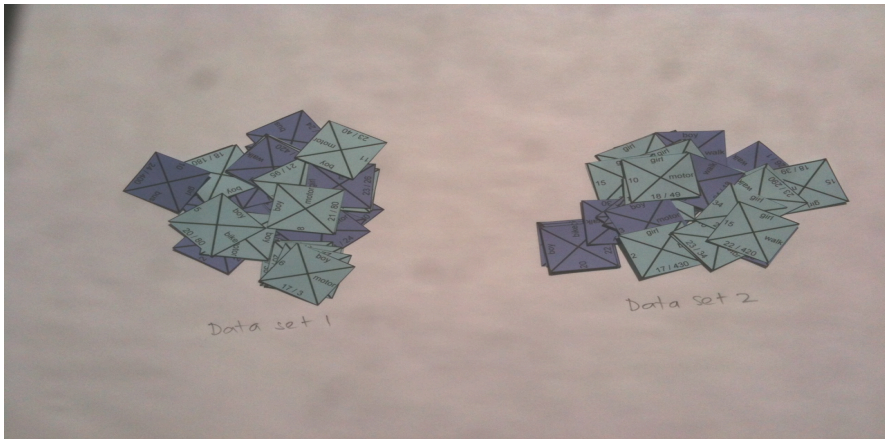


Title: ID Cards		
Achievement Objectives: S2-1 Conduct investigations using the statistical enquiry cycle: A posing and answering questions B gathering, sorting, and displaying category and whole-number data C communicating findings based on the data. S3-1 Conduct investigations using the statistical enquiry cycle: A gathering, sorting, and displaying multivariate category and whole-number data to answer questions B identifying patterns and trends in context, within and between data sets C communicating findings, using data displays.		Key Competencies: Thinking: - Investigating - Analysing - Use patterns in data Using language, symbols and text: - Use statistical language to pose questions and communicate findings Relating to others: - Working collaboratively and cooperatively
This activity explores the following key ideas: * Differentiating between category data and whole number data * Drawing dot plots and bar graphs * Making summary statements about dot plots and bar graphs http://www.nzmaths.co.nz/statistical-investigations-level-2?parent_node= A key transition point at this level is moving students' data display knowledge from individual case plots to frequency plots of the variable of interest.		Resources Data cards (see preparation) Survey questions
Prior Knowledge: * Conceptual understanding of measurement units, cm, mm & min		Adapting for ICT
Preparation Prepare sets of data cards. Photocopy of enough data sets (Year4DataSet-TimeRFHair.pdf) so that there is a least one set between two students. Use colours to make up the data sets*. When you cut up the data cards use two different coloured sheets to make two sets, put the girls of one colour with the boys of the other colour. Store the data cards in envelopes or plastic bags.		
		
* Suggest that you use different colours for the different sets of two. This way when you find them on the ground at the end of the lesson you know which pack/envelope to put them back into.		
Introduction/Background After this lesson students will know: How to make dot plots and bar graphs		

Introduction: In New Zealand every two years there is an online CensusAtSchool. This is where data is collected from many students around New Zealand. The data is collected by students completing an online questionnaire.

To show the online questionnaire for 2011 follow the link <http://censusatschool.org.nz/2011/questions/>.

We are going to use a data set that has 35 students in it. The “students” are in the envelope/bag I just gave you. (Teachers to provide students with envelope or bag of student data cards – see preparation above).

NOTE: This investigation is one where we are working with a given data set and the PPDAC cycle is a bit rearranged. (The other type of investigation is one where the data is collected during the process.)

Plan/knowning the data



Familiarisation with the data cards.

When students are using data from Census At School and they are not familiar with the variables it is very important to take time for the students to “unpack” what each variable is. One way to do this is by getting the students to work out what each variable is. There are a number of ways of doing this, at this early level a good way is to give them the **survey** questions from the questionnaire and ask them which survey question they think generated which responses.

The five survey questions are given in the document **surveyquestionsActivity1.docx** and can either be printed off or shown on a data projector. The students need to see the entire survey question with response so that they can make sense of the variables. The survey questions are for reference:

1. Are you: male/female
8. What is the length of your right foot, without a shoe? Answer to the nearest centimetre.
15. What is the length of your hair? Answer to the nearest millimetre. (Pull one hair out from the back of your head and measure it.)
16. What is the main way you usually get to school?
17. How long does it usually take you to get to school? Answer to the nearest minute.

Each data card is split into four parts.



The top section is gender, recorded on the cards as boy/girl and is the response from Question 1.

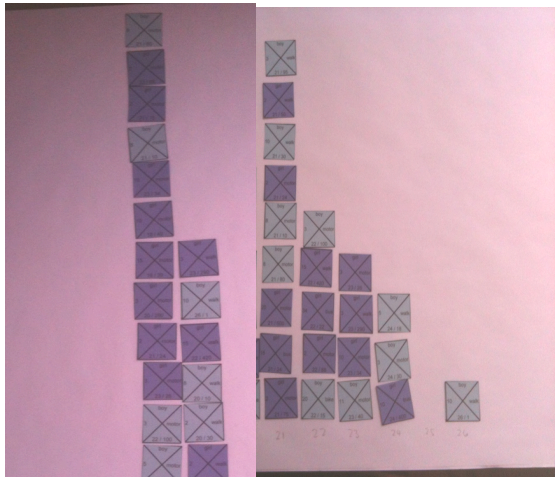
The left hand section is the time taken to get to school and is the response from Question 17. This can be prompted by suggesting a link to the right hand section which is the main method of getting to school and is the response from Question 16.

The bottom section has two values. Once the first three are found the remaining two must be hair length in mm and right foot length in cm. It is worthwhile asking the students as to which they think it is and why. Here we are looking for number and measurement sense. Can a right foot length be 420cm? The first value is the right foot length in cm, from Question 8 and the second value is hairlength in mm, from Question 15.

Please don't just tell the students what the variables are. This process of understanding the variables is a key step in students developing contextual knowledge about data.

Once the students have worked out the variables a good activity is to get them to describe one of the students based on the information on the data card. For example for the data card given above: *This student is a girl who walks to school. It takes her 15*

	<i>minutes to walk to school. She has a right foot length of 22 cm and her hair is 420mm long.</i> Data are numbers with a context. Another activity could be to get the students to draw a picture to show the information on the data card for a particular student. At this point you might get them to also notice that the cards are different colours. They might notice that the girls are all one colour and the boys are all another colour. This is also an opportunity to start to introduce students to the idea of category and number data. Gender and ways to get to school are both category data. Time taken to get to school, hair length and right foot length are all measurement data, and relative to curriculum level 2 and 3 they are whole number data. Category data and number data use different displays. Category data is most likely displayed using picture graphs (level 2) or bar graphs (level 3). Number data is most likely displayed at this level using a dot plot and by level 3 this would be expected.
Problem 	Once the variables are identified we want to ask the students what sorts of things they think we can find out using the variables we have. The starter <i>I wonder...</i> is useful for this. Remember the variables are gender, time taken to get to school, main way to get to school, right foot length and hair length. The “I wonder” statements will probably be ones like: <i>I wonder if many students come to school by bus, I wonder how long the longest right foot is, I wonder how many girls there are...</i> Any of these that are not about the variables listed should be challenged at this stage, for example, <i>I wonder if the girls have dark hair or light hair</i>, this cannot be answered as we don’t have hair colour as one of our variables. These initial “I wonder” statements are NOT investigative questions; they are an inkling of an idea of what might be investigated. The teacher works with the students to pose suitable investigative questions. For example: <i>I wonder how long the longest right foot is...</i> this question asks about an individual or the person with the longest foot, this is not an investigative question, it is however a question we could ask of our data once we have displayed it and we are writing summary statements. We want to ask investigative questions about the whole group. “I wonder what are typical right foot lengths for these students?” would be a suitable investigative question. Find out more about posing investigative questions at: http://new.censusatschool.org.nz/resource/posing-summary-investigative-questions/ Other suitable investigative questions would be “I wonder what the main ways these students come to school are?”; “I wonder what typical hair lengths of these girls are? ...of these boys are? ...of these students are?”; “I wonder how long it takes these students to get to school?” Investigative questions need to be about the whole group (the aggregate) and not just an individual. To answer the investigative question students will need to make displays and write summary statements about the data. Remember at curriculum levels 2 and 3 the teacher should be posing the investigative question with the students. At curriculum level 4 students start to pose their own investigative questions. Good modeling in the lower levels will help.

Data 	Get students to use their data cards to build displays for the investigative question chosen. See analysis.
Analysis 	Displays using data cards are a good starting point for displaying the data. Below is shown (1) main ways of getting to school and (2) right foot length.  you might like to get students to paste the cards onto paper for a groups might do different investigative questions. the main ways of getting to school should be drawn up in student and the right foot length as a dot plot.  Work with students to make summary statements of their displays. The starter I notice is useful here. For example: <i>I notice that the most common main way of getting to school is by car for these students, I notice that using a bike is the least common way of getting to school for these students, I notice that most of these students get to school by walking or by car. (From the data card display they might also notice that only boys bike to school and only girls come by bus.)</i> <i>I notice that the most common right foot length for these students is 21 cm. I notice that none of these students has a right foot length of 25cm. I notice that the right foot lengths of these students go from 17cm to 26cm. I notice that over half of these students have right foot lengths between 20cm and 22cm. (From the data cards they might also notice that the student with the longest foot length is a boy.)</i>
Conclusion	When writing the conclusion the students should be answering the investigative question. This information will come from their analysis.

	For example: I wonder what the main ways these students come to school are?" <i>These students come to school by bike, bus, car and by walking. The most common method of transport is by car and the least common is by bike. Over half the students come by car or by walking.</i> I wonder what are typical right foot lengths for these students? <i>Typically these students have right foot lengths between 20cm and 22 cm. Over half the students are in this group.</i>
Reflection	• Is it easier to graph category or number data? Why?
To extend this activity	• What would your own data card look like? • Could we collect our own class data cards? • What other information might be interesting to find out about students from CensusAtSchool data & how would we display that information?

Lesson Vocabulary: here is a list of the interest words used in this lesson. You may wish to write them on a chart, enlarge and photocopy or get students to add into their mathematics books.

most common	investigate	investigative question
data	length	number data
dot plots	typical	category data
gender	question	range
bar graphs	middle	analysis
data card	survey	
conclusion	individual	