Statistical Project

Citizenship in Maths

Information for teachers …

The assessment task and data for this project are outlined on the next few pages. These pages should be photocopied and distributed to the students.

Students should use ICT to help them produce the graphs for this project. They should select the most appropriate graph to help them present their data clearly and appropriately.

Students should choose 3 or more different questions to investigate from the data. Encourage students to select one question to explore that will enable them to draw pie charts to compare the data. More able students could however use the information on house prices to try to estimate the average property price in Maidstone or, for greater challenge, they could try to find the mean age of people living in Maidstone over time. A particularly keen student could gather her own data from the National Statistics website – www.statistics.gov.uk.

This task covers some of the KS3 citizenship requirements.

> The KS3 citizenship programme of study states that all students should have opportunities to explore… the changing nature of UK society including the diversity of ideas, beliefs, cultures, identities, traditions, perspectives and values that are shared.

This task could be **peer assessed** as well as **teacher assessed**. I have included a sheet that could be used to aid the peer assessment but students may need some guidance on what sorts of things they need to check. I have attached some marking principles describing what types of things the students could do in order to get a particular level.

Citizenship in Maths

Statistics Project

How does Maidstone compare with the rest of the UK and how has it changed over time?

You will find on this handout some data about Maidstone and the rest of the UK. There is also information about Maidstone from the past.

You will need to decide on at least 3 particular questions to investigate, which you should write down clearly. Each question should involve a comparison (either a comparison of Maidstone with the rest of the UK or a comparison with the past). For each of your chosen questions, you should:

- describe what you expect to find out (and why);
- present the relevant data;
- choose a suitable way of displaying the data and try to explain why you've chosen to present your data in this way;
- find suitable averages (if relevant);
- write conclusions, explaining how they relate to the original question.

You are encouraged to use ICT to draw your graphs.

Population of Maidstone over time

Year	1901	1911	1921	1931	1941	1951	1961	1971	1981	1991	2001
Population	63,482	65,165	70,191	75,606	82,314	89,618	104,644	122,212	129,275	137,525	138,959

Age distribution of Maidstone over time

Number of females

Age (years)	*1911*	*1971*	*2001*
0-9	6304	10309	8090
10-19	5804	7921	8146
20-29	5523	9114	7940
30-39	4845	7439	10741
40-49	4121	7597	9777
50-59	3180	7164	9858
60-69	2151	6576	6778
70-79	1220	6125	5473
80 and up	362	n/a	3790

Number of males

Age (years)	*1911*	*1971*	*2001*
0-9	6234	10770	8648
10-19	5844	8525	8959
20-29	5035	9321	8046
30-39	4573	7817	10409
40-49	3778	7467	9638
50-59	2931	6854	9946
60-69	1983	5731	6528
70-79	1018	3482	4256
80 and up	257	n/a	1936

Type of occupations people in Maidstone were employed in over time

Type of industry	*1881*	*1971*	*2001*
Agriculture	6655	2620	1299
Mining	152	180	104
Manufacturing	4570	14290	7970
Construction	1591	4520	6594
Utilities	2421	4280	5027
Services	9440	28290	44934
Unknown			3544

Changing role of women in Maidstone over time

	1931	1951	1971	1981	1991	2001
Economically active	9235	11735	20033	23293	29617	30911
Economically inactive	22097	25486	27678	27931	26769	20184

Change in social class structure over time

Social class	*1881*	*1971*	*2001*
Class 1	303	2360	7390
Class 2	2882	8113	14080
Class 3	5789	16993	11070
Class 4	7172	5815	3343
Class 5	1654	2339	4952

Number of people per household in Maidstone

Size of household	*1971*	*2001*
1	7246	14583
2	12882	20610
3	7648	8912
4	6843	8649
5	3220	2780
6 or more	2415	920

Country of birth in Maidstone compared with the rest of England (2001)

Country of birth	*Number of people: Maidstone*	*Number of people: England as a whole*
England	127,890	42,968,596
Rest of the UK	3,811	1,619,412
Republic of Ireland	773	459,662
Other EU countries	1,866	695,045
Elsewhere	4,608	3,396,116

Ethnic group for people in Maidstone compared with the rest of England (2001)

Ethnic Group	*Number of people: Maidstone*	*Number of people: England*
White	135,262	44,679,361
Mixed	1,099	643,373
Asian or Asian British	1,523	2,248,289
Black or Black British	413	1,132,508
Chinese or Other Ethnic Group	651	435,300

Accommodation type in Maidstone compared with the rest of England (2001)

Accommodation type	Percentage of households: Maidstone	Percentage of households: England and Wales	Average price: Maidstone	Average price: England and Wales
Detached	27.4	22.8	£220,225	£178,806
Semi-detached	35.4	31.6	£128,348	£101,733
Terraced	23.8	26.0	£99,648	£89,499
Flat	12.6	19.2	£85,512	£119,436

Data from the following sources:

- Office for National Statistics (including 2001 Census)
- The Land Registry
- *A vision of Britain through time* website.

Marking Principles

Level 4: Mathematical Processes and Applications
Pupils develop their own strategies for solving problems and use these strategies both in working within mathematics and in applying mathematics to practical contexts. When solving problems, with or without a calculator, they check their results are reasonable by considering the context or the size of the numbers. They look for patterns and relationships, presenting information and results in a clear and organised way. They search for a solution by trying out ideas of their own.

Level 4: Handling data
Pupils describe [data] using a frequency table. They understand and use the mode and range to describe sets of data. They group data in equal class intervals where appropriate, represent collected data in frequency diagrams and interpret such diagrams. They construct simple line graphs.

Students could gain a level 4 for example by choosing to investigate one question arising from the data. They display the data graphically and write some basic comments about what the chart shows, perhaps mentioning the modal value or group.

Level 5: Mathematical Processes and Applications
In order to explore mathematical situations, carry out tasks or tackle problems, pupils identify the mathematical aspects and obtain necessary information. They calculate accurately, using ICT where appropriate. They check their working and results, considering whether these are sensible. They show understanding of situations by describing them mathematically using symbols, words and diagrams. They draw simple conclusions of their own and explain their reasoning.

Level 5: Handling data
Pupils understand and use the mean of discrete data. They compare two distributions using the range and one of the mode, median or mean. They interpret graphs and diagrams, including pie charts, and draw conclusions.

Students could gain a level 5 by choosing to investigate at least one question that allows them to compare two sets of data. They choose appropriate graphs to display their data, for example a pair of pie charts, which they might draw using ICT. They describe what their graphs show and write sensible comparisons using mathematical language (for example, talking about the modal value, average, spread, etc).

Level 6: Mathematical Processes and Applications
Pupils carry out substantial tasks and solve quite complex problems by independently and systematically breaking them down into smaller, more manageable tasks. They interpret, discuss and synthesise information presented in a variety of mathematical forms, relating findings to the original context. Their written and spoken language explains and informs their use of diagrams. They begin to give mathematical justifications, making connections between the current situation and situations they have encountered before.

Level 6: Handling data
They construct and interpret frequency diagrams. They construct pie charts…

In order to achieve level 6, students would need to explore several different questions. For each question, they present their data in an appropriate way, perhaps explaining why they have chosen that particular form. Hopefully within the project there will have been an opportunity to display data in the form of a pie chart for at least one of their questions. They choose diagrams consistently within a question so that comparisons can easily be made. They find an average (such as the mean) from a frequency table and are able to compare sets of data using an average and the range. They explain how their results relate to their original questions and comment on whether their results are as expected.

Statistics Project: Feedback Sheet

Name of student ……

Name of peer reviewer ……..

Peer assessment

	☺	😐	☹
The student has chosen at least one question to investigate. The question has been stated clearly.			
The student has stated what they expect to find out and why.			
The student stated at least three clearly worded questions.			
The student has produced a variety of diagrams to investigate each question.			
The student has explained what her diagrams show and can use her diagrams to make comparisons.			
The student has found an average correctly.			
The student has found the mean from a table.			
The student is able to compare sets of data using an average and the range.			
The student has used ICT effectively.			
The student relates her findings to the original question.			

Comments from the peer reviewer:

Aspects of the project that I thought were good …

Aspects of the project that could be improved or could have been clearer …

Teacher feedback …

Level …….