

Strengths and Weaknesses in Maths and Science at Fourth Class

This summary gives a snapshot of findings about the relative strengths and weaknesses of Fourth Class pupils in maths and science, based on a major international study (TIMSS) that took place in 2019.

We present relative strengths and weaknesses here. In other words, we know from previous research that Fourth Class pupils achieve significantly higher scores in maths and science than pupils in many other countries worldwide. This means that, where we talk about strengths and weaknesses here, they should be interpreted relative to the overall high performance of pupils in Ireland to identify areas where pupils may need more support.



Maths

How TIMSS links to the Fourth Class maths curriculum (1999)

TIMSS Content Domains	1999 Curriculum Strand
Number	Number Algebra
Measurement & Geometry	Shape and Space Measures
Data	Data

	Relative strength	Relative weakness
Content Domains	<ul style="list-style-type: none"> Number 	<ul style="list-style-type: none"> Measurement & Geometry Data
Subdomains	<ul style="list-style-type: none"> Fractions and decimals 	<ul style="list-style-type: none"> Using data to solve problems Measurement
Topics	<ul style="list-style-type: none"> Identify and draw lines and angles Organise and represent data to help answer questions Identify and use relationships in well-defined patterns 	<ul style="list-style-type: none"> Length: measure, estimate and solve problems involving lengths

You can see some example items on the next two pages.

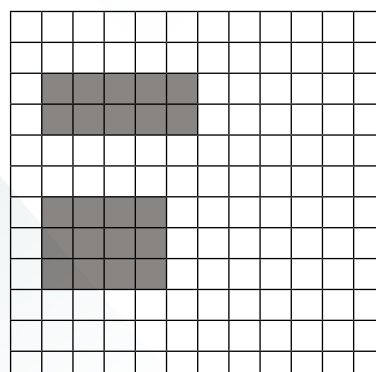
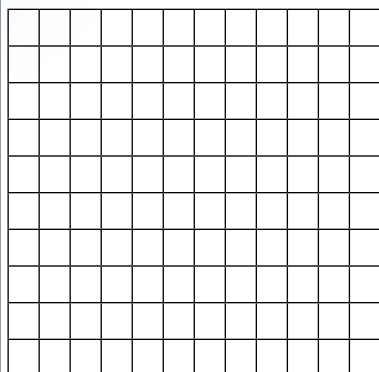
Example item assessing fractions

A chocolate bar is in the shape of a rectangle. One-quarter of it is shown below.

Draw the complete chocolate bar on the grid.

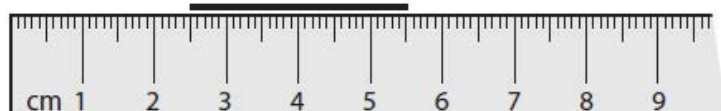


Solution: Rectangle: 2 X 6 or 3 X 4



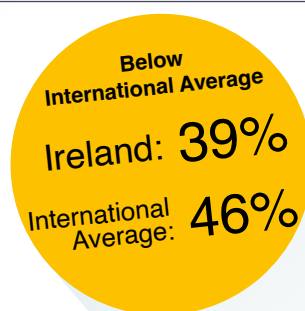
Example item assessing measurement

How long is this line in centimetres?



- (a) 7
- (b) 5.5
- (c) 3.5
- (d) 3

Solution: (d) 3



Science

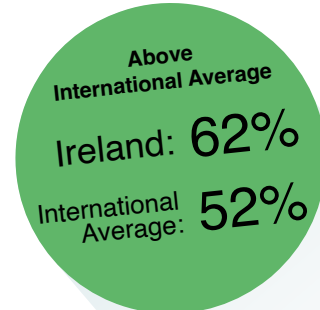
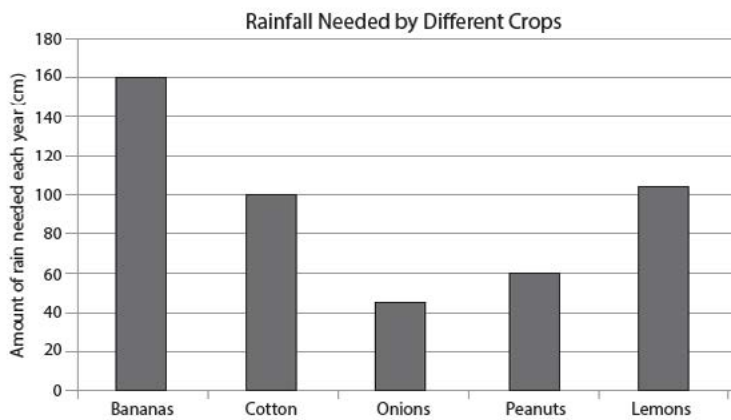
How the TIMSS Framework links to the Third/Fourth Class science curriculum (1999)

TIMSS Content Domains	1999 Curriculum Strand
Life Science	Living Things
Physical Science	Energy & Forces Materials
Earth Science	Environmental Awareness & Care Natural Environments (Geography)

	Relative strength	Relative weakness
Content Domains	<ul style="list-style-type: none"> Earth Science 	<ul style="list-style-type: none"> Physical Science
Subdomains	<ul style="list-style-type: none"> Organisms, environment and their interactions Forces and motion Earth's weather and climates 	<ul style="list-style-type: none"> Characteristics and life processes of organisms Life cycles, reproduction and heredity Classification and properties of matter and changes in matter Earth in the Solar System
Topics	<ul style="list-style-type: none"> Response of living things to environmental conditions Weather and climate 	<ul style="list-style-type: none"> Differences between living and non-living things and what living things require to live. Physical changes observed in everyday life

Example item assessing Earth's weather and climate

The amount of rainfall needed by different crops is shown in the graph below.



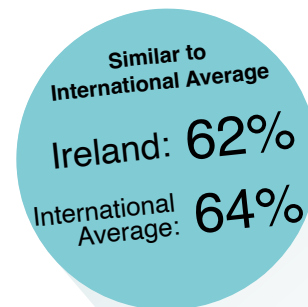
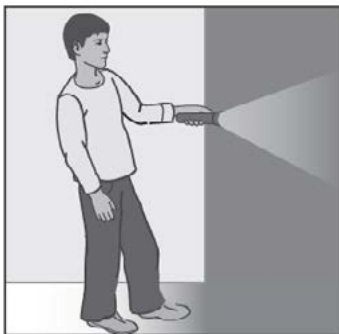
A farmer wants to plant crops in an area that gets about 60 cm of rain each year. Which crops will probably grow best in this area?

- (a) Onions only
- (b) Onions and peanuts
- (c) Cotton and lemons
- (d) Bananas, lemons and cotton

Solution: (b) Onions and peanuts

Example item assessing forms of energy and energy transfer

Jake switches on a torch.



One kind of energy changes into another kind of energy in the torch. Which statement describes this change?

- (a) Electrical energy changes into light energy
- (b) Motion energy changes into light energy
- (c) Light energy changes into electrical energy
- (d) Light energy changes into motion energy

Solution: (a) Electrical energy changes into light energy

The **full report** on which this summary is based can be read for free at <https://doi.org/10.70092/2091319.0724>.

The report is **aimed at teachers, professional development providers, and others working in education and curriculum development**. It contains more details on:

- **The performance of Fourth Class pupils in Ireland in 2019** compared to their peers internationally in maths and science;
- Specific areas (domains, subdomains, and topics) where pupils in Ireland showed **relative strengths or weaknesses**;
- **Links between the Irish curriculum and the TIMSS assessment framework** for maths and science. This analysis highlights where they align and also where topics are assessed in TIMSS but not yet expected to be taught in Ireland.

Other findings from TIMSS 2019 and other cycles of TIMSS in Ireland are available from <https://www.erc.ie/studies/timss/reports>.

An infographic summary of the main TIMSS 2019 findings can be found here: <https://www.erc.ie/wp-content/uploads/2021/04/TIMSS-2019-infographic.pdf>

The initial findings of TIMSS 2023 will be published on 4th December 2024 and will also be available from <https://www.erc.ie/studies/timss/reports>.

