

Exhibit 1.18: Differences in Achievement for Mathematics Cognitive Domains Across Assessment Years[◇]

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	Average Scale Score	Knowing			Average Scale Score	Applying			Average Scale Score	Reasoning		
		Differences Between Years				Differences Between Years				Differences Between Years		
		2015	2011	2007		2015	2011	2007		2015	2011	2007
Armenia												
2019	497 (2.7)	3	36 ▲		501 (2.9)	26 ▲	55 ▲		483 (2.9)	25 ▲	41 ▲	
2015	494 (3.5)		33 ▲		475 (3.8)		29 ▲		458 (4.4)		16 ▲	
2011	461 (4.0)				446 (4.0)				442 (3.7)			
Australia												
2019	509 (3.3)	0	-7	-2	516 (2.9)	-5	-3	-6	522 (3.0)	-1	9 ▲	6
2015	509 (3.5)		-7	-2	521 (3.0)		2	-1	523 (3.0)		10 ▲	7
2011	516 (3.4)			5	519 (3.0)			-3	513 (2.7)			-3
2007	511 (4.1)				522 (3.6)				516 (3.7)			
Austria												
2019	540 (2.0)		33 ▲	36 ▲	538 (2.1)		32 ▲	32 ▲	537 (2.4)		24 ▲	31 ▲
2011	507 (2.7)			4	506 (2.8)			0	513 (3.3)			7
2007	504 (2.2)				505 (2.0)				506 (2.4)			
Azerbaijan												
2019	513 (2.3)		40 ▲		519 (3.1)		62 ▲		506 (3.1)		62 ▲	
² 2011	473 (6.5)				457 (6.1)				445 (6.2)			
Bahrain												
2019	478 (2.7)	25 ▲	39 ▲		479 (2.6)	29 ▲	48 ▲		479 (2.5)	32 ▲	40 ▲	
² 2015	453 (1.8)		15 ▲		450 (1.6)		19 ▲		447 (2.0)		8 ▲	
2011	438 (3.8)				431 (3.3)				439 (3.2)			
Belgium (Flemish)												
[†] 2019	546 (2.4)	-8 ▽	-18 ▽		526 (2.0)	-18 ▽	-19 ▽		530 (2.0)	-6	-1	
[†] 2015	554 (2.3)		-10 ▽		544 (2.2)		-2		536 (2.7)		4	
2011	564 (2.0)				546 (2.2)				532 (2.7)			
Bulgaria												
2019	511 (4.1)	-16 ▽			518 (4.5)	-4			509 (5.0)	-11		
2015	527 (5.1)				523 (5.6)				521 (5.8)			
Canada												
^{1,2} 2019	506 (2.1)	1			513 (1.9)	3			513 (2.0)	-8 ▽		
^{1,2} 2015	505 (2.4)				510 (2.3)				521 (2.4)			
Chile												
2019	427 (2.6)	-21 ▽	-28 ▽		446 (3.0)	-17 ▽	-17 ▽		448 (4.0)	-18 ▽	-21 ▽	
2015	449 (2.8)		-7		462 (2.4)		0		466 (2.3)		-3	
2011	455 (2.4)				463 (2.4)				469 (2.5)			
Chinese Taipei												
2019	622 (1.9)	1	23 ▲	36 ▲	600 (1.5)	7 ▲	7 ▲	26 ▲	576 (1.8)	1	-1	5
2015	620 (2.3)		21 ▲	35 ▲	593 (2.1)		0	19 ▲	576 (3.1)		-2	5
2011	599 (2.0)			13 ▲	593 (2.1)			19 ▲	577 (2.5)			6
2007	586 (1.9)				574 (1.9)				571 (2.0)			
Croatia												
2019	508 (2.2)	5	13 ▲		509 (2.3)	11 ▲	26 ▲		510 (2.8)	2	17 ▲	
2015	502 (1.9)		8 ▲		499 (1.9)		15 ▲		507 (2.1)		15 ▲	
² 2011	495 (1.9)				484 (2.0)				492 (2.9)			
Cyprus												
2019	530 (3.3)	11 ▲			536 (3.0)	8			526 (2.9)	8		
2015	519 (2.8)				529 (2.8)				519 (3.1)			
Czech Republic												
2019	528 (3.0)	9 ▲	26 ▲	57 ▲	531 (2.6)	3	20 ▲	38 ▲	541 (2.8)	-2	19 ▲	50 ▲
2015	519 (2.5)		17 ▲	48 ▲	528 (2.4)		16 ▲	35 ▲	544 (3.0)		21 ▲	52 ▲
2011	502 (2.4)			30 ▲	512 (2.8)			19 ▲	523 (2.5)			31 ▲
2007	472 (2.5)				493 (2.9)				491 (3.6)			
Denmark												
[†] 2019	524 (2.2)	-12 ▽	-8 ▽	10 ▲	520 (2.3)	-18 ▽	-19 ▽	-7	535 (2.2)	-13 ▽	-8 ▽	10 ▲
² 2015	536 (3.3)		5	22 ▲	538 (2.8)		-1	11 ▲	548 (3.2)		5	22 ▲
² 2011	531 (2.7)			18 ▲	539 (2.9)			12 ▲	543 (2.7)			17 ▲
[†] 2007	514 (2.7)				527 (2.8)				525 (2.5)			
England												
² 2019	563 (3.3)	9	11 ▲	17 ▲	553 (3.3)	9	11 ▲	11 ▲	554 (3.4)	14 ▲	23 ▲	15 ▲
2015	554 (3.3)		2	8	544 (3.2)		2	3	540 (3.2)		9	1
2011	552 (4.3)			6	542 (3.7)			0	531 (3.8)			-8
2007	546 (3.6)				542 (3.3)				539 (3.4)			

▲ Average from more recent year significantly higher
 ▽ Average from more recent year significantly lower

[◇] Trend reporting in cognitive domains using current methodology began with TIMSS 2007.

See Appendix B.2 for population coverage notes 1, 2, and 3. See Appendix B.5 for sampling guidelines and sampling participation notes †, ‡, and ≡.

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

Exhibit 1.18: Differences in Achievement for Mathematics Cognitive Domains Across Assessment Years^o

(Continued)

Country	Average Scale Score	Knowing			Average Scale Score	Applying			Average Scale Score	Reasoning		
		Differences Between Years				Differences Between Years				Differences Between Years		
		2015	2011	2007		2015	2011	2007		2015	2011	2007
Finland												
2019	531 (2.4)	1	-17 ▽		531 (2.4)	-5	-13 ▽		535 (2.5)	-5	-10 ▽	
2015	530 (2.2)		-18 ▽		536 (2.1)		-8 ▽		540 (3.1)		-5	
2011	548 (2.6)				544 (2.6)				546 (2.3)			
France												
2019	488 (3.3)	3			482 (3.1)	-7			480 (3.3)	-11 ▽		
2015	484 (2.8)				488 (3.1)				491 (3.4)			
Georgia												
¹ 2019	473 (3.9)	8	24 ▲	28 ▲	490 (3.6)	29 ▲	42 ▲	59 ▲	469 (4.5)	17 ▲	19 ▲	36 ▲
¹ 2015	466 (4.0)		16 ▲	21 ▲	461 (4.1)		14 ▲	31 ▲	452 (4.4)		1	19 ▲
¹ 2011	449 (3.7)			4	447 (3.4)			17 ▲	450 (3.3)			18 ▲
¹ 2007	445 (4.4)				430 (4.7)				433 (4.7)			
Germany												
2019	523 (2.3)	0	0	9 ▲	514 (2.5)	-1	-14 ▽	-16 ▽	531 (2.8)	-4	-1	2
2015	524 (2.3)		0	9 ▲	515 (2.2)		-13 ▽	-15 ▽	535 (2.4)		3	5
2011	524 (2.4)			9 ▲	528 (2.3)			-2	532 (3.0)			2
2007	515 (2.1)				530 (2.3)				530 (2.9)			
Hong Kong SAR												
[†] 2019	600 (3.0)	-18 ▽	-19 ▽	-22 ▽	606 (3.3)	-14 ▽	9	0	596 (4.2)	-4	7	0
[†] 2015	618 (3.1)		-1	-4	621 (3.1)		23 ▲	14 ▲	600 (3.2)		11 ▲	4
² 2011	619 (3.4)			-3	597 (3.4)			-9	589 (3.3)			-7
2007	622 (3.8)				606 (3.8)				596 (3.8)			
Hungary												
2019	525 (2.6)	-8	5	14 ▲	521 (2.8)	-5	8	15 ▲	522 (3.0)	-7	8	12 ▲
2015	532 (3.1)		13 ▲	21 ▲	526 (3.3)		13 ▲	20 ▲	529 (3.6)		15 ▲	20 ▲
2011	519 (3.8)			8	513 (3.3)			7	514 (3.7)			5
2007	511 (3.8)				506 (3.8)				510 (4.3)			
Iran, Islamic Rep. of												
2019	436 (3.9)	7	1	32 ▲	450 (4.0)	15 ▲	22 ▲	52 ▲	426 (4.3)	0	4	26 ▲
2015	429 (3.2)		-6	25 ▲	435 (2.9)		7	38 ▲	426 (3.3)		4	26 ▲
2011	435 (4.0)			31 ▲	427 (3.7)			30 ▲	423 (3.2)			22 ▲
2007	404 (3.9)				397 (4.0)				401 (4.3)			
Ireland												
2019	550 (3.0)	-4	11 ▲		551 (2.7)	3	23 ▲		542 (2.5)	7	32 ▲	
2015	554 (2.9)		15 ▲		549 (2.2)		20 ▲		535 (2.7)		26 ▲	
2011	539 (3.1)				529 (2.7)				510 (3.1)			
Italy												
2019	515 (3.0)	4	5	3	517 (2.6)	13 ▲	11 ▲	18 ▲	504 (2.9)	1	-1	-7
² 2015	511 (2.9)		1	-1	504 (2.5)		-2	5	503 (3.3)		-3	-8
2011	510 (2.8)			-3	506 (2.8)			7	505 (3.2)			-5
2007	512 (3.5)				499 (3.1)				511 (3.4)			
Japan												
2019	597 (2.0)	-4	7 ▲	31 ▲	593 (2.0)	4	14 ▲	23 ▲	589 (2.2)	-6	-3	19 ▲
2015	601 (2.4)		11 ▲	35 ▲	589 (2.1)		10 ▲	19 ▲	595 (2.7)		3	26 ▲
2011	590 (1.7)			24 ▲	579 (1.6)			9 ▲	592 (1.9)			22 ▲
2007	567 (2.4)				570 (2.2)				569 (2.3)			
Kazakhstan												
² 2019	510 (2.3)		7		514 (2.7)		15 ▲		507 (2.7)		6	
² 2011	503 (4.7)				499 (5.0)				501 (4.7)			
Korea, Rep. of												
2019	612 (3.6)	-15 ▽	-2		594 (2.5)	-1	-6		596 (2.9)	-22 ▽	-6	
2015	627 (2.9)		13 ▲		595 (2.1)		-5		619 (2.5)		16 ▲	
2011	614 (2.0)				600 (2.2)				603 (2.3)			
Lithuania												
² 2019	535 (2.8)	3	10 ▲	16 ▲	547 (2.7)	10 ▲	7	7	534 (3.3)	-1	-3	5
² 2015	532 (2.5)		7	13 ▲	537 (2.7)		-4	-4	534 (2.8)		-2	6
^{1,2} 2011	525 (2.9)			5	540 (2.4)			0	536 (2.5)			8 ▲
¹ 2007	520 (2.8)				540 (2.7)				529 (2.8)			
Malta												
2019	510 (1.4)		6 ▲		508 (1.2)		10 ▲		508 (1.4)		33 ▲	
2011	504 (1.5)				497 (1.9)				475 (1.7)			
Morocco												
2019	379 (4.4)	3	59 ▲		387 (4.5)	12 ▲	55 ▲		380 (5.2)	1	33 ▲	
2015	377 (3.7)		57 ▲		375 (3.6)		43 ▲		379 (3.6)		32 ▲	
* 2011	320 (4.3)				332 (3.9)				347 (4.2)			

▲ Average from more recent year significantly higher
 ▽ Average from more recent year significantly lower

* Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 25%.

Exhibit 1.18: Differences in Achievement for Mathematics Cognitive Domains Across Assessment Years^o

(Continued)

Country	Average Scale Score	Knowing			Average Scale Score	Applying			Average Scale Score	Reasoning		
		Differences Between Years				Differences Between Years				Differences Between Years		
		2015	2011	2007		2015	2011	2007		2015	2011	2007
Netherlands												
[≡] 2019	534 (2.1)	14 ▲	-3	6	536 (2.2)	5	-4	-4	546 (2.9)	3	2	9 ▲
† 2015	521 (1.8)		-17 ▼	-8 ▼	531 (1.7)		-10 ▼	-10 ▼	543 (2.6)		0	6
† 2011	537 (2.0)			9 ▲	540 (1.7)			0	543 (2.7)			7
‡ 2007	528 (2.3)				540 (2.2)				537 (2.5)			
New Zealand												
² 2019	476 (2.7)	1	0	-8 ▼	487 (2.4)	-10 ▼	-2	-5	501 (2.7)	-2	11 ▲	0
2015	475 (2.6)		-1	-8 ▼	497 (2.5)		7 ▲	4	504 (2.7)		13 ▲	2
2011	476 (3.2)			-7	490 (2.4)			-3	490 (2.5)			-12 ▼
2007	484 (2.7)				493 (2.5)				502 (2.7)			
Northern Ireland												
† 2019	574 (3.3)	-7	-5		565 (2.8)	-11 ▼	0		558 (2.9)	9 ▲	20 ▲	
‡ 2015	582 (3.9)		2		575 (3.2)		11 ▲		550 (3.3)		12 ▲	
† 2011	580 (3.4)				565 (2.9)				538 (3.4)			
Norway (5)												
† 2019	541 (2.3)	-4			540 (2.3)	-10 ▼			551 (2.9)	-5		
2015	544 (3.1)				550 (2.6)				556 (2.9)			
Oman												
2019	424 (4.4)	2	44 ▲		434 (3.5)	6	52 ▲		424 (3.7)	5	34 ▲	
2015	422 (2.7)		43 ▲		428 (2.4)		46 ▲		420 (2.4)		29 ▲	
ψ 2011	380 (3.2)				382 (2.9)				391 (2.7)			
Poland												
2019	509 (2.7)	-8 ▼			521 (2.8)	-20 ▼			527 (2.8)	-19 ▼		
2015	517 (2.4)				541 (2.1)				546 (2.3)			
Portugal												
² 2019	523 (2.8)	-24 ▼	-8		528 (2.6)	-12 ▼	-6		519 (2.9)	-12 ▼	-11 ▼	
² 2015	548 (2.6)		17 ▲		540 (2.4)		6		532 (2.3)		1	
2011	531 (3.3)				534 (3.7)				531 (3.7)			
Qatar												
2019	447 (3.6)	3	36 ▲		453 (3.4)	19 ▲	42 ▲		440 (3.5)	9	24 ▲	
2015	444 (3.4)		33 ▲		434 (3.5)		23 ▲		431 (4.4)		15 ▲	
² 2011	411 (3.7)				411 (3.4)				416 (4.4)			
Russian Federation												
² 2019	555 (3.0)	-2	14 ▲	16 ▲	571 (3.6)	4	31 ▲	22 ▲	573 (3.6)	3	25 ▲	29 ▲
2015	556 (3.4)		16 ▲	18 ▲	566 (3.7)		27 ▲	18 ▲	570 (4.0)		22 ▲	26 ▲
2011	541 (3.4)			2	539 (3.9)			-9	548 (3.4)			4
2007	539 (5.0)				549 (5.2)				544 (5.1)			
Serbia												
² 2019	504 (3.3)	-9	-16 ▼		509 (3.5)	-12 ▼	-2		503 (3.7)	-14 ▼	-11 ▼	
³ 2015	513 (3.5)		-7		521 (3.4)		10 ▲		517 (3.8)		2	
² 2011	520 (3.0)				511 (3.2)				514 (3.9)			
Singapore												
³ 2019	640 (3.9)	10	11 ▲	15 ▲	626 (3.9)	6	24 ▲	29 ▲	614 (4.0)	11	26 ▲	30 ▲
² 2015	631 (4.0)		2	5	619 (4.0)		17 ▲	23 ▲	603 (4.5)		15 ▲	19 ▲
² 2011	629 (3.6)			4	602 (3.4)			5	588 (3.7)			4
2007	625 (4.2)				597 (4.1)				584 (4.0)			
Slovak Republic												
² 2019	502 (3.3)	11 ▲	-5	10	508 (3.4)	11 ▲	3	12 ▲	522 (3.5)	6	11 ▲	23 ▲
2015	491 (2.4)		-16 ▼	-1	497 (2.5)		-9	1	515 (2.9)		5	17 ▲
2011	506 (3.7)			15 ▲	505 (3.9)			9	511 (3.8)			12 ▲
2007	491 (4.4)				496 (4.4)				499 (4.8)			
South Africa (5)												
2019	372 (3.7)	-5			375 (3.6)	-1			370 (3.8)	1		
2015	378 (3.6)				377 (3.4)				369 (3.5)			
Spain												
2019	499 (2.4)	-6	17 ▲		506 (1.9)	1	22 ▲		497 (2.0)	-5	14 ▲	
² 2015	505 (2.4)		23 ▲		505 (2.4)		22 ▲		502 (2.5)		19 ▲	
2011	482 (3.4)				483 (3.1)				483 (2.9)			
Sweden												
2019	515 (3.1)	15 ▲	26 ▲	32 ▲	518 (2.8)	-3	10 ▲	12 ▲	536 (2.9)	-6	16 ▲	16 ▲
² 2015	501 (3.4)		12 ▲	18 ▲	521 (2.7)		14 ▲	16 ▲	542 (3.3)		22 ▲	22 ▲
2011	489 (2.2)			6	507 (2.2)			2	520 (2.9)			0
2007	483 (2.6)				506 (2.4)				519 (2.8)			

▲ Average from more recent year significantly higher
 ▼ Average from more recent year significantly lower

ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

Exhibit 1.18: Differences in Achievement for Mathematics Cognitive Domains Across Assessment Years^o

(Continued)

Country	Average Scale Score	Knowing			Average Scale Score	Applying			Average Scale Score	Reasoning		
		Differences Between Years				Differences Between Years				Differences Between Years		
		2015	2011	2007		2015	2011	2007		2015	2011	2007
United Arab Emirates												
2019	479 (1.6)	26 ▲	42 ▲		484 (1.7)	32 ▲	54 ▲		474 (1.7)	29 ▲	41 ▲	
2015	453 (2.7)		16 ▲		452 (2.5)		22 ▲		445 (2.4)		11 ▲	
2011	437 (2.2)				430 (2.0)				434 (2.3)			
United States												
^{2†} 2019	536 (2.6)	-11 ▽	-19 ▽	-5	537 (2.6)	0	-1	13 ▲	524 (2.5)	-7	-2	-1
^{2†} 2015	547 (2.3)		-8 ▽	6	537 (2.4)		-2	13 ▲	531 (2.5)		5	6
² 2011	556 (2.1)			14 ▲	539 (2.1)			15 ▲	525 (2.1)			1
^{2†} 2007	541 (2.8)				524 (2.8)				525 (2.4)			
Benchmarking Participants												
Ontario, Canada												
² 2019	504 (3.7)	-1	-6	6	514 (3.4)	1	-7	0	516 (3.5)	-9 ▽	-6	-11 ▽
2015	505 (2.5)		-5	7	513 (2.3)		-8	0	524 (2.6)		3	-2
2011	510 (3.4)			11 ▲	521 (3.4)			8	522 (3.1)			-5
² 2007	498 (3.5)				513 (3.3)				526 (3.1)			
Quebec, Canada												
2019	535 (2.7)	-7	-1	16 ▲	533 (2.3)	1	4	17 ▲	524 (2.8)	-13 ▽	-10 ▽	1
[≡] 2015	542 (4.3)		6	23 ▲	533 (4.1)		3	17 ▲	536 (4.9)		2	14 ▲
2011	536 (2.4)			18 ▲	529 (2.4)			13 ▲	534 (2.5)			12 ▲
² 2007	519 (3.3)				516 (3.1)				523 (3.2)			
Abu Dhabi, UAE												
2019	439 (2.0)	21 ▲	21 ▲		442 (2.0)	20 ▲	29 ▲		435 (2.4)	21 ▲	16 ▲	
^{2ψ} 2015	418 (5.1)		0		422 (4.8)		9		414 (4.4)		-5	
2011	418 (4.9)				413 (4.7)				418 (4.5)			
Dubai, UAE												
² 2019	542 (1.8)	29 ▲	71 ▲	88 ▲	547 (1.6)	37 ▲	82 ▲	111 ▲	538 (1.8)	31 ▲	74 ▲	97 ▲
2015	514 (2.0)		42 ▲	60 ▲	510 (1.8)		45 ▲	74 ▲	507 (1.7)		44 ▲	66 ▲
2011	472 (2.4)			18 ▲	465 (2.3)			29 ▲	464 (2.2)			23 ▲
[‡] 2007	454 (2.5)				436 (2.2)				441 (3.0)			

▲ Average from more recent year significantly higher
 ▽ Average from more recent year significantly lower

^ψ Reservations about reliability because the percentage of students with achievement too low for estimation exceeds 15% but does not exceed 25%.

SOURCE: IEA's Trends in International Mathematics and Science Study - TIMSS 2019
 Downloaded from <http://timss2019.org/download>