table from www.nuffieldfoundation.org/AMP

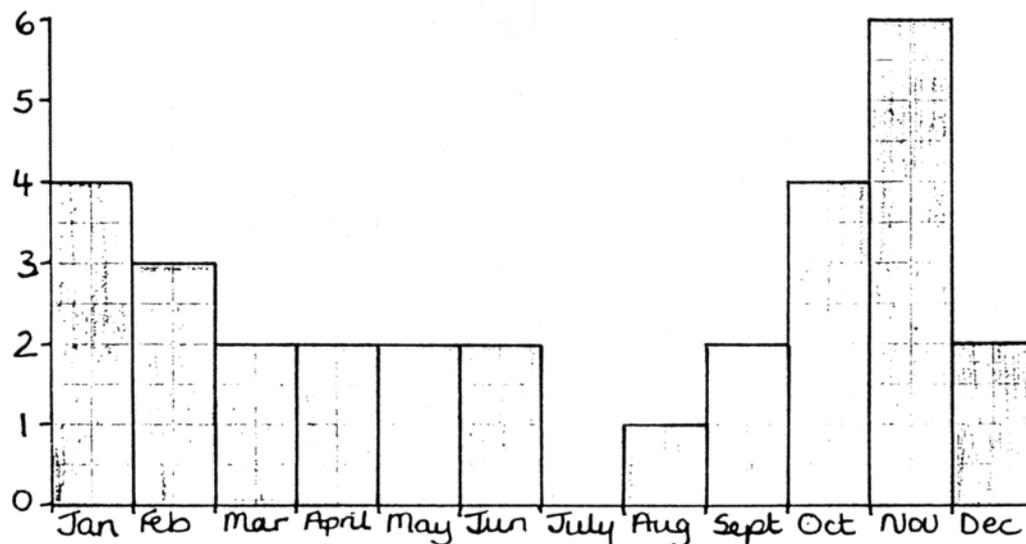


Sample responses

Pupil A

No.	First name of person	Age	Year of Death	Month	State of Gravestone New Stone Fair
1.	Anna	—	1831	May	Fair
2.	Rud. Cox.	32	1867	—	Fair
3.	Maria	75	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

Months of death



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

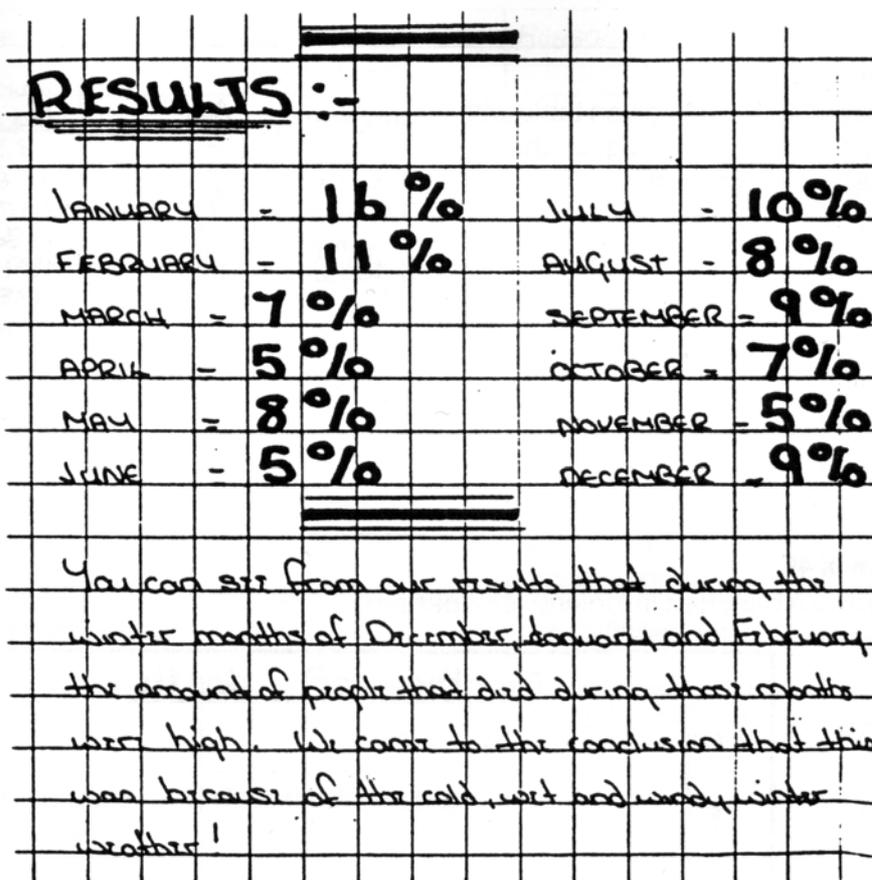
Most frequent month of Death is April
Most frequent age of Death is 72
Average age of Death is 60

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

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 (notes on next page)





Pupil C (see previous page)

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

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.

Pupil 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?