# scottish survey of achievement 



## 2008 Scottish Survey of Achievement

 Mathematics and Core SkillsThis Statistics Publication Notice presents results from the 2008 Scottish Survey of Achievement (SSA). The SSA is a sample survey which monitors how well pupils in Scotland are learning. Each year the SSA focuses on a different aspect of the school curriculum. In 2008, the focus was mathematics. Between April and June 2008 just under 40,000 pupils in P3, P5, P7 and S2 from around 1,200 Scottish schools took part in the survey. It reflects learning and teaching under the 5-14 Curriculum.

The SSA is a partnership between the Scottish Government, Learning and Teaching Scotland (LTS), Scottish Qualifications Authority (SQA) and HM Inspectorate of Education (HMIE).

This is the first year SSA results have been treated as Official Statistics.
> pupils who answered 50 per cent or more of the questions - 'made a good start' with skills but need more practice.

The current 5-14 curriculum is based on six levels, A-F. Most pupils are expected to progress through a level in about 18 months to two years. The expectations are that:
, almost all pupils will have attained Level A by the end of P3
, most will have attained Level B by the end of P4
, most will have attained Level C by the end of P6
, most will have attained Level D by the end of P7
, most will have attained Level E by the end of S2 (and a few will have attained Level F).

Because the SSA is based on a sample of pupils rather than on the whole population the results shown are estimates. That is to say there is an element of uncertainty within the results because they are based on a sample. To give a scale to this uncertainty we can use confidence intervals to show the range of values within which we are confident the actual value would lie if we tested all pupils. Confidence intervals for the main national estimates are a maximum of 2 percentage points, meaning that we are confident that the true value of each estimate lies within 2 percentage points either side of the given estimate. Where appropriate, confidence intervals are represented on charts by thin bars to help make comparisons between different groups of pupils. Full details of this can be found in the supporting evidence and the technical annexes.
As numeracy in the SSA is defined as a subset of mathematics, both mathematics and numeracy were assessed using the same test booklets. Each booklet was structured to ensure enough numeracy content to give valid results. The content was then made up from the remaining mathematics content to ensure the whole of the mathematics curriculum was covered within the test booklets.
As well as test-based results, the SSA collected teachers' judgements of pupils' levels in mathematics. These are based on a range of evidence about the individual pupil gathered by the teacher over a period of time.

The SSA written assessments provide a picture of the nation at the time of testing. Tests are unseen and independently developed and marked. The content of the tests is drawn from across the whole mathematics curriculum and individual pupils are not expected to be able to answer all of the questions set. The assessments are designed to allow pupils to demonstrate their learning as far as they can and are not designed to produce a 'pass'. These design
features should be noted when interpreting the results of the SSA.
In addition to the written assessments and the teachers' judgements, all pupils in the SSA and their mathematics teachers were asked to complete a questionnaire exploring their attitudes to and experiences of mathematics learning and teaching. More information on how the SSA is designed and run can be found in the technical annexes.

## Mathematics



## Main Messages - Mathematics

, at P3 over 85 per cent of children were estimated to have 'well-established or better' skills at the expected level in mathematics
, the proportion of pupils attaining the expected levels in mathematics decreased through primary and into secondary
> by S2, an estimated 30 per cent of pupils were 'well-established or better' at the expected level for the stage
> there was limited evidence of boys performing better than girls in mathematics
> pupils from deprived areas had lower attainment than those in less deprived areas
> both teachers' judgements and SSA assessments showed strong levels of attainment in mathematics at P3 decreasing into S2 (relative to expectations)
, teachers' judgements of pupils' levels in mathematics were consistently greater than the results based on the main SSA assessment.

## Mathematics - National Attainment Estimates

Charts 1 to 3 show the estimated percentages of pupils in each of P3, P5, P7 and S2 that can be categorised into attainment bands at Levels A-F in mathematics.

Chart 1 National mathematics attainment estimates
Estimated \% pupils classified into attainment bands by 5-14 level
Sample: approximately 6,000 pupils per stage


* Expected level for the stage. There is no expected level at P5

Attainment levels were good in early primary (when compared to the formal 5-14 expectations) before falling relative to these expectations through primary into secondary. At P3, over 85 per cent were 'well-established or better' at the expected level but at the expected level for S 2 this proportion was 30 per cent.

The chart shows a spread of attainment across the 5-14 levels tested with some pupils not yet having made a good start at the lowest level tested, while some were 'well-established or better' at levels beyond those expected.

## Mathematics - Attainment Estimates by Gender

Chart 2 compares the proportions of boys and girls having 'well-established' or better skills in mathematics at the given 5-14 levels, at P3, P5, P7 and S2.

Chart 2 National mathematics attainment estimates, by gender
Estimated \% pupils having 'well-established' skills or better at the given level
Sample: Approximately 3,000 boys and 3,000 girls per stage


* Expected level for the stage. There is no expected level at P5

The chart shows that boys tend to have better attainment than girls across most stages and levels. Notably boys attainment is better at the highest levels tested at each stage, while at the lowest levels tested at each stage girls tend to have higher attainment.

When considering the attainment of boys and girls separately, the underlying pattern of decreasing attainment, relative to expected levels, could be seen for both groups.

> HELPFUL FEEDBACK

## Mathematics - Attainment Estimates by Deprivation

Chart 3 compares the proportions of pupils having 'well-established' or better skills in mathematics at the given 5-14 levels, by deprivation category at P3, P5, P7 and S2.

Chart 3 National mathematics attainment estimates, by deprivation
Estimated \% pupils having 'well-established' skills or better at the given level
Sample: Approximately 5,000 'less deprived’ and 1,000 'most deprived’ per stage

'Most deprived' means the pupil lived in one of the 20 per cent most deprived areas in Scotland based on the 2004 Scottish Index of Multiple Deprivation (SIMD), the remainder of pupils are classified as 'less deprived'

* Expected level for the stage. There is no expected level at P5

Pupils from less deprived areas had significantly higher attainment than pupils from the most deprived areas at every stage and level. The largest difference of 19 percentage points was seen at S2 Level D.

When we consider pupils from more and less deprived areas separately, the underlying pattern of decreasing attainment relative to expected levels throughout primary into early secondary remained evident. Both groups followed this general trend.

## Mathematics - Teachers' Judgements

In addition to the direct assessment of pupils' mathematics skills, teachers were invited to submit judgements of current 5-14 levels in mathematics for each pupil in the survey. Chart 4 illustrates the resulting level distributions for each stage.

Judgements were based on a range of knowledge and evidence that the classroom teacher had gathered about each pupil over a period of time.

Chart 4 Teachers' judgements: mathematics
Estimated \% pupils judged to be at indicated level by their teachers
Sample: approximately 10,000 pupils per stage


At P3 and P5, the majority of pupils were distributed between two levels. At P3, around two thirds were at Level A which is the expected level for this stage. At P5, there is no expected level. Most pupils at P5 were judged to be at Level C which is the expected level for P6.

At P7 and S2, the majority of pupils were judged to be at the expected levels and the remainder approximately evenly distributed amongst the next higher and lower levels.

## Mathematics - Teachers' Judgements

Chart 5 compares the SSA test-based results with the teachers' judgements for the pupils in the sample.
Chart 5 Teachers' judgements for mathematics compared with SSA test-based results* (\% pupils judged to be at indicated levels or better by teachers and proportion of pupils well-established or better at the level from the SSA)

$\square$ Test based $\square$ Teacher judgements

* In order to facilitate comparison both test-based results and teacher judgements have been re-categorised into equivalent scales. Well established or better in an SSA test (i.e. a score of 65 per cent or more) is treated as the pupils having demonstrated the level. The teacher judgements are the summation of the pupils at the given level or higher.

The chart shows that teachers consistently judged more pupils to be at the expected levels, or beyond, than the tests. The size of this gap increased from P3 up to S2.

The underlying pattern of strong attainment at P3 followed by a decrease through the stages to S2 was evident again in the teachers' judgements, giving support to the test-based results.

## Numeracy



## Main Messages - Numeracy

, the attainment profile of pupils across stages and levels in numeracy was similar to that in mathematics with higher attainment relative to expectations at P3 decreasing into S2
, over 90 per cent of pupils at P3 were estimated to be well-established at the expected level compared to around 45 per cent at S 2
> there was some evidence of boys performing better than girls in numeracy
> pupils from deprived areas had lower attainment than those in less deprived areas in numeracy
> comparison with previous surveys showed there had been no improvement in numeracy attainment over the last four years.

## HELPFUL FEEDBACK

## Numeracy - National Attainment Estimates

Charts 6,7 and 8 show the percentages of pupils in each of P3, P5, P7 and S2, categorised into attainment bands at Levels A-F overall and by gender and deprivation in numeracy.

Chart 6 National numeracy attainment estimates
Estimated \% pupils classified into attainment bands by 5-14 level
Sample: approximately 6,000 pupils per stage


* Expected level for the stage. There is no expected level at P5

The overall picture is similar to that in mathematics. Attainment relative to expectations was good in P3 before falling through primary into secondary. In general, attainment in numeracy compared to mathematics on a level by level basis is slightly better.

At P3, over 90 per cent were 'well-established or better' at the expected level. At the expected level for S2 this proportion is almost 45 per cent.

There was a spread of attainment across the 5-14 levels in each stage, with some pupils not yet having made a good start at the lowest level tested while some were 'well-established or better' at levels beyond those expected.
DEPENDABLE EVIDENCE

## Numeracy - Attainment Estimates by Gender

Chart 7 compares the proportions of boys and girls having 'well-established' skills or better in numeracy at the given 5-14 levels, at P3, P5, P7 and S2.

Chart 7 National numeracy attainment estimates, by gender
Estimated \% pupils having 'well-established' skills or better at the given level
Sample: Approximately 3,000 boys and 3,000 girls per stage


* Expected level for the stage. There is no expected level at P5

The chart shows that boys tended to have better attainment than girls across most stages and levels. Notably boys' attainment is generally better at the highest levels tested at each stage, while at the lowest levels tested at each stage girls have higher attainment.

Similarly to mathematics, the underlying pattern of decreasing attainment, relative to expected levels, could be seen for both groups.

## Numeracy - Attainment Estimates by Deprivation

Chart 8 compares the proportions of pupils having 'well-established' skills or better in numeracy at the given $5-14$ levels by deprivation category at P3, P5, P7 and S2.

Chart 8 National numeracy attainment estimates, by deprivation
Estimated \% pupils having 'well-established' skills or better at the given level
Sample: Approximately 5,000 'less deprived' and 1,000 'most deprived’ per stage

'Most deprived' means the pupil lived in one of the 20 per cent most deprived areas in Scotland based on the 2004 Scottish Index of Multiple Deprivation (SIMD), the remainder of pupils are classified as 'less' deprived

* Expected level for the stage. There is no expected level at P5.

Pupils from less deprived areas had significantly higher attainment than pupils from the most deprived areas at every stage and level. All differences were statistically significant, with the largest difference of 19 percentage points at S2 Level E.

The overall pattern of falling attainment against the expectations throughout primary into early secondary remained evident when considering pupils from more and less deprived areas separately. This is the same pattern seen in mathematics attainment.

## Changes in Numeracy Attainment Over Time

The chart below compares the average pupil score on individual numeracy test items included in each of the 2005, 2006 and 2008 surveys. There were 66, 70, 75 and 93 items respectively at P3, P5, P7 and S2 that were included in each survey. Each item was completed by a minimum of 550 pupils. Comparison of common items is a standard approach to measuring change over time in this type of survey.

Chart 9 Numeracy attainment in 2005, 2006 and 2008
Average item score on numeracy items common to all three surveys


The differences in attainment between each year by stage were not statistically significant. While it cannot be said attainment has dropped, it is clear that there has been no improvement in numeracy attainment between 2005 and 2008.

## Pupil and Teacher Questionnaires



## Main Messages - Questionnaires

, Across the stages most pupils wanted to do well in mathematics but their enjoyment and interest decreased through primary into S2
, Teachers agreed that the majority of pupils had good motivation and that motivation was higher in primary school compared to S2
, Pupil confidence in mathematics was generally lower at S2 than in primary
, According to pupils, there was more discussion of mathematics in primary school than in S2
> Pupils and teachers agreed that teaching as a whole class was more frequent in S2 than in primary
, Confidence among teachers was generally lowest at P3 and increased to P7. Teachers of S2 were consistently confident teaching mathematics topics
, Teachers' ratings of pupil attendance and class behaviour was 'very positive'
> Around one in five primary teachers had not taken part in any mathematical CPD in the last four years.

## Pupil Questionnaires

The charts below show some of the key findings from the pupil questionnaires. In total around 10,000 pupils per stage returned completed questionnaires. Two versions of the questionnaires were distributed with a limited number of questions common to both, consequently the results to each question were based on a minimum of 4,500-5,500 responses each.

## Attitudes Towards Mathematics

Pupils were asked a number of questions relating to their attitude towards mathematics and to their perceptions of their own mathematics ability. Some of the main findings are shown below.

Chart 10 Pupil questionnaires
How good do you think you are at maths?
\% of pupils responding


Chart 10 shows that pupils' self assessment of their ability in mathematics decreased as they progressed through the stages. At P3, more than three quarters of pupils rated themselves above average but by S 2 this fell to less than half.

Chart 11 Pupil questionnaires
Attitudes towards mathematics
\% of pupils responding

$\square$ Very often $\quad$ Sometimes $\quad$ Hardly ever $\quad$ Don't know

Chart 11 shows how often pupils agreed with a series of statements related to their attitude towards mathematics. The chart shows a general decline in positive responses to each question from P3 through to S2. In particular over half of P3 pupils reported that they 'very often' found maths both interesting and enjoyable. This decreased to less than a quarter of pupils by S2.

However pupils' ratings of how often they want to do well in maths were more positive. Although this showed a decrease from primary into secondary, over 80 per cent of pupils at each stage reported that they 'very often' wanted to do well in mathematics.

## Confidence in Mathematics

Pupils were asked a number of questions relating to their confidence in mathematics. The results are shown in Chart 12.

Chart 12 Pupil questionnaires
Confidence in mathematics
\% of pupils responding


## $\square$ Very often $\square$ Sometimes $\square$ Hardly ever $\square$ Don't know

The chart shows that S2 pupils consistently reported lower levels of confidence than pupils in primary. Between a quarter and a third of S2 pupils reported feeling confident 'very often' in the areas explored, while across the primary stages, around half of pupils claimed they felt confident in the three areas 'very often'.
Around 15 per cent of pupils at S 2 reported 'hardly ever' feeling confident across the three questions. This is consistently greater than at any of the primary stages.

## Discussions in Mathematics

Pupils were asked a number of questions relating to how often they had the opportunity to discuss mathematics within the classroom and specifically with their teacher. Charts 13 and 14 present the main findings.

Chart 13 Pupil Questionnaires
Discussion in the classroom
\% of pupils responding


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\squareVery often ■ Sometimes ם Hardly ever ם Don't know
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In general about a fifth of pupils across all stages reported that they discussed mathematics 'very often'. Through primary the proportion who reported 'hardly ever' decreased before increasing in S2 with around 30 per cent of S2 pupils reporting 'hardly ever' in response to each of these questions.

Chart 14 Pupil questionnaires Discussing mathematics with your teacher
\% of pupils responding


The proportion of pupils reporting that they 'very often' talked with their teacher about what they were going to learn remained steady through primary, at around 60 per cent, before dropping to around 40 per cent at S2. The proportion reporting that they were 'very often' asked to explain their answers in mathematics increased from just under 40 per cent to almost 60 per cent between P3 and S2. The proportion reporting that they 'very often' suggested ways to answer maths problems remained relatively stable across the stages at around 25 to 30 per cent.

## Usefulness of Mathematics in the Future

Pupils were asked about how useful mathematics will be when they leave school. Ninety per cent of P3 pupils thought studying mathematics would be useful when they left school. This figure rose to around 95 per cent among the older pupils.

## Support in Mathematics

Pupils were asked a number of questions relating to the support they felt they received within the classroom.
Chart 15 Pupil questionnaires
Support in mathematics
\% of pupils responding

$\square$ Very often $\square$ Sometimes $\quad$ Hardly ever $\square$ Don't know

Chart 15 shows that the proportion of pupils reporting that their teacher 'very often' started lessons by explaining what they were going to learn, dropped from over 70 per cent in P3 to just over 50 per cent in S2. Less than half of pupils at all stages reported 'very often' getting extra help when they needed it. More than half reported that their teacher 'very often' helped them to understand how they could do better in maths.

## Detailed Lesson Activity

A range of questions were asked relating to the activities taking place in mathematics lessons. Pupils reported being taught as a class, using text books and writing in jotters as being more frequent activities as they moved from P3 to S2. They reported working with groups or partners, working with computers and carrying out investigations and problem solving more frequently in the early stages, with a decrease in these activities up to S2.

Full details of pupils' experiences of the activities that took place in their mathematics classes are available in the supporting evidence.

## Activities Outside School

Pupils were asked a range of questions relating to their time outside school.

## Chart 16 Pupil questionnaires Activity outside of school - talking with adults <br> \% of pupils responding


$\square$ Very often $\quad$ Sometimes $\square$ Hardly ever $\square$ Don't know

Chart 16 shows the results of questions relating to talking with an adult about their learning in mathematics and about topical issues in the news. The proportion of pupils reporting 'hardly ever' talking with an adult about what they learned in their mathematics lessons increased from around 20 per cent to over 40 per cent between P3 and S2. The proportion who 'sometimes' talked about topical issues with an adult increased from P3 to S2 but the proportion who reported hardly ever doing this remained at about 40 per cent for all stages.

Chart 17 Pupil questionnaires
After school activity
\% of pupils responding


Chart 17 shows the proportion of pupils taking part in school clubs and other after school activity. More pupils attended activities outside school than school clubs across all stages. In both cases the proportion increased to a maximum at P5 before decreasing through P7 and into S 2 . The most popular activities amongst pupils were sports and keeping fit, and attending young people's organisations such as youth clubs or scouts/guides. The most popular activities organised within school were music and art clubs.

Further details of activities pupils participate in outside school can be found in the supporting evidence.

## Teacher Questionnaires

All teachers teaching mathematics to sample pupils were asked to complete a questionnaire exploring their attitudes and experiences of learning and teaching. The charts below show some of the key findings from this enquiry. In total around 1,000 to 1,400 teachers returned completed questionnaires at each stage. This is around three quarters of the questionnaires distributed at each stage. Full results are available in the supporting evidence.

## Gender

Over 90 per cent of the teachers completing the questionnaire at primary stages were female. At $\mathrm{S} 2,52$ per cent were female. Across the stages the proportion of male teachers increased from 5 per cent at P3 to 12 per cent at P7.

## Teaching Experience

The following chart describes the length of experience of the teachers in the survey

## Chart 18 Teacher questionnaires

Teaching experience
\% of teachers of mathematics responding


Chart 18 shows a fairly consistent profile of experience across the stages. Most teachers had been teaching for more than five years and around half had been in their current post for more than five years.

## Confidence in Teaching Mathematics

Teachers were asked how confident they were in teaching the following mathematics topics; algebraic processes such as functions and equations, fractions, graphs and charts, patterns and sequences, percentages, ratio, the four operations and whole number processes.

For each topic, over 85 per cent of S2 teachers reported being 'very confident'. Teachers' confidence in teaching mathematics generally increased from P3 to P7. Primary teachers were most confident teaching graphs and charts and patterns and sequences, and least confident teaching ratio and algebraic processes.

## Development and Support

The results of a number of questions that related to development and support are given below.
Around one in five primary teachers had not participated in professional development opportunities in mathematics during the last four years. Around a third had participated in more than two, with the rest evenly split between one and two opportunities.

At secondary, seven per cent had taken up no opportunities in the previous four years. Three quarters had taken more than two opportunities, with the rest split between one and two opportunities.

Two questions were asked relating to satisfaction with guidance and professional development.

Chart 19 Teacher questionnaires
Development and guidance
$\%$ of teachers of mathematics responding

$\square$ Very satisfied $\quad$ Fairly satisfied $\quad \square$ Not at all satisfied $\quad \square$ Don't know

Across the stages most teachers were 'fairly satisfied' with the development opportunities in mathematics that had been made available to them. Across all stages around 15 per cent were 'not at all satisfied'. However, at each stage similar proportions of teachers were very satisfied.

Teachers were specifically asked about information and support relating to Curriculum for Excellence, which is currently being introduced to Scottish schools. While the majority were 'fairly' or 'very satisfied', over a quarter of primary teachers and almost 40 per cent of secondary teachers were 'not at all satisfied'.

Teachers were asked how often additional staff were available to support mathematics lessons. At primary around 75 per cent reported that support was available at least in 'most weeks'. At S2 this dropped to just over 50 per cent with more than a third reporting that extra support was available 'once a year or less'.

Detailed results are available in the supporting evidence.

## Pupil Attitude

Teachers were asked to rate their pupils' lesson attendance, behaviour in class and motivation to learn.

> Chart 20 Teacher questionnaires
> Attendance, behaviour and motivation
\% of teachers of mathematics responding




Almost all teachers reported that their pupils' lesson attendance, behaviour in class and motivation to learn were either 'good' or 'very good'. At S2, a small number of teachers reported negative opinions on these issues; six per cent of S 2 teachers reported that their pupils' lesson attendance was 'poor', 11 per cent reported poor behaviour in class and 16 per cent reported poor learning motivation.

> HELPFUL FEEDBACK

## Pupil Assessment

Teachers were asked a number of questions to investigate how they assessed pupils in mathematics.
Chart 21 Teacher questionnaires

## Pupil assessment

\% of teachers of mathematics responding


The results show that over 85 per cent of teachers 'often’ assessed pupils through class work or homework. Similar proportions of primary teachers 'often' used assessment information to plan lessons, although the proportion was lower in S2, where just over 60 per cent reported doing this with the same frequency.

Less than a quarter allowed their pupils to 'often' decide on their next step in learning mathematics although over 85 per cent at primary and 75 per cent at S2 provided these opportunities at least 'sometimes'. Almost all teachers reported at least 'sometimes' providing opportunities for pupils to reflect on the evidence of their learning in mathematics. Almost two-thirds of primary teachers and around 40 per cent of S 2 teachers 'often' did this.

Teachers were asked about the types of assessment they used in mathematics. Around a third of primary teachers and almost half of S2 teachers reported 'often' using standardised tests to assess levels of attainment in mathematics. Over 85 per cent of primary teachers and 63 per cent of secondary teachers reported using National Assessments with pupils. Of those who used these over 90 per cent said the results agreed with their own judgements in the 'majority' of cases. At P3, 50 per cent reported this as being 'almost always' the case. At P5 and P7, the proportion was 44 per cent and at S2 it was 22 per cent.

## Lesson Activities

Teachers were asked a series of questions on the activities taking place in their mathematics classes.
Most frequent activities for pupils as reported by their teachers were working quietly on their own, using text books and writing in jotters. 'Working quietly on their own' showed a slight decrease through primary before increasing in S2. The other categories all increased in frequency from P3 up to S2. Being taught as a class showed a large increase in frequency between primary and S2. This is consistent with the results of the pupil questionnaire.

On the basis of the teachers' reports, working with computers, completing worksheets and working with numbers all become less frequent activities from P3 to S2.

Full details of teachers' reports on the activities taking place in their mathematics classes are available in the supporting evidence.

## Want to know more?

## The SSA in Scottish Schools

If you would like more information about how the survey works, please visit Learning and Teaching Scotland's assessment website at www.Itscotland.org.uk/assess/of/ssa or the Scottish
Government's website at www.scotland.gov.uk/stats/bulletins/00729

## International Studies

If you would like to learn more about related international studies on educational attainment, including Scotland, please visit www.scotland.gov.uk/Topics/Education/Schools/ Excellence/IE

## Statistics on Scottish Education

Other statistics about Scottish education are available from the Scottish Government website at http://www.scotland.gov.uk/Topics/Statistics/Browse/ School-Education

## Official Statistics Publication

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