Key Features of OECD Programme for International Students Assessment 2022 (PISA 2022)

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1. Japan's PISA 2022 Results (Summary)

What is PISA?

- PISA assesses the extent to which **15-year-old students near the end of their compulsory education** have acquired **the knowledge and skills that are essential for full participation in modern societies.**
- The survey has been carried out every three years since 2000 and deals with 3 domains: **Reading**, **Mathematics**, and **Science**. Each year the survey focuses alternately on one of these three domains.
- **Computer Based Testing** (CBT) has been used since PISA 2015.
- The mean score is designed to **be able to be compared over the years**.

  *In mean comparisons, it is important to not only see the difference in numbers, but also find statistically significant differences.
- At the same time, **questionnaires** are asked of students and schools to analyze the survey results in relation to their characteristics.

About PISA 2022

- The number of participants was about 690,000 from **81 countries and economies**. In Japan, about 6,000 students from 183 schools were selected out of 1st-year high school students (including upper secondary schools and vocational high schools) that met international criteria. Conducted between June–August, 2022.
- This time the major domain was on **Mathematics**.
- The survey was originally scheduled for 2021, but was postponed until 2022 due to COVID-19.

PISA 2022 Result Summary (Japan) ①

Three Domains: Mathematics, Reading and Science

- **Mathematics**: (1st/5th), **Reading**: (2nd/3rd) and **Science**: (1st/2nd). Japanese students achieved **world-class performances in all 3 domains**. While the OECD average scores declined from the last survey in 2018, Japan's mean scores rose in all three areas. (Statistically, reading and science was significantly higher. No significant difference in mathematics.)

* Numbers in ( ) show how Japan ranked. The left is among the OECD member countries. The right is among all the participating countries and economies.

- OECD pointed out that the results may bear the impact of COVID-19. In Japan, the period in which schools were closed was shorter than other countries. Other factors specific to Japan include:
  - ・Class improvements have been implemented based on the latest the National Curriculum Standard (Course of Study).
  - ・Schools are now well equipped with ICT and students are familiar with CBT.
- The proportion of low-achieving students (Proficiency Level 1) in reading and science significantly decreased, while the proportion of high-achieving students (Proficiency Level 5 or above) in mathematics and science significantly increased.

PISA 2022 Result Summary (Japan) ②

Economic, Social and Cultural Status (ESCS) and Average Scores

- The higher the level of ESCS, the greater the proportion of high-achieving students. The lower the level of ESCS, the greater the proportion of low-achieving students. It is the same tendency as OECD average.
- Among the countries with high mathematical proficiency, Japan is one of the countries with small math score difference between different ESCS levels. Japan is also one of the countries where ESCS has very little impact on the scores.

Impact of COVID-19 pandemic Resilient Countries and Economies during 2018–2022

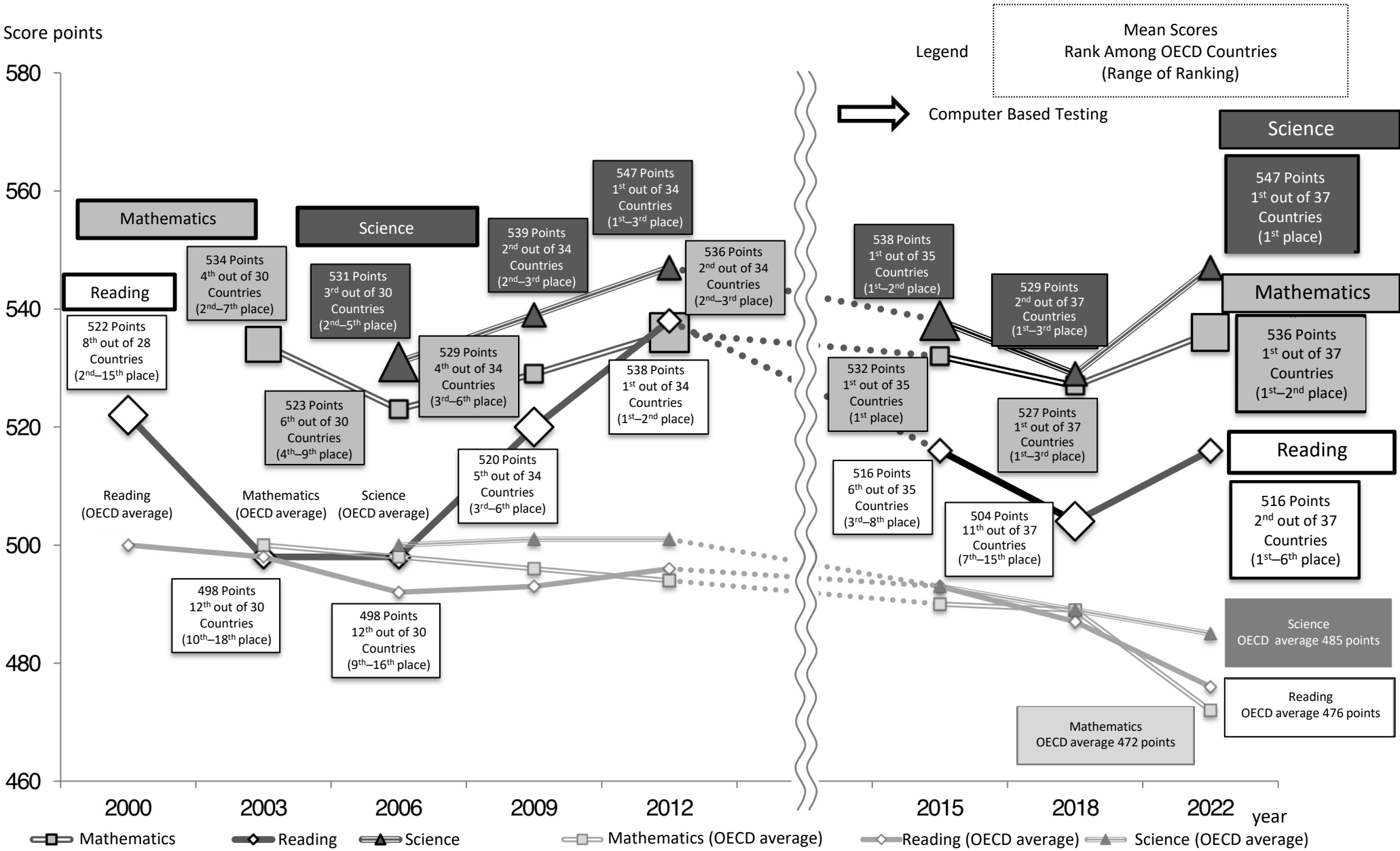
- In the analysis of "Resilient" countries and economies*1 by OECD, Japan is one of the four.*2

*1: Showing stability or improvement in all of the following 3 aspects.

① Mathematical performance (Math score in 2022 and its changes between 2018 and 2022)
② Well-being in education (Sense of belonging to school in 2022 and its changes between 2018 and 2022)
③ Equity in education (Equity in education in 2022 and its changes between 2018 and 2022)

*2: Japan, Korea, Lithuania and Chinese Taipei

Changes in mean scores and ranking (Japan/OECD Average)



PISA 2022 Scores International Comparison (Summary)

OECD Countries (37 countries)

Statistically no difference in mean scores with Japan

	Mathmatics	Mean	Reading	Mean	Science	Mean
1	Japan	536	Ireland*	516	Japan	547
2	Korea	527	Japan	516	Korea	528
3	Estonia	510	Korea	515	Estonia	526
4	Switzerland	508	Estonia	511	Canada*	515
5	Canada*	497	Canada*	507	Finland	511
6	Netherlands*	493	US*	504	Australia*	507
7	Ireland*	492	New Zealand*	501	New Zealand*	504
8	Belgium	489	Australia*	498	Ireland*	504
9	Denmark*	489	UK*	494	Switzerland	503
10	UK*	489	Finland	490	Slovenia	500
	OECD Average	472	OECD Average	476	OECD Average	485
	Confidence Interval (Japan): 530–54		Confidence Interval (Japan): 510–52		Confidence Interval (Japan): 541–55	

* One or more PISA Sampling Criteria are not met.

**Confidence Interval (CI) shows the range of mean scores of the entire population (students). As PISA is a sample survey, it is necessary to consider the mean value with a certain margin.

Comparison of Participating Countries/Economies (81)

Statistically no difference in mean scores with Japan

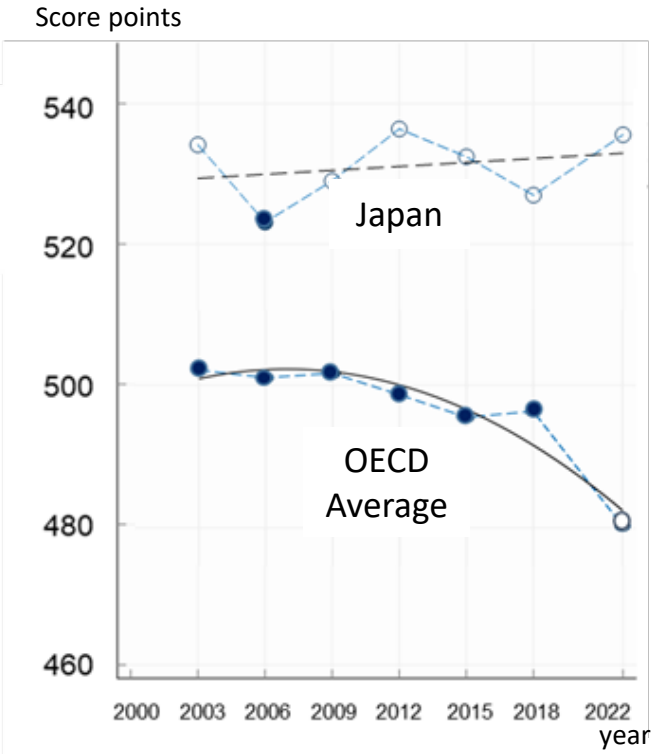
	Mathematics	Mean	Reading	Mean	Science	Mean
1	Singapore	575	Singapore	543	Singapore	561
2	Macao (China)	552	Ireland*	516	Japan	547
3	Taiwan	547	Japan	516	Macao (China)	543
4	Hong Kong*	540	Korea	515	Taiwan	537
5	Japan	536	Taiwan	515	Korea	528
6	Korea	527	Estonia	511	Estonia	526
7	Estonia	510	Macao (China)	510	Hong Kong*	520
8	Switzerland	508	Canada*	507	Canada*	515
9	Canada*	497	United States*	504	Finland	511
10	Netherlands*	493	New Zealand*	501	Australia*	507
	Confidence Interval (Japan): 530–541		Confidence Interval (Japan): 510–522		Confidence Interval (Japan): 541-552	

PISA Average Scores Up To 2022 (Japan and OECD)

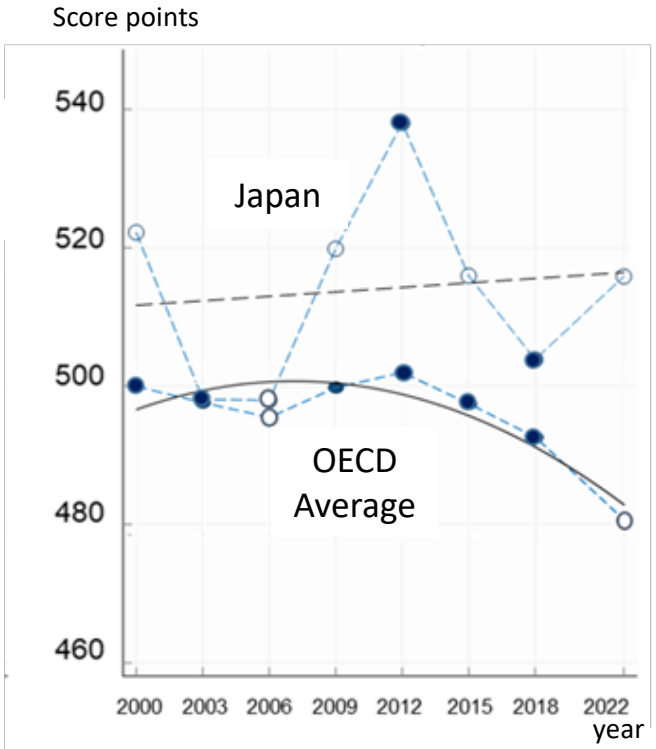
OECD average shows a descending long-term trend.

Japan's mean scores remains at the same level (no significant difference).

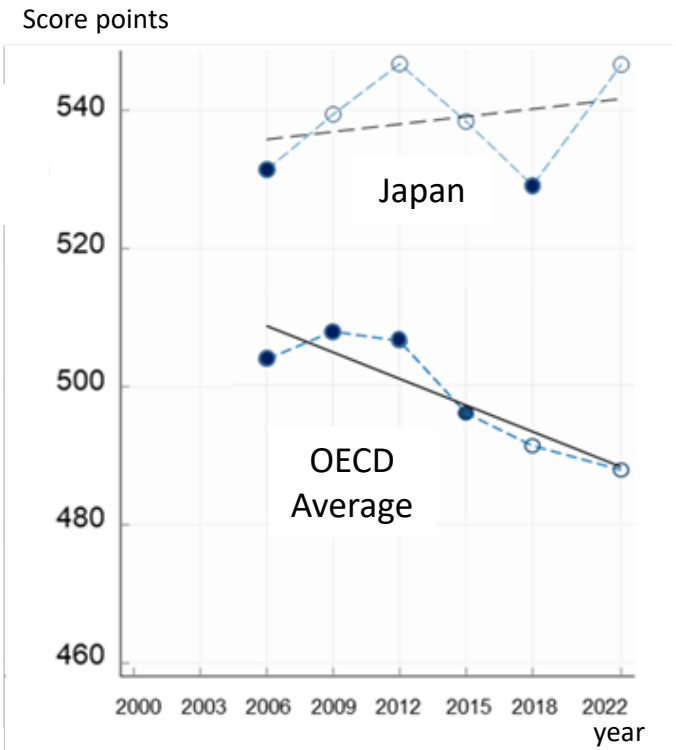
Note: White dots indicate mean performance estimates that are not statistically significantly above/below PISA 2022 estimates.



Mathematics



Reading



Science

2. Japan's PISA 2022 Results (Details)

(1) Mathematical Literacy (Major Domain of PISA 2022)

◆Definition of Mathematical Literacy

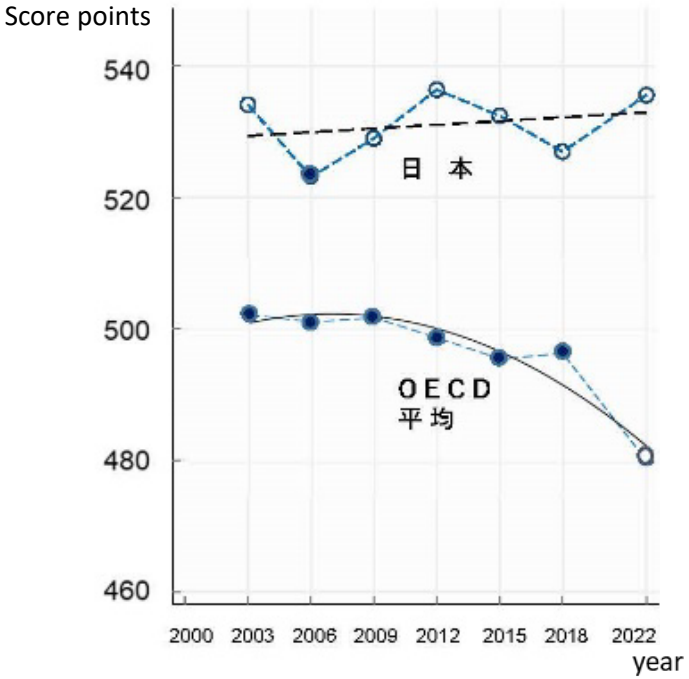
Students' capacity to reason mathematically and to formulate, employ, and interpret mathematics to solve problems in a variety of real-world contexts. It includes concepts, procedures, facts, and tools to describe, explain, and predict phenomena.
It assists individuals to know the role that mathematics plays in the world and to make the well-founded judgments and decisions needed by constructive, engaged and reflective 21st century citizens.

- **Japan's mean score in Mathematical Literacy (536) continues to be world class. Among OECD member countries, Japan ranks 1st (range: 1st–2nd).**
- **Since the 2018 survey, the average score for the OECD has greatly declined, while Japan has maintained a high and stable level.**
- **Japan's mean performance on mathematics-process subscales and mathematics-content subscale are also high by international standards.**
- **Compared with the OECD average, Japan has a higher proportion of students achieving Proficiency Levels 5 and above and a lower proportion of students at Proficiency Level 1 or below. This trend has continued, and the proportion of students scoring at Proficiency Levels 5 and above has significantly increased since the 2018 survey.**

① Mathematical Literacy Scores & Proficiency Levels

Trends in mathematics performance

Note: White dots indicate mean-performance estimates that are not statistically significantly above/below PISA 2022 estimates.



Mean performance on the mathematics subscales

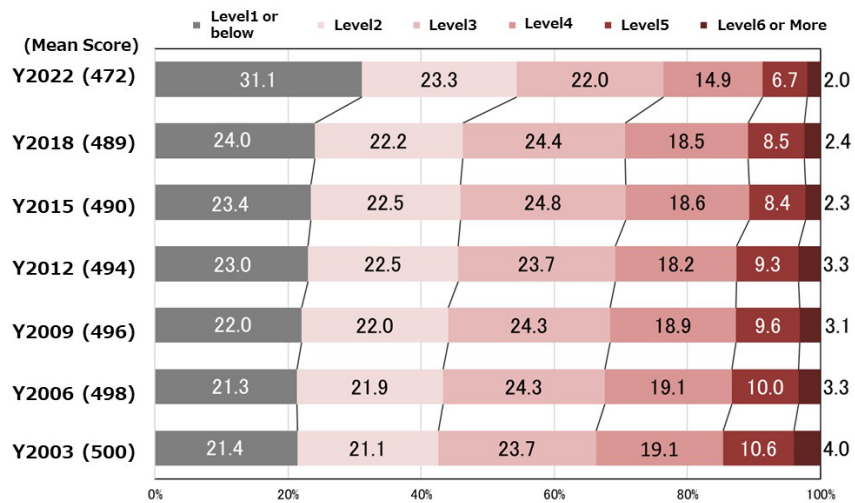
		Process Subscales			
Country	Mean performance	Formulating	Employing	Interpreting	Reasoning
Japan	536	536	536	544	534
OECD Average	472	469	472	474	473

Content Subscales			
Change and relationship	Quantity	Space and shape	Uncertainty and data
533	535	541	540
470	472	471	474

Percentage of students at each proficiency level in mathematics (Long-term Trend)

Japan

OECD Average



② Example of Assessment Items

Note: Each question is given a number that shows the level, with 6 being the most difficult and 1 the easiest.

This item assesses the ability to interpret numerical data presented in diagrams and tables, and to appropriately use it for a given purpose.

Solar System Q1

Drag-and-drop the appropriate planets into the model diagram showing the average distance between the three planets based on the information in the table that shows the average distances from the Sun to each planet in astronomical units (1 astronomical unit is approximately 150 million km).

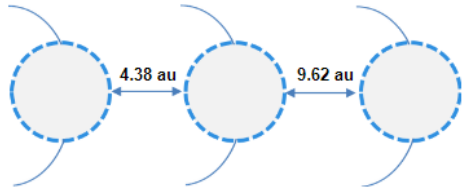
Process: Interpret
Topic: Quantity
Situation: Scientific

PISA 2022

Solar System
Question 1 / 2

Refer to "Solar System" on the right. Use drag and drop to answer the question.

The following model shows the average distances between three planets. (Planets and model not drawn to scale.)



Based on the distances given, which planets belong in the model? Drag the correct three planets in the correct order. To change an answer, first drag the previous planet out.

SOLAR SYSTEM

The table below shows the average distance from the Sun to the primary planets in Astronomical Units (au).

1 au is approximately 150 million kilometres.

Planet	Average distance from Sun in au
Mercury	0.39
Venus	0.72
Earth	1.00
Mars	1.52
Jupiter	5.20
Saturn	9.58
Uranus	19.20
Neptune	30.05

Answer: Jupiter, Saturn and Uranus (from left to right).

The key to the question is to recognize that the numbers in the diagram represent the average distances from the Sun to each planet, and to use that data to calculate the distance between each planet to find the appropriate ones.

More specifically, the numbers 4.38 and 9.62 are the average distances between certain planets. 9.62 can be rounded up to 10, which is about the average distance between Uranus and Saturn, and when calculated is, in fact, found to be 9.62 AU. In the same way, the average difference between Jupiter and Saturn is 4.38 AU.

This question is classified as Level 3. 67.5% of Japanese students answered correctly (Japan ranked 2nd among OECD member countries).

② Example of Assessment Items

Note: Each question is given a number that shows the level, with 6 being the most difficult and 1 the easiest.

This item assesses the ability to understand statistical concepts and to appropriately infer and make judgments about phenomena encountered in daily life.

Points Q1

If the the average point difference across multiple games for a basketball team was 19 points, determine whether it is possible that there were no games with a point difference of exactly 19 points, and explain the reasoning behind your determination.

Process: Reasoning
Topic: Uncertainty and data
Situation: Societal

PISA 2022

Points
Question 1 / 1

Refer to "Points" on the right. Click on a choice and then type an explanation to answer the question.

Given the average margin of victory for the season, is it possible that the team never actually won a game by 19 points?

- ○ Yes
- ○ No

Explain your answer.

POINTS

The following headlines about the Zedland basketball team appeared in the local newspaper.

Margin of victory is the difference between the number of points scored by the winning team and the number of points scored by the losing team in one game.

Answer

- Yes: It is possible because the average does not actually have to be one of the values in your data set.
- Yes: If one differences was 16 points and another was 22 points, then the average difference would be 19 points, but 19 was not one of the differences.

The key aspect of this question is to explain the possibility that there were no games won with a 19-point difference, despite not knowing the number of games or the point difference for each game, by utilizing knowledge of averages.

Specifically, one could assume a certain number of games and point differences, and provide an example where there are no games with a 19-point difference, yet the average is 19 points.

This question is classified as Level 6, and the correct answer rate in Japan was 26.6% (ranked 1st among OECD countries). From the students' responses, such as "there could have been wins by a 19-point difference" or "it cannot be stated whether or not there were wins by a 19-point difference," it is evident that while many understand the concept of averages, their grasp of mathematical reasoning (or logical understanding related to propositions) was lacking in some cases.

② Example of Assessment Items

Note: Each question is given a number that shows the level, with 6 being the most difficult and 1 the easiest.

The item assesses the ability to process multiple datasets and interpret the results.

Forested Area Q3

Use a spreadsheet to investigate the changes in the proportion of forest area between two periods (2005–2010 and 2010–2015) and identify the top two countries with the largest differences in changes.

Process: Interpret
Topic: Uncertainty and data
Situation: Societal

PISA 2022

Forested Area
Question 3 / 4

How to Use the Spreadsheet

Refer to "Forested Area" on the right. Use the spreadsheet to help you answer the question below. Select from the drop-down menus to answer the question.

Consider the two time periods: 2005 to 2010 and 2010 to 2015.

In terms of percentage points, which two countries had the biggest change in the percent of forested area from one **time period** to the other time period?

Answers: Select and Select

FORESTED AREA

The spreadsheet below shows the amount of forested area as a percentage of the total land area in each of the 15 countries in this data set. Data are shown for the years 2005, 2010, and 2015.

Column A	Column B	Column C	Column D	Column E	Column F	Column G
Country	2005	2010	2015			
India	22.77	23.47	23.77	0.70	0.30	0.40
United States	33.26	33.7	33.85	0.44	0.15	0.29
Algeria	0.64	0.81	0.82	0.17	0.01	0.16
Peru	59.01	58.45	57.79	-0.56	-0.66	0.10
South Korea	64.42	64.08	63.69	-0.34	-0.39	0.05
Germany	32.66	32.73	32.76	0.07	0.03	0.04
Portugal	36.52	35.89	35.25	-0.63	-0.64	0.01
Thailand	31.51	31.81	32.1	0.30	0.29	0.01
Senegal	45.05	44.01	42.97	-1.04	-1.04	0.00
Lebanon	13.34	13.38	13.42	0.04	0.04	0.00
Greece	29.11	30.28	31.45	1.17	1.17	0.00
Kazakhstan	1.24	1.23	1.23	-0.01	0.00	-0.01
Panama	64.33	63.21	62.11	-1.12	-1.10	-0.02
Armenia	11.77	11.74	11.77	-0.03	0.03	-0.06
Colombia	54.26	52.85	52.73	-1.41	-0.12	-1.29

Calculate: Column E | Subtract | Column F | Run

Mean: Column | Run | Clear All

Answer: India and Columbia.

The main point of the question is to process multiple data sets using the spreadsheet and to then interpret the results in line with the objective.

Specifically, it involves calculating the changes in the proportion of forested area during the 2005–2010 and 2010–2015 periods, and then determining the differences between the two periods. Then, based on the understanding that the question asks which country had the largest change in the proportion of forestry area, identifying the two countries with the greatest change in absolute values, regardless of whether that change was positive or negative.

This problem is classified as Level 6, and 33.5% of Japanese students answered correctly, making Japan top among OECD member countries.

② Example of Assessment Items

Note: Each question is given a number that shows the level, with 6 being the most difficult and 1 the easiest.

This item assesses the ability to understand statistical information and critically analyze and contemplate phenomena.

Forested Area Q4

The proportion of forest area to total land area for 15 countries is shown in the spreadsheet. Determine whether the data supports the claim that " South Korea has a larger forest area than any other country on the list", and explain your reasoning.

Process: Reasoning
Topic: Uncertainty and data
Situation: Societal

PISA 2022

Forested Area
Question 4 / 4

How to Use the Spreadsheet

Refer to "Forested Area" on the right. Use the spreadsheet to help you answer the question below. Click on a choice and then type an explanation to answer the question.

Helena claims that South Korea has more forested area than any other country in this list for the years shown.

Is her claim supported by the data in the spreadsheet?

- Yes
- No

Explain your answer.

FORESTED AREA

The spreadsheet below shows the amount of forested area as a percentage of the total land area in each of the 15 countries in this data set. Data are shown for the years 2005, 2010, and 2015.

Column A	Column B	Column C	Column D	Column E	Column F	Column G
Country	2005	2010	2015			
Algeria	0.64	0.81	0.82			
Armenia	11.77	11.74	11.77			
Colombia	54.26	52.85	52.73			
Germany	32.66	32.73	32.76			
Greece	29.11	30.28	31.45			
India	22.77	23.47	23.77			
Kazakhstan	1.24	1.23	1.23			
Lebanon	13.34	13.38	13.42			
Panama	64.33	63.21	62.11			
Peru	59.01	58.45	57.79			
Portugal	36.52	35.89	35.25			
Senegal	45.05	44.01	42.97			
South Korea	64.42	64.08	63.69			
Thailand	31.51	31.81	32.1			
United States	33.26	33.7	33.85			

Calculate: Column | Operation | Column | Run

Mean: Column | Run | Clear All

The main point of the question is that the data presented represents the percentage of forested area to the total land area, and you are required to determine that it is not possible to claim that South Korea has more forested area than other countries based on that percentage alone, and to explain.

In this case, while the data on the proportion of forested area is provided, there is no direct data on forest area itself, meaning that Helena's assertion is not based on the data. However, some students could not distinguish the difference between the proportion of forestry area and forestry size, answering, "Korea had the largest amount in 2005, 2010 and 2015."

This problem is classified as Level 6, and 18.3% of Japanese students answered correctly, the highest among OECD member countries.

Answers

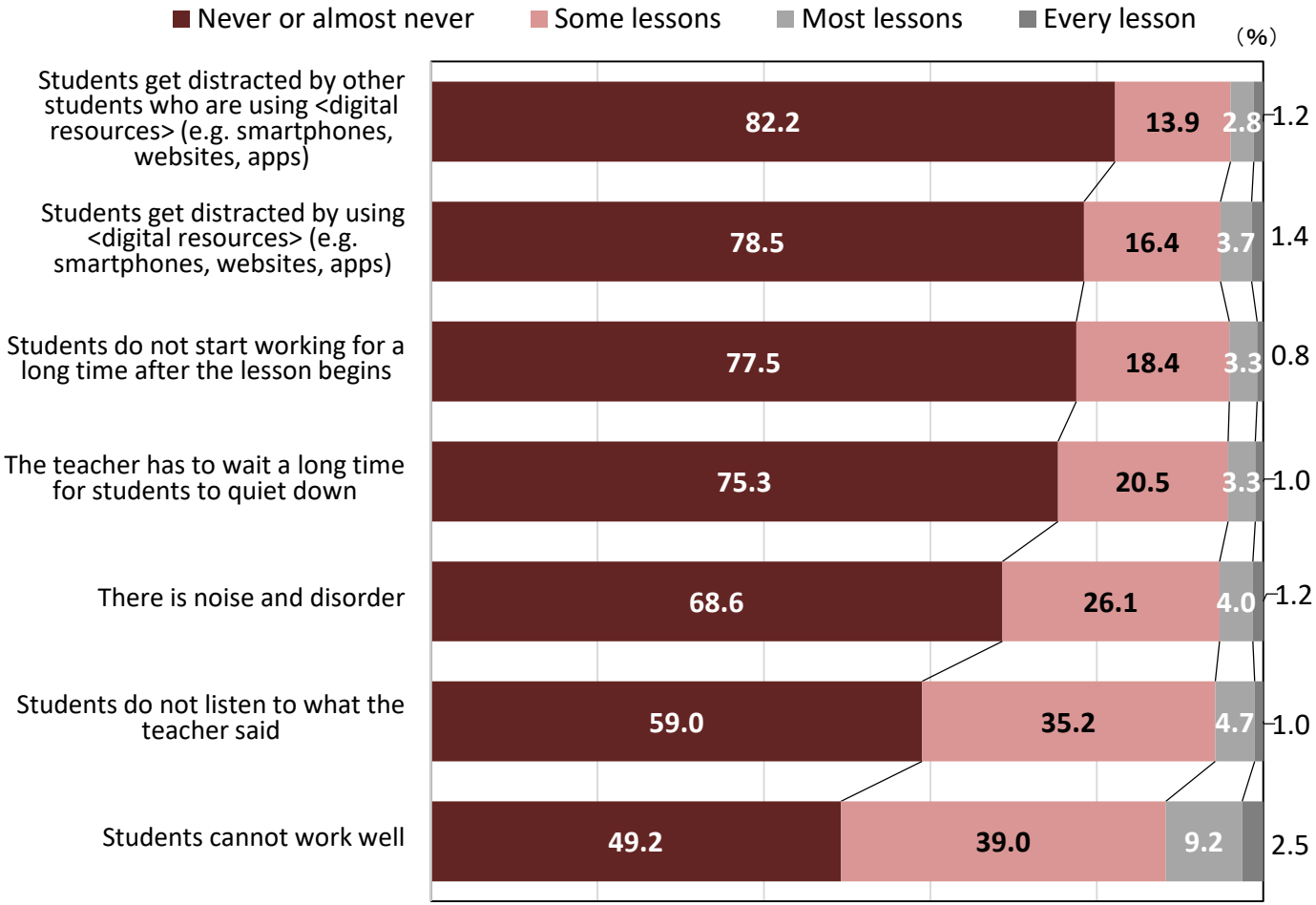
- No: This is not true because the spreadsheet only shows the values as a percentage.
- No: Because the total area of each country is different.

③ Student Questionnaire Results for Mathematical Literacy

- **Japan ranked top among OECD member countries for Disciplinary Climate in Mathematics Lessons.**

Student Questionnaire Q35: Disciplinary climate in mathematics (Japan)

How often do these things happen in your mathematics lessons?



Student Questionnaire: Disciplinary Climate in Mathematics Lessons

The indicator was calculated based on the response rate for the 7 questions on the left.

1st	Japan	1.09
OECD Average		0.02

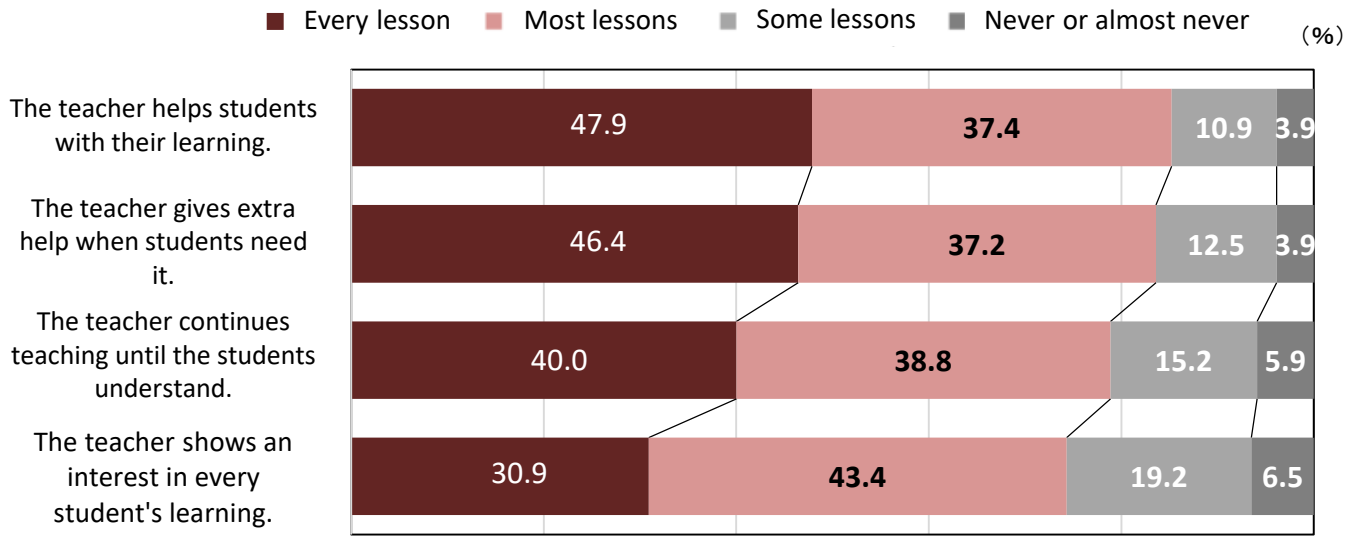
* The average value of the 37 OECD member countries is standardized to 0.0 with a standard deviation of 1.0. The higher this value, the more disciplined the climate in mathematics lessons.

③ Student Questionnaire Results for Mathematical Literacy

- **Japan ranked 8th among OECD member countries for teacher support in mathematics lessons. Japanese students feel like they are being supported by teachers in mathematics lessons.**

Student Questionnaire Q36: Mathematics teacher support (Japan)

How often do these things happen in your mathematics lessons?



Student Questionnaire: Teacher Support in Mathematics Lessons

The indicator was calculated based on the response rate for the 4 questions on the left.

8th	Japan	0.24
OECD Average		0.03

* The average value of the 37 OECD member countries is standardized to 0.0 with a standard deviation of 1.0. The higher this value, the greater the awareness of students that they are being supported by teachers in mathematics lessons.

③ Student Questionnaire Results for Mathematical Literacy

- **Japanese students are less confident about solving real-life challenges using mathematics than the OECD average. They also have less experience in linking mathematics with real-life events.**

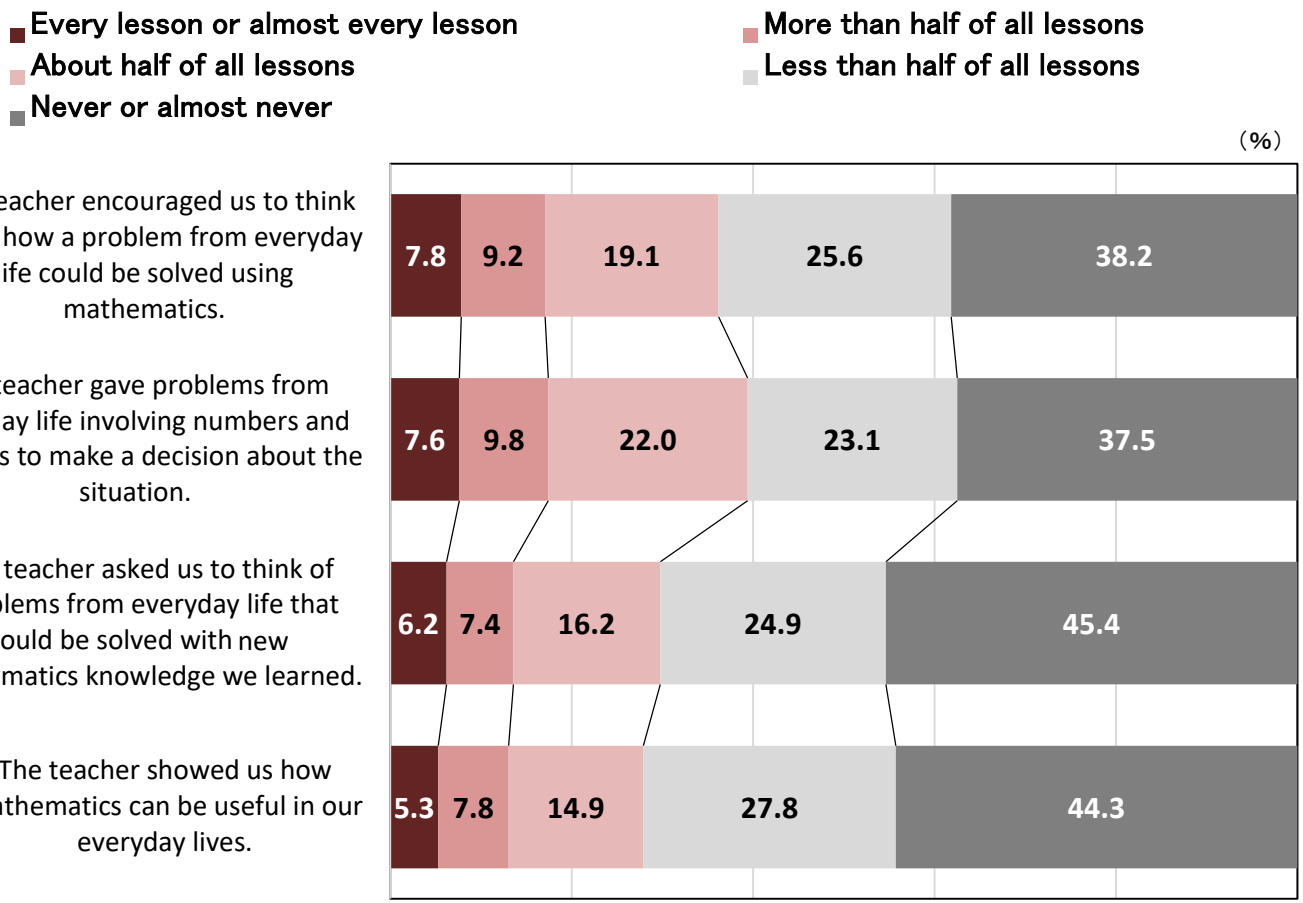
Student Questionnaire **Q43 Mathematics self-efficacy: reasoning and 21st century mathematics** "How confident do you feel about having to do the following mathematics tasks?" **Q40 Exposure to mathematics reasoning and 21st century mathematics** "How often have you encountered the following types of mathematics tasks during your time at school?"	**Q43 (Self-Efficacy)** * Proportion of students who answered "Very Confident" or "Confident"		**Q40 (Experience)** * Proportion of students who answered "Frequently" or "Sometimes"	
	Japan	OECD Average	Japan	OECD Average
Interpreting mathematical solutions in the context of a real-life challenge.	30.0%	52.5%	46.6%	59.3%
Identifying mathematical aspects of a real-world problem	22.7%	51.2%	37.8%	55.5%

③ Student Questionnaire Results for Mathematical Literacy

- **The tendency to incorporate everyday life into teaching to encourage mathematical thinking is lower than the OECD average.**

Student Questionnaire: Q38 Cognitive activation in mathematics: Encourage mathematical thinking (COGACMCO) (Japan)

This school year, how often did your teacher do the following things in your mathematics lessons?



Student Questionnaire: Cognitive Activation in Mathematics: Encourage Mathematical Thinking

The indicator was calculated based on the response rate for the 9 questions on the left.

OECD Average		**0.01**
36th	**Japan**	**-0.35**

* The average value of the 37 OECD member countries is standardized to 0.0 with a standard deviation of 1.0 The higher this value, the greater the cognitive activation in mathematics.

(2) Reading Literacy

◆Definition of Reading Literacy

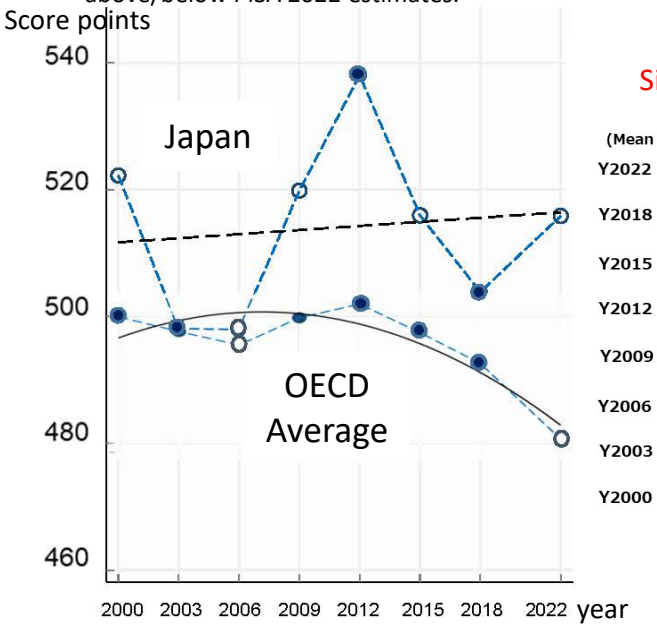
Understanding, using, evaluating, reflecting on and engaging with texts, in order to achieve one's goals, develop one's knowledge and potential, and participate in society.

Measured Competencies: ① Locating Information ②Understanding ③ Evaluating and reflecting

- **Japan's mean score in reading(516) was 2nd place among OECD member countries (range: 1st–6th). This represents a significant increase from PISA 2018 (504), and is same as it was in 2015 (516).**
- **The OECD average score is showing a tendency to decline over long-term, while Japan maintains the same level (no statistically significant change).**
- **The proportion of students who scored low (Proficiency Level 1 or below) significantly decreased from the last assessment.**

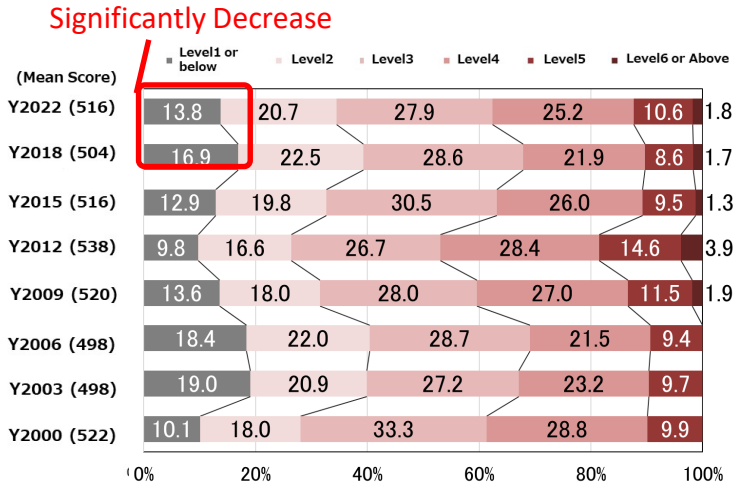
Trends in reading performance

Note: White dots indicate mean-performance estimates that are not statistically significantly above/below PISA 2022 estimates.

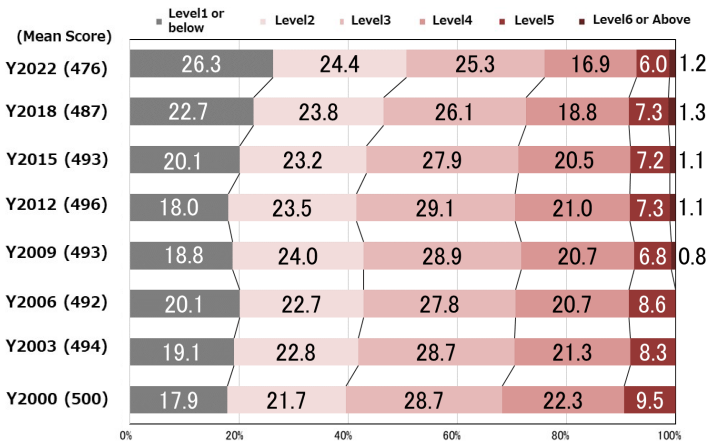


Percentage of students at each proficiency level in reading (Long-term Trend)

Japan



OECD Average



Issue of Reading – Previous and Present Results

- In PISA 2018, there was a question that presented two different texts about a product. One was written by the distributer of the product, and the other was by an online magazine. Students were required to find necessary information, assess the quality of the information and the credibility of their claims, and explain how they would respond. The percentage of correct answers to Q4 and Q6 were lower than the OECD average.

- The percentage of correct answers to these questions slightly increased this time.
  *The OECD average for these questions was not announced.

◆Text 1: A Company website
(Advertising the safety of a product)

Q1: Comprehend the meaning of sentences.
69.9%→75.2%
② Understand

Q2: Assess the quality and credibility of the statement (Open-ended response).
60.2%→65.7%
③ Evaluate and reflect

◆Text 2: Online magazine article
(A different view on the safety of the product)

Q3: Reflect on the content and the manner of the text.
81.5%→83.1%
③ Evaluate and reflect

Q4: Make assumption and locate a website which contains necessary information.
56.1%→56.8%
① Locate information

◆Compare Text 1 and 2

Q5: Identify differences between the texts.
53.1%→59.9%
③ Evaluate and reflect

Q6: Assess the quality and credibility of information and explain the way to handle the situation using evidence from the text. (Open-ended response)
8.9%→14.3%
③ Evaluate and reflect

* The blue portions are the percentage of correct answers for Japan (Left: 2018, right: 2022)

(3) Scientific Literacy

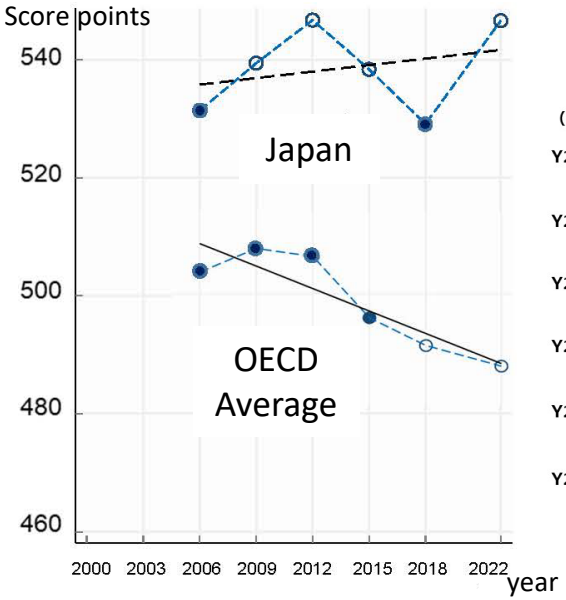
◆Definition of Scientific Literacy

The ability to engage with science-related issues, and with the ideas of science, as a reflective citizen.
Measured Abilities: ① Explaining phenomena scientifically, ② Evaluating and designing scientific enquiry, and ③ Interpreting data and evidence scientifically.

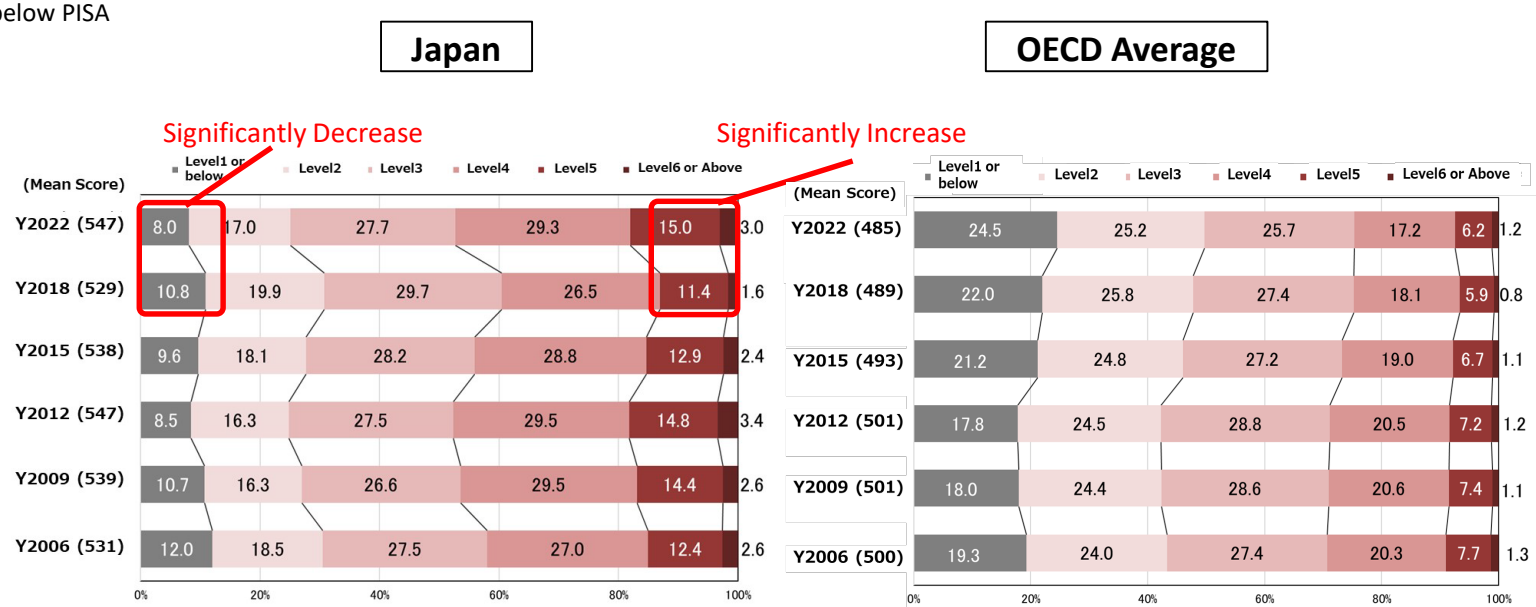
- **Japan's mean score in science (547) was still at the top among the OECD member countries (range: 1st). It significantly increased from the last assessment in 2018 (529).**
- **While the OECD average is showing a tendency to decline in the long-term, Japan is stable at a high level.**
- **The low-scoring group in Japan (≤ Level 1) significantly decreased from the last assessment, while the high-scoring group (≥ Level 5) showed a significant increase.**

Trends in science performance

Note: White dots indicate mean-performance estimates that are not statistically significantly above/below PISA 2022 estimates.



Percentage of students at each proficiency level in science (Long-term Trend)



(4) Economic, Social and Cultural Status, and Average Scores

◆Economic, Social and Cultural Status (ESCS)

In PISA, the ESCS index is created based on students' questionnaire responses regarding their parents' educational background and family assets.

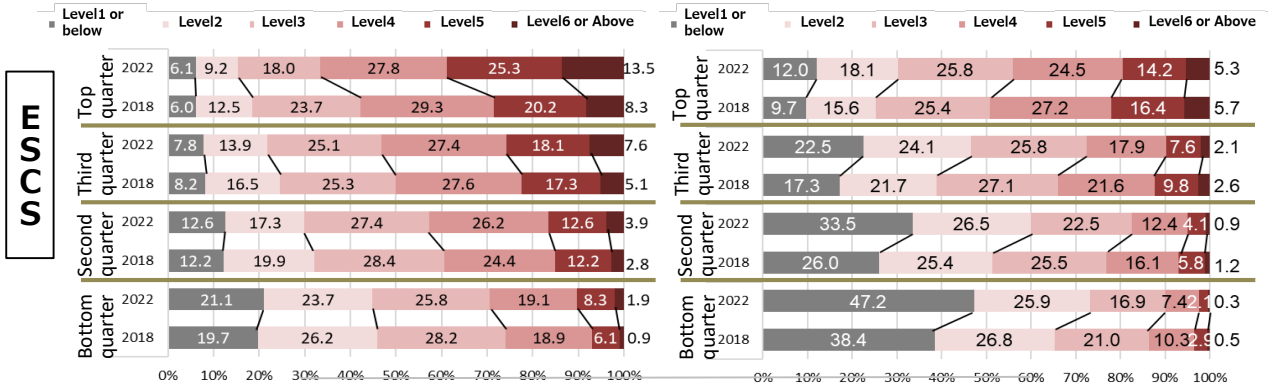
Higher ESCS scores indicate a higher ESCS. Students were divided into 4 groups according to ESCS value, and analyses were conducted on their relationship with their performance in the 3 domains.

- **In both Japan and the OECD average, a higher ESCS is associated with a greater proportion of top-performing students, while a lower ESCS is associated with a greater proportion of low-performing students.**
- **When viewed by ESCS, in all 3 domains, Japan has seen an overall increase in proficiency levels from 2018 to 2022.**

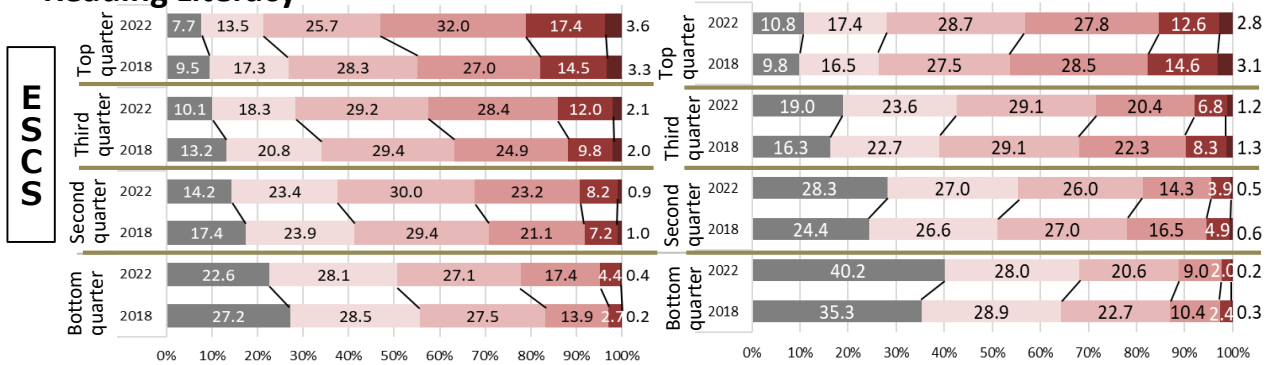
Proficiency Levels by ESCS (2018 to 2022)

Japan | OECD Average

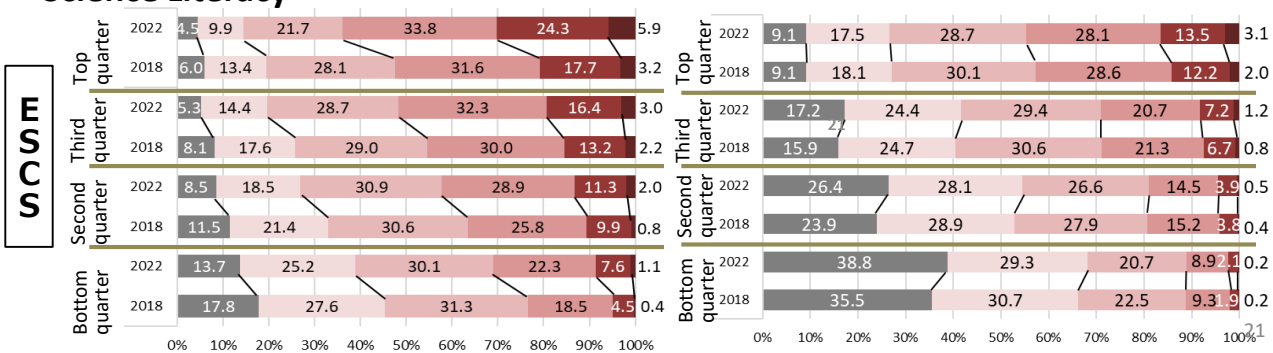
Mathematical Literacy



Reading Literacy



Science Literacy

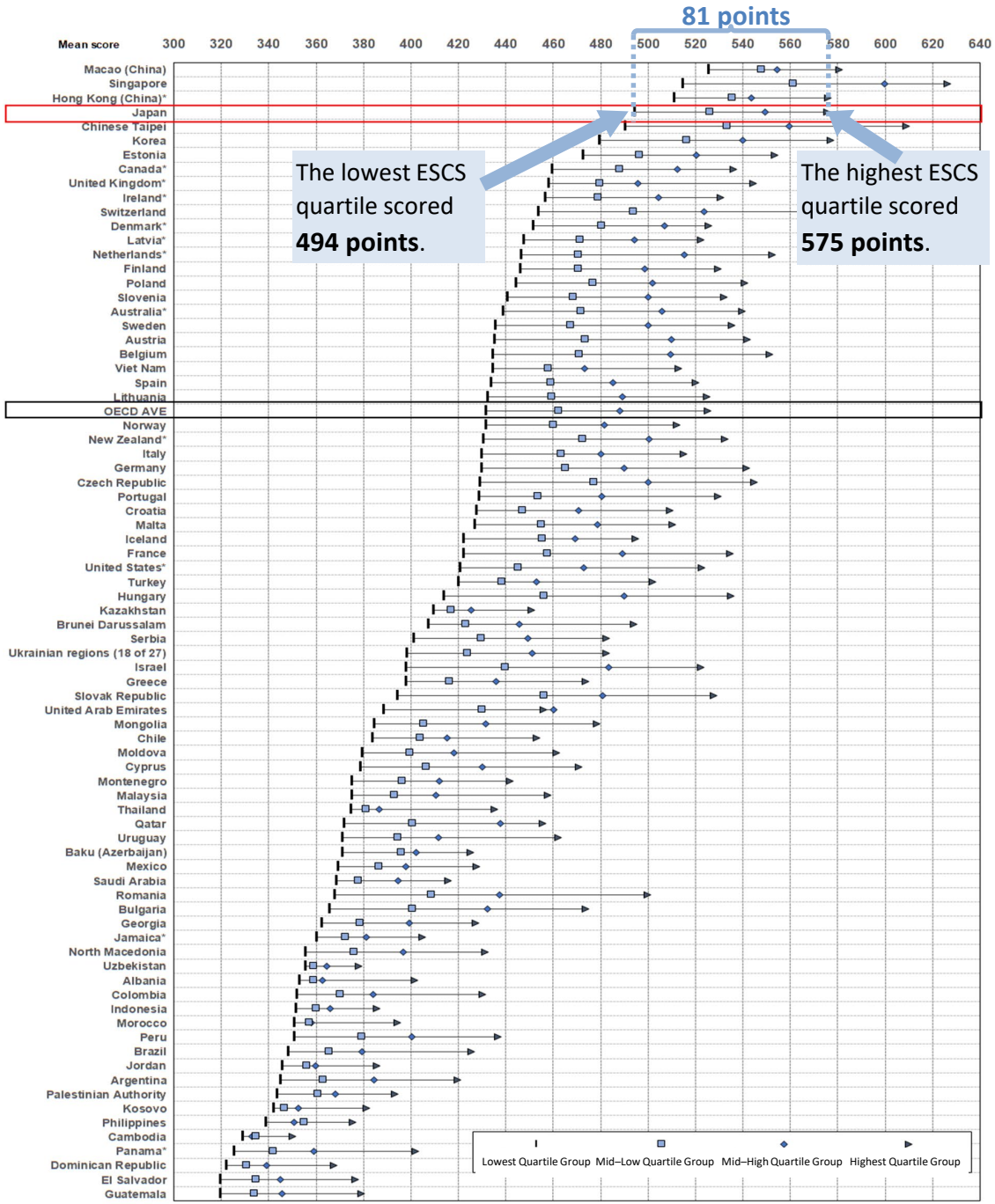


- **Among countries with high performance in mathematical literacy, Japan is one of the countries with small differences in mathematical literacy scores among students when viewed by domestic ESCS levels.**

Mean performance in mathematics, by national quarter of socio-economic status

- In Japan, the mathematics scores of students in **<u>the lowest quartile group based on domestic ESCS levels were high internationally, with a score of 494 points</u>.**

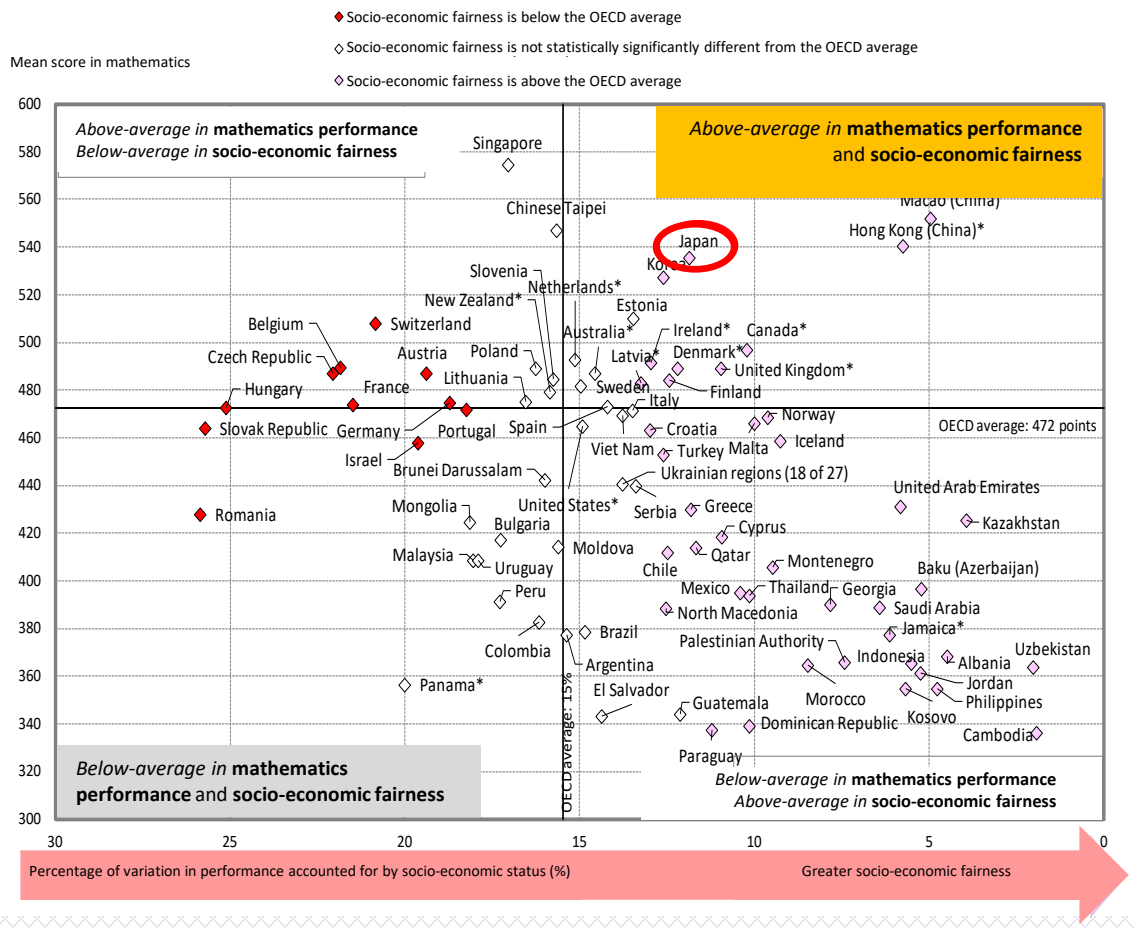
- In Japan, students in the lowest quartile ESCS group scored 494 points, while those in the highest quartile score 575 points. The difference between the two groups (highest quartile group - lowest quartile group) was 81 points, which was **<u>smaller than the OECD average of 93 points</u>.**



Note: Countries/regions are listed in descending order based on the average scores of students in the lowest quartile group by ESCS.

ESCS and Mathematical Literacy

- Japan is positioned in the top right group where the mean scores for mathematical literacy, shown on the vertical axis, are higher than the OECD average, and the educational socio-economic fairness, shown on the horizontal axis, exceeds the OECD average (located in the top-right group in the diagram).
- "Fairness" refers to the extent to which ESCS can explain the variation in math scores in regression analysis predicting math scores.
- The explanatory rate in Japan is **11.9%**, which is below the OECD average of **15.5%**.
- In the top right quadrant, Japan has the highest score in math among the OECD member countries, and its fairness is lower than that of Canada (10.2%) and UK (11.0%), meaning that in Japan, the influence of ESCS on the variability of students' math scores is relatively low.
- Singapore, in the top left quadrant, has higher math scores than Japan, but fairness is 17.0%, indicating a greater impact of socio-economic cultural levels on the variability of students' math scores compared with Japan.



(5) Impact of COVID-19 Pandemic （Resilient countries and economies during 2018–2022）

Resilient Countries and Economies (Education systems that were resilient in 2022)

- **The OECD identified resilient countries and economies by analyzing trends in ① performance in mathematics, ② well-being in education, and ③ equity in education based on assessments during 2018–2022.**
- **Among the 81 countries and economies that participated in PISA 2022, only Japan, Korea, Lithuania, and Taiwan kept or improved their performance in all three aspects. That is why these countries are called "resilient."**

Three Aspects of Resilience

① Performance in Mathematics

(Changes in math scores between 2018 and 2022)

The average performance in mathematics was stable or improved between 2018–2022, and was at or above the OECD average in 2022.

② Well-being in Education

(Sense of belonging at school in 2022, and its changes between 2018 and 2022)

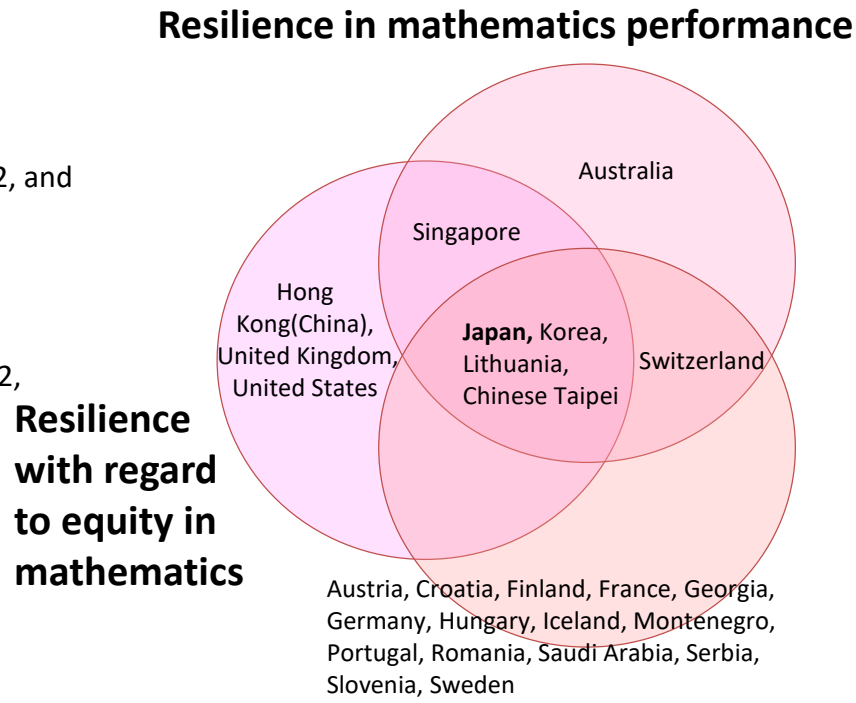
The index for sense of belonging at school was stable or improved between 2018–2022, and was above the OECD average in 2022.

③ Equity in Education

(Equity in 2022, and its changes between 2018 and 2022)

The following 3 criteria are met.

1. The variation in performance in mathematics unexplained by students' socio-economic status was at or above the OECD average in 2022.
2. The average performance in mathematics was at or above the OECD average in 2022.
3. The performance in mathematics of advantaged (the top quartile in ESCS) and disadvantaged students (the bottom quartile in ESCS) remained stable or improved between 2018–2022 (trend in socio-economic parity).

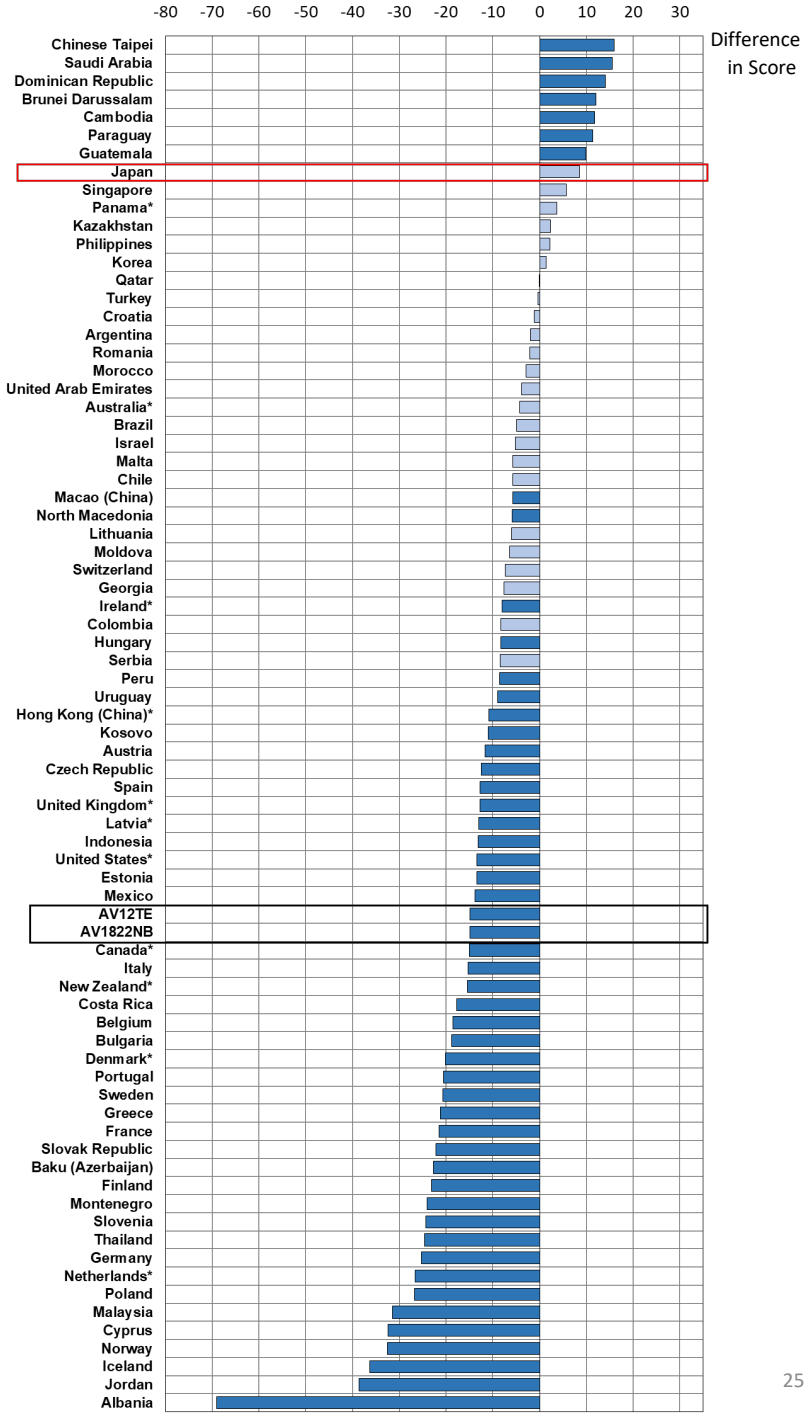


① Performance in Mathematics

Changes between 2018 and 2022
In mean mathematics performance

Although the OECD average dropped from 2018 to 2022 in mathematics, Japan did not drop. In fact, Japan's scores were 8.6 score points higher than the OECD average (no significant difference).

Changes in Math Scores (2018→2022)



Note 1: Statistically significant differences are a darker color.

Note 2: The meaning of 2 codes regarding the OECD average is as follows:

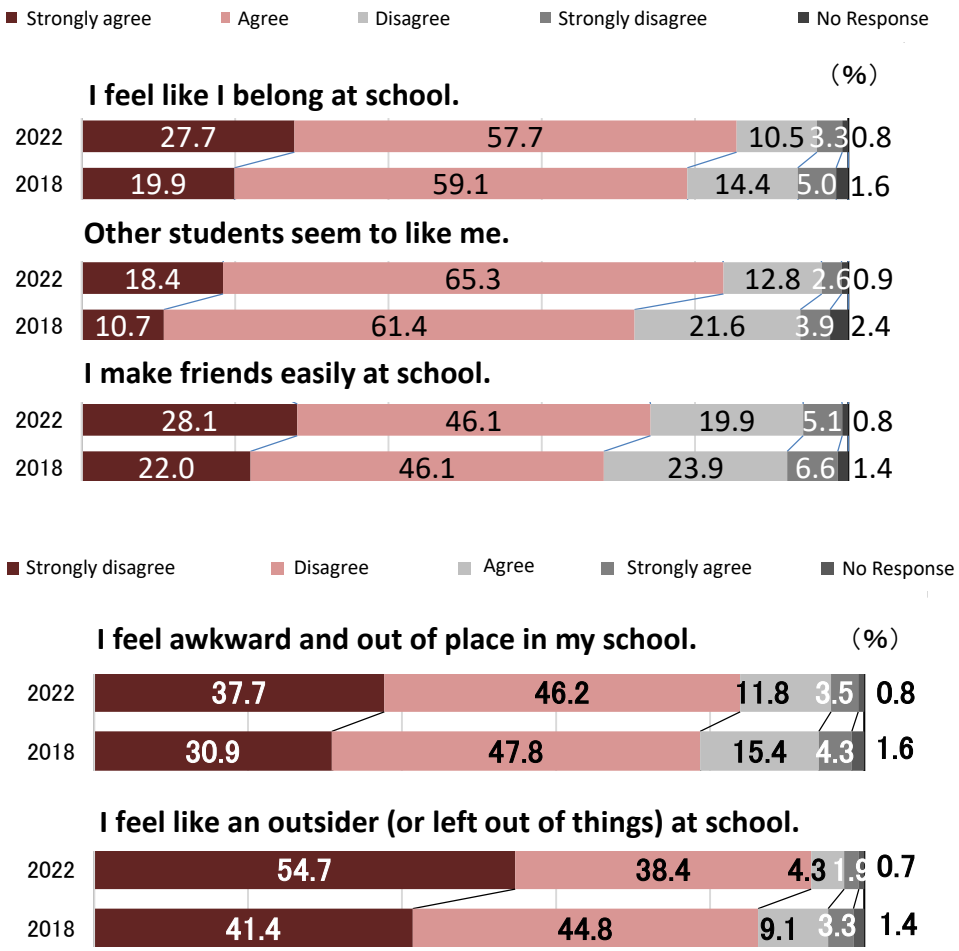
AV12TE: An average of 35 OECD countries that participated in both the 2018 and 2022 assessments.

AV1822NB: An average of 26 OECD countries participated in both the 2018 and 2022 assessments and met the PISA Sampling Criteria.

② Well-being in Education (Changes in Sense of Belonging at school between 2018 and 2022)

- **The OECD average for Sense of Belonging at school declined between 2018 and 2022, but Japan was one of the most improved countries.**

Student Questionnaire Q24: Sense of Belonging at School (Japan, 2018 to 2022)



Student Questionnaire: Sense of Belonging at School (2018→2022)

The index was calculated based on the answers to 6 items, including the 5 on the left.

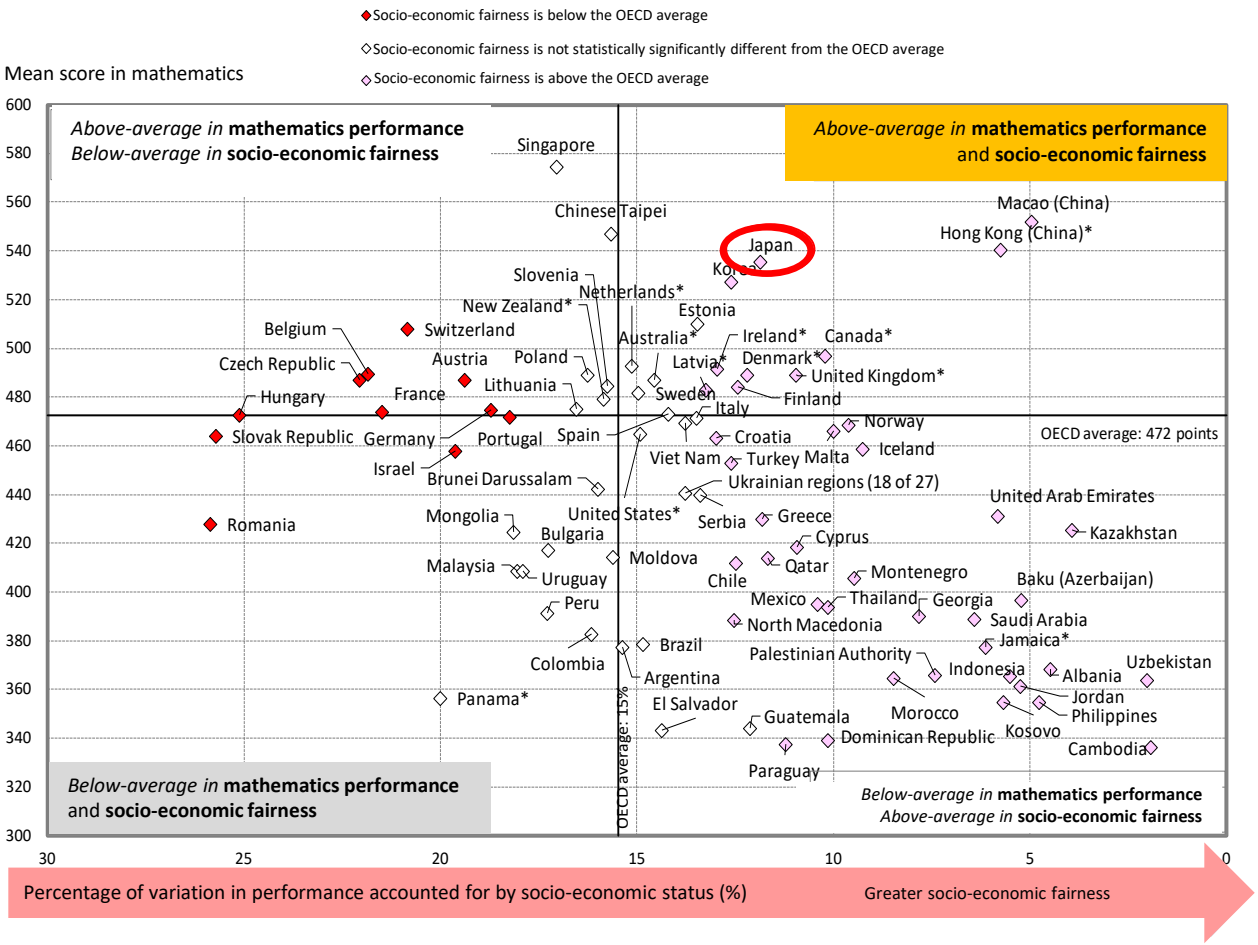
	Country	2018	2022
1	Australia	0.40	0.44
2	Switzerland	0.30	0.36
3	Spain	0.46	0.27
4	Germany	0.28	0.27
5	Korea	0.28	0.26
6	**Japan**	**0.02**	**0.25**
7	Norway	0.36	0.23
8	Ireland	0.10	0.16
9	Hungry	0.07	0.14
10	Denmark	0.21	0.11
OECD Average		**0.00**	**-0.02**

*The average value of the 37 OECD member countries is standardized to 0.0 with a standard deviation of 1.0. The higher this value, the stronger the sense of belonging that the students have at school.

③ Equity in Education (Changes in equity in education between 2018 and 2022)

- **Socio-economic Fairness in Education: The percentage of influence of ESCS on the average performance in mathematics is lower than the OECD average, and was at or above the OECD average in 2022.**
- **Socio-economic Parity in Education: The performance of disadvantaged and advantaged students remained stable or improved between 2018 and 2022.**

Strength of socio-economic gradient and mathematics



Changes in Performance by quarter of ESCS (2018–2022)

	Math
Performance among Advantaged Students (Top quarter in ESCS)	+17.7
Performance among Disadvantaged Students (Bottom quarter in ESCS)	+5.1

Duration of School Closure and the Mean Score in Mathematics

- According to OECD analysis, countries/economies where a smaller proportion of students reported that schools were closed for more than 3 months due to COVID-19 tended to have higher mean scores in mathematics than those where a larger proportion reported extended school closures.
- The above proportion was 15.5% in Japan, which was smaller than the OECD average (50.3%), and Japan was one of the countries with higher mean scores.

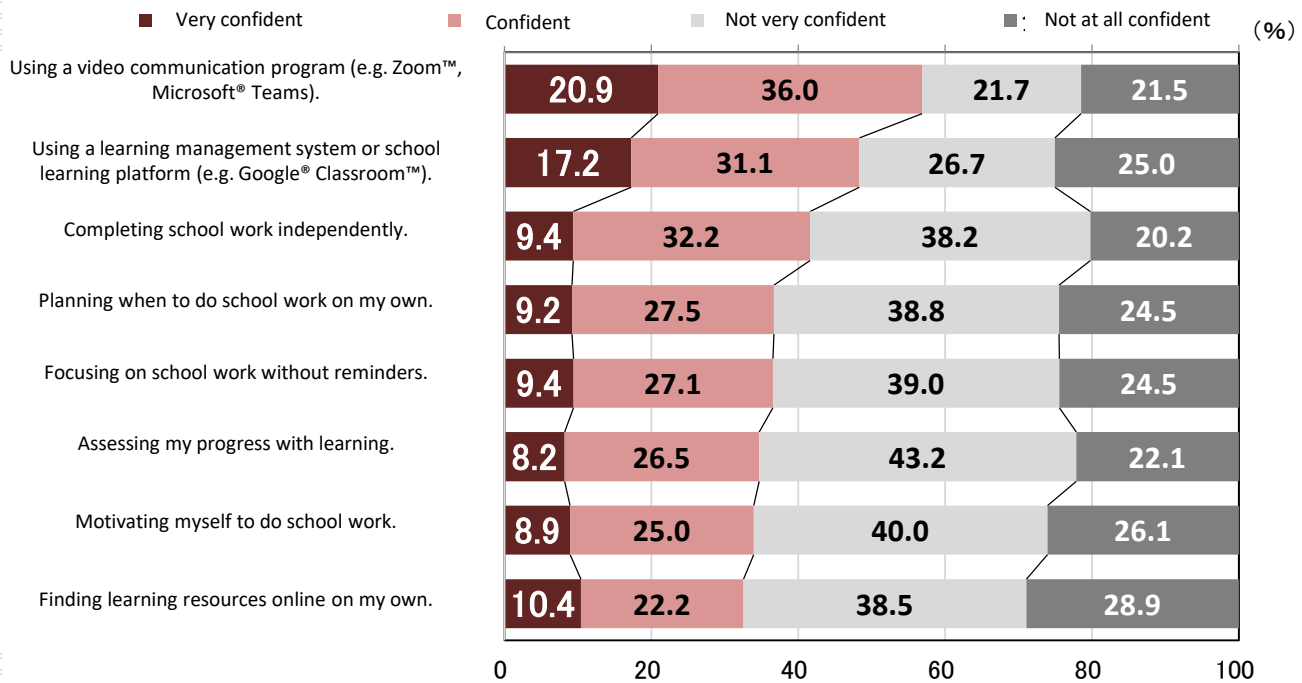
COVID-19 School Closure and Mathematics Performance

Confidence in Self-directed Learning Skills

- When asked, “Are you confident in your ability to self-study if school is closed again?” many students in Japan answered “No.”

Student Questionnaire Q61: Self-directed learning and self-efficacy (Japan)

“How confident do you feel about doing the following things if your school building closes again in the future?”



Self-directed Learning and Self-efficacy Index (SDLEFF)

The index was calculated based on the answers to the 8 items on the left.

OECD Average		0.01
34th	Japan	-0.68

*The average value of the 37 OECD member countries is standardized to 0.0 with a standard deviation of 1.0. The higher this value, the higher the sense of Self-efficacy to do Self-directed Learning (confidence).

- It is important for children living in a rapidly-changing society to have experiences that allow them to self-directed learning not only during emergencies, such as pandemics and disasters. Promoting teaching methods that nurture their motivation to study from the perspective of proactive, interactive, and authentic learning can enhance opportunities to think, judge, and express themselves, and creating an environment in which students can choose materials and methods for learning based on their own pace of learning, interests, and concerns is crucial for fostering independent learners. Efforts should be made to advance initiatives aimed at developing such learners.

(6) Use of ICT

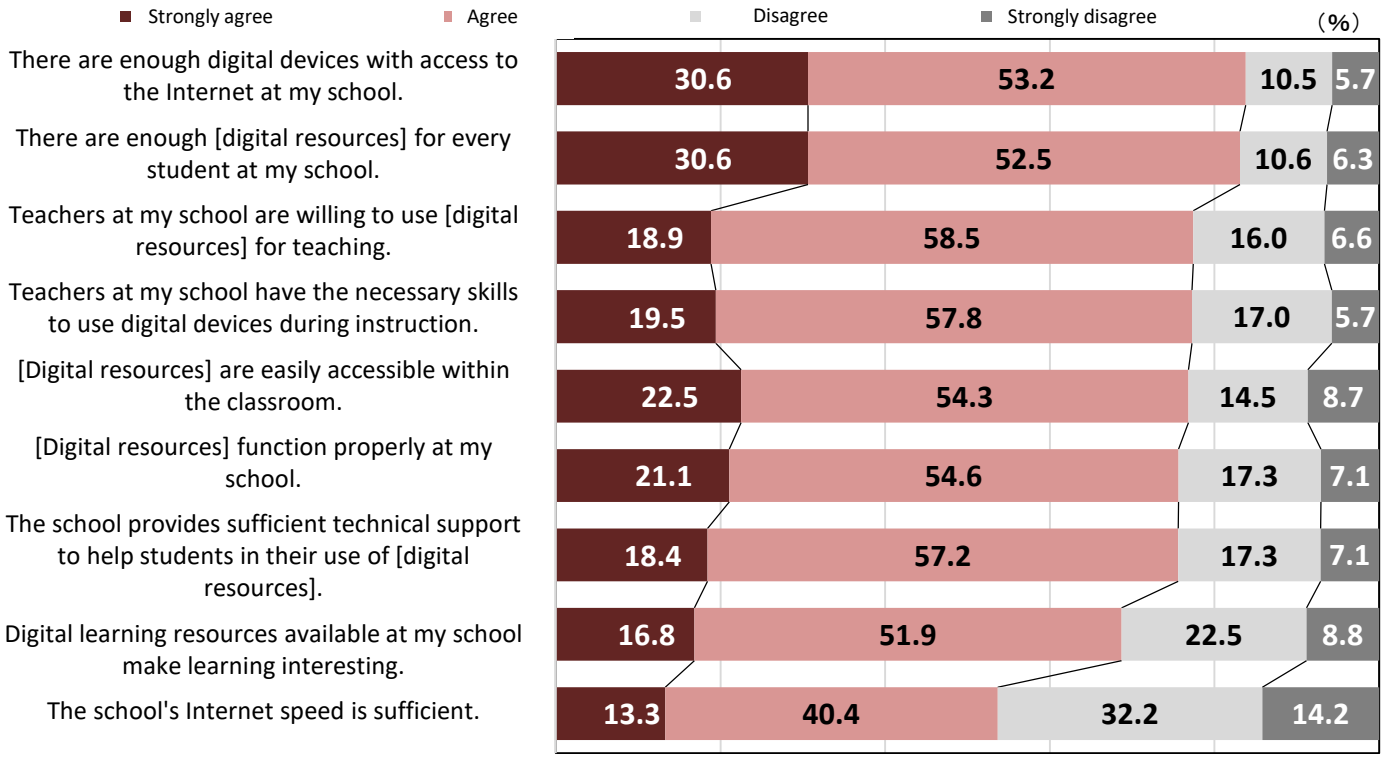
Note: The initiative to equip every high school student with a personal device was planned to be completed within FY2022, targeting first-year high school students. PISA 2022 was conducted in Japan from June to August 2022, targeting first-year high school students nationwide selected based on international criteria. Therefore, when reviewing the results of PISA 2022, especially the outcomes of the ICT Use Survey, it is important to note that the survey was conducted while the initiative to provide every high school student with a personal device was still in progress.

① Access to ICT Resources at School

- **Development of the ICT environment in Japanese high schools has progressed since the assessment in 2018. The index for accessibility to ICT at school in Japan was above the OECD average.**

ICT Questionnaire Q3: Quality of access to ICT resources at school (Japan)

To what extent do you agree or disagree with the following statements?



Quality of access to ICT Index

The index was calculated based on answers to the 9 items on the left.

5th	Japan	0.31
OECD Average		0.00

* The average value of the 29 OECD member countries that participated in the survey on ICT is standardized to 0.0, with a standard deviation of 1.0. The higher the value, the more accessible ICT resources are to students at school.

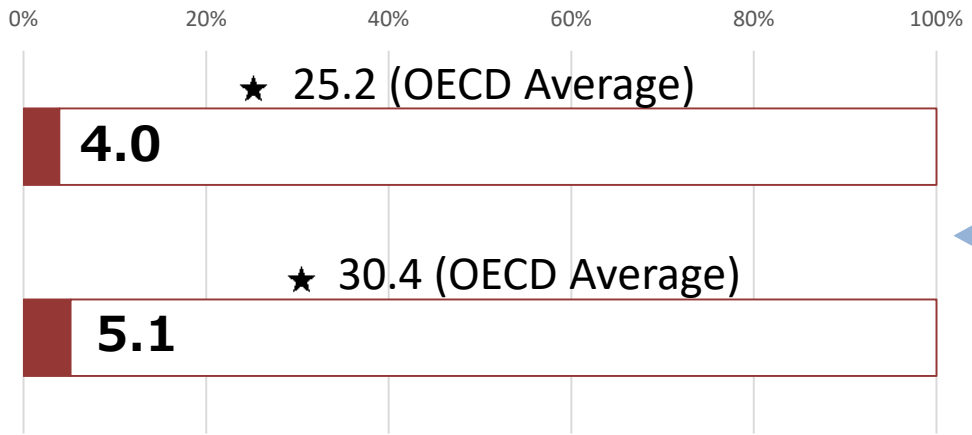
- **Japanese students are less often distracted by the use of ICT devices during class than OECD countries.**

Student Questionnaire Q35: Disciplinary Climate in Mathematics Lessons (Japan)

"How often do these things happen in your mathematics lessons?"

Students get distracted by other students who are using <digital resources> (e.g. smartphones, websites, apps).

Students get distracted by using <digital resources> (e.g. smartphones, websites, apps).

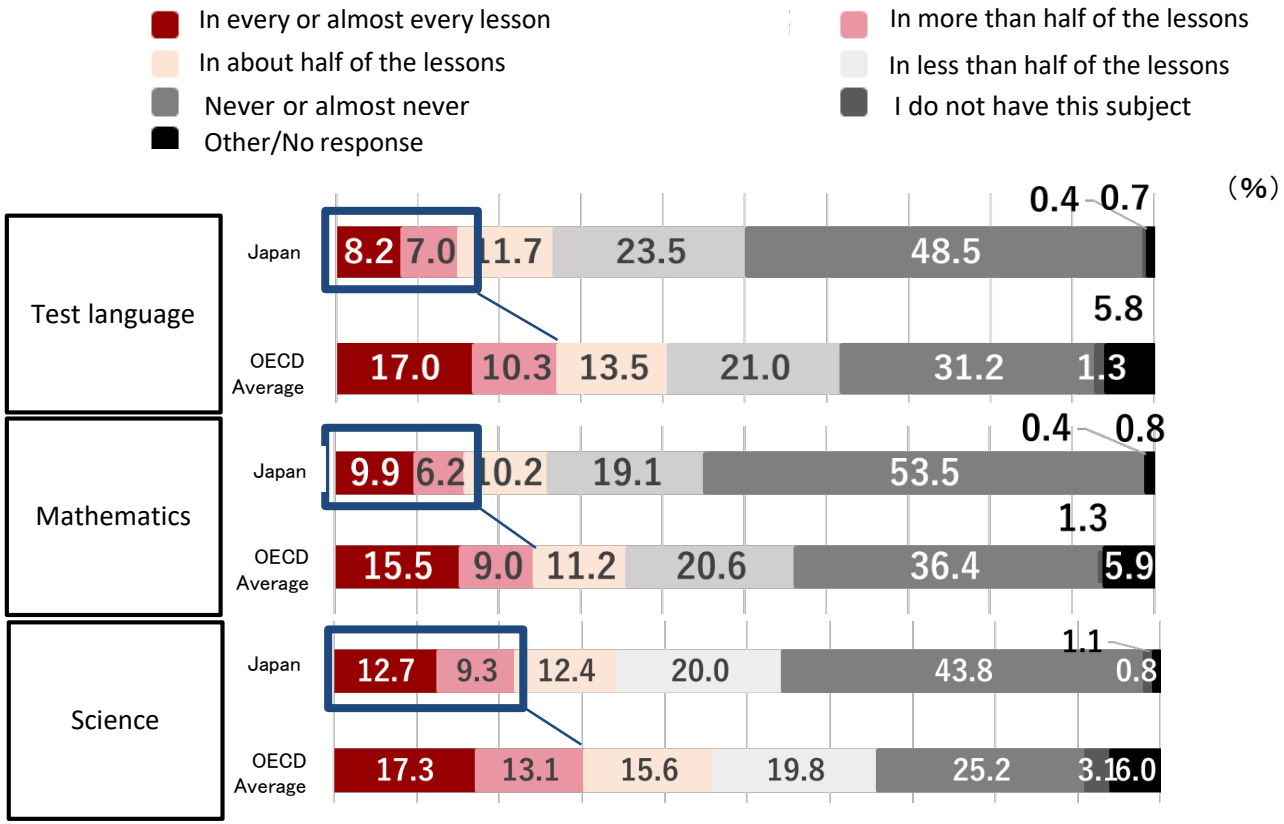


Japan had the lowest proportion of students who reported "Always" or "Often" among participating countries.

- **Japan uses ICT in classes less frequently than other OECD countries.**

ICT Questionnaire Q4: Frequency of ICT use by subject

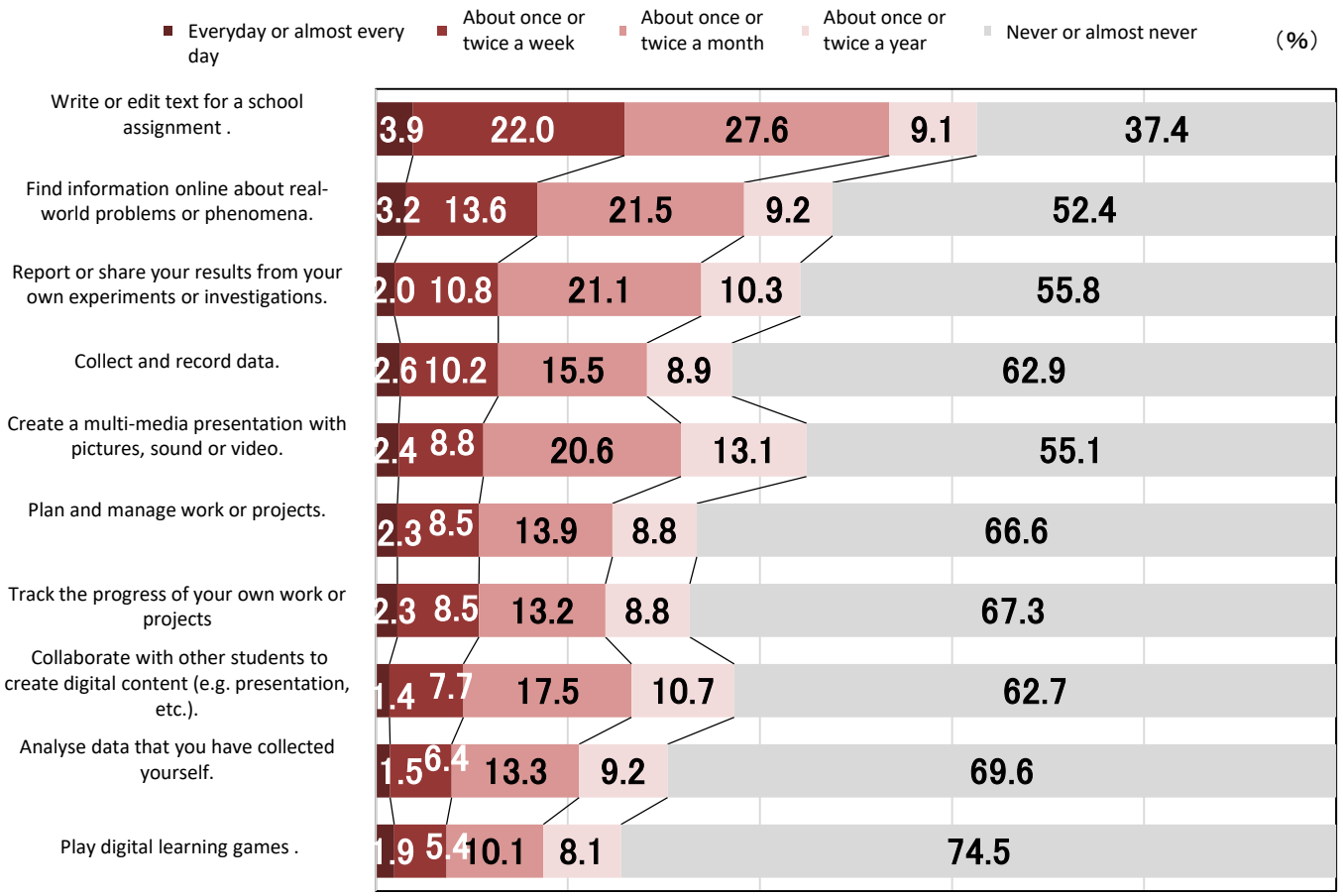
How often do you use <digital resources> in the following classroom lessons?



- **Frequency of students using digital resources to gather, record, and analyze information for their report is lower than other countries, and the index for the Frequency of Using ICT in enquiry-based learning activities is below the OECD average.**

ICT Questionnaire Q5: Inquiry based teaching with ICT (Japan)

This school year, how often did you use <digital resources> to conduct the following activities?



Use of ICT in enquiry-based learning activities Index (ICTENQ)

The index was calculated based on the answers to the 10 items on the left.

OECD Average		0.01
29th	Japan	-0.82

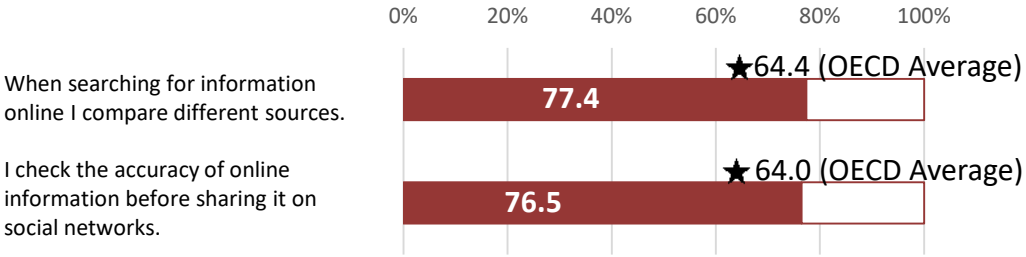
*The average value of the 37 OECD member countries is standardized to 0.0 with a standard deviation of 1.0. The higher this value, the more frequently they were engaged in enquiry-based learning activities using ICT.

② Students' Interest in ICT and Their Capacity to Use it

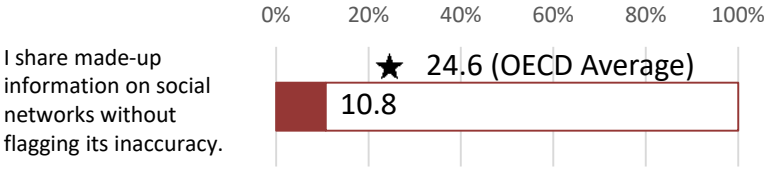
- **Japanese students' information literacy is higher than other OECD countries.**

ICT Questionnaire Q12: Students' practices regarding online information (Japan)

To what extent do you agree or disagree with the following statements?



*Percentage of students who responded "Strongly agree" or "Agree"

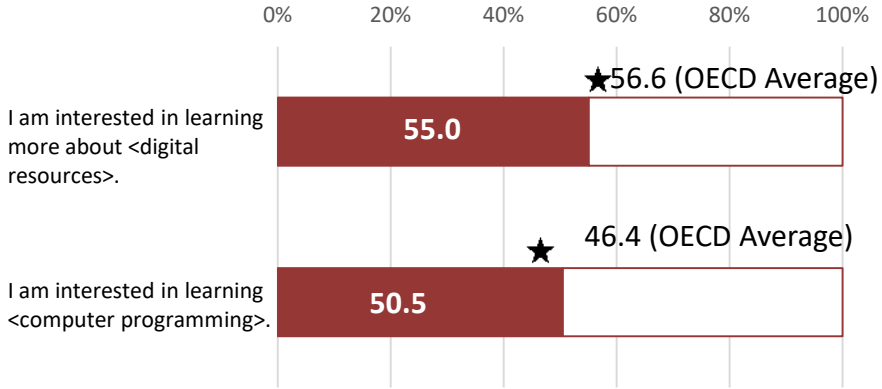


- **Japanese students are interested in computers and programing as same as the OECD average, but less confident in programing and solving the computer troubles.**

ICT Questionnaire Q14: Interest in Computer Programming (Japan)

To what extent do you agree or disagree with the following statements?

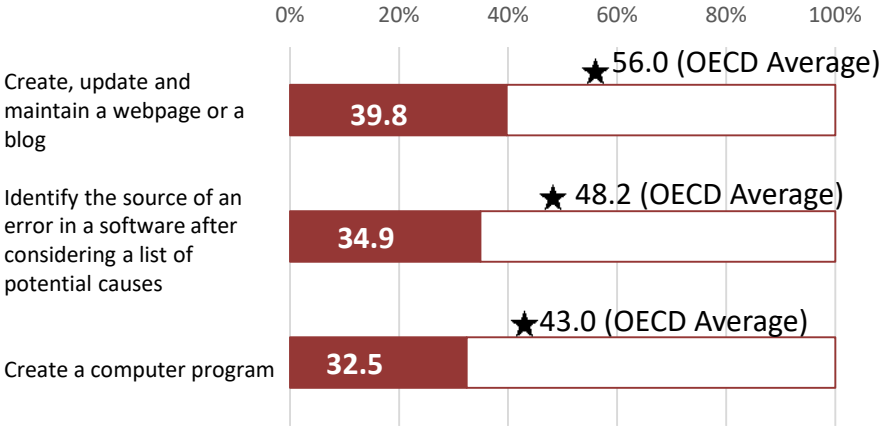
*Percentage of students who reported "Strongly agree" or "Agree"



ICT Questionnaire Q15: Self-efficacy in Digital Competencies (Japan)

To what extent are you able to do the following tasks when using <digital resources>?

*Percentage of Students who responded "I can easily do this" or "I can do with a bit of effort"

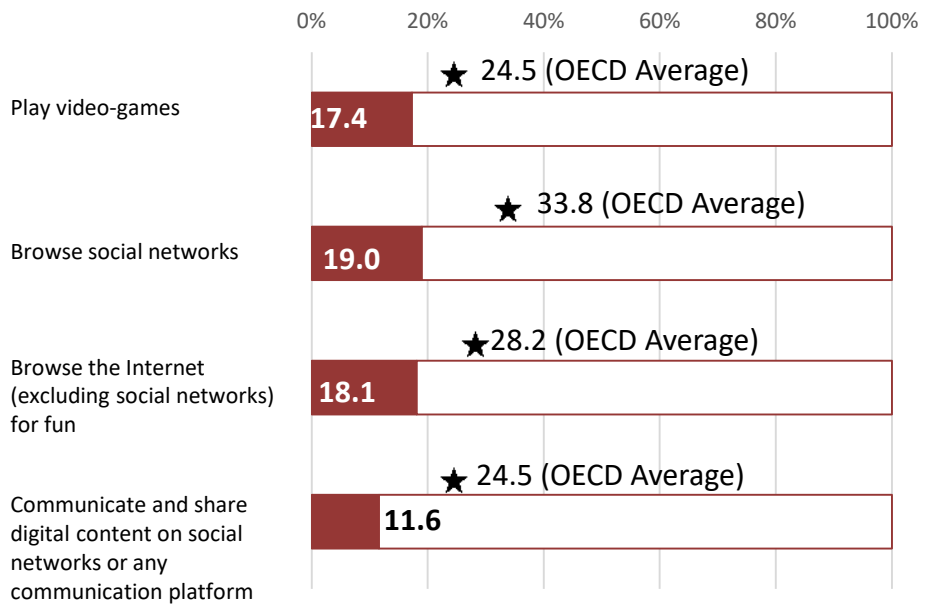


③Use of ICT in Free Time on School Days

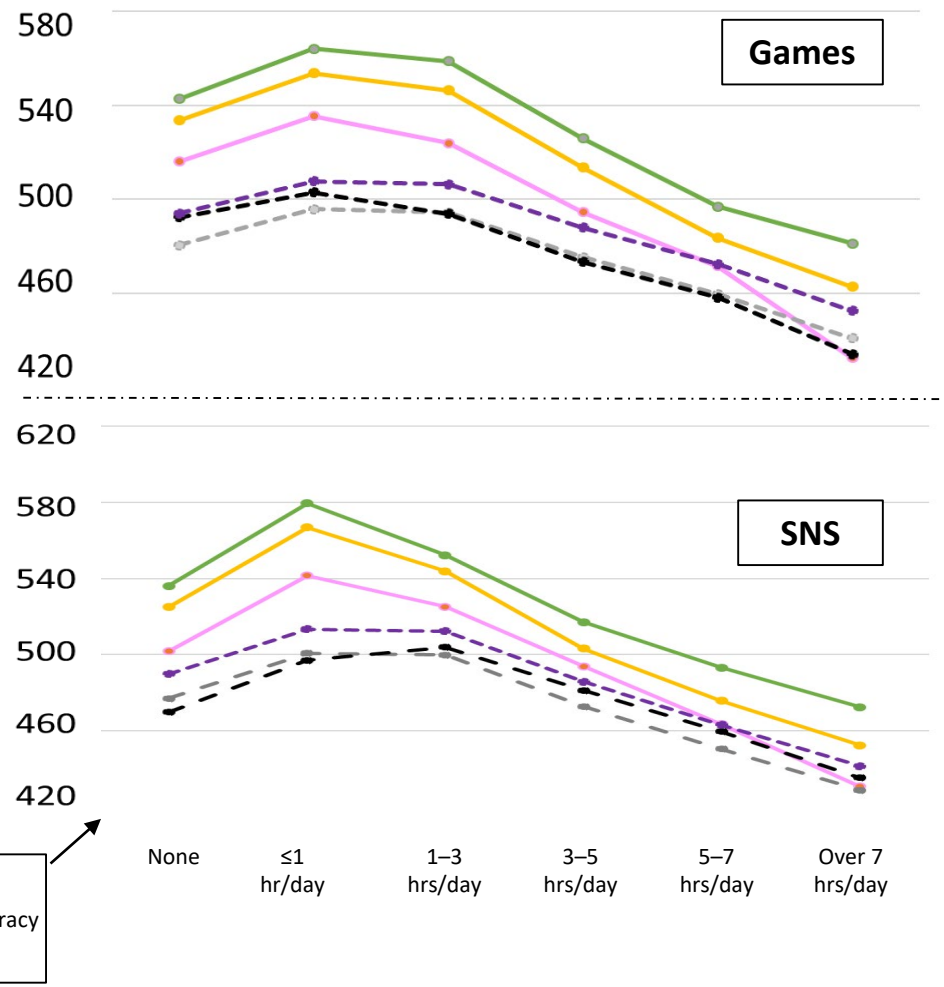
- The proportion of Japanese students who spend 3 hours or more on SNS and digital games is smaller than the OECD average.
- There is the tendency common to Japan and the OECD average that when time spent on SNS and digital games go over a certain level, the average scores of all domain decline.

ICT Questionnaire Q9: Exposure to various ICT practices

During a *typical* week day, how much time do you spend doing the following leisure activities? *Percentage of students who reported "3 or more hours a day"



Average Scores for Time Spent on ICT in Free Time on School Days



3. Main Efforts Made by MEXT in Light of PISA Results ①

1. Solid Education Based on the National Curriculum Standards

(1) Improving Lessons to Encourage Proactive, Interactive, and Authentic Learning

- Keep improving lessons with a view to encouraging proactive, interactive, and authentic learning. Make efforts to equip students with the abilities to think for themselves to solve challenges that they face in real life, make judgement, and express themselves.
- Provide information and accumulate data regarding good lesson examples where teaching materials and methods are selected to accommodate individual student's learning progress and interests to facilitate independent learning.
- Ensure that students acquire enough vocabulary to accurately understand sentences, learn how to read information and enhance language activities according to the characteristics of each subject, because improved linguistic ability creates a solid foundation for learning.
- Promote inquiry-based learning, in which students find their own targets in real life, make hypotheses, collect/organize/analyze information, and summarize and express the outcomes.

(2) Further Emphasis on Science and Mathematics

- Increase mathematical activities in which students independently find situations in real life that they can solve using a mathematical approach or see social problems from a mathematical perspective.
- In science classes, increase the time allocated to observe relationships between daily routine and society and to engage in activities in which natural phenomena can be studied, including time for experiments and discussion to solve problems.

3. Main Efforts Made by MEXT in Light of PISA Results ②

2. Promotion of GIGA School Program and Digital Education

(1) Promoting GIGA School Program

Steadily implement THE GIGA (Global and Innovation Gateway for All) program to further combine individually tailored learning assisted by personal terminal devices and the cloud with collaborative learning.

① Hardware Aspects

- Each and every student will be equipped with a terminal device, and scheduled update of supply will be carried out, including sufficient spare devices.
- The telecommunication network will be assessed nationwide in order to ensure that the GIGA program is not interrupted by poor accessibility to the Internet.

② Software Aspects

- The State will provide concentrated support during 2023 and 2024 to promote the use of terminal devices across the nation, closing any gaps between local governments and schools. (Featuring effective cases through the Leading DX School Program, etc.)
- The GIGA StuDX team will assist school teaching incorporating ICT, and specialists will be dispatched as advisers.

(2) Further Enhancing Digital Education

- Increase programming in school teaching.

  (Implement programming in elementary school education, and increase programming-related content in technical arts in junior-high school. The Informatics Ⅰ will be added to the required subjects in high school, ensuring that all students will learn about programming.)
- Promote digital transformation in high schools in order to be able to introduce the Informatics Ⅱ and intensify exploratory learning.
- Enhancement of information moral education.

  (Promote activities to make them think about the reliability of information and lessons on fact-checking.)