

such decisions made at the regional or local

or

University

is

is

Countries	National Curriculum	Year Curriculum Introduced	Curriculum Under Revision	Public Exams with Consequences for Individual Students	Grades Tested in Public Exams
. 5 +2/	●	2000	○	●	3,8,10
. 865, 0(○	Varies by state; generally ongoing process	●	●	12
1 ~ +0 /81 ~ f10-1 /6 ~	○	1998-1999	○	○	-
l . /2+6+ &(/4+ /	●	2002	●	●	9,12
l ; 4586	●	1995	○	●	7-12
/2- 0(2*	●	2000	○	●	10,11,12
f132- ž 32- % \$	●	1983	●	●	11,13
f182- (5	●	2000	○	●	12
5(2' 6(1 /) \$+4" 3,	●	1983	○	●	5,8,11,12
2 5; 5@	●	1985, revised 2002	●	●	5,8,13
l, 9, 7	●	2002	○	○	-
ž, <4	●	2001	○	●	6,9,12
ž43=, 74	●	1997, revised 2003	○	●	10,12
! 8● 8>, ' &09" 81	●	1999-2000	○	●	4,9,11,12
! 87,					

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

based on student samples, and by systems of school inspection or audit. The different methods used by the TIMSS 2003 countries are shown in Exhibit 5.2, first for countries that participated at the eighth grade and then for those at the fourth grade.

Of the methods for supporting and monitoring curriculum implementation shown in Exhibit 5.2, at the eighth grade, 12 participants reported using all 7, and an additional 22 used 5 or 6. The most widely used methods were ministry notes and directives (42 pa

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Countries							
Armenia	●	●	●	○	○	○	○
Australia	○	●	●	●	●	●	●
Belgium (Flemish)	○	●	●	●	●	○	●
Chinese Taipei	●	●	●	○	●	○	●
Cyprus	●	○	●	○	○	○	●
England	○	●	●	●	●	○	●
Hong Kong, SAR	●	●	●	●	○	●	●
Hungary	●	●	●	●	○	○	○
Iran, Islamic Rep. of	●	●	●	●	●	○	●
Italy	○	●	●	●	○	●	●
Japan	●	●	●	●	●	●	●
Latvia	●	○	●	●	●	○	●
Lithuania	●	●	●	●	●	●	●
Moldova, Rep. of	○	●	●	●	●	●	○
Morocco							

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

preparation in how to teach the intended curriculum as part of their

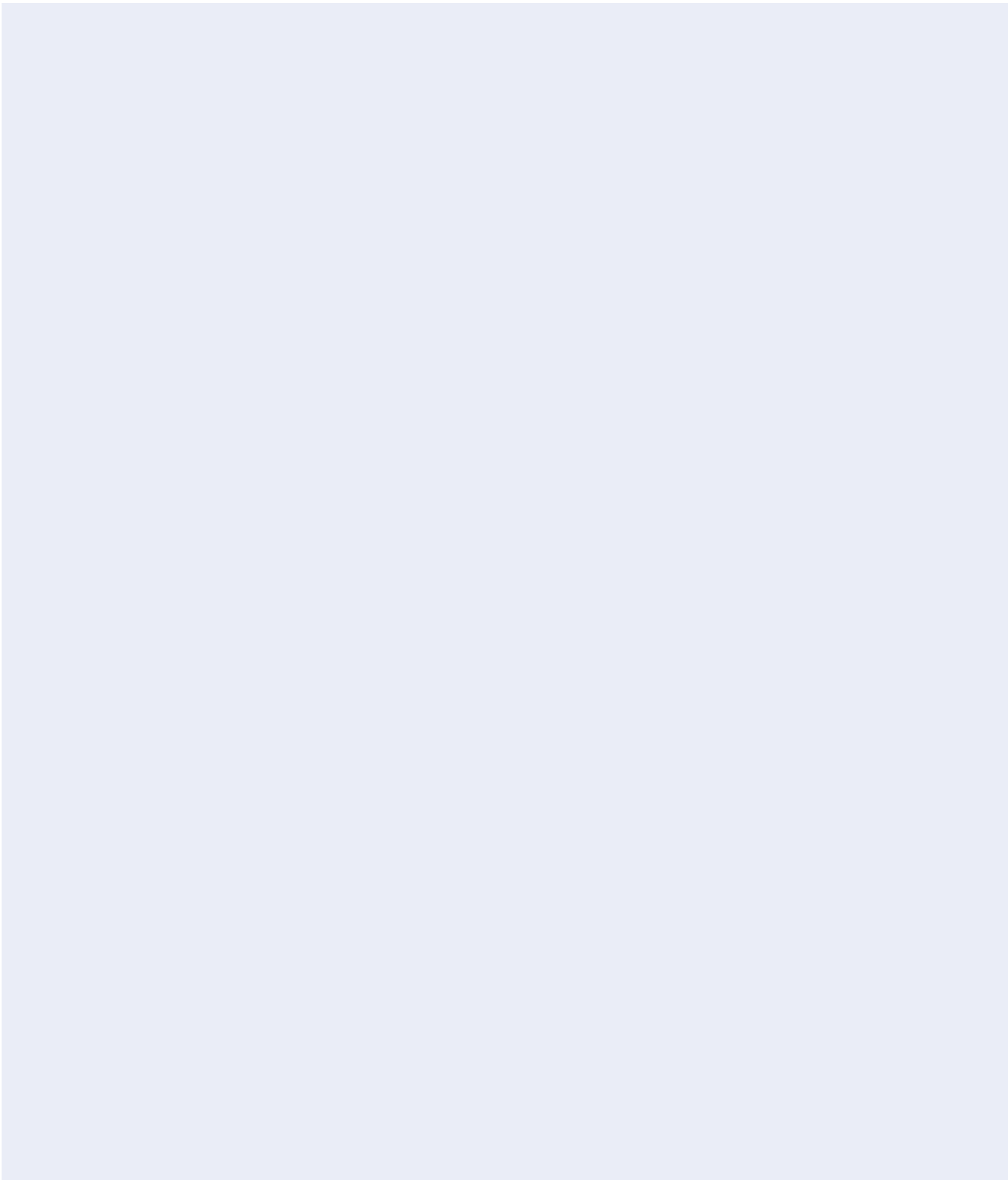




Exhibit 5.4: The Way the Intended Mathematics Curriculum Addresses the Issue of Students with Different Levels of Ability

Countries	One Curriculum for All Students with No Grouping	One Curriculum for All Students but Different Groups of Students Have Different Difficulty Levels	Different Curricula for Different Groups of Students According to Ability Level
Armenia	●	○	○
Australia	○	●	○
Belgium (Flemish)	●	○	○
Chinese Taipei	●	○	○
Cyprus	●	○	○
England	○	●	○
Hong Kong, SAR	●	○	○
Hungary	●	○	○
Iran, Islamic Rep. of	●	○	○
Italy	●	○	○
Japan	●	○	○
Latvia	●	○	○
Lithuania	●	○	○
Moldova, Rep. of	●	○	○
Morocco	●	○	○
Netherlands	●	○	○
New Zealand	○	●	○
Norway	●	○	○
Philippines	●	○	○
Russian Federation	●	○	○
Scotland	○	●	○
Singapore	●	○	○
Slovenia	●	○	○
Tunisia	●	○	○
United States	○	●	○
Yemen	●	○	○
Benchmarking Participants			
Indiana State, US	●	○	○
Ontario Province, Can.	●	○	○
Quebec Province, Can.	●	○	○

● Country reported Yes for the particular option
○ Country reported No for the particular option

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Background data provided by National Research Coordinators

What Approaches and Processes Do Countries Emphasize in their Intended Mathematics Curriculum?

Exhibit 5.5 indicates the relative emphasis given to various aspects of mathematics instruction in the intended curriculum of participating countries,

to Q

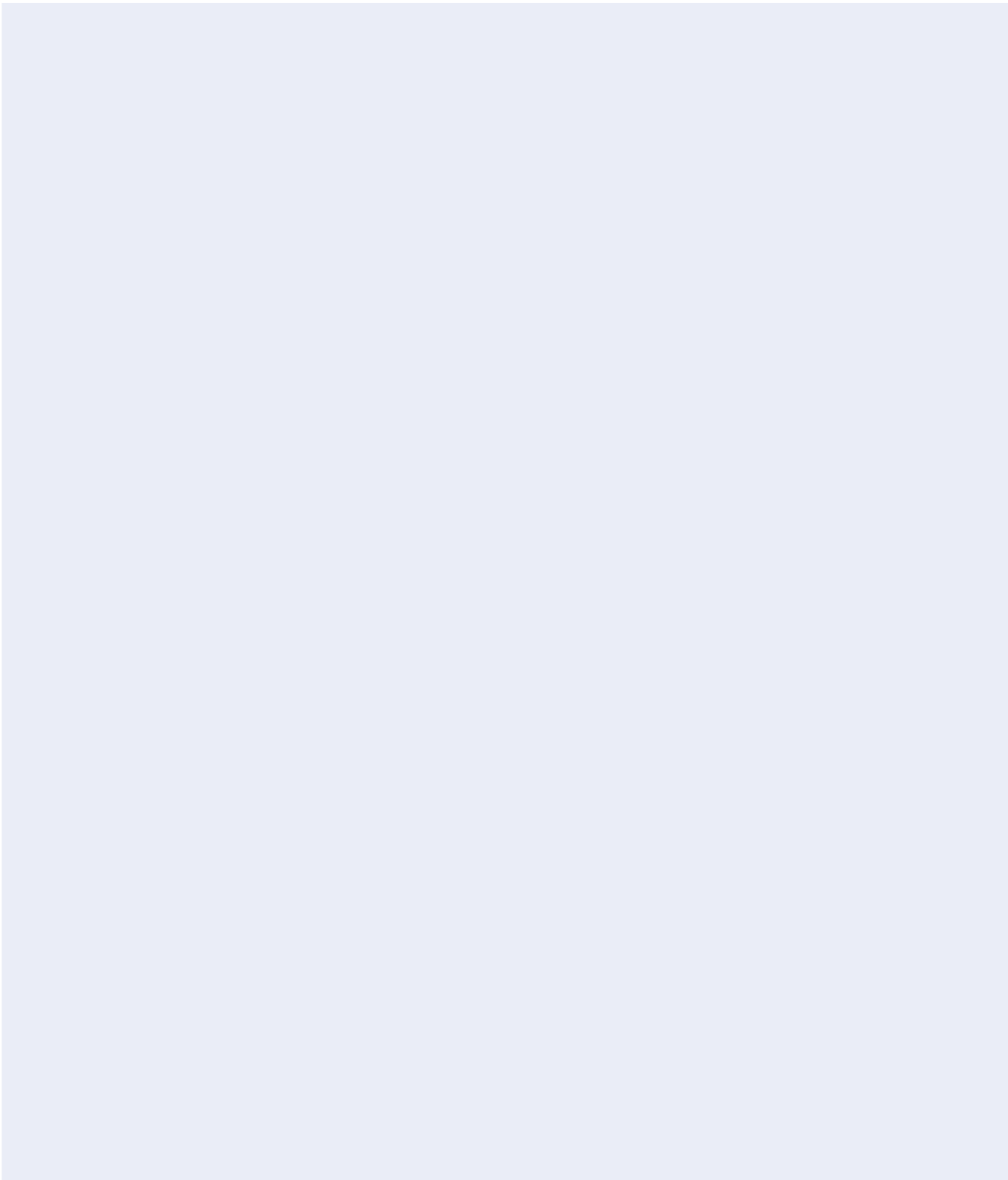


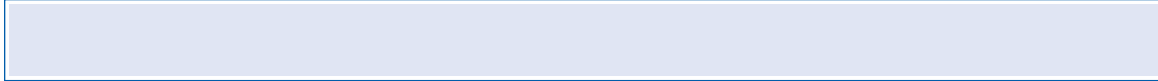
Exhibit 5.5:



Countries

A large table area with horizontal lines, mostly blank, intended for listing countries.

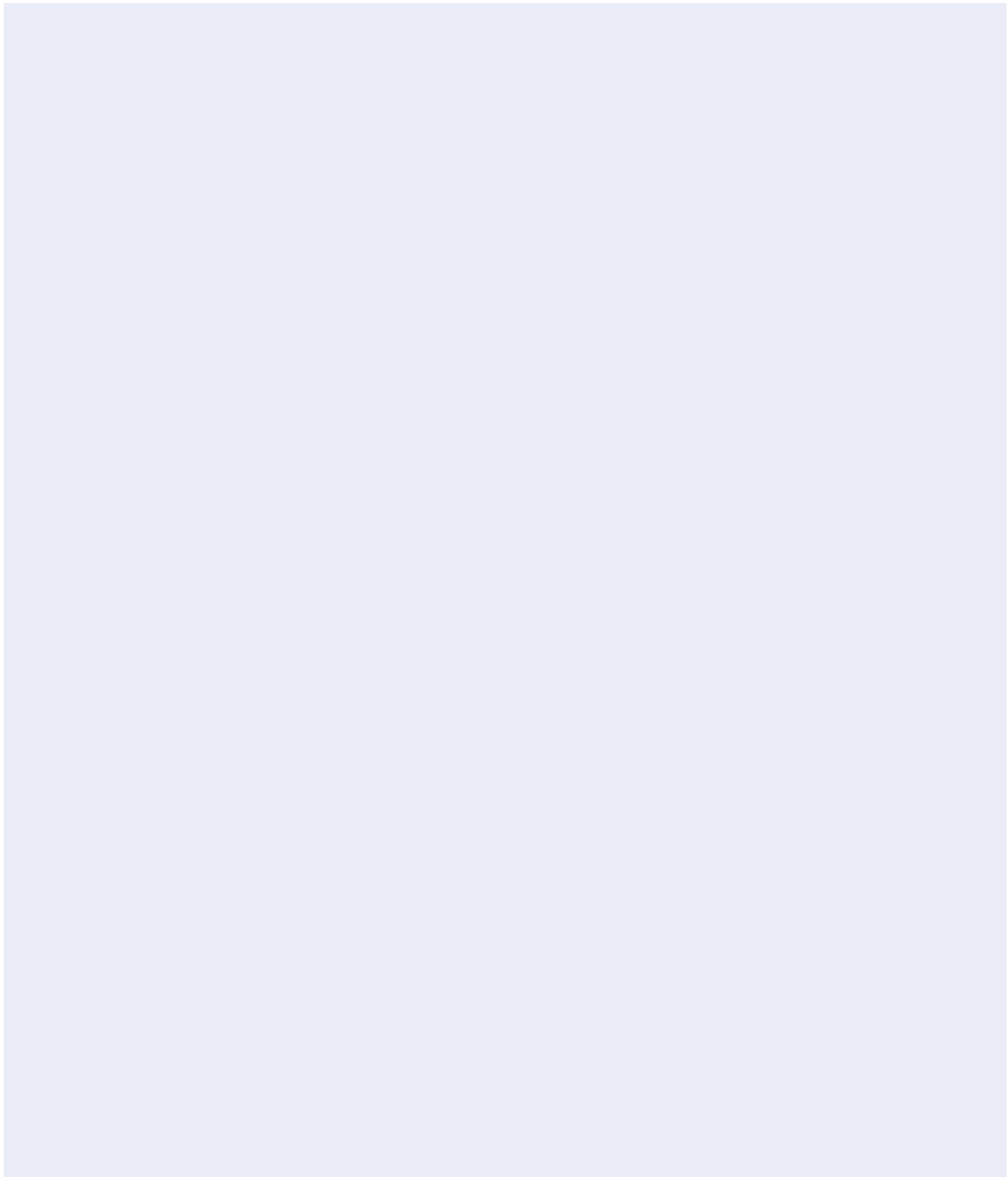
SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003



Are the TIMSS Mathematics Topics Included in the Intended Curriculum?

The ability of policy makers to make sound judgments about rela-

the eighth grade, 70 percent of the assessment topics were intended for all or almost all students, and a further six percent for only the more able students. In only six countries were less than half of the topics included in the eighth-grade curriculum: Botswana, Indonesia, Lebanon c



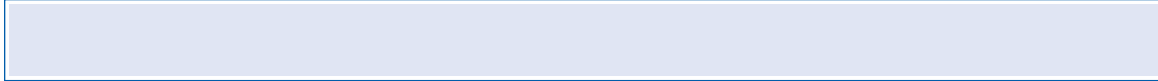
9 percent for only the more able students. More than eighty percent of the mathematics topics were included in the intended curriculum for all or almost all students in Armenia, England, Italy, Moldova, the United States, Indiana, and Ontario.

Although measurement had fewer topics than number at the fourth grade (6 vs 12), it had a greater percentage of topics included in the intended curricula of participating countries – 81 percent for all or almost all students compared with 68 percent. Nineteen of the twenty-nine fourth-grade participants included at least five of the six measurement topics in their curricula. Comparable coverage of number topics

MATHEMATICS
Grade



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003



At the fourth grade, as at the eighth grade, the relationship between the coverage of the TIMSS mathematics topics in participants' intended curricula and student achievement in mathematics is a moderately positive one. Higher-performing countries had generally greater levels of coverage, and lower-performing countries lesser levels. For example, $r = .46$ for the United States and $r = .31$ for Mexico.

R

exhibit shows for each TIMSS participant, averaged across mathematics content areas, the percentage of students whose teachers reported that the students had been taught each topic. The topics were listed in a questionnaire completed by the mathematics teachers of the students who took the TIMSS 2003 test.⁶ Although generally teacher participation was high, sometimes teachers did not complete the questionnaire assigned to them, so most countries had some percentage of students for whom no teacher questionnaire information is available. The exhibits in this chapter have special notations on this point. For a country where teacher responses are available for at least 70 but less than 85 percent of the students, an “r” is included next to its data. Where teacher responses are available for at least 50 but less than 70 percent of students, an “s” is included. Where teacher responses are available for less than 50 percent, an “x” replaces the data.

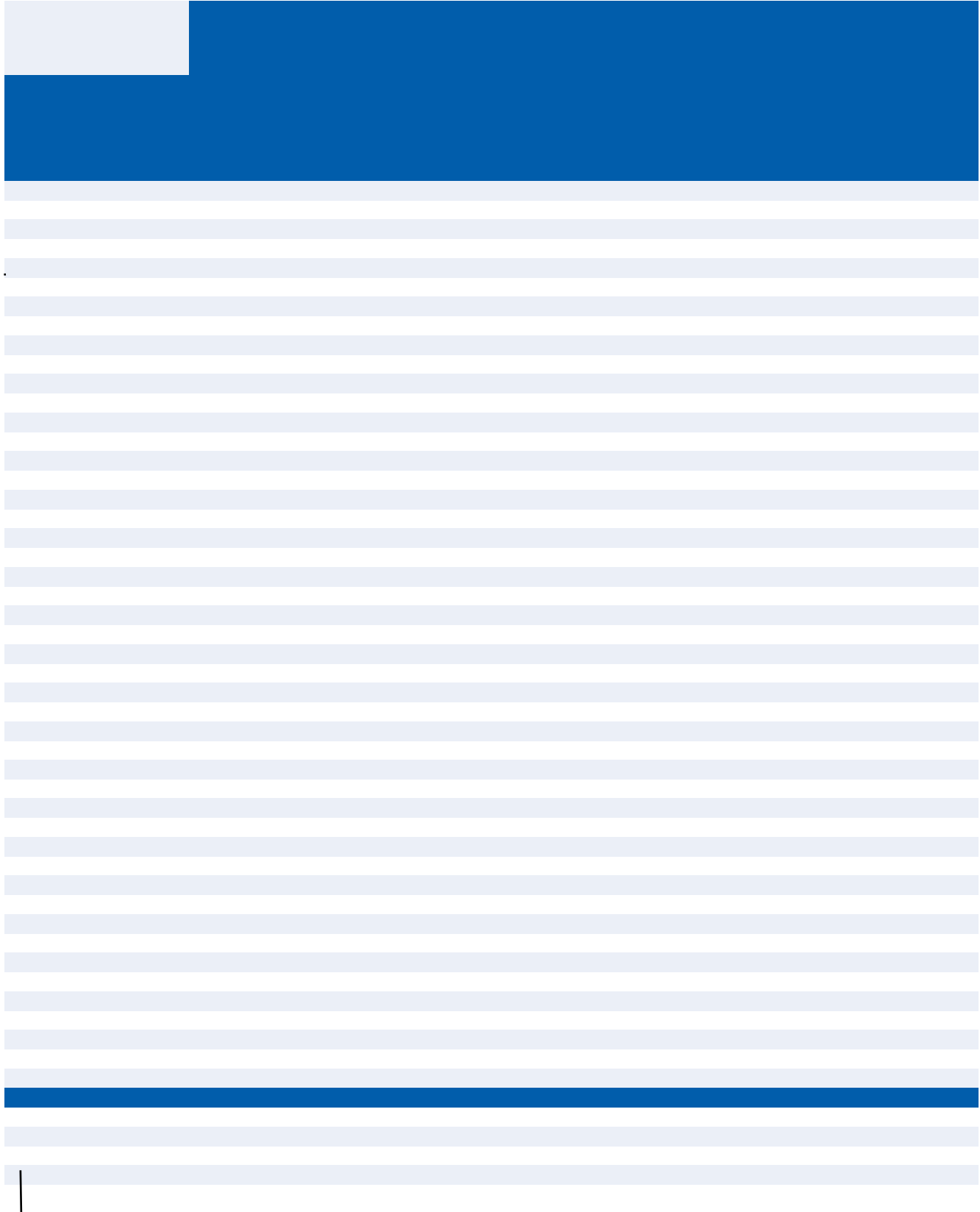
Exhibit 5.7 shows that, according to their teachers, on average 72 percent of the eighth-grade students tested in TIMSS 2003 had been taught the TIMSS mathematics topics. In Armenia and Macedonia almost all students (90% or more) had been taught the topics, as had the majority of students in every country except Botswana.

Consistent with the information on the intended curriculum presented in the previous section, number was the content area with

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no difference for measurement, two percentage points for geometry,



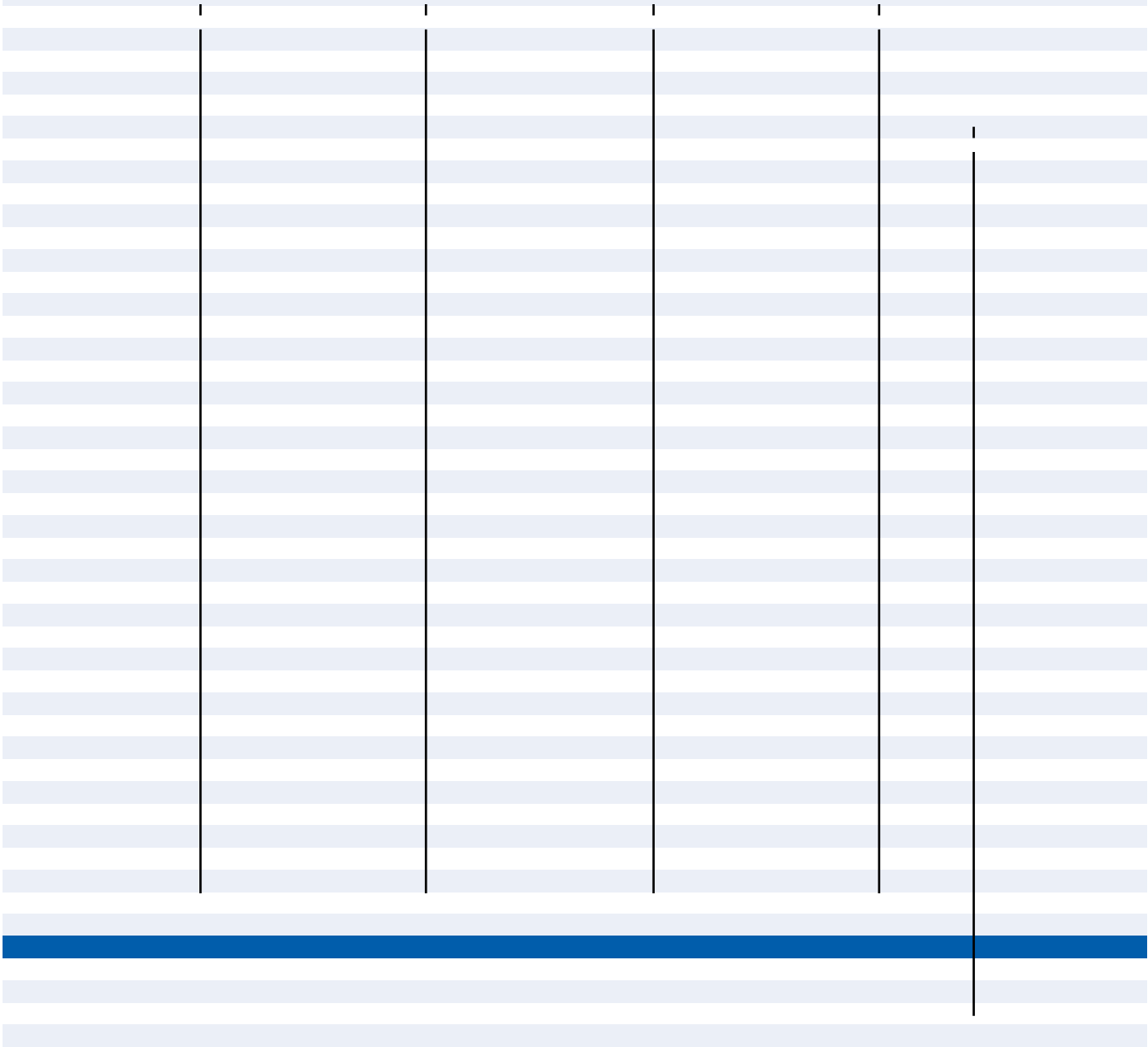
SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

MATHEMATICS
Grade

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Armenia	●	--	r	99 (07)	●	--	r	100 (00)	●	--	r	100 (00)	●	--	r	99 (07)
Australia	●	5-8		98 (1.1)	●	5-8		97 (1.1)	●	5-8		98 (09)				



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003



Exhibit 5.8: Intended and Taught TIMSS Number Topics (...Continued)

Country	Ratios			Conversion of percents to fractions or decimals and vice versa		
	Student population intended to be taught through 8th grade	Grade(s) topic(s) intended to be taught	Percent of students taught the topic	Student population intended to be taught through 8th grade	Grade(s) topic(s) intended to be taught	Percent of students taught the topic
Armenia	●	7	97 (1.1)	●	7	97 (1.1)
Australia	○	7-8	97 (1.5)	●	7-8	97 (1.5)
Bahrain	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Belgium (Flemish)	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Botswana	○	7-8	97 (1.5)	●	7-8	97 (1.5)
Bulgaria	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Chile	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Chinese Taipei	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Cyprus	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Egypt	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Estonia	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Ghana	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Hong Kong, SAR	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Hungary	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Indonesia	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Iran, Islamic Rep. of	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Israel	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Italy	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Japan	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Jordan	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Korea, Rep. of	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Latvia	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Lebanon	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Lithuania	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Macedonia, Rep. of	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Malaysia	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Moldova, Rep. of	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Morocco	○	7-8	97 (1.5)	○	7-8	97 (1.5)
Netherlands	●	7-8	97 (1.5)	●	7-8	97 (1.5)
New Zealand	○	7-8	97 (1.5)	○	7-8	97 (1.5)
Norway	○	7-8	97 (1.5)	○	7-8	97 (1.5)
Palestinian Nat'l Auth.	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Philippines	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Romania	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Russian Federation	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Saudi Arabia	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Scotland	○	7-8	97 (1.5)	○	7-8	97 (1.5)
Serbia	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Singapore	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Slovak Republic	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Slovenia	●	7-8	97 (1.5)	●	7-8	97 (1.5)
South Africa	○	7-8	97 (1.5)	○	7-8	97 (1.5)
Sweden	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Syrian Arab Republic	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Tunisia	●	7-8	97 (1.5)	●	7-8	97 (1.5)
United States	●	7-8	97 (1.5)	●	7-8	97 (1.5)
‡ England	●	7-8	97 (1.5)	●	7-8	97 (1.5)
International Avg.			86 (0.4)			94 (0.3)
Benchmarking Participants						
Basque Country, Spain	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Indiana State, US	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Ontario Province, Can.	●	7-8	97 (1.5)	●	7-8	97 (1.5)
Quebec Province, Can.	●	7-8	97 (1.5)	●	7-8	97 (1.5)

● All or almost all students
 ○ Only the more able students
 ○ Not included in the curriculum through eighth grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

4SU Ydg VVS S a [fWWW LgdLgU_ bdbW Tk eSfa' S'DW&DZ Saad' Sfadh S Va [_ bWZ
 _ WVV LgdLgU_ Tk N&ZVW SF rZVW_ W&XWV YZ
 § 6[V' af eSf[eK Yg[Wf' V&XdeS_b W&Sd[LbSfa' dSfV'eWVZ T[T' 3z-fz
 /fi EFS V&D' W&XdeSbbW&D' bSdW rZVW 4W&SgaVdVg fe SdVdg VV fa rZV W&Df i Za W g_ TVW
 ea_ WfaS'e_ Sk SbbW&D' Ua' eSfWVZ

3 V&Z' /ffl' VLSfVU_ bSdW W&SfS SdW af SdS[ST'WZ
 3' -dE [VLSfV& VSfS SdW SdS[ST'W&Sf W&Sf) " Tgf V&e fZS ** , aXfZW&gWf&Z' -eE [VLSfV& VSfS
 SdW SdS[ST'W&Sf W&Sf) " Tgf V&e fZS)", aXfZW&gWf&Z

The algebra topics were included in their intended eighth-grade curricula by somewhat fewer participants, as shown in Exhibit 5.9. The most frequently reported topic – “sums, products, and powers of expressions containing variables” – was included for all or almost all students in 42 of the participating entities. In contrast, “attributes of a



MATHEMATICS
Grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

	MATHEMATICS Grade
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At the fourth grade, 12 of the 42 TIMSS mathematics topics were in the number content area. As shown in Exhibit 5.13, there was generally good coverage of the topics both in the intended curriculum and in the classroom. Five of the topics – “whole numbers including place value and ordering”

Exhibit 5.12:

MATHEMATICS
Grade



k	n	n	n
k	n	n	k
k	k	k	j
n	n	n	n
j	j	j	j
j	j	j	j
k	j	j	j
j	j	j	j
n	n	n	n
k	j	j	k
j	j	j	j
k	k	j	k
k	j	j	k
k	\$ ' i % Z % K	j	k
j	j	j	j
j	j	j	j
k	n	n	k
k	k	j	k
z %# \$ \$			

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

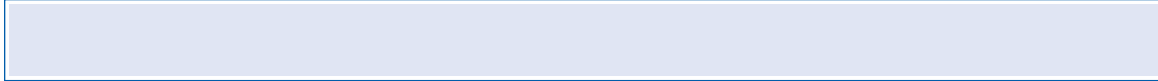


Exhibit 5.13:

MATHEMATICS
Grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

units,” and “instruments to measure length, area, mass/weight, angle, and time.” Less often included in participants’ intended curricula were “calculating areas and perimeters of squares” and “estimating length, area, volume, weight, and time.” Regardless of whether they were in the intended curriculum or not, the measurement topics were widely taught, with no fewer than 80 percent of students being taught each one.

Although there are 11 geometry topics in the TIMSS fourth-grade mathematics assessment, their inclusion in participants’ curricula varies widely, as does the percentage of students taught each of the topics. Exhibit 5.16 shows that only one geometry topic – “angles greater than, equal to, or less than a right angle” – was included in the intended curriculum of more than half the participants, and that three topics – “congruent triangles,” “similar triangles,” and “translation, reflection, and rotation” – were included by very few participants indeed. The percentage of students taught the geometry topics also was generally lower than in areas such as number or measurement. Percentages ranged from 74 percent for the aforementioned angles topic to just 33 percent for “translation, reflection, and rotation.” For many countries, geometry topics not included in the fourth-grade curriculum were intended for later grades.

As shown in Exhibit 5.17, three of the seven TIMSS data topics were included in the intended fourth-grade mathematics curriculum of more than half the participating entities. Furthermore, these three topics, “organizing a set of data by one characteristic,” “reading data directly from tables, pictographs, and bar graphs,” and “display data using tables, pictographs, and bar graphs,” were each taught to more than 85 percent of students. “Comparing and matching different representations of the same data” was in the curriculum of the fewest participants (11), yet was taught to 65 percent of students, on average.

Exhibit 5.14:

MATHEMATICS
Grade 4



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Exhibit 5.15:

MATHEMATICS
Grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003



Exhibit 5.15:

Measurement

Countries

Armenia	●	--	r	100 (0.3)	●	--	r	96 (1.6)
Australia	●	--		79 (3.5)	●	--		86 (4.0)
Belgium (Flemish)	⊙	5		78 (3.6)	⊙	5		91 (2.5)
Chinese Taipei	○	5		93 (2.2)	○	5		93 (2.1)
Cyprus	●	--		98 (1.2)	⊙	6		91 (2.4)
England	●	34	r	97 (1.5)	●	1-3	r	95 (2.4)
Hong Kong, SAR	●	4		82 (3.5)	○	7-9		81 (3.4)
Hungary	●	4		81 (3.3)	●	1		84 (3.4)
Iran, Islamic Rep. of	●	34		96 (1.5)	○	6		x x
Italy	●	46		60 (3.2)	●	4-10		47 (3.4)
Japan	●	4		88 (2.4)	○	6		47 (4.4)
ž, <4	●	--	s	99 (0.7)	●	--	s	98 (1.6)
ž43=, 74	●	34		100 (0.0)	●	1-4		94 (1.7)
! 85 8>, " &09" 81	●	--	r	100 (0.0)	●	--	r	99 (0.7)
! 8: 8. 8	⊙	--		x x	⊙	--		x x
" 0<0: 5 7/;	○	5		65 (4.9)	●	--		61 (5.0)
" 0? +0, 5 7/	⊙	5		71 (3.0)	●	K-5		82 (2.5)
" 8: ? , @	○	5-7		67 (4.4)	●	3-7		59 (4.9)
\$340940;	○	--		80 (4.1)	○	--		72 (4.1)
&=:; 4 7 f0/0., <87	●	--						

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003

Geometry

Countries

Armenia	○	--	r	22 (4.0)	●	--	r	18 (3.5)	●	--	r	7 (2.0)
Australia	●	--		87 (2.9)	●	--		86 (2.9)	○	6		68 (4.4)
Belgium (Flemish)	●	--		68 (3.5)	⊙	5		55 (4.2)	○	6		27 (3.4)
Chinese Taipei	○	5		25 (3.9)	○	5		33 (4.4)	○	6		13 (2.9)
Cyprus	⊙	7		94 (1.5)	⊙	7		65 (3.8)	⊙	7		33 (3.8)
England	●	K-4	r	95 (2.4)	●	1-4	r	91 (3.1)	⊙	2-4	r	65 (4.6)
Hong Kong, SAR	○	6		69 (4.4)	○	7-9		67 (4.2)	○	7-9		13 (2.9)
Hungary	○	6		75 (3.7)	○	6		86 (3.1)	○	7		45 (4.2)
Iran, Islamic Rep. of	●	4,5,7		78 (3.7)	●	4,5,7		56 (5.0)	○	7,11		32 (5.0)
Italy	●	4-6,9		80 (2.9)	●	4-6,9		69 (3.5)	○	5-10		55 (3.7)
Japan	○	7		1 (1.0)	○	7		1 (0.7)	○	-9		1 (0.7)
Latvia	○	--	s	39 (5.5)	○	--	s	43 (5.0)	○	--	s	20 (3.9)
Lithuania	○	8		68 (4.0)	○	8		67 (4.1)	○	--		23 (3.2)
Moldova, Rep. of	●	--	r	84 (3.0)	●	--	r	64 (4.3)	○	--	r	42 (4.7)
Morocco	●	--		x x	●	--		x x	○	--		x x
Netherlands	●	--		14 (3.3)	●	--		19				

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2003



