

Exhibit 3.8: Differences in Achievement for Mathematics 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
Australia									
2015	504 (3.1)	0	15 ▲	502 (3.0)	-4	4	512 (3.1)	6	9
2011	504 (5.2)		14 ▲	506 (4.9)		8	506 (5.2)		3
2007	490 (3.9)			498 (3.8)			503 (4.0)		
Bahrain									
2015	463 (2.3)	52 ▲	74 ▲	445 (1.7)	45 ▲	45 ▲	452 (2.2)	37 ▲	46 ▲
ψ**	2011	411 (2.4)		23 ▲	400 (2.4)		0	415 (2.1)	9 ▲
	2007	389 (1.8)			400 (2.4)			406 (2.4)	
Botswana (9)									
ψ	2015	394 (3.0)	-10 ▼		385 (2.3)	2		389 (2.0)	-9 ▼
ψ	2011	404 (2.7)			383 (2.8)			398 (2.4)	
Chile									
ψ	2015	423 (3.4)	17 ▲		427 (3.3)	2		432 (3.3)	10 ▲
	2011	405 (2.9)			425 (2.6)			422 (2.9)	
Chinese Taipei									
2015	598 (2.9)	-13 ▼	-6	602 (2.5)	-12 ▼	5	602 (2.5)	-7	0
2011	611 (3.6)		7	614 (3.4)		17 ▲	609 (3.4)		7
2007	604 (5.0)			597 (4.8)			602 (4.4)		
Egypt									
ψ	2015	399 (4.3)		14 ▲	385 (3.9)		-6	379 (4.3)	-7
	2007	385 (3.7)			391 (3.9)			386 (3.7)	
England									
2015	513 (4.1)	12	5	519 (4.1)	11	6	522 (4.4)	12	4
‡	2011	501 (5.5)		-6	508 (5.6)		-5	510 (5.6)	-8
†	2007	508 (4.7)			514 (5.1)			518 (5.1)	
Georgia									
^{1 2}	2015	456 (4.1)	18 ▲	37 ▲	454 (3.6)	30 ▲	55 ▲	441 (4.5)	27 ▲
¹	2011	438 (4.1)		19 ▲	425 (3.8)		26 ▲	414 (4.0)	30 ▲
¹	2007	419 (6.1)			399 (5.9)			383 (6.1)	
Hong Kong SAR									
2015	600 (5.1)	9	17 ▲	595 (4.5)	8	23 ▲	591 (5.1)	11	24 ▲
2011	591 (4.1)		8	587 (3.8)		15 ▲	580 (4.0)		13
†	2007	583 (6.0)			572 (6.2)			567 (6.1)	
Hungary									
2015	511 (3.9)	4	-10	516 (3.8)	11 ▲	3	515 (3.9)	13 ▲	0
2011	507 (3.9)		-15 ▼	505 (3.6)		-9	502 (3.8)		-13 ▼
2007	522 (3.7)			513 (3.5)			515 (3.7)		
Iran, Islamic Rep. of									
ψ	2015	435 (4.9)	25 ▲	38 ▲	434 (4.4)	23 ▲	35 ▲	436 (4.7)	8
ψ	2011	410 (4.4)		13 ▲	411 (4.6)		12	428 (4.3)	11
	2007	397 (4.3)			399 (4.4)			417 (3.9)	
Israel									
³	2015	511 (4.2)	-5		512 (4.0)	-1		510 (4.4)	-10
³	2011	516 (4.2)			513 (4.4)			520 (4.2)	
Italy									
²	2015	489 (2.7)	-5	15 ▲	495 (2.6)	-8 ▼	13 ▲	500 (2.8)	4
	2011	494 (2.7)		20 ▲	503 (2.3)		20 ▲	496 (2.6)	14 ▲
	2007	474 (3.4)			482 (3.0)			482 (3.4)	
Japan									
2015	578 (2.6)	20 ▲	9 ▲	592 (2.3)	17 ▲	23 ▲	591 (2.6)	12 ▲	14 ▲
2011	558 (2.8)		-11 ▼	574 (2.5)		6	579 (3.0)		2
2007	569 (2.9)			568 (2.3)			577 (2.6)		

▲ 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.

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

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 Mathematics 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	
Jordan										
ⵛ	2015	391 (3.2)	-14 ▼	-35 ▼	378 (3.2)	-19 ▼	-43 ▼	380 (3.3)	-36 ▼	-55 ▼
ψ	2011	405 (4.2)		-20 ▼	397 (3.7)		-24 ▼	416 (4.0)		-19 ▼
	2007	425 (4.5)			421 (4.5)			434 (4.1)		
Kazakhstan										
	2015	533 (6.3)	44 ▲		527 (5.4)	43 ▲		525 (5.5)	42 ▲	
	2011	489 (4.4)			484 (4.3)			482 (4.9)		
Korea, Rep. of										
	2015	607 (2.8)	-9 ▼	-1	606 (2.8)	-10 ▼	6	608 (2.7)	-5	15 ▲
	2011	616 (3.1)		8	617 (2.8)		16 ▲	612 (2.6)		20 ▲
	2007	608 (3.1)			600 (2.8)			592 (2.5)		
Kuwait										
ψ	2015	381 (3.8)		37 ▲	371 (4.1)		13 ▲	353 (4.2)		11 ▲
ⵛ	2007	344 (3.4)			358 (2.5)			342 (3.5)		
Lebanon										
	2015	456 (3.8)	-8	-1	439 (3.9)	3	-8	406 (4.5)	-20 ▼	-17 ▼
	2011	464 (3.9)		7	436 (4.1)		-11	426 (4.6)		3
	2007	457 (4.2)			447 (4.5)			423 (4.7)		
Lithuania										
²	2015	503 (3.2)	1	-6	521 (2.8)	14 ▲	10 ▲	502 (3.2)	10 ▲	15 ▲
¹	2011	502 (2.6)		-8 ▼	508 (2.4)		-3	493 (2.6)		6
¹	2007	509 (2.7)			511 (2.5)			487 (2.8)		
Malaysia										
	2015	472 (3.8)	28 ▲	-1	463 (3.6)	24 ▲	-14 ▼	453 (3.7)	27 ▲	-13 ▼
	2011	444 (5.8)		-29 ▼	439 (5.3)		-38 ▼	426 (5.6)		-40 ▼
	2007	473 (5.4)			477 (5.2)			466 (4.6)		
Malta										
	2015	499 (1.5)		9 ▲	493 (1.5)		3	484 (2.2)		10 ▲
	2007	490 (2.2)			491 (1.3)			474 (1.2)		
Morocco										
ⵛ	2015	382 (2.4)	19 ▲		385 (2.2)	7 ▲		374 (2.8)	17 ▲	
ⵛ	2011	363 (2.3)			378 (2.0)			357 (2.8)		
New Zealand										
†	2015	488 (3.4)	7		493 (3.3)	2		499 (3.5)	5	
	2011	481 (5.7)			491 (5.2)			494 (5.5)		
Norway (8)										
	2015	476 (2.6)	12 ▲	19 ▲	492 (2.3)	12 ▲	17 ▲	488 (2.3)	10 ▲	14 ▲
	2011	465 (2.4)		8 ▲	480 (2.7)		5	478 (3.0)		4
	2007	457 (2.0)			475 (2.5)			474 (2.5)		
Oman										
ψ	2015	401 (3.1)	37 ▲	36 ▲	401 (2.5)	41 ▲	36 ▲	402 (3.1)	33 ▲	14 ▲
ψ	2011	365 (3.0)		-1	360 (3.0)		-5	369 (3.0)		-20 ▼
	2007	366 (3.6)			365 (3.1)			389 (3.1)		

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

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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	
Qatar										
ψ	2015	440 (3.1)	22 ▲		435 (2.9)	39 ▲		431 (2.8)	25 ▲	
ψ	2011	418 (3.0)			396 (3.4)			406 (3.6)		
Russian Federation										
	2015	543 (5.6)	-5	22 ▲	541 (4.6)	3	31 ▲	528 (5.0)	-4	28 ▲
²	2011	548 (3.8)		28 ▲	538 (3.6)		28 ▲	531 (3.8)		32 ▲
	2007	521 (4.5)			510 (3.9)			499 (4.0)		
Saudi Arabia										
Ж	2015	359 (4.9)	-42 ▼		364 (4.2)	-11		374 (4.0)	-13 ▼	
ψ	2011	402 (4.8)			375 (4.8)			388 (4.9)		
Singapore										
²	2015	633 (3.4)	16 ▲	41 ▲	619 (3.2)	7	22 ▲	616 (3.7)	12 ▲	27 ▲
²	2011	617 (3.9)		25 ▲	613 (4.0)		16 ▲	604 (4.3)		15 ▲
	2007	592 (3.7)			597 (3.9)			589 (4.5)		
Slovenia										
	2015	518 (2.4)	10 ▲	17 ▲	514 (2.1)	12 ▲	12 ▲	516 (2.7)	16 ▲	19 ▲
	2011	508 (2.4)		7 ▲	502 (2.1)		0	500 (2.7)		3
	2007	501 (2.5)			502 (2.2)			497 (2.8)		
South Africa (9)										
Ж	2015	371 (5.2)	19 ▲		362 (4.6)	26 ▲		383 (4.2)	20 ▲	
Ж	2011	352 (2.3)			336 (2.7)			363 (2.5)		
Sweden										
	2015	484 (2.8)	7	4	507 (2.8)	17 ▲	12 ▲	509 (3.5)	32 ▲	17 ▲
	2011	478 (2.0)		-2	489 (2.2)		-6	478 (2.4)		-15 ▼
	2007	480 (2.2)			495 (2.2)			493 (2.8)		
Thailand										
	2015	425 (5.1)	2	-6	431 (4.7)	3	-13	435 (4.8)	6	-16 ▼
	2011	423 (4.6)		-8	428 (4.0)		-16 ▼	429 (4.2)		-23 ▼
	2007	432 (5.2)			444 (4.8)			452 (5.0)		
Turkey										
	2015	447 (4.9)	7		460 (4.3)	1		472 (4.8)	7	
	2011	441 (4.2)			459 (4.0)			465 (3.7)		
United Arab Emirates										
	2015	476 (2.2)	9 ▲		457 (2.1)	16 ▲		461 (2.2)	12 ▲	
	2011	467 (2.2)			442 (2.3)			449 (2.2)		
United States										
†	2015	528 (3.5)	9 ▲	11 ▲	515 (3.2)	12 ▲	13 ▲	514 (3.1)	11 ▲	8
²	2011	519 (2.7)		2	503 (2.9)		1	503 (2.7)		-3
² †	2007	517 (2.9)			502 (3.1)			506 (2.8)		

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Benchmarking Participants

Ontario, Canada										
	2015	513 (3.0)	10 ▲	4	522 (2.8)	12 ▲	4	534 (3.1)	10 ▲	9
²	2011	503 (2.6)		-6	510 (2.3)		-8	524 (2.7)		-1
²	2007	509 (3.6)			518 (4.0)			526 (3.8)		
Quebec, Canada										
£	2015	541 (4.2)	13 ▲	16 ▲	546 (4.0)	11 ▲	17 ▲	538 (4.2)	9	10
	2011	528 (2.9)		4	536 (2.7)		6	529 (2.7)		1
³	2007	524 (3.1)			529 (3.3)			528 (3.5)		
Abu Dhabi, UAE										
	2015	453 (4.8)	-6		434 (4.7)	-1		440 (4.7)	-2	
	2011	459 (3.8)			434 (4.3)			442 (4.2)		
Dubai, UAE										
	2015	521 (2.3)	33 ▲	56 ▲	505 (2.5)	40 ▲	51 ▲	509 (2.8)	40 ▲	50 ▲
	2011	488 (2.4)		23 ▲	465 (2.5)		11 ▲	470 (2.7)		10 ▲
♦♦ £	2007	465 (2.6)			454 (3.2)			460 (3.0)		
Florida, US										
¹	2015	501 (7.3)	-22 ▼		488 (6.7)	-16		491 (6.6)	-14	
¹ ²	2011	524 (6.9)			504 (7.4)			505 (6.9)		

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