Although national monitoring has been designed primarily to present an overall national picture of student achievement, there is some provision for reporting on performance differences among subgroups of the sample. Nine demographic variables are available for creating subgroups, with students divided into two or three subgroups on each variable, as detailed in Chapter 1 (p6).

The analyses of the relative performance of subgroups used an overall score for each task, created by adding scores for the most important components of the task.

Where only two subgroups were compared, 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 $\mathrm{p}=.01$ (so that differences this large or larger among the subgroups would not be expected by chance in more than one percent of cases). The critical level was adjusted to $\mathrm{p}=.05$ for the two tasks where differences in team performance among 120 teams were being examined.
For the first five of the nine demographic variables, statistically significant differences among the subgroups were found for less than 20 percent of the tasks at both year levels. For the remaining four variables, statistically significant differences were found on large numbers of tasks. Details are presented below.

## School Size

Results were compared from students in larger, medium sized, and small schools (exact definitions were given in Chapter 1).

For year 4 students, there were statistically significant differences among the three subgroups on 3 of the 53 tasks. Students from the smallest schools scored higher than students from medium sized and larger schools on Link task (p27), Link task 16 (p44), and Link task 24 (p60).There was also a statistically significant difference on one question of the Mathematics survey ( p 61 ): students attending medium sized schools were least positive about doing mathematics at school (question 2).
For year 8 students, there were no statistically significant differences on any of the 56 tasks, or on any questions of the Mathematics survey.
School Type
Results were compared for year 8 students attending full primary and intermediate schools. Statistically significant differences were found on just 3 of the 56 tasks. Students from full primary schools scored higher than students from intermediate schools on Decimals (p25), Link task 17 (p45), and Bear mixes (p56).There were no statistically significant differences on questions of the Mathematics survey.

## Gender

Results achieved by male and female students were compared.
For year 4 students, there were statistically significant differences between boys and girls on 3 of the 50 tasks. Boys scored higher than girls on Burger lunch (p30), but lower than girls on Multiplication facts (p15) and Shapes (p43).There were also statistically significant differences on two questions of the Mathematics survey (p61). Thirty-two percent of girls, compared with 18 percent of boys, said they "didn't know" how good their teacher thought they were at maths (question 4), and girls expressed greater enthusiasm than boys for doing maths in their own time (question 7).
For year 8 students, there were statistically significant differences between boys and girls on 8 of the 53 tasks. Boys scored higher than girls on Link task 20 (p53), but lower than girls on Subtraction (p14), Link task 3 (p26), Link task 7 (p26), Money computations (p27), String thing (p38), Calendars (p39), and Geometry items (p49).There were also statistically significant differences on three questions of the Mathematics survey (p61). Boys rated their ability in mathematics higher (question 3), but girls were more positive about doing maths in their own time (question 7). Forty-seven percent of girls, compared to 31 percent of boys, said they "didn't know" how good their teacher thought they were at maths (question 4).

## 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 was a statistically significant difference among the three subgroups on 1 of the 53 tasks. Students from provincial cities scored highest on Link task 3 (p26).There were no statistically significant differences on questions of the Mathematics survey.
For year 8 students, there were statistically significant differences among the three subgroups on 9 of the 56 tasks. Students from main centres scored highest on all nine tasks, spread across four chapters in this report. Because of the number of tasks, they are not listed here. There were no statistically significant differences on questions of the Mathematics survey.

## 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 statistically significant differences among the three subgroups on 5 of the 53 tasks. Students from the South Island scored highest on all five: Link task 5 (p27), Bottles (p42), Link task 13 (p44), Link task 15 (p44), and Treasure island (p47). There were no statistically significant differences on questions of the Mathematics survey.
For year 8 students, there were statistically significant differences among the three subgroups on 11 of the 56 tasks. Students from the South Island scored high on four tasks, students from Auckland scored high on one task, and students from the rest of the North Island scored low on six tasks. There were no statistically significant differences on questions of the Mathematics survey.

## Socio-Economic Index

Schools are categorised by the Ministry of Education based on census data for the census mesh blocks where children attending the schools live. The SES index takes into account household income levels, categories of employment, and the ethnic mix in the census mesh blocks.The SES index uses ten subdivisions, each containing ten percent 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 statistically significant differences among the three subgroups on 45 of the 53 tasks. In each case, students in the low SES schools performed worst. While students from high SES schools generally did better than students from medium SES school, these differences were usually much smaller than the differences between low and medium SES schools. There were statistically significant differences on four questions of the Mathematics survey (p61). Students from low SES schools were more positive than students from other schools about doing maths at school (question 2), doing more maths at school (question 1), doing things in maths that they hadn't tried before (question 6), and doing maths in their own time (question 7).
For year 8 students, there were statistically significant differences among the three subgroups on 43 of the 56 tasks. On most tasks, students' performance increased steadily with SES level. On the Mathematics survey (p61), there was a statistically significant difference on one question: students from low SES schools were more positive about doing maths in their own time (question 7).

## Student Ethnicity

Results achieved by Māori and non-Māori students were compared. For year 4 students, there were statistically significant differences on 40 of the 50 tasks. In each case, non-Māori students scored higher than Māori students.There were also statistically significant differences between Māori and non-Māori students on five questions of the Mathematics survey (p61). Māori students were more positive than non-Māori students about doing maths at school (question 2), doing more maths at school (question 1), their ability at maths (question 3), doing things in maths that they hadn't tried before (question 6), and doing maths in their own time (question 7).

For year 8 students, there were statistically significant differences between Māori and non-Māori students on 41 of the 53 tasks. In each case, non-Māori students scored higher than Māori students. It is noteworthy that differences were found for all 18 tasks administered using the independent approach (most similar to normal paper-and-pencil tests). There were no statistically significant differences on questions of the Mathematics survey.

## Proportion of Mā ori Students in Schools

Schools were categorised into three subgroups: schools with less than 10 percent Māori students, schools with 10 to 30 percent Māori students, and schools with more than 30 percent Māori students. Results were compared for students attending schools in these three categories.
For year 4 students, statistically significant differences between the three subgroups were found on 37 of the 53 tasks. In most cases, students attending schools with less than ten percent Māori students scored markedly higher than students in the other two categories. Differences between the second and third category were generally smaller. There were also statistically significant differences on two questions of the Mathematics survey ( p 61 ). Students in schools with less than 10 percent Māori students were least enthusiastic about doing more maths at school (question 1), and about doing maths in their own time (question 7).
For year 8 students, statistically significant differences between the three subgroups were found on 41 of the 56 tasks. In almost all cases, students attending schools with less than ten percent Māori students scored highest, and performance levels steadily declined as the proportion of Māori students increased. There were no statistically significant differences on questions of the Mathematics survey.

## Proportion of Pacific Island Students in Schools

Because most of the Pacific Island students are concentrated into relatively few schools, it was difficult to create sensible subgroups for schools with higher or lower percentages of Pacific Island students. Two subgroups were formed: students attending schools with up to 5 percent Pacific Island students, and students attending schools with more than 5 percent Pacific Island students. Results were compared for students in these two subgroups.

For year 4 students, statistically significant differences between the two subgroups were found on 35 of the 53 tasks. In each case, students attending schools with more than five percent of Pacific Island students scored lower.There were also statistically significant differences on three questions of the Mathematics survey (p61). Students attending schools with more than five percent Pacific Island students were more enthusiastic about doing maths at school (question 2), doing more maths at school (question 1), and doing things in maths that they hadn't tried before (question 6).
The results for year 8 students contrast strongly with those at year 4 : statistically significant differences between the two subgroups were found on just 7 of the 56 tasks. In each case, students attending schools with more than five percent of Pacific Island students scored lower. There were statistically significant differences on two questions of the Mathematics survey (p61). Students attending schools with more than 5 percent Pacific Island students were more positive about doing maths in school (question 2), and about doing maths in their own time (question 7)

## SUMMARY

School size, school type (full primary or intermediate), community size or geographic zone did not seem to be important factors influencing maths achievement. At both year levels, girls performed as well or better than boys on every task except one, and also displayed more positive attitudes to doing maths in their own time. Year 4 Māori students were noticeably more positive about maths than their non-Māori counterparts, but nonMaori students outperformed Māori students on more than two thirds of the tasks at both year levels. Similarly disturbing results were obtained for the comparisons involving school socio-economic index and the proportion of Māori students in schools. The results for schools with more than 5 percent Pacific Island students are particularly interesting: at year 4 level students attending these schools did worse on two thirds of the tasks, but a year 8 level they did worse on only one eighth of the tasks. A similar pattern has been reported in other NEMP reports.

