Chapter 2

Average Achievement in the Mathematics Content Areas

Recognizing that important curricular differences exist between and within countries is an important aspect of IEA studies, and TIMSS attempted to measure achievement in different areas within mathematics that would be useful in relating achievement to curriculum. After much deliberation, the mathematics test for the seventh and eighth grades was designed to enable reporting by six content areas.[1] These six content areas include:

- fractions and number sense
- geometry
- algebra
- data representation, analysis, and probability
- measurement
- proportionality

Following the discussion in this chapter about differences in average achievement for the TIMSS countries across the content areas, Chapter 3 contains further information about the types of items within each content area, including a range of five or six example items within each content area and the percent of correct responses on those items for each of the TIMSS countries.

How Does Achievement Differ Across Mathematics Content Areas?

As we have seen in Chapter 1, there are substantial differences in achievement among the participating countries on the TIMSS mathematics test. Given that the mathematics test was designed to include items from different curricular areas, it is important to examine whether or not the participating countries have particular strengths and weaknesses in their achievement in these content areas.

This chapter uses an analysis based on the average percent of correct responses to items within each content area to address the question of whether or not countries performed at the same level in each of the content areas as they did on the mathematics test as a whole. Because additional resources and time would have been required to use the more complex IRT scaling methodology that served as the basis for the overall achievement estimates in Chapter 1, TIMSS could not generate scale scores for the six content areas for this report.[2]

[1] Please see the test development section of Appendix A for more information about the process used to develop the TIMSS tests. Appendix B provides an analysis of the match between the test and curriculum in the different TIMSS countries and the effect of this match on the TIMSS results.

[2] TIMSS plans to generate IRT scale scores for the mathematics content areas for future reports.

Tables 2.1 and 2.2 provide the average percent of correct responses to items in the different content areas for the eighth- and seventh-grade students, respectively. The countries are listed in order of their average percent correct across all items in the test. As indicated by the numbers of items overall and in each content area, the overall test contains more fractions and number sense items (34%) and fewer proportionality items (7%). Thus, countries that did well on the items testing fractions and number sense were more likely to have higher overall scores than those that performed better in proportionality.[3]

The results for the average percent correct across all mathematics items are provided for each country primarily to provide a basis of comparison for performance in each of the content areas. For the purpose of comparing overall achievement between countries, it is preferable to use the results presented in Chapter 1.[4] It is interesting to note, however, that even though the relative standings of countries differ somewhat from Tables 1.1 and 1.2, the slight differences are well within the limits expected by sampling error and can be attributed to the differences in the methodologies used.

The data in each column show each country's average percent correct for items in that content area and the international average across all countries for the content area (shown as the last entry in the column). Looking down each of the columns, in turn, two findings become apparent. First, the countries that did well on the overall test generally did well in each of the various content areas, and those that did poorly overall also tended to do so in each of the content areas. There are differences between the relative standing of countries within each of the content areas and their overall standing, but these differences are small when sampling error is considered.

Second, the international averages show that the different content areas in the TIMSS test were not equally difficult for the students taking the test. Data representation, analysis, and probability was the least difficult content area for both grades. On average, the items in this content area were answered correctly by 62% of the eighth-graders and 57% of the seventh-graders across countries. Internationally, the proportionality items (international averages of 45% at eighth grade and 40% at seventh grade) were the most difficult items for the students at both grades.

It is important to keep these differences in average difficulty in mind when reading across the rows of the table. These differences mean that for many countries, students will appear to have higher than average performance in data representation, analysis, and probability and lower than average performance in proportionality. For example, even the eighth-grade students in Singapore, who performed above the international average for the area of proportionality by a substantial margin, still

[3] Table A.1 in Appendix A provides details about the distributions of items across the content areas, by format and score points (taking into account multi-part items and items scored for partial credit).

[4] The IRT scale scores provide better estimates of overall achievement, because they take the difficulty of items into account. This is important in a study such as TIMSS, where different students take overlapping but somewhat different sets of items.

Table 2.1

Average Percent Correct by Mathematics Content Areas Upper Grade (Eighth Grade*)

Country	Mathematics Overall (151 items)	Fractions & Number Sense (51 items)	Geometry (23 items)	Algebra (27 items)	Data Representation, Analysis & Probability (21 items)	Measurement (18 items)	Proportionality (11 items)
Singapore	79 (0.9)	84 (0.8)	76 (1.0)	76 (1.1)	79 (0.8)	77 (1.0)	75 (1.0)
Japan	73 (0.4)	75 (0.4)	80 (0.4)	72 (0.6)	78 (0.4)	67 (0.5)	61 (0.5)
Korea	72 (0.5)	74 (0.5)	75 (0.6)	69 (0.6)	78 (0.6)	66 (0.7)	62 (0.6)
Hong Kong	70 (1.4)	72 (1.4)	73 (1.5)	70 (1.5)	72 (1.3)	65 (1.7)	62 (1.4)
† Belgium (Fl)	66 (1.4)	71 (1.2)	64 (1.5)	63 (1.7)	73 (1.3)	60 (1.3)	53 (1.8)
Czech Republic	66 (1.1)	69 (1.1)	66 (1.1)	65 (1.3)	68 (0.9)	62 (1.2)	52 (1.3)
Slovak Republic	62 (0.8)	66 (0.8)	63 (0.8)	62 (0.9)	62 (0.7)	60 (0.9)	49 (1.0)
1 Switzerland	62 (0.6)	67 (0.7)	60 (0.8)	53 (0.7)	72 (0.7)	61 (0.8)	52 (0.7)
Hungary	62 (0.7)	65 (0.8)	60 (0.8)	63 (0.9)	66 (0.7)	56 (0.8)	47 (0.9)
France	61 (0.8)	64 (0.8)	66 (0.8)	54 (1.0)	71 (0.8)	57 (0.9)	49 (0.9)
Russian Federation	60 (1.3)	62 (1.2)	63 (1.4)	63 (1.5)	60 (1.2)	56 (1.5)	48 (1.5)
Canada	59 (0.5)	64 (0.6)	58 (0.6)	54 (0.7)	69 (0.5)	51 (0.7)	48 (0.7)
Ireland	59 (1.2)	65 (1.2)	51 (1.3)	53 (1.3)	69 (1.1)	53 (1.3)	51 (1.2)
Sweden	56 (0.7)	62 (0.8)	48 (0.7)	44 (0.9)	70 (0.7)	56 (0.9)	44 (0.9)
New Zealand	54 (1.0)	57 (1.1)	54 (1.1)	49 (1.1)	66 (1.0)	48 (1.2)	42 (1.0)
Norway	54 (0.5)	58 (0.6)	51 (0.6)	45 (0.7)	66 (0.6)	51 (0.6)	40 (0.6)
†2 England	53 (0.7)	54 (0.8)	54 (1.0)	49 (0.9)	66 (0.7)	50 (0.9)	41 (1.1)
† United States	53 (1.1)	59 (1.1)	48 (1.2)	51 (1.2)	65 (1.1)	40 (1.1)	42 (1.1)
1 Latvia (LSS)	51 (0.8)	53 (0.9)	57 (0.8)	51 (0.9)	56 (0.8)	47 (0.9)	39 (0.9)
Spain	51 (0.5)	52 (0.5)	49 (0.6)	54 (0.8)	60 (0.7)	44 (0.7)	40 (0.8)
Iceland	50 (1.1)	54 (1.2)	51 (1.4)	40 (1.3)	63 (1.1)	45 (1.4)	38 (1.4)
1 Lithuania	48 (0.9)	51 (1.0)	53 (1.1)	47 (1.2)	52 (1.0)	43 (0.9)	35 (0.9)
Cyprus	48 (0.5)	50 (0.6)	47 (0.6)	48 (0.7)	53 (0.6)	44 (0.9)	40 (0.7)
Portugal	43 (0.7)	44 (0.7)	44 (0.8)	40 (0.8)	54 (0.7)	39 (0.7)	32 (0.8)
Iran, Islamic Rep.	38 (0.6)	39 (0.6)	43 (0.8)	37 (0.8)	41 (0.6)	29 (1.2)	36 (0.8)
Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details):							
Australia	58 (0.9)	61 (0.9)	57 (1.0)	55 (1.0)	67 (0.8)	54 (1.0)	47 (0.9)
Austria	62 (0.8)	66 (0.8)	57 (1.0)	59 (0.8)	68 (0.8)	62 (1.0)	49 (0.9)
Belgium (Fr)	59 (0.9)	62 (1.0)	58 (1.0)	53 (1.1)	68 (1.0)	56 (1.0)	48 (0.9)
Bulgaria	60 (1.2)	60 (1.4)	65 (1.3)	62 (1.5)	62 (1.1)	54 (1.6)	47 (1.5)
Netherlands	60 (1.6)	62 (1.6)	59 (1.8)	53 (1.6)	72 (1.7)	57 (1.6)	51 (1.9)
Scotland	52 (1.3)	53 (1.3)	52 (1.4)	46 (1.5)	65 (1.3)	48 (1.6)	40 (1.4)
Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details):							
Colombia	29 (0.8)	31 (0.9)	29 (0.9)	28 (0.9)	37 (1.0)	25 (1.5)	23 (0.9)
†1 Germany	54 (1.1)	58 (1.1)	51 (1.4)	48 (1.3)	64 (1.2)	51 (1.1)	42 (1.3)
Romania	49 (1.0)	48 (1.0)	52 (0.9)	52 (1.3)	49 (1.0)	48 (1.1)	42 (1.2)
Slovenia	61 (0.7)	63 (0.7)	60 (0.9)	61 (0.8)	66 (0.7)	59 (0.9)	49 (0.8)
Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details):							
Denmark	52 (0.7)	53 (0.9)	54 (0.9)	45 (0.7)	67 (0.9)	49 (1.0)	41 (0.8)
Greece	49 (0.7)	53 (0.8)	51 (0.7)	46 (0.8)	56 (0.8)	43 (0.9)	39 (1.1)
Thailand	57 (1.4)	60 (1.5)	62 (1.3)	53 (1.7)	63 (1.1)	50 (1.4)	51 (1.5)
Unapproved Sampling Procedures at Classroom Level and Not Meeting Other Guidelines (See Appendix A for Details):							
1 Israel	57 (1.3)	60 (1.4)	57 (1.4)	61 (1.6)	63 (1.3)	48 (1.6)	43 (1.6)
Kuwait	30 (0.7)	27 (0.8)	38 (1.0)	30 (1.0)	38 (1.0)	23 (1.0)	21 (0.7)
South Africa	24 (1.1)	26 (1.4)	24 (1.0)	23 (1.1)	26 (1.2)	18 (1.1)	21 (0.9)
International Average Percent Correct	55 (0.1)	58 (0.1)	56 (0.1)	52 (0.2)	62 (0.1)	51 (0.1)	45 (0.2)

*Eighth grade in most countries; see Table 2 for information about the grades tested in each country.

†Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).

[1]National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

[2]National Defined Population covers less than 90 percent of National Desired Population (see Table A.2).

( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

Table 2.2

Average Percent Correct by Mathematics Content Areas
Lower Grade (Seventh Grade*)

Country	Mathematics Overall (151 items)	Fractions & Number Sense (51 items)	Geometry (23 items)	Algebra (27 items)	Data Representation, Analysis & Probability (21 items)	Measurement (18 items)	Proportionality (11 items)
Singapore	73 (1.3)	79 (1.2)	69 (1.4)	68 (1.4)	72 (1.2)	70 (1.5)	71 (1.4)
Japan	67 (0.4)	71 (0.4)	70 (0.4)	64 (0.6)	73 (0.5)	62 (0.6)	55 (0.6)
Korea	67 (0.6)	70 (0.6)	70 (0.7)	64 (0.7)	73 (0.5)	62 (0.8)	55 (0.7)
Hong Kong	65 (1.8)	67 (1.7)	68 (1.9)	66 (2.0)	69 (1.5)	62 (2.0)	55 (1.7)
† Belgium (Fl)	65 (0.8)	72 (0.8)	59 (0.9)	60 (1.0)	73 (0.9)	59 (1.0)	54 (1.0)
Czech Republic	57 (1.2)	61 (1.4)	58 (1.1)	55 (1.2)	61 (1.1)	55 (1.2)	41 (1.3)
† Belgium (Fr)	54 (0.9)	59 (1.0)	55 (1.0)	44 (1.0)	64 (1.0)	53 (1.0)	44 (1.0)
Slovak Republic	54 (0.8)	58 (0.9)	57 (0.8)	50 (1.0)	56 (0.7)	52 (1.0)	41 (1.0)
Hungary	54 (0.8)	59 (0.9)	52 (0.9)	52 (1.1)	60 (0.8)	49 (1.0)	38 (1.0)
Ireland	53 (1.0)	62 (1.1)	43 (0.9)	47 (1.1)	64 (0.9)	46 (1.1)	46 (1.1)
[1] Switzerland	53 (0.5)	60 (0.7)	46 (0.6)	41 (0.6)	65 (0.7)	53 (0.8)	44 (0.7)
Russian Federation	53 (0.9)	56 (1.0)	55 (1.2)	55 (1.0)	55 (1.0)	47 (1.0)	40 (1.1)
Canada	52 (0.5)	58 (0.6)	50 (0.7)	43 (0.7)	63 (0.6)	44 (0.6)	42 (0.7)
France	51 (0.8)	53 (0.8)	58 (0.9)	39 (0.8)	63 (0.8)	49 (1.0)	41 (1.0)
† United States	48 (1.2)	54 (1.4)	44 (1.1)	44 (1.3)	60 (1.2)	36 (1.4)	38 (1.2)
†[2] England	47 (0.9)	48 (1.0)	49 (0.9)	41 (1.0)	62 (0.9)	43 (0.9)	38 (1.0)
Sweden	47 (0.6)	51 (0.8)	43 (0.6)	35 (0.6)	64 (0.9)	47 (0.7)	36 (0.8)
New Zealand	46 (0.9)	50 (0.9)	46 (1.1)	39 (0.9)	59 (1.0)	40 (1.0)	38 (1.0)
† Scotland	44 (0.9)	47 (1.0)	46 (1.1)	36 (0.8)	58 (1.0)	40 (0.9)	34 (0.8)
Norway	44 (0.7)	49 (0.9)	42 (0.7)	32 (0.7)	59 (0.9)	44 (0.9)	34 (0.7)
[1] Latvia (LSS)	44 (0.7)	46 (0.8)	48 (0.8)	43 (1.0)	49 (0.8)	41 (0.8)	33 (1.0)
Iceland	43 (0.7)	49 (1.0)	47 (0.7)	31 (0.6)	56 (0.8)	38 (0.8)	33 (0.7)
Spain	42 (0.6)	43 (0.6)	43 (0.7)	41 (0.7)	52 (0.7)	38 (0.7)	35 (0.7)
Cyprus	42 (0.4)	46 (0.5)	43 (0.6)	39 (0.5)	48 (0.6)	34 (0.5)	36 (0.7)
[1] Lithuania	38 (0.8)	41 (0.9)	38 (1.0)	38 (1.0)	44 (0.9)	32 (0.9)	25 (0.7)
Portugal	37 (0.6)	39 (0.6)	38 (0.8)	31 (0.7)	46 (0.6)	34 (0.7)	25 (0.6)
Iran, Islamic Rep.	32 (0.5)	34 (0.6)	40 (0.9)	28 (0.6)	36 (0.7)	23 (0.7)	30 (0.7)
Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details):							
Australia	52 (0.8)	56 (0.9)	52 (0.8)	47 (1.0)	63 (0.9)	48 (1.0)	41 (0.9)
Austria	56 (0.7)	61 (0.8)	52 (0.9)	48 (0.8)	63 (0.8)	55 (0.8)	44 (1.0)
Bulgaria	55 (1.7)	56 (1.8)	61 (1.8)	58 (2.2)	56 (1.1)	52 (1.8)	44 (2.1)
Netherlands	55 (1.0)	60 (1.2)	54 (1.1)	42 (1.0)	69 (1.0)	52 (1.2)	51 (1.2)
Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details):							
Colombia	26 (0.6)	28 (0.7)	26 (0.9)	24 (0.8)	32 (0.8)	22 (0.7)	21 (0.9)
†[1] Germany	49 (1.0)	55 (1.2)	46 (1.1)	39 (1.4)	61 (1.1)	46 (0.9)	37 (1.0)
Romania	43 (0.8)	43 (0.8)	48 (1.0)	46 (1.0)	44 (0.7)	42 (1.1)	35 (0.9)
Slovenia	53 (0.7)	56 (0.7)	52 (0.8)	48 (0.8)	60 (0.7)	50 (0.8)	39 (0.9)
Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details):							
Denmark	44 (0.5)	45 (0.7)	46 (0.8)	36 (0.7)	59 (0.8)	41 (0.7)	34 (0.7)
Greece	40 (0.6)	47 (0.7)	39 (0.7)	33 (0.7)	46 (0.7)	35 (0.8)	34 (0.7)
† South Africa	23 (0.9)	26 (1.1)	22 (0.9)	20 (0.8)	25 (1.1)	17 (1.0)	20 (0.8)
Thailand	52 (1.2)	56 (1.3)	57 (1.0)	45 (1.3)	57 (1.1)	44 (1.4)	46 (1.3)
International Average Percent Correct	49 (0.1)	53 (0.2)	49 (0.2)	44 (0.2)	57 (0.1)	45 (0.2)	40 (0.2)

*Seventh grade in most countries; See Table 2 for information about the grades tested in each country.
†Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).
[1]National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
[2]National Defined Population covers less than 90 percent of National Desired Population (see Table A.2).
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

performed somewhat less well in this area than they did on the test as a whole. That is, simply comparing performance across the rows gives an unclear picture of each country's relative performance across the content areas because the differing difficulty of the items has not been taken into account.

To facilitate more meaningful comparisons across rows, TIMSS has developed profiles of relative performance, which are shown for both grades in Table 2.3. These profiles are designed to show whether participating countries performed better or worse in some content areas than they did on the test as a whole, after adjusting for the differing difficulty of the items in each of the content areas.[5] An up-arrow indicates that a country did significantly better in a content area than it did on the test as a whole, a down-arrow indicates significantly lower performance, and a circle indicates that the country's performance in a content area is not very different from its performance on the test as a whole.[6]

The profiles in Table 2.3 reveal that many countries performed relatively better or worse in several content areas than they did overall. Except in the Netherlands at the seventh grade, each country had at least one content area in which it did relatively better or worse than it did on average. Although countries that did well in one content area tended to do well in others, there were still significant performance differences by content area among countries. For example, countries that performed relatively better in fractions and number sense often were different from those that performed relatively better in geometry and algebra. Also, although there were some differences between the two grades, relative performance tended to be similar at both the seventh and eighth grades.

Singapore, Belgium (Flemish), Hungary, Ireland, Switzerland, Canada, the United States, and Germany all performed relatively better in fractions and number sense than they did on the test as a whole at both grades. The countries performing relatively better in geometry at both grades included Japan, Korea, Hong Kong, the Russian Federation, France, Latvia (LSS), Iran, Romania, and Thailand. In algebra, the countries performing relatively better at both grades were Japan, Hong Kong, the Czech Republic, the Slovak Republic, Hungary, the Russian Federation, Spain, Cyprus, Romania, and South Africa. This is consistent with the existence of differing curricular patterns and

[5] Since the items in the different content areas varied in difficulty, the first step was to adjust the average percents to make all content areas equally difficult so that the comparisons would not reflect the various difficulties of the items in the content areas. The next step was to subtract these adjusted percentages for each content area from a country's average percentage over all six content areas. If the overall percentage of correct items by students in a country was the same as the adjusted average for that country for each of the content areas, then these differences would all be zero. The standard errors for these differences were computed, and then each difference was examined for statistical significance. This approach is similar to testing interaction terms in the analysis of variance. The jackknife method was used to compute the standard error of each interaction term. The significance level was adjusted using the Bonferroni method, assuming 6x41 (content areas by countries) comparisons at the eighth grade and 6x39 at the seventh grade.

[6] The statistics are not independent. That is, a country cannot do better (or worse) than its average on all scales, since a country's differences must add up to zero. However, it is possible for a country to have no statistically significant differences in performance.

approaches among countries as discussed in the curriculum analysis report, *Many Visions, Many Aims: A Cross-National Investigation of Curricular Intentions in School Mathematics.*[7] This report indicates that a number of the Pacific Rim and Eastern European countries focus on geometry and algebra during the middle-school years.

[7] Schmidt, W.H., McKnight, C.C., Valverde, G. A., Houang, R.T., and Wiley, D. E. (in press). *Many Visions, Many Aims: A Cross-National Investigation of Curricular Intentions in School Mathematics.* Dordrecht, the Netherlands: Kluwer Academic Publishers.

Table 2.3

Profiles of Relative Performance in Mathematics Content Areas - Lower and Upper Grades (Seventh and Eighth Grades*) - Indicators of Statistically Significant Differences from Overall Percent Correct Adjusted for the Difficulty of the Content Areas

Seventh Grade							Eighth Grade						
Country	Fractions & Number Sense	Geometry	Algebra	Data Rep., Analy. & Probability	Measurement	Proportionality	Country	Fractions & Number Sense	Geometry	Algebra	Data Rep., Analy. & Probability	Measurement	Proportionality
Singapore	▲	▼	●	▼	▲	▲	Singapore	▲	▼	●	▼	▲	▲
Japan	●	▲	▲	▼	●	▼	Japan	▼	▲	▲	▼	▼	▼
Korea	●	▲	▲	▼	●	▼	Korea	●	▲	●	●	●	●
Hong Kong	▼	▲	▲	▼	●	●	Hong Kong	●	▲	▲	▼	●	▲
† Belgium (Fl)	▲	▼	●	●	●	●	† Belgium (Fl)	▲	▼	●	●	●	▼
Czech Republic	●	●	▲	▼	▲	▼	Czech Republic	●	●	▲	▼	▲	▼
† Belgium (Fr)	●	●	▼	●	▲	●	Slovak Republic	▲	●	▲	▼	▲	▼
Slovak Republic	●	▲	▲	▼	▲	▼	1 Switzerland	▲	▼	▼	▲	▲	●
Hungary	▲	●	▲	●	●	▼	Hungary	▲	●	▲	▼	●	▼
Ireland	▲	▼	●	▲	▼	▲	France	●	▲	▼	▲	●	▼
1 Switzerland	▲	▼	▼	▲	▲	●	Russian Federation	●	▲	▲	▼	●	●
Russian Federation	●	▲	▲	▼	●	▼	Canada	▲	●	▼	▲	▼	●
Canada	▲	●	▼	▲	▼	●	Ireland	▲	▼	▼	▲	●	▲
France	▼	▲	▼	▲	●	●	Sweden	▲	▼	▼	▲	▲	●
† United States	▲	▼	▲	▲	▼	●	New Zealand	●	●	▼	▲	●	●
†2 England	▼	●	●	▲	●	●	Norway	▲	▼	▼	▲	▲	▼
Sweden	●	▼	▼	▲	▲	▼	†2 England	▼	●	▼	▲	●	●
New Zealand	●	●	▼	▲	▼	●	† United States	▲	▼	●	▲	▼	●
† Scotland	▼	●	▼	▲	●	●	1 Latvia (LSS)	▼	▲	●	▼	●	▼
Norway	●	▼	▼	▲	▲	●	Spain	▼	▼	▲	●	▼	●
1 Latvia (LSS)	▼	▲	▲	▼	●	▼	Iceland	▲	●	▼	▲	●	●
Iceland	●	▲	▼	▲	●	●	1 Lithuania	●	▲	●	▼	●	▼
Spain	▼	●	▲	●	●	▲	Cyprus	●	●	▲	▼	●	●
Cyprus	●	●	▲	▼	▼	▲	Portugal	▼	●	●	▲	●	●
1 Lithuania	●	●	▲	▼	●	▼	Iran, Islamic Rep.	▼	▲	●	▼	▼	▲
Portugal	▼	●	●	▲	●	▼							
Iran, Islamic Rep.	▼	▲	●	▼	▼	▲							
Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details):													
Australia	▲	▼	●	●	▲	●	Australia	●	▼	●	▲	●	●
Austria	▼	▲	▲	▼	●	●	Austria	▲	▼	●	●	▲	▼
Bulgaria	●	▼	▼	▲	●	▲	Belgium (Fr)	●	●	▼	▲	▲	●
Netherlands	●	●	●	●	●	●	Bulgaria	▼	▲	▲	▼	●	●
							Netherlands	●	●	▼	▲	●	●
							Scotland	▼	●	▼	▲	●	●
Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details):													
Colombia	▼	●	▲	▼	●	▲	Colombia	●	●	●	●	●	▲
†1 Germany	▲	▼	▼	▲	▲	▼	†1 Germany	▲	▼	▼	▲	▲	●
Romania	▼	▲	▲	▼	●	●	Romania	▼	▲	▲	▼	▲	▲
Slovenia	●	●	●	●	▲	▼	Slovenia	●	●	▲	▼	▲	●
Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details):													
Denmark	▼	●	▼	▲	●	●	Denmark	▼	●	▼	▲	●	●
Greece	▲	●	▼	▼	●	▲	Greece	●	●	●	●	▼	●
† South Africa	●	▼	▲	▼	▼	▲	Thailand	●	▲	▼	▼	▼	▲
Thailand	●	▲	▼	▼	▼	▲							
Unapproved Sampling Procedures at Classroom Level and Not Meeting Other Guidelines (See Appendix A for Details):													
							1 Israel	●	●	▲	●	▼	▼
							Kuwait	▼	▲	●	●	▼	●
							South Africa	●	●	▲	▼	▼	▲

▲= Significantly higher than overall average ●= No significant difference from overall average ▼= Significantly lower than overall average

*Seventh and eighth grades in most countries; see Table 2 for information about the grades tested in each country.

†Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).

1National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.

2National Defined Population covers less than 90 percent of National Desired Population (see Table A.2).

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

What Are the Increases in Achievement Between the Lower and Upper Grades?

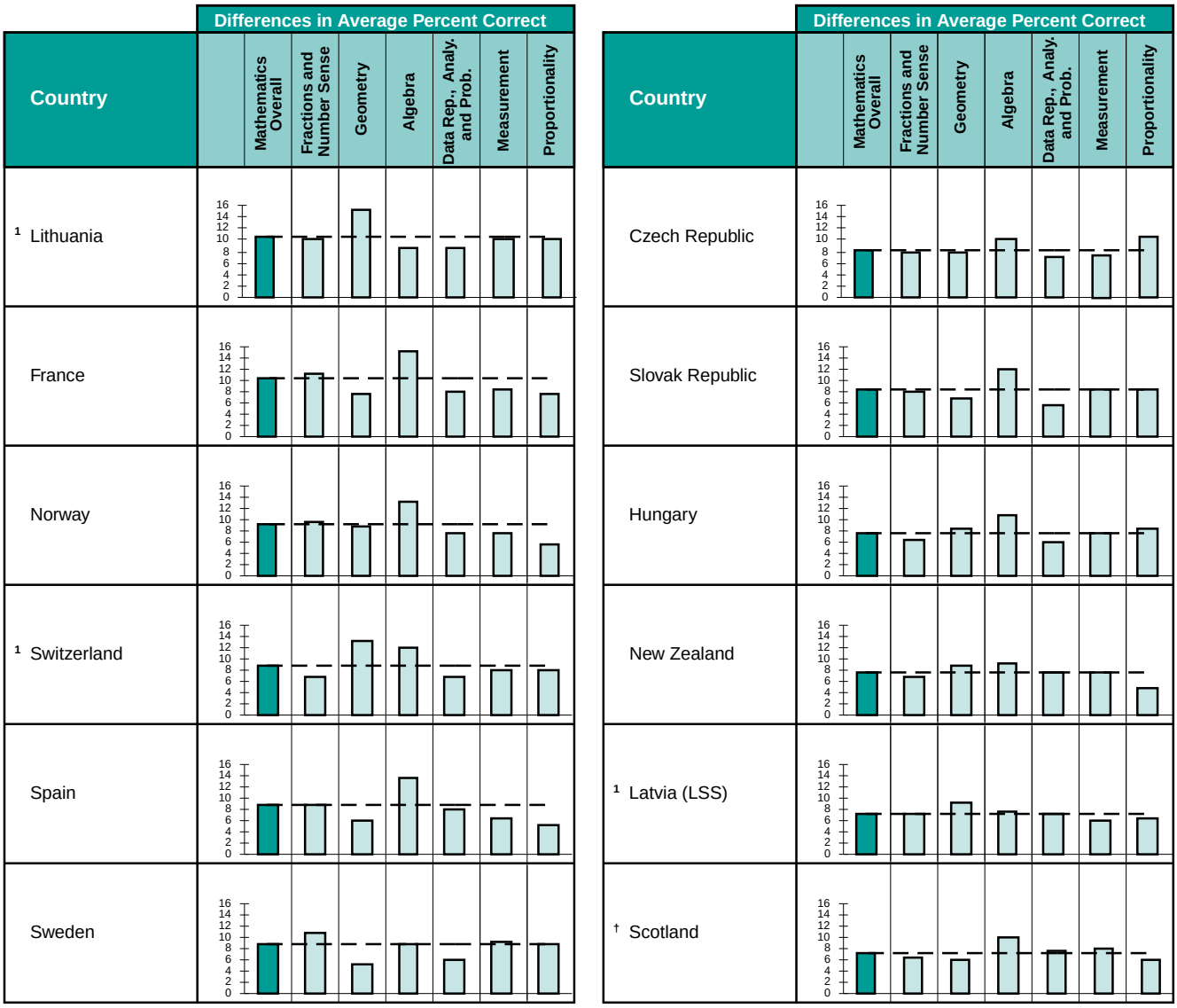
Figure 2.1, which profiles the increases in average percent correct between the seventh and eighth grade for each country across content areas, also reflects these curricular differences. The figure portrays the degree of the increase in mathematics achievement overall as well as the increase in achievement for each of the six content areas. The dashed line indicates the overall increase, for ease in comparing the growth within content areas against the growth in performance overall. The results are presented in descending order by the amount of overall increase between the grades, beginning with Lithuania, France, and Norway, all three of which showed the greatest increases (about 10%).

The results show that the degree of increase across the different content areas was uneven in most countries, generally reflecting a greater emphasis in the curriculum on some areas compared to others during the eighth grade. There were several countries, however, where the increases in the content areas were similar to the overall between-grade increase across most content areas, including Latvia (LSS), the United States, Korea, Hong Kong, and Denmark, for example.

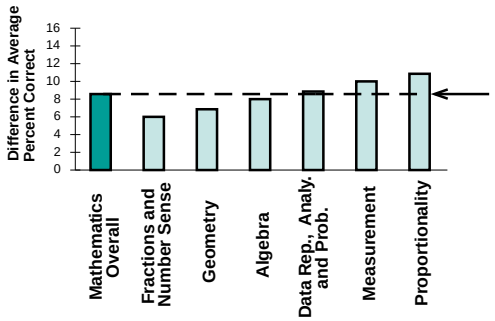
In general, performance in geometry and algebra showed the largest growth between the seventh and eighth grades. This is most noticeable in geometry for Lithuania and Switzerland. France, Norway, Switzerland, Spain, the Slovak Republic, and Hungary were among those countries showing higher-than-average between-grade increases in algebra. In general, the growth in data representation, analysis, and probability was quite similar or somewhat below the average between-grade increase. Fractions and number sense often showed a smaller-than-average increase compared to that overall, presumably because this content area was no longer emphasized in the middle-school curriculum in many countries. The smaller-than-average increases in the area of proportionality most likely reflect a general lack of special emphasis in this area.

Figure 2.1

Difference in Average Percent Correct Between Lower and Upper Grades (Seventh and Eighth Grades*) Overall and in Mathematics Content Areas



Legend:

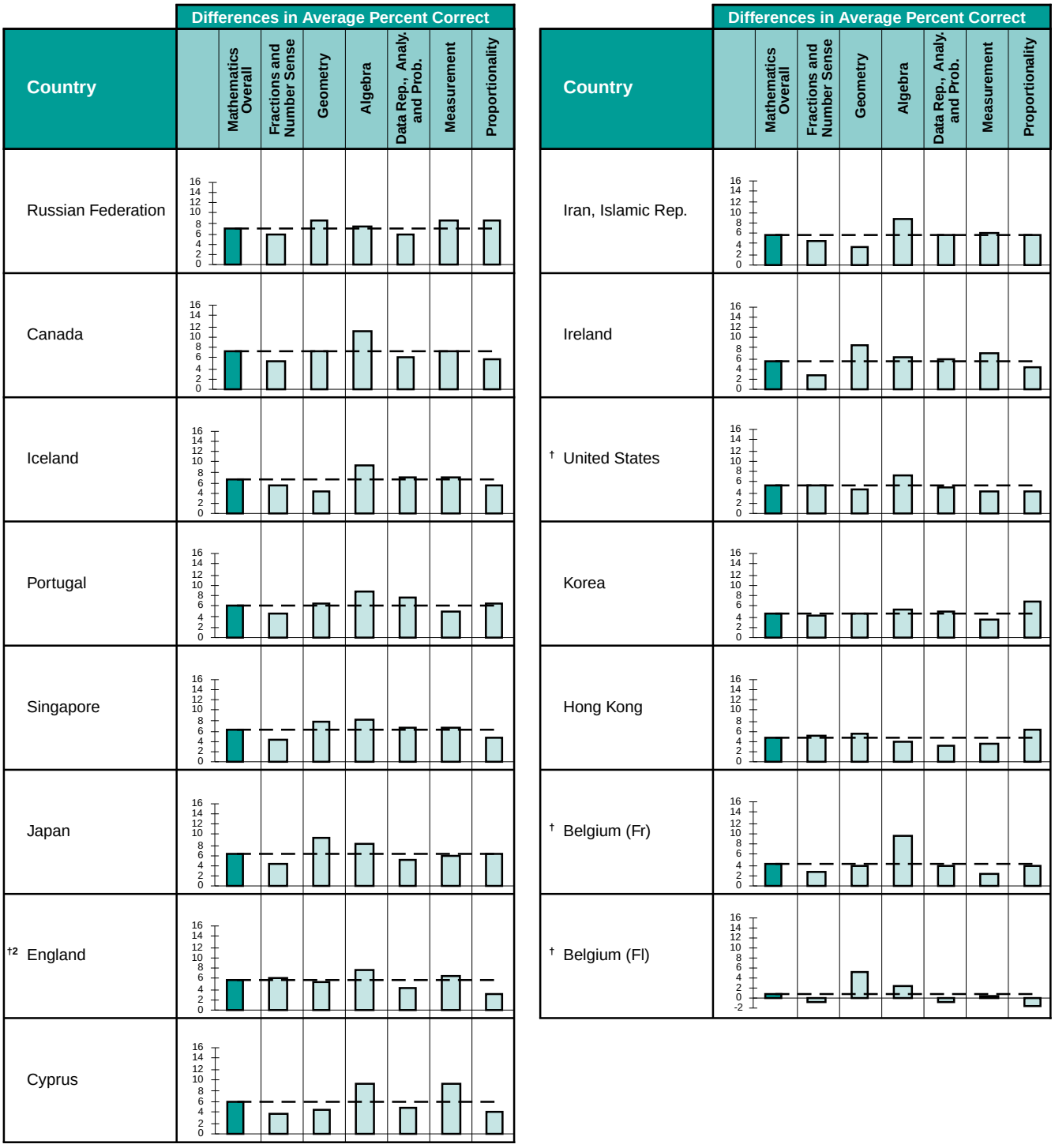


*Seventh and eighth grades in most countries; see Table 2 for information about the grades tested in each country.
†Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).
[1]National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
[2]National Defined Population covers less than 90 percent of National Desired Population (see Table A.2).
Because results are rounded to the nearest whole number, some totals may appear inconsistent.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

Figure 2.1 (Continued-2)

Difference in Average Percent Correct Between Lower and Upper Grades (Seventh and Eighth Grades*) Overall and in Mathematics Content Areas

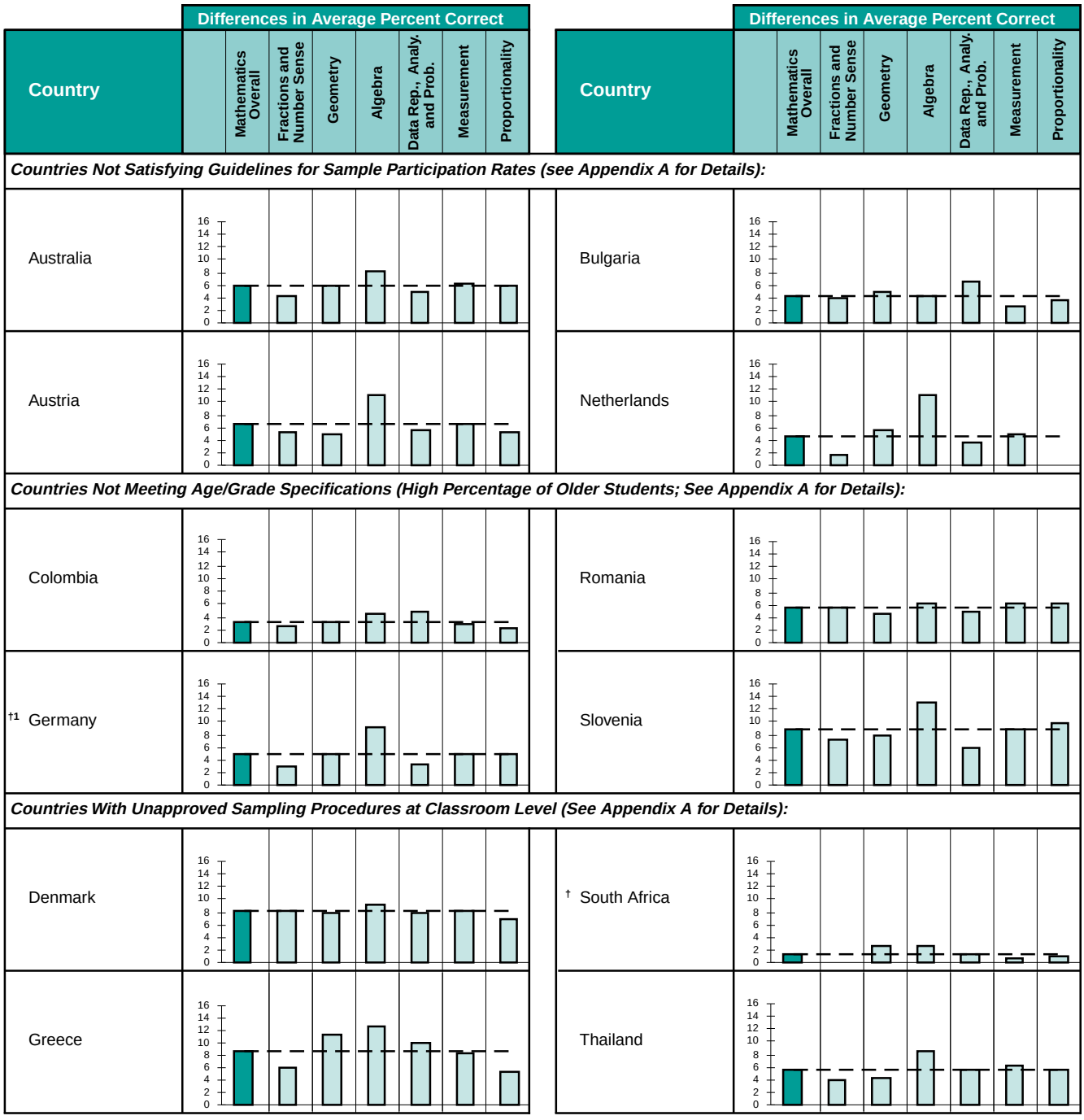


*Seventh and eighth grades in most countries; see Table 2 for information about the grades tested in each country.
†Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).
[1]National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
[2]National Defined Population covers less than 90 percent of National Desired Population (see Table A.2).
Because results are rounded to the nearest whole number, some totals may appear inconsistent.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

Figure 2.1 (Continued-3)

Difference in Average Percent Correct Between Lower and Upper Grades (Seventh and Eighth Grades*) Overall and in Mathematics Content Areas



*Seventh and eighth grades in most countries; see Table 2 for information about the grades tested in each country.
†Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).
[1]National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
[2]National Defined Population covers less than 90 percent of National Desired Population (see Table A.2).
Because results are rounded to the nearest whole number, some totals may appear inconsistent.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

What Are the Gender Differences in Achievement for the Content Areas?

Tables 2.4 and 2.5 indicate few statistically significant gender differences in achievement by content areas. However, the reduced number of gender differences in performance overall compared to the differences in scale scores discussed in Chapter 1 reinforces the idea of less precision in the percent-correct metric. Still, the findings are consistent — few gender differences, but the differences that do exist tended to favor boys. The exception from the pattern occurred in algebra, where, if anything, girls tended to have the advantage.

In fractions and number sense, the gender differences at both grades were minimal in all countries except Korea, where the eighth-grade boys showed a significant advantage. Similarly, boys and girls performed about the same in the content area of geometry at both grades. The exception was Greece, where the eighth-grade boys performed significantly better than the girls did.

In algebra, no gender differences were statistically significant at the eighth grade, but the results appeared to be more diverse, with girls having slightly higher averages (3 percentage points or more) than boys in a dozen or so countries. At the seventh grade, the pattern was similar, and girls performed significantly better than boys in Canada and Lithuania.

Boys and girls performed similarly on the items in the content area of data representation, analysis, and probability, except in a few countries where boys appeared to outperform girls. The only significant differences were in Korea, where the boys outperformed the girls at both grades.

The most differences in performance by gender were found in measurement where boys had higher achievement than did girls in a number of countries. At the eighth grade, the differences were statistically significant in Korea, Portugal, Spain, and Denmark. At the seventh grade, a significant difference was found in Iran.

Results in the area of proportionality paralleled those in fractions and number sense, with boys and girls performing similarly in most countries. There were no significant gender differences at the eighth grade. At the seventh grade, boys performed better than girls in Iceland, Japan, and Denmark.

In some respects, the TIMSS findings about gender differences parallel those found in the Second International Mathematics Study (SIMS) conducted in 1980-82.[8] Based on testing the grade with the most 13-year-old students, SIMS results indicated that girls were more likely to achieve better than boys in computation-level arithmetic, whole numbers, estimation and approximation, and algebra. Boys tended to be better in measurement, geometry, and proportional thinking. Even though the SIMS gender differences in arithmetic, geometry, and proportional thinking did not appear in the

[8] Robitaille, D.F. (1989). "Students' Achievements: Population A" in D.F. Robitaille, and R.A. Garden (eds.), *The IEA Study of Mathematics II: Contexts and Outcomes of School Mathematics.* New York: Pergamon Press.

TIMSS results, the patterns of higher achievement for girls in algebra and of higher achievement for boys in measurement are consistent from the second to the third IEA mathematics studies. In the SIMS report, the authors suggested that "boys' familiarity with the application of, and relationships between, units of measure may well be related to their link with traditionally male occupations, hobbies, and pastimes, and the gender differences for this subtest may underline the effect that experience can have on learning." This potential explanation for boys' advantage in the content area of measurement may also be worth considering in the context of the TIMSS data.

Table 2.4

Average Percent Correct for Boys and Girls by Mathematics Content Areas Upper Grade (Eighth Grade*)

Country	Mathematics Overall		Fractions & Number Sense		Geometry		Algebra	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
† Belgium (Fl)	65 (2.0)	66 (1.9)	71 (1.8)	72 (1.7)	63 (2.1)	64 (2.1)	60 (2.5)	65 (2.4)
Canada	59 (0.7)	59 (0.6)	63 (0.8)	64 (0.7)	58 (0.9)	58 (0.7)	52 (0.9)	55 (1.0)
Cyprus	47 (0.6)	48 (0.6)	50 (0.7)	50 (0.8)	47 (0.9)	48 (0.8)	46 (0.9)	49 (1.0)
Czech Republic	67 (1.0)	64 (1.3)	70 (1.1)	68 (1.3)	68 (1.1)	65 (1.4)	64 (1.4)	66 (1.4)
†2 England	53 (1.3)	53 (0.9)	54 (1.3)	53 (1.0)	54 (1.5)	54 (1.3)	47 (1.6)	51 (1.1)
France	62 (0.8)	61 (0.9)	65 (0.9)	64 (1.0)	67 (1.0)	65 (1.1)	54 (1.1)	54 (1.3)
Hong Kong	72 (1.7)	68 (1.7)	74 (1.7)	70 (1.7)	74 (1.8)	71 (1.9)	71 (1.8)	69 (2.0)
Hungary	61 (0.8)	62 (0.8)	64 (1.0)	65 (0.9)	61 (1.0)	60 (1.0)	61 (1.0)	66 (1.1)
Iceland	49 (1.3)	50 (1.3)	54 (1.8)	55 (1.4)	50 (1.3)	52 (1.6)	39 (1.1)	41 (1.9)
Iran, Islamic Rep.	39 (0.8)	36 (0.8)	40 (0.9)	37 (0.8)	45 (1.1)	40 (1.2)	36 (0.9)	38 (1.2)
Ireland	60 (1.6)	58 (1.4)	65 (1.7)	64 (1.5)	54 (1.7)	49 (1.6)	54 (1.7)	53 (1.7)
Japan	74 (0.5)	73 (0.4)	76 (0.6)	75 (0.5)	79 (0.6)	80 (0.5)	72 (0.7)	72 (0.7)
Korea	▲ 73 (0.6)	70 (0.7)	▲ 76 (0.7)	72 (0.8)	77 (0.8)	73 (0.8)	70 (0.8)	69 (0.9)
1 Latvia (LSS)	52 (1.0)	51 (0.8)	53 (1.2)	53 (1.0)	58 (1.0)	56 (1.1)	50 (1.3)	51 (0.9)
1 Lithuania	48 (1.1)	49 (1.0)	51 (1.2)	52 (1.2)	54 (1.2)	53 (1.2)	45 (1.5)	49 (1.4)
New Zealand	55 (1.4)	53 (1.3)	58 (1.4)	55 (1.3)	54 (1.5)	55 (1.4)	48 (1.5)	49 (1.3)
Norway	54 (0.6)	53 (0.6)	58 (0.7)	58 (0.7)	50 (0.8)	51 (0.9)	44 (0.9)	46 (0.9)
Portugal	44 (0.8)	42 (0.7)	45 (0.9)	42 (0.8)	46 (1.2)	42 (0.9)	39 (1.0)	40 (1.0)
Russian Federation	59 (1.4)	61 (1.3)	61 (1.5)	62 (1.1)	62 (1.7)	64 (1.4)	61 (1.8)	64 (1.3)
Singapore	79 (1.1)	79 (1.0)	83 (1.0)	84 (0.8)	76 (1.3)	77 (1.2)	75 (1.3)	77 (1.3)
Slovak Republic	63 (0.9)	62 (0.8)	66 (1.0)	66 (0.8)	65 (0.9)	62 (1.0)	60 (1.1)	64 (1.0)
Spain	52 (0.7)	50 (0.7)	53 (0.7)	51 (0.7)	51 (0.8)	48 (0.8)	54 (1.0)	54 (0.9)
Sweden	56 (0.8)	56 (0.8)	62 (0.9)	62 (0.9)	48 (0.8)	49 (0.8)	43 (1.0)	45 (1.1)
1 Switzerland	63 (0.8)	61 (0.7)	67 (0.8)	66 (0.9)	60 (1.1)	59 (0.9)	53 (1.1)	53 (0.9)
† United States	53 (1.2)	53 (1.1)	60 (1.3)	59 (1.2)	49 (1.4)	47 (1.1)	50 (1.4)	51 (1.2)
Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details):								
Australia	57 (1.2)	59 (1.1)	60 (1.2)	61 (1.1)	57 (1.3)	58 (1.2)	53 (1.3)	57 (1.2)
Austria	63 (0.8)	61 (1.2)	67 (0.9)	65 (1.1)	57 (1.3)	57 (1.4)	59 (0.9)	60 (1.2)
Belgium (Fr)	59 (1.1)	58 (1.0)	62 (1.4)	62 (0.9)	60 (1.3)	57 (1.1)	52 (1.6)	55 (1.3)
Netherlands	61 (1.8)	59 (1.6)	63 (1.8)	60 (1.7)	61 (2.1)	58 (1.8)	52 (1.8)	53 (1.8)
Scotland	53 (1.7)	50 (1.3)	55 (1.5)	51 (1.3)	54 (1.8)	50 (1.4)	46 (2.0)	46 (1.4)
Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details):								
Colombia	30 (1.6)	29 (0.9)	31 (1.8)	30 (0.7)	29 (1.6)	29 (1.1)	28 (1.7)	28 (1.0)
†1 Germany	54 (1.3)	54 (1.2)	60 (1.3)	57 (1.3)	51 (1.5)	53 (1.5)	47 (1.5)	49 (1.4)
Romania	49 (1.1)	49 (1.0)	48 (1.2)	48 (1.0)	53 (1.1)	51 (1.1)	50 (1.5)	54 (1.2)
Slovenia	62 (0.8)	60 (0.7)	64 (0.9)	62 (0.8)	61 (1.1)	59 (1.1)	61 (1.0)	61 (0.9)
Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details):								
Denmark	▲ 54 (0.8)	50 (0.9)	55 (1.0)	51 (1.1)	56 (1.1)	53 (1.3)	47 (0.8)	44 (1.0)
Greece	51 (0.9)	48 (0.7)	54 (1.0)	51 (0.8)	▲ 53 (0.9)	48 (0.9)	46 (1.0)	46 (0.9)
Thailand	56 (1.4)	58 (1.7)	59 (1.5)	61 (1.8)	60 (1.3)	63 (1.5)	51 (1.8)	55 (2.0)
Unapproved Sampling Procedures at Classroom Level and Not Meeting Other Guidelines (See Appendix A for Details):								
1 Israel	61 (1.5)	55 (1.5)	64 (1.6)	58 (1.6)	61 (1.3)	55 (1.8)	63 (1.7)	59 (1.9)
South Africa	25 (1.7)	22 (1.0)	28 (2.0)	24 (1.2)	25 (1.6)	24 (0.9)	24 (1.5)	23 (1.2)

▲ = Difference from other gender statistically significant at .05 level, adjusted for multiple comparisons

*Eighth grade in most countries; See Table 2 for information about the grades tested in each country.
†Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).
[1]National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
[2]National Defined Population covers less than 90 percent of National Desired Population (see Table A.2).
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

Table 2.4 (Continued)

Average Percent Correct for Boys and Girls by Mathematics Content Areas Upper Grade (Eighth Grade*)

Country	Data Representation, Analysis & Probability		Measurement		Proportionality	
	Boys	Girls	Boys	Girls	Boys	Girls
† Belgium (Fl)	72 (2.2)	73 (1.4)	60 (1.9)	59 (2.0)	52 (2.2)	53 (2.7)
Canada	69 (0.9)	69 (0.6)	52 (0.9)	50 (0.8)	48 (0.9)	48 (1.0)
Cyprus	52 (0.9)	54 (0.9)	44 (1.1)	43 (1.1)	40 (1.0)	39 (0.9)
Czech Republic	70 (0.9)	67 (1.4)	64 (1.2)	60 (1.5)	54 (1.4)	49 (1.7)
†2 England	67 (1.2)	65 (1.1)	51 (1.5)	48 (1.1)	42 (1.5)	40 (1.3)
France	72 (0.8)	70 (1.1)	58 (1.0)	56 (1.1)	50 (1.2)	48 (1.2)
Hong Kong	73 (1.6)	69 (1.4)	68 (1.9)	62 (2.1)	63 (1.5)	60 (1.9)
Hungary	66 (0.9)	65 (0.9)	57 (1.0)	56 (1.0)	47 (1.2)	46 (1.1)
Iceland	63 (1.6)	62 (1.4)	45 (1.8)	45 (2.0)	40 (1.6)	37 (1.4)
Iran, Islamic Rep.	42 (0.8)	40 (0.9)	32 (1.7)	26 (1.4)	38 (1.3)	34 (1.1)
Ireland	70 (1.6)	68 (1.3)	55 (1.9)	51 (1.6)	52 (1.8)	49 (1.2)
Japan	79 (0.5)	77 (0.5)	68 (0.6)	67 (0.6)	62 (0.8)	60 (0.8)
Korea	▲ 80 (0.7)	75 (0.8)	▲ 69 (0.9)	62 (1.0)	62 (0.9)	61 (0.9)
1 Latvia (LSS)	57 (1.0)	55 (1.0)	49 (1.2)	46 (1.1)	41 (1.1)	37 (1.0)
1 Lithuania	52 (1.2)	52 (1.1)	44 (1.1)	41 (1.2)	34 (1.1)	35 (1.2)
New Zealand	67 (1.3)	65 (1.3)	50 (1.5)	46 (1.4)	44 (1.5)	40 (1.4)
Norway	67 (0.8)	66 (0.8)	53 (0.8)	50 (0.7)	41 (0.8)	40 (0.8)
Portugal	55 (0.9)	53 (0.8)	▲ 41 (0.9)	36 (0.8)	33 (1.0)	30 (0.9)
Russian Federation	60 (1.2)	60 (1.4)	56 (1.3)	56 (1.8)	48 (1.6)	49 (1.6)
Singapore	79 (1.1)	79 (1.0)	77 (1.3)	77 (1.0)	75 (1.2)	76 (1.1)
Slovak Republic	62 (0.9)	61 (0.8)	62 (1.1)	59 (1.0)	50 (1.1)	48 (1.3)
Spain	61 (0.8)	59 (0.8)	▲ 47 (1.0)	42 (0.9)	42 (1.1)	38 (0.9)
Sweden	70 (0.9)	69 (0.9)	57 (1.1)	55 (1.0)	46 (1.1)	43 (1.1)
1 Switzerland	73 (1.0)	71 (0.7)	62 (1.0)	59 (1.0)	53 (1.0)	52 (0.9)
† United States	65 (1.1)	66 (1.2)	42 (1.2)	38 (1.2)	43 (1.1)	42 (1.2)
Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details):						
Australia	66 (1.1)	69 (1.0)	54 (1.2)	53 (1.1)	47 (1.3)	46 (1.1)
Austria	69 (0.9)	68 (1.2)	64 (1.0)	60 (1.6)	50 (1.0)	48 (1.3)
Belgium (Fr)	69 (1.4)	67 (1.1)	56 (1.2)	55 (1.2)	49 (1.1)	46 (1.2)
Netherlands	74 (2.0)	70 (1.5)	58 (1.8)	56 (1.7)	54 (2.4)	49 (1.9)
Scotland	67 (1.6)	63 (1.3)	50 (2.0)	45 (1.4)	43 (1.7)	37 (1.4)
Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details):						
Colombia	38 (1.9)	36 (1.1)	25 (1.9)	25 (2.5)	24 (1.5)	22 (0.9)
†1 Germany	65 (1.3)	64 (1.3)	52 (1.3)	50 (1.3)	44 (1.6)	41 (1.3)
Romania	49 (1.2)	48 (1.1)	49 (1.4)	47 (1.3)	41 (1.3)	42 (1.3)
Slovenia	67 (0.9)	65 (0.8)	60 (1.1)	57 (1.0)	50 (1.1)	48 (1.2)
Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details):						
Denmark	69 (1.0)	64 (1.3)	▲ 52 (1.0)	47 (1.2)	43 (1.2)	39 (0.9)
Greece	58 (1.2)	55 (0.8)	45 (1.0)	41 (1.0)	41 (1.3)	38 (1.1)
Thailand	62 (1.3)	63 (1.4)	50 (1.5)	51 (1.8)	50 (1.7)	52 (1.9)
Unapproved Sampling Procedures at Classroom Level and Not Meeting Other Guidelines (See Appendix A for Details):						
1 Israel	67 (1.6)	60 (1.6)	52 (1.9)	46 (1.8)	48 (2.0)	40 (1.6)
South Africa	28 (1.9)	25 (1.1)	20 (1.8)	16 (1.0)	23 (1.4)	20 (0.9)

▲ = Difference from other gender statistically significant at .05 level, adjusted for multiple comparisons

*Eighth grade in most countries; See Table 2 for information about the grades tested in each country.
†Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).
1National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
2National Defined Population covers less than 90 percent of National Desired Population (see Table A.2).
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

Table 2.5

Average Percent Correct for Boys and Girls by Mathematics Content Areas
Lower Grade (Seventh Grade*)

Country	Mathematics Overall		Fractions & Number Sense		Geometry		Algebra	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
† Belgium (Fl)	65 (1.1)	66 (1.1)	72 (1.1)	73 (1.0)	58 (1.2)	59 (1.3)	59 (1.5)	62 (1.2)
† Belgium (Fr)	56 (1.0)	53 (1.1)	61 (1.2)	58 (1.2)	56 (1.4)	53 (1.4)	44 (1.1)	43 (1.3)
Canada	52 (0.6)	52 (0.6)	58 (0.6)	58 (0.7)	51 (1.0)	50 (0.8)	41 (0.8)	▲ 44 (0.8)
Cyprus	42 (0.6)	42 (0.5)	46 (0.7)	45 (0.6)	43 (0.9)	43 (0.9)	38 (0.8)	39 (0.8)
Czech Republic	58 (1.1)	57 (1.3)	62 (1.4)	60 (1.4)	59 (1.0)	58 (1.5)	54 (1.2)	57 (1.4)
†2 England	49 (1.4)	45 (1.0)	49 (1.7)	46 (1.1)	51 (1.4)	47 (1.2)	42 (1.6)	40 (1.2)
France	52 (0.9)	50 (0.8)	54 (1.0)	52 (1.0)	59 (1.1)	57 (1.1)	39 (0.9)	39 (0.9)
Hong Kong	66 (2.2)	64 (2.0)	67 (2.2)	66 (1.9)	69 (2.4)	66 (2.0)	66 (2.5)	65 (2.3)
Hungary	53 (0.9)	54 (1.0)	58 (1.0)	59 (1.0)	53 (1.0)	51 (1.1)	50 (1.1)	54 (1.3)
Iceland	43 (0.7)	43 (0.7)	49 (1.1)	49 (0.9)	46 (1.0)	48 (0.8)	30 (0.6)	32 (0.8)
Iran, Islamic Rep.	33 (0.7)	31 (0.7)	35 (0.8)	33 (0.8)	41 (1.5)	38 (0.9)	29 (0.9)	28 (0.8)
Ireland	55 (1.5)	52 (1.1)	64 (1.6)	61 (1.3)	44 (1.4)	41 (1.1)	48 (1.7)	46 (1.4)
Japan	68 (0.6)	66 (0.4)	72 (0.5)	70 (0.5)	71 (0.7)	70 (0.5)	64 (0.7)	63 (0.7)
Korea	68 (0.8)	65 (0.9)	71 (0.8)	67 (1.0)	72 (1.0)	69 (1.1)	65 (1.1)	63 (1.1)
1 Latvia (LSS)	44 (1.0)	44 (0.8)	46 (1.0)	45 (0.9)	48 (1.1)	47 (1.0)	42 (1.3)	44 (1.1)
1 Lithuania	37 (0.9)	39 (0.9)	39 (1.1)	43 (1.1)	38 (1.1)	39 (1.3)	36 (1.1)	▲ 42 (1.4)
New Zealand	46 (1.0)	46 (0.9)	49 (1.1)	50 (1.0)	45 (1.3)	46 (1.2)	39 (1.0)	40 (1.0)
Norway	45 (0.8)	43 (0.8)	50 (1.0)	48 (1.0)	42 (0.9)	42 (1.1)	33 (0.8)	32 (1.1)
Portugal	37 (0.7)	36 (0.6)	39 (0.8)	39 (0.6)	40 (1.0)	36 (1.0)	31 (1.0)	31 (0.7)
Russian Federation	53 (1.2)	53 (0.8)	56 (1.3)	56 (0.8)	55 (1.4)	54 (1.2)	53 (1.5)	56 (0.9)
† Scotland	45 (1.1)	44 (0.9)	48 (1.2)	47 (1.1)	46 (1.3)	46 (1.1)	36 (1.1)	37 (0.9)
Singapore	73 (1.4)	73 (1.6)	79 (1.3)	79 (1.5)	68 (1.5)	69 (1.8)	68 (1.6)	68 (1.8)
Slovak Republic	55 (1.1)	54 (0.8)	59 (1.1)	58 (0.9)	58 (1.3)	55 (0.9)	49 (1.3)	52 (1.0)
Spain	43 (0.6)	42 (0.7)	43 (0.7)	42 (0.7)	44 (0.8)	42 (1.0)	41 (0.9)	41 (0.9)
Sweden	47 (0.7)	47 (0.8)	51 (0.8)	52 (1.0)	44 (0.8)	42 (1.0)	35 (0.7)	36 (0.8)
1 Switzerland	54 (0.6)	52 (0.6)	61 (0.8)	58 (0.7)	48 (0.9)	44 (0.9)	41 (0.6)	41 (0.8)
† United States	48 (1.3)	48 (1.3)	54 (1.4)	54 (1.5)	44 (1.3)	43 (1.2)	42 (1.4)	45 (1.4)
Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details):								
Australia	52 (1.2)	53 (1.0)	56 (1.3)	57 (1.1)	50 (1.1)	53 (1.1)	45 (1.3)	48 (1.1)
Austria	55 (1.1)	56 (0.8)	60 (1.2)	61 (0.9)	52 (1.4)	53 (1.2)	46 (1.2)	50 (0.9)
Netherlands	56 (1.3)	55 (1.1)	61 (1.5)	59 (1.2)	55 (1.5)	53 (1.2)	41 (1.3)	42 (1.1)
Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details):								
Colombia	27 (0.8)	25 (1.0)	29 (1.0)	27 (0.9)	27 (1.2)	25 (1.3)	24 (1.0)	23 (1.4)
†1 Germany	49 (1.3)	49 (1.1)	55 (1.4)	55 (1.3)	45 (1.4)	48 (1.3)	39 (1.6)	38 (1.4)
Romania	43 (0.9)	43 (0.9)	43 (1.0)	42 (0.9)	48 (1.1)	47 (1.1)	44 (1.2)	47 (1.2)
Slovenia	53 (0.8)	52 (0.8)	56 (0.9)	56 (0.8)	52 (1.1)	53 (0.9)	47 (1.1)	49 (0.9)
Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details):								
Denmark	45 (0.7)	43 (0.7)	46 (0.9)	44 (0.9)	47 (1.0)	46 (1.1)	37 (0.9)	35 (0.9)
Greece	40 (0.7)	41 (0.6)	47 (0.8)	47 (0.8)	39 (0.8)	39 (0.9)	32 (0.9)	34 (0.7)
† South Africa	24 (1.4)	22 (0.8)	27 (1.5)	25 (1.0)	23 (1.4)	21 (0.8)	21 (1.3)	20 (0.7)
Thailand	51 (1.2)	52 (1.4)	56 (1.4)	56 (1.6)	57 (1.1)	58 (1.2)	44 (1.3)	46 (1.5)

▲ = Difference from other gender statistically significant at .05 level, adjusted for multiple comparisons

*Seventh grade in most countries; See Table 2 for information about the grades tested in each country.
†Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).
1National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
2National Defined Population covers less than 90 percent of National Desired Population (see Table A.2).
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.

Table 2.5 (Continued)

Average Percent Correct for Boys and Girls by Mathematics Content Areas Lower Grade (Seventh Grade*)

Country	Data Representation, Analysis & Probability		Measurement		Proportionality	
	Boys	Girls	Boys	Girls	Boys	Girls
† Belgium (Fl)	73 (1.1)	73 (1.2)	60 (1.2)	59 (1.4)	53 (1.2)	55 (1.4)
† Belgium (Fr)	66 (1.3)	62 (1.4)	55 (1.1)	52 (1.4)	45 (1.4)	43 (1.1)
Canada	63 (0.9)	62 (0.8)	45 (0.7)	43 (0.8)	43 (0.9)	41 (0.8)
Cyprus	48 (0.9)	48 (0.7)	36 (0.9)	33 (0.8)	36 (1.1)	35 (0.8)
Czech Republic	63 (1.1)	60 (1.3)	57 (1.2)	52 (1.4)	42 (1.2)	40 (1.6)
†2 England	63 (1.3)	61 (1.4)	46 (1.5)	40 (1.1)	41 (1.6)	35 (1.2)
France	64 (1.0)	61 (0.9)	50 (1.1)	47 (1.1)	42 (1.1)	40 (1.2)
Hong Kong	69 (2.0)	67 (1.5)	63 (2.4)	60 (2.2)	56 (2.0)	54 (1.9)
Hungary	60 (1.0)	60 (1.0)	50 (1.1)	48 (1.2)	39 (1.1)	38 (1.2)
Iceland	56 (0.9)	55 (1.1)	38 (0.9)	38 (1.0)	▲ 35 (0.8)	31 (0.9)
Iran, Islamic Rep.	37 (0.9)	34 (1.0)	▲ 25 (1.1)	21 (0.9)	32 (1.3)	29 (0.7)
Ireland	65 (1.3)	62 (1.2)	49 (1.7)	43 (1.3)	48 (1.8)	45 (1.2)
Japan	73 (0.6)	72 (0.6)	63 (0.8)	60 (0.6)	▲ 57 (0.8)	53 (0.7)
Korea	▲ 75 (0.7)	70 (0.9)	64 (1.2)	60 (1.0)	56 (1.1)	53 (1.1)
1 Latvia (LSS)	49 (1.1)	49 (0.9)	43 (1.1)	39 (1.0)	34 (1.4)	31 (1.1)
1 Lithuania	43 (1.1)	44 (0.9)	33 (1.1)	32 (1.0)	25 (0.9)	24 (1.0)
New Zealand	58 (1.2)	59 (1.1)	42 (1.2)	39 (1.1)	38 (1.2)	37 (1.1)
Norway	60 (1.1)	57 (1.0)	45 (1.1)	42 (1.1)	35 (0.9)	33 (0.8)
Portugal	48 (0.9)	45 (0.8)	36 (0.8)	32 (0.9)	27 (0.8)	23 (0.8)
Russian Federation	56 (1.3)	53 (0.9)	48 (1.2)	47 (1.0)	40 (1.3)	39 (1.3)
† Scotland	58 (1.2)	57 (1.0)	42 (1.2)	39 (1.1)	36 (0.9)	33 (1.1)
Singapore	72 (1.5)	73 (1.5)	70 (1.7)	70 (1.9)	70 (1.6)	71 (1.6)
Slovak Republic	57 (0.9)	55 (0.8)	54 (1.2)	50 (1.0)	42 (1.2)	40 (1.1)
Spain	53 (0.8)	51 (0.9)	39 (0.9)	36 (0.9)	36 (0.8)	34 (0.8)
Sweden	64 (1.0)	64 (1.1)	48 (1.0)	45 (1.0)	36 (0.9)	35 (1.0)
1 Switzerland	67 (0.9)	64 (0.8)	54 (1.0)	51 (0.9)	46 (0.9)	43 (0.9)
† United States	60 (1.3)	60 (1.4)	37 (1.4)	35 (1.6)	39 (1.3)	37 (1.3)
Countries Not Satisfying Guidelines for Sample Participation Rates (See Appendix A for Details):						
Australia	62 (1.2)	63 (1.0)	48 (1.3)	47 (1.1)	41 (1.3)	41 (1.0)
Austria	62 (1.1)	64 (1.0)	56 (1.1)	54 (0.9)	44 (1.2)	44 (1.2)
Netherlands	69 (1.3)	68 (1.2)	53 (1.4)	52 (1.3)	51 (1.5)	51 (1.7)
Countries Not Meeting Age/Grade Specifications (High Percentage of Older Students; See Appendix A for Details):						
Colombia	33 (1.0)	32 (1.3)	23 (1.0)	21 (0.9)	21 (1.4)	20 (0.8)
†1 Germany	62 (1.3)	61 (1.2)	48 (1.1)	44 (1.0)	39 (1.4)	36 (1.1)
Romania	44 (0.9)	43 (0.9)	42 (1.3)	41 (1.0)	35 (1.1)	35 (1.0)
Slovenia	61 (0.8)	59 (0.9)	51 (0.9)	48 (1.1)	41 (1.2)	38 (1.0)
Countries With Unapproved Sampling Procedures at Classroom Level (See Appendix A for Details):						
Denmark	61 (1.1)	57 (1.0)	42 (1.0)	40 (0.9)	▲ 37 (1.1)	31 (1.1)
Greece	46 (1.0)	46 (0.7)	36 (0.8)	34 (0.9)	34 (0.8)	34 (0.8)
† South Africa	26 (1.6)	24 (0.9)	19 (1.5)	16 (0.8)	21 (1.2)	20 (0.7)
Thailand	57 (1.2)	57 (1.2)	44 (1.3)	44 (1.7)	45 (1.3)	46 (1.6)

▲ = Difference from other gender statistically significant at .05 level, adjusted for multiple comparisons

*Seventh grade in most countries; See Table 2 for information about the grades tested in each country.
†Met guidelines for sample participation rates only after replacement schools were included (see Appendix A for details).
[1]National Desired Population does not cover all of International Desired Population (see Table A.2). Because coverage falls below 65%, Latvia is annotated LSS for Latvian Speaking Schools only.
[2]National Defined Population covers less than 90 percent of National Desired Population (see Table A.2).
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1994-95.