

Exhibit 1.15: Differences in Achievement for Mathematics Content 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	Number				Measurement and Geometry				Data			
	Average Scale Score	Differences Between Years			Average Scale Score	Differences Between Years			Average Scale Score	Differences Between Years		
		2015	2011	2007		2015	2011	2007		2015	2011	2007
Armenia												
2019	518 (2.3)	8 ▲	34 ▲		490 (3.0)	46 ▲	66 ▲		446 (4.2)	39 ▲	61 ▲	
2015	510 (3.0)		26 ▲		444 (4.6)		20 ▲		407 (5.1)		21 ▲	
2011	484 (3.1)				424 (4.3)				386 (5.0)			
Australia												
2019	506 (3.1)	-3	-2	3	516 (3.3)	-11 ▽	-18 ▽	-20 ▽	534 (3.4)	2	19 ▲	2
2015	509 (3.1)		1	6	527 (3.3)		-7	-9	533 (3.6)		17 ▲	0
2011	508 (3.2)			5	534 (3.0)			-3	515 (3.1)			-17 ▽
2007	503 (3.6)				536 (3.6)				532 (4.3)			
Austria												
2019	542 (1.9)		36 ▲	36 ▲	542 (2.4)		30 ▲	36 ▲	528 (2.7)		13 ▲	27 ▲
2011	506 (2.4)			0	512 (3.4)			6	515 (3.2)			13 ▲
2007	506 (2.1)				506 (2.6)				502 (3.4)			
Azerbaijan												
2019	526 (2.7)		35 ▲		503 (3.2)		66 ▲		504 (3.0)		96 ▲	
² 2011	491 (5.2)				437 (7.2)				407 (6.3)			
Bahrain												
2019	478 (2.6)	26 ▲	39 ▲		474 (2.6)	27 ▲	52 ▲		483 (3.3)	29 ▲	41 ▲	
² 2015	453 (1.7)		14 ▲		447 (1.9)		25 ▲		454 (2.3)		12 ▲	
2011	439 (3.1)				422 (3.8)				442 (4.0)			
Belgium (Flemish)												
[†] 2019	526 (2.0)	-17 ▽	-25 ▽		551 (2.0)	-13 ▽	-1		527 (2.2)	3	-10 ▽	
[†] 2015	543 (2.1)		-8 ▽		564 (2.3)		11 ▲		523 (3.0)		-13 ▽	
2011	552 (2.1)				552 (1.9)				536 (2.8)			
Bulgaria												
2019	521 (4.0)	-8			522 (4.9)	-3			490 (5.6)	-15		
2015	529 (4.6)				525 (5.9)				504 (7.6)			
Canada												
^{1,2} 2019	505 (2.1)	2			511 (1.8)	-6 ▽			523 (2.4)	-6		
^{1,2} 2015	503 (2.4)				517 (2.5)				528 (2.7)			
Chinese Taipei												
2019	599 (1.7)	0	0	17 ▲	607 (1.8)	11 ▲	35 ▲	42 ▲	590 (2.4)	-1	-10 ▽	14 ▲
2015	599 (1.8)		0	17 ▲	597 (3.0)		24 ▲	31 ▲	591 (2.2)		-9 ▽	15 ▲
2011	599 (2.0)			17 ▲	573 (2.1)			7 ▲	600 (2.6)			24 ▲
2007	583 (1.8)				566 (2.7)				576 (2.4)			
Croatia												
2019	512 (1.9)	14 ▲	21 ▲		518 (2.7)	5	28 ▲		494 (2.7)	-4	6	
2015	498 (1.8)		7 ▲		512 (2.3)		22 ▲		498 (3.0)		10 ▲	
² 2011	491 (1.9)				490 (2.5)				488 (2.9)			
Cyprus												
2019	538 (2.8)	10 ▲			526 (3.1)	2			524 (3.4)	16 ▲		
2015	528 (2.5)				524 (2.8)				507 (3.8)			
Czech Republic												
2019	536 (2.4)	8 ▲	27 ▲	49 ▲	540 (2.9)	9 ▲	27 ▲	53 ▲	518 (2.9)	-7	-1	36 ▲
2015	528 (2.4)		19 ▲	42 ▲	531 (2.5)		18 ▲	44 ▲	525 (3.0)		6	43 ▲
2011	509 (2.5)			23 ▲	513 (3.0)			26 ▲	519 (2.9)			37 ▲
2007	486 (2.7)				487 (3.2)				482 (4.1)			
Denmark												
[†] 2019	518 (2.1)	-17 ▽	-16 ▽	4	536 (2.4)	-19 ▽	-12 ▽	-9 ▽	525 (2.3)	-1	-6	-1
² 2015	535 (2.7)		1	21 ▲	555 (3.2)		7	10 ▲	526 (3.5)		-6	-1
² 2011	534 (2.5)			21 ▲	548 (3.1)			2	532 (2.9)			5
[†] 2007	513 (2.7)				546 (3.1)				527 (4.0)			
England												
² 2019	559 (3.3)	12 ▲	20 ▲	24 ▲	545 (3.3)	3	0	-6	565 (3.1)	13 ▲	15 ▲	14 ▲
2015	547 (3.2)		8	11 ▲	542 (3.3)		-3	-9 ▽	552 (3.2)		3	2
2011	539 (3.7)			4	545 (3.8)			-6	549 (4.6)			-1
2007	535 (3.2)				552 (3.3)				551 (3.3)			

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

◇ Trend reporting in content 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 1.15: Differences in Achievement for Mathematics Content Domains Across Assessment Years⁰

(Continued)

Country	Average Scale Score	Number			Measurement and Geometry			Data				
		Differences Between Years			Differences Between Years			Differences Between Years				
		2015	2011	2007	2015	2011	2007	2015	2011	2007		
Finland												
2019	528 (2.3)	-4	-17 ▽		538 (3.0)	-1	-5		534 (2.8)	-8	-17 ▽	
2015	532 (2.1)		-14 ▽		539 (2.5)		-4		542 (3.3)		-9	
2011	545 (2.4)				543 (3.0)				551 (3.7)			
France												
2019	480 (3.2)	-3			498 (3.3)	-6			476 (3.4)	0		
2015	483 (3.0)				503 (3.0)				476 (3.1)			
Georgia												
¹ 2019	501 (3.6)	18 ▲	28 ▲	30 ▲	470 (4.1)	41 ▲	58 ▲	74 ▲	444 (4.6)	10	12	54 ▲
¹ 2015	483 (3.5)		10 ▲	12 ▲	429 (4.6)		17 ▲	33 ▲	435 (4.4)		2	45 ▲
¹ 2011	473 (3.2)			2	411 (4.2)			16 ▲	433 (4.2)			43 ▲
¹ 2007	470 (3.7)				395 (5.9)				390 (5.4)			
Germany												
2019	517 (2.1)	2	-3	-7 ▽	531 (2.6)	0	-5	4	515 (3.1)	-20 ▽	-31 ▽	-17 ▽
2015	515 (2.1)		-5	-9 ▽	531 (2.5)		-5	4	535 (2.6)		-11 ▽	3
2011	520 (2.3)			-4	536 (2.7)			9 ▲	546 (2.8)			14 ▲
2007	524 (2.2)				527 (2.4)				532 (3.7)			
Hong Kong SAR												
[†] 2019	598 (3.6)	-18 ▽	-6	-10	608 (3.1)	-9	3	-5	607 (3.6)	-4	13 ▲	6
[†] 2015	616 (3.1)		12 ▲	9	617 (3.4)		12 ▲	3	611 (3.8)		18 ▲	10 ▲
² 2011	604 (3.3)			-4	605 (3.4)			-9	593 (3.7)			-7
2007	608 (3.7)				613 (3.8)				600 (3.3)			
Hungary												
2019	531 (2.6)	-1	16 ▲	16 ▲	519 (3.3)	-17 ▽	-1	13 ▲	508 (3.2)	-5	-2	11 ▲
2015	531 (3.0)		16 ▲	16 ▲	536 (3.6)		16 ▲	29 ▲	513 (3.6)		3	16 ▲
2011	515 (3.3)			0	520 (3.7)			14 ▲	510 (4.1)			13 ▲
2007	515 (3.4)				507 (3.9)				497 (4.3)			
Iran, Islamic Rep. of												
2019	446 (4.0)	11 ▲	6	39 ▲	445 (3.6)	17 ▲	11 ▲	37 ▲	424 (3.8)	9	27 ▲	51 ▲
2015	435 (3.2)		-5	28 ▲	428 (3.5)		-7	19 ▲	416 (3.2)		18 ▲	42 ▲
2011	440 (3.3)			32 ▲	435 (3.7)			26 ▲	397 (4.2)			24 ▲
2007	407 (3.5)				408 (4.0)				374 (5.1)			
Ireland												
2019	555 (2.7)	4	22 ▲		540 (2.7)	-2	20 ▲		543 (3.0)	-5	20 ▲	
2015	551 (2.2)		18 ▲		542 (2.9)		22 ▲		548 (3.8)		25 ▲	
2011	533 (2.6)				520 (3.1)				523 (3.0)			
Italy												
2019	522 (2.5)	12 ▲	12 ▲	12 ▲	510 (3.2)	7	-2	4	498 (3.0)	0	4	0
² 2015	510 (2.4)		0	0	503 (2.8)		-9 ▽	-3	498 (2.9)		3	-1
2011	510 (2.7)			0	513 (3.2)			6	495 (3.2)			-4
2007	510 (2.9)				507 (3.6)				499 (4.0)			
Japan												
2019	586 (1.8)	-6 ▽	2	22 ▲	601 (2.7)	0	12 ▲	26 ▲	606 (2.1)	12 ▲	16 ▲	18 ▲
2015	592 (1.9)		8 ▲	28 ▲	601 (2.5)		12 ▲	26 ▲	593 (2.6)		4	6
2011	584 (1.7)			20 ▲	589 (1.9)			14 ▲	590 (3.0)			2
2007	564 (2.1)				575 (2.7)				588 (3.5)			
Kazakhstan												
² 2019	523 (2.4)		8		513 (2.8)		22 ▲		481 (3.0)		5	
² 2011	515 (4.1)				491 (5.4)				476 (5.5)			
Korea, Rep. of												
2019	593 (2.4)	-16 ▽	-12 ▽		608 (2.6)	-3	0		602 (2.5)	-4	-1	
2015	610 (2.6)		4		610 (2.3)		3		607 (2.6)		4	
2011	606 (2.0)				607 (2.0)				603 (1.8)			
Lithuania												
² 2019	538 (2.8)	0	1	2	543 (3.0)	18 ▲	12 ▲	25 ▲	545 (3.0)	5	18 ▲	16 ▲
² 2015	538 (2.6)		1	2	526 (3.0)		-5	7	540 (3.6)		14 ▲	11 ▲
^{1,2} 2011	537 (2.4)			1	531 (2.9)			12 ▲	526 (2.8)			-3
¹ 2007	536 (2.2)				518 (3.1)				529 (3.7)			
Malta												
2019	512 (1.5)		14 ▲		497 (1.8)		10 ▲		512 (1.8)		14 ▲	
2011	498 (1.9)				487 (1.5)				498 (1.7)			
Morocco												
2019	383 (4.4)	2	43 ▲		386 (4.5)	1	36 ▲		374 (5.3)	24 ▲	104 ▲	
2015	381 (3.3)		41 ▲		385 (3.8)		35 ▲		351 (4.2)		80 ▲	
* 2011	340 (4.0)				350 (3.8)				271 (4.7)			

▲ 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 1.15: Differences in Achievement for Mathematics Content Domains Across Assessment Years⁰

(Continued)

Country	Average Scale Score	Number			Measurement and Geometry			Data				
		Differences Between Years			Differences Between Years			Differences Between Years				
		2015	2011	2007	2015	2011	2007	2015	2011	2007		
Netherlands												
[≡] 2019	533 (2.2)	2	-10 ▽	-6	537 (2.2)	15 ▲	13 ▲	15 ▲	549 (3.0)	11 ▲	-10 ▽	4
† 2015	531 (2.2)		-12 ▽	-8 ▽	522 (1.9)		-2	0	539 (3.4)		-20 ▽	-6
† 2011	543 (1.7)			4	524 (2.9)			2	559 (2.8)			14 ▲
‡ 2007	539 (2.2)				522 (2.6)				545 (2.8)			
New Zealand												
² 2019	478 (2.9)	-7	-4	-7	481 (2.7)	-7	-2	-14 ▽	504 (3.1)	-2	13 ▲	-3
2015	485 (2.7)		3	0	489 (2.8)		6	-7	506 (2.9)		15 ▲	0
2011	483 (2.7)			-3	483 (2.6)			-12 ▽	491 (2.8)			-15 ▽
2007	485 (2.6)				495 (2.5)				506 (3.0)			
Northern Ireland												
† 2019	572 (3.1)	-2	6		556 (3.0)	-10 ▽	-4		564 (2.5)	-3	9 ▲	
‡ 2015	574 (3.1)		8		566 (3.3)		6		567 (3.8)		12 ▲	
† 2011	566 (2.9)				560 (3.2)				555 (2.9)			
Norway (5)												
† 2019	540 (2.0)	-2			546 (2.8)	-12 ▽			547 (3.2)	-19 ▽		
2015	542 (2.4)				559 (3.5)				566 (3.0)			
Oman												
2019	424 (4.0)	1	40 ▲		429 (4.2)	-2	52 ▲		433 (3.8)	19 ▲	52 ▲	
2015	423 (2.6)		39 ▲		430 (2.9)		54 ▲		414 (2.6)		33 ▲	
ψ 2011	384 (3.1)				376 (3.2)				381 (3.0)			
Poland												
2019	513 (2.8)	-22 ▽			529 (2.7)	-4			524 (2.9)	-14 ▽		
2015	534 (2.3)				534 (2.5)				538 (2.8)			
Portugal												
² 2019	524 (2.9)	-16 ▽	2		520 (2.9)	-19 ▽	-28 ▽		528 (2.6)	-18 ▽	-20 ▽	
² 2015	541 (2.1)		18 ▲		539 (2.6)		-9		546 (2.8)		-2	
2011	522 (3.6)				548 (4.0)				548 (2.9)			
Qatar												
2019	455 (3.4)	9	38 ▲		434 (3.4)	11 ▲	36 ▲		445 (3.8)	10	29 ▲	
2015	446 (3.4)		29 ▲		423 (4.4)		24 ▲		435 (3.9)		19 ▲	
² 2011	417 (3.4)				399 (4.0)				416 (4.7)			
Russian Federation												
² 2019	567 (3.4)	1	23 ▲	18 ▲	571 (3.7)	14 ▲	29 ▲	28 ▲	560 (3.9)	-13 ▽	27 ▲	31 ▲
2015	567 (3.3)		22 ▲	18 ▲	557 (4.4)		15 ▲	14	573 (3.6)		40 ▲	44 ▲
2011	545 (3.3)			-4	542 (4.2)			-1	533 (4.0)			4
2007	549 (4.4)				543 (6.2)				529 (6.2)			
Serbia												
² 2019	518 (2.9)	-6	-11 ▽		499 (3.7)	-4	2		489 (4.2)	-28 ▽	-13 ▽	
³ 2015	524 (3.4)		-5		503 (3.8)		6		517 (3.8)		14 ▲	
² 2011	529 (3.0)				497 (3.7)				503 (3.7)			
Singapore												
³ 2019	635 (4.0)	5	16 ▲	24 ▲	620 (3.9)	13 ▲	31 ▲	36 ▲	613 (3.8)	14 ▲	26 ▲	16 ▲
² 2015	630 (4.2)		11 ▲	18 ▲	607 (4.2)		18 ▲	24 ▲	600 (4.1)		12 ▲	3
² 2011	619 (3.4)			8	589 (3.6)			5	588 (3.3)			-9
2007	611 (4.0)				584 (4.2)				597 (3.7)			
Slovak Republic												
² 2019	512 (3.6)	10 ▲	1	12 ▲	506 (3.7)	15 ▲	6	11	506 (4.1)	10	2	23 ▲
2015	502 (2.4)		-9 ▽	2	491 (2.6)		-9	-3	496 (3.8)		-8	14 ▲
2011	511 (3.7)			11 ▲	500 (4.2)			6	504 (4.6)			22 ▲
2007	500 (4.0)				494 (5.3)				482 (5.6)			
South Africa (5)												
2019	370 (3.6)	-8			362 (3.7)	3			390 (3.8)	9		
2015	379 (3.4)				359 (3.7)				381 (4.0)			
Spain												
2019	506 (1.9)	2	20 ▲		494 (2.2)	-9 ▽	17 ▲		499 (2.6)	-9 ▽	20 ▲	
² 2015	504 (2.5)		18 ▲		503 (2.8)		26 ▲		509 (3.1)		30 ▲	
2011	487 (2.9)				476 (2.9)				479 (3.6)			
Sweden												
2019	517 (2.9)	3	17 ▲	22 ▲	521 (3.4)	-1	22 ▲	18 ▲	527 (3.5)	-2	4	0
² 2015	514 (2.7)		14 ▲	19 ▲	523 (3.3)		23 ▲	19 ▲	529 (3.9)		6	2
2011	500 (2.2)			5	500 (2.4)			-4	523 (3.0)			-4
2007	495 (2.5)				503 (2.9)				527 (3.4)			

▲ 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 1.15: Differences in Achievement for Mathematics Content Domains Across Assessment Years⁰

(Continued)

Country	Average Scale Score	Number			Measurement and Geometry			Data				
		Differences Between Years			Differences Between Years			Differences Between Years				
		2015	2011	2007	2015	2011	2007	2015	2011	2007		
United Arab Emirates												
2019	485 (1.7)	30 ▲	47 ▲		472 (1.8)	30 ▲	54 ▲		476 (1.8)	23 ▲	39 ▲	
2015	455 (2.4)		17 ▲		442 (2.7)		24 ▲		453 (2.4)		16 ▲	
2011	438 (2.1)				418 (2.2)				437 (1.9)			
United States												
² † 2019	542 (2.6)	-3	-1	13 ▲	520 (2.6)	-6	-15 ▽	-2	533 (3.0)	-7	-12 ▽	-13 ▽
² † 2015	546 (2.2)		3	16 ▲	525 (2.6)		-9 ▽	3	540 (2.8)		-4	-5
² 2011	543 (2.0)			13 ▲	535 (2.2)			13 ▲	545 (1.8)			-1
² † 2007	529 (2.6)				522 (3.0)				546 (2.8)			
Benchmarking Participants												
Ontario, Canada												
² 2019	501 (3.6)	2	-2	6	516 (3.2)	-10 ▽	-19 ▽	-14 ▽	527 (4.0)	-9	-9	-18 ▽
2015	500 (2.6)		-4	4	526 (2.9)		-9	-3	536 (2.6)		-1	-9
2011	504 (3.4)			9	535 (3.5)			5	536 (3.6)			-9
² 2007	495 (3.5)				530 (3.7)				545 (4.0)			
Quebec, Canada												
2019	530 (2.4)	-3	-2	14 ▲	532 (2.6)	-11 ▽	-4	8	535 (3.1)	-6	-3	12 ▲
[≡] 2015	533 (4.2)		1	17 ▲	542 (4.6)		6	18 ▲	541 (5.0)		4	18 ▲
2011	531 (2.6)			16 ▲	536 (3.2)			12 ▲	538 (3.7)			15 ▲
² 2007	515 (3.0)				524 (3.8)				523 (4.4)			
Abu Dhabi, UAE												
2019	443 (2.0)	21 ▲	23 ▲		429 (2.1)	18 ▲	28 ▲		435 (2.3)	12 ▲	17 ▲	
² ψ 2015	422 (4.7)		2		412 (5.1)		10		423 (4.8)		5	
2011	420 (4.7)				401 (5.3)				418 (4.4)			
Dubai, UAE												
² 2019	548 (1.7)	34 ▲	74 ▲	95 ▲	535 (2.1)	33 ▲	86 ▲	112 ▲	546 (2.0)	30 ▲	75 ▲	102 ▲
2015	514 (1.5)		40 ▲	61 ▲	503 (1.9)		54 ▲	79 ▲	517 (1.7)		45 ▲	73 ▲
2011	474 (1.7)			21 ▲	449 (2.3)			26 ▲	471 (3.1)			27 ▲
‡ 2007	452 (2.1)				424 (3.4)				444 (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%.

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