

Exhibit 3.3: Achievement in Mathematics Cognitive Domains

| Country | Overall Mathematics Average Scale Score | Knowing (64 items) | | Applying (72 items) | | Reasoning (33 items) | |
|--------------------------------|-----------------------------------------|---------------------|-------------------------------------------|---------------------|-------------------------------------------|----------------------|-------------------------------------------|
| | | Average Scale Score | Difference from Overall Mathematics Score | Average Scale Score | Difference from Overall Mathematics Score | Average Scale Score | Difference from Overall Mathematics Score |
| ² Singapore | 618 (3.8) | 631 (4.0) | 13 (1.4) ▲ | 619 (4.0) | 2 (1.0) | 603 (4.5) | -15 (1.4) ▼ |
| [†] Hong Kong SAR | 615 (2.9) | 618 (3.1) | 4 (1.3) ▲ | 621 (3.1) | 6 (1.3) ▲ | 600 (3.2) | -15 (1.5) ▼ |
| Korea, Rep. of | 608 (2.2) | 627 (2.9) | 19 (1.4) ▲ | 595 (2.1) | -13 (1.2) ▼ | 619 (2.5) | 11 (2.0) ▲ |
| Chinese Taipei | 597 (1.9) | 620 (2.3) | 24 (1.9) ▲ | 593 (2.1) | -3 (1.5) ▼ | 576 (3.1) | -21 (2.0) ▼ |
| Japan | 593 (2.0) | 601 (2.4) | 9 (1.3) ▲ | 589 (2.1) | -4 (1.2) ▼ | 595 (2.7) | 2 (1.9) |
| [‡] Northern Ireland | 570 (2.9) | 582 (3.9) | 11 (1.6) ▲ | 575 (3.2) | 5 (1.2) ▲ | 550 (3.3) | -21 (1.9) ▼ |
| Russian Federation | 564 (3.4) | 556 (3.4) | -7 (1.0) ▼ | 566 (3.7) | 3 (1.7) | 570 (4.0) | 6 (1.8) ▲ |
| Norway (5) | 549 (2.5) | 544 (3.1) | -5 (1.9) ▼ | 550 (2.6) | 1 (1.1) | 556 (2.9) | 7 (2.2) ▲ |
| Ireland | 547 (2.1) | 554 (2.9) | 7 (2.2) ▲ | 549 (2.2) | 1 (1.2) | 535 (2.7) | -12 (1.7) ▼ |
| England | 546 (2.8) | 554 (3.3) | 8 (1.5) ▲ | 544 (3.2) | -2 (1.7) | 540 (3.2) | -6 (2.0) ▼ |
| [†] Belgium (Flemish) | 546 (2.1) | 554 (2.3) | 8 (0.8) ▲ | 544 (2.2) | -2 (1.1) | 536 (2.7) | -10 (1.4) ▼ |
| Kazakhstan | 544 (4.5) | 546 (4.4) | 1 (1.3) | 541 (4.9) | -4 (1.3) ▼ | 553 (4.6) | 9 (1.6) ▲ |
| ² Portugal | 541 (2.2) | 548 (2.6) | 6 (1.9) ▲ | 540 (2.4) | -2 (1.2) | 532 (2.3) | -10 (1.3) ▼ |
| ^{2 †} United States | 539 (2.3) | 547 (2.3) | 8 (1.2) ▲ | 537 (2.4) | -2 (1.0) | 531 (2.5) | -9 (1.3) ▼ |
| ^{2 †} Denmark | 539 (2.7) | 536 (3.3) | -3 (1.6) ▼ | 538 (2.8) | -1 (1.7) | 548 (3.2) | 9 (2.0) ▲ |
| ² Lithuania | 535 (2.5) | 532 (2.5) | -3 (1.1) ▼ | 537 (2.7) | 1 (1.3) | 534 (2.8) | -1 (1.4) ▼ |
| Finland | 535 (2.0) | 530 (2.2) | -5 (1.4) ▼ | 536 (2.1) | 1 (1.0) | 540 (3.1) | 5 (2.2) ▲ |
| Poland | 535 (2.1) | 517 (2.4) | -18 (1.0) ▼ | 541 (2.1) | 6 (0.7) ▲ | 546 (2.3) | 11 (1.3) ▲ |
| [†] Netherlands | 530 (1.7) | 521 (1.8) | -9 (0.8) ▼ | 531 (1.7) | 1 (1.4) | 543 (2.6) | 13 (2.4) ▲ |
| Hungary | 529 (3.2) | 532 (3.1) | 3 (1.2) ▲ | 526 (3.3) | -3 (1.0) ▼ | 529 (3.6) | 0 (1.5) |
| Czech Republic | 528 (2.2) | 519 (2.5) | -9 (1.2) ▼ | 528 (2.4) | 0 (0.9) | 544 (3.0) | 16 (1.9) ▲ |
| Bulgaria | 524 (5.3) | 527 (5.1) | 3 (1.7) | 523 (5.6) | -2 (1.8) | 521 (5.8) | -4 (1.8) ▼ |
| Cyprus | 523 (2.7) | 519 (2.8) | -4 (1.7) ▼ | 529 (2.8) | 6 (1.6) ▲ | 519 (3.1) | -4 (1.6) ▼ |
| Germany | 522 (2.0) | 524 (2.3) | 2 (0.9) ▲ | 515 (2.2) | -6 (1.2) ▼ | 535 (2.4) | 13 (1.6) ▲ |
| Slovenia | 520 (1.9) | 517 (1.9) | -3 (1.2) ▼ | 521 (2.1) | 1 (0.8) | 524 (2.2) | 4 (1.2) ▲ |
| ² Sweden | 519 (2.8) | 501 (3.4) | -18 (1.8) ▼ | 521 (2.7) | 3 (0.9) ▲ | 542 (3.3) | 23 (1.5) ▲ |
| ³ Serbia | 518 (3.5) | 513 (3.5) | -5 (1.7) ▼ | 521 (3.4) | 3 (1.4) ▲ | 517 (3.8) | -1 (1.8) |
| Australia | 517 (3.1) | 509 (3.5) | -8 (1.6) ▼ | 521 (3.0) | 4 (1.2) ▲ | 523 (3.0) | 6 (1.7) ▲ |
| ^{1 2 †} Canada | 511 (2.3) | 505 (2.4) | -5 (0.7) ▼ | 510 (2.3) | 0 (0.6) | 521 (2.4) | 10 (0.7) ▲ |
| ² Italy | 507 (2.6) | 511 (2.9) | 4 (1.0) ▲ | 504 (2.5) | -3 (1.7) | 503 (3.3) | -4 (3.0) |
| ² Spain | 505 (2.5) | 505 (2.4) | 0 (1.2) | 505 (2.4) | 0 (0.9) | 502 (2.5) | -3 (0.9) ▼ |
| Croatia | 502 (1.8) | 502 (1.9) | 0 (1.2) | 499 (1.9) | -4 (1.2) ▼ | 507 (2.1) | 5 (1.1) ▲ |
| Slovak Republic | 498 (2.5) | 491 (2.4) | -8 (1.3) ▼ | 497 (2.5) | -2 (1.0) | 515 (2.9) | 17 (1.8) ▲ |
| New Zealand | 491 (2.3) | 475 (2.6) | -15 (1.3) ▼ | 497 (2.5) | 6 (1.5) ▲ | 504 (2.7) | 13 (1.3) ▲ |
| France | 488 (2.9) | 484 (2.8) | -4 (0.9) ▼ | 488 (3.1) | 0 (1.0) | 491 (3.4) | 3 (2.2) |
| Turkey | 483 (3.1) | 491 (3.4) | 8 (1.5) ▲ | 482 (3.5) | -1 (2.0) | 466 (3.5) | -17 (2.0) ▼ |
| Armenia | 481 (3.4) | 494 (3.5) | 13 (1.7) ▲ | 475 (3.8) | -6 (1.1) ▼ | 458 (4.4) | -23 (2.1) ▼ |
| ¹ Georgia | 463 (3.6) | 466 (4.0) | 3 (1.8) | 461 (4.1) | -2 (2.4) | 452 (4.4) | -11 (2.1) ▼ |
| Chile | 459 (2.4) | 449 (2.8) | -10 (1.8) ▼ | 462 (2.4) | 4 (1.2) ▲ | 466 (2.3) | 7 (1.2) ▲ |
| United Arab Emirates | 452 (2.4) | 453 (2.7) | 1 (1.0) | 452 (2.5) | 1 (0.7) | 445 (2.4) | -6 (1.0) ▼ |
| ² Bahrain | 451 (1.6) | 453 (1.8) | 2 (1.2) | 450 (1.6) | -1 (0.9) | 447 (2.0) | -4 (1.4) ▼ |
| Qatar | 439 (3.4) | 444 (3.4) | 5 (1.2) ▲ | 434 (3.5) | -5 (1.0) ▼ | 431 (4.4) | -8 (3.0) ▼ |
| Iran, Islamic Rep. of | 431 (3.2) | 429 (3.2) | -3 (1.7) | 435 (2.9) | 3 (1.4) ▲ | 426 (3.3) | -5 (1.8) ▼ |
| Oman | 425 (2.5) | 422 (2.7) | -3 (1.0) ▼ | 428 (2.4) | 2 (1.2) ▲ | 420 (2.4) | -6 (1.1) ▼ |
| Indonesia | 397 (3.7) | 395 (4.2) | -3 (1.8) | 397 (3.6) | 0 (1.0) | 397 (3.5) | -1 (1.2) |
| Jordan | 388 (3.1) | 389 (3.1) | 1 (0.9) | 388 (3.1) | 0 (1.1) | 385 (3.3) | -3 (1.9) |
| ^ψ Saudi Arabia | 383 (4.1) | 374 (4.6) | -10 (2.0) ▼ | 382 (4.5) | -2 (2.1) | 383 (4.3) | -1 (2.4) |
| Morocco | 377 (3.4) | 377 (3.7) | -1 (1.2) | 375 (3.6) | -3 (0.9) ▼ | 379 (3.6) | 2 (1.7) |
| South Africa (5) | 376 (3.5) | 378 (3.6) | 2 (0.6) ▲ | 377 (3.4) | 1 (0.7) | 369 (3.5) | -7 (0.9) ▼ |
| ^ψ Kuwait | 353 (4.6) | 354 (4.5) | 1 (1.6) | 348 (4.8) | -5 (1.7) ▼ | 332 (5.0) | -21 (1.5) ▼ |

▲ Subscale score significantly higher than overall mathematics score
▼ Subscale score significantly lower than overall mathematics score

Numbers of items are based on the TIMSS 2015 fourth grade mathematics assessment items included in scaling.

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

See Appendix C.1 for target population coverage notes 1, 2, and 3. See Appendix C.7 for sampling guidelines and sampling participation notes †, ‡, and §.

() 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 3.3: Achievement in Mathematics Cognitive Domains (Continued)

| Country | Overall Mathematics Average Scale Score | Knowing (64 items) | | Applying (72 items) | | Reasoning (33 items) | | |
|------------------------------------------|-----------------------------------------|---------------------|-------------------------------------------|---------------------|-------------------------------------------|----------------------|-------------------------------------------|--|
| | | Average Scale Score | Difference from Overall Mathematics Score | Average Scale Score | Difference from Overall Mathematics Score | Average Scale Score | Difference from Overall Mathematics Score | |
| Benchmarking Participants | | | | | | | | |
| ¹ Florida, US | 546 (4.7) | 555 (5.2) | 9 (2.8) ▲ | 545 (4.9) | -2 (1.6) | 534 (6.2) | -12 (3.7) ▼ | |
| [‡] Quebec, Canada | 536 (4.0) | 542 (4.3) | 6 (1.9) ▲ | 533 (4.1) | -3 (1.3) ▼ | 536 (4.9) | 1 (2.3) | |
| Ontario, Canada | 512 (2.3) | 505 (2.5) | -8 (1.0) ▼ | 513 (2.3) | 1 (0.8) | 524 (2.6) | 12 (1.0) ▲ | |
| Dubai, UAE | 511 (1.4) | 514 (2.0) | 3 (1.6) | 510 (1.8) | 0 (1.5) | 507 (1.7) | -4 (1.1) ▼ | |
| Norway (4) | 493 (2.3) | 479 (2.6) | -14 (1.3) ▼ | 495 (2.5) | 2 (1.9) | 506 (3.0) | 13 (2.0) ▲ | |
| Buenos Aires, Argentina | 432 (2.9) | 432 (2.9) | 0 (1.3) | 427 (3.0) | -5 (0.9) ▼ | 437 (3.4) | 5 (1.8) ▲ | |
| ² ^ψ Abu Dhabi, UAE | 419 (4.7) | 418 (5.1) | -1 (1.3) | 422 (4.8) | 2 (1.8) | 414 (4.4) | -6 (1.4) ▼ | |

- ▲ Subscale score significantly higher than overall mathematics score
- ▼ Subscale score significantly lower than overall mathematics score

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