

Deanery Digests are short, plain language summaries of the Department of Education's research outputs. This Deanery Digest is based on the following three open-access reports: Ingram, J.; Stiff, J., Cadwallader S., Lee, G. & Kayton, H (2023) *PISA 2022: National Report for England*. Department for Education. Available from <https://www.gov.uk/government/publications/pisa-2022-national-report-for-england> ; Ingram, J.; Stiff, J., Cadwallader S., Lee, G. & Kayton, H (2023) *PISA 2022: National Report for Northern Ireland*. Department for Education. Available from <https://www.education-ni.gov.uk/articles/programme-international-student-assessment-pisa> ; Ingram, J.; Stiff, J., Cadwallader S., Lee, G. & Kayton, H (2023) *PISA 2022: National Report for Wales*. Welsh Government. Available from <https://www.gov.wales/achievement-15-year-olds-programme-international-student-assessment-pisa-national-report-2022>

What do students in England, Wales and Northern Ireland tell us about their experiences of learning mathematics? Analysing student questionnaire and performance data from PISA 2022

What is this research about and why is it important?

The Programme for International Student Assessment (PISA) is a worldwide study of 15-year-old students. Primarily, it assesses students' knowledge and skills in mathematics, reading and science, but it also gathers valuable information about their experiences, attitudes and beliefs through a questionnaire. This is the second in a series of Deanery Digests focusing on the Programme for International Student Assessment (PISA). In 2022, there was a particular focus on mathematics, meaning that more data were collected about students' performance, experiences and attitudes in mathematics. This Digest focuses on the assessments and questions related to mathematics. Such insights can often inform education policymaking and practice.

What did we do?

- The Organisation for Economic Co-operation and Development (OECD) develops and organises PISA internationally, while Pearson delivered it in England, Wales and Northern Ireland for the 2022 cycle. The University of Oxford's Department of Education analysed the data and produced national reports for each of England, Northern Ireland and Wales.
- In our recent digests about student performance in PISA 2022, we told you about how young people in England, Wales and Northern Ireland got on in the assessment. In this Digest, we will explore in more detail how they performed in mathematics and their attitudes and experiences of learning mathematics.

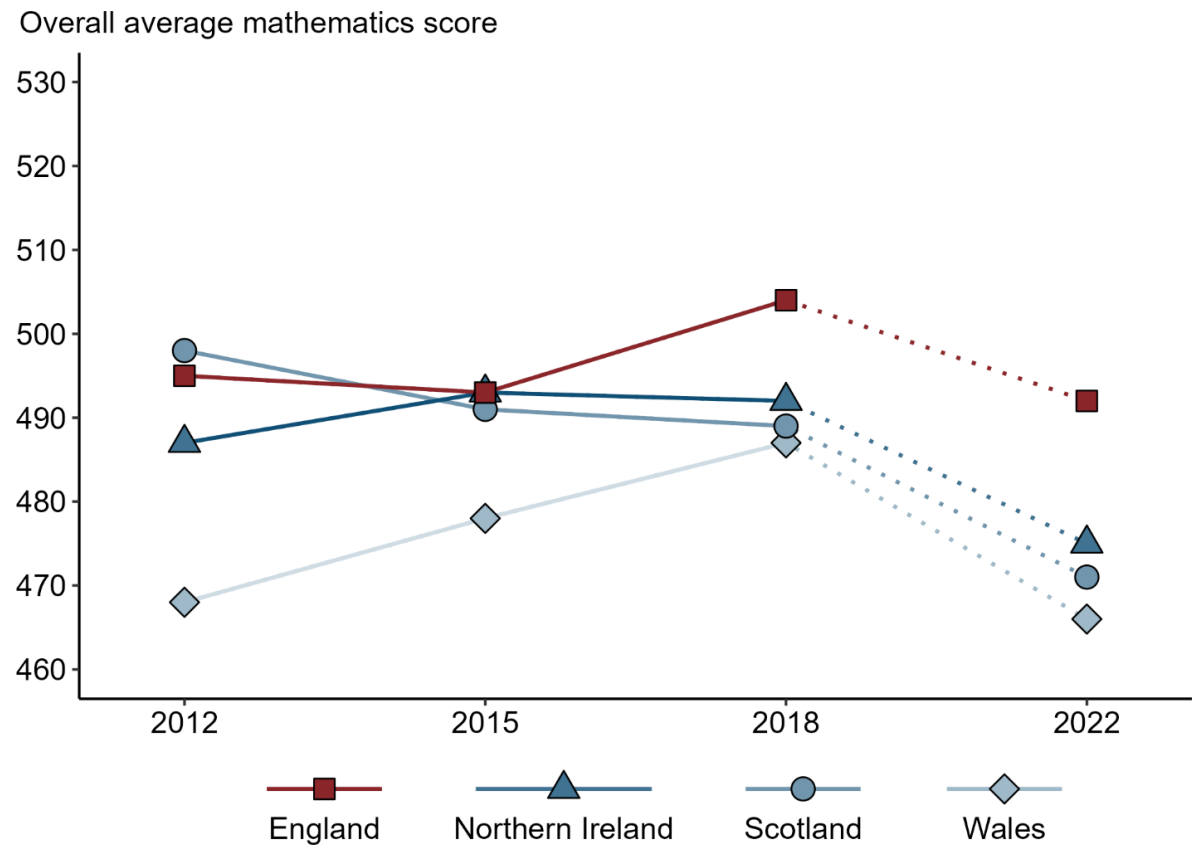
What did we find?

- The average mathematics score of students in England was significantly¹ above the OECD international average. The average score of students in Northern Ireland was similar to the OECD average score and the average score of students in Wales was significantly lower

¹Note that when we use the word significant, we are referring to statistical significance. Statistically significant differences are likely to reflect a true difference between the groups that are being compared (and less likely to reflect 'sampling' or 'measurement' error).

than the OECD average score for mathematics. The graph and table below show how the scores in mathematics for each nation have changed over the past decade.

Figure 1: PISA performance scores for England, Northern Ireland, Scotland and Wales in mathematics since 2012.

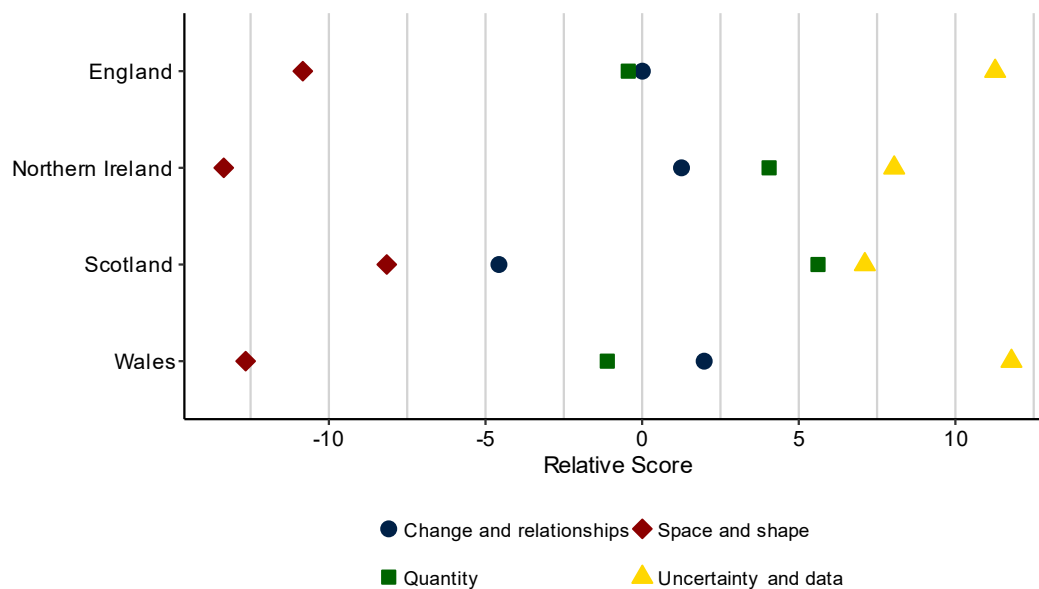


Nation	2012	2015	2018	2022
England	495	493	504	492
Northern Ireland	487	493	492	475
Scotland	498	491	489	471
Wales	468	478	487	466

- The nature of the PISA study allows performance in 2022 to be compared to performance in previous PISA cycles, the last of which was in 2018. Across the education systems measured by the OECD globally, including in the UK nations, scores in mathematics declined since 2018.
- Students answered questions from four content areas within the mathematics assessment: Quantity, Change and relationships, Space and shape, and Uncertainty and data. The next graph shows the relative score² in relation to the average score across all these content areas in each nation.

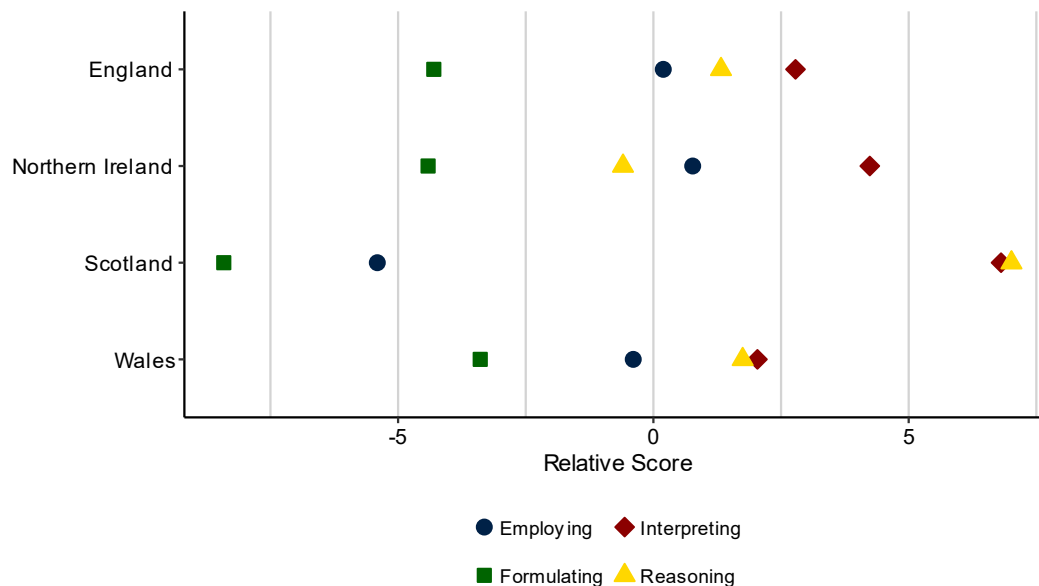
² Scores are relative to the average score across the four content areas (which is different from the overall mathematics score).

Figure 2: Relative scores in each of the mathematics content areas for England, Northern Ireland, Scotland and Wales.



- In each of the UK nations, students' performance in Uncertainty and data was stronger on average than in the other content areas. In contrast, students' performance in Space and shape was weaker on average than in the other content areas.
- The test questions also focus on four processes of problem-solving: Reasoning, Formulating, Employing, and Interpreting or evaluating. The graph below shows the relative performance of students in England, Northern Ireland, Scotland and Wales in each of these processes.

Figure 3: Relative scores in each of the mathematics process areas for England, Northern Ireland, Scotland and Wales.



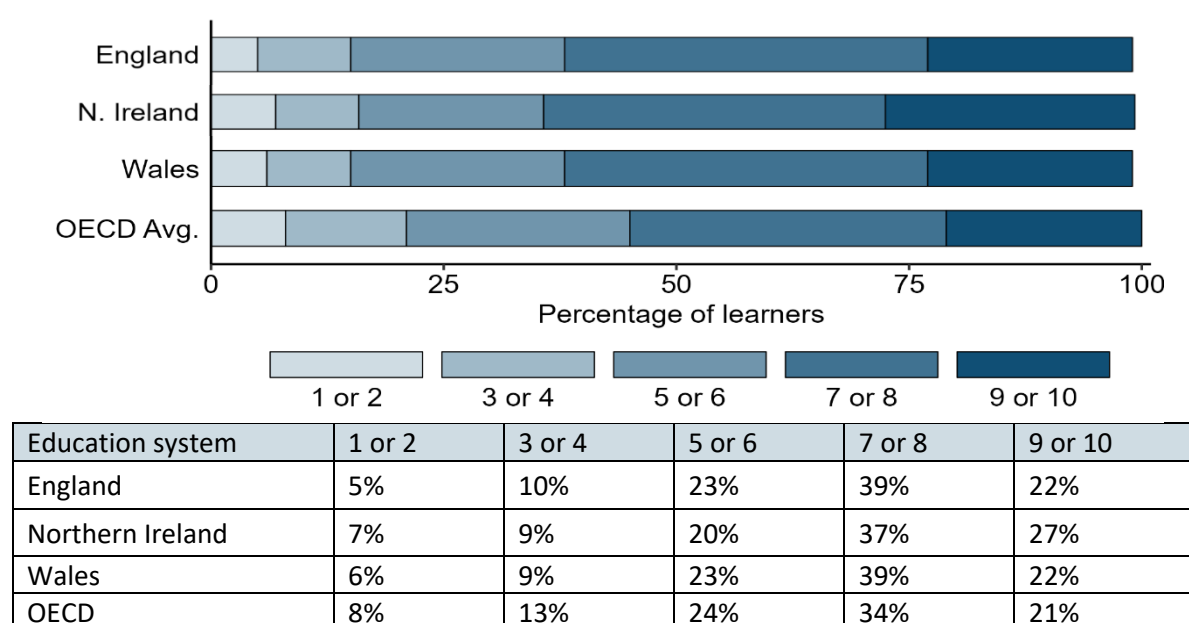
- In each of the UK nations, students' performance in Interpreting or evaluating was one of the strongest areas while Formulating was the weakest. Having said this, students' performance across these different processes is generally more consistent than across the content areas, except in Northern Ireland.
- Students were also asked several questions about their attitudes towards mathematics. The table below shows the percentages of students agreeing or strongly agreeing with each of the statements about mathematics.

Table 1: Students' perceptions of and attitudes towards mathematics in England, Northern Ireland and Wales, and on average across OECD countries

Statement	England	Northern Ireland	Wales	OECD
Mathematics is one of my favourite subjects.	44%	41%	39%	39%
Mathematics is easy for me.	48%	49%	46%	44%
I want to do well in my mathematics class.	96%	95%	92%	89%

- Students were also asked to rate the quality of their mathematics teaching this year on a scale of 1 to 10, where 1 was the worst mathematics teaching possible and 10 was the best mathematics instruction possible. The average rating in England was 6.8, in Northern Ireland it was 6.9, and in Wales it was also 6.8. These were not significantly different from the average across the OECD countries of 6.8.

Figure 4: Students' perceptions of the quality of mathematics instruction in England, Northern Ireland and Wales, and on average across OECD countries



- Overall, the majority of students reported that they want to do well in mathematics and that the quality of their mathematics teaching was good. Almost half of students reported finding mathematics easy though slightly fewer students included mathematics as one of their favourite subjects.

What does it all mean anyway?

- Students in England, Northern Ireland and Wales are more positive about their experiences of learning mathematics than on average across OECD countries. While overall performance in mathematics across the UK varies, in all UK nations students found questions about space and shape more challenging than the other questions and this relative performance is more pronounced than in other comparable countries.
- All international study results must be considered in the context of their limitations. For PISA 2022 we found evidence that the sample who completed the questionnaire may not perfectly represent the population of students in each nation. It is also important to be cautious when interpreting responses to a questionnaire that is distributed internationally, because questions may be interpreted differently by different groups of students and in different contexts.

- Caveats aside, PISA does provide us with information about how students are experiencing their lives and their education. By providing a common measure of such sentiments, over time and across different countries, PISA provides us with a useful tool for exploring and monitoring trends over time and across contexts. This information, when combined with other sources of evidence, can be very important for understanding the student experience and is therefore useful for both policy makers and teachers.

Open access reports: For those interested in further detail, the full national reports for England, Northern Ireland and Wales can be downloaded from the following websites:

- [Department for Education \(England\)](#)
- [Department of Education \(Northern Ireland\)](#)
- Welsh Government (Wales), [in English](#) and [Cymraeg](#)

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