

**Exhibit 3.8: Differences in Achievement for Science Cognitive Domains Across Assessment Years**

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Knowing Average Scale Score	Knowing		Applying Average Scale Score	Applying		Reasoning Average Scale Score	Reasoning	
		Differences Between Years			Differences Between Years			Differences Between Years	
		2011	2007		2011	2007		2011	2007
<b>Australia</b>									
2015	510 (2.7)	-4	6	512 (2.9)	-5	1	513 (2.8)	-14 ▼	-18 ▼
2011	514 (5.1)		9	517 (4.5)		6	526 (5.0)		-4
2007	505 (3.7)			511 (3.7)			530 (4.1)		
<b>Bahrain</b>									
2015	462 (2.5)	4	-6	464 (2.4)	15 ▲	-1	466 (2.8)	18 ▲	3
2011	457 (3.7)		-10 ▼	450 (2.1)		-16 ▼	449 (2.0)		-15 ▼
2007	468 (2.2)			465 (2.2)			464 (2.4)		
<b>Botswana (9)</b>									
2015	371 (3.6)	-26 ▼		398 (3.8)	-5		390 (2.6)	-15 ▼	
2011	397 (3.6)			404 (3.3)			404 (3.3)		
<b>Chile</b>									
2015	466 (3.2)	-10 ▼		446 (3.0)	-7		448 (3.6)	-11 ▼	
2011	476 (3.1)			454 (2.3)			459 (2.7)		
<b>Chinese Taipei</b>									
2015	589 (2.3)	20 ▲	15 ▲	565 (2.0)	-5	2	560 (2.0)	9 ▲	16 ▲
2011	569 (2.6)		-5	570 (2.6)		6	551 (2.9)		7
2007	574 (3.9)			564 (3.7)			544 (4.0)		
<b>Egypt</b>									
2015	372 (5.2)		-57 ▼	371 (4.4)		-27 ▼	359 (4.8)		-26 ▼
2007	429 (4.1)			398 (3.8)			385 (3.7)		
<b>England</b>									
2015	523 (4.1)	-11	-14 ▼	538 (3.9)	7	-1	545 (4.0)	8	-4
2011	533 (5.1)		-3	531 (4.7)		-8	537 (4.9)		-12
2007	536 (5.2)			540 (4.3)			548 (4.6)		
<b>Georgia</b>									
2015	452 (3.3)	25 ▲	15 ▲	442 (3.1)	24 ▲	24 ▲	432 (3.5)	20 ▲	47 ▲
2011	428 (3.9)		-10	418 (3.8)		0	412 (3.7)		27 ▲
2007	438 (5.3)			418 (4.6)			385 (5.0)		
<b>Hong Kong SAR</b>									
2015	547 (3.7)	3	10	541 (4.3)	12 ▲	18 ▲	550 (4.4)	12 ▲	15 ▲
2011	544 (3.2)		7	529 (3.4)		6	538 (4.0)		3
2007	537 (4.8)			522 (5.1)			535 (5.6)		
<b>Hungary</b>									
2015	525 (3.5)	14 ▲	-5	528 (3.4)	-4	-23 ▼	524 (3.8)	6	-6
2011	511 (3.2)		-19 ▼	532 (3.5)		-19 ▼	518 (3.3)		-12 ▼
2007	530 (3.2)			551 (3.2)			530 (3.4)		
<b>Iran, Islamic Rep. of</b>									
2015	455 (4.8)	-24 ▼	-13 ▼	457 (4.0)	-13 ▼	6	454 (4.0)	-22 ▼	-2
2011	479 (4.6)		11	470 (3.9)		18 ▲	475 (3.8)		19 ▲
2007	468 (4.1)			452 (4.0)			456 (4.0)		
<b>Israel</b>									
2015	503 (4.3)	-15 ▼		504 (3.8)	-8		511 (4.4)	-8	
2011	518 (4.2)			512 (4.0)			519 (4.4)		
<b>Italy</b>									
2015	505 (2.6)	-8 ▼	8	496 (2.4)	-4	-1	493 (2.8)	4	4
2011	512 (2.7)		16 ▲	500 (2.3)		3	489 (2.6)		-1
2007	496 (3.6)			497 (2.9)			489 (3.1)		
<b>Japan</b>									
2015	567 (2.2)	27 ▲	26 ▲	575 (1.9)	14 ▲	18 ▲	570 (2.1)	3	7 ▲
2011	541 (2.7)		-1	561 (2.6)		4	568 (2.4)		4
2007	542 (2.4)			556 (2.1)			564 (2.3)		

▲ More recent year significantly higher  
▼ More recent year significantly lower

Trend results for Kuwait do not include private schools. Trend results for Lithuania do not include students taught in Polish or in Russian. South Africa (9) tested one year later.

Ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%. Such annotations in exhibits with trend data began in 2011, so data from assessments prior to 2011 are not annotated for reservations.

See Appendix C.2 for target population coverage notes 1, 2, and 3. See Appendix C.8 for sampling guidelines and sampling participation notes †, ‡, and §.

•• Tested the same cohort of students as other countries, but later in the assessment year at the beginning of the next school year.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Exhibit 3.8: Differences in Achievement for Science Cognitive Domains Across Assessment Years (Continued)**

Instructions: Read across the row to determine if the performance in the row year is significantly higher (▲) or significantly lower (▼) than the performance in the column year.

Country	Knowing Average Scale Score	Knowing		Applying Average Scale Score	Applying		Reasoning Average Scale Score	Reasoning	
		Differences Between Years			Differences Between Years			Differences Between Years	
		2011	2007		2011	2007		2011	2007
<b>Jordan</b>									
2015	430 (3.3)	-23 ▼	-62 ▼	425 (3.3)	-26 ▼	-59 ▼	419 (3.6)	-22 ▼	-47 ▼
2011	453 (4.4)		-39 ▼	451 (4.0)		-33 ▼	441 (4.3)		-25 ▼
2007	492 (4.8)			484 (4.3)			466 (4.2)		
<b>Kazakhstan</b>									
2015	529 (5.8)	46 ▲		535 (4.5)	44 ▲		528 (4.7)	41 ▲	
2011	483 (4.9)			491 (4.1)			487 (4.4)		
<b>Korea, Rep. of</b>									
2015	555 (2.9)	2	6	552 (2.2)	-9 ▼	2	560 (2.8)	-3	-1
2011	554 (3.0)		4	561 (2.1)		11 ▲	564 (2.3)		2
2007	550 (2.3)			550 (2.4)			561 (2.3)		
<b>Kuwait</b>									
2015	396 (4.8)		-30 ▼	392 (4.7)		-22 ▼	382 (4.9)		-20 ▼
2007	426 (2.6)			413 (3.1)			402 (3.1)		
<b>Lebanon</b>									
2015	403 (5.9)	22 ▲	2	398 (5.3)	-10	-20 ▼	381 (6.3)	-27 ▼	-29 ▼
2011	381 (5.7)		-20 ▼	408 (5.2)		-10	408 (5.7)		-2
2007	401 (6.3)			418 (6.1)			410 (6.6)		
<b>Lithuania</b>									
2015	516 (3.3)	0	-1	519 (3.7)	7	6	529 (3.3)	16 ▲	2
2011	516 (2.4)		-1	512 (2.3)		-1	513 (2.8)		-14 ▼
2007	517 (2.5)			513 (2.4)			527 (2.7)		
<b>Malaysia</b>									
2015	466 (5.1)	63 ▲	8	476 (4.2)	52 ▲	6	467 (3.9)	28 ▲	-15 ▼
2011	403 (7.1)		-55 ▼	424 (6.2)		-46 ▼	439 (6.0)		-44 ▼
2007	458 (6.8)			470 (6.2)			483 (5.5)		
<b>Malta</b>									
2015	468 (2.1)		31 ▲	489 (1.8)		28 ▲	479 (1.7)		11 ▲
2007	437 (1.3)			461 (1.3)			468 (1.5)		
<b>Morocco</b>									
2015	395 (2.3)	32 ▲		391 (2.8)	11 ▲		385 (2.6)	18 ▲	
2011	363 (2.8)			381 (2.0)			366 (2.3)		
<b>New Zealand</b>									
2015	503 (3.2)	-8		513 (3.5)	4		520 (3.3)	4	
2011	511 (5.0)			509 (4.4)			515 (4.7)		
<b>Norway (8)</b>									
2015	477 (3.2)	-12 ▼	-10 ▼	488 (2.6)	-8	3	498 (2.4)	4	10 ▲
2011	490 (2.7)		3	496 (3.0)		11 ▲	494 (3.0)		6
2007	487 (2.7)			485 (2.4)			488 (3.1)		
<b>Oman</b>									
2015	455 (2.9)	38 ▲	30 ▲	454 (2.9)	34 ▲	34 ▲	454 (2.4)	37 ▲	36 ▲
2011	416 (3.4)		-8	419 (3.4)		0	417 (3.0)		-2
2007	425 (3.5)			419 (3.6)			419 (3.8)		

▲ More recent year significantly higher  
▼ More recent year significantly lower

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**Exhibit 3.8: Differences in Achievement for Science Cognitive Domains Across Assessment Years (Continued)**

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Country	Knowing Average Scale Score	Knowing		Applying Average Scale Score	Applying		Reasoning Average Scale Score	Reasoning	
		Differences Between Years			Differences Between Years			Differences Between Years	
		2011	2007		2011	2007		2011	2007
<b>Qatar</b>									
2015	448 (3.6)	30 ▲		460 (3.6)	40 ▲		454 (3.2)	45 ▲	
2011	418 (4.5)			420 (3.7)			409 (4.6)		
<b>Russian Federation</b>									
2015	558 (5.2)	1	17 ▲	538 (4.6)	0	11	538 (3.9)	5	18 ▲
<sup>2</sup> 2011	557 (3.8)		16 ▲	539 (3.3)		12 ▲	533 (3.2)		13 ▲
2007	541 (4.4)			527 (4.0)			519 (4.0)		
<b>Saudi Arabia</b>									
2015	395 (5.0)	-53 ▼		383 (4.9)	-49 ▼		405 (4.7)	-19 ▼	
2011	448 (4.2)			432 (3.9)			424 (3.5)		
<b>Singapore</b>									
<sup>2</sup> 2015	594 (3.4)	6	32 ▲	600 (3.4)	11 ▲	30 ▲	595 (3.2)	2	26 ▲
<sup>2</sup> 2011	588 (4.9)		26 ▲	589 (4.4)		19 ▲	592 (4.4)		24 ▲
2007	561 (4.9)			570 (4.5)			568 (4.5)		
<b>Slovenia</b>									
2015	558 (2.6)	8 ▲	20 ▲	547 (2.3)	5	12 ▲	550 (2.3)	15 ▲	11 ▲
2011	551 (2.6)		12 ▲	542 (2.5)		7 ▲	536 (2.7)		-4
2007	538 (2.2)			535 (2.5)			540 (2.6)		
<b>South Africa (9)</b>									
2015	337 (6.7)	55 ▲		368 (5.9)	33 ▲		350 (5.6)	12	
<sup>ψ</sup> 2011	282 (4.1)			335 (3.5)			338 (5.0)		
<b>Sweden</b>									
2015	519 (3.2)	8	12 ▲	518 (3.5)	10 ▲	9 ▲	526 (4.0)	17 ▲	10 ▲
2011	512 (2.5)		4	508 (2.7)		-1	510 (3.0)		-6
2007	508 (2.6)			509 (2.8)			516 (2.9)		
<b>Thailand</b>									
2015	469 (4.3)	27 ▲	-3	450 (4.7)	-1	-20 ▼	447 (4.0)	-6	-20 ▼
2011	443 (4.7)		-30 ▼	451 (4.1)		-19 ▼	453 (4.1)		-14 ▼
2007	473 (4.7)			471 (4.4)			467 (4.4)		
<b>Turkey</b>									
2015	489 (4.5)	-1		492 (3.9)	15 ▲		495 (4.2)	12 ▲	
2011	490 (3.7)			478 (3.4)			483 (3.3)		
<b>United Arab Emirates</b>									
2015	478 (2.5)	7		478 (2.4)	14 ▲		473 (2.4)	17 ▲	
2011	471 (2.4)			464 (2.1)			456 (2.5)		
<b>United States</b>									
<sup>†</sup> 2015	532 (3.4)	5	16 ▲	531 (2.8)	9 ▲	14 ▲	526 (2.8)	3	-2
<sup>2</sup> 2011	527 (2.8)		11 ▲	522 (2.3)		5	524 (2.5)		-5
<sup>2 †</sup> 2007	516 (3.2)			517 (2.9)			529 (3.0)		

SOURCE: IEA's Trends in International Mathematics and Science Study – TIMSS 2015

**Benchmarking Participants**

<b>Ontario, Canada</b>									
2015	514 (2.6)	1	-1	525 (2.4)	7 ▲	1	532 (2.6)	0	-10 ▼
<sup>2</sup> 2011	513 (2.8)		-2	518 (2.4)		-6	532 (3.0)		-10
<sup>2</sup> 2007	515 (3.6)			524 (3.8)			542 (4.2)		
<b>Quebec, Canada</b>									
<sup>‡</sup> 2015	527 (5.1)	7	28 ▲	524 (4.6)	7	24 ▲	535 (4.5)	13 ▲	13 ▲
2011	519 (2.8)		20 ▲	518 (2.9)		17 ▲	522 (3.1)		-1
<sup>3</sup> 2007	499 (3.3)			500 (3.4)			523 (3.3)		
<b>Abu Dhabi, UAE</b>									
2015	453 (6.1)	-13		457 (5.9)	-4		454 (5.7)	-1	
2011	466 (4.2)			461 (3.9)			455 (4.3)		
<b>Dubai, UAE</b>									
2015	527 (2.5)	35 ▲	32 ▲	525 (2.2)	39 ▲	37 ▲	521 (2.0)	41 ▲	43 ▲
2011	492 (2.9)		-4	486 (2.8)		-2	479 (2.6)		1
<sup>♦ ‡</sup> 2007	496 (3.5)			488 (3.0)			478 (3.5)		
<b>Florida, US</b>									
<sup>1</sup> 2015	511 (6.9)	-30 ▼		508 (5.8)	-18		506 (6.4)	-19	
<sup>1 2</sup> 2011	541 (7.9)			526 (7.3)			524 (7.7)		

▲ More recent year significantly higher  
▼ More recent year significantly lower