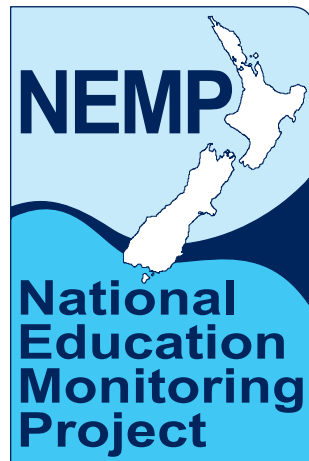


# Graphs, Tables & Maps

A s s e s s m e n t R e s u l t s 2 0 0 7

GRAPHS, TABLES & MAPS ASSESSMENT RESULTS 2007





**NEW ZEALAND**

# **Graphs, Tables and Maps**

## **Assessment Results**

# **2007**

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**EARU**

**NATIONAL EDUCATION MONITORING**  
**REPORT 46**



## MINISTRY OF EDUCATION

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### NEMP REPORTS

#### CYCLE 1

**1995** 1 Science  
2 Art  
3 Graphs, Tables and Maps

**1996** 4 Music  
5 Aspects of Technology  
6 Reading and Speaking

**1997** 7 Information Skills  
8 Social Studies  
9 Mathematics

**1998** 10 Listening and Viewing  
11 Health and Physical Education  
12 Writing

#### CYCLE 2

**1999** 13 Science  
14 Art  
15 Graphs, Tables and Maps  
16 Māori Students' Results

**2000** 17 Music  
18 Aspects of Technology  
19 Reading and Speaking  
20 Māori Students' Results

**2001** 21 Information Skills  
22 Social Studies  
23 Mathematics  
24 Māori Students' Results

**2002** 25 Listening and Viewing  
26 Health and Physical Education  
27 Writing  
28 Māori Students' Results

#### CYCLE 3

**2003** 29 Science  
30 Visual Arts  
31 Graphs, Tables and Maps  
42 Māori Medium Students' Results

**2004** 32 Music  
33 Aspects of Technology  
34 Reading and Speaking  
43 Māori Medium Students' Results

**2005** 35 Information Skills  
36 Social Studies  
37 Mathematics  
38 Māori Medium Students' Results

**2006** 39 Listening and Viewing  
40 Health and Physical Education  
41 Writing

#### CYCLE 4

**2007** 44 Science  
45 Visual Arts  
46 Graphs, Tables and Maps

**2008** Music  
Aspects of Technology  
Reading and Speaking

**2009** Information Skills  
Social Studies  
Mathematics

**2010** Listening and Viewing  
Health and Physical Education  
Writing

Note that reports are published the year after the research is undertaken  
i.e. reports for 2008 will not be available until 2009.



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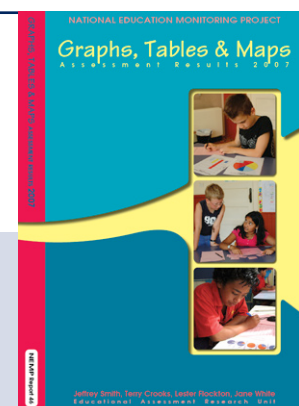
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### NATIONAL EDUCATION MONITORING REPORT 46

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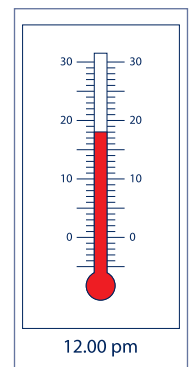
# A

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The Project directors acknowledge the vital support and contributions of many people to this report, including:

- ▶ the very dedicated staff of the Educational Assessment Research Unit
- ▶ Heleen Visser, Hadyn Green, Nicola Durling and other staff members of the Ministry of Education
- ▶ members of the Project's National Advisory Committee
- ▶ principals and children of the schools where tasks were trialled
- ▶ principals, staff and Board of Trustee members of the 248 schools included in the 2007 sample
- ▶ the 2877 children who participated in the assessments and their parents
- ▶ the 96 teachers who administered the assessments to the children
- ▶ the 44 senior tertiary students who assisted with the marking process
- ▶ the 170 teachers who assisted with the marking of tasks early in 2008.

**Overview:** Year 4 and year 8 students show a basic ability to read and interpret graphs, tables and maps, with year 8 students showing marked improvement over year 4 students. Tasks that involve interpreting information, combining information, or using information to make inferences or deductions are particularly difficult for year 4 students. Many year 8 students are skilled at producing or completing graphs and tables, with year 4 students having substantially more difficulty in this area. When a task requires the construction of a graph or table without a model to work from, many students at both years have trouble. Overall performance levels were very similar in 2007 and 2003, and differences between demographic subgroups had not changed substantially. On average, across the range of 2007 tasks at both year levels, differences in performance between boys and girls were very small; Pakeha students performed better than Māori students by moderate to large margins; Pakeha students performed better than Pasifika students by large margins; and students for whom the predominant language at home was English performed slightly to moderately better than other students.



## THE NEMP APPROACH TO NATIONAL MONITORING

New Zealand's National Education Monitoring Project (NEMP) commenced in 1993, with the task of assessing and reporting on the achievement of New Zealand primary school children in all areas of the school curriculum. Children are assessed at two class levels: year 4 (halfway through primary education) and year 8 (at the end of primary education). Different curriculum areas and skills are assessed each year, over a four-year cycle. The main goal of national monitoring is to provide detailed information about what children can do so that patterns of performance can be recognised, successes celebrated and desirable changes to educational practices and resources identified and implemented.

Each year, random samples of children are selected nationally, then assessed in their own schools by teachers

specially seconded and trained for this work. Task instructions are given orally by teachers, through video presentations, on laptop computers, or in writing. Many of the assessment tasks involve the children in the use of equipment and supplies. Their responses are presented orally, by demonstration, in writing, in computer files, or through submission of other physical products. Many of the responses are recorded on videotape for subsequent analysis.

The use of many tasks with both year 4 and year 8 students allows comparisons of the performance of year 4 and 8 students in 2007. Because some tasks have now been used twice, in 2003 and again in 2007, trends in performance across the four-year period can also be analysed. We have also included in this report results from a re-administration of two tasks from 1995.

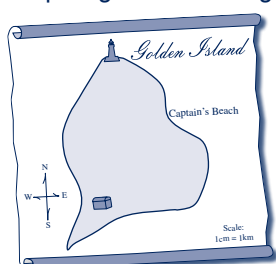


## ASSESSING SKILLS IN THE USE OF GRAPHS, TABLES AND MAPS

In 2007, the first year of the fourth cycle of national monitoring, three areas were assessed: science, art, and the use of graphs, tables and maps. This report presents details and results of the assessments of students' skills in the use of graphs, tables and maps. Understanding and using information presented in the form of graphs, tables and maps is an important part of everyday life in our community. This report highlights two aspects of the use of graphs, tables and maps: extracting and interpreting information, and constructing or completing graphs, tables and maps.

## INTERPRETATION OF GRAPHS, TABLES AND MAPS

**Chapter 3** focuses on extracting and interpreting information from a wide variety of graphs, tables and maps. Averaged across 130 task components used with both year 4 and year 8 students, 65% of year 8 students produced correct responses compared to 51% of year 4 students. This indicates that, on average, students have made good progress between year 4 and year 8 in the skills assessed by the tasks. Year 8 students were quite good at reading basic information



from graphs, and most performed well when the graph called for calculations or finding information that involved a

more sophisticated use of the graph (such as combining information or making deductions from graphical information). Most year 4 students had difficulty when asked to do anything more than a straightforward reading of the information from the graph.

Thirteen trend tasks involving 64 task components were administered to year 4 students in both the 2003 and 2007 assessments. Averaged across all 64 components, 1% fewer students succeeded in 2007 (46%) than in 2003 (47%). Thus, performance stayed almost the same over the four-year time span. Two tasks, with a total of 10 components, were administered in 1995 and 2007, allowing for a 12-year look at change. Averaged across these 10 components, students in 2007 were

successful 65% of the time, compared to 58% of the time in 1995. Thus, we see a gain over the 12-year period on these two tasks.

Fifteen trend tasks involving 72 task components were administered to year 8 students in both the 2003 and 2007 assessments. Averaged across all 72 components, students in 2007 were successful at a rate of 68%, compared to 71% in 2003. Thus, a small decline is seen in performance over the four-year period. Two tasks, with a total of 10 components, were administered in 1995 and 2007, allowing for a 12-year look at change. Averaged across these ten components, students in both 2007 and 2003 were successful 86% of the time, indicating no change over the 12-year period on these two tasks.

## CONSTRUCTING OR COMPLETING GRAPHS, TABLES AND MAPS

The focus of **Chapter 4** is constructing or completing graphs, tables and maps. Performance in graphs, tables, and maps shows strong growth from year 4 to year 8 overall. Averaged across 64 task components used with both year 4 and year 8 students, 80% of year 8 students produced correct responses compared to 50% of year 4 students. Thus, on average 30% more year 8 students than year 4 students successfully responded to task components. Furthermore, many students at year 8 showed a mastery of the skills necessary to produce graphs.

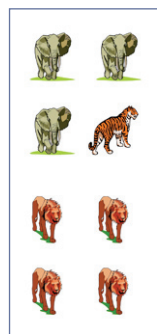
The biggest weakness for both years was the lack of appropriate labels and titles to accompany the graphs. Students also had trouble in developing a graph or table if they were not given some suggestion as to what the display should look like. If they had to do all of the layout and design, they were far less successful than if they were completing work that was already started. The difficulty appears to be in the ability to conceptualise what the finished product might look like as opposed to working from a model.

Six trend tasks involving 40 components were administered at year 4 in 2003 and again in 2007. The average successful completion rate on these tasks was 46% in 2003 and 45% in 2007. Thus, performance in the two years is very similar. Seven trend tasks involving 52 components were administered at year 8 in both 2003 and 2007. The average success rate in 2003 was 72% and in 2007 the comparable figure is 70%. Again, performance across the four-year span is quite similar.

## PERFORMANCE OF SUBGROUPS

**Chapter 5** reports the results of analyses that compared the performance of different demographic subgroups. School type (full primary school, intermediate school, or year 7 to 13 high school), geographic zone, community size and school size produced few statistically significant differences among subgroups, and no strong trends were seen in the data. Furthermore, gender differences were very small, with less than ten percent of tasks at either year level showing statistically significant differences between the performance of boys and girls (with some tasks favouring boys but others, girls). There were, however, stronger differences by socio-economic status (SES), ethnicity and home language.

With regard to SES, we used the Ministry of Education decile system to form three SES levels for schools: deciles 1-3 formed the lowest group, deciles 4-7 formed the middle group, and deciles 8-10 formed the highest group. There were statistically significant differences in the performance of students from low, medium and high decile schools on 80% of the tasks at year 4 level and 75% of the tasks at year 8 level. The corresponding figures in 2003 were 51% and 73%, in 1999 were 52% and 84%, and in 1995 were 67% and 60%.



For comparisons of Pakeha students with Māori students, Pakeha with Pasifika students, and students for whom the predominant language at home was English with those for whom it was not, effect sizes were used. Effect size is the difference

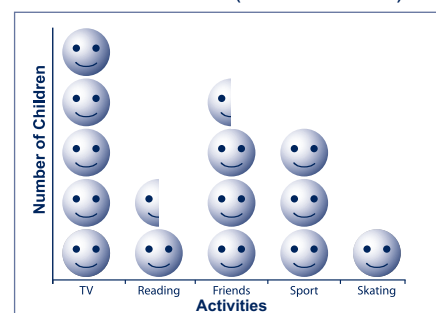
in mean (average) performance of the two groups, divided by the pooled standard deviation of the scores on the particular task.

In general, Pakeha students performed better than Māori students. For year 4 students, the mean effect size across 40 tasks was 0.38 (Pakeha students averaged 0.38 standard deviations higher than Māori students). This is a moderate to large difference. For year 8 students, the mean effect size across the 45 tasks was 0.42. This is also a moderate to large difference. The corresponding effect sizes in earlier assessments were similar or slightly smaller: 0.33 for year 4 students and 0.40 for year 8 students in 2003, and 0.33 and 0.33 in 1999.

The results for comparisons of Pakeha and Pasifika students show larger disparities. For year 4 students, the mean effect size across the 40 tasks was 0.59 (Pakeha students averaged 0.59 standard deviations higher than Pasifika students). This is a large difference. For year 8 students, the mean effect size across the 40 tasks was 0.56. This also is a large difference. The corresponding mean effect sizes in the 2003 and 1999 assessments were also large: 0.50 for year 4 students and 0.70 for year 8 students in 2003, and 0.59 and 0.66 in 1999. The disparity for year 4 students has not changed over eight years, but at year 8 level the disparity has decreased a little.

Compared to students for whom the predominant language at home was English, students from homes where other languages predominated scored lower, on average, with mean effect sizes of 0.21 for year 4 and 0.15 for year 8. These are small to moderate

disparities, substantially smaller than the moderate disparities in the 2003 assessments (0.35 for year 4 students and 0.27 for year 8 students) and in the 1999 assessments (0.37 and 0.31).



## SUMMARY OF PERFORMANCE TRENDS

An indication of overall trends in performance across the four-year period between 2003 and 2007 can be obtained by looking at the patterns of change across all of the trend tasks. Averaged across 104 components of the year 4 trend tasks, 1% fewer students succeeded in 2007 than in 2003. Averaged across 124 components of the year 8 trend tasks, 2% fewer students succeeded in 2007 than in 2003. The report on the 2003 graphs, tables and maps assessments reported trends between 1999 and 2003, with an average loss over that four-year period of 4% on year 4 trend task components and a decline of 1% on year 8 trend task components. The report on the 1999 graphs, tables and maps assessments reported trends between 1995 and 1999, with an average gain over that four-year period of 6% on year 4 trend task components and a decline of 1% on year 8 trend task components. Taken together, these three sets of trend results suggest little change in performance overall, at either year level, for the twelve year period from 1995 to 2007.



# The National Education Monitoring Project 1



This chapter presents a concise outline of the rationale and operating procedures for national monitoring, together with some information about the reactions of participants in the 2007 assessments. Detailed information about the sample of students and schools is available in the Appendix.

## **Purpose of National Monitoring**

*The New Zealand Curriculum Framework (1993, p26) states that the purpose of national monitoring is to provide information on how well overall national standards are being maintained, and where improvements might be needed.*

The focus of the National Education Monitoring Project (NEMP) is on the educational achievements and attitudes of New Zealand primary and intermediate school children. NEMP provides a national “snapshot” of children’s knowledge, skills and motivation, and a way to identify which aspects are improving, staying constant or declining. This information allows successes to be celebrated and priorities for curriculum change and teacher development to be debated

more effectively, with the goal of helping to improve the education which children receive.

Assessment and reporting procedures are designed to provide a rich picture of what children can do and thus to optimise value to the educational community. The result is a detailed national picture of student achievement. It is neither feasible nor appropriate, given the purpose and the approach used, to release information about individual students or schools.

## **Monitoring at Two Class Levels**

National monitoring assesses and reports what children know and can do at two levels in primary and intermediate schools: year 4 (ages 8-9) and year 8 (ages 12-13).

## **National Samples of Students**

National monitoring information is gathered using carefully selected random samples of students, rather than all year 4 and year 8 students. This enables a relatively extensive exploration of students’ achievement, far more detailed than would be possible if all students were to be

assessed. The main national samples of 1440 year 4 children and 1440 year 8 children represent about 2.5% of the children at those levels in New Zealand schools, large enough samples to give a trustworthy national picture.

## **Three Sets of Tasks at Each Level**

So that a considerable amount of information can be gathered without placing too many demands on individual students, different students attempt different tasks. The 1440 students selected in the main sample at each year level are divided into three groups of 480 students, comprising four students from each of 120 schools. Each group attempts one third of the tasks.

## **Timing of Assessments**

The assessments take place in the second half of the school year, between August and November. The year 8 assessments occur first, over a five-week period. The year 4 assessments follow, over a similar period. Each student participates in about four hours of assessment activities spread over one week.

YEAR		NEW ZEALAND CURRICULUM	
1	2007 (2003) (1999) (1995)	Science Visual Arts Information Skills: <i>graphs, tables, maps, charts &amp; diagrams</i>	Communication skills Problem-solving skills Self-management and competitive skills Social and cooperative skills Work and study skills Attitudes
	2008 (2004) (2000) (1996)	Language: <i>reading and speaking</i> Aspects of Technology Music	
	2009 (2005) (2001) (1997)	Mathematics: <i>numeracy skills</i> Social Studies Information Skills: <i>library, research</i>	
	2010 (2006) (2002) (1998)	Language: <i>writing, listening, viewing</i> Health and Physical Education	

### Specially Trained Teacher Administrators

The assessments are conducted by experienced teachers, usually working in their own region of New Zealand. They are selected from a national pool of applicants, attend a week of specialist training in Wellington led by senior Project staff and then work in pairs to conduct assessments of 60 children over five weeks. Their employing school is fully funded by the Project to employ a relief teacher during their secondment.



### Four-Year Assessment Cycle

Each year, the assessments cover about one quarter of the areas within the national curriculum for primary schools. The New Zealand Curriculum Framework is the blueprint for the school curriculum. It places emphasis on seven essential learning areas, eight essential skills and a variety of attitudes and values. National monitoring aims to address all of these areas, rather than restrict itself to pre-selected priority areas.

The first four-year cycle of assessments began in 1995 and was completed in 1998. The second cycle ran from 1999 to 2002. The third cycle began in 2003 and finished in 2006. The fourth cycle began in 2007. The areas covered each year and the reports produced are listed opposite the contents page of this report.

Approximately 45% of the tasks are kept constant from one cycle to the next. This re-use of tasks allows trends in achievement across a four-year interval to be observed and reported.

### Important Learning Outcomes Assessed

The assessment tasks emphasise aspects of the curriculum which are particularly important to life in our community, and which are likely to be of enduring importance to students. Care is taken to achieve balanced coverage of important skills, knowledge

and understandings within the various curriculum strands, but without attempting to follow slavishly the finer details of current curriculum statements. Such details change from time to time, whereas national monitoring needs to take a long-term perspective if it is to achieve its goals.

### Wide Range of Task Difficulty

National monitoring aims to show what students know and can do. Because children at any particular class level vary greatly in educational development, tasks spanning multiple levels of the curriculum need to be included if all children are to enjoy some success and all children are to experience some challenge. Many tasks include several aspects, progressing from aspects most children can handle well to aspects that are less straightforward.

### Engaging Task Approaches

Special care is taken to use tasks and approaches that interest students and stimulate them to do their best. Students' individual efforts are not reported and have no obvious consequences for them. This means that worthwhile and engaging tasks are needed to ensure that students' results represent their capabilities rather than their level of motivation. One helpful factor is that extensive use is made of equipment and supplies which allow students to be involved in hands-on activities. Presenting some of the tasks



on video or computer also allows the use of richer stimulus material, and standardises the presentation of those tasks.

### Positive Student Reactions to Tasks

At the conclusion of each assessment session, students completed evaluation forms in which they identified tasks that they particularly enjoyed, tasks they felt relatively neutral about and tasks that did not appeal. Averaged across all tasks in the 2007 assessments, 75% of year 4 students indicated that they particularly enjoyed the tasks. The range across the 117 tasks was from 99% down to 48%. As usual, year 8 students were more demanding. On average, 60% of them indicated that they particularly enjoyed the tasks, with a range across 149 tasks from 95% down to 32%. One task was more disliked than liked, by year 8 students only (a table interpretation task involving New Zealand travelling times).

### Appropriate Support for Students

A key goal in Project planning is to minimise the extent to which student strengths or weaknesses in one area of the curriculum might unduly influence their assessed performance in other areas. For instance, skills in reading and writing often play a key role in success or failure in paper-and-pencil tests in areas such as science, social studies, or even mathematics. In national monitoring, a majority of tasks are presented orally by teachers, on video, or on computer, and most answers are given orally or by demonstration rather than in writing. Where reading or writing skills are required to perform tasks in areas other than reading and writing, teachers are happy to help students to understand these tasks or to communicate their responses. Teachers are working with no more than four students at a time, so are readily available to help individuals.

To free teachers further to concentrate on providing appropriate guidance and help to students, so that the students achieve as well as they can, teachers are not asked to record judgements on the work the students are doing. All marking and analysis is done later, when the students' work has reached the Project office in Dunedin. Some of the work comes on paper, but much of it arrives recorded on videotape. In 2007, about 45% of the students'



work came in that form, on a total of about 3500 videotapes. The video recordings give a detailed picture of what students and teachers did and said, allowing rich analysis of both process and task achievement.

### Four Task Approaches Used

In 2007, four task approaches were used. Each student was expected to spend about an hour working in each format. The four approaches were:

- *One-to-one interview*  
Each student worked individually with a teacher, with the whole session recorded on videotape.
- *Stations*  
Four students, working independently, moved around a series of stations where tasks had been set up. This session was not videotaped.
- *Team and Independent*  
Four students worked collaboratively, supervised by a teacher, on some tasks. This was recorded on videotape. The students then worked individually on some paper-and-pencil tasks.
- *Art-making*  
Four students, supervised by a teacher, worked individually on two art-making tasks. For one task, their clay sculptures were recorded on videotape together with an interview about the sculpture.

### Professional Development Benefits for Teacher Administrators

The teacher administrators reported that they found their training and assessment work very stimulating and professionally enriching. Working so closely with interesting tasks administered to 60 children in at least five schools offered valuable

insights. Some teachers have reported major changes in their teaching and assessment practices as a result of their experiences working with the Project. Given that 96 teachers served as teacher administrators in 2007, or about 0.5% of all primary teachers, the Project is making a major contribution to the professional development of teachers in assessment knowledge and skills. This contribution will steadily grow, since preference for appointment each year is given to teachers who have not previously served as teacher administrators. The total after 13 years is 1232 different teachers, 68 of whom have served more than once.

### Marking Arrangements

The marking and analysis of the students' work occurs in Dunedin. The marking process includes extensive discussion of initial examples and careful checks of the consistency of marking by different markers.

Tasks which can be marked objectively or with modest amounts of professional experience usually are marked by senior tertiary students, most of whom have completed two or three years of pre-service preparation for primary school teaching. Forty-four student markers worked on the 2007 tasks, employed five hours per day for about five weeks.

The tasks that require higher levels of professional judgement are marked by teachers, selected from throughout New Zealand. In 2007, 170 teachers were appointed as markers. Most teachers worked either mornings or afternoons for one week. Teacher professional development through participation in the marking process is another substantial benefit from national monitoring.



In evaluations of their experiences on a four-point scale (“dissatisfied” to “highly satisfied”), 67% to 92% of the teachers who marked student work in 2008 chose “highly satisfied” in response to questions about:

- the instructions and guidance given during marking sessions
- the degree to which marking was professionally satisfying and interesting
- its contribution to their professional development in the area of assessment
- the overall experience.

### Analysis of Results

The results are analysed and reported task by task. Most task reports include a total score, created by adding scores for appropriate task components. Details of how the total score has been constructed for particular assessment tasks can be obtained from the NEMP office (earu@otago.ac.nz).

Although the emphasis is on the overall national picture, some attention is also given to possible differences in performance patterns for different demographic groups and categories of school. The variables considered are:

- **Student gender:**
  - male
  - female
- **Student ethnicity:**
  - Māori
  - Pasifika
  - Pakeha (includes all other students)
- **Home language:** (predominant language spoken at home)
  - English
  - any other language
- **Geographical zone:**
  - Greater Auckland
  - other North Island
  - South Island
- **Size of community:**
  - main centre over 100,000
  - provincial city of 10,000 to 100,000
  - rural area or town of less than 10,000
- **Socio-economic index for the school:**
  - lowest three deciles
  - middle four deciles
  - highest three deciles
- **Size of school:**
  - YEAR 4 SCHOOLS
    - less than 25 year-4 students
    - 25 to 60 year-4 students
    - more than 60 year-4 students
  - YEAR 8 SCHOOLS
    - less than 35 year-8 students
    - 35 to 150 year-8 students
    - more than 150 year-8 students
- **Type of school:** (for year 8 sample only)
  - full primary school
  - intermediate school
  - year 7–13 high school (some students were in other types of schools, but too few to allow separate analysis).

Categories containing fewer children, such as Asian students or female Māori students, were not used because the resulting statistics would be based on the performance of fewer than 70 children, and would therefore be unreliable.

An exception to this guideline was made for Pasifika children and children whose home language was not English because of the agreed importance of gaining some information about their performance.

### Funding Arrangements

National monitoring is funded by the Ministry of Education, and organised by the Educational Assessment Research Unit at the University of Otago, under the direction of Professors Terry Crooks and Jeffrey Smith. The current contract runs until 2010. The cost is about \$2.7 million per year, less than one tenth of a percent of the budget allocation for primary and secondary education. Almost half of the funding is used to pay for the time and expenses of the teachers who assist with the assessments as task developers, teacher administrators or markers.

### Reviews by International Scholars

In June 1996, three scholars from the United States and England, with distinguished international reputations in the field of educational assessment, accepted an invitation from the Project directors to visit the Project. They conducted a thorough review of the progress of the Project, with particular attention to the procedures and tasks used in 1995 and the results emerging. At the end of their review, they prepared a report which concluded as follows:

*The National Education Monitoring Project is well conceived and admirably implemented. Decisions about design, task development, scoring and reporting have been made thoughtfully. The work is of exceptionally high quality and displays considerable originality. We believe that the project has considerable potential for advancing the understanding of and public debate about the educational achievement of New Zealand students. It may also serve as a model for national and/or state monitoring in other countries.*

*(Professors Paul Black, Michael Kane & Robert Linn, 1996)*

A further review was conducted late in 1998 by another distinguished panel (Professors Elliot Eisner, Caroline Gipps and Wynne Harlen). Amid very helpful suggestions for further refinements and investigations, they commented that:

*We want to acknowledge publicly that the overall design of NEMP is very well thought through... The vast majority of tasks are well designed, engaging to students and consistent with good assessment principles in making clear to students what is expected of them.*

### Further Information

A more extended description of national monitoring, including detailed information about task development procedures, is available in:

Flockton, L. (1999). *School-wide Assessment: National Education Monitoring Project*. Wellington: New Zealand Council for Educational Research.



# Assessing Skills in the Use of Graphs, Tables and Maps 2



## Graphs, Tables and Maps are Widely Used

Understanding and using information presented in the form of graphs, tables and maps is an important part of everyday life in our community. Graphs help us learn about how the values of shares are changing or the fortunes of political parties are fluctuating. We use tables in various guises, such as timetables, tables of postage rates and tax tables. Maps also feature regularly in our lives, as we encounter floor plans in shopping malls and public buildings, use street maps to find our way around towns and cities, or study weather maps in the hope that they may enlighten us about what clothes to wear or activities to plan. It is appropriate, therefore, that children begin to experience and understand graphs, tables and maps from an early age.



## Graphs, Tables and Maps and the National Curriculum

The study or use of graphs, tables or maps is featured in several learning areas of the newly revised *The New Zealand Curriculum*. Mathematics, science, technology and the social sciences all make use of information presented in the form of graphs, tables and maps. Language also includes an important role for graphs, tables and maps. The Second International Reading Literacy Study, conducted in 32 countries in 1990–91, assessed literacy in three domains. One of those domains was documents, for which the assessments focused on students' abilities to "search, locate, and process information ... set out in the form of graphs, charts, maps, lists, or sets of instructions". The *Progress in Reading Literacy Study* (PIRLS, 2000-1) conducted in 35 countries repeated its assessment of informational literacy. New Zealand students averaged 525 points, 25 higher than the international mean.

The use of maps, tables and graphs is particularly relevant to the Key Competency of *Using Language, Symbols, and Texts*:

*Students who are competent users of language, symbols and texts can interpret and use words, number, images, movement, metaphor and technologies in a range of contexts. They recognise how choices of language, symbol or text affect people's understanding and the ways in which they respond to communications.*

(p.12, *The New Zealand Curriculum*)





### Choosing Where to Assess Skills in the Use of Graphs, Tables and Maps

During the planning for national monitoring, a decision was taken that skills in the use of graphs, tables and maps should be brought into sharp focus by assessing and reporting on these skills separately, in one year of the four-year assessment cycle. Graphs, tables and maps are also included in assessment tasks relating to specific learning areas, but there the emphasis is on specific features associated with that learning area (such as the use of maps to depict physical geography) or on the application of the information within the learning area (such as the use of tide tables in a science question about why tides occur).

### Developing the Tasks

The criteria for selecting tasks are outlined in Chapter 1, with more details in the book referenced at the end of that chapter. The tasks described in this report were either designed by staff of the Project or adapted by them from published tasks previously used elsewhere. Every attempt was made to select tasks that assessed skills students could be expected to use in their everyday lives.

### Two Aspects Assessed

This report highlights two aspects of the use of graphs, tables and maps: extracting and interpreting information, and organising and presenting information. Of the 62 assessment tasks discussed, 42 tasks involved extracting and interpreting information from completed graphs, tables or maps. The remaining 20 tasks involved organising and presenting information by constructing graphs or tables or adding to partially completed graphs or tables.

### Trend Tasks

Twenty-four of the tasks reported here were previously used in identical form in previous assessments, 22 in the 2003 report and two in the 1995 report. The tasks from the 2003 report were called "link tasks" in that report and were not described in detail there to avoid any distortions in the 2007 report. The two 1995 tasks were included to take a look at longer-term trends. In the current report, these 24 tasks are called "trend tasks" and are used to examine trends in student performance levels: whether they have improved, stayed constant or declined since the previous assessments.

### Link Tasks

To allow comparisons of performance between the 2007 and 2011 assessments, 31 of the tasks used for the first time in 2007 have been designated as link tasks. Patterns of student results on these tasks are presented in this report, but the tasks are described only in general terms, so they can be used again in 2011.

### Marking Methods

The students' responses were assessed using specially designed marking procedures. All of the tasks in this report were marked by senior tertiary students. The criteria used in the marking had been developed in advance by Project staff, but were sometimes modified as a result of issues raised during the marking.

When the marking for each task commenced, all markers gathered to be introduced to the task and the marking criteria. They then collectively marked two to four performances, discussing discrepancies between the marks awarded. In this way, the meaning of

the criteria and the standards to be applied were determined collectively by the markers and Project staff leading the session. Once good consistency had been achieved, the markers marked performances individually, periodically being brought back together to mark a few performances collectively and discuss any discrepancies that were apparent. This process provided both assurance and reassurance that adequately consistent marking was being achieved.

### Task-by-Task Reporting

National monitoring assessment is reported task by task so that results can be understood in relation to what the students were asked to do.

### Access Tasks

Teachers and principals have expressed considerable interest in accessing NEMP task materials and marking instructions, so that they can use them within their own schools. Some are interested in comparing the performance of their own students to national results on aspects of the curriculum, while others want to use tasks as models of good practice. Some would like to modify tasks to suit their own purposes, while others want to follow the original procedures as closely as possible. There is obvious merit in making available carefully developed tasks that are seen to be highly valid and useful for assessing student learning.

Some of the tasks in this report cannot be made available in this way. Link tasks must be saved for use in four years' time, and other tasks use copyright or expensive resources that cannot be duplicated by NEMP and provided economically to schools. There are also limitations on how precisely a school's administration and marking of tasks can mirror the ways that they are administered and marked by the Project. Nevertheless, a substantial number of tasks are suitable to duplicate for teachers and schools. In this report, these access tasks are identified with the symbol above, and can be purchased in a kit from the New Zealand Council for Educational Research (P.O. Box 3237, Wellington 6000, New Zealand).

Teachers are also encouraged to use the NEMP web site (<http://nemp.otago.ac.nz>) to view video clips and listen to audio material associated with some of the tasks.



# How to Read the Tasks and Results



ABOUT THE TASK

WHAT THE STUDENTS READ OR HEARD (BLUE)  
MARKING CRITERIA (RED)

PERFORMANCE PATTERNS

The content, instructions and key resources are shown for each task, as they were presented to the students. Sentences in bold, blue are an instruction to the teacher administrator. The students' results are shown in red.

Students did this task on their own at a "station", writing their own answers. See page 7 for descriptions of all four approaches used.

**Trend Task: Free Time Favourites**

Approach: **Station**      Year: **4 & 8**

Focus: **Interpreting a pictograph**

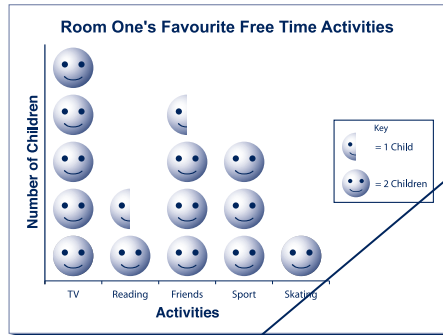
Resources: **Pictograph in work book**

What this task was aiming to evaluate.

The resources used in this task.

**Questions / instructions:**

The children in Room One were asked "What is your favourite free time activity?" The information is shown on the pictograph.

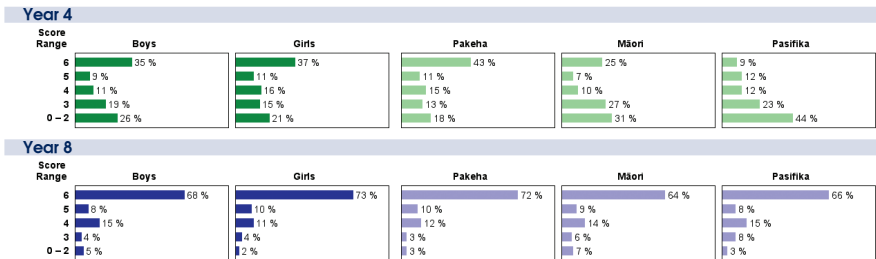


- 61% of the year 4 students in 2007 gave the correct answer of "7"
- 63% of the year 4 students in 2003 gave the correct answer of "7"
- 92% of the year 8 students in 2007 gave the correct answer of "7"
- 93% of the year 8 students in 2003 gave the correct answer of "7"

Question	Marking Criteria	% response		Total score	% response	
		2007 (03)	year 8		2007 (03)	year 8
1. How many children said playing <b>sport</b> was their favourite free time activity?	6 3	59 (62)	92 (91)	6 5 4 3 0-2	36 (38)	70 (71)
2. How many children said being with their <b>friends</b> was their favourite free time activity?	7	61 (63)	92 (93)	5 4 3 0-2	11 (11)	9 (7)
3. What free time activity did most children in Room One say was their favourite?	TV	83 (86)	94 (95)	4 3 0-2	13 (15)	13 (14)
4. Two more children said they liked playing <b>sport</b> . Put this information on the graph. <b>draw a circle on to "Sport"</b> <b>draw two circles on to "Sport"</b>		45 (48)	76 (76)		24 (22)	4 (3)

The total score is created by adding those marking criteria that seem to capture best the overall task performance. For some tasks this is all of the criteria but for others, it is just one or two of the criteria.

**Subgroup Analyses:**



Performance patterns for boys and girls; Māori, Pasifika and Pakeha students, based on their total scores on the task. Note that Pakeha is defined as everyone not included in Māori or Pasifika.

**Commentary:**

Strong growth from year 4 to year 8 is seen in the ability to interpret a pictograph. While year 4 children had some difficulties with issues such as the units involved in the graph, year 8 children generally had little difficulty with the task. Performance was very similar in 2003 and 2007, and for boys and girls. Most year 4 Pasifika students scored half marks or lower but at year 8 level, all three ethnic groups performed similarly.

Comments that assist with interpreting the results.



# 3 Interpretation of Graphs, Tables and Maps

**Overview:** Students at year 8, and to a somewhat lesser degree at year 4, are able to read and interpret basic information presented in graphs, tables and maps. When the task requires a degree of interpretation or combining of information from the graph, performance drops off, particularly at year 4. Gains from year 4 to year 8 are substantial, with overall success on tasks occurring at a 51% rate for year 4 compared to a 65% rate at year 8. A slight decrease in performance was seen from 2003 to 2007 for year 8, with little change at year 4; however, gains were seen on two tasks administered in 1995 and again in 2007.



## Details of the Tasks Administered

Forty-two of the assessment tasks presented students with completed graphs, tables or maps and asked them to extract and interpret particular information. Twenty-nine tasks were completely or largely the same for year 4 and year 8 students. Thirteen of these are trend tasks from 2003 to 2007 (fully described with data for both 2003 and 2007); two of these are trend tasks from 1995 to 2007 (fully described with data for both 1995 and 2007). Three are released tasks (fully described with data for 2007 only), and 11 are link tasks (to be used again in 2007 so only partially described here). Twelve tasks were completed by year 8 students only; eight of these are link tasks, two are released tasks, and two are trend tasks. The final task was a link task completed by year 4 students only.

The tasks were presented to students in three formats. Three tasks involved more complex instructions or required more extended responses. These were administered in one-to-one interview format. Twenty-three tasks were presented in station format. The remaining sixteen tasks were presented in independent format.

The task details and results for trend tasks are presented in the first section, followed by the task details and results for released tasks. The third section contains a little task information and the results for the link tasks. Within each of the three sections, tasks used with both year 4 and year 8 students are presented first, followed by tasks used only with year 8 students and then by tasks used only with year 4 students.



## Comparing Results For Year 4 and Year 8 Students

Averaged across 130 task components used with both year 4 and year 8 students, 65% of year 8 students produced correct responses compared to 51% of year 4 students. This indicates that, on average, students have made good progress between year 4 and year 8 in the skills assessed by the tasks. Year 8 students were quite good at reading basic information from graphs, and most performed well when the graph called for calculations or finding information that involved a more sophisticated use of the graph (such as combining information or making deductions from graphical information). Year 4 students had difficulty when asked to do anything more than a straightforward reading of the information from the graph.

## Trend Results: Comparing 1995 and 2003 Results with 2007

Thirteen trend tasks involving 64 task components were administered to year 4 students in both the 2003 and 2007 assessments. Averaged across all 64 components, 1% fewer students succeeded in 2007 than in 2003 (46% to 47%). Thus, performance stayed almost the same over the four-year time span. Two tasks, with a total of 10 components, were administered in 1995 and 2007, allowing for a 12-year look at change. Averaged across these 10 components, students in 2007 were successful 65% of the time, compared to 58% of the time in 1995. Thus, we see a gain over the 12-year period on these two tasks.

Fifteen trend tasks involving 72 task components were administered to year 8 students in both the 2003 and 2007 assessments. Averaged across all 72 components, students in 2003 were successful at a rate of 71%, compared to 68% in 2007. Thus, a small decline is seen in performance over the four-year period. Two tasks, with a total of 10 components, were administered in 1995 and 2007, allowing for a 12-year look at change. Averaged across these 10 components, students in both 2007 and 2003 were successful 86% of the time. Thus, we see no change over the 12-year period on these two tasks.

Trend Task:

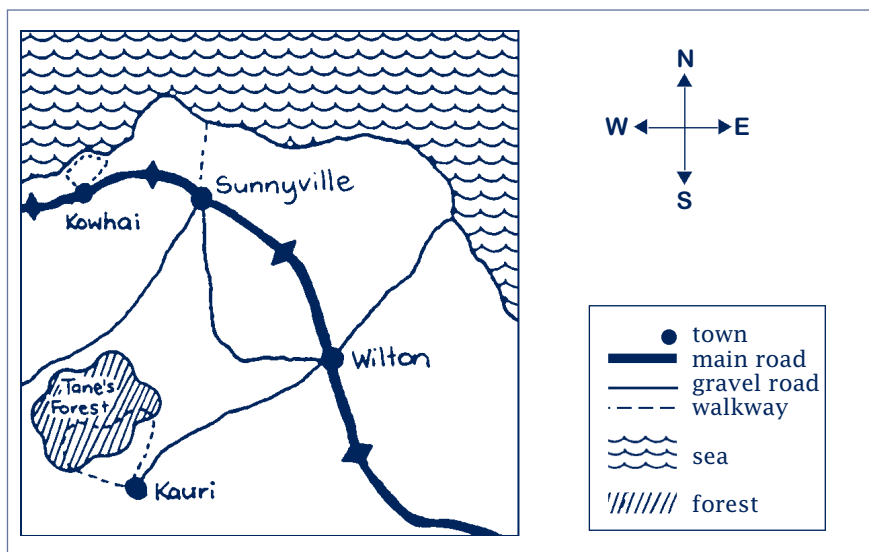
Tane's Forest

Approach: Station

Year: 4 & 8

Focus: Interpreting a map

Resources: Map in work book



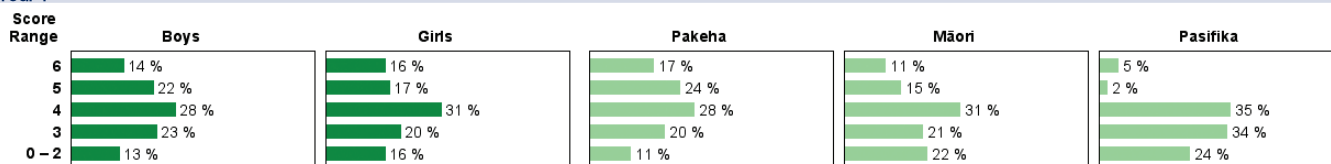
Questions / instructions:

- How many towns are shown on the map?
- How many walkways are shown on the map?
- Does the map show more sea or more land?
- What does the line from Sunnyville to Kowhai mean?
- Is Sunnyville north or south of Kauri?
- Which town will you have to pass through when going from Sunnyville to Kauri?

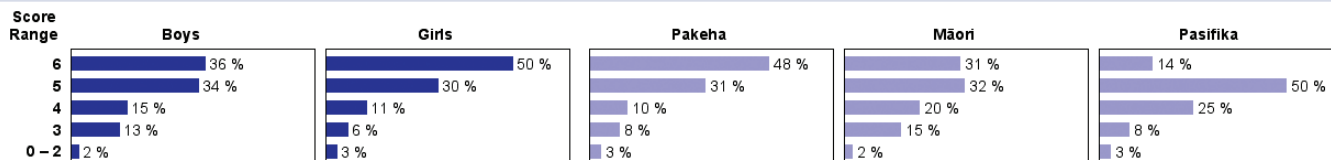
	Linked to 1995	
	% response 2007 ('95)	
	year 4	year 8
1. How many towns are shown on the map?	4	82 (82) 94 (96)
2. How many walkways are shown on the map?	3	47 (42) 82 (76)
3. Does the map show more sea or more land?	more land	81 (79) 88 (89)
4. What does the line from Sunnyville to Kowhai mean?	main road	44 (31) 72 (84)
5. Is Sunnyville north or south of Kauri?	north	58 (56) 74 (70)
6. Which town will you have to pass through when going from Sunnyville to Kauri?	Wilton	76 (78) 93 (95)
<b>Total score:</b>	<b>6</b>	<b>15 (7) 43 (42)</b>
	<b>5</b>	<b>20 (22) 32 (35)</b>
	<b>4</b>	<b>30 (29) 13 (16)</b>
	<b>3</b>	<b>21 (23) 9 (5)</b>
	<b>0-2</b>	<b>15 (19) 3 (2)</b>

Subgroup Analyses:

Year 4



Year 8



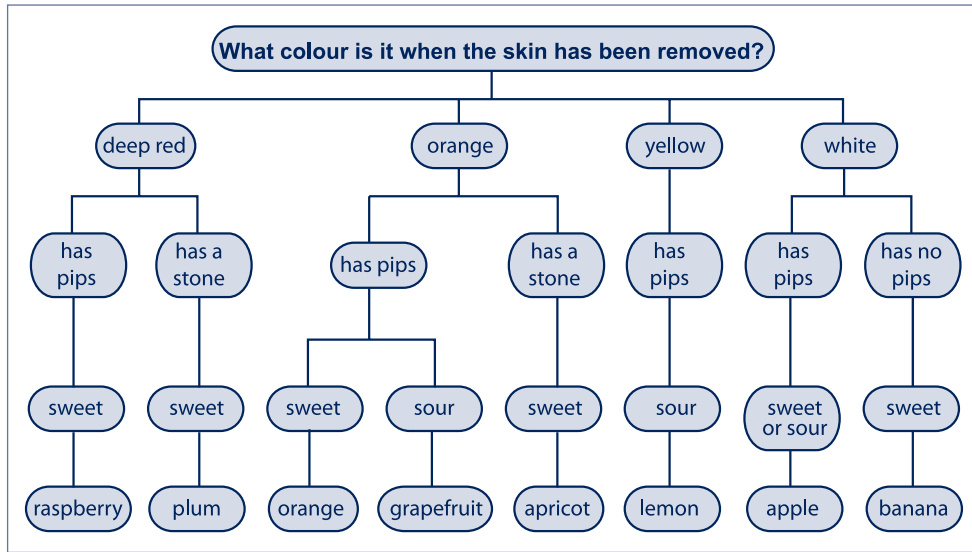
Commentary:

There was strong growth from year 4 to year 8 in the ability to read a simple map. Three quarters of year 8 students were able to answer all, or all but one, of the questions. There were no gender differences, and little change from 1995, when the task was first administered, to 2007.

# Trend Task: Fruit Chart

Approach: Station  
 Focus: Interpreting a tree diagram  
 Resources: Diagram in work book

Year: 4 & 8



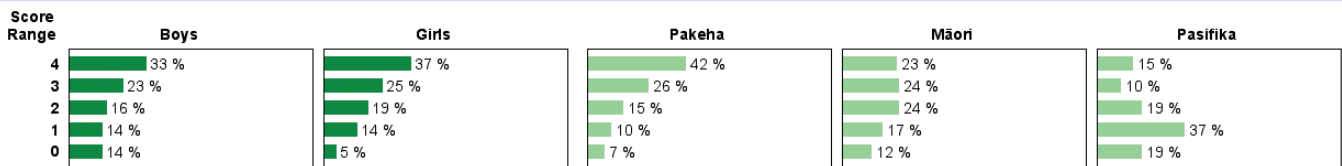
## Questions / instructions:

1. What is deep red and has a stone?
2. What is sour, has pips and is orange?
3. Use the flow chart to describe an apricot.  
 ["sweet", "has a stone", "orange"]
4. What fruit is described in the chart as being "sweet or sour"?

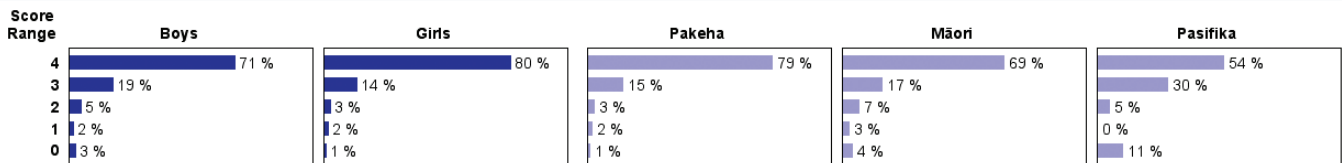
	Linked to 1995	
	% response 2007 ('95)	
	year 4	year 8
plum	83 (70)	96 (96)
grapefruit	63 (53)	90 (91)
all three descriptions mentioned	58 (36)	87 (76)
apple	59 (49)	87 (90)
<b>Total score:</b>	<b>4</b> 35 (19)	<b>75</b> (68)
	<b>3</b> 24 (24)	<b>17</b> (22)
	<b>2</b> 17 (20)	<b>4</b> (6)
	<b>1</b> 14 (20)	<b>2</b> (2)
	<b>0</b> 9 (17)	<b>2</b> (2)

## Subgroup Analyses:

Year 4



Year 8



## Commentary:

This task was first administered in 1995. Many students in both year 4 and year 8 were successful in reading a tree diagram. Three quarters of the year 8 students got all of the answers correct. Boys and girls performed similarly, but year 4 Pasifika students had a much higher proportion of low scores than Māori or Pakeha students. Performance in 2007 for year 4 students was markedly higher than in 1995, but there was little difference for year 8 students.

Approach: Station

Year: 4 &amp; 8

Focus: Reading a timetable

Resources: Table in work book

Dunedin to Port Chalmers			
	Dunedin	St Leonards	Port Chalmers
<b>MONDAY TO FRIDAY</b>			
AM	7.20	7.30	7.40
	7.40	7.50	8.00
	8.25	8.35	8.50
Via Totara St	11.30	11.40	11.55
PM	12.45	12.55	1.10
	1.50	2.00	2.15
	3.15	3.25	3.40
Via Totara St	4.00	4.10	4.25
	4.45	4.55	5.10
	6.10	6.20	6.35
	8.15	8.25	8.40

## Questions / instructions:

This is a bus timetable.

1. When is the earliest you can catch a bus from St. Leonards to Port Chalmers?

7.30 am	13 (15)	54 (62)
7.30	37 (40)	30 (25)

2. What time will it get in to Port Chalmers?

7.40 am	12 (11)	48 (58)
7.40	43 (46)	35 (30)

3. What time does the last bus leave Dunedin?

8.15 pm	45 (13)	46 (53)
8.15	45 (46)	34 (28)

4. What time will that bus arrive at Port Chalmers?

8.40 pm	8 (8)	40 (50)
8.40	34 (34)	31 (27)

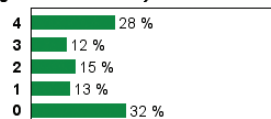
<b>Total score:</b>	4	28 (25)	56 (66)
	3	11 (18)	13 (11)
	2	16 (18)	16 (15)
	1	15 (19)	8 (5)
	0	30 (20)	7 (3)

## Subgroup Analyses:

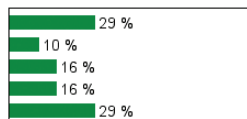
## Year 4

Score Range

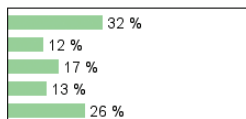
Boys



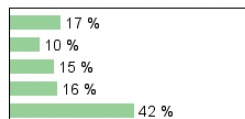
Girls



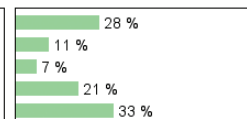
Pakeha



Māori



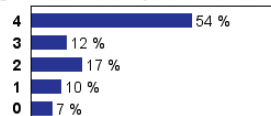
Pasifika



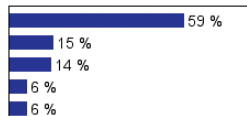
## Year 8

Score Range

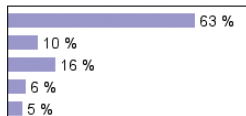
Boys



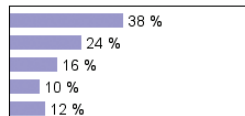
Girls



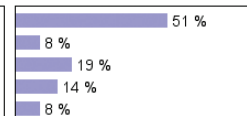
Pakeha



Māori



Pasifika



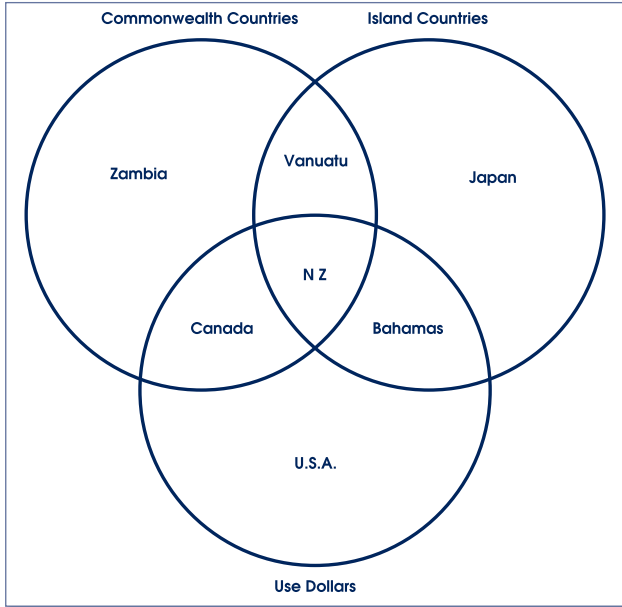
## Commentary:

Reading a bus schedule was a task handled completely successfully by 56% of year 8 students and 28% of year 4 students. One issue seen consistently was the lack of attention to detail on whether the time was AM or PM. Māori students were less successful than Pakeha or Pasifika students at both year 4 and year 8. There was little change in performance between 2003 and 2007.



Approach: Station  
 Focus: Interpreting a Venn diagram  
 Resources: Diagram and table in work book

**Questions / instructions:**



		% response 2007 ('03)	
		year 4	year 8
<b>Countries that are islands:</b>	Bahamas	71 (66)	86 (89)
	Japan	65 (62)	75 (81)
	New Zealand	56 (53)	69 (75)
	Vanuatu	56 (50)	72 (77)
<b>Countries that are in the Commonwealth and are islands:</b>	New Zealand	49 (58)	76 (81)
	Vanuatu	55 (49)	76 (83)
<b>Countries that are in the Commonwealth and use dollars:</b>	Canada	55 (69)	79 (85)
	New Zealand	60 (65)	84 (87)
<b>Countries that are not islands but use dollars:</b>	Canada	38 (39)	59 (57)
	U.S.A	52 (53)	72 (81)

2. Write the three things this diagram tells you about the Bahamas.  
*[is an island, uses dollars, not in the Commonwealth]*

Look at the diagram. It shows some information about different countries.

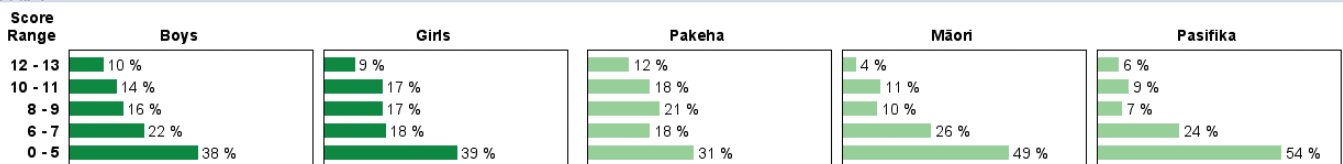
1. Put ticks in the boxes to show the countries that fit the descriptions.

Countries	Countries that are islands	Countries that are in the Commonwealth and are islands	Countries that are in the Commonwealth and use dollars	Countries that are not islands but use dollars
Bahamas				
Canada				
Japan				
New Zealand				
U.S.A.				
Vanuatu				
Zambia				

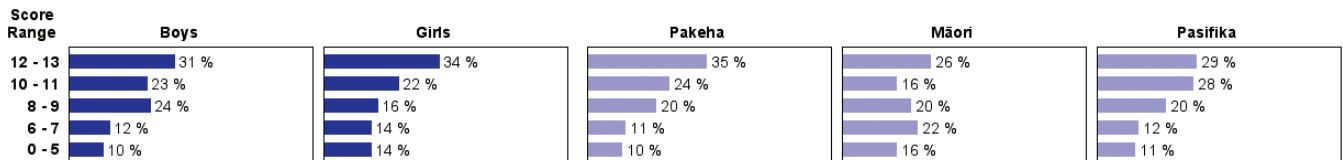
<b>all three things identified</b>	14 (12)	38 (41)	
	29 (32)	32 (33)	
	22 (21)	11 (15)	
<b>Total score:</b>	12-13	10 (9)	33 (37)
	10-11	15 (15)	22 (26)
	8-9	17 (22)	20 (19)
	6-7	21 (17)	13 (8)
	0-5	36 (38)	12 (11)

**Subgroup Analyses:**

Year 4



Year 8



**Commentary:**

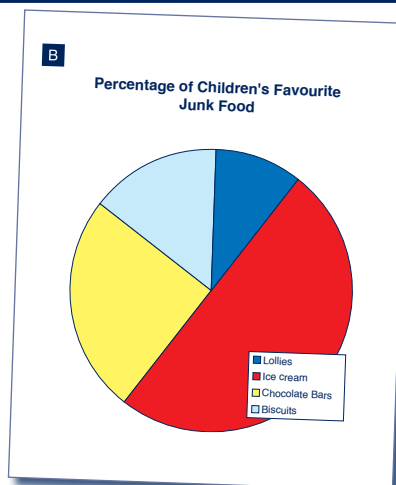
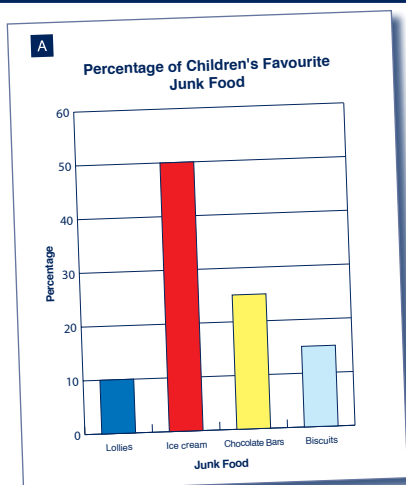
Students performed fairly well on this task involving interpreting a Venn diagram. There was an error in the diagram because the Bahamas are within the Commonwealth, but this is not believed to have confused many students. Some students, particularly at year 4, had trouble with the combinatorial nature of Venn diagrams. Growth from year 4 to year 8 was substantial. Performance was very similar in 2003 and 2007. Year 8 Pasifika students performed as well as Pakeha students.

Approach: One to one

Year: 4 & 8

Focus: Deciding which graph shows the information most clearly

Resources: 2 graphs – A, B



Questions / instructions:

Give student graphs.

These graphs both show the same information about children's favourite junk foods.

1. What percentage of children said biscuits were their favourite junk food?  
15% (15)  
14% or 16% (14 or 16)

2. Which graph did you use to work that out, graph A or graph B?  
A 88 (92) 93 (93)  
B 8 (7) 6 (5)

3. Why did you use that graph?  
**Bar:**  
explanation showed good understanding of bar graph (e.g. has numbers) 50 (48) 57 (59)  
preferred that type of graph/was easier/seen that type before 19 (21) 14 (11)  
both above 13 (14) 20 (20)

% response  
2007 ('03)  
year 4 year 8

4. What junk food did half the children say was their favourite junk food?  
ice cream 52 (61) 86 (85)
5. Which graph did you use to work that out, graph A or graph B?  
B 51 (58) 71 (61)  
A 39 (31) 18 (23)
6. Why did you use that graph?  
easy to see half (pie graph) 46 (51) 75 (70)  
50% was half, easy to see (bar graph) 17 (8) 17 (21)  
liked that type of graph/was easier/had seen that type before 23 (16) 16 (17)  
it was the first one student looked at and gave answer 2 (0) 4 (2)

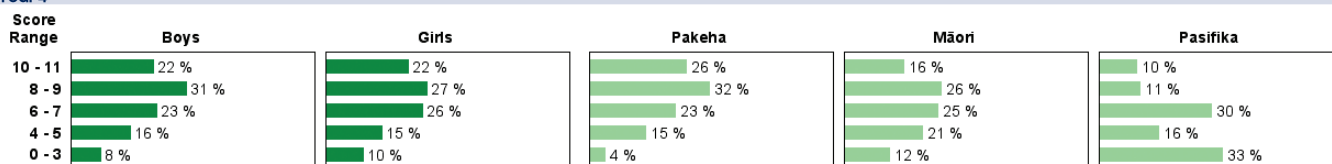
% response  
2007 ('03)  
year 4 year 8

**Total score:**

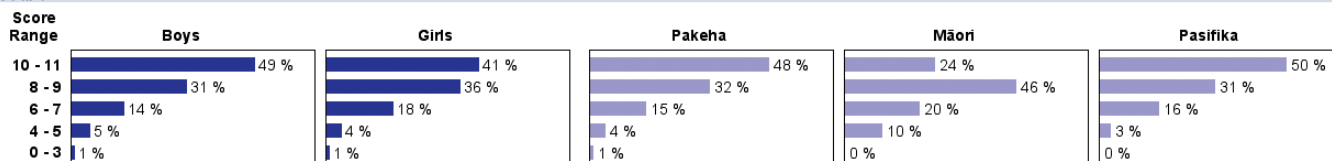
10-11	22 (31)	45 (36)
8-9	29 (25)	34 (38)
6-7	25 (19)	16 (17)
4-5	16 (17)	5 (8)
0-3	9 (8)	1 (1)

Subgroup Analyses:

Year 4



Year 8



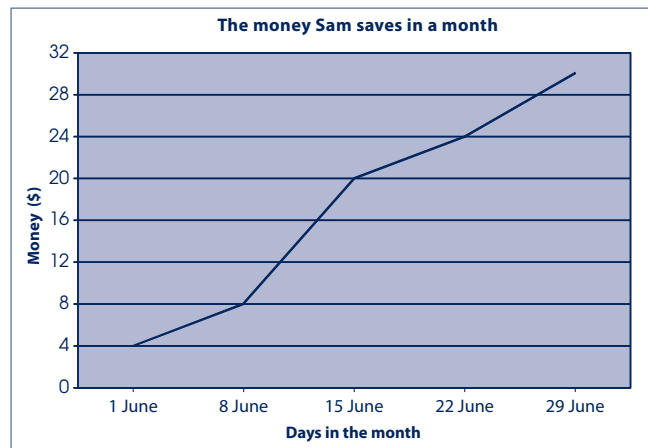
Commentary:

Students at both years were fairly successful in determining which graphs provided the best information in a given setting. Moderate growth was seen from year 4 to year 8. There were few differences in performance by gender or ethnicity. Year 4 students showed a slight decline in performance from 2003, while year 8 students showed a slight increase. Pasifika students scored lowest at year 4 but highest at year 8.

# Trend Task: Sam's Savings

Approach: Station  
 Focus: Interpreting a line graph  
 Resources: Graph in work book

Year: 4 & 8



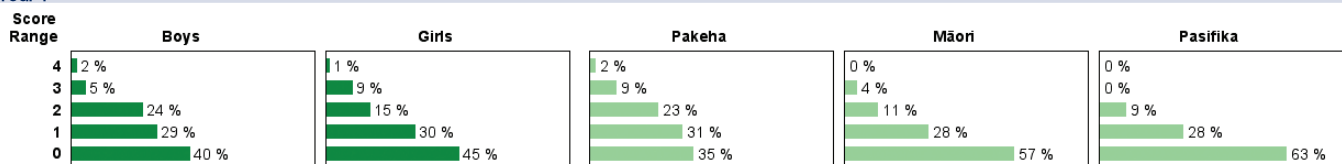
## Questions / instructions:

Sam is saving his money. At the end of each week he draws on his graph how much money he has saved so far.

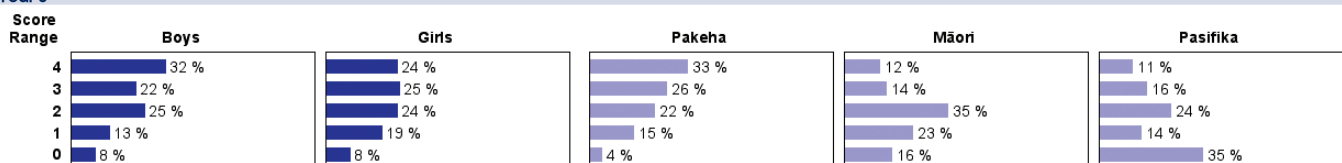
		% response 2007 ('03)	
		year 4	year 8
1.	How much money has he saved by the 29th of June?	\$30 30 29 or \$29	20 (21) 3 (2) 3 (5)
2.	How much money did Sam save between the 1st and the 8th of June?	\$4 4	13 (17) 4 (4)
3.	Sam was given \$8 for his birthday. He saved this money. Between which dates do you think he had his birthday?	8th and 15th June	13 (11)
4.	What will the line on the graph look like if he doesn't save any money next week? Circle your answer.	a. go up b. go down c. be flat	10 (11) 35 (28) 43 (58)
<b>Total score:</b>		4 3 2 1 0	2 (2) 7 (7) 20 (20) 29 (44) 43 (27)

## Subgroup Analyses:

### Year 4



### Year 8



## Commentary:

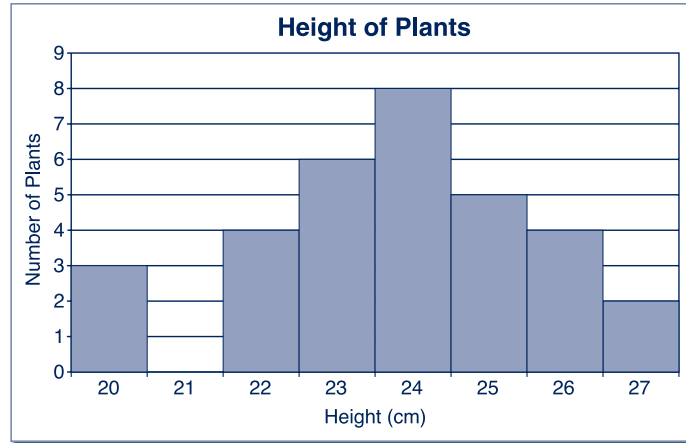
Year 4 students had great difficulty with this task involving interpreting a line graph. Year 8 students were substantially better, but still not strong. In particular, students had difficulty in working from given information back to the graph. There was little change from 2003.

Approach: Station

Year: 4 & 8

Focus: Interpret bar graph

Resources: Bar graph in work book



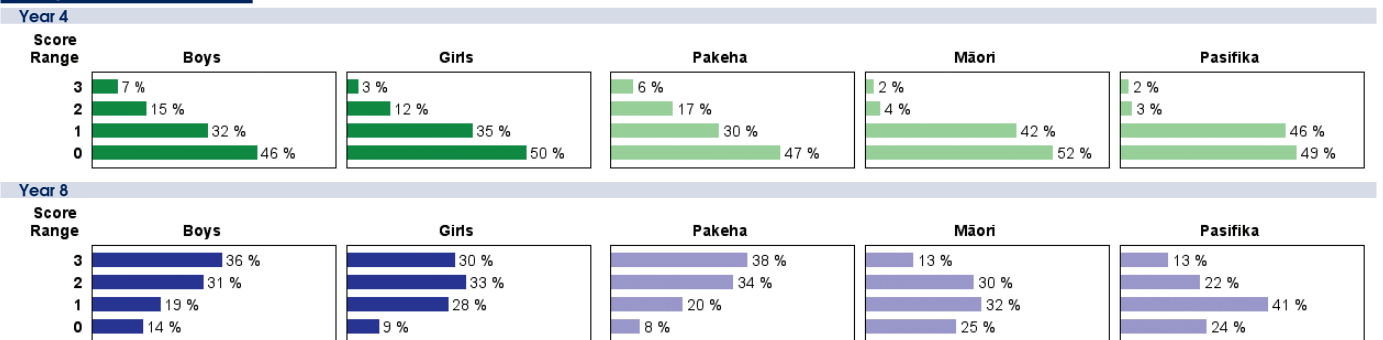
Questions / instructions:

A class has made a graph of the plants they are growing.

- How many plants are 20cm tall?
- What is the height of the tallest plant?
- How many plants is the class growing?

	% response 2007 ('03)	
	year 4	year 8
1. How many plants are 20cm tall?	3	48 (60) 84 (88)
2. What is the height of the tallest plant?	27cm	9 (7) 40 (30)
	27	5 (5) 6 (11)
	24cm or 24	48 (48) 46 (50)
	8	21 (30) 4 (6)
3. How many plants is the class growing?	32	14 (18) 56 (58)
<b>Total score:</b>	<b>3</b>	<b>5 (6) 33 (30)</b>
	<b>2</b>	<b>13 (17) 32 (36)</b>
	<b>1</b>	<b>34 (40) 24 (25)</b>
	<b>0</b>	<b>48 (38) 12 (9)</b>

Subgroup Analyses:



Commentary:

Year 8 students were moderately successful in reading the data from a simple graph, while year 4 students had much less success. Performance in 2003 and 2007 was similar. Boys and girls performed similarly, while at year 8 level Pakeha students did substantially better than Māori or Pasifika students.

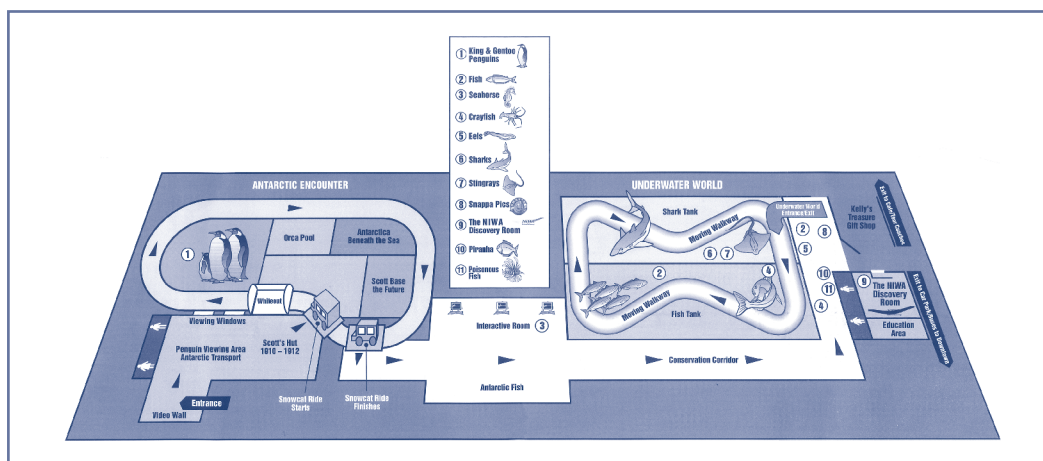


Approach: Station

Year: 4 & 8

Focus: Interpreting a map

Resources: Coloured stickers, map in work book



[Map sourced from: Kelly Tarlton's Antarctic Encounter and Underwater World (2002). Information brochure; Auckland. Kelly Tarlton's]

Questions / instructions:

This is a map of Kelly Tarlton's Antarctica Encounter and Underwater World.

- Put the red sticker on the entrance to Kelly Tarlton's.

placed on "Entrance" to Antarctic Encounter  
placed on "Underwater World Entrance/Exit"

- Put the blue sticker where people get on the Snowcat Ride.

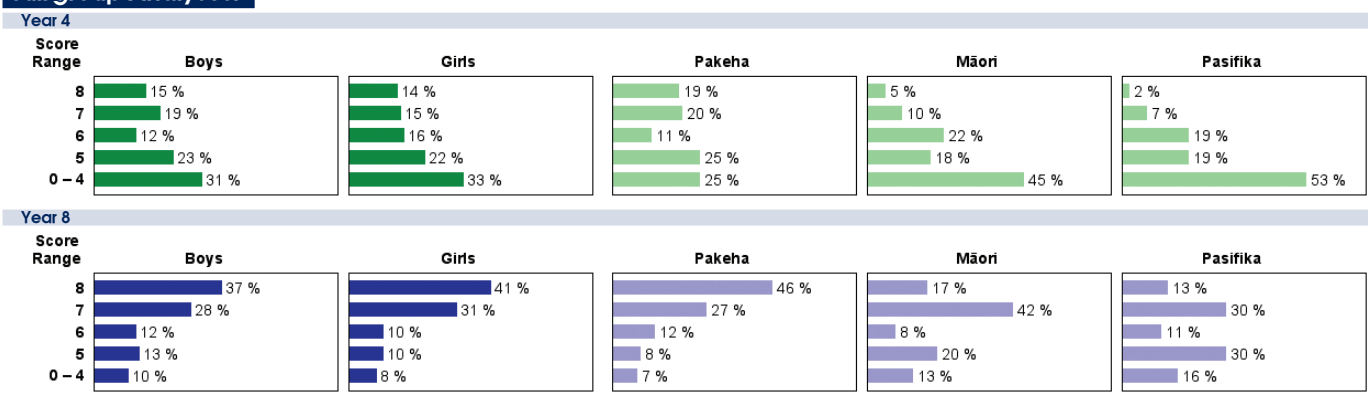
placed on icon, not on words "Snowcat Ride starts"

- Put the yellow sticker where the Snowcat Ride finishes.

placed on icon, not on words "Snowcat Ride finishes"

	% response 2007 ('03)			% response 2007 ('03)	
	year 4	year 8		year 4	year 8
4. Follow the arrows. After the Antarctic Encounter, what is in display number 3?			seahorse interactive room or antarctic fish computers	36 (32)	52 (50)
5. Put a black sticker on the piranha fish display.			placed on display placed on key for 10	48 (47)	77 (76)
6. What are two animals you will see in the Underwater World?			[fish, crayfish, eels, sharks, stingrays, piranha, poisonous fish] two of these one of these	78 (81)	88 (89)
<b>Total score:</b>				8	14 (14)
				7	17 (16)
				6	14 (13)
				5	23 (23)
				0-4	32 (34)
					9 (9)

Subgroup Analyses:



Commentary:

Students varied considerably in their ability to locate information on a map of an amusement park. While some year 4 and many year 8 students had little difficulty, others could find almost nothing on the map. There was little change in performance from 2003. Boys and girls performed similarly, but many more Pakeha than Māori or Pasifika students enjoyed total success with the task.

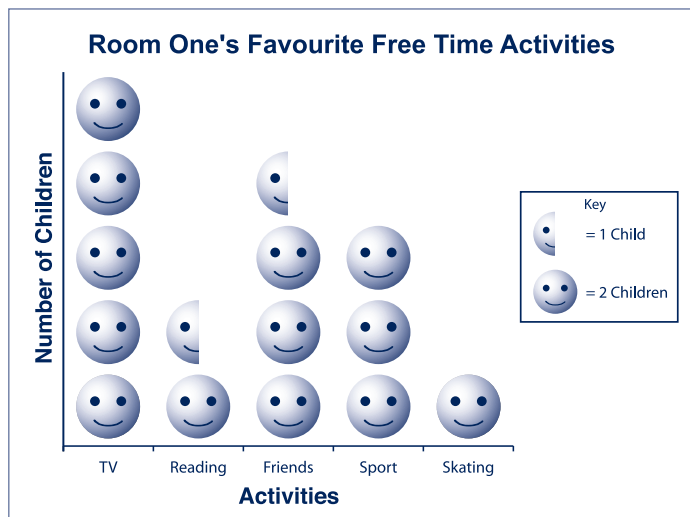
# Trend Task: Free Time Favourites

Approach: Station  
 Focus: Interpreting a pictograph  
 Resources: Pictograph in work book

Year: 4 & 8

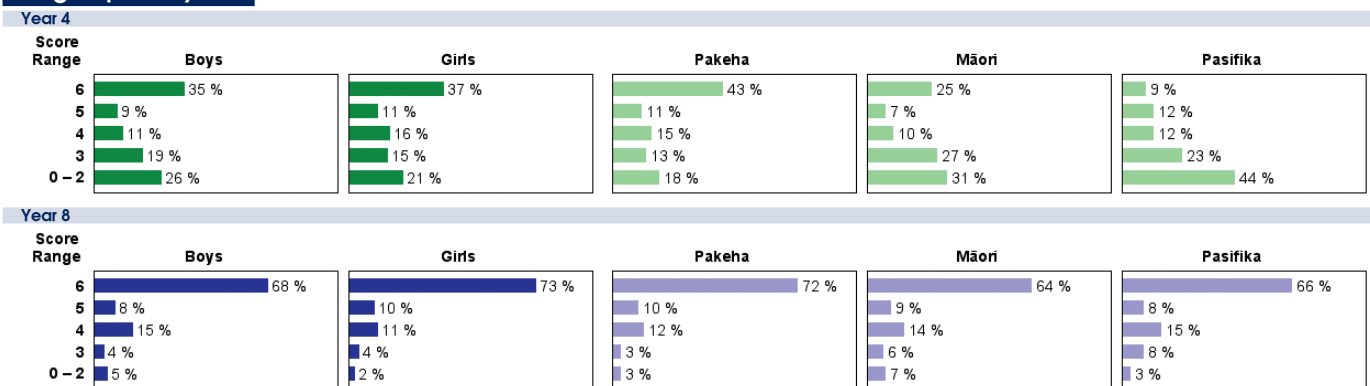
## Questions / instructions:

The children in Room One were asked "What is your favourite free time activity?"  
 The information is shown on the pictograph.



		% response 2007 ('03)			% response 2007 ('03)	
		year 4	year 8		year 4	year 8
1.	How many children said playing <b>sport</b> was their favourite free time activity?	6	59 (62)	92 (91)		
		3	27 (24)	4 (5)		
2.	How many children said being with their <b>friends</b> was their favourite free time activity?	7	61 (63)	92 (93)		
3.	What free time activity did most children in Room One say was their favourite?	TV	83 (86)	94 (95)		
4.	Two more children said they liked playing <b>sport</b> . Put this information on the graph.					
	drew a circle on to "Sport"		45 (48)	76 (76)		
	drew two circles on to "Sport"		23 (22)	10 (10)		
	<b>Total score:</b>	6	36 (38)	70 (71)		
		5	11 (11)	9 (7)		
		4	13 (15)	13 (14)		
		3	17 (14)	4 (5)		
		0-2	24 (22)	4 (3)		

## Subgroup Analyses:



## Commentary:

Strong growth from year 4 to year 8 is seen in the ability to interpret a pictograph. While year 4 children had some difficulties with issues such as the units involved in the graph, year 8 children generally had little difficulty with the task. Performance was very similar in 2003 and 2007, and for boys and girls. Most year 4 Pasifika students scored half marks or lower but at year 8, all three ethnic groups performed similarly.



Approach: Station

Year: 4 & 8

Focus: Interpreting a timetable

Resources: TV timetable

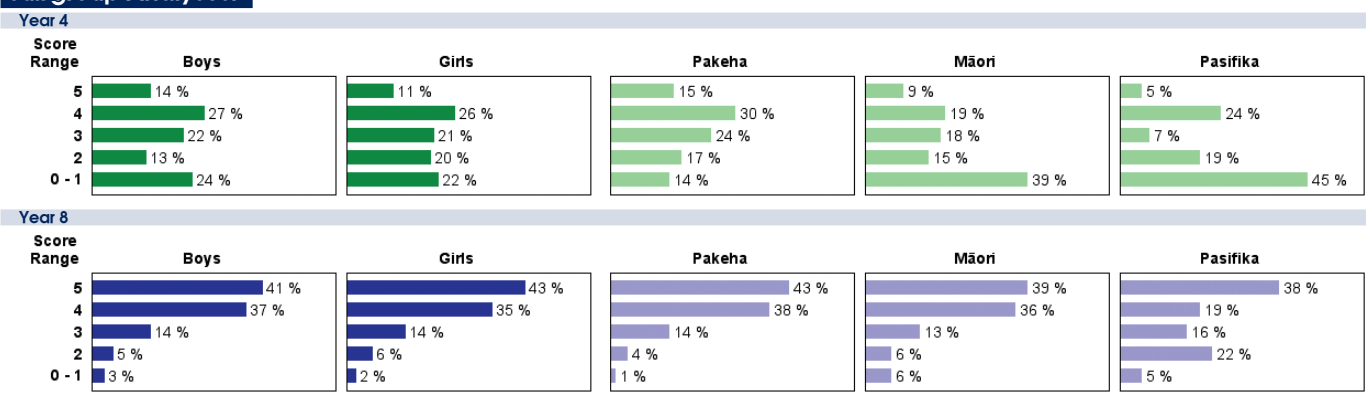
Questions / instructions:

TV ONE	TV TWO	TV THREE
6am UK Today The Tweenies. R 6:10 Te Karere R 6:30 TelstraClear Business 7:00 Breakfast 9:00 Taste New Zealand R 9:30 How's Life? R 10:00 Good Morning Noon Midday 12:25 EastEnders PGR + 1:00 Crossroads PGR 1:30 Hot Auctions R + 2:00 Dream Team AO 3:00 Class Act 3:40 Emmetdale 4:10 Sixth Sense With Colin Fry R 4:40 Te Karere 4:55 Cheers R + 5:25 How's Life? 6pm One News + 7:00 Holmes 7:30 Netball - National Bank Cup Live coverage of the grand final. Sling v Force. 9:30 Pilot Guides - Southern Mexico PGR The Day of the Dead Festival in Pazuaro; bull riding in the old colonial town of Guanajuato; the night life and cliff divers of Acapulco. + 10:30 Late Edition 10:35 The Last Word 10:55 Baddiel's Syndrome AO Comedy about an architect whose former girlfriend is also his boss, and who is convinced their son is growing up to be gay. + 11:25 So Graham Norton AO Tonight's guests include Lee Majors and Liz Smith. + 12:05 BBC News 12:30 Business Report 12:45 Sport Today 1am BBC News 1:30 Talking Movies 2:00 BBC News 2:30 Asia Today 3:00 BBC News 3:30 HardTalk 4:00 BBC News 4:15 Business Report 4:30 Decisive Weapons PGR 5:00 BBC News 5:30 Business Report 5:45 Sport Today	6am Crefo A Dollar Jr 6:30 Destiny Television 7:00 Catdog R 7:25 Aladdin 7:50 Hi-5 R 8:25 Blue's Clues R + 8:50 Clifford The Big Red Dog R 9:15 Burnable R 9:40 Shortland Street PGR R + 10:10 Infomercials 11:35 Home And Away R + 12:05 The Young And The Restless PGR 1pm Days Of Our Lives 2:00 Ricki Lake AO Deadly New Drug Exposed. 3:00 Percy The Parkkeeper 3:10 Buzz And Poppy R 3:20 Classic Cartoons 3:25 WNTV Featuring: 3:40 Baby Looney Tunes; 3:50 Spongebob Squarepants; 4:00 XMen - Evolution; 4:30 Yu-Gi-Oh! 5:00 Big Wolf On Campus R 5:30 Neighbours + 6pm The Simpsons R + 6:30 Big Brother 7:00 Shortland Street PGR Matt opens his mind to clinic closure; Barb takes Marshall's artwork in hand. + 7:30 My Wife And Kids Michael gets the family out of the house so he can have solitude. 8:00 8 Simple Rules For Dating My Teenage Daughter Paul and his new editor become friends, both being fathers of teenage girls, but Paul learns they have something else in common. + 8:30 Smallville PGR Martha is seriously affected by meteor dust, and Clark and Jonathan must help her. + 9:30 Whose Line Is It Anyway? + 10:00 Big Brother Uncut version of the show. 10:30 Space Local music entertainment show with hosts Phil Bostwick and Jo Tuapawa. + 12:00 Seven Days AO 1am Freedom AO 2:55 Dream Factory AO 3:25 Mad TV AO 5:10 Hope Island PGR	6am Hour Of Power 6:30 Teletubbies R 6:55 Thomas The Tank Engine R 7:00 Pocket Dragon Adventures R 7:25 Mona The Vampire R 7:55 Brum R 8:05 Buzz Lightyear Of Star Command 8:30 Untalkative Bunny R 8:35 Bananas In Pyjamas R 8:40 Bob The Builder R 8:50 Angelina Ballerina 9:05 Sesame Street 9:30 Infomercials 10:30 Will And Grace PGR R + 11:00 Power Of Attorney R 11:30 Home And Away R + Noon Law And Order AO R + 1:00 Boston Public AO 2:00 Oprah Winfrey R Birth mothers, adoptive parents and adopted children share their stories in a look inside the adoption process. 3:00 Elmo's World R 3:15 Suzy's World R Snow And Ice. 3:25 Sticky TV Featuring: 3:30 Arthur; 4:15 Animation Station; 4:30 Dragonball Z 5:00 Home And Away + 5:30 Judge Judy R 6pm 3 News 7:00 Home Improvement R Tim's vision for his family's Christmas card photograph gets a cold reception from Jill. + 7:30 Pepsi Chart PGR 8:30 John Doe John thwarts a bomb threat which he later learns was a ruse by a mysterious group that has been plaguing him and Karen. + 9:30 Monk PGR When a lawyer and his assistant are murdered, suspicion falls on a disgruntled client, but then he, too, is murdered. 10:30 Nightline 11:00 The Sweet Hereafter AO 1997 Drama. When a bus accident kills most of a town's children, the sole survivor, a girl left paralysed, must help the town to deal with it. Ian Holm, Caerthan Banks, Sarah Polley. 1:20 World News Tonight 1:50 Infomercials 3:50 Home And Away + 4:15 World News Tonight 4:40 Infomercials TV FOUR 9am Infomercials 6pm Hang Time R Mary Beth finds out that Julie and Chris have been dating in secret. 6:30 Power Of Attorney 7:00 Most Wanted PGR 7:30 Beverly Hills 90210 PGR R While watching footage of an emergency plane landing on the news, Dylan and Steve notice that one of the passengers bears an uncanny resemblance to Dylan's deceased father. 8:30 The Test AO 9:30 The Tempest PGR 1998 Drama. A plantation owner is forced to flee from his home when his younger brother becomes greedy and tries to have him executed. Twelve years later, he is forced to come out of his exile and when his brother finds out, he sets out to kill him once again. Peter Fonda, John Pyper-Ferguson, John Glover, Katherine Heigl. 11:20 Infomercials 1:20 Teletrader

Look at the TV timetable.

	% response 2007 ('03)	
	year 4	year 8
1. What programme is on TV Two at 6 pm? <b>The Simpsons</b>	82 (81)	93 (96)
2. What programme is on TV Three at 3:30 in the afternoon? <b>Arthur</b> <b>Sticky TV</b>	32 (39) 29 (26)	53 (73) 38 (19)
3. The netball is on at night on TV One. How long does it go for? <b>2 hours</b>	46 (49)	84 (81)
4. Pepsi Chart is on at night on TV Three. What time does it finish? <b>8:30 or 8:30 pm</b>	63 (66)	89 (93)
<b>Total score:</b>	<b>5</b>	<b>13 (19)</b>
	<b>4</b>	<b>27 (24)</b>
	<b>3</b>	<b>21 (20)</b>
	<b>2</b>	<b>16 (18)</b>
	<b>0-1</b>	<b>23 (19)</b>
		<b>42 (56)</b>
		<b>36 (29)</b>
		<b>14 (9)</b>
		<b>6 (4)</b>
		<b>2 (2)</b>

Subgroup Analyses:



Commentary:

Most year 8 students had little difficulty with this task, but certain questions were hard for the year 4 students. In particular, year 4 students had trouble when asked to use the information to answer a question as opposed to simply looking something up. There was a slight decline in performance by year 8 students between 2003 and 2007. Year 8 Pasifika students had a particularly wide spread of performance.

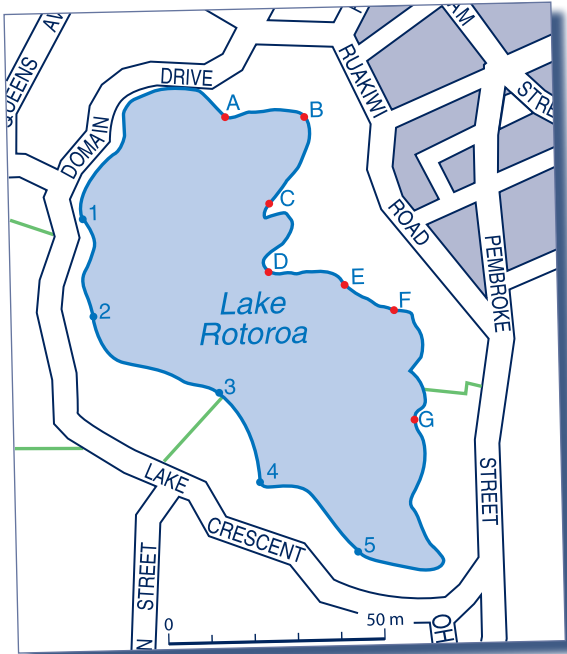
# Trend Task: Swimathon



Approach: Independent  
 Focus: Using a distance key  
 Resources: Map, ruler

Year: 4 & 8

## Questions / instructions:



A school is planning a swimathon where children are going to swim across Lake Rotoroa. They want to find the narrowest place to cross.

- Find the red and blue points that mark the shortest place to cross.

D to 3

- How far is it to swim across the lake at these points?

30m

29m – 31m

about 3cm

other response correct for answer given in question 1 (in metres)

% response  
 2007 ('03)  
 year 4 year 8

21 (30) 44 (54)

3 (7) 23 (33)

0 (1) 0 (1)

2 (1) 2 (1)

9 (6) 20 (11)

Total score:

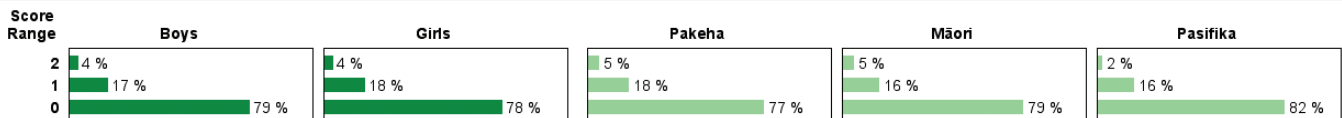
2 4 (5) 29 (32)

1 17 (27) 29 (23)

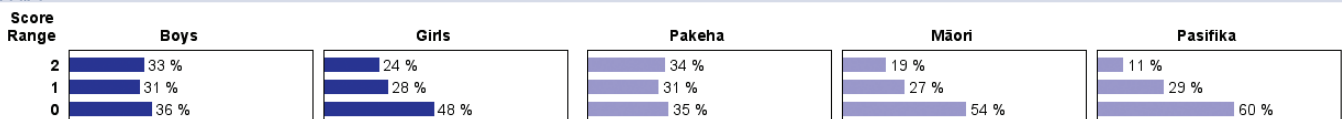
0 79 (68) 42 (45)

## Subgroup Analyses:

Year 4



Year 8



## Commentary:

This task involved using a ruler and a distance key to measure distances on a map and find the shortest route. Very few students at either year 4 or year 8 were able to complete this task, although year 8 students showed improvement over year 4 students. Year 4 students did less well in 2007 than in 2003. Year 8 boys scored a little higher than year 8 girls. Year 8 Pakeha students scored a little higher than year 8 Māori and Pasifika students.

Approach: Independent

Year: 4 & 8

Focus: Interpreting topographical maps

Resources: Map, 9 pictures

Questions / instructions:

A sailor saw this island in the distance. She took pictures of the island as she sailed around it.

1. Put the pictures in the order that they were taken as the sailor went round the island. The first one has been done for you.

- Picture 1 =  D
- Picture 2 =  B     44 (37)    77 (78)
- Picture 3 =  I     34 (32)    73 (75)
- Picture 4 =  E     37 (38)    75 (78)
- Picture 5 =  C     30 (29)    68 (72)
- Picture 6 =  H     24 (25)    59 (58)
- Picture 7 =  G     28 (29)    59 (58)
- Picture 8 =  A     24 (23)    59 (58)
- Picture 9 =  F     57 (62)    86 (90)

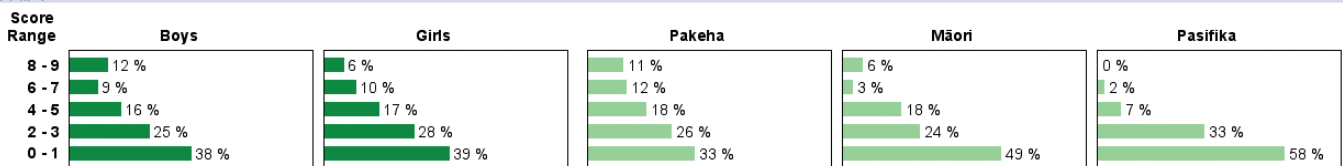
2. Which compass direction did the sailor come from?

<b>West</b>	31 (42)	49 (49)
<b>Total score:</b>	<b>8-9</b>	9 (8)    44 (42)
	<b>6-7</b>	9 (11)    13 (20)
	<b>4-5</b>	17 (15)    19 (18)
	<b>2-3</b>	26 (28)    13 (12)
	<b>0-1</b>	39 (38)    11 (8)

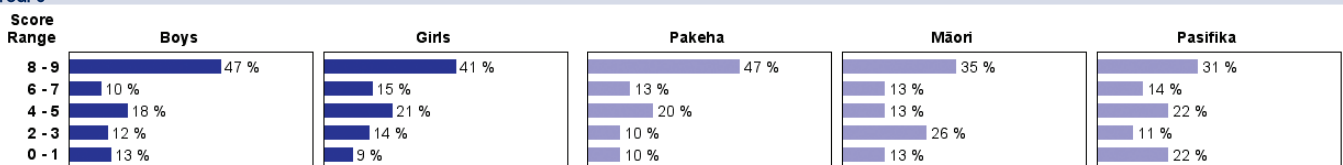
[Illustrations sourced from: Robinson, I. (1995). *Mathscheck 6*. Melbourne: Collins Dove.]

Subgroup Analyses:

Year 4



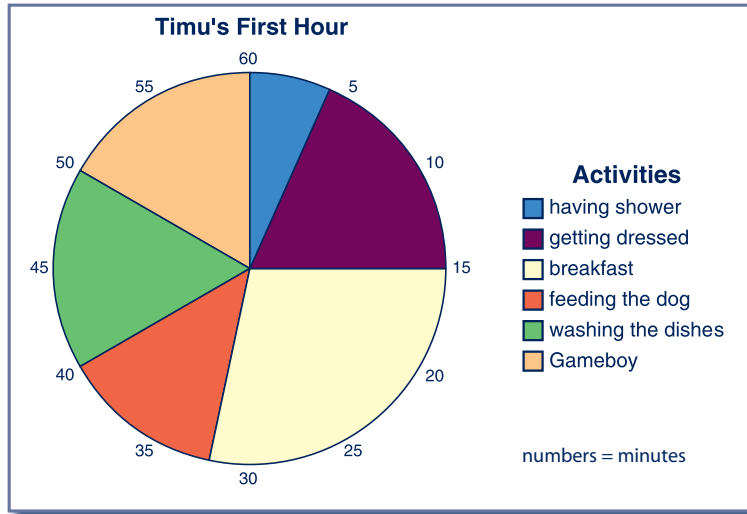
Year 8



Commentary:

The ability of students to interpret a topographical map improved greatly from year 4 to year 8. Most year 4 students had very limited success, whereas most year 8 students had little or no difficulty. Performance was similar in 2003 and 2007. Year 4 Pasifika students had more trouble than Māori or Pakeha students, but the differences declined by year 8.

Approach: Independent  
 Focus: Interpreting a pie graph  
 Resources: Colour graph



**Questions / instructions:**

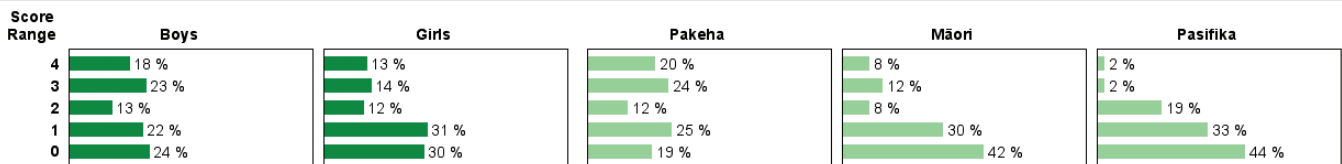
Timu has lots to do in the morning to get ready.  
 The pie graph shows how Timu spends the first hour of his day.

- |   |                             |         |         |
|---|-----------------------------|---------|---------|
| 1. How many minutes does Timu spend having a shower?      | <b>3.5 to 4.5 (minutes)</b> | 26 (22) | 60 (67) |
| 2. How many minutes does he get on his Gameboy?           | <b>10 (minutes)</b>         | 43 (41) | 83 (76) |
| 3. How many minutes does he spend washing the dishes?     | <b>10 (minutes)</b>         | 43 (43) | 82 (85) |
| 4. Does he take longer to feed the dog or to get dressed? | <b>get dressed</b>          | 58 (56) | 82 (85) |

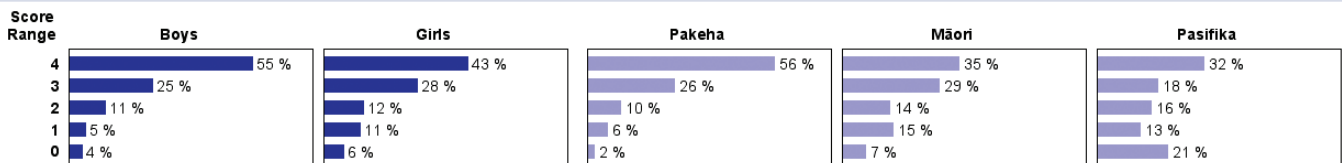
	% response 2007 ('03)	
	year 4	year 8
<b>Total score:</b>	4	16 (11) 50 (50)
	3	19 (21) 26 (28)
	2	12 (14) 11 (10)
	1	27 (25) 8 (7)
	0	27 (28) 5 (5)

**Subgroup Analyses:**

**Year 4**



**Year 8**



**Commentary:**

Reading this fairly complex pie graph was difficult for the year 4 students, but most year 8 students had learned this skill. Over three quarters of year 8 students got all, or all but one, of the questions correct. Boys performed a little better than girls.

Trend Task:

# Cellphone Choices

Approach:	Station	Year:	4 & 8
Focus:	Reading information		
Resources:	Table in work book		

Questions / instructions:

Telecom PrePaid	
Time	Charge per minute
7am – 7pm weekdays	\$1.35
7pm – 7am weeknights, all weekend and National Holidays	\$0.49

Vodafone PrePaid Prepay Nights and Weekends Plan	
Time	Charge per minute
7am – 7pm weekdays	\$1.39
7pm – 7am weeknights, all weekend and National Holidays	\$0.49

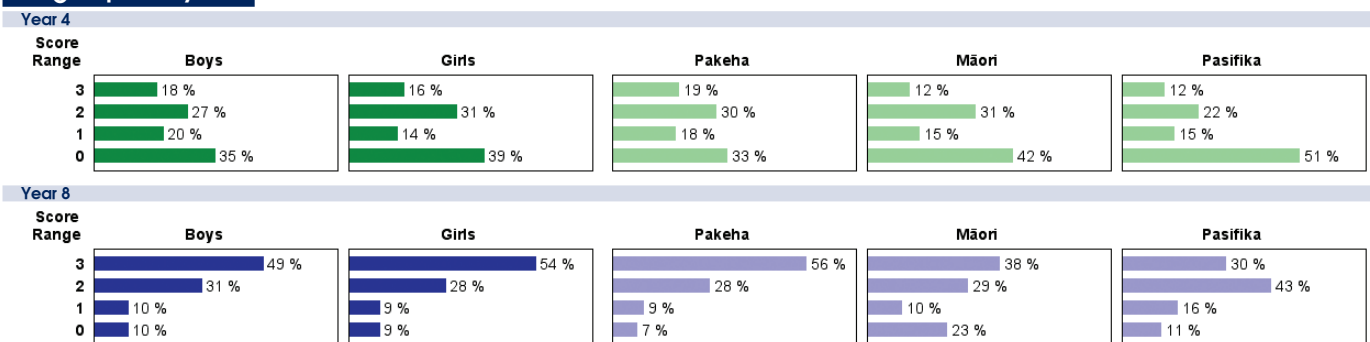
  

Vodafone Prepay Anytime Plan	
Time	Charge per minute
Anytime	\$0.89

A family is deciding which cellphone plan to get. They can choose from Telecom PrePaid, Vodafone Prepay Nights and Weekends, or Vodafone Prepay Anytime. Use the table to work out the answers.

	% response 2007 ('03)	
	year 4	year 8
1. On Telecom PrePaid plan how much does it cost to speak for a minute at 3 pm on Tuesday? <span style="color: red;">\$1.35 or 1.35</span>	48 (61)	80 (86)
2. On Telecom PrePaid plan how much does it cost to speak for a minute at 3pm on Saturday? <span style="color: red;">\$0.49 or 49c or 0.49</span>	49 (65)	77 (85)
3. Which plan is the cheapest one if they use the phone mostly during the day? <span style="color: red;">Vodafone Prepay Anytime Plan/ Vodafone Anytime</span>	29 (26)	66 (69)
<b>Total score:</b>	<b>3</b> 17 (17)	<b>51</b> (58)
	<b>2</b> 29 (39)	<b>29</b> (29)
	<b>1</b> 17 (22)	<b>10</b> (8)
	<b>0</b> 37 (21)	<b>9</b> (5)

Subgroup Analyses:



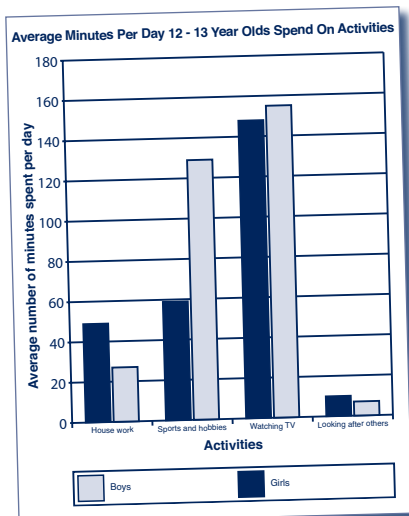
Commentary:

This task showed substantial growth from year 4 to year 8. Two thirds of year 8 students were able to determine the best deal under given circumstances. At both year levels, performance was slightly lower in 2007 than in 2003.

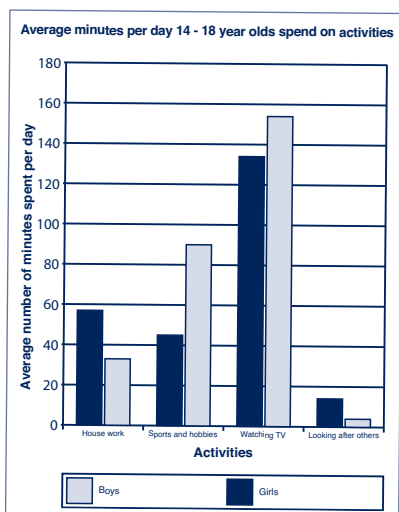


Approach: One to one  
 Focus: Interpreting bar graphs  
 Resources: 2 graphs (A, B)

**Questions / instructions:**



A



B

Here are two graphs. They show how much time New Zealand teenagers spend on different activities.

**Hand out graph A.**

This graph shows how long each day 12 to 13 year olds spend on different activities. The bars show girls and boys on different activities.

- Which activity has the biggest time difference between boys and girls?

sports and hobbies

**Place graph B beside graph A.**

This graph shows how long each day older girls and boys, aged 14 to 18, spend on different activities.

- Which activity do boys spend a lot less time doing as they get older?

sports and hobbies

- How does the time boys and girls spend looking after others change as they get older?

girls spend **more** time/bar goes higher  
 boys spend **less** time/bar goes lower

**Total score:**

- 4
- 3
- 2
- 1
- 0

% response  
2007 ('03)

year 8

83 (79)

46 (41)

69 (67)

68 (67)

37 (31)

26 (27)

14 (17)

14 (13)

9 (11)

**Subgroup Analyses:**

Year 8

Score Range	Boys	Girls	Pakeha	Māori	Pasifika
4	36 %	39 %	43 %	22 %	14 %
3	28 %	23 %	29 %	15 %	25 %
2	13 %	15 %	12 %	21 %	14 %
1	12 %	16 %	13 %	20 %	4 %
0	11 %	7 %	3 %	22 %	43 %

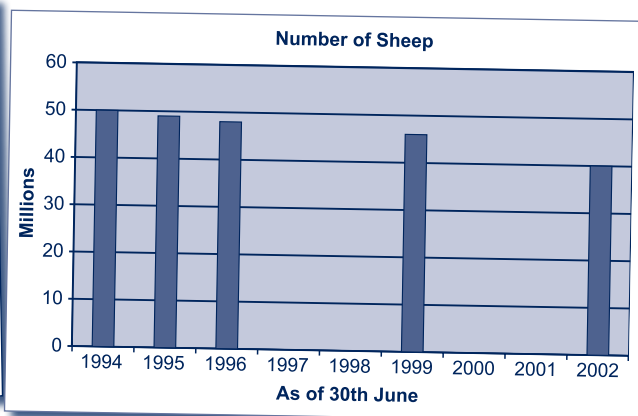
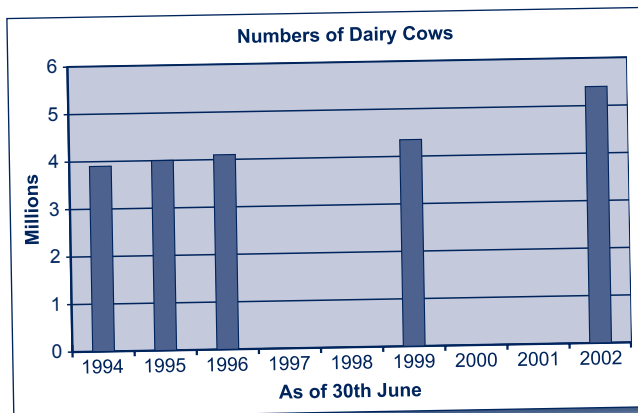
**Commentary:**

Most year 8 students were able to extract basic information from a bar chart, but many had some difficulty when required to interpret a trend. There was little change from 2003 to 2007. Almost half of the Pasifika students had no success with this task.

Trend Task:

# Cows and Sheep

Approach:	Station	Year:	8
Focus:	Interpreting graphs		
Resources:	2 graphs in work book		



Questions / instructions:

Look at this graph carefully [*Numbers of Dairy Cows*].

- Write three facts about dairy cows in New Zealand.
  - 3 correct facts
  - 2 correct facts
  - 1 correct fact
  - identified that graph shows no cows in some years

Now look at the Cows graph and the Sheep graph.

- How has farming in New Zealand changed between 1994 and 2002?
  - used both graphs and recorded a change over time (cows increased **and** sheep decreased)
  - used one graph and recorded a change over time (cows increased **or** sheep decreased)
  - response included an incorrect interpretation

Score	% response 2007 ('03)
6	11 (14)
5	20 (23)
4	14 (15)
3	22 (21)
0-2	33 (27)

Subgroup Analyses:

Year 8

Score Range	Boys	Girls	Pakeha	Māori	Pasifika
6	1%	1%	1%	0%	3%
5	10%	14%	14%	6%	2%
4	24%	29%	29%	22%	11%
3	16%	16%	18%	10%	22%
0-2	49%	40%	38%	62%	62%

Commentary:

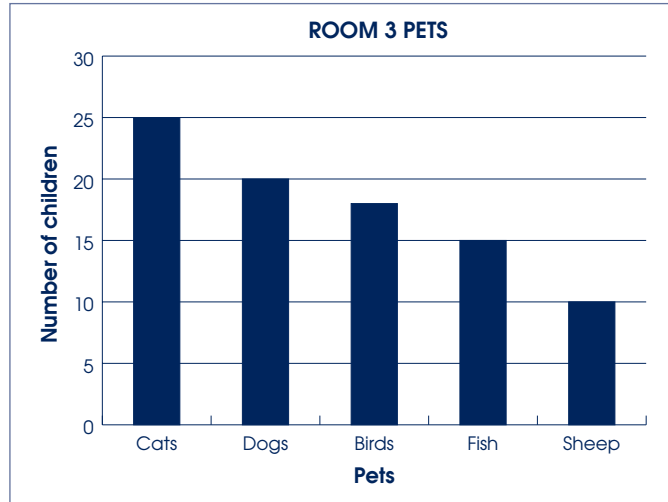
Many year 8 students had some difficulty in interpreting bar graphs where there were gaps in the graph. Performance declined slightly from 2003 to 2007. Pasifika students, in particular, had little success with this task.



# Task: Class Pets

Approach: Independent  
 Focus: Interpreting a bar graph  
 Resources: Bar chart in work book

Year: 4 & 8



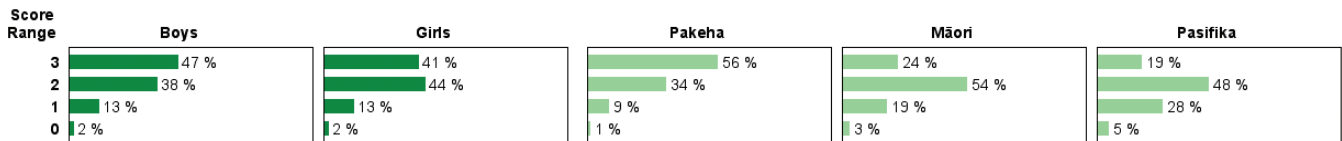
### Questions / instructions:

1. What pet did most children have?
2. How many children had fish?
3. More children had dogs than sheep. How many more had dogs?

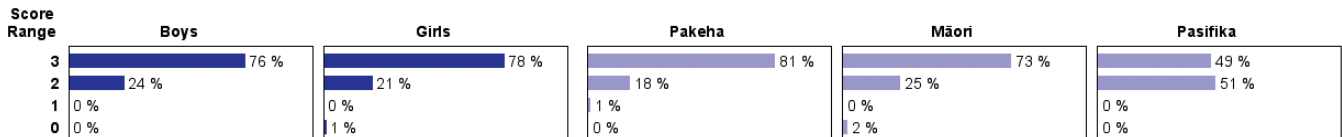
	% responses	
	y4	y8
cat	95	99
15	87	99
10	45	77
<b>Total score:</b>	<b>3</b>	<b>44</b>
	2	22
	1	0
	0	2
		1

### Subgroup Analyses:

#### Year 4



#### Year 8



### Commentary:

Students were quite successful at reading a simple graph. The one question that asked for a calculation in addition to reading numbers from the graph proved to be somewhat difficult for year 4 students. Māori and Pasifika year 4 students performed similarly, but Māori students outperformed Pasifika students at year 8.

Task:

Queenstown Combos

Approach: Station

Year: 4 & 8

Focus: Interpreting a table

Resources: Brochure

							ADULT	CHILD
KAWARAU DOUBLE		RIVER JET		AWA RAFT			\$235	N/A
SHOTOVER HELI SPLASH		RIVER JET	HELI		GONDOLA		\$200	\$135
SHOTOVER BIG FIVE		RIVER JET	HELI		GONDOLA	LUGE	\$210	\$145
SHOTOVER FLYOVER		RIVER JET	HELI				\$230	\$170
SHOTOVER FLY & SPLASH			HELI	SHOT RAFT			\$224	N/A
SHOTOVER DOUBLE		RIVER JET		SHOT RAFT			\$244	N/A
SHOTOVER TREBLE		RIVER JET	HELI	SHOT RAFT			\$294	N/A
CANYON DIVE & SPLASH	CANYON BUNGY			SHOT RAFT			\$344	N/A
FABULOUS FOUR	CANYON BUNGY	RIVER JET	HELI	SHOT RAFT			\$490	N/A
KAWARAU DIVE & JET	KAWARAU BUNGY	RIVER JET					\$234	N/A
CANYON DIVE & JET	CANYON BUNGY	RIVER JET					\$294	N/A
SHOTOVER GO HIGH	EDGE BUNGY	RIVER JET	HELI		GONDOLA		\$314	\$220
CANYON TAKE A DIVE	CANYON BUNGY					SKYDIVE	\$440	\$220
SHOTOVER DO IT ALL	CANYON SWING	RIVER JET	HELI	SHOT RAFT			\$440	N/A
SHOTOVER HIGH SPLASH	CANYON SWING			SHOT RAFT			\$294	N/A
SHOTOVER HIGH JET	CANYON SWING	RIVER JET					\$253	N/A
HIGH HELI SPLASH	CANYON SWING		HELI	SHOT RAFT			\$375	N/A
SHOTOVER BIKE SPLASH	BIKE			SHOT RAFT			\$274	N/A
SHOTOVER TAKE A DIVE		RIVER JET	HELI	SHOT RAFT		SKYDIVE	\$534	N/A

[Simulated resource in lieu of copyright permission.]

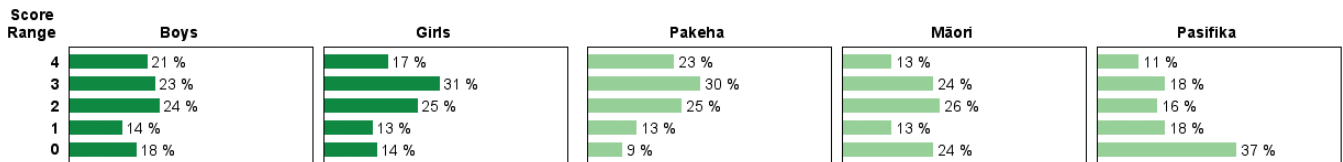
Questions / instructions:

Look at the brochure showing Queenstown adventure activities and the different combinations of activities.

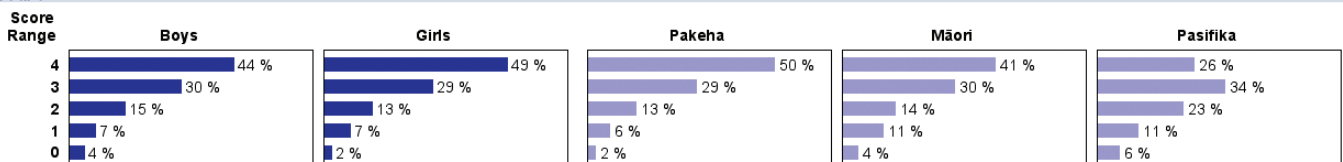
		% responses	
		y4	y8
1. Which activities make up the Shotover Double?	River Jet and Shot Raft	66	77
2. What is the cheapest adventure package for children?	Shotover Heli Splash	40	72
3. Which package includes the most activities?	Shotover Big Five	71	84
4. If Sam wanted to go on the Gondola and do a bungy jump, which package is best for her?	Shotover Go High	43	75
<b>Total score:</b>		4	19
		3	27
		2	24
		1	14
		0	16

Subgroup Analyses:

Year 4



Year 8



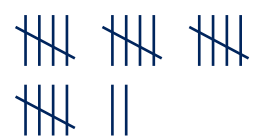
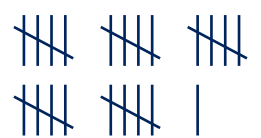
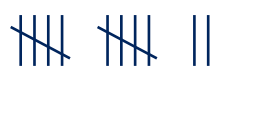
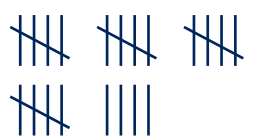
Commentary:

About three quarters of year 8 students and half of year 4 students scored highly on this task. Many year 4 students had some difficulty determining what the “best deal” would be for various options. Large differences by ethnicity at year 4 level were greatly reduced at year 8 level.

# Task: School Shop

Approach: Independent  
 Focus: Interpreting a table  
 Resources: Table in work book

Year: 4 & 8

Pens	Pencils	Erasers	Rulers
			

### Questions / instructions:

The table shows items sold in the school shop.

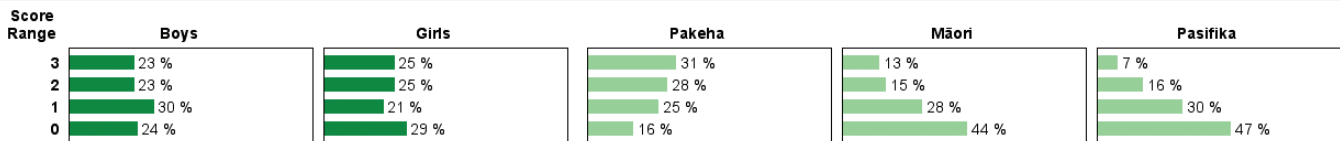
1. How many more pencils than rulers were sold?
2. How many more pens than erasers were sold?
3. How many pens and pencils were sold?

**Total score:**

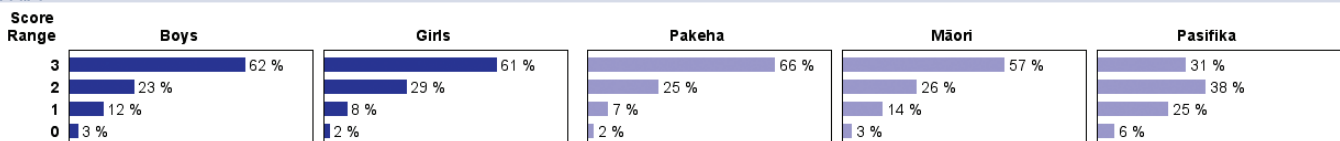
	% responses	
	y4	y8
1	52	85
2	42	80
3	52	80
<b>Total score:</b>	<b>3</b>	<b>24</b>
	<b>2</b>	<b>23</b>
	<b>1</b>	<b>26</b>
	<b>0</b>	<b>27</b>

### Subgroup Analyses:

Year 4



Year 8



### Commentary:

Many year 4 students had trouble with this task involving reading a chart and doing simple calculations based on the information presented. Year 8 students were much more successful. There were strong differences by ethnicity at year 4, but year 8 Pakeha and Māori students performed similarly well.

Task:

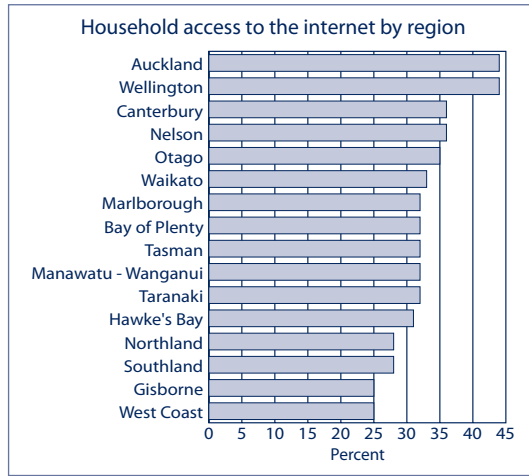
# Do You Have The Internet?

Approach: Station

Year: 8

Focus: Interpreting census graph and making predictions

Resources: Graph



[Graph sourced from: Statistics New Zealand. Retrieved 2002 from <http://www2.stats.govt.nz/domino/external/pastfull.nsf/web/4C2567EF00247C6ACC256B7500141AB1>.]

Questions / instructions:

Look at the graph showing access to the internet in New Zealanders' homes.

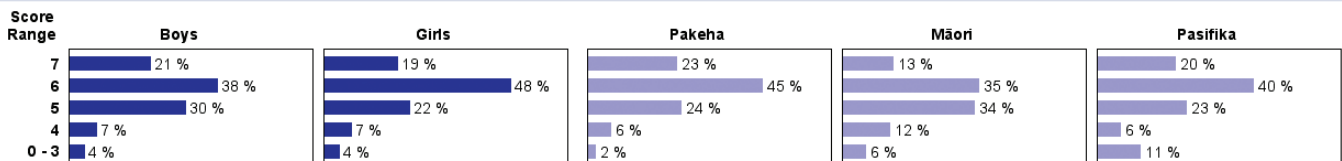
- Which regions had the highest household internet access? **Auckland and Wellington**  
**Auckland or Wellington**
- Which regions had the lowest household internet access? **Gisborne and West Coast**  
**Gisborne or West Coast**
- What percent of households in Otago had access to the internet? **35 (%)**
- What changes to the graph might you see, if this question is asked again in 5 years' time?  
**changes across all regions**  
**changes in general or specific regions**  
**no changes**

**Total score:** 7  
6  
5  
4  
0-3

% responses	y8
89	
10	
93	
7	
90	
23	
48	
29	
20	
42	
26	
7	
4	

Subgroup Analyses:

Year 8



Commentary:

Most year 8 students extracted accurate information from this graph. Understanding of likely trends in internet usage was more mixed. Boys, girls and all three ethnic groups performed similarly.

# Task: Is That Right?

Approach: Independent  
 Focus: Interpreting bar graphs  
 Resources: Bar graphs in work book

Year: 8

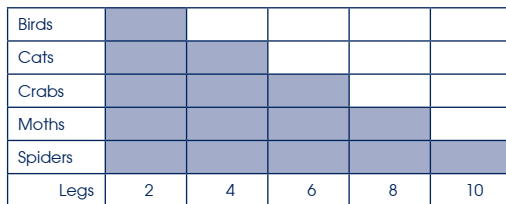
## Questions / instructions:

Only one of the bar graphs fits all of the facts.  
 Circle the letter of the correct graph.

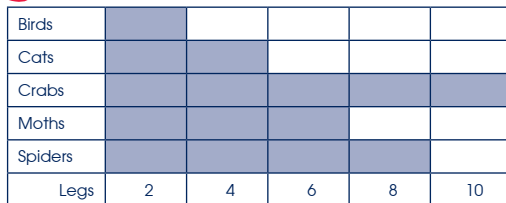
### 1. Legs on Animals:

Animal	Number of legs
Birds	2
Crabs	10
Spiders	8
Cats	4
Moths	6

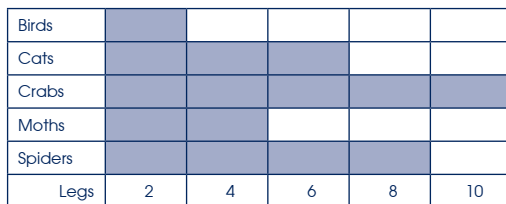
#### A



#### B



#### C



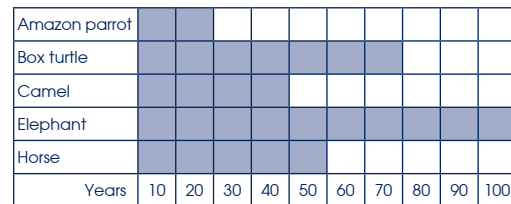
% responses  
y8

85

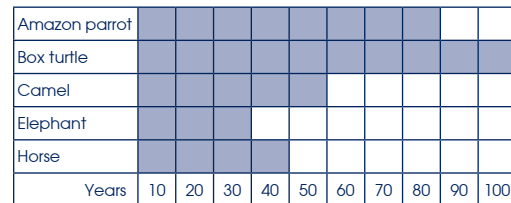
### 2. Ages of Animals:

Animal	Can live to age
Elephant	70
Horse	40
Box turtle	100
Amazon parrot	80
Camel	50

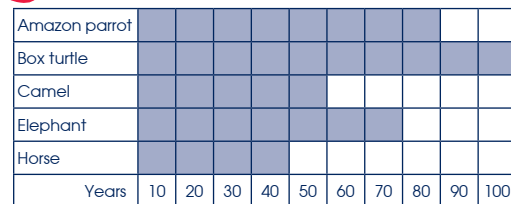
#### A



#### B



#### C



% responses  
y8

88

Total score: 2  
1  
0

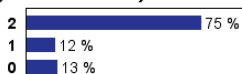
76  
12  
12

## Subgroup Analyses:

Year 8

Score Range

Boys



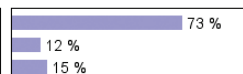
Girls



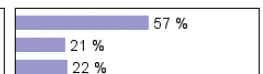
Pakeha



Māori



Pasifika



## Commentary:

Most year 8 students were successfully able to interpret the information in the data tables and select the proper graphs.

		% responses	
		y4	y8
<b>LINK TASK: 1</b>			
Approach:	Independent		
Year:	4 & 8		
Focus:	Interpreting a graph		
<b>Total score:</b>	11–12	2	16
	9–10	35	54
	7–8	27	14
	5–6	6	3
	0–4	30	13

<b>LINK TASK: 2</b>			
Approach:	Station		
Year:	4 & 8		
Focus:	Interpreting a map		
<b>Total score:</b>	6	23	50
	5	32	36
	4	18	9
	3	11	2
	0–2	16	4

<b>LINK TASK: 3</b>			
Approach:	Independent		
Year:	4 & 8		
Focus:	Interpreting a graph		
<b>Total score:</b>	3	22	75
	2	27	12
	1	44	12
	0	7	0

<b>LINK TASK: 4</b>			
Approach:	Independent		
Year:	4 & 8		
Focus:	Interpreting a graph		
<b>Total score:</b>	6	5	43
	5	11	17
	4	11	17
	3	10	10
	0–2	62	13

<b>LINK TASK: 5</b>			
Approach:	Independent		
Year:	4 & 8		
Focus:	Interpreting a graph		
<b>Total score:</b>	2	21	38
	1	59	56
	0	19	6

		% responses	
		y4	y8
<b>LINK TASK: 6</b>			
Approach:	Independent		
Year:	4 & 8		
Focus:	Interpreting a graph		
<b>Total score:</b>	5	6	34
	4	11	19
	3	17	25
	2	25	13
	0–1	42	8

<b>LINK TASK: 7</b>			
Approach:	Independent		
Year:	4 & 8		
Focus:	Interpreting a table		
<b>Total score:</b>	1	7	32
	0	93	68

<b>LINK TASK: 8</b>			
Approach:	Independent		
Year:	4 & 8		
Focus:	Interpreting a pie chart		
<b>Total score:</b>	4–5	17	43
	3	11	21
	2	30	19
	1	34	15
	0	8	2

<b>LINK TASK: 9</b>			
Approach:	Station		
Year:	4 & 8		
Focus:	Interpreting a graph		
<b>Total score:</b>	3	73	89
	2	14	7
	1	5	1
	0	8	3

<b>LINK TASK: 10</b>			
Approach:	Independent		
Year:	4 & 8		
Focus:	Interpreting a bar graph		
<b>Total score:</b>	3	16	56
	2	20	17
	1	12	4
	0	51	24

# Link Tasks 11 – 20

LINK TASK: 11	% responses	
	y4	y8
Approach: Station		
Year: 4 & 8		
Focus: Drawing routes on a map		
<b>Total score:</b>	2	9
	1	31
	0	60
		22
		45
		33

LINK TASK: 12	% responses	
Approach: One to one		
Year: 8		
Focus: Interpreting graphs		
<b>Total score:</b>	10-12	5
	8-9	16
	6-7	32
	4-5	29
	0-3	17

LINK TASK: 13	% responses	
Approach: Station		
Year: 8		
Focus: Interpreting tables		
<b>Total score:</b>	6-7	27
	4-5	24
	2-3	29
	1	9
	0	11

LINK TASK: 14	% responses	
Approach: Independent		
Year: 8		
Focus: Interpreting a chart		
<b>Total score:</b>	4	38
	3	28
	2	19
	1	9
	0	6

LINK TASK: 15	% responses	
Approach: Independent		
Year: 8		
Focus: Interpreting a graph		
<b>Total score:</b>	6	28
	5	0
	4	28
	2-3	19
	0-1	25

LINK TASK: 16	% responses	
	y4	y8
Approach: Station		
Year: 8		
Focus: Interpreting a display		
<b>Total score:</b>	8-9	2
	6-7	19
	4-5	21
	2-3	24
	0-1	35

LINK TASK: 17	% responses	
Approach: Station		
Year: 8		
Focus: Interpreting a graph		
<b>Total score:</b>	10-11	33
	8-9	30
	6-7	13
	4-5	12
	0-3	12

LINK TASK: 18	% responses	
Approach: Station		
Year: 8		
Focus: Interpreting a travel timetable		
<b>Total score:</b>	5	26
	4	15
	3	17
	2	16
	0-1	27

LINK TASK: 19	% responses	
Approach: Station		
Year: 8		
Focus: Interpreting compass directions		
<b>Total score:</b>	5	49
	4	2
	3	20
	2	11
	0-1	19

LINK TASK: 20	% responses	
Approach: Station		
Year: 4		
Focus: Interpreting compass directions		
<b>Total score:</b>	5	56
	4	0
	3	11
	2	5
	0-1	28



# Constructing or Completing Graphs, Tables and Maps 4

**Overview:** The construction and completion of graphs, tables and maps is an area that shows strong growth in abilities between year 4 and year 8. Year 8 students are particularly adept at completing displays that have been conceptualised, but need to be completed. They are not nearly as strong when they have to generate the entire layout for the graph, tables or map. Many year 4 students struggle somewhat with completing graphs, tables and maps, and have great difficulty in developing them without a model from which to work. Performance in 2007 was very similar to performance in 2003 at both year 4 and year 8.



## Details of The Tasks Administered

Twenty of the assessment tasks presented students with information to be displayed in a graph, table or map and instructions for preparing the graph, table or map. In some cases, much of the graph, table or map was provided, and the student was to incorporate the additional information. In other cases, a framework was provided, but students were asked to add data, title, axis labels or value labels.

Nine of the tasks are released for full description and publication in this report. Seven of these tasks are trend tasks that were given in 2003 and again in this administration. Six of these trend tasks were given at both year 4 and year 8; the remaining one was given at year 8 only. The two remaining tasks were given for the first time in 2007 to year 8 students only, and are being released with full details for publication.

Eleven of the tasks are link tasks and are being held to be used again in 2011, with only partial information given in this report. Four of these were given at both year 4 and year 8, and the remaining seven only at year 8.

Eleven of the 20 tasks were given in station format, and the remaining nine were presented in independent format.

The task details and results for trend tasks are presented in the first section, followed by the task details and results for the released tasks. The third section contains information on the link tasks being held for the 2011 administration.

## Comparing Results For Year 4 and Year 8 Students

Performance in graphs, tables and maps shows strong growth from year 4 to year 8 overall. We summed the individual task components (scores on the individual questions and subparts of the tasks) across 64 such components for eight tasks. The average percent correct at year 4 was 50; the average at year 8 was 80. Thus, roughly a third more year 8 than year 4 students were successfully responding to task components. Furthermore, students at year 8 generally showed a strong mastery of the skills necessary to produce graphs. The biggest weakness for both years was the lack of appropriate labels and titles to accompany the graphs. Students also had trouble in developing a graph or table if they were not given some suggestion as to what the display should look like. If they had to do all of the layout and design, they were far less successful than if they were completing work that was already started. The difficulty appears to be in the ability to conceptualise what the finished product might look like as opposed to working from a model.

## Trend Results: Comparing 2003 and 2007 Results

Six trend tasks involving 40 components were administered at year 4 in 2003 and again in 2007. The average successful completion rate on these tasks was 46% in 2003 and 45% in 2007. Thus, performance in the two years is quite similar.

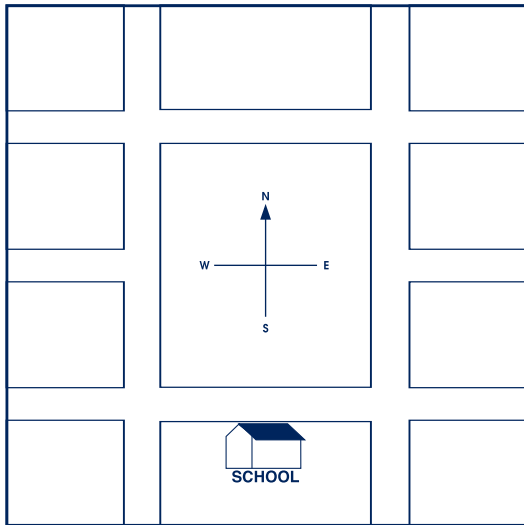
Seven trend tasks involving 52 components were administered at year 8 in both 2003 and 2007. The average success rate in 2003 was 72%; in 2007, the comparable figure is 70%. Again, performance across the four-year span is quite similar.



Approach: Station  
 Focus: Drawing a map  
 Resources: Map in work book

**Questions / instructions:**

Kate said "My school is on Main Street. I walk west along Main Street to Hills Street. Then I walk north along Hills Street. I go past Frame Street on my left. Pioneer Street crosses over Hills Street. I turn right into Pioneer Street. My house is the second house on the left on Pioneer Street."



1. Write in the names of the streets that Kate walks along to get from school to home.

<b>Correctly marked:</b>	Main Street	62 (54)	82 (80)
	Hills Street	47 (47)	82 (79)
	Frame Street	24 (27)	62 (58)
	Pioneer Street	40 (40)	79 (76)

2. Draw Kate's house on the map.  
*[left (top) side of Pioneer St, middle section]*

drawn in correct position, not on the corner	22 (9)	45 (40)
drawn in generally correct position, but on the corner	4 (19)	8 (15)

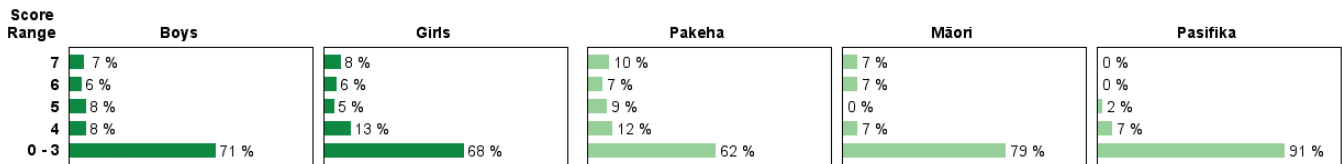
3. Draw a line to show where Kate walks to get from school to home.

line showed correct route	25 (22)	61 (51)
---------------------------	---------	---------

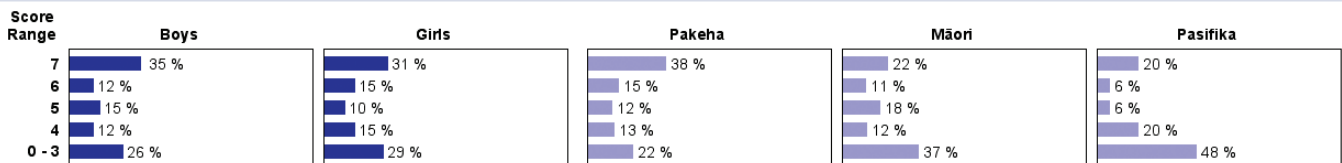
<b>Total score:</b>	7	8 (3)	33 (26)
	6	6 (10)	13 (18)
	5	6 (5)	13 (5)
	4	10 (12)	14 (17)
	0-3	70 (69)	28 (33)

**Subgroup Analyses:**

Year 4



Year 8



**Commentary:**

Year 8 students were moderately successful in following the directions and marking a route on a simple map. Year 4 students had much more difficulty with the task. Whereas 61% of the year 8 students could trace the route that the student took from school to her house, only one quarter of year 4 students could do so. There was little change between 2003 and 2007. Boys and girls performed similarly. Pasifika students had the least success with this task.

Trend Task:

# Counting Counters

Approach: Station

Year: 4 & 8

Focus: Constructing a table

Resources: Bag of counters (8 large: 3 red, 3 blue, 2 yellow; 6 small: 2 red, 1 blue, 3 yellow), ruler

**Questions / instructions:**

Here is a bag of red, blue and yellow counters. Some of them are big and some are small.

Draw a table that shows how many of each colour are big and how many of each colour are small.

table format used  
(6 cells, in 3 by 2 arrangement)

	Big	Small
Red	3	2
Blue	3	1
Yellow	2	3

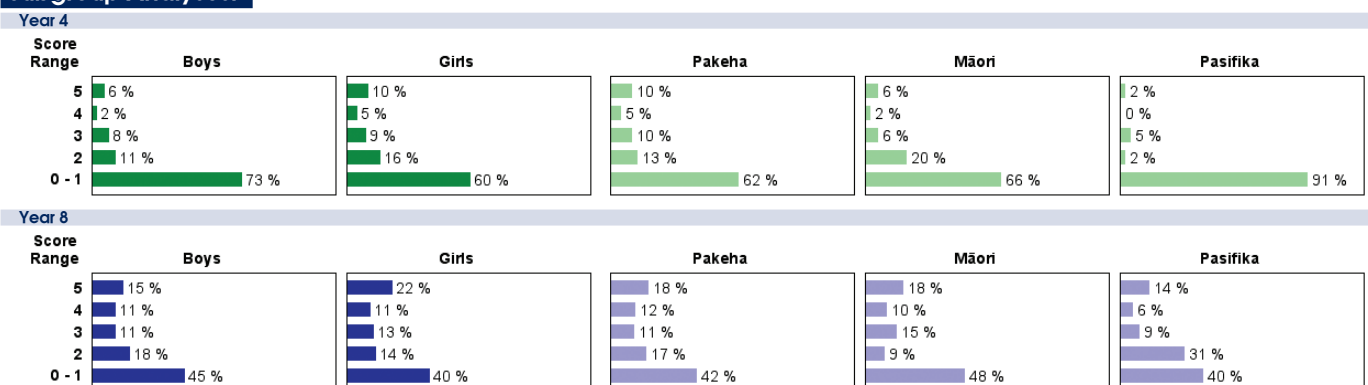
Labelled rows/columns for:  
big and small  
red, blue and yellow

Six numbers, all correct, formatted as:  
digits  
tallies or dots

	Year 4	Year 8
15 (12)	35 (29)	
22 (16)	39 (36)	
28 (15)	43 (38)	
25 (20)	38 (23)	
8 (5)	21 (18)	
<b>Total score:</b>	<b>5</b>	<b>18 (16)</b>
	4 (4)	11 (8)
	8 (7)	12 (6)
	13 (9)	16 (11)
	66 (75)	43 (58)



**Subgroup Analyses:**



**Commentary:**

Children at both year 4 and year 8 had difficulty with this task, although there was considerable growth from year 4 to year 8. Many recorded the information but not in an efficient table. There was a little improvement from 2003 to 2007 at year 8 level. Pakeha and Māori students performed comparably, with Pasifika students a little lower, on average.

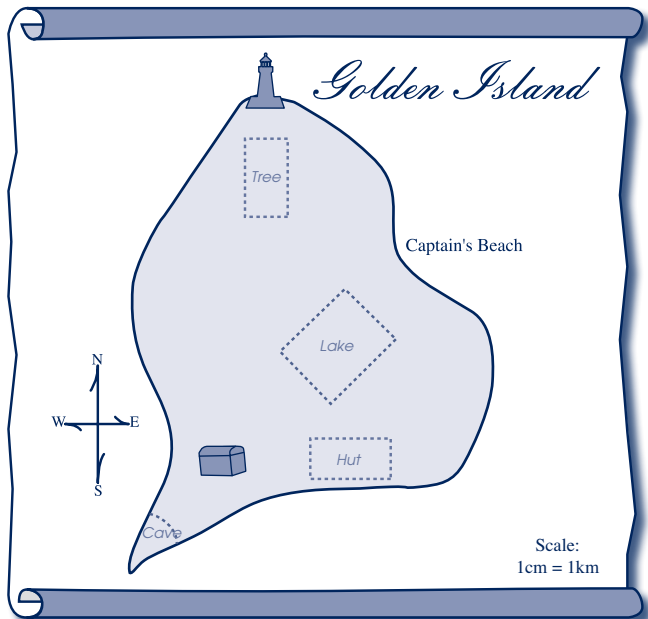
# Trend Task: Pirate Map



Year: 4 & 8

Approach: Station  
 Focus: Making a map  
 Resources: Ruler, map in work book

## Questions / instructions:



Help the old pirate finish his treasure map. Here is the information you need to draw on the map:

- a **hut** 3 km east of the treasure
- a large **tree** 2 km south of the lighthouse
- a **cave** on the south tip of the island
- a small **lake** 4 km north-east of the treasure
- a **stream** running straight between the lake and Captain's Beach.

Finish the map by:

- finishing the key
- drawing the things on the map.

% response  
2007 ('03)  
year 4 year 8

Key drawn & labelled correctly:	hut	tree	cave	lake	stream
	53 (61)	54 (66)	50 (58)	54 (65)	48 (62)
	81 (83)	82 (87)	77 (80)	82 (86)	78 (80)

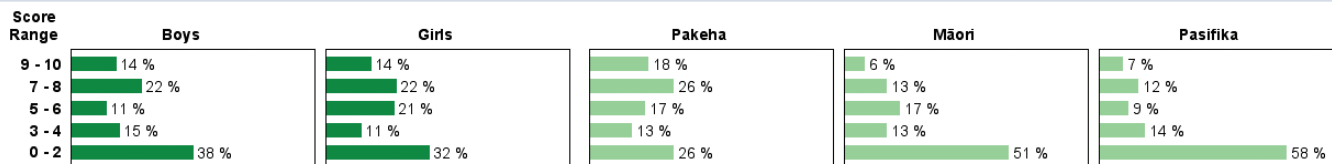
Map drawn & labelled correctly: (within marked area)	hut	tree	cave	lake	stream (anything joining lake to Captain's Beach)
	38 (47)	49 (57)	57 (63)	30 (31)	27 (22)
	80 (75)	87 (87)	87 (78)	64 (70)	56 (64)

Total score:	9-10	7-8	5-6	3-4	0-2
	14 (18)	22 (32)	16 (15)	13 (8)	35 (28)
	56 (60)	22 (17)	7 (11)	7 (7)	8 (6)

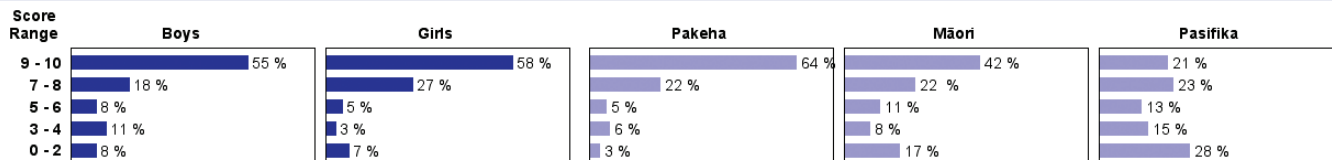
Key	
	= Lighthouse
	= Treasure

## Subgroup Analyses:

Year 4



Year 8



## Commentary:

There was strong growth from year 4 to year 8 in the ability to complete a map with appropriate symbols in the proper locations. Year 8 students were generally quite good at this task. There was a slight decline in performance for year 4 students from 2003 to 2007. Māori and Pasifika year 4 students performed comparably, but Māori students did better at year 8 level.

Approach: Station

Year: 4 & 8

Focus: Constructing a tally and bar graph

Resources: Animal card, ruler, table and blank grid in work book

### Questions / instructions:

1. Fill in the table using tally marks. The lions are done for you.

Animal	Tally
Lion	HH I
Elephant	
Giraffe	
Tiger	

	% response 2007 ('03)	
	year 4	year 8
	85 (84)	97 (95)
	89 (91)	97 (98)
	89 (87)	96 (98)

**5 elephants:**

number and convention correct 85 (84) 97 (95)  
 number correct 3 (5) 0 (3)

**3 giraffes:**

number and convention correct 89 (91) 97 (98)  
 number correct 2 (2) 0 (1)

**1 tiger:**

number correct 89 (87) 96 (98)

2. Use the tally chart to help you draw a bar graph of this information on the next page.

Make sure your graph has:

- a title
- labels on the side and bottom axis
- bar graphs drawn to the right height.

**Title:**  
 ("Animal Add Ups"/  
 "How many Animals?" or similar)

**Position of title:** above 47 (46) 79 (80)  
 below 49 (47) 79 (80)  
 1 (0) 1 (1)

**"Animals" axis:**  
 appropriate axis label and all animal names 3 (5) 41 (41)  
 appropriate axis label, not all animal names 1 (0) 2 (3)  
 all animal names, but no appropriate axis label 44 (43) 46 (48)

**Number axis:**  
 appropriate axis label and appropriate numbering (starting at zero) 1 (3) 39 (43)  
 appropriate axis label, not appropriate number labelling 1 (1) 5 (4)  
 appropriate number labelling, but no appropriate axis label 32 (30) 39 (38)

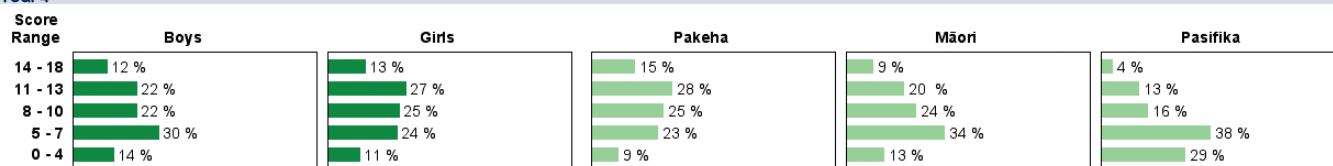
**Bars of graph:**  
 all bars drawn to correct height (or matching tally numbers) 42 (42) 82 (87)  
 two or three bars drawn to correct height (or matching tally numbers) 6 (7) 6 (6)

**Placement of bars:** bars separated 31 (29) 55 (53)  
 bars together 25 (19) 40 (41)

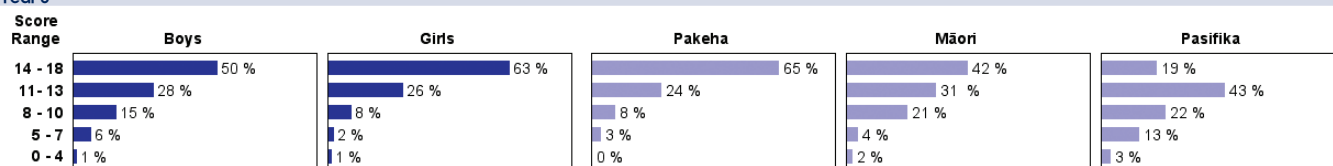
**Total score:** 14-18 13 (11) 56 (59)  
 11-13 25 (23) 27 (28)  
 8-10 24 (27) 12 (9)  
 5-7 27 (28) 4 (4)  
 0-4 13 (11) 1 (1)

### Subgroup Analyses:

**Year 4**



**Year 8**



### Commentary:

Most year 4 and year 8 students were successful in tallying information, but many year 4 students had difficulty translating those tallies into a bar graph. Year 8 students were much more successful at that task. Students at both years tended to ignore the need for labels and titles on their graphs. Performance in 2003 and 2007 was very similar. On average, Pasifika students scored lower than Māori students who, in turn, were lower than Pakeha students.



# Trend Task: Mini Golf

Approach: Station  
 Focus: Constructing a table  
 Resources: Ruler

Year: 4 & 8

## Questions / instructions:

Draw a table to show the prices for adults and children to play mini golf during the week and in the weekends.

Here is the information to use:

For children it costs \$3 on weekdays and \$4 in the weekend.

For adults it costs \$5 on weekdays and \$6 in the weekend.

**Prices to play Mini Golf**

	Adults	Children
Weekdays	5	3
Weekend	6	4

### Table format used:

table (4 cells, 2 by 2)	6 (5)	31 (27)
table (other)	39 (30)	43 (47)

### Labelled rows/columns for:

children and adults	59 (62)	88 (90)
weekdays and weekend	53 (51)	88 (86)

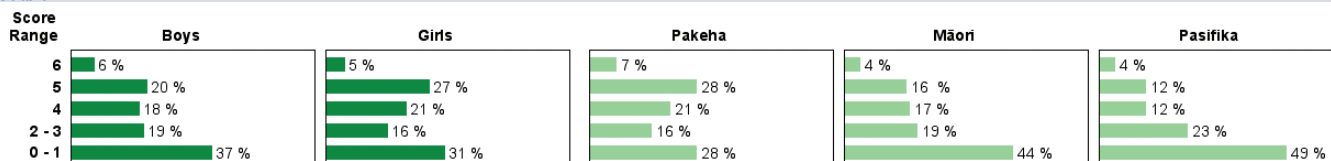
### Four numbers all correct, using:

digits	5 (2)	5 (2)
tallies or dots	54 (62)	83 (86)

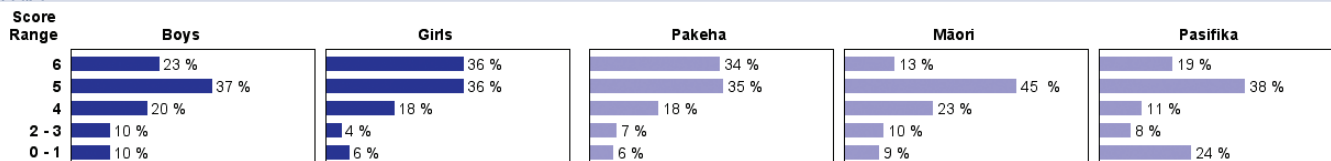
<b>Total score:</b>	6	6 (5)	29 (26)
	5	24 (21)	37 (40)
	4	19 (26)	19 (18)
	2-3	18 (16)	7 (10)
	0-1	34 (33)	8 (6)

## Subgroup Analyses:

### Year 4



### Year 8



## Commentary:

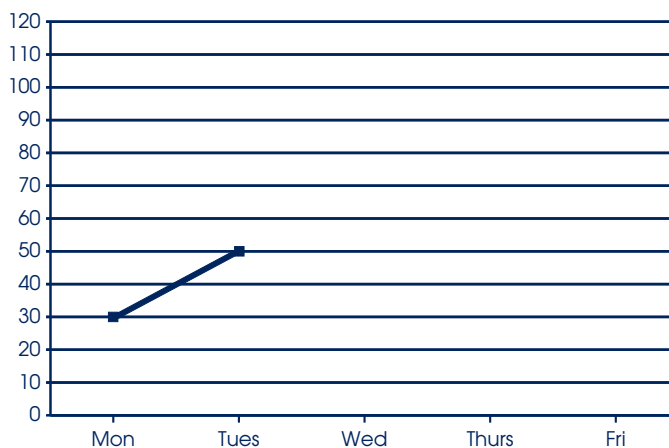
Students experienced some difficulty in constructing an efficient table from data presented in verbal form, particularly at year 4. Most students did not see how the information could be laid out in a simple 2 x 2 table. Performance was very similar in 2003 and 2007. Performance of year 8 Pasifika students was particularly diverse, with 19% getting the maximum score and 24% scoring zero.

Approach:	Station	Year:	4 & 8
Focus:	Completing a line graph		
Resources:	Ruler, graph in work book		

**Questions / instructions:**

The teacher said if the class could earn more than 100 points in the week then they could have a treat. Here are the points they collected each day.

Day	Points
Monday	30
Tuesday	20
Wednesday	30
Thursday	10
Friday	20

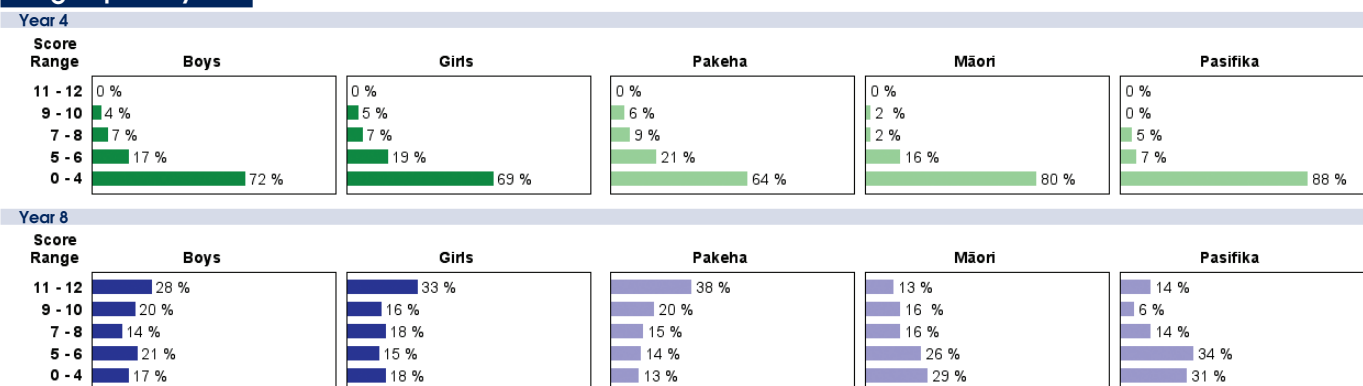


Finish the line graph and make sure graph has:

- a title
- the line drawn
- labels on the side and bottom axes.

	% response 2007 ('03)			% response 2007 ('03)	
	year 4	year 8		year 4	year 8
<b>Mentioned in title:</b>			<b>Line on graph:</b>		
(class) points	44 (50)	77 (86)	Wednesday – marked at 80	26 (25)	61 (69)
earned (or similar)	2 (1)	8 (10)	Thursday – marked at 90, or up 10 from Wednesday	23 (23)	62 (70)
in a week	2 (2)	11 (12)	Friday – marked at 110, or up 20 from Thursday	23 (21)	61 (69)
<b>Position of title:</b>			<b>Line drawn:</b>		
above graph	47 (53)	73 (86)	(marks/dots connected up with line)		
below graph	4 (8)	5 (5)	with all points correct	11 (18)	56 (64)
<b>Appropriate side axis label:</b>			not all points correct	41 (40)	32 (30)
(e.g. class points, points, points earned)	14 (11)	50 (67)	<b>Total score:</b>		
<b>Appropriate bottom axis label:</b>			11–12	0 (0)	31 (11)
(days, week days)	15 (14)	50 (68)	9–10	5 (5)	18 (40)
			7–8	7 (8)	16 (18)
			5–6	18 (16)	18 (16)
			0–4	71 (71)	18 (15)

**Subgroup Analyses:**

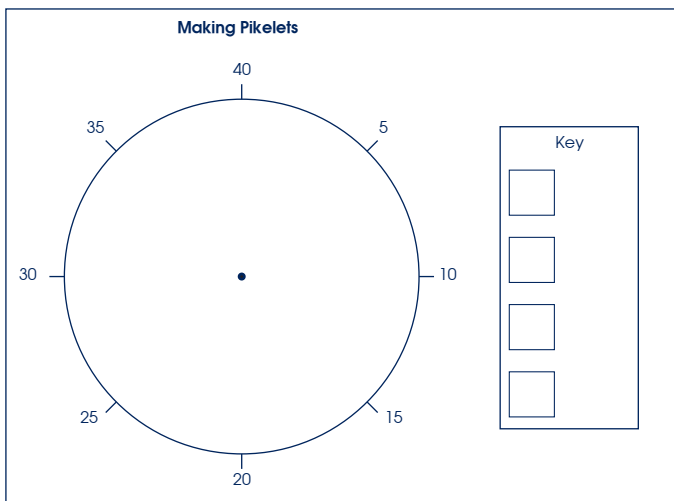


**Commentary:**

Year 8 students performed moderately well on this task, but year 4 students had great difficulty with it. Only about one in ten year 4 students could complete the line of the graph successfully, where slightly over half of the year 8 students were able to do so. Year 4 students performed very similarly in 2003 and 2007, but there were more very high performing year 8 students in 2007 than in 2003. At year 8 level especially, Pakeha students performed better than Māori and Pasifika students.

Approach: Station  
 Focus: Completing a pie graph  
 Resources: Ruler, 3 coloured pencils – red, blue, yellow

**Questions / instructions:**



It takes Hannah 40 minutes to make pikelets.  
 Finish the pie graph and make sure the graph has:

- the activities marked in
- the colour key finished.

Activity	Time (minutes)
Getting ready	5
Making mixture	10
Cooking pikelets	15
Cleaning up	10

- sectors of the circle used
  - exactly four sectors
  - four sectors showing 5 mins, 10 mins, 15 mins, 10 mins (*fairly accurately*)
  - four sectors in correct sequence
  - "getting ready" (5 mins) started at 0/40
- Labelling issues:**
- key boxes labelled with four activities
  - key boxes filled (or left white) to match each sector of pie graph
  - sectors labelled by other means than key/or in addition to key
  - sector proportions correct and labelled accurately (*by key or other means*)

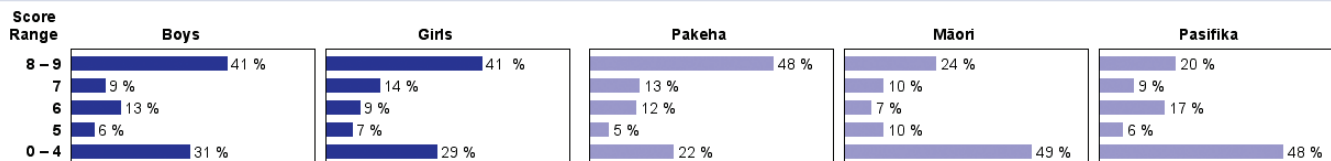
<b>Total score:</b>	8–9	41 (49)
	7	12 (11)
	6	11 (12)
	5	6 (7)
	0–4	30 (22)

% response 2007 ('03)

year 8

**Subgroup Analyses:**

Year 8



**Commentary:**

Almost half of the year 8 students were quite successful at making a pie graph from data presented in a table. The most common problem came in properly labelling their graphs. There was a slight decline in performance from 2003. Māori and Pasifika students performed similarly, but markedly less well than Pakeha students, on average.

Approach: Independent

Year: 8

Focus: Interpreting a table and completing a graph

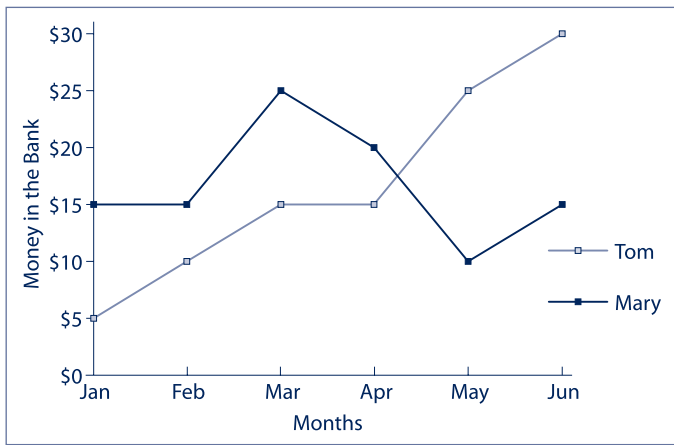
Resources: Ruler, table and line graph in work book

Questions / instructions:

This table shows how much each child in a family had in the bank from January to June.

	Jan.	Feb.	Mar.	Apr.	May	Jun.
Mary	\$15	\$15	\$25	\$20	\$10	\$15
Tom	\$5	\$10	\$15	\$15	\$25	\$30
Jake	\$10	\$20	\$10	\$5	\$20	\$25

This line graph shows the bank balances for Mary and Tom. Use the information from the table to draw the line for Jake.



<b>Jan:</b>	marked at \$10	90
<b>Feb:</b>	marked at \$20 (±1)	72
<b>Mar:</b>	marked at \$10 (±1)	72
<b>Apr:</b>	marked at \$5 (±1)	74
<b>May:</b>	marked at \$20 (±1)	72
<b>Jun:</b>	marked at \$25 (±1)	74

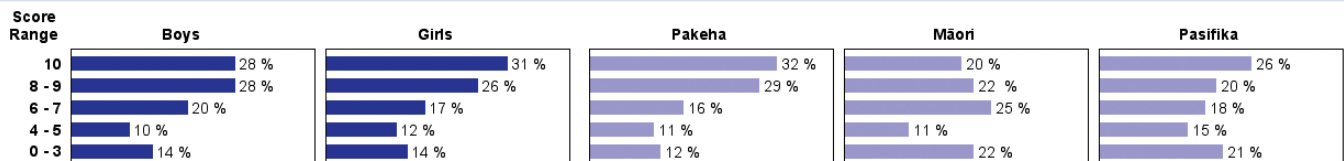
**Line drawn:**  
*(i.e. squares, marks, dots connected up with line)*  
 marked tidily between marked points 51  
 marked but quite roughly 39

**Line appropriately labelled:**  
 positioned with and labelled like Tom and Mary 53  
 labelled but in another way 4

<b>Total score:</b>	10	29
	8-9	27
	6-7	19
	4-5	11
	0-3	15

Subgroup Analyses:

Year 8



Commentary:

Year 8 students were moderately successful on this task, with over half of the students scoring 8 or better. They were generally successful at finding the points on the graph but had somewhat more difficulty with line drawing and labelling. Gender and ethnic differences were quite small.

# Task: Monday's Temperatures

Approach: Independent

Year: 8

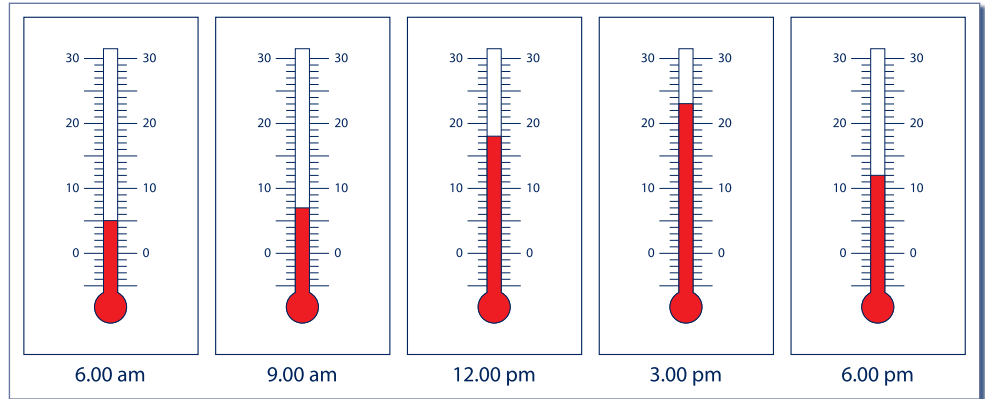
Focus: Constructing a graph

Resources: Ruler, thermometers and blank grid in work book

## Questions / instructions:

The thermometers show the temperature outside at different times of the day.

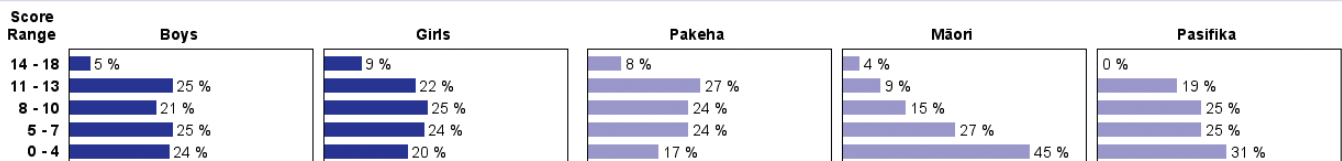
Make a line graph to show the temperatures. Write labels on your graph.



		% responses			% responses
		y8			y8
<b>Appropriate title:</b>	temperatures outside	1	<b>Drawing of graph:</b>		
	temperatures	8	6.00am –	5 marked correctly	72
<b>Appropriate qualification in title:</b>			9.00am –	7 marked correctly	73
	different times of the day ( <i>Monday</i> )	6	12:00pm –	18 marked correctly	66
	mentioned in title	0	3.00pm –	23 marked correctly	67
	different times mentioned in title	0	6.00pm –	12 marked correctly	71
<b>Position of title:</b>	above graph	8	<b>Line drawn:</b>		
	below graph	0	(i.e. marks connected up with line)		
<b>Bottom axis (time):</b>			yes, tidily between marked points	44	
	appropriate axis label and all five times	33	yes, but quite roughly	21	
	appropriately given ( <i>am/pm not necessary</i> )	2			
	appropriate axis label, but not all	51			
	5 times appropriately given				
	all times given, but no appropriate axis label				
<b>Side axis (temperature):</b>			<b>Total score:</b>	14–18	7
	appropriate axis label and	38		11–13	23
	appropriate numbering	4		8–10	23
	appropriate axis label, but not			5–7	25
	appropriate number labelling	31		0–4	22
	appropriate number labelling,				
	but no appropriate axis label				

## Subgroup Analyses:

Year 8



## Commentary:

As was found with other relatively unstructured tasks, many students failed to provide appropriate labels for their graph and its axes. The data points were more commonly recorded correctly. Almost half of the Māori students had very low scores.



		% responses	
		y4	y8
<b>LINK TASK: 21</b>			
Approach:	Station		
Year:	4 & 8		
Focus:	Constructing a bar graph		
<b>Total score:</b>	13–14	1	9
	10–12	1	20
	7–9	18	28
	4–6	47	38
	0–3	34	5

		% responses	
		y4	y8
<b>LINK TASK: 25</b>			
Approach:	Station		
Year:	8		
Focus:	Constructing a graph		
<b>Total score:</b>	13–16		18
	10–12		11
	7–9		12
	4–6		16
	0–3		43

		% responses	
		y4	y8
<b>LINK TASK: 22</b>			
Approach:	Independent		
Year:	4 & 8		
Focus:	Constructing a pie graph		
<b>Total score:</b>	5–6	3	22
	4	11	45
	3	19	14
	2	17	8
	0–1	51	10

		% responses	
		y4	y8
<b>LINK TASK: 26</b>			
Approach:	Station		
Year:	8		
Focus:	Constructing a chart		
<b>Total score:</b>	13–15		13
	10–12		23
	7–9		38
	4–6		13
	0–3		14

		% responses	
		y4	y8
<b>LINK TASK: 23</b>			
Approach:	Independent		
Year:	4 & 8		
Focus:	Completing a map and a key		
<b>Total score:</b>	18	57	78
	15–17	11	9
	12–14	7	6
	9–11	2	2
	0–8	23	6

		% responses	
		y4	y8
<b>LINK TASK: 27</b>			
Approach:	Independent		
Year:	8		
Focus:	Constructing a bar graph		
<b>Total score:</b>	12–14		12
	9–11		15
	6–8		34
	3–5		30
	0–2		10

		% responses	
		y4	y8
<b>LINK TASK: 24</b>			
Approach:	Independent		
Year:	4 & 8		
Focus:	Completing a bar graph		
<b>Total score:</b>	3	61	87
	2	28	10
	1	2	0
	0	10	3

		% responses	
		y4	y8
<b>LINK TASK: 28</b>			
Approach:	Independent		
Year:	8		
Focus:	Interpreting a graph and completing a table		
<b>Total score:</b>	7		74
	6		11
	5		4
	4		2
	0–3		10

## Link Tasks 29 – 31

% responses  
y8

### LINK TASK: 29

Approach: Independent

Year: 8

Focus: Interpreting tables and completing a graph

<b>Total score:</b>	14–15	32
	12–13	33
	10–11	8
	8–9	5
	0–7	22

### LINK TASK: 30

Approach: Station

Year: 8

Focus: Interpreting a chart and constructing a table

<b>Total score:</b>	21–27	13
	16–20	26
	11–15	28
	6–10	15
	0–5	18

### LINK TASK: 31

Approach: Independent

Year: 8

Focus: Interpreting a table and constructing a bar graph

<b>Total score:</b>	13–15	5
	10–12	13
	7–9	44
	4–6	19
	0–3	19

# Performance of Subgroups 5

**Overview:** Although national monitoring has been designed primarily to present an overall national picture of student achievement, the data collected allow for some reporting on differences among subgroups. Using an overall total score for each task, results broken down by eight demographic variables (detailed in Chapter 1) can be examined.

At the school level, the dominant factor is clearly socio-economic status (SES), as measured by a grouping of the decile levels of the schools the children attend (explained below in the SES section). Students in high and medium decile schools consistently outperform students from low decile schools. There are also some differences by school size, with students from large schools generally tending to get the highest scores on some tasks, but this is not a consistent trend. School type does not appear to be an important factor in performance in graphs, tables and map, nor do zone or community size.

At the individual level, there are moderate to large differences between Pakeha and Māori students, and consistently large differences between Pakeha and Pasifika students. Home language is a small to moderate factor in performance, and gender differences were minimal.

The pattern of differences by subgroups in 2007 is consistent with the patterns seen in the 2003 report.



## SCHOOL VARIABLES

Five of the demographic variables related to the schools the students attended. For these five variables, statistical significance testing was used to explore differences in task performance among the subgroups. Where only two subgroups were compared (for *School Type*), differences in task performance between the two subgroups were checked for statistical significance using t-tests. Where three subgroups were compared, one-way analysis of variance was used to check for statistically significant differences among the three subgroups.

Because the number of students included in each analysis was quite large (approximately 450), the statistical tests were quite sensitive to small differences. To reduce the likelihood of attention being drawn to unimportant differences, the critical level for statistical significance was set at  $p = .01$  (so that differences this large or larger among the subgroups would not be expected by chance in more than 1% of cases).

For the first three of the five school variables (*School Type*, *Zone*, and *Community Size*), statistically significant differences were found for less than 10% of tasks at both year levels. For the variable *School Size*, statistically significant differences were found for between 10% and 20% of tasks at both year levels. For the variable *Socio-Economic Status*, statistically significant differences were found on over 75% of tasks at both year levels. In the detailed report below, all “differences” mentioned are statistically significant (to save space, the words “statistically significant” are omitted).

### School Type

Results were compared for year 8 students attending full primary and intermediate schools. There were no differences between these two subgroups on any of the 61 tasks.

Results were also compared for year 8 students attending intermediate schools and year 7 to 13 high schools.

There were differences on three of the 61 tasks (5%), with students from year 7 to 13 high schools scoring higher on *Sam's Savings* (p18), *Class Points* (p43), and *Link Task 22* (p47).

### Zone

Results achieved by students from Auckland, the rest of the North Island, and the South Island were compared.

For year 4 students, there were differences among the three subgroups on three of the 40 tasks (7.5%). Students from the North Island other than Auckland scored lowest on *TV Watching* (p23), while students from Auckland scored lowest on *Link Task 9* (p35) but highest on *Mini Golf* (p42).

For year 8 students, there were differences among the three subgroups on four of the 61 tasks (7%). Students from the South Island scored highest on *Sam's Savings* (p18), *Link Task 14* (p36) and *Monday's Temperatures* (p46), while students from Auckland scored highest on *Link Task 7* (p35).

## Community Size

Results were compared for students living in communities containing over 100,000 people (main centres), communities containing 10,000 to 100,000 people (provincial cities), and communities containing less than 10,000 people (rural areas).

For year 4 students, there were differences on two of the 40 tasks (5%). Students from rural areas scored highest on *Link Task 7* (p35) but lowest on *Mini Golf* (p42).

For year 8 students, there were differences among the three subgroups on five of the 61 tasks (8%). Students from provincial cities scored lowest on *Fruit Chart* (p14), *Country Facts* (p16), and *Link Task 4* (p35), while students from main centres scored highest on *Link Task 7* (p35) and *Link Task 31* (p48).

## School Size

Results were compared from students in large, medium sized and small schools (exact definitions were given in Chapter 1). For year 4 students, there were differences among the subgroups on seven of the 40 tasks (17.5%). Students from large schools scored highest on *Class Pets* (p30),

*School Shop* (p32), *Link Task 1* (p35), *Link Task 3* (p35) and *Link Task 21* (p47). Students from small schools scored highest on *Link Task 7* (p35), but lowest on *Mini Golf* (p42).

For year 8 students, there were differences on seven of the 61 tasks (11%). Students from small schools scored lowest on *Cows and Sheep* (p29), *Link Task 6* (p35), *Animal Add Ups* (p41) and *Link Task 27* (p47). Students from large schools scored highest on *Link Task 7* (p35), and students from medium sized schools scored highest on *Drawing a Map* (p38) and *Link Task 21* (p47).

## Socio-Economic Index (SES)

Schools are categorised by the Ministry of Education based on census data for the census mesh blocks where children attending the schools live. The socio-economic index, commonly referred to as the SES index, takes into account household income levels and categories of employment in the census mesh blocks. The SES index uses 10 subdivisions, each containing 10% of schools (deciles 1 to 10). For our purposes, the bottom three deciles (1-3) formed the low SES group, the middle four deciles (4-7) formed the medium SES group and the top three

deciles (8-10) formed the high SES group. Results were compared for students attending schools in each of these three SES groups.

For year 4 students, there were differences among the three subgroups on 32 of the 40 tasks (80%). Because of the large number of tasks involved, they will not be listed here. Students in high decile schools performed better than students in low decile schools on all 32 tasks, in most cases with students in medium decile schools scoring substantially closer to the students from high decile schools than to the students from low decile schools.

For year 8 students, there were differences among the three subgroups on 47 of the 61 tasks (77%). Students in high decile schools performed better than students in low decile schools on all 47 tasks. For about 60% of these 47 tasks, students in medium decile schools scored substantially closer to the students from high decile schools than to the students from low decile schools. On the remaining 40% of the tasks, students in medium decile schools scored about midway between students from low and high decile schools.

## STUDENT VARIABLES

Three demographic variables related to the students themselves:

- **Gender:** boys and girls
- **Ethnicity:** Māori, Pasifika and Pakeha (this term was used for all other students)
- **Language used predominantly at home:** English and other.

The analyses reported here compare the performances of boys and girls, Pakeha and Māori students, Pakeha and Pasifika students, and students from predominantly English speaking and non-English speaking homes.

For each of these three comparisons, differences in task performance between the two subgroups are described using “effect sizes” and statistical significance. For each task and each year level, the analyses began with a t-test comparing the performance of the two selected subgroups and checking for statistical significance of the differences. Then the mean score obtained by students

in one subgroup was subtracted from the mean score obtained by students in the other subgroup, and the difference in means was divided by the pooled standard deviation of the scores obtained by the two groups of students. This computed effect size describes the magnitude of the difference between the two subgroups in a way that indicates the strength of the difference and is not affected by the sample size. An effect size of +.30,



for instance, indicates that students in the first subgroup scored, on average, three tenths of a standard deviation higher than students in the second subgroup.

For each pair of subgroups at each year level, the effect sizes of all available tasks were averaged to produce a mean effect size for the curriculum area and year level, giving an overall indication of the typical performance difference between the two subgroups.

## Gender

Results achieved by male and female students were compared using the effect size procedures.

For year 4 students, the mean effect size across the 40 tasks was 0.02, with girls performing very slightly better than boys overall (girls averaged 0.02 standard deviations higher than boys). The pattern was different for tasks from Chapter 3 (*Interpretation of Graphs, Table and Maps*) and Chapter 4



(Constructing or Completing Graphs, Tables and Maps). For Chapter 3 tasks, boys performed very slightly better than girls (mean effect size 0.01), while for Chapter 4 tasks, girls performed noticeably better than boys (effect size 0.12). There were statistically significant differences on just three of the 40 tasks. Boys performed better on *Timu Gets Ready* (p26), while girls performed better on *Link Task 5* (p35) and *Counting Counters* (p39).

For year 8 students, the mean effect size across the 61 tasks was 0.05 (girls averaged 0.05 standard deviations higher than boys). This is a small difference. Girls' advantage was greater on Chapter 4 tasks (mean effect size 0.12) than on Chapter 3 tasks (mean effect size 0.02). There were statistically significant differences on five of the 61 tasks. Boys performed better on two Chapter 3 tasks: *Swimathon* (p24) and *Timu Gets Ready* (p26). Girls performed better on three Chapter 4 tasks: *Animal Add Ups* (p41), *Mini Golf* (p42), and *Link Task 25* (p47).

### Ethnicity

Results achieved by Māori, Pasifika and Pakeha (all other) students were compared using the effect size procedures. First, the results for Pakeha students were compared to those for Māori students. Second, the results for Pakeha students were compared to those for Pasifika students.

### Pakeha-Māori Comparisons

For year 4 students, the mean effect size across the 40 tasks was 0.38 (Pakeha students averaged 0.38 standard deviations higher than Māori students). We classify that as a moderate difference. There were statistically significant differences on 28 of the 40 tasks (70%), with Pakeha students performing better on all 28 tasks, spread quite evenly across both chapters. Because of the large number of tasks, they are not listed here.

For year 8 students, the mean effect size across the 61 tasks was 0.42 (Pakeha students averaged 0.42 standard deviations higher than Māori students). We classify that as a large difference. There were statistically significant differences on 39 of the 61 tasks (64%), with Pakeha students performing better on all 39 tasks, spread quite evenly across both task chapters.



### Pakeha-Pasifika Comparisons

Readers should note that only 30 to 50 Pasifika students were included in the analysis for each task. This is lower than normally preferred for NEMP subgroup analyses, but has been judged adequate for giving a useful indication, through the overall pattern of results, of the Pasifika students' performance. Because of the relatively small number of Pasifika students,  $p = .05$  has been used here as the critical level for statistical significance.

For year 4 students, the mean effect size across the 40 tasks was 0.59 (Pakeha students averaged 0.59 standard deviations higher than Pasifika students). This is a large difference. There were statistically significant differences on 34 of the 40 tasks (85%). Pakeha students performed better on all 34 tasks, spread quite evenly across both task chapters.

For year 8 students, the mean effect size across the 61 tasks was 0.56 (Pakeha students averaged 0.56 standard deviations higher than Pasifika students). This is a large difference. There were statistically significant differences on 49 of the 61 tasks (80%). Pakeha students performed better on all 49 tasks, spread quite evenly across both task chapters.

Although Pakeha/Pasifika differences remain large from year 4 to year 8, it should be noted that large year 4 to year 8 gains are made by Pasifika students on most tasks.

### Home Language

Results achieved by students who reported that English was the predominant language spoken at home were compared, using the effect size procedures, with the results of students who reported predominant use of another language at home (most commonly an Asian or Pasifika language).

For year 4 students, the mean effect size across the 40 tasks was 0.21 (students for whom English was the predominant language at home averaged 0.21 standard deviations higher than the other students). This is a moderate difference. There were statistically significant differences on 17 of the 40 tasks (42.5%): students for whom English was the predominant language spoken at home performed better on all 17 tasks, spread quite evenly across the two task chapters.

For year 8 students, the mean effect size across the 61 tasks was 0.15 (students for whom English was the predominant language at home averaged 0.15 standard deviations higher than the other students). This is a small difference. There were statistically significant differences on five of the 61 tasks. Students for whom English was the predominant language spoken at home performed better on all five tasks: *Kelly Tarlton's* (p21), *School Shop* (p32), *Drawing a Map* (p38), *Animal Add Ups* (p41), and *Link Task 31* (p48).



# A Appendix : The Sample of Schools and Students in 2007



## Year 4 and Year 8 Samples

In 2007, 2877 children from 248 schools were in the main samples to participate in national monitoring. Half were in year 4, the other half in year 8. At each level, 120 schools were selected randomly from national lists of state, integrated and private schools teaching at that level, with their probability of selection proportional to the number of students enrolled in the level. The process used ensured that each region was fairly represented. Schools with fewer than four students enrolled at the given level were excluded from these main samples, as were special schools and Māori immersion schools (such as Kura Kaupapa Māori).

In late April 2007, the Ministry of Education provided computer files containing lists of eligible schools with year 4 and year 8 students, organised by region and district, including year 4 and year 8 roll numbers drawn from school statistical returns based on enrolments at 1 March 2007.

From these lists, we randomly selected 120 schools with year 4 students and



120 schools with year 8 students. Schools with four students in year 4 or 8 had about a 1% chance of being selected, while some of the largest intermediate (year 7 and 8) schools had more than 90% chance of inclusion.

## Pairing Small Schools

At the year 8 level, four of the 120 chosen schools in the main sample had fewer than 12 year 8 students. For each of these schools, we identified the nearest small school meeting our criteria to be paired with the first school. Wherever possible, schools with eight to 11 students were paired with schools with four to seven students and vice versa. However, the travelling distances between the schools were also taken into account.

Similar pairing procedures were followed at the year 4 level. Four pairs of very small schools were included in the sample of 120 schools.

## Contacting Schools

In early May, we attempted to telephone the principals or acting principals of all schools in the year 8 sample. In these calls, we briefly explained the purpose

of national monitoring, the safeguards for schools and students, and the practical demands that participation would make on schools and students. We informed the principals about the materials which would be arriving in the school (a copy of a 20-minute NEMP video on DVD plus copies for all staff and trustees of the general NEMP brochure and the information booklet for sample schools). We asked the principals to consult with their staff and Board of Trustees and confirm their participation by the middle of June.

A similar procedure was followed in the middle of July with the principals of the schools selected in the year 4 samples, and they were asked to respond to the invitation by the middle of August.

## Response from Schools

Of the 124 schools originally invited to participate at year 8 level, 122 agreed. A middle school asked to be replaced because no space was available, in or near the school, for the assessment activities. It was replaced by a nearby intermediate with similar year 8 enrolment and the same decile rating. An independent year 1 to 13 school withdrew without giving a reason, and was replaced by a year 1-8 primary school with similar year 8 enrolment and socio-economic mix.

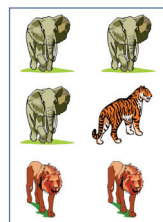
Of the 124 schools originally invited to participate at year 4 level, 120 agreed. One school had a severe space shortage and could not accommodate the assessment activities. A second had three productions and a school camp scheduled in term 4 and could not fit in the NEMP assessments.

A third stated simply that they were too busy. The final school had an acting principal, was expecting a follow-up visit from the Education Review Office, and was heavily involved in other assessment contracts. These four schools were replaced by nearby schools of similar size and decile ratings.

### Sampling of Students

Each school sent a list of the names of all year 4 or year 8 students on their roll. Using computer-generated random numbers, we randomly selected the required number of students (12 or four plus eight in a pair of small schools), at the same time clustering them into random groups of four students. The schools were then sent a list of their selected students and invited to inform us if special care would be needed in assessing any of those children (e.g. children with disabilities or limited skills in English).

For the year 8 sample, we received 132 comments about particular students. In 70 cases, we randomly selected replacement students because the children initially selected had left the school between the time the roll was provided and the start of the assessment programme in the school, or were expected to be away or involved in special activities throughout the assessment week. Two were replaced because they were suspended. The remaining 60 comments concerned children with special needs. Each such child was discussed with the school and a decision agreed. Ten students were replaced because they were very recent immigrants or overseas students who had extremely limited English-language skills. Twenty-seven students were replaced because they had disabilities or other problems of such seriousness that it was agreed that the students would be placed at risk if they participated. Participation was agreed upon for the remaining 23 students, but a special note was prepared to give additional guidance to the teachers who would assess them.



For the year 4 sample, we received 169 comments about particular students. Fifty-three students originally selected were replaced because they

had left the school or were expected to be away throughout the assessment week. Twenty-two students were replaced because of their NESB (*Not from English-Speaking Background*) status and very limited English, two because they were in Māori immersion classes, and five because of a wrong year level. Forty-seven students were replaced because they had disabilities or other problems of such seriousness the students appeared to be at risk if they participated. Special notes for the assessing teachers were made about 40 children retained in the sample.

### Communication with Parents

Following these discussions with the school, Project staff prepared letters to all of the parents, including a copy of the NEMP brochure, and asked the schools to address the letters and mail them. Parents were told they could obtain further information from Project staff (using an 0800 number) or their school principal and advised that they had the right to ask that their child be excluded from the assessment.

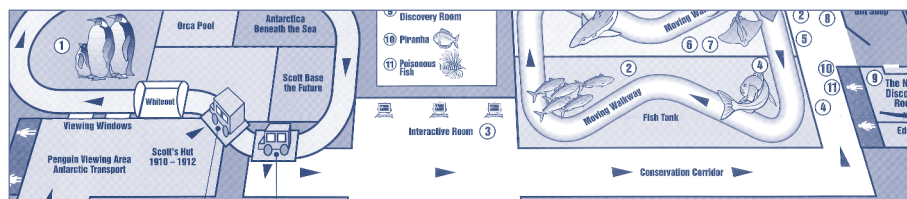
At the year 8 level, we received a number of phone calls including

several from students or parents wanting more information about what would be involved. Seven children were replaced because they did not want to participate or their parents did not want them to.

At the year 4 level we also received several phone calls from parents. Some wanted details confirmed or explained (notably about reasons for selection). Six children were replaced at their parents' request.

### Practical Arrangements with Schools

On the basis of preferences expressed by the schools, we then allocated each school to one of the five assessment weeks available and gave them contact information for the two teachers who would come to the school for a week to conduct the assessments. We also provided information about the assessment schedule and the space and furniture requirements, offering to pay for hire of a nearby facility if the school was too crowded to accommodate the assessment programme. This proved necessary in several cases.



### Results of the Sampling Process

As a result of the considerable care taken, and the attractiveness of the assessment arrangements to schools and children, the attrition from the initial sample was quite low. Less than 3% of selected schools in the main samples did not participate, and less than 3% of the originally-sampled children had to be replaced for reasons other than their transfer to another school or planned absence for the assessment week. The main samples can be regarded as very representative of the populations from which they were chosen (all children in New Zealand schools at the two class levels apart from the 1 – 2% who were in special schools, Māori immersion programmes, or schools with fewer than four year 4 or year 8 children).

Of course, not all the children in the samples actually could be assessed. Three student places in the year 4 sample were not filled because insufficient students were available in that school. Three year 8 students and 10 year 4 students left school at short notice and could not be replaced. Three year 8 and two year 4 students withdrew or were withdrawn by their parents too late to be replaced. Thirty-one year 8 students and 16 year 4 students were absent from school throughout the assessment week. Some other students were absent from school for some of their assessment sessions and a small percentage of performances were lost because of malfunctions in the video recording process. Some of the students ran out of time to complete the schedules of tasks. Nevertheless, for almost all of the tasks over 90% of the sampled students were assessed. Given the complexity of the Project, this is a very acceptable level of participation.

## Composition of the Sample

Because of the sampling approach used, regions were fairly represented in the sample, in approximate proportion to the number of school children in the regions.

### REGION

PERCENTAGES OF STUDENTS FROM EACH REGION:		
REGION	% YEAR 4 SAMPLE	% YEAR 8 SAMPLE
Northland	4.2	4.2
Auckland	34.1	32.5
Waikato	9.2	10.0
Bay of Plenty/Poverty Bay	8.3	8.3
Hawkes Bay	4.2	4.2
Taranaki	2.5	2.5
Wanganui/Manawatu	5.0	5.8
Wellington/Wairarapa	10.8	10.0
Nelson/Marlborough/West Coast	3.3	4.2
Canterbury	11.7	12.5
Otago	4.2	3.3
Southland	2.5	2.5

### DEMOGRAPHY

DEMOGRAPHIC VARIABLES: PERCENTAGES OF STUDENTS IN EACH CATEGORY			
VARIABLE	CATEGORY	% YEAR 4 SAMPLE	% YEAR 8 SAMPLE
Gender	Male	52	52
	Female	48	48
Ethnicity	Pakeha	67	73
	Māori	22	19
	Pasifika	11	8
Main Language at Home	English	87	89
	Other	13	11
Geographic Zone	Greater Auckland	33	31
	Other North Island	45	46
	South Island	22	23
Community Size	< 10,000	19	15
	10,000 – 100,000	22	23
	> 100,000	59	62
School SES Index	Bottom 30%	28	20
	Middle 40%	36	40
	Top 30%	36	40
Size of School	< 25 y4 students	17	
	25 – 60 y4 students	46	
	> 60 y4 students	37	
	<35 y8 students		20
	35 – 150 y8 students		37
Type of School	> 150 y8 students		43
	Full Primary		34
	Intermediate or Middle		44
	Year 7 to 13 High School		17
	Other (not analysed)		5

**Understanding and using information presented in the form of graphs, tables and maps is an important part of everyday life in our community.**

Graphs help us learn about how the values of shares are changing or the fortunes of political parties are fluctuating. We use tables in various guises, such as timetables, tables of postage rates and tax tables. Maps also feature regularly in our lives, as we encounter floor plans in shopping malls and public buildings, use street maps to find our way around towns and cities, or study weather maps in the hope that they may enlighten us about what clothes to wear or activities to plan.



**National monitoring provides a “snapshot” of what New Zealand children can do at two levels, at the middle and end of primary education (year 4 and year 8).**

The main purposes for national monitoring are:

- to meet public accountability and information requirements by identifying and reporting patterns and trends in educational performance
- to provide high quality, detailed information which policy makers, curriculum planners and educators can use to debate and review educational practices and resourcing.



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