Chapter 3

Average Achievement in the Mathematics Content and Cognitive Domains

As described in the *TIMSS 2007 Assessment Frameworks*,[1] the mathematics assessment is organized around two dimensions, a content dimension specifying the subject matter or content domains to be assessed in mathematics and a cognitive dimension specifying the thinking processes that students are likely to use as they engage with the content. Each item in the mathematics assessment is associated with one content domain and one cognitive domain, providing for both content-based and cognitive-oriented perspectives on student achievement in mathematics.

Chapter 3 presents average student performance in three content domains at the fourth grade: number, geometric shapes and measures, and data display, and four domains at the eighth grade: number, algebra, geometry, and data and chance. Average performance also is presented for each of three cognitive domains—knowing, applying, and reasoning—at both grades. The same three cognitive domains were used at both fourth and eighth grades. Knowing refers to the student's knowledge base of mathematics facts, concepts, tools, and procedures. Applying focuses on the student's ability to apply knowledge and conceptual understanding in a problem situation. Reasoning goes beyond the solution of routine problems to encompass unfamiliar situations, complex contexts, and multi-step problems. To describe each country's relative strengths in the content and cognitive domains, relative performance in each content and cognitive

1   Mullis, I.V.S., Martin, M.O., Ruddock, G.J., O'Sullivan, C.Y., Arora, A., & Erberber, E. (2005). *TIMSS 2007 assessment frameworks*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.

domain are depicted graphically. Gender differences in the content and cognitive domains also are shown. Trend results are not presented separately for the content and cognitive domains, because there are too few items in common with the previous assessments.

To simplify comparisons of student achievement across domains, the content and cognitive achievement scales at each grade were constructed to have the same average difficulty.[2] As a point of reference, however, Exhibit A.9 in Appendix A shows the average percentage of students correctly answering the items within each of the content and cognitive domains for each country and benchmarking participant. It can be seen that across participants the difficulty of the mathematics items was similar from domain to domain but varied somewhat. At the fourth grade, the data display content domain was considerably easier, but only for students in some countries (Appendix C contains the results of the Test-Curriculum Matching Analysis). At both grades, the items in the reasoning cognitive domain were more difficult for students, on average, than those in the applying domain, which were in turn more difficult than the items in the knowing domain. In Yemen, the items were very difficult in all of the domains, making it difficult to obtain accurate domain scale estimates. Therefore, the content and cognitive domain scale results were not reported for Yemen in the exhibits in this chapter. Similarly, students at the fourth grade in Kuwait, Morocco, Qatar, and Tunisia, and at the eighth grade in Algeria, Botswana, El Salvador, Ghana, Kuwait, Qatar, and Saudi Arabia had particular difficulty with the mathematics reasoning items, and because of concerns about reliability, results for the reasoning domain scale were not reported in this chapter for these countries.

How Does Achievement Differ Across the TIMSS 2007 Mathematics Content and Cognitive Domains?

Exhibit 3.1 presents average achievement in each of the content and cognitive domains for fourth and eighth grades. Countries and benchmarking participants are displayed in alphabetical order, and to provide a basis for comparison, symbols indicate whether a country's performance is statistically significantly above or below the TIMSS scale average of 500. Please note that

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2   At both fourth and eighth grades, student achievement in each of the content and cognitive domains was placed on the same scale by aligning its achievement distribution with the achievement distribution of the overall mathematics scale.

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this refers to the mid-point of the TIMSS achievement scale, and not the average of the country means presented in the exhibit.

At both grades, the countries scoring highest on the overall mathematics assessment tended also to be the highest-scoring countries in each of the content and cognitive domains and the lowest-scoring countries overall tended to be those with lowest scores in the content and cognitive domains. In Appendix B, Exhibits B.1 through B.6 for fourth grade and B.7 through B.13 for eighth grade compare average achievement among individual countries and benchmarking participants for each of the content and cognitive domains. The exhibits show whether or not the differences in average achievement between pairs of countries are statistically significant.

At the fourth grade, Hong Kong SAR was a top performer in all three content areas. Hong Kong SAR had the highest achievement in geometric shapes and measures, was joined by Singapore in having the highest achievement in number, and they were joined by Japan in the data display content area. Chinese Taipei, Japan, Kazakhstan, and the Russian Federation also did very well in number as did the benchmarking states of Massachusetts and Minnesota. In geometric shapes and measures, other high performers included Singapore, Japan, Chinese Taipei, England, Denmark, Kazakhstan, and the Russian Federation as well as the benchmarking states of Massachusetts and Minnesota. In data display, Chinese Taipei, England, the United States, and the Netherlands also were among those with the highest average achievement as were the benchmarking states of Massachusetts and Minnesota and the province of Ontario.

At the fourth grade, Hong Kong SAR also had the highest average achievement in each of the cognitive domains, being joined by Singapore in the knowing domain. In this domain, each country typically had higher achievement than the next one or two countries. However, in addition to Singapore and Hong Kong SAR, other high performers included Chinese Taipei, Japan, Kazakhstan, England, the United States, and the Russian Federation as well as the benchmarking states of Massachusetts and Minnesota. In the applying domain, in addition to Hong Kong SAR, the other

Exhibit 3.1   **Average Achievement in the Mathematics Content and Cognitive Domains**

TIMSS2007 Mathematics 4th Grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Country	Average Scale Scores for Mathematics Content Domains						Average Scale Scores for Mathematics Cognitive Domains					
	Number		Geometric Shapes and Measures		Data Display		Knowing		Applying		Reasoning	
Algeria	391 (5.0)	▼	383 (4.5)	▼	361 (5.2)	▼	384 (5.4)	▼	376 (5.2)	▼	387 (4.7)	▼
Armenia	522 (4.0)	▲	483 (4.7)	▼	458 (4.3)	▼	518 (4.8)	▲	493 (4.1)		489 (4.7)	▼
Australia	496 (3.7)		536 (3.1)	▲	534 (3.1)	▲	509 (4.2)	▲	523 (3.5)	▲	516 (3.4)	▲
Austria	502 (2.2)		509 (2.4)	▲	508 (2.6)	▲	505 (2.0)	▲	507 (1.8)	▲	506 (2.1)	▲
Chinese Taipei	581 (1.9)	▲	556 (2.2)	▲	567 (2.0)	▲	584 (1.7)	▲	569 (1.7)	▲	566 (1.9)	▲
Colombia	360 (4.3)	▼	361 (4.8)	▼	363 (5.9)	▼	360 (5.2)	▼	357 (5.1)	▼	372 (4.9)	▼
Czech Republic	482 (2.8)	▼	494 (2.8)	▼	493 (3.3)	▼	473 (2.4)	▼	496 (2.7)		493 (3.4)	▼
† Denmark	509 (2.9)	▲	544 (2.6)	▲	529 (3.4)	▲	513 (2.7)	▲	528 (2.5)	▲	524 (2.1)	▲
El Salvador	317 (3.9)	▼	333 (4.3)	▼	367 (3.5)	▼	312 (4.1)	▼	339 (3.7)	▼	356 (4.0)	▼
England	531 (3.2)	▲	548 (2.7)	▲	547 (2.5)	▲	544 (3.6)	▲	540 (3.1)	▲	537 (3.1)	▲
¹ Georgia	464 (3.8)	▼	415 (4.8)	▼	414 (4.6)	▼	450 (4.0)	▼	433 (4.5)	▼	437 (4.2)	▼
Germany	521 (2.2)	▲	528 (2.0)	▲	534 (3.1)	▲	514 (2.0)	▲	531 (2.2)	▲	528 (2.5)	▲
Hong Kong SAR	606 (3.8)	▲	599 (3.1)	▲	585 (2.7)	▲	617 (3.5)	▲	599 (3.4)	▲	589 (3.5)	▲
Hungary	510 (3.7)	▲	510 (3.3)	▲	504 (3.5)		511 (3.4)	▲	507 (3.5)	▲	509 (3.8)	▲
Iran, Islamic Rep. of	398 (3.6)	▼	429 (3.3)	▼	400 (4.0)	▼	410 (3.6)	▼	405 (3.7)	▼	410 (3.8)	▼
Italy	505 (3.2)		509 (3.0)		506 (3.4)		514 (3.2)	▲	501 (2.9)		509 (3.1)	▲
Japan	561 (2.2)	▲	566 (2.2)	▲	578 (2.8)	▲	565 (2.1)	▲	566 (2.0)	▲	563 (2.1)	▲
¹ Kazakhstan	556 (6.6)	▲	542 (7.4)	▲	522 (5.8)	▲	559 (7.3)	▲	547 (7.2)	▲	539 (6.1)	▲
⤖ Kuwait	321 (3.5)	▼	316 (3.6)	▼	318 (4.7)	▼	326 (4.6)	▼	305 (4.1)	▼	+ +	
¹ Latvia	536 (2.1)	▲	532 (2.6)	▲	536 (3.0)	▲	530 (2.2)	▲	540 (2.5)	▲	537 (2.5)	▲
¹ Lithuania	533 (2.3)	▲	518 (2.4)	▲	530 (2.9)	▲	520 (2.8)	▲	539 (2.4)	▲	526 (2.5)	▲
Morocco	353 (4.7)	▼	365 (4.3)	▼	316 (6.1)	▼	354 (4.8)	▼	346 (4.7)	▼	+ +	
‡ Netherlands	535 (2.2)	▲	522 (2.3)	▲	543 (2.3)	▲	525 (2.2)	▲	540 (2.0)	▲	534 (2.4)	▲
New Zealand	478 (2.7)	▼	502 (2.3)		513 (2.6)	▲	482 (2.5)	▼	495 (2.3)	▼	503 (2.8)	
Norway	461 (2.8)	▼	490 (3.0)	▼	487 (2.6)	▼	461 (2.9)	▼	479 (2.8)	▼	489 (2.7)	▼
Qatar	292 (1.2)	▼	296 (1.4)	▼	326 (1.6)	▼	293 (1.3)	▼	296 (1.2)	▼	+ +	
Russian Federation	546 (4.4)	▲	538 (5.1)	▲	530 (4.9)	▲	538 (4.5)	▲	547 (4.8)	▲	540 (4.8)	▲
† Scotland	481 (2.6)	▼	503 (2.6)		516 (2.2)	▲	489 (2.6)	▼	500 (2.4)		497 (2.2)	
Singapore	611 (4.3)	▲	570 (3.6)	▲	583 (3.2)	▲	620 (4.0)	▲	590 (3.7)	▲	578 (3.8)	▲
Slovak Republic	495 (3.9)		499 (4.3)		492 (4.2)		492 (3.9)	▼	498 (4.0)		499 (4.0)	
Slovenia	485 (1.9)	▼	522 (1.8)	▲	518 (2.5)	▲	497 (1.8)		504 (1.9)	▲	505 (2.1)	▲
Sweden	490 (2.5)	▼	508 (2.3)	▲	529 (2.7)	▲	482 (2.5)	▼	508 (2.2)	▲	519 (2.5)	▲
Tunisia	352 (4.5)	▼	334 (4.5)	▼	307 (4.8)	▼	343 (4.9)	▼	329 (4.8)	▼	+ +	
Ukraine	480 (2.9)	▼	457 (2.8)	▼	462 (3.2)	▼	472 (3.0)	▼	466 (3.1)	▼	474 (3.2)	▼
² † United States	524 (2.7)	▲	522 (2.5)	▲	543 (2.4)	▲	541 (2.6)	▲	524 (2.6)	▲	523 (2.2)	▲
Yemen	+ +		+ +		+ +		+ +		+ +		+ +	
TIMSS Scale Avg.	**500**		**500**		**500**		**500**		**500**		**500**	
Benchmarking Participants												
² Alberta, Canada	489 (3.3)	▼	512 (2.9)	▲	537 (3.7)	▲	494 (3.1)		505 (2.9)		519 (3.1)	▲
² British Columbia, Canada	493 (2.8)	▼	510 (2.9)	▲	531 (2.8)	▲	498 (2.5)		505 (2.6)	▲	516 (2.3)	▲
⤖ ‡ Dubai, UAE	444 (2.0)	▼	440 (2.8)	▼	461 (2.7)	▼	457 (2.1)	▼	441 (1.7)	▼	446 (2.9)	▼
² Massachusetts, US	571 (4.0)	▲	564 (4.1)	▲	571 (4.0)	▲	581 (4.1)	▲	566 (3.5)	▲	565 (3.2)	▲
² † Minnesota, US	546 (6.2)	▲	556 (5.3)	▲	557 (4.8)	▲	565 (6.2)	▲	548 (5.5)	▲	543 (5.1)	▲
² Ontario, Canada	489 (3.6)	▼	530 (3.0)	▲	544 (3.4)	▲	498 (3.2)		515 (3.1)	▲	526 (2.6)	▲
² Quebec, Canada	511 (3.0)	▲	525 (3.2)	▲	527 (3.6)	▲	517 (3.2)	▲	517 (2.8)	▲	523 (3.0)	▲

▲ Country average significantly higher than TIMSS scale average   ▼ Country average significantly lower than TIMSS scale average

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

‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

¹ National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

² National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

⤖ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

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

A plus (+) sign indicates average achievement could not be accurately estimated.

Exhibit 3.1   Average Achievement in the Mathematics Content and Cognitive Domains (Continued)

TIMSS2007 8th Grade Mathematics

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Country	Average Scale Scores for Mathematics Content Domains				Average Scale Scores for Mathematics Cognitive Domains		
	Number	Algebra	Geometry	Data and Chance	Knowing	Applying	Reasoning
Algeria	403 (1.7) ▼	349 (2.4) ▼	432 (2.1) ▼	371 (1.7) ▼	371 (1.9) ▼	412 (2.0) ▼	+ +
Armenia	492 (3.1) ▼	532 (2.5) ▲	493 (4.1)	427 (3.9) ▼	507 (3.1) ▲	493 (3.8)	489 (3.8) ▼
Australia	503 (3.7)	471 (3.7) ▼	487 (3.6) ▼	525 (3.2) ▲	487 (3.3) ▼	500 (3.4)	502 (3.3)
Bahrain	388 (2.0) ▼	403 (1.8) ▼	412 (2.1) ▼	418 (2.1) ▼	395 (1.7) ▼	403 (1.9) ▼	413 (2.1) ▼
Bosnia and Herzegovina	451 (3.0) ▼	475 (3.2) ▼	451 (3.5) ▼	437 (2.3) ▼	478 (2.9) ▼	440 (2.6) ▼	452 (2.9) ▼
Botswana	366 (2.9) ▼	394 (2.2) ▼	325 (3.2) ▼	384 (2.6) ▼	376 (2.1) ▼	351 (2.6) ▼	+ +
Bulgaria	458 (4.7) ▼	476 (5.1) ▼	468 (5.0) ▼	440 (4.7) ▼	477 (4.7) ▼	458 (4.8) ▼	455 (4.7) ▼
Chinese Taipei	577 (4.2) ▲	617 (5.4) ▲	592 (4.6) ▲	566 (3.6) ▲	594 (4.5) ▲	592 (4.2) ▲	591 (4.1) ▲
Colombia	369 (3.5) ▼	390 (3.1) ▼	371 (3.3) ▼	405 (3.8) ▼	364 (3.4) ▼	384 (3.7) ▼	416 (3.3) ▼
Cyprus	464 (1.6) ▼	468 (2.0) ▼	458 (2.7) ▼	464 (1.6) ▼	468 (1.6) ▼	465 (1.8) ▼	461 (2.1) ▼
Czech Republic	511 (2.5) ▲	484 (2.4) ▼	498 (2.7)	512 (2.8) ▲	502 (2.5)	504 (2.7)	500 (2.6)
Egypt	393 (3.1) ▼	409 (3.3) ▼	406 (3.4) ▼	384 (3.1) ▼	392 (3.6) ▼	393 (3.6) ▼	396 (3.4) ▼
El Salvador	355 (3.0) ▼	331 (3.7) ▼	318 (3.7) ▼	362 (3.0) ▼	336 (3.1) ▼	347 (3.3) ▼	+ +
† England	510 (5.0)	492 (4.6)	510 (4.4) ▲	547 (5.0) ▲	503 (4.0)	514 (4.9) ▲	518 (4.3) ▲
¹ Georgia	421 (5.6) ▼	421 (6.6) ▼	409 (6.7) ▼	373 (4.3) ▼	427 (5.8) ▼	401 (5.5) ▼	389 (5.8) ▼
Ghana	310 (3.9) ▼	358 (3.6) ▼	275 (4.9) ▼	321 (3.6) ▼	313 (4.6) ▼	297 (4.2) ▼	+ +
† Hong Kong SAR	567 (5.6) ▲	565 (5.6) ▲	570 (5.5) ▲	549 (4.7) ▲	574 (5.4) ▲	569 (5.9) ▲	557 (5.6) ▲
Hungary	517 (3.6) ▲	503 (3.6)	508 (3.6) ▲	524 (3.3) ▲	518 (3.3) ▲	513 (3.1) ▲	513 (3.2) ▲
Indonesia	399 (3.7) ▼	405 (3.5) ▼	395 (4.5) ▼	402 (3.6) ▼	397 (4.0) ▼	398 (3.7) ▼	405 (3.3) ▼
Iran, Islamic Rep. of	395 (3.9) ▼	408 (3.9) ▼	423 (4.4) ▼	415 (3.5) ▼	403 (4.1) ▼	402 (4.2) ▼	427 (3.5) ▼
³ Israel	469 (3.2) ▼	470 (3.9) ▼	436 (4.3) ▼	465 (4.4) ▼	473 (3.7) ▼	456 (4.1) ▼	462 (4.1) ▼
Italy	478 (2.8) ▼	460 (3.2) ▼	490 (3.1) ▼	491 (3.1) ▼	476 (3.0) ▼	483 (2.9) ▼	483 (2.8) ▼
Japan	551 (2.3) ▲	559 (2.5) ▲	573 (2.2) ▲	573 (2.2) ▲	560 (2.2) ▲	565 (2.2) ▲	568 (2.4) ▲
Jordan	416 (4.3) ▼	448 (4.1) ▼	436 (3.9) ▼	425 (3.8) ▼	432 (4.2) ▼	422 (4.1) ▼	440 (3.6) ▼
Korea, Rep. of	583 (2.4) ▲	596 (3.0) ▲	587 (2.3) ▲	580 (2.0) ▲	596 (2.5) ▲	595 (2.8) ▲	579 (2.3) ▲
⇥ Kuwait	347 (3.1) ▼	354 (3.0) ▼	385 (2.8) ▼	366 (3.5) ▼	347 (3.1) ▼	361 (2.7) ▼	+ +
Lebanon	454 (3.4) ▼	465 (3.2) ▼	462 (4.0) ▼	407 (4.4) ▼	464 (3.9) ▼	448 (4.6) ▼	429 (4.0) ▼
¹ Lithuania	506 (2.7) ▲	483 (2.7) ▼	507 (2.6) ▲	523 (2.3) ▲	508 (2.5) ▲	511 (2.4) ▲	486 (2.5) ▼
Malaysia	491 (5.1)	454 (4.3) ▼	477 (5.6) ▼	469 (4.1) ▼	477 (4.8) ▼	478 (4.9) ▼	468 (3.8) ▼
Malta	496 (1.3)	473 (1.4) ▼	495 (1.1) ▼	487 (1.4) ▼	490 (1.6) ▼	492 (1.0) ▼	475 (1.3) ▼
Norway	488 (2.0) ▼	425 (2.8) ▼	459 (2.3) ▼	505 (2.5) ▲	458 (1.8) ▼	477 (2.2) ▼	475 (2.3) ▼
Oman	363 (2.7) ▼	391 (3.2) ▼	387 (3.0) ▼	389 (3.0) ▼	372 (3.5) ▼	368 (3.0) ▼	397 (3.3) ▼
Palestinian Nat'l Auth.	366 (3.2) ▼	382 (3.4) ▼	388 (3.8) ▼	371 (2.9) ▼	365 (3.8) ▼	371 (3.4) ▼	381 (3.5) ▼
Qatar	334 (1.6) ▼	312 (1.5) ▼	301 (1.8) ▼	305 (1.6) ▼	307 (1.4) ▼	305 (1.4) ▼	+ +
Romania	457 (3.5) ▼	478 (4.6) ▼	466 (4.0) ▼	429 (3.7) ▼	470 (4.2) ▼	462 (4.0) ▼	449 (4.6) ▼
Russian Federation	507 (3.8)	518 (4.5) ▲	510 (4.1) ▲	487 (3.8) ▼	521 (3.9) ▲	510 (3.7) ▲	497 (3.6)
Saudi Arabia	309 (3.3) ▼	344 (2.8) ▼	359 (2.6) ▼	348 (2.2) ▼	308 (2.6) ▼	335 (2.3) ▼	+ +
† Scotland	489 (3.7) ▼	467 (3.7) ▼	485 (3.9) ▼	517 (3.5) ▲	481 (3.3) ▼	489 (3.7) ▼	495 (3.3)
¹ ² Serbia	478 (2.9) ▼	500 (3.2)	486 (3.6) ▼	458 (3.0) ▼	500 (3.2)	478 (3.3) ▼	474 (3.3) ▼
Singapore	597 (3.5) ▲	579 (3.7) ▲	578 (3.9) ▲	574 (3.9) ▲	581 (3.4) ▲	593 (3.6) ▲	579 (4.1) ▲
Slovenia	502 (2.3)	488 (2.4) ▼	499 (2.4)	511 (2.3) ▲	500 (2.2)	503 (2.0)	496 (2.5)
Sweden	507 (1.8) ▲	456 (2.4) ▼	472 (2.5) ▼	526 (3.0) ▲	478 (2.0) ▼	497 (2.0)	490 (2.6) ▼
Syrian Arab Republic	393 (3.4) ▼	406 (3.7) ▼	417 (3.4) ▼	387 (2.7) ▼	393 (4.2) ▼	401 (3.4) ▼	396 (3.4) ▼
Thailand	444 (4.8) ▼	433 (5.0) ▼	442 (5.3) ▼	453 (4.1) ▼	436 (4.8) ▼	446 (4.7) ▼	456 (4.4) ▼
Tunisia	425 (2.6) ▼	423 (2.6) ▼	437 (2.6) ▼	411 (2.3) ▼	421 (2.6) ▼	423 (2.4) ▼	425 (2.3) ▼
Turkey	429 (4.0) ▼	440 (5.1) ▼	411 (5.1) ▼	445 (4.4) ▼	439 (4.8) ▼	425 (4.5) ▼	441 (4.2) ▼
Ukraine	460 (3.7) ▼	464 (3.9) ▼	467 (3.6) ▼	458 (3.5) ▼	471 (3.5) ▼	464 (3.5) ▼	445 (3.8) ▼
² † United States	510 (2.7) ▲	501 (2.7)	480 (2.5) ▼	531 (2.8) ▲	514 (2.6) ▲	503 (2.9)	505 (2.4) ▲
‡ Morocco	389 (3.4) ▼	362 (4.0) ▼	396 (3.6) ▼	371 (3.4) ▼	365 (4.4) ▼	389 (3.3) ▼	383 (3.5) ▼
TIMSS Scale Avg.	500	500	500	500	500	500	500

Benchmarking Participants

Country	Number	Algebra	Geometry	Data and Chance	Knowing	Applying	Reasoning
Basque Country, Spain	509 (2.9) ▲	485 (3.1) ▼	476 (3.7) ▼	504 (3.7)	501 (2.9)	495 (3.0)	496 (3.5)
³ British Columbia, Canada	520 (3.2) ▲	489 (3.1) ▼	487 (3.7) ▼	529 (3.2) ▲	504 (2.9)	509 (3.1) ▲	510 (3.3) ▲
⇥ ‡ Dubai, UAE	458 (3.0) ▼	475 (2.4) ▼	451 (3.4) ▼	457 (3.2) ▼	469 (2.7) ▼	456 (2.9) ▼	465 (2.8) ▼
² Massachusetts, US	548 (5.2) ▲	538 (4.8) ▲	519 (4.3) ▲	569 (5.2) ▲	546 (4.5) ▲	542 (4.4) ▲	543 (4.1) ▲
² † Minnesota, US	537 (4.3) ▲	515 (4.7) ▲	505 (4.4)	560 (5.4) ▲	532 (4.6) ▲	530 (4.8) ▲	523 (4.2) ▲
² Ontario, Canada	525 (4.0) ▲	490 (3.7) ▼	508 (4.2)	543 (4.2) ▲	505 (3.2)	518 (3.7) ▲	521 (3.2) ▲
³ Quebec, Canada	534 (3.4) ▲	505 (3.3)	523 (3.3) ▲	533 (3.0) ▲	520 (2.7) ▲	529 (3.1) ▲	524 (3.0) ▲

▲ Country average significantly higher than TIMSS scale average   ▼ Country average significantly lower than TIMSS scale average

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

‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

¹ National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

² National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

³ National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).

⇥ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

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

A plus (+) sign indicates average achievement could not be accurately estimated.

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three Asian countries also had high performance as did the benchmarking state of Massachusetts, followed by a group of countries with similar average achievement—Kazakhstan, the Russian Federation, England, Latvia, the Netherlands, and Lithuania, as well as the benchmarking state of Minnesota. In the reasoning domain, after the four Asian countries, there were five countries with similar achievement—the Russian Federation, Kazakhstan, England, Latvia, and the Netherlands. The state of Massachusetts in the United States had average achievement similar to Chinese Taipei and Japan, and the state of Minnesota had average achievement similar to the five countries with the next highest achievement.

At the eighth grade, Singapore had the highest average achievement in the content area of number, closely followed by Korea and Chinese Taipei, and then Hong Kong SAR. Next, Japan, Hungary, the Czech Republic, the United States, and England performed similarly followed by Sweden, the Russian Federation, Lithuania, and Australia. Also, the two benchmarking states, the four benchmarking provinces, and the Basque Country in Spain had achievement similar to that of Japan, Hungary, the Czech Republic, the United States, and England. In algebra, Chinese Taipei had the highest achievement followed closely by Korea, Singapore, and, then, Hong Kong SAR and Japan. Armenia had the next highest average achievement, followed by the Russian Federation, and, then, Hungary, the United States, and Serbia with about the same achievement. Among the benchmarking participants, the state of Massachusetts performed similarly to Armenia, the state of Minnesota similarly to the Russian Federation, and the province of Quebec like the three-country group with Hungary, the United States, and Serbia. In geometry, Chinese Taipei and Korea had the highest average achievement followed by Singapore, Japan, and Hong Kong SAR all with similar achievement. Next was a group of four countries also with similar average achievement—England, the Russian Federation, Hungary, and Lithuania, and also four of the benchmarking participants—the two provinces of Quebec and Ontario and the two states of Massachusetts and Minnesota. In data and chance, top-performing Korea and Singapore were followed closely by

Japan and Chinese Taipei. Next, Hong Kong SAR and England had similar achievement, followed by the four-country group of the United States, Sweden, Australia, and Hungary. The benchmarking state of Massachusetts performed the same as Japan and Chinese Taipei, the state of Minnesota and the province of Ontario performed similarly to Hong Kong SAR and England, and the provinces of Quebec and British Columbia performed similarly to the four-country group of the United States, Sweden, Australia, and Hungary.

At the eighth grade, Chinese Taipei was a top-performer across the cognitive domains—knowing, applying, and reasoning. Achievement in the knowing domain was led by Korea and Chinese Taipei followed by Singapore and Hong Kong SAR and, then, Japan followed by the Russian Federation, Hungary, and the United States. Among the benchmarking participants, the two states of Massachusetts and Minnesota and the province of Quebec performed as well as the latter group of countries. In the applying domain, the three highest achieving countries were Korea, Singapore, and Chinese Taipei. They were followed by Hong Kong SAR and Japan. Next, was a group of four countries with similar achievement—England, Hungary, Lithuania, and the Russian Federation, and five benchmarking participants—the two states, Massachusetts and Minnesota, and the three provinces, Quebec, Ontario, and British Columbia. As mentioned earlier, Chinese Taipei had the highest average achievement in the reasoning domain, with Korea and Singapore having the next highest achievement. These three countries were followed by similarly performing Japan and Hong Kong SAR, and then, after a gap, England and Hungary with similar achievement. Five of the benchmarking participants also had performance aligned with England and Hungary—the two states, Massachusetts and Minnesota, and the three provinces, Quebec, Ontario, and British Columbia.

In Which Mathematics Content and Cognitive Domains Are Countries Relatively Strong or Weak?

To highlight relative strengths and weaknesses in the mathematics content and cognitive domains within each country, Exhibit 3.2 profiles average achievement in these domains relative to the overall level of performance in the country. For each TIMSS 2007 participant, Exhibit 3.2 displays the difference between average performance in each mathematics content domain and the average across all the mathematics items for that participant, and similarly the difference between average performance in each mathematics cognitive domain and the average across all items. This relative performance is presented in two panels for each country, one for content domains and one for cognitive domains. Average relative performance is represented by a small circle, with a bar extending above and below the circle to denote a 95 percent confidence interval for this average.
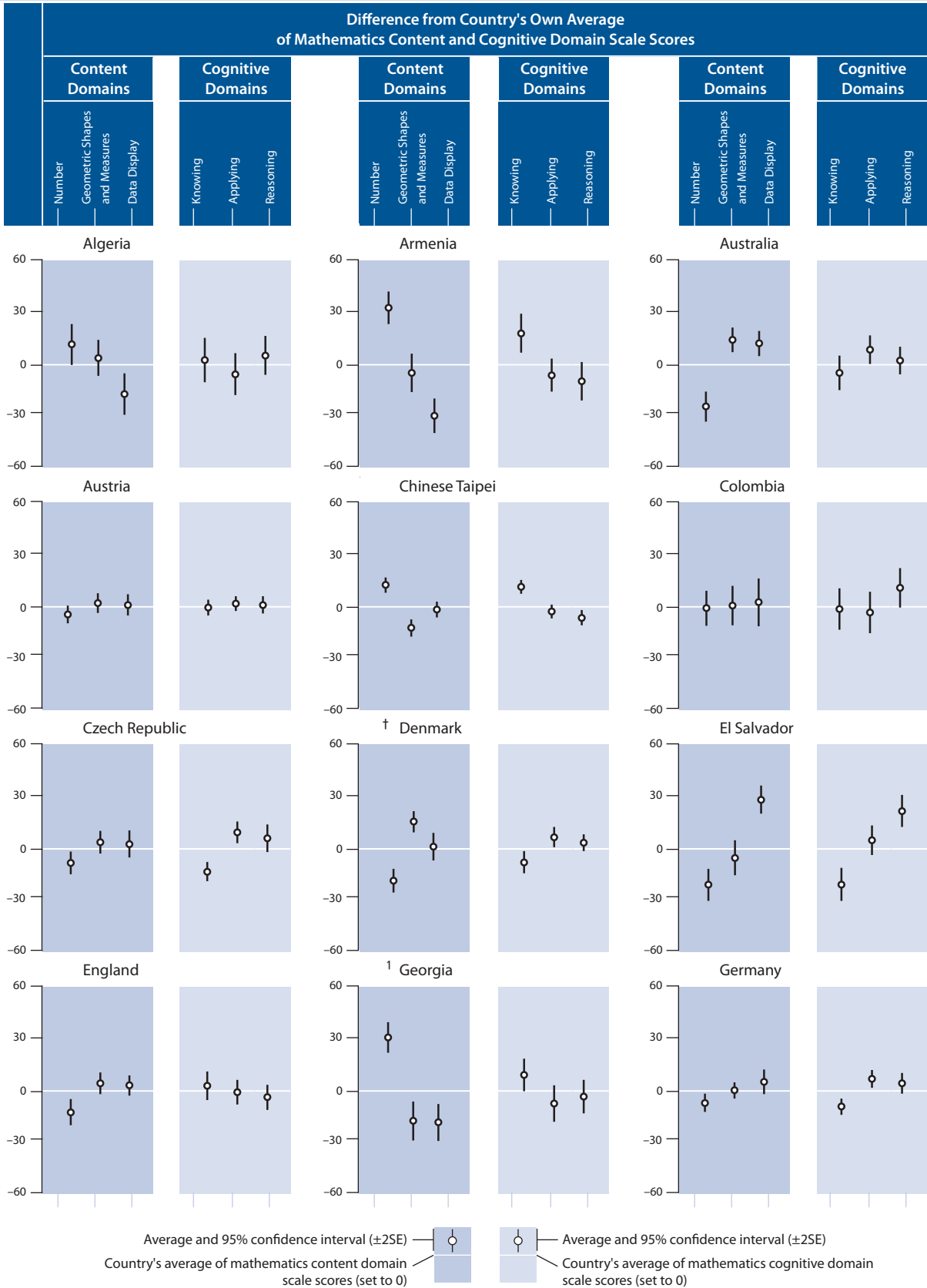
The profiles reveal that many countries performed relatively better in one content domain or in one cognitive domain than on average. At fourth grade, countries performing relatively better in number than in mathematics overall included Armenia, Chinese Taipei, Georgia, Singapore, Tunisia, and the Ukraine, while those performing relatively less well included Australia, Denmark, El Salvador, England, New Zealand, Norway, Qatar, Scotland, Slovenia, and Sweden as well as the four Canadian Provinces. In geometric shapes and measures, Australia, Denmark, Iran, Morocco, Norway, Slovenia, as well as the Canadian province of Ontario performed relatively better, while Chinese Taipei, Georgia, Lithuania, the Netherlands, Singapore, the Ukraine, and the United States performed relatively less well. In data display, those performing relatively better included Australia, El Salvador, Japan, the Netherlands, New Zealand, Qatar, Scotland, Slovenia, Sweden, the United States as well as the three Canadian provinces of Alberta, British Columbia, and Ontario as well as Dubai, while those performing less well included Algeria, Armenia, Georgia, Hong Kong SAR, Kazakhstan, Morocco, and Tunisia.

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At the fourth grade, with the exceptions of the Czech republic, Germany, and Lithuania performing relatively better in the applying domain than in mathematics overall and Dubai performing relatively less well, differences in relative performance among the cognitive domains were mainly in the areas of knowing and reasoning. Armenia, Chinese Taipei, Georgia, Hong Kong SAR, Kuwait, Singapore, and the United States as well as the state of Massachusetts and Dubai in the United Arab Emirates performed relatively better in the knowing domain than in mathematics overall. In contrast, the Czech Republic, Denmark, El Salvador, Germany, the Netherlands, New Zealand, Norway, and Sweden performed relatively less well in the knowing domain, as did three of the Canadian provinces (Alberta, British Columbia, and Ontario). El Salvador, New Zealand, Norway, and Sweden, as well as the Canadian provinces of Alberta, British Columbia, and Ontario, performed relatively better in the reasoning domain while Hong Kong SAR and Singapore performed relatively less well.

At eighth grade, many participants showed a relative strength or weakness in one or other of the content domains. Those performing relatively better in number than in mathematics overall included Algeria, the Czech Republic, El Salvador, Malaysia, Malta, Norway, Qatar, Singapore, Sweden, the Basque Country in Spain and the Canadian province of British Columbia, while Bahrain, Colombia, Iran, Japan, Jordan, Kuwait, Oman, and Saudi Arabia performed relatively less well. In algebra, countries that performed relatively better included Armenia, Bosnia and Herzegovina, Botswana, Chinese Taipei, Egypt, Ghana, Jordan, Lebanon, Romania, Serbia, and Dubai in the United Arab Emirates, while participants that performed relatively less well included Algeria, Australia, the Czech Republic, El Salvador, England, Italy, Lithuania, Malaysia, Malta, Norway, Scotland, Slovenia, Sweden, Morocco, the Basque Country in Spain, and British Columbia, Ontario, and Quebec in Canada. In geometry, Algeria, Bahrain, Japan, Kuwait, Lebanon, Malta, the Palestinian National Authority, Saudi Arabia, the Syrian Arab Republic, Tunisia, and Morocco performed relatively better, while those performing less well included Botswana, Colombia, El Salvador,

Exhibit 3.2   **Profiles of Within-country Relative Performance in the Mathematics Content and Cognitive Domains**

TIMSS2007 **4th Grade** Mathematics

Difference from Country's Own Average of Mathematics Content and Cognitive Domain Scale Scores

Content Domains: Number, Geometric Shapes and Measures, Data Display
Cognitive Domains: Knowing, Applying, Reasoning

Countries shown: Algeria, Armenia, Australia, Austria, Chinese Taipei, Colombia, Czech Republic, † Denmark, El Salvador, England, ¹ Georgia, Germany

Average and 95% confidence interval (±2SE)
Country's average of mathematics content domain scale scores (set to 0)
Country's average of mathematics cognitive domain scale scores (set to 0)

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

‡   Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

¹   National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

²   National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

⬥⬥   Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

Note: Average achievement could not be accurately estimated on the reasoning scale for Kuwait, Morocco, Qatar, and Tunisia and on all subscales for Yemen.

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Exhibit 3.2   **Profiles of Within-country Relative Performance in the Mathematics Content and Cognitive Domains (Continued)**   TIMSS2007 4th Mathematics Grade
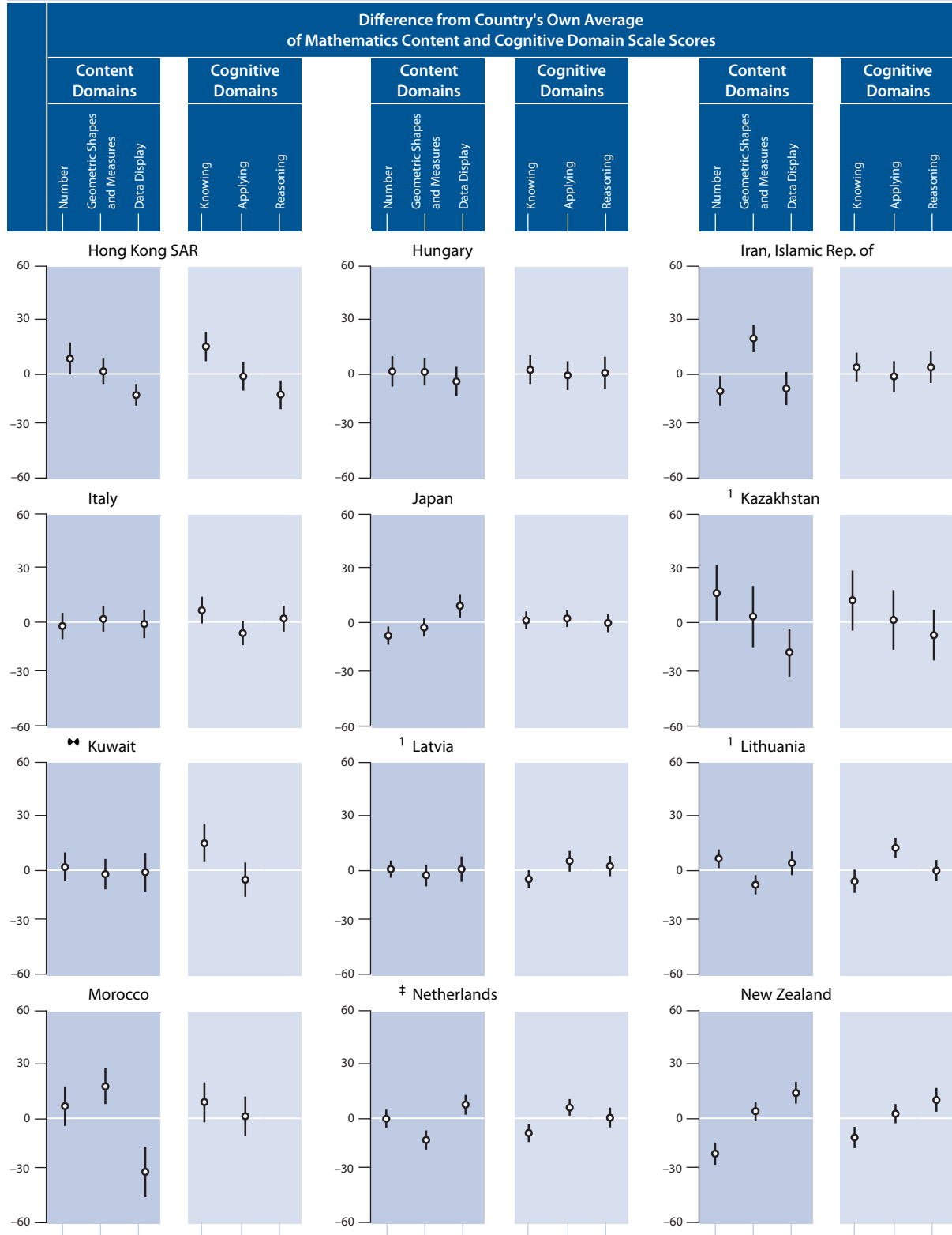

Difference from Country's Own Average of Mathematics Content and Cognitive Domain Scale Scores

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Average and 95% confidence interval (±2SE) — Country's average of mathematics content domain scale scores (set to 0)

Average and 95% confidence interval (±2SE) — Country's average of mathematics cognitive domain scale scores (set to 0)

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Exhibit 3.2 **Profiles of Within-country Relative Performance in the Mathematics Content and Cognitive Domains (Continued)**

TIMSS2007 **4th Grade** **Mathematics**

Difference from Country's Own Average of Mathematics Content and Cognitive Domain Scale Scores

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Average and 95% confidence interval (±2SE)
Country's average of mathematics content domain scale scores (set to 0)

Average and 95% confidence interval (±2SE)
Country's average of mathematics cognitive domain scale scores (set to 0)

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Exhibit 3.2   **Profiles of Within-country Relative Performance in the Mathematics Content and Cognitive Domains (Continued)**   TIMSS2007 4th Grade Mathematics
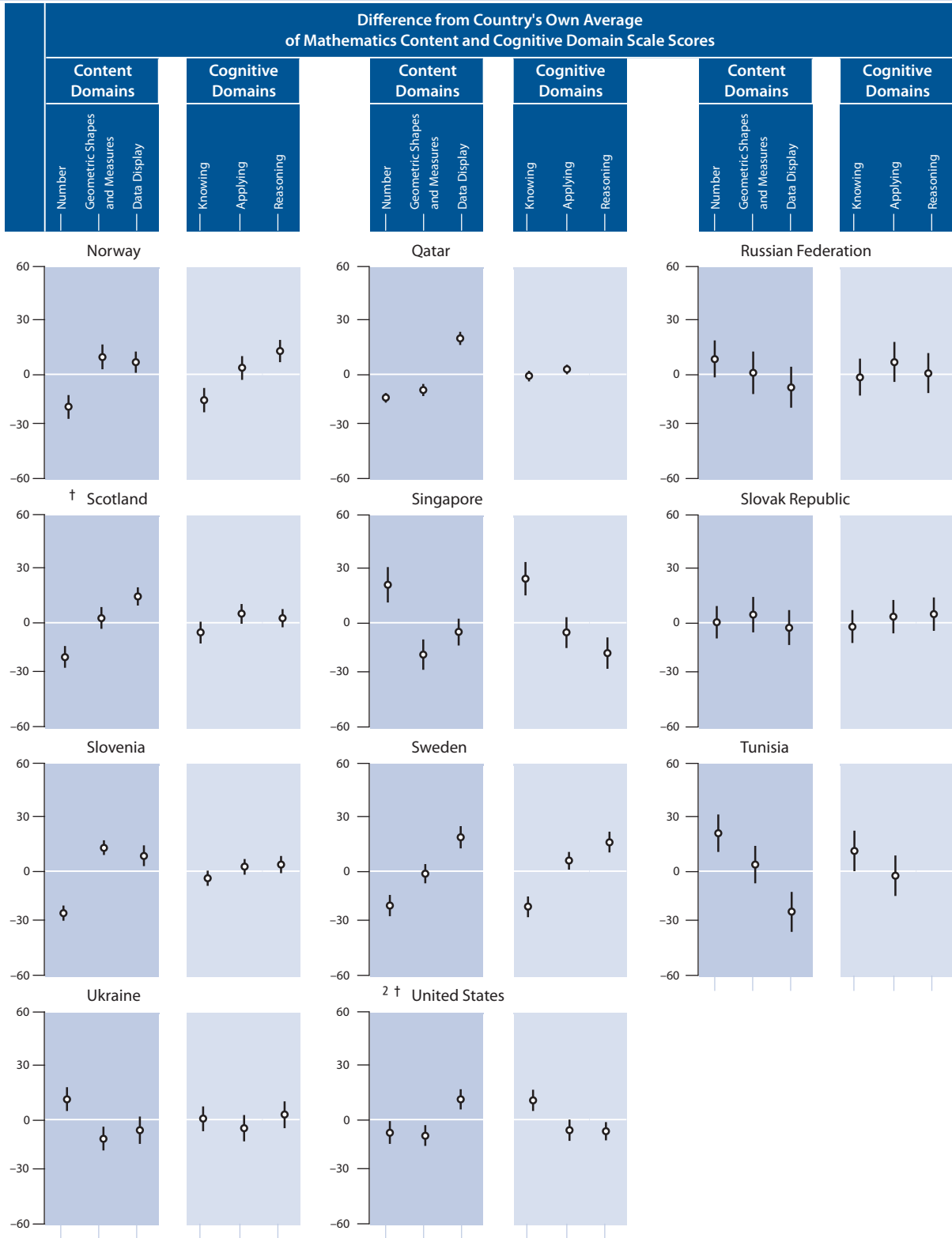
Difference from Country's Own Average of Mathematics Content and Cognitive Domain Scale Scores

Content Domains			Cognitive Domains		
Number	Geometric Shapes and Measures	Data Display	Knowing	Applying	Reasoning

Benchmarking Participants

² Alberta, Canada

² British Columbia, Canada

⤜ ‡ Dubai, UAE

² Massachusetts, US

² † Minnesota, US

² Ontario, Canada

² Quebec, Canada

Average and 95% confidence interval (±2SE)
Country's average of mathematics content domain scale scores (set to 0)

Average and 95% confidence interval (±2SE)
Country's average of mathematics cognitive domain scale scores (set to 0)

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Exhibit 3.2   **Profiles of Within-country Relative Performance in the Mathematics Content and Cognitive Domains (Continued)**
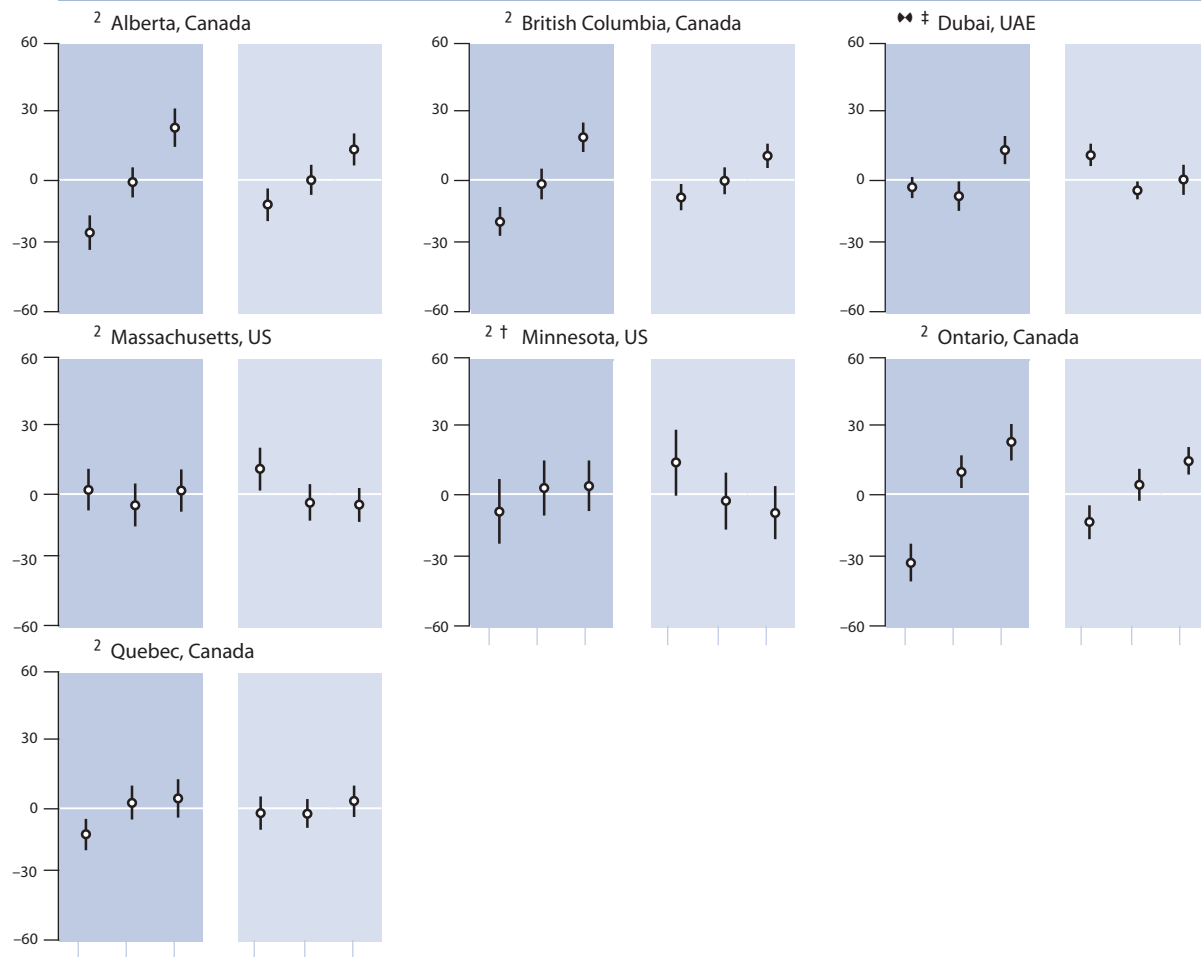
TIMSS2007 8th Grade Mathematics
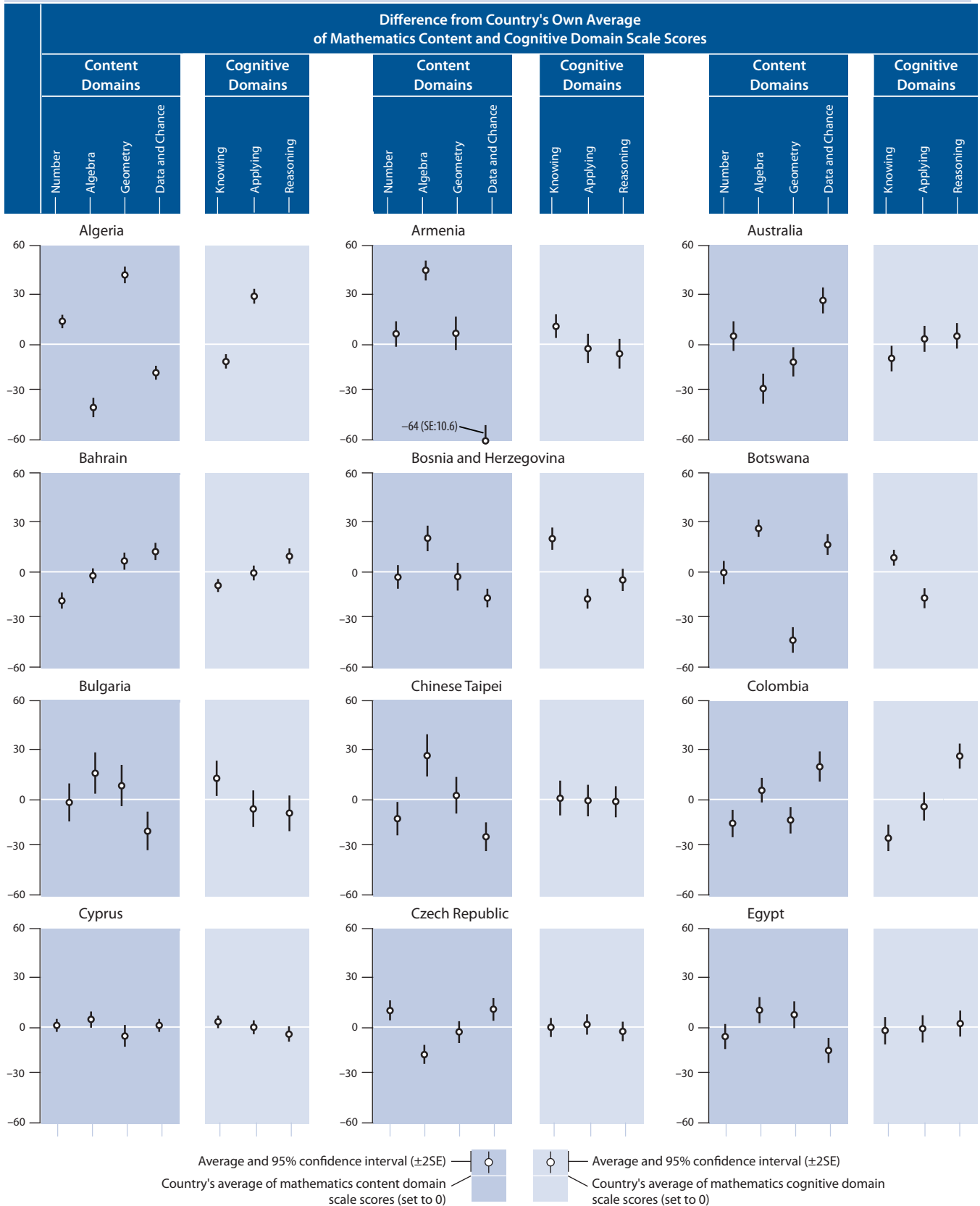

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Average and 95% confidence interval (±2SE)

Country's average of mathematics content domain scale scores (set to 0)

Average and 95% confidence interval (±2SE)

Country's average of mathematics cognitive domain scale scores (set to 0)

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

‡   Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡   Did not satisfy guidelines for sample participation rates (see Appendix A).

1   National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

2   National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

3   National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).

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Exhibit 3.2 **Profiles of Within-country Relative Performance in the Mathematics Content and Cognitive Domains (Continued)**
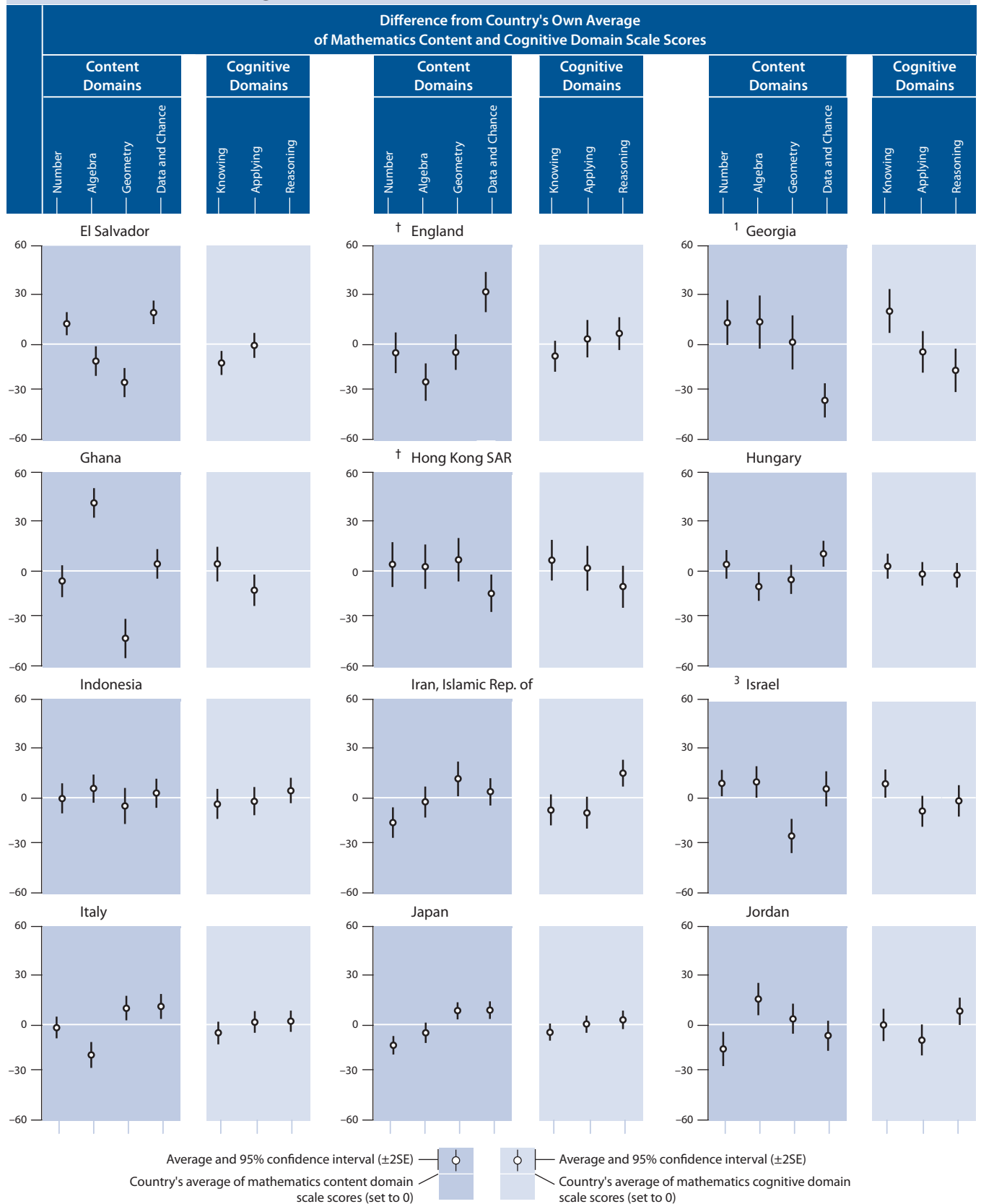
TIMSS2007 Mathematics 8th Grade

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Difference from Country's Own Average of Mathematics Content and Cognitive Domain Scale Scores

Content Domains: Number, Algebra, Geometry, Data and Chance
Cognitive Domains: Knowing, Applying, Reasoning

El Salvador, Ghana, Indonesia, Italy, † England, † Hong Kong SAR, Iran, Islamic Rep. of, Japan, ¹ Georgia, Hungary, ³ Israel, Jordan

Average and 95% confidence interval (±2SE)

Country's average of mathematics content domain scale scores (set to 0)

Average and 95% confidence interval (±2SE)

Country's average of mathematics cognitive domain scale scores (set to 0)

✎ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

Note: Average achievement could not be accurately estimated on the reasoning scale for Algeria, Botswana, El Salvador, Ghana, Kuwait, Qatar, and Saudi Arabia.

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Exhibit 3.2   **Profiles of Within-country Relative Performance in the Mathematics Content and Cognitive Domains (Continued)**

TIMSS2007 Mathematics 8th Grade

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Exhibit 3.2 **Profiles of Within-country Relative Performance in the Mathematics Content and Cognitive Domains (Continued)**

TIMSS2007 8th Grade Mathematics

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

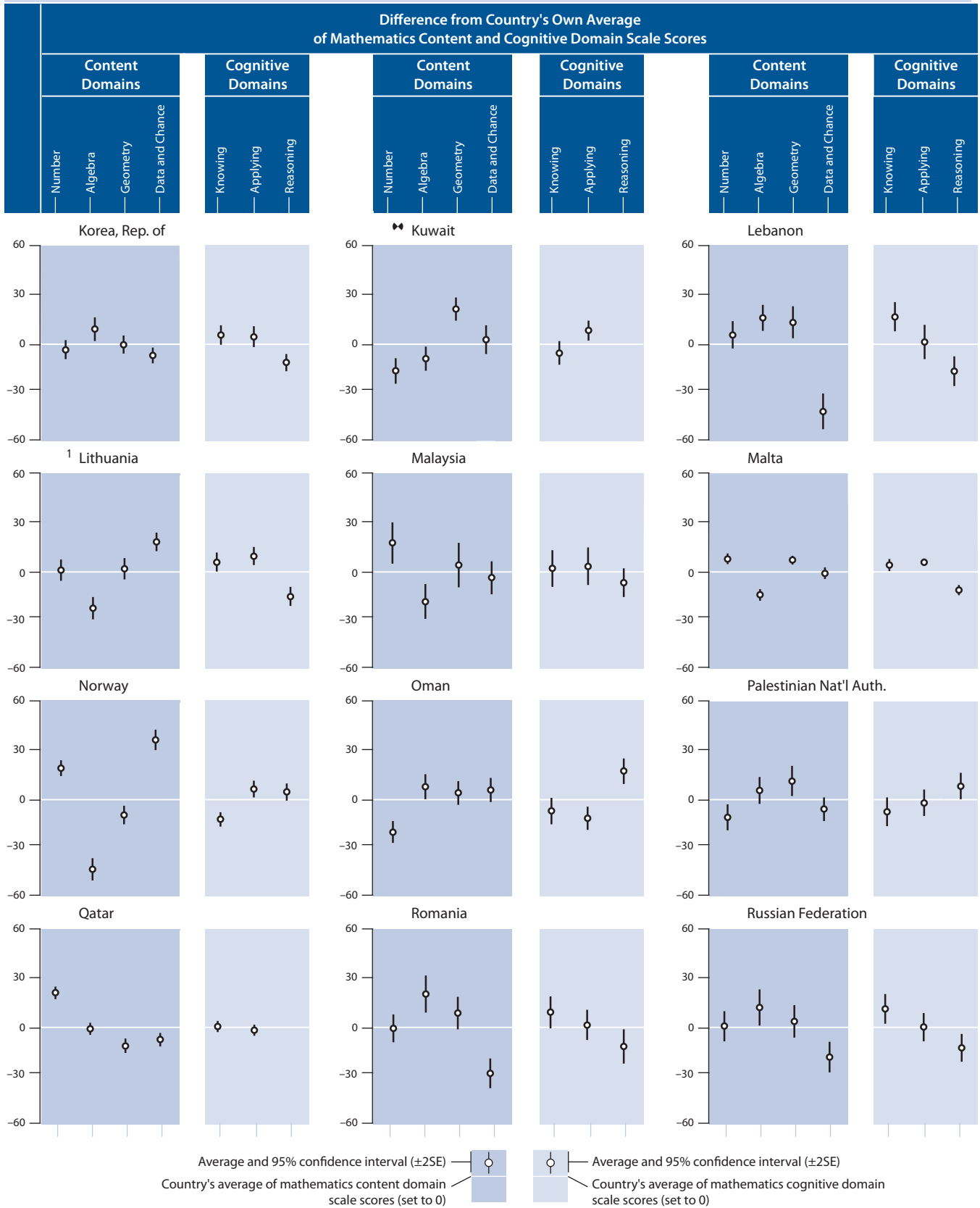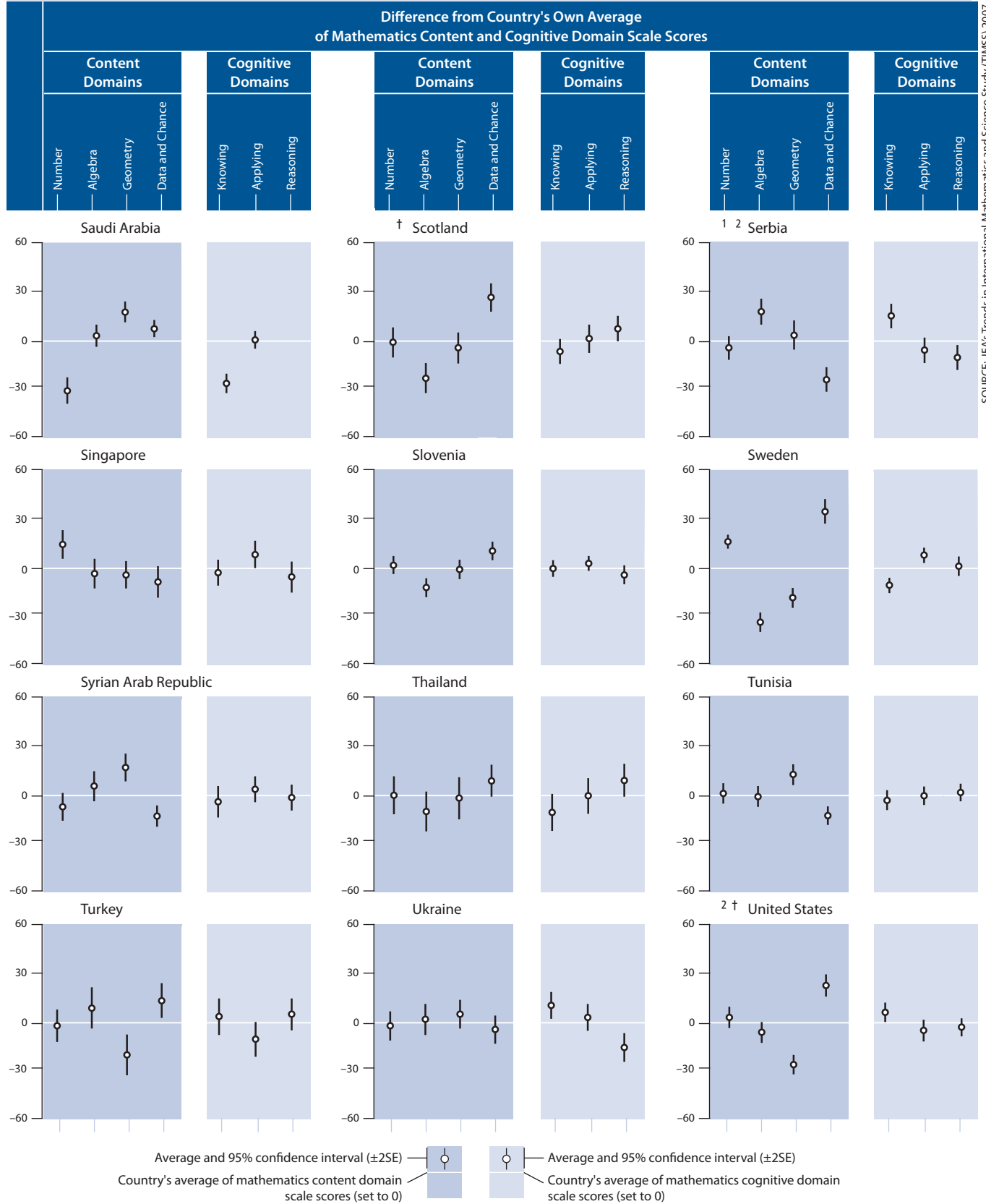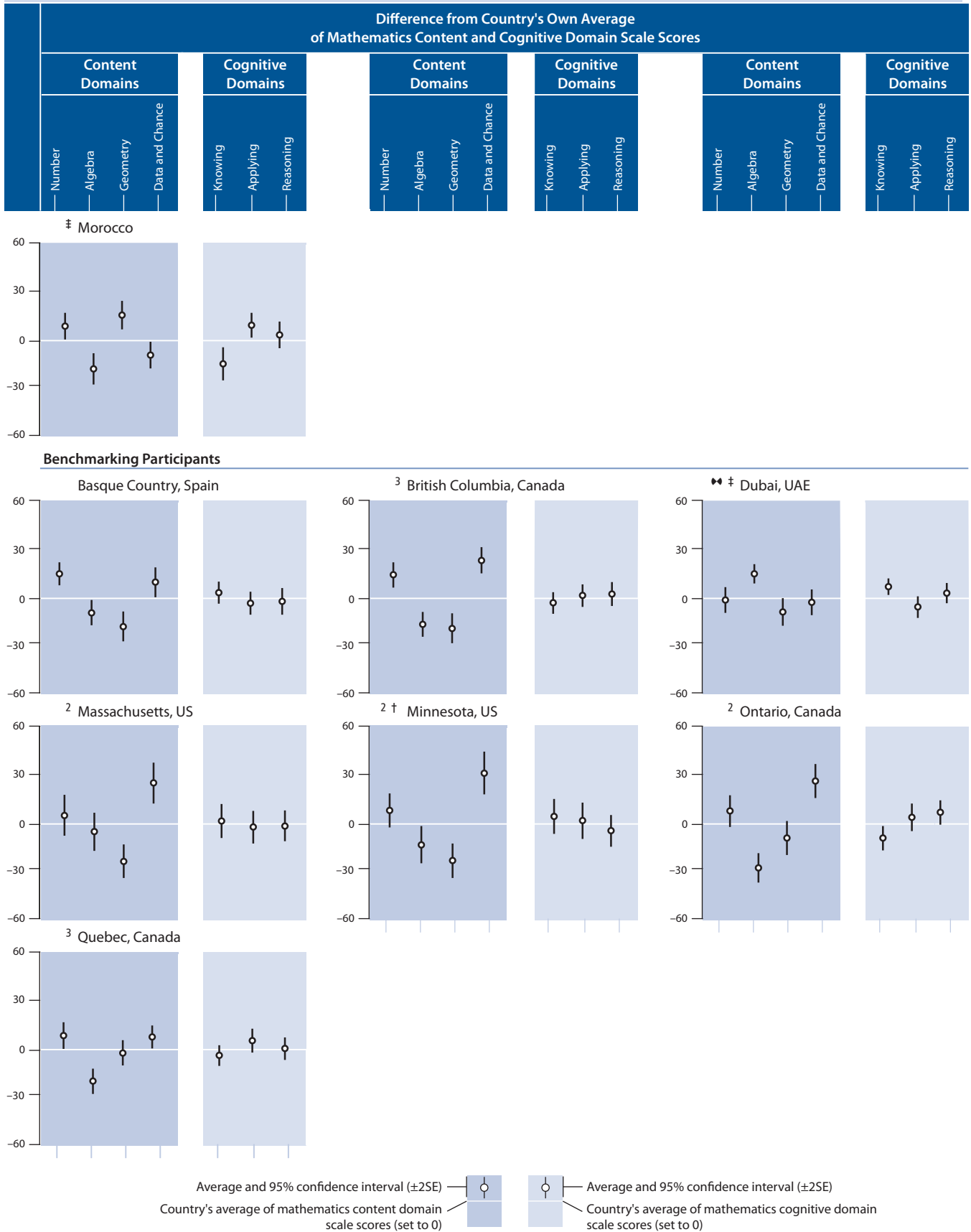|	Average and 95% confidence interval (±2SE)
Country's average of mathematics content domain scale scores (set to 0)	
	Average and 95% confidence interval (±2SE)
Country's average of mathematics cognitive domain scale scores (set to 0)	

Exhibit 3.2 **Profiles of Within-country Relative Performance in the Mathematics Content and Cognitive Domains (Continued)**

TIMSS2007 Mathematics 8th Grade

Difference from Country's Own Average of Mathematics Content and Cognitive Domain Scale Scores

Content Domains: Number, Algebra, Geometry, Data and Chance
Cognitive Domains: Knowing, Applying, Reasoning

‡ Morocco

Benchmarking Participants

Basque Country, Spain
3 British Columbia, Canada
◄► ‡ Dubai, UAE
2 Massachusetts, US
2 † Minnesota, US
2 Ontario, Canada
3 Quebec, Canada

Average and 95% confidence interval (±2SE)
Country's average of mathematics content domain scale scores (set to 0)

Average and 95% confidence interval (±2SE)
Country's average of mathematics cognitive domain scale scores (set to 0)

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Ghana, Israel, Norway, Qatar, Sweden, Turkey, the United States, the Basque Country in Spain, the states of Massachusetts and Minnesota in the United States, and the Canadian province of British Columbia. Participants with relatively better performance in data and chance included Australia, Bahrain, Botswana, Colombia, the Czech Republic, El Salvador, England, Italy, Japan, Lithuania, Norway, Saudi Arabia, Scotland, Slovenia, Sweden, Turkey, the United States, the states of Massachusetts and Minnesota in the United States, and the Canadian provinces of British Columbia and Ontario. Those performing less well included Algeria, Armenia, Bosnia and Herzegovina, Bulgaria, Chinese Taipei, Egypt, Georgia, Hong Kong SAR, Korea, Lebanon, Qatar, Romania, the Russian Federation, Serbia, the Syrian Arab Republic, and Tunisia.

At eighth grade, participants performing relatively better in the knowing domain than in mathematics overall included Armenia, Bosnia and Herzegovina, Botswana, Bulgaria, Georgia, Lebanon, the Russian Federation, Serbia, Ukraine, and Dubai in the United Arab Emirates, while those performing relatively less well included Algeria, Bahrain, Colombia, Kuwait, Norway, Saudi Arabia, Sweden, and Morocco. Participants with relatively better performance in applying included Algeria, Lithuania, and Malta, while Bosnia and Herzegovina, Botswana, Ghana, and Oman performed less well. Those participants performing better in the reasoning domain than in mathematics overall included Bahrain, Colombia, Iran, and Oman, while Georgia, Korea, Lebanon, Lithuania, Malta, the Russian Federation, and the Ukraine performed relatively less well.

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What Are the Gender Differences in Achievement for the Mathematics Content and Cognitive Domains?

To elaborate on the gender differences in overall mathematics achievement presented earlier in Exhibit 1.5, Exhibit 3.3 presents average achievement for boys and girls in each of the content and cognitive domains for fourth and eighth grades. As an additional basis for comparison, the international average for boys and girls (the average across all of the TIMSS 2007 countries) also is shown.

At the fourth grade, boys had higher achievement than girls in the number content domain in 19 countries and 5 benchmarking entities. In comparison, girls had higher achievement in the number domain in just 3 countries. The pattern was reversed for the other two content areas. In both geometric shapes and measures and data display at the fourth grade, girls had significantly higher achievement than boys on average across countries. In geometric shapes and measures, girls performed better in 11 countries and 1 benchmarking entity, whereas boys performed better in 2 countries. In data display, girls performed better in 15 countries and boys performed better in 3 countries and 1 benchmarking entity.

Among cognitive domains at the fourth grade, there were no gender differences, on average internationally, across the participating countries in the knowing and reasoning domains. Although the gender difference was statistically different in the applying domain, it was not substantively different. There were gender differences in many countries, however, especially in favor of boys in the knowing and applying domains. In the knowing domain, boys performed better than girls in 9 countries and 5 benchmarking entities, and girls performed better in 5 countries. In applying, boys performed better in 14 countries and 3 benchmarking entities and girls performed better in 5 countries. In the reasoning domain, girls performed better on the reasoning scale in 3 countries and boys performed better in 5 countries.

At eighth grade, the results in the content domains mirrored those at the fourth grade. In number, boys had higher achievement on average across countries, and performed better than girls in 21 countries and 3 benchmarking entities, while girls performed better than boys in

7 countries. Girls had higher achievement, on average across countries, in the remaining three content domains—algebra (13 points), geometry (6 points), and data and chance (4 points). Girls performed better than boys in 31 countries in algebra, whereas boys performed better in just 4 countries. In geometry, girls had higher achievement in 15 countries, and boys in 6 countries and 1 benchmarking entity. In data and chance, girls performed better than boys in 14 countries, whereas boys performed better than girls in 9 countries and 2 benchmarking entities.

In the cognitive domains at the eighth grade, girls had higher achievement than boys, on average internationally, in all three mathematics cognitive domains—knowing, applying, and reasoning. In the applying cognitive domain, however, the average difference across countries was small (2 points) and the boys had better achievement in about as many countries as did the girls. Girls had higher achievement in 13 countries and the boys had higher achievement in 12 countries and 4 benchmarking entities. In the knowing and reasoning domains, better performance by the girls was more consistent. They had higher average achievement than the boys (6–7 points), and outperformed the boys in 23 countries in knowing and in 15 countries in reasoning. In comparison, the boys had higher achievement in 6 countries and 1 benchmarking entity in knowing and in 4 countries and 1 benchmarking entity in the reasoning domain.

Exhibit 3.3   **Average Achievement in the Mathematics Content and Cognitive Domains by Gender**

TIMSS2007 Mathematics 4th Grade

Country	Average Scale Scores for Mathematics Content Domains					
	Number		Geometric Shapes and Measures		Data Display	
	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	391 (5.5)	390 (5.1)	388 (4.2) ⬤	378 (5.3)	364 (5.1)	359 (6.6)
Armenia	524 (5.1)	520 (3.9)	489 (5.9) ⬤	478 (5.0)	468 (5.1) ⬤	449 (4.5)
Australia	491 (3.9)	503 (4.3) ⬤	535 (3.8)	536 (3.3)	536 (3.7) ⬤	531 (3.1)
Austria	493 (2.4)	511 (2.7) ⬤	507 (3.8)	511 (3.2)	503 (3.8)	513 (2.5) ⬤
Chinese Taipei	578 (2.2)	584 (2.2) ⬤	558 (2.5)	553 (2.6)	571 (2.0) ⬤	562 (2.3)
Colombia	348 (4.6)	371 (4.7) ⬤	354 (4.8)	369 (5.8) ⬤	359 (6.7)	368 (6.4)
Czech Republic	477 (3.3)	486 (3.2) ⬤	493 (3.6)	495 (3.1)	491 (4.2)	495 (4.1)
† Denmark	503 (3.0)	514 (4.1) ⬤	546 (3.3)	540 (2.9)	527 (3.9)	531 (4.0)
El Salvador	308 (4.4)	325 (5.0) ⬤	330 (5.4)	336 (5.2)	365 (4.2)	369 (4.8)
England	529 (3.6)	533 (4.0)	553 (3.0) ⬤	543 (3.5)	548 (2.9)	545 (3.1)
¹ Georgia	464 (4.0)	465 (4.3)	418 (4.9)	413 (5.8)	420 (4.9) ⬤	409 (5.6)
Germany	513 (2.5)	529 (2.7) ⬤	527 (2.6)	530 (2.6)	529 (3.6)	538 (3.4) ⬤
Hong Kong SAR	602 (3.3)	610 (4.8) ⬤	599 (3.0)	598 (4.0)	590 (2.9) ⬤	581 (3.4)
Hungary	505 (5.0)	514 (3.7) ⬤	509 (4.8)	510 (3.4)	508 (4.6)	500 (3.8)
Iran, Islamic Rep. of	404 (4.3)	393 (5.3)	437 (3.9) ⬤	421 (5.0)	409 (5.7) ⬤	391 (6.1)
Italy	497 (3.4)	514 (3.5) ⬤	505 (3.1)	513 (3.5) ⬤	500 (4.1)	513 (4.2) ⬤
Japan	558 (2.7)	564 (2.6) ⬤	571 (3.1) ⬤	561 (2.5)	583 (3.2) ⬤	574 (3.2)
¹ Kazakhstan	559 (5.9)	553 (7.9)	548 (7.3) ⬤	537 (8.2)	526 (5.7)	517 (7.3)
◑ Kuwait	333 (4.5) ⬤	307 (5.3)	335 (3.9) ⬤	297 (5.8)	335 (5.7) ⬤	299 (6.7)
¹ Latvia	534 (2.7)	537 (2.9)	534 (3.6)	531 (3.3)	543 (3.6) ⬤	529 (4.4)
¹ Lithuania	530 (2.7)	536 (3.0)	522 (2.6) ⬤	514 (2.9)	534 (3.0)	527 (4.1)
Morocco	349 (5.0)	357 (5.8)	365 (4.3)	365 (5.2)	314 (5.8)	317 (7.3)
‡ Netherlands	527 (3.4)	542 (2.2) ⬤	520 (3.7)	525 (2.2)	544 (3.6)	541 (2.6)
New Zealand	474 (2.9)	482 (3.3) ⬤	504 (2.7)	500 (2.8)	517 (3.1) ⬤	509 (3.1)
Norway	454 (3.8)	467 (3.3) ⬤	491 (3.5)	488 (3.7)	485 (3.2)	489 (3.5)
Qatar	300 (1.7) ⬤	283 (1.9)	309 (2.2) ⬤	283 (2.6)	337 (1.9) ⬤	314 (2.4)
Russian Federation	548 (5.0)	545 (4.4)	542 (6.0)	535 (5.0)	537 (5.7) ⬤	524 (5.2)
† Scotland	473 (2.8)	489 (3.4) ⬤	504 (3.1)	502 (2.9)	513 (2.6)	518 (2.8)
Singapore	611 (4.4)	610 (4.8)	574 (3.6) ⬤	567 (4.1)	589 (3.6) ⬤	578 (4.0)
Slovak Republic	489 (4.4)	501 (4.0) ⬤	498 (4.6)	501 (4.4)	491 (4.7)	493 (4.3)
Slovenia	477 (2.5)	492 (2.2) ⬤	524 (2.5)	521 (2.3)	519 (2.6)	516 (3.1)
Sweden	484 (2.7)	496 (3.3) ⬤	509 (2.3)	507 (3.0)	530 (2.9)	528 (3.6)
Tunisia	360 (5.0) ⬤	346 (5.2)	343 (4.9) ⬤	327 (5.1)	322 (5.3) ⬤	295 (5.3)
Ukraine	478 (3.6)	482 (3.1)	457 (3.9)	457 (3.3)	470 (3.8) ⬤	455 (3.8)
² † United States	520 (2.8)	528 (3.1) ⬤	522 (2.6)	523 (2.7)	543 (2.6)	544 (2.9)
Yemen	+ +	+ +	+ +	+ +	+ +	+ +
International Avg.	477 (0.6)	482 (0.7) ⬤	483 (0.6) ⬤	479 (0.7)	483 (0.6) ⬤	478 (0.7)
Benchmarking Participants						
² Alberta, Canada	481 (4.0)	497 (3.3) ⬤	511 (2.8)	514 (3.4)	534 (4.1)	540 (3.6) ⬤
² British Columbia, Canada	486 (3.4)	499 (3.1) ⬤	509 (3.6)	510 (3.4)	532 (3.1)	530 (3.0)
◑ ‡ Dubai, UAE	448 (3.8)	441 (4.1)	452 (5.4) ⬤	430 (4.9)	471 (5.2)	452 (5.9)
² Massachusetts, US	565 (4.0)	578 (4.9) ⬤	564 (4.6)	565 (4.9)	566 (6.2)	576 (6.1)
² † Minnesota, US	541 (6.3)	550 (7.1)	558 (5.8)	554 (6.7)	557 (4.7)	557 (6.3)
² Ontario, Canada	483 (4.0)	495 (4.2) ⬤	533 (3.6)	528 (4.0)	544 (4.0)	544 (4.1)
² Quebec, Canada	504 (3.3)	518 (3.7) ⬤	524 (3.4)	526 (4.1)	526 (4.8)	528 (3.9)

⬤ Average significantly higher than other gender

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

‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

¹ National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

² National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

◑ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

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

A plus (+) sign indicates average achievement could not be accurately estimated.

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Exhibit 3.3   Average Achievement in the Mathematics Content and Cognitive Domains by Gender (Continued)

TIMSS2007 4th Grade Mathematics

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Country	Average Scale Scores for Mathematics Cognitive Domains					
	Knowing		Applying		Reasoning	
	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	387 (5.7)	381 (5.9)	378 (5.7)	373 (5.3)	390 (5.8)	384 (4.8)
Armenia	523 (5.9) ⊘	513 (4.7)	498 (4.8) ⊘	488 (4.5)	492 (6.3)	486 (4.5)
Australia	506 (5.0)	512 (4.1)	518 (4.0)	528 (3.7) ⊘	515 (3.8)	517 (3.4)
Austria	501 (2.8)	509 (2.3) ⊘	499 (2.3)	515 (2.2) ⊘	501 (2.9)	511 (3.2) ⊘
Chinese Taipei	583 (3.2)	585 (2.2)	568 (1.9)	570 (2.3)	564 (2.3)	568 (2.2)
Colombia	353 (6.0)	365 (5.1) ⊘	346 (5.6)	369 (5.3) ⊘	363 (5.6)	381 (5.0) ⊘
Czech Republic	471 (2.6)	475 (2.9)	492 (3.3)	500 (3.0) ⊘	489 (4.2)	496 (3.8)
† Denmark	509 (3.0)	516 (3.7)	524 (3.1)	531 (3.1)	522 (2.5)	527 (3.4)
El Salvador	311 (4.8)	314 (5.6)	332 (4.8)	345 (4.6) ⊘	349 (4.8)	363 (5.6) ⊘
England	544 (3.8)	544 (4.5)	540 (3.4)	541 (3.5)	538 (4.0)	537 (3.5)
¹ Georgia	453 (4.1)	447 (4.6)	435 (4.8)	432 (5.2)	438 (4.1)	437 (4.8)
Germany	509 (2.6)	520 (2.4) ⊘	526 (2.6)	536 (2.4) ⊘	525 (2.8)	531 (3.1) ⊘
Hong Kong SAR	614 (3.6)	619 (4.2)	597 (3.7)	602 (4.0)	588 (3.6)	589 (4.4)
Hungary	509 (4.7)	513 (3.7)	506 (4.6)	509 (3.8)	507 (5.5)	511 (3.6)
Iran, Islamic Rep. of	418 (4.5) ⊘	402 (5.1)	410 (4.1)	399 (6.1)	419 (4.2) ⊘	401 (5.4)
Italy	507 (3.2)	521 (3.8) ⊘	493 (3.7)	508 (3.5) ⊘	504 (3.6)	515 (3.3) ⊘
Japan	564 (2.6)	566 (2.4)	566 (2.4)	566 (2.4)	562 (2.7)	564 (2.7)
¹ Kazakhstan	562 (6.5)	555 (8.4)	551 (6.6)	544 (8.4)	542 (5.8)	535 (6.9)
⬌ Kuwait	346 (5.3) ⊘	305 (6.6)	320 (5.2) ⊘	289 (7.2)	+ +	+ +
¹ Latvia	531 (2.7)	528 (3.0)	540 (2.6)	540 (3.7)	538 (3.0)	537 (3.4)
¹ Lithuania	520 (3.8)	520 (3.0)	539 (3.2)	539 (2.9)	528 (3.8)	524 (2.9)
Morocco	352 (6.1)	355 (5.3)	343 (5.1)	348 (6.0)	+ +	+ +
‡ Netherlands	520 (2.6)	530 (2.5) ⊘	535 (2.6)	544 (2.2) ⊘	531 (3.5)	537 (2.6)
New Zealand	482 (2.8)	482 (3.1)	494 (2.7)	497 (2.7)	503 (3.2)	503 (3.2)
Norway	457 (3.3)	464 (3.4)	474 (3.5)	484 (3.0) ⊘	490 (3.6)	488 (3.2)
Qatar	306 (1.6) ⊘	279 (2.2)	306 (1.7) ⊘	286 (1.6)	+ +	+ +
Russian Federation	541 (5.2)	535 (4.2)	549 (5.8)	545 (4.8)	546 (5.3) ⊘	535 (5.2)
† Scotland	485 (2.9)	492 (3.1) ⊘	495 (2.5)	504 (2.9) ⊘	494 (3.2)	500 (3.3)
Singapore	622 (4.5)	619 (4.5)	593 (3.8) ⊘	586 (4.1)	581 (3.9) ⊘	575 (4.1)
Slovak Republic	490 (4.1)	495 (4.3)	495 (4.2)	501 (4.4) ⊘	498 (4.7)	501 (4.3)
Slovenia	493 (2.0)	501 (2.9) ⊘	500 (2.0)	507 (2.8) ⊘	505 (2.0)	505 (3.5)
Sweden	478 (2.5)	486 (3.4) ⊘	506 (2.1)	511 (2.9) ⊘	517 (2.9)	521 (3.2)
Tunisia	353 (5.5) ⊘	335 (5.2)	338 (5.0) ⊘	321 (5.4)	+ +	+ +
Ukraine	472 (3.7)	472 (3.5)	466 (3.2)	467 (4.1)	475 (3.5)	473 (3.6)
² † United States	537 (2.8)	545 (2.9) ⊘	521 (2.7)	527 (3.0) ⊘	523 (2.4)	524 (2.6)
Yemen	+ +	+ +	+ +	+ +	+ +	+ +
International Avg.	480 (0.7)	480 (0.7)	480 (0.7)	481 (0.7) ⊘	501 (0.7)	502 (0.7)
Benchmarking Participants						
² Alberta, Canada	488 (3.6)	500 (3.2) ⊘	497 (3.5)	513 (3.1) ⊘	518 (3.7)	521 (3.1)
² British Columbia, Canada	493 (3.0)	502 (3.0) ⊘	501 (2.9)	509 (3.0) ⊘	515 (2.9)	518 (3.2)
⬌ ‡ Dubai, UAE	464 (4.9)	450 (5.1)	448 (4.4)	435 (4.5)	453 (5.2)	439 (5.3)
² Massachusetts, US	575 (4.2)	587 (5.1) ⊘	562 (4.2)	570 (4.6)	563 (4.3)	567 (4.6)
² † Minnesota, US	560 (6.2)	570 (6.9) ⊘	544 (6.3)	551 (5.7)	543 (5.0)	542 (5.6)
² Ontario, Canada	493 (3.5)	502 (3.9) ⊘	512 (3.6)	518 (3.5)	527 (3.3)	525 (3.6)
² Quebec, Canada	514 (3.9)	521 (3.6)	512 (3.1)	523 (3.2) ⊘	520 (3.7)	526 (3.2)

⊘ Average significantly higher than other gender

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Exhibit 3.3   Average Achievement in the Mathematics Content and Cognitive Domains by Gender (Continued)

TIMSS2007 Mathematics 8th Grade

Country	Average Scale Scores for Mathematics Content Domains							
	Number		Algebra		Geometry		Data and Chance	
	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	398 (2.2)	408 (2.3) ⬤	350 (2.8)	349 (3.8)	429 (2.5)	435 (2.5) ⬤	369 (2.0)	373 (1.9) ⬤
Armenia	492 (4.1)	492 (3.5)	538 (3.4) ⬤	525 (2.8)	490 (5.1)	495 (4.6)	427 (5.4)	427 (4.1)
Australia	492 (5.3)	514 (5.6) ⬤	466 (5.6)	475 (5.2)	481 (4.8)	493 (5.3)	516 (4.8)	534 (4.8) ⬤
Bahrain	392 (2.4) ⬤	384 (3.2)	427 (2.9) ⬤	380 (3.4)	429 (2.7) ⬤	396 (3.1)	429 (3.1) ⬤	408 (2.5)
Bosnia and Herzegovina	447 (3.0)	454 (3.5)	483 (3.5) ⬤	467 (3.6)	452 (4.6)	450 (3.4)	435 (3.1)	440 (2.6)
Botswana	372 (3.4) ⬤	361 (4.0)	404 (2.7) ⬤	383 (2.7)	325 (4.3)	324 (4.1)	390 (3.3) ⬤	376 (4.0)
Bulgaria	459 (4.4)	457 (6.0)	488 (5.0) ⬤	464 (6.3)	476 (5.0) ⬤	460 (6.1)	445 (4.6)	436 (6.4)
Chinese Taipei	574 (4.6)	579 (4.9)	622 (5.8)	613 (6.3)	593 (4.9)	591 (5.3)	567 (4.5)	564 (4.1)
Colombia	348 (4.0)	391 (4.1) ⬤	381 (3.6)	400 (3.8) ⬤	358 (4.2)	385 (4.5) ⬤	391 (4.7)	420 (4.0) ⬤
Cyprus	468 (2.2) ⬤	461 (2.4)	481 (2.5) ⬤	455 (2.9)	470 (4.0) ⬤	445 (2.9)	474 (2.4) ⬤	454 (2.5)
Czech Republic	507 (2.8)	515 (2.7) ⬤	492 (2.6) ⬤	476 (2.7)	497 (2.7)	498 (3.4)	512 (3.6)	511 (3.0)
Egypt	393 (4.3)	392 (4.5)	418 (5.1) ⬤	401 (4.6)	411 (5.0)	402 (4.8)	391 (3.9) ⬤	377 (4.2)
El Salvador	345 (4.0)	366 (4.0) ⬤	326 (4.4)	337 (5.1) ⬤	310 (4.9)	326 (4.4) ⬤	348 (4.3)	377 (4.0) ⬤
† England	502 (5.2)	518 (6.2) ⬤	493 (4.8)	491 (6.0)	508 (4.5)	512 (5.7)	545 (5.2)	549 (6.2)
1 Georgia	417 (5.4)	424 (6.4)	429 (6.6) ⬤	413 (7.1)	409 (6.8)	408 (7.3)	378 (4.7) ⬤	367 (5.0)
Ghana	298 (4.6)	319 (4.1) ⬤	345 (4.4)	369 (3.5) ⬤	265 (5.5)	283 (5.4) ⬤	311 (6.2)	328 (3.7) ⬤
† Hong Kong SAR	570 (5.1)	564 (7.7)	573 (5.1) ⬤	558 (7.5)	573 (4.6)	567 (7.5)	554 (4.2)	544 (6.7)
Hungary	511 (4.4)	523 (3.7) ⬤	509 (4.0) ⬤	498 (4.2)	508 (4.1)	507 (4.0)	523 (3.6)	525 (3.9)
Indonesia	398 (4.3)	401 (4.3)	410 (3.8) ⬤	400 (4.6)	396 (4.9)	393 (5.1)	405 (4.4)	400 (3.8)
Iran, Islamic Rep. of	392 (5.2)	397 (5.8)	417 (5.2) ⬤	401 (5.8)	429 (6.1)	418 (6.6)	417 (4.7)	413 (5.2)
3 Israel	464 (4.0)	474 (4.3) ⬤	476 (4.3) ⬤	463 (5.3)	439 (4.5)	433 (5.9)	465 (4.8)	466 (6.0)
Italy	469 (3.5)	485 (3.0) ⬤	462 (3.6)	459 (3.6)	488 (3.5)	491 (3.6)	488 (3.4)	493 (3.7)
Japan	545 (3.3)	558 (3.1) ⬤	560 (4.0)	559 (3.3)	573 (2.9)	572 (3.2)	573 (2.5)	573 (3.1)
Jordan	419 (6.3)	414 (5.7)	461 (6.5) ⬤	436 (5.6)	447 (6.1) ⬤	425 (5.1)	434 (5.3) ⬤	417 (5.4)
Korea, Rep. of	575 (3.4)	591 (2.8) ⬤	596 (4.1)	596 (3.9)	585 (2.7)	588 (3.3)	580 (2.5)	579 (2.5)
⋈ Kuwait	346 (4.3)	347 (3.9)	367 (3.8) ⬤	339 (5.5)	396 (3.6) ⬤	371 (4.4)	378 (4.7) ⬤	352 (3.8)
Lebanon	446 (3.8)	465 (4.1) ⬤	461 (3.9)	469 (3.7)	459 (4.5)	465 (4.8)	402 (4.8)	414 (5.3) ⬤
1 Lithuania	505 (3.0)	507 (3.5)	491 (3.6) ⬤	474 (2.9)	510 (3.0)	503 (3.8)	525 (2.6)	521 (2.6)
Malaysia	495 (5.6)	485 (5.7)	461 (4.7) ⬤	446 (4.6)	480 (6.4)	473 (6.6)	469 (4.5)	468 (4.6)
Malta	495 (2.1)	497 (2.0)	476 (1.5)	471 (2.6)	493 (2.1)	497 (2.9)	487 (2.3)	486 (1.9)
Norway	487 (2.5)	488 (2.5)	428 (3.0)	423 (3.4)	464 (2.5) ⬤	453 (3.2)	510 (3.1) ⬤	500 (3.4)
Oman	380 (3.1) ⬤	344 (4.1)	421 (3.8) ⬤	360 (4.8)	412 (3.7) ⬤	362 (4.8)	411 (4.1) ⬤	367 (4.3)
Palestinian Nat'l Auth.	376 (4.2) ⬤	355 (4.8)	403 (4.0) ⬤	362 (5.5)	403 (4.7) ⬤	373 (5.2)	388 (3.6) ⬤	352 (4.4)
Qatar	342 (2.1) ⬤	327 (2.1)	331 (2.4) ⬤	293 (2.8)	323 (2.8) ⬤	280 (3.7)	329 (2.3) ⬤	281 (2.5)
Romania	461 (4.0)	454 (4.1)	493 (4.7) ⬤	464 (5.3)	475 (4.4) ⬤	459 (4.9)	431 (4.3)	426 (4.5)
Russian Federation	504 (4.1)	509 (4.2)	527 (5.2) ⬤	509 (4.9)	510 (4.4)	509 (4.7)	486 (4.4)	489 (4.2)
Saudi Arabia	314 (4.6)	305 (4.3)	350 (3.8) ⬤	338 (3.8)	375 (4.2) ⬤	344 (4.0)	362 (3.3) ⬤	336 (3.1)
† Scotland	483 (3.7)	495 (4.6) ⬤	470 (3.9)	464 (4.4)	485 (3.6)	486 (4.8)	515 (3.7)	518 (4.3)
1 2 Serbia	474 (3.4)	481 (3.8)	510 (3.8) ⬤	491 (3.9)	491 (4.3) ⬤	480 (4.4)	455 (3.9)	461 (3.6)
Singapore	601 (3.9)	593 (4.3)	589 (3.9)	569 (4.5)	586 (3.7) ⬤	571 (4.2)	581 (4.5) ⬤	568 (4.3)
Slovenia	496 (2.8)	508 (2.6) ⬤	493 (2.9) ⬤	483 (2.8)	498 (3.1)	501 (2.5)	507 (2.5)	515 (3.4) ⬤
Sweden	506 (2.3)	508 (1.9)	462 (2.8) ⬤	452 (2.7)	475 (3.5)	469 (2.9)	526 (3.7)	525 (3.6)
Syrian Arab Republic	380 (4.3)	407 (4.6) ⬤	403 (4.2)	408 (5.3)	413 (3.5)	422 (5.4)	383 (2.9)	392 (4.5)
Thailand	452 (5.5) ⬤	435 (5.1)	446 (5.5) ⬤	420 (5.4)	451 (6.0) ⬤	433 (5.6)	464 (4.3) ⬤	442 (4.4)
Tunisia	411 (3.0)	440 (2.7) ⬤	420 (2.8)	427 (3.1) ⬤	429 (3.0)	446 (3.2) ⬤	400 (3.0)	423 (3.0) ⬤
Turkey	423 (4.3)	435 (4.5) ⬤	447 (5.8) ⬤	434 (5.6)	415 (5.5) ⬤	407 (5.4)	448 (4.7)	442 (4.9)
Ukraine	459 (4.1)	461 (3.8)	472 (4.4) ⬤	455 (4.3)	468 (4.1)	466 (3.9)	459 (3.7)	456 (4.3)
2 † United States	506 (3.1)	515 (3.1) ⬤	503 (2.9)	498 (3.2)	477 (2.7)	483 (2.8) ⬤	527 (3.1)	535 (3.0) ⬤
‡ Morocco	382 (4.0)	398 (5.0) ⬤	364 (5.2)	361 (5.6)	391 (4.7)	403 (5.1)	373 (4.7)	369 (4.6)
International Avg.	448 (0.6)	453 (0.6) ⬤	457 (0.6) ⬤	444 (0.6)	454 (0.6) ⬤	448 (0.6)	453 (0.5) ⬤	449 (0.6)
Benchmarking Participants								
Basque Country, Spain	503 (3.2)	515 (3.5) ⬤	487 (3.4)	483 (4.0)	476 (4.1)	477 (4.9)	500 (4.6)	507 (5.5)
3 British Columbia, Canada	514 (3.7)	526 (3.7) ⬤	488 (3.2)	490 (3.6)	483 (4.2)	491 (3.8) ⬤	527 (4.0)	532 (4.0)
⋈ ‡ Dubai, UAE	453 (5.3)	463 (6.8)	475 (5.1)	474 (5.8)	455 (5.7)	447 (5.6)	457 (6.3)	457 (5.7)
2 Massachusetts, US	544 (6.0)	553 (5.5)	539 (5.1)	537 (5.6)	516 (4.9)	522 (5.2)	563 (5.2)	575 (6.1) ⬤
2 † Minnesota, US	533 (5.6)	541 (4.7)	515 (5.0)	515 (4.9)	501 (5.7)	510 (5.9)	556 (6.3)	565 (5.8)
2 Ontario, Canada	517 (4.6)	532 (4.3) ⬤	489 (4.1)	491 (4.4)	504 (4.5)	512 (5.3)	540 (4.6)	547 (4.8)
3 Quebec, Canada	531 (3.5)	537 (4.7)	507 (3.4)	502 (4.6)	520 (3.6)	526 (4.4)	529 (3.1)	537 (4.1) ⬤

⬤ Average significantly higher than other gender

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

‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Did not satisfy guidelines for sample participation rates (see Appendix A).

1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

TIMSS & PIRLS International Study Center
Lynch School of Education, Boston College

Exhibit 3.3   Average Achievement in the Mathematics Content and Cognitive Domains by Gender (Continued)

TIMSS2007 8th Grade Mathematics

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Country	Average Scale Scores for Mathematics Cognitive Domains					
	Knowing		Applying		Reasoning	
	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	369 (2.2)	373 (2.2)	409 (2.0)	415 (2.5) ▲	+ +	+ +
Armenia	512 (4.1) ▲	502 (3.2)	492 (4.5)	493 (4.0)	493 (4.9)	486 (3.9)
Australia	481 (4.9)	493 (4.9)	491 (4.9)	508 (5.2) ▲	495 (4.8)	508 (4.9)
Bahrain	414 (3.6) ▲	377 (2.7)	415 (2.3) ▲	391 (2.7)	426 (3.9) ▲	401 (4.2)
Bosnia and Herzegovina	483 (3.3) ▲	474 (2.9)	439 (3.3)	442 (2.8)	454 (3.8)	451 (2.9)
Botswana	385 (2.7) ▲	367 (2.8)	356 (3.3) ▲	346 (3.1)	+ +	+ +
Bulgaria	485 (4.3) ▲	468 (6.0)	463 (4.4) ▲	452 (6.3)	465 (4.4) ▲	445 (6.1)
Chinese Taipei	596 (4.5)	592 (5.6)	592 (4.3)	593 (4.9)	591 (4.4)	592 (5.1)
Colombia	349 (3.9)	379 (4.3) ▲	366 (4.7)	402 (4.2) ▲	405 (3.6)	427 (4.3) ▲
Cyprus	478 (2.2) ▲	458 (2.2)	474 (2.6) ▲	456 (2.5)	472 (3.1) ▲	450 (2.9)
Czech Republic	506 (2.7) ▲	499 (2.7)	502 (2.8)	507 (3.0) ▲	505 (2.9) ▲	495 (2.8)
Egypt	403 (5.4) ▲	382 (4.8)	398 (5.0)	389 (4.7)	401 (4.6)	392 (4.7)
El Salvador	323 (4.5)	349 (4.0) ▲	336 (4.0)	358 (4.3) ▲	+ +	+ +
[†] England	501 (4.2)	506 (5.3)	510 (5.1)	519 (6.1)	519 (4.5)	516 (5.6)
[1] Georgia	429 (6.0)	424 (6.5)	401 (5.4)	401 (6.5)	393 (6.1)	385 (6.8)
Ghana	298 (5.6)	326 (4.8) ▲	287 (5.0)	305 (4.3) ▲	+ +	+ +
[†] Hong Kong SAR	580 (4.8) ▲	567 (7.3)	573 (4.9)	564 (8.1)	563 (5.0)	551 (7.9)
Hungary	521 (3.8)	516 (3.7)	511 (4.0)	516 (3.4)	514 (3.8)	511 (3.7)
Indonesia	400 (4.4)	393 (4.8)	401 (4.6)	396 (4.2)	406 (3.8)	404 (4.0)
Iran, Islamic Rep. of	409 (5.4)	399 (5.9)	404 (5.3)	400 (6.2)	430 (4.7)	424 (5.4)
[3] Israel	475 (4.1)	471 (4.7)	457 (4.5)	455 (5.5)	467 (4.7)	458 (5.0)
Italy	475 (3.4)	477 (3.5)	477 (3.1)	488 (3.2) ▲	484 (3.4)	483 (3.4)
Japan	560 (2.8)	560 (3.3)	562 (3.2)	569 (2.9)	568 (3.4)	567 (3.5)
Jordan	444 (6.5) ▲	421 (5.8)	431 (6.2) ▲	414 (5.6)	450 (5.6) ▲	432 (4.7)
Korea, Rep. of	597 (3.7)	596 (2.8)	592 (3.7)	598 (3.4)	577 (3.1)	580 (2.7)
[※] Kuwait	355 (4.0) ▲	338 (4.3)	370 (3.0) ▲	351 (4.3)	+ +	+ +
Lebanon	458 (4.1)	471 (4.6) ▲	444 (4.6)	453 (5.4) ▲	423 (4.9)	437 (5.6) ▲
[1] Lithuania	514 (3.2) ▲	501 (2.4)	513 (2.9)	510 (2.6)	489 (3.2) ▲	482 (2.7)
Malaysia	485 (5.5) ▲	468 (5.0)	481 (5.6)	475 (5.2)	470 (4.4)	465 (4.2)
Malta	492 (1.8)	489 (2.2)	491 (1.5)	494 (1.9)	473 (1.6)	476 (2.2)
Norway	460 (2.3)	457 (2.4)	480 (2.3)	475 (2.7)	479 (2.5) ▲	472 (2.8)
Oman	401 (4.2) ▲	341 (5.6)	391 (3.6) ▲	342 (5.3)	420 (4.4) ▲	372 (5.0)
Palestinian Nat'l Auth.	386 (4.8) ▲	344 (5.5)	386 (4.0) ▲	355 (5.2)	396 (4.5) ▲	366 (5.6)
Qatar	322 (2.1) ▲	292 (1.9)	324 (2.5) ▲	285 (2.5)	+ +	+ +
Romania	480 (4.8) ▲	461 (4.5)	469 (4.5) ▲	455 (4.5)	458 (4.9) ▲	440 (5.4)
Russian Federation	525 (4.4) ▲	517 (4.4)	509 (4.1)	510 (4.2)	501 (4.2) ▲	493 (4.2)
Saudi Arabia	316 (4.0) ▲	300 (3.4)	352 (3.2) ▲	320 (3.5)	+ +	+ +
[†] Scotland	480 (3.4)	482 (3.9)	487 (3.8)	491 (4.3)	496 (3.5)	494 (3.9)
[1] [2] Serbia	507 (4.1) ▲	493 (3.7)	480 (3.7)	477 (4.0)	478 (3.7) ▲	469 (4.2)
Singapore	590 (3.8) ▲	573 (4.2)	600 (3.9) ▲	586 (4.4)	586 (4.6) ▲	571 (4.9)
Slovenia	500 (2.5)	499 (2.6)	498 (2.3)	508 (2.4) ▲	499 (3.1)	493 (2.9)
Sweden	478 (2.2)	478 (2.6)	499 (2.7)	495 (2.7)	494 (2.9) ▲	487 (2.9)
Syrian Arab Republic	387 (4.7)	400 (5.5) ▲	393 (3.8)	410 (4.7) ▲	389 (3.5)	403 (4.7) ▲
Thailand	448 (5.3) ▲	424 (5.1)	456 (5.2) ▲	437 (5.0)	466 (4.9) ▲	447 (4.7)
Tunisia	411 (2.8)	431 (3.8) ▲	413 (2.8)	435 (2.7) ▲	417 (3.2)	434 (2.2) ▲
Turkey	441 (5.1)	438 (5.3)	425 (4.9)	425 (4.9)	441 (4.7)	440 (4.7)
Ukraine	477 (4.2) ▲	465 (3.7)	464 (4.0)	464 (4.0)	449 (4.2) ▲	440 (4.2)
[2] [†] United States	514 (2.8)	514 (2.8)	499 (3.2)	506 (3.1) ▲	504 (2.7)	505 (2.6)
[‡] Morocco	361 (5.9)	369 (5.1)	385 (4.1)	394 (4.4)	381 (5.4)	386 (4.5)
International Avg.	454 (0.6) ▲	447 (0.6)	452 (0.6) ▲	450 (0.6)	471 (0.6) ▲	465 (0.7)
Benchmarking Participants						
Basque Country, Spain	502 (3.4)	501 (3.7)	490 (3.6)	499 (3.7) ▲	495 (4.2)	497 (4.4)
[3] British Columbia, Canada	502 (3.2)	507 (3.7) ▲	505 (3.3)	514 (3.4) ▲	508 (3.7)	513 (3.4)
[※] [‡] Dubai, UAE	469 (5.6)	469 (5.2)	458 (5.4)	453 (5.7)	462 (5.7)	467 (5.9)
[2] Massachusetts, US	545 (5.0)	548 (5.2)	539 (5.0)	546 (5.1)	541 (4.8)	545 (4.5)
[2] [†] Minnesota, US	532 (4.7)	532 (4.9)	525 (5.2)	534 (5.2) ▲	525 (4.0)	522 (5.2)
[2] Ontario, Canada	504 (3.6)	506 (3.9)	513 (4.3)	524 (4.0) ▲	517 (3.6)	526 (3.5) ▲
[3] Quebec, Canada	523 (3.0)	516 (3.9)	525 (3.3)	533 (4.3)	522 (3.5)	526 (4.0)

▲ Average significantly higher than other gender

[3] National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).

[※] Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

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

A plus (+) sign indicates average achievement could not be accurately estimated.